



MR S. O'CONNOR: Good afternoon and welcome. Before we begin I would like to acknowledge the traditional owners of the land on which we meet, and I would also like to pay my respects to their elders past and present. Welcome to the video conference today to discuss the proposed Narrabri Gas Project in the Narrabri area.

5 My name is Steve O'Connor. I'm getting some feedback there – that's fine. I'm the chair of this commission panel. Joining me are my fellow commissioners John Hann and Professor Snow Barlow. Casey Joshua and Stephen Barry from the office of the commission are also in attendance. In the interests of openness and transparency and to ensure the full capture of the information, today's video conferencing is being

10 recorded and a full transcript will be produced and made available on the commission's website.

This video conference is one part of the commission's decision-making process. It is taking place at the preliminary stage of this process and will form one of several

15 sources of information on which the commission will base its decision. It's important for the commissioners to ask questions of attendees and to clarify issues where that's appropriate. If you are asked a question and are not in a position to answer, please feel free to take the question on notice and provide any additional information in writing which we will subsequently place on our website. To ensure

20 the full accuracy of the transcript, I request that all those participating today introduce themselves each time before they speak, and for all members present to ensure that they do not speak over the top of others.

We can now commence. So this briefing session this afternoon, we have distributed

25 a very brief agenda. We're looking for Santos to provide a brief overview of the project. We understand you've got a PowerPoint presentation that will assist in that overview and we're particularly keen to hear your response to the Department of Planning's assessment report. However, we do want to make sure we have ample time for questions so we'd like you to keep that as brief as you possibly can.

30 Following the asking of questions, there may be some follow-up actions, some extra information or additional material we might ask for. So we will just confirm what that is, and then that will be the finish of the meeting. So at this point I'm not sure who I'm handing over to. Is it Todd, perhaps, we'll start - - -

35 MS T. WINTERS: Chairman, it's myself and my name is Tracey Winters.

MR O'CONNOR: Thank you, Tracey.

MS WINTERS: We appreciate the opportunity to present our proposal for the

40 Narrabri Gas Project to you today. We understand that the panel may have technical questions and we're happy to take those on notice and respond to you very promptly after this meeting. Later in the meeting we would appreciate obtaining from you an indication of how you would like to conduct the public hearings, in particular what your expectations of Santos and our various experts who are also on the call today

45 will be during the hearings. For the record, my role at Santos – my name is Tracey

Winters, and my role at Santos is as strategic adviser external affairs, reporting to the CEO.

5 I'll make a short opening statement and then hand to Nick Fox and other experts in  
their fields to take you through different aspects of the project. Santos is an  
Australian company, Australia's biggest domestic gas supplier and a supplier of  
natural gas to Asia-Pacific customers. We've been working in partnership with local  
communities around Australia for 65 years providing jobs and business opportunities  
and developing Australia's natural gas resources safely and sustainably to power  
10 Australian industries and households. We're already a major producer of natural gas  
from coal seams in Queensland where we are protecting water and the environment.  
The industry is welcomed by the communities where we operate, and regional towns  
are thriving because of our industry.

15 Analysis from Lorax Consulting shows that the Queensland gas industry has spent  
almost \$50 billion over the past eight years purchasing Queensland made goods and  
services, investing in regional community infrastructure and in payments to  
governments by way of royalties and so on. There are 4600 long-term direct jobs in  
the industry there and 1700 of those are in Queensland's regional areas. Farmers  
20 have received over \$500 million in payments from the gas industry, and some are  
benefiting from a major new source of water supply available only because of gas  
production.

25 In New South Wales, Santos is seeking approval to develop the natural - Narrabri  
Gas Project which has the potential to supply enough natural gas to meet up to half  
of New South Wales' gas needs. New South Wales imports more than 95 per cent of  
its gas from other states, and as a result New South Wales businesses face a  
disadvantage compared to their peers in other states. According to the New South  
Wales Business Chamber, a commercial baker in Sydney pays \$26,400 more for gas  
30 every year than the same business would in Brisbane. Santos has committed that 100  
per cent of Narrabri gas will be sold into the domestic market. Narrabri gas from  
appraisal wells already supplies the Wilga Park Power Station in north-west New  
South Wales generating enough electricity to power around 23,000 households.

35 Santos is already an important member of the Narrabri community. We employ 16  
people who live and work locally. We are buying locally, spending \$2 million last  
year alone on local goods and services. New South Wales has very strong  
environmental regulation in place, providing confidence that the project can be  
developed safely and sustainably. In our EIS Santos has used the best available  
40 science to confirm the project can be developed safely, sustainably and without harm  
to water resources, human health or the environment.

The Department of Planning has concluded that the project is in the public interest  
and is approvable subject to strict conditions. It concludes that the project is unlikely  
45 to result in any significant impacts on the local community or the environment ..... is  
critical for energy security and reliability in New South Wales and would deliver

significant economic benefits to New South Wales and the Narrabri region. I'll now hand over to my colleague, Nick Fox, to provide a more detailed project overview.

5 MR N. FOX: Thank you, Tracey. Thank you, Chair. I am Nick Fox. I'm the head  
of environment and access at Santos. I have over 25 years of environmental  
management experience across several industries, the last 16 at Santos itself. It is a  
pleasure to be able to give you an overview of the Narrabri Gas Project, a project that  
will support the more than one million homes, 33,000 businesses and 300,000 jobs  
that rely on natural gas as a source of energy. Over a 25-year project life, the project  
10 will produce up to 200 terajoules a day for domestic market. The project occupies  
95,000 hectares, however, the total project footprint will occupy just 1000 hectares or  
around one per cent of the project area.

15 Within the project footprint 850 predominantly new wells will be drilled on a  
maximum of 425 new well pads. Each well pad will occupy one hectare for  
construction, reducing in size for operations. All production wells will be at least  
750 metres apart. These wells will be developed in accordance with the New South  
Wales Code of Practice for Coal Seam Gas Wells. Santos is not seeking approval for  
hydraulic fracturing, and we have indicated we will accept a condition on any  
20 development consent the project prohibiting fracking. As you will hear later in this  
presentation, Santos is not proposing to take any water directly from the Great  
Artesian Basin or other high-quality groundwater sources for production operations.  
Following extraction, all gas and produced water would be transferred to the  
Bibblewindi and/or Leewood facilities. At these facilities, the gas would be treated  
25 and compressed before it is sent into the domestic gas market. Produced water will  
be treated to a suitable standard for a variety of beneficial uses, including irrigation.

Santos will treat the water we extract so approximately 80 per cent of it can be  
beneficially used for this purpose. The project will extract around 1.1 gigalitres per  
30 year of produced water, capped at 37.5 gigalitres over the project's 25-year life. To  
put that in context, this is just over a third of what an average cotton farm uses in a  
year. We anticipate the project will remove approximately 47.5 tonnes of salt per  
day from the environment. To put this in context, the Murray-Darling Basin  
Authority's salt interception scheme generates about 500,000 tonnes of salt a year.  
35 This means the project's salt removal, over its 25-year life, is less than what the  
Murray-Darling scheme produces in one year. Santos is looking at opportunities to  
beneficially reuse or sell the salt commercially. If no options can be found, the salt  
will be sent to an EPA-licensed landfill for disposal.

40 The assessment report states there are 11 licensed facilities within a 150-kilometres  
radius of this site. The project area does not include pristine forest, national parks or  
nature reserves. The part of the Pilliga in the – in which the project is located is  
largely dry scrubland that is currently used for timber harvesting. At full production,  
project activities will cover less than half a per cent of the Pilliga's 500,000 hectares.  
45 Our operations will be located on about 1000 hectares of land within this project  
area. Next slide, please. As you can see, we do considerable community  
engagement since September 2014, and it is ongoing still to this day. Next slide,

please. And here is an overview of the landholders in the project area, and the land use. At Santos, we are committed to preventing harm to the environment and protecting our unique Australian landscape.

5 Santos operates in diverse locations which have unique biodiversity and land features. We have strong processes in place to identify biodiversity and mitigate potential risks. We employ experts to conduct ongoing measurement of water, waste, air and biodiversity indicators to ensure we meet the high environmental standards we set at Santos. Through mitigation and avoidance measures identified in  
10 the EIS, including pre-clearance surveys and the precise locating of well pads through a process called micrositing, we can ensure the project will not have a significant impact on ecology in the area. Significant impacts on threatened and endangered flora and fauna will be avoided. Species and ecosystems of the Pilliga will continue to function as they currently function, without habitat fragmentation  
15 and without significant impact to species or ecosystems.

There will be approximately 1.5 per cent of native vegetation removal in the project area, half of which will be progressively rehabilitated following construction. When wells are decommissioned, the land is returned to its natural state. The EIS includes  
20 comprehensive data and scientific studies and concluded we would have a negligible impact on the ecology of the Pilliga. It was set aside by the New South Wales Government in 2005 for forestry and extractive industries, following a thorough ecological assessment: the Brigalow and Nandewar agreement. The same agreement created an additional 350,000 hectares of reserves in the region. The  
25 assessment report concludes that the project has been planned in a manner that is consistent with comprehensive strategic land use planning for the Pilliga and surrounding region.

A field development project ..... project will determine where to place gas field  
30 infrastructure. The object of the field development protocol is to ensure the avoidance and minimisation of impacts to biodiversity. The field development protocol is implemented through two key elements: first, an ecological scouting framework, and, second, pre-clearing and clearing procedure design to minimise risk to fauna. The ecological scouting framework has three stages: a desktop assessment,  
35 in-field micrositing and post-field micrositing. In the desktop assessment stage, a preliminary constraints analysis is performed using spatial layers to highlight areas of ecological sensitivity. The desktop assessment ensures that no well pads are in riparian zones, impacts to Pilliga mouse habitat, threatened ecological communities are also minimised. In effect, the field development protocol sets rules on where to  
40 place our gas field infrastructure so we minimise or avoid impacts to important flora, fauna and habitat.

Santos works with 18 parties under the Native Title Act and three land councils across the Northern Territory, South Australia, Queensland and New South Wales.  
45 We have around 80 agreements related to native title cultural heritage consent, all administered in full compliance with our obligations. In 2019, Santos undertook 499 cultural heritage assessments on 121 compliance actions across our upstream and

exploration activities. We engaged over 120 cultural heritage officers to undertake field clearance activities. The project EIS includes a cultural heritage management plan that was developed after extensive consultation to ensure the project is developed without impact on any significant cultural heritage sites.

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Santos believes that Aboriginal people should be responsible for the management of Aboriginal cultural heritage. The majority view of the Aboriginal community expressed during consultation is that they are the experts in their heritage and that they, through the Aboriginal cultural heritage working group, should select the appropriate cultural heritage officers to walk country and the appropriate technical expert for implementation of the cultural heritage management plan. Fundamental to Santos' compliance with cultural heritage management obligations are the principles of avoidance and precaution. There are 99 Aboriginal cultural heritage sites in the project area footprint. The project would completely avoid all of these.

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Through this plan, Santos has committed to avoiding all known cultural heritage sites. Pre-clearance surveys will ensure that any further sites of significant cultural heritage are avoided when siting project infrastructure. The assessment report shows Santos' commitment to avoidance would appropriately mitigate the project's potential Aboriginal cultural heritage impacts. Conditions are proposed to ensure this occurs, including requiring Santos to establish an Aboriginal cultural heritage advisory group for the project. Santos publicly reports its audited greenhouse gas emissions under the Australian Government's National Greenhouse and Energy Reporting Scheme. The latest dataset was also included in Santos' 2020 climate change report.

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Santos has set a long-term aspiration of achieving net zero emissions from our operations by 2050, as well as medium-term targets. We are actively pursuing projects to reduce fuel use and emissions around our business projects, such as converting all ..... to solar, as well as identifying step-change technology, such as carbon capture and storage, that will help achieve our long-term aspiration. For this project, the total project-related greenhouse gas emissions, scopes 1 to 3, are also low relative to Australian emissions, at approximately 0.9 per cent of the nation's total emissions. This is despite the project potentially supplying up to 50 per cent of New South Wales' gas needs.

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The assessment report identifies that Santos' commitment to supply 100 per cent of the project's gas to the domestic market will significantly assist in driving down New South Wales' greenhouse gas emissions and working towards a low-carbon future by providing flexible, local, scalable, dispatchable energy source that can work with renewables to reduce energy sector greenhouse gas emissions. In relation to fugitive emissions, we are constantly monitoring our wells' infrastructure with state of the art technology as part of the leak detection repair program to ensure fugitive emissions are minimised. Santos has commenced a 10-year program across its operated onshore assets to determine the quantity of any fugitive emissions over and above background levels. The CSIRO is conducting this program.

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As the assessment report highlights in chapter 6.6, recent research projects undertaken by the CSIRO indicate that fugitive emissions from coal seam gas projects in Australia are lower than previously thought and that on a life-cycle basis, domestic coal-seam-gas-produced electricity would produce up to 50 per cent less carbon emissions compared to coal-fired electricity production. CSIRO research included a 17,000-head cattle feedlot in New South Wales. If all the proposed 850 wells were operating concurrently, methane emissions from the project would be significantly less than a feedlot of this size. Predicted noise levels from construction and operational activities at sensitive receptors, including at Leewood and Bibblewindi, have been modelled in accordance and with accepted acoustic industry practice and relevant guidelines.

Noise assessments indicate that the noise emissions during the operation of the project would comply with the applicable noise criterion – ie, 35 Dba – at all sensitive receivers and at all time periods during routine operations. Santos has committed to locating all wells to comply with the 35 Dba criterion, which is about the same noise level as a library, unless otherwise agreed by the landowner. The assessment report shows air-quality risks associated with the project are low and can be effectively managed with conditions. The air quality impact assessment for the project found that the project is unlikely to cause an adverse impact to air quality in the region. We will now hear from some of the technical experts for the project. First, I'd like to introduce, on economics, Alan Smart from ACIL Allen.

MR A. SMART: Good afternoon. It's a pleasure to be speaking to this project today. My name is Alan Smart. I'm a senior associate with ACIL Allen Consulting. My field and area of focus is on the economics of energy, infrastructure and agricultural projects. I've had over 20 years analysing the east coast gas market, including the impact of economics of supply sources and the operation of the transmission network. Prior to joining Consulting over 20 years ago now, I held senior positions in the Commonwealth Government in the energy and petroleum areas, and I was also, for a period, the chief executive of the pipeline ..... the purpose of – next slide, please.

The purpose of my presentation today is to briefly outline the documents, processes and findings of the economic analysis undertaken for the environmental impact statement process, the economics outlined in the original environmental impact statement, responses to submissions and reports from an independent economist engaged to review the assessments. They have been undertaken in line with government guidelines for economic assessment of mining and coal seam gas projects, particularly the most recent guidelines released by the department on the assessment of mining and coal seam gas proposals. Next slide, please.

Before discussing the key findings, I would like to touch briefly on the methodology we adopted to assess the economic impacts. The economic analysis involved a benefit-cost analysis for the project and a macroeconomic analysis for New South Wales and the Narrabri region. The benefit-cost analysis focused specifically on the project's net benefits to New South Wales. It reports a net present value and benefit-

cost ratios calculated at the seven per cent discount rate over a 25-year period on the base case. Sensitivity testing of key assumptions was also undertaken. The macroeconomic analysis was carried out ..... ACIL Allen CGE model as for all sectors in the economy. This approach supports assessment impacts on output, incomes and employment for New South Wales, as well as for the Narrabri region. At the time the evaluation was undertaken, Australia was experiencing ..... accordingly, it was assumed there would be no ..... employment nationally ..... gas prices. The analysis therefore gives a conservative estimate of the economic impacts as it only focuses on the benefits to New South Wales ..... next slide, please.

Dr Fisher, the CEO of BAEconomics ..... reviewing all of the analysis, commented in his review that he believed the assessment, together with the supplemented report, now meets the reporting guidelines. He went further to say that in his opinion, it's highly likely the project ..... benefits to the New South Wales community flowing from the development ..... he added that he believed ..... local effects of the project ..... analysis has been carefully done ..... plausible estimates of the likely impacts project, given this assumption is made. Next slide please.

The department's assessment report concludes that the project would involve \$3.5 billion of capital investment ..... create up to 1300 jobs during construction and 200 jobs during operation. Following ..... assessment, the department also concluded the Narrabri gas project would be critical for energy security and reliability for New South Wales. The Australian energy market operator and the ACCC both foreshadowed in recent reports a gas ..... market emerging in the 2024 to 2026 period.

The Department of Planning, Industry and Environment ..... gas is also to be used by 500 ..... facilities in New South Wales, 33,000 businesses, gas-fired power stations and 1.4 million households ..... support around 300,000 jobs in New South Wales. Energy security is therefore critical to the New South Wales economy. The project will also increase competition in the domestic gas market and put ..... pressure ..... this has been a key concern for both the Commonwealth and the New South Wales government. The next slide, please.

The findings of the benefit cost analysis were as follows – project would deliver net economic benefits of 1.5 to 1.6 billion dollars in net present value terms, 87 per cent ..... benefit cost ratio of between 1.39 and 1.43, depending on which electricity generation option was used. The evaluation assumed a ..... gas price of \$8.7 per gigajoule per minute for the ..... last few months ..... market should ..... prospective pricing in gas sales agreements are higher than the spot prices, according to the latest gas ..... report released by the ACCC.

Next slide, please. .... key findings from the CG modelling ..... benefits from CG modelling indicated project would create economic benefits for the Moree-Narrabri region, the rest of New South Wales and New South Wales as a whole over the 25 year assessment period. Economic benefits for the region of economic assessment included ..... additional economic output of \$11.9 billion for about \$5.1 billion .....

product. This included \$11 billion ..... 4.5 billion ..... present value terms in the Moree-Narrabri region. It would also generate ..... real income of \$6 billion or around \$2.8 billion in present value, including \$605 million, around \$307 million in present value, in the Moree-Narrabri region. The tables from the report on the right  
5 also show that the regions around Narrabri ..... New South Wales also. Next slide.

The modelling also found that ..... of around \$820 million ..... New South Wales – that’s around \$293 million in present value terms ..... New South Wales government over 25 years ..... employment of around 512 fulltime equivalent jobs would accrue  
10 in New South Wales, including an additional ..... jobs in the Moree-Narrabri region.

The assumption of no net increase in employment nationally ..... sectors decline ..... this is because of the fixed ..... assumption. For example, employment in manufacturing in the Moree-Narrabri region is predicted to grow by 8.36 per cent  
15 over the life of the project ..... 8.5 per cent ..... If there were a constraint on ..... additional employment, these results could be expected to be higher.

The project will also involve establishment of a gas community fund which would receive an estimated \$120 million through the life of the project. It will also be  
20 support for local business ..... throughout the construction operation phase of the project in accordance with Santos’ ..... logistics policy. Final compensation agreement with landholders ..... compensation scheme would also deliver ..... next slide, please.

In summary, the net present value of the project is strongly positive over a range of scenarios ..... net benefit to the Narrabri region as well as to the state of New South  
25 Wales. The project will also help to moderate gas price rises in New South Wales, introduce more competition ..... Australian gas market and provide additional opportunities for industrial ..... New South Wales ..... local gas supply. That  
30 concludes my presentation. Thank you.

MR FOX: Thank you, Alan. I’d like to now hand over to Detlef from CDM and Richard Cresswell from Eco Logical who will go through our groundwater, produced  
35 water and water modelling. Richard, over to you.

MR R. CRESSWELL: Thanks, Nick. Good afternoon, commissioners. My name’s Richard Cresswell. My colleague Detlef Brigenmeier and I will now provide a brief  
40 overview of our impressions of the final assessment report as it relates to water management to the project. Now, I’ve been working provide water advice for the Narrabri gas project for the last eight years, and I’ve been working on water in the unconventional gas industry for the last 11, including two on the commonwealth expert panel for large coal seam gas projects. Been a hydrogeologist for 20 years and worked in the Great Artesian Basin for 25. I’ve been a geologist all my working  
45 life. Detlef, would you introduce yourself, please.

MR D. BRIGENMEIER: Sure. Thanks, Richard. Good afternoon. I’m Detlef Brigenmeier, the technical lead for the Narrabri gas project modelling. I’m a

practising hydrogeologist serving the engineering and resource sectors for many years. My consulting experience in hydrogeology and groundwater modelling is spanning most Australian states and includes hydrogeological conceptualisation and outcome modelling and also third party review of groundwater model studies.

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MR CRESSWELL: Thanks, Detlef. Next slide, please. Thank you. And – the DPI report quotes the water expert panel during both briefings, and this is paragraph 221. So it could not identify any land and water issues that were likely to result in significant impacts. There are a few other positive comments made by the panel and repeated in the DPI assessment report, including that the project area has favourable geology and hydrogeology for coal seam gas regards and that the risk of unintended groundwater movement, contamination or gas leakage remains small. Broader expert panel also concluded that any uncertainties could be addressed through ongoing monitoring, adapted management and a robust regulatory regime that could be rigorously and effectively enforced. We know with some satisfaction that most comments echo those initially put forward by Santos. The Expert Panel, for example, accepts that the project area's not in a significant recharge zone for the GAB and the indirect impacts on valuable aquifers will be very small and would not occur until many years after mining commences.

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Also, the project meets the non-discretionary development standards for aquifer interference under the mining ..... critical value, the DPI ..... assessment report notes multiple agencies and it includes themselves and the EPA, CSIRO and the Water Expert Panel that has support for the groundwater model as fit for purpose. Now, there are caveats, of course, and, like what we would expect, the regulators need to ensure all management plans and monitoring programs are robust and then police them appropriately. We know that monitoring is crucial to validate and verify the modelling.

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Next slide, please. First, if we look at the context, the Great Artesian Basin is often the conversation. This is an iconic Australian feature, but what we think of as the GAB is actually a very large geological structure that underlies a-fifth of Australia. Hydrogeologically, however, groundwater flow is controlled by pressure gradients and geological structures. This creates separate and distinct groundwater basins within the geological framework.

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The Narrabri Gas Project sits on the very edge of the most south-easterly GAB Sub-basin, known as the Coonamble Embayment. This is the GAB in New South Wales. In this part of New South Wales are the sandstones, silk stones and mudstones that comprise the aquitards of the GAB over on to the older sediments in the Gunnedah-Oxley Basin, which is shown in green on this map on the right.

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Next slide, please. There is these deeper sediments beneath the Great Artesian Basin that contain the coal measures that are the target for the Narrabri Gas Project. As has been said, the project will not take water directly from the Great Artesian Basin aquifers during the gas production phase, and our environmental impact assessment shows the Narrabri Gas Project will not have any significant impact on the aquifers

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overlying the coal measures. Further, as the Water Expert Panel have confirmed, this is also an area of very low recharge to the GAB and the NGP will not impede local recharge to those intake beds.

5 Next slide, please. We note that the project will also not take any water directly from the shallow highly productive Namoi alluvial sediments, which sit to the north and east of the project. This is shown by the red and blue dots, representing the groundwater course on the map on the left. Of significance here, the target coal measures in the Gunnedah Basin sediments are entirely separate and much deeper than the regionally important aquifers of the GAB and the Namoi. There are hundreds of metres of rock between the coal measures and any productive groundwater boards.

15 Next slide. If we look closer at the hydrostratigraphic sequence, that is, if we look at the sediments in terms of their ability to transmit groundwater, and we see no evidence of connectivity between those deeper coal measures and the overlying Pilliga sandstones in the Narrabri Gas Project area. And the groundwater moves several orders of magnitude slower than surface water, at rates of only up to a metre a year and not metres a second, so any physical groundwater movement will occur over millennia.

25 Hydrochemically, the coal measures are intrinsically more saline, and you can say more common, and with correspondingly higher levels of metals and salts. These higher concentrations allow us to examine groundwater movement both through the aquifers and between them, and we see no evidence of any ..... in the shallow aquifers and, hence, no upward movement of groundwater and no methane, other than a few pockets that form from bacterial growth in the shallow sediments. Importantly, the Napperby formation, which is shown by the red dotted line on this map, contains very tight sediments that almost completely inhibit the passage of groundwater vertically. We can, therefore, be very confident that there is virtually no risk of contaminating growing aquifers due to CSG operations.

35 Further, the pumping from the Gunnedah-Oxley Basin of coal measures will create a downward pressure gradient that will naturally draw water from the pressure of overlying beds towards the coal measures and not the other way around. On this basis, there is no mechanism that will allow coal seam water to migrate on the coal up into the overlying aquifers.

40 The Water Expert Panel also made its conclusion, repeated at paragraph 287 of the ..... report stating that the risk of unintended groundwater movement, contamination or gas leakage remains small. We'll return to what happens to the groundwater that's produced during gas production, but, first, let's investigate the role and results from numerical modelling of groundwater from the project and I'll hand it over to Detlef to explain how that's done.

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MR BRIGENMEIER: Thanks, Richard. Information to build the groundwater model includes primary data interpretation of more than 1000 kilometres of seismic

lines, baseline monitoring of aquifer pressures and water table elevations, resource, coal and water bore data, and geophysical logs. Historical interpreted data and models dating as far back as the 70s were incorporated, including the Lower and the Upper Namoi groundwater models developed in 2001 and 2006. The model is fit for purpose. It's corroborated by in-depth and independent expert reviews by CSIRO, DPI and the water expert panel. Next slide, please.

The model simulates water extraction from the coal of 37.5 gigalitres over life of the project, or 1.5 gigalitres per year on average. This is what the project has committed to produce during gas production. In the context of water allocations from other aquifers, this is a relatively small volume of water. Another way of looking at it: the same volume of water that Santos plans to extract from the coal over 25 years may be extracted from the Alluvium aquifer by farmers and other users in less than three months. Next slide, please.

The model predicts a rate of induced water take between formations due to coal seam water extraction. The table to the right summarises extraction limits for each management unit taken from corresponding water sharing plans, the induced water take due to CSG production, and the time for the induced water take rates to peak. The model predicts negligible induced water take from the Alluvium, effectively thousandths of a per cent of allocated water. This will be undetectable as compared to the amount of water that is extracted each year by existing water users. The model also predicts a very small rate of induced water take from the New South Wales Great Artesian Basin, especially the Pilliga sandstone. Santos intends to acquire all required water licences, even though the model predicts this induced water take would not peak until the year 2170. Next slide, please.

The small extra demand due to induced water take is easily met by natural groundwater flow within the aquifers. This limits the drawdown in the aquifers to less than half a metre, which is well-below the minimum harm thresholds of the New South Wales Aquifer Interference Policy, and it's within the observed natural groundwater level variation. Propagation of water level drawdown in the Pilliga sandstone and Namoi Alluvium is estimated to take a long time to occur. The total levels predicted by the project EIS are considered by the water expert panel as reasonable, with a level of confidence provided by the later CSIRO GISERA modelling and water expert panel observations from the field trials at Bibblewindi. Next slide, please.

Modelling is all well and good, but we also need to monitor the system's response to the development activities to validate what we are predicting. The key principles of the monitoring strategy, therefore, have different primary objectives for different aquifers to achieve different outcomes. Firstly, you need to monitor to make sure of no unexpected impacts. For this, we monitor the important receptors, the shallow aquifers of the Great Artesian Basin and Namoi Alluvium. This is to validate and extend the baseline database and confirm that no unexpected impacts are taking place.

Secondly, we need to monitor to confirm that the model predictions are in agreement with these observations. For this, we need to see a response to the stressors of the development. Such monitoring is based placed in the beds immediately above the coal measures in the Gunnedah-Oxley Basin formations. Lastly, coal measures will be monitored during development to confirm depressurisation in the reservoir itself, as well as volume of water produced. This data is highly valuable and will help further calibrate our groundwater model early in the life of the project to improve confidence.

10 The groundwater monitoring data will be utilised to review the groundwater model and to revise the model if and when needed. This also includes additional hydrogeological and production data obtained during times in between model ..... use. The model will be reviewed before stage 2 of the operation commences and then every three years thereafter. The proposed management plan includes triggers with response trigger levels to update the groundwater modelling predictions should monitoring suggest further model adaptation is required. So confidence in the predictive capacity of the model will increase with every round of model review. Richard will now present on the management of produced water. Back to you, Richard.

20 MR CRESSWELL: Thanks, Detlef. And as we have already pointed out, the project is committed to extract less than 37 and a half gigalitres of produced water over its 25-year lifetime, and as Detlef has just pointed out, this is a relatively small volume when compared against volumes generally extracted for the agricultural purposes. He also pointed out that Santos is already handling large volumes of produced water in Queensland, and this expertise can be readily transferred to New South Wales, to the Narrabri Gas Project. Next slide, please.

30 Now, we also note that the produced water from these coal measures is inherently not very dirty. We have looked at maximum values of the minor and trace constituents in the produced water, and it's been presented in a water baseline report, and very few constituents are reported above drinking water guidelines despite salinities of over tens of thousands of milligrams per litre. No radionuclides have been detected and neither have any critical contaminants like mercury. This makes water treatment relatively straightforward, and Santos has a proven track record of produced water management for its Queensland operations. This makes treatment relatively straightforward and makes the favoured reuse option to be irrigation.

40 Now, as an example of this, one hectare of lucerne requires about four megalitres per year. Now, if we were producing an average of about 1.5 gigalitres per year, Santos could therefore support a modest 300 hectares of new lucerne. We – so we could actually use all of the produced water within five kilometres of the water treatment plan. Concerns over irrigation beneficial use should be allayed by the capability to amend the treated water to any composition necessary to optimise applications to the local clay soils. Indeed, the application of treated and amended water will actually improve the soils of the region and pose little to no potential adverse harm.

Use for irrigation will, of course, be subject to an appropriate irrigation management plan, and smaller amounts of treated water will be retained for construction activities and seasonally for dust suppression activities. During very wet periods when irrigation and dust suppression are not needed, there may be occasions when release to Bohena Creek may be useful, but this would only occur when 100 megalitres per day flows past the Newell Highway gauge. That ..... to happen maybe 18 days a year. The bottom line is that there is a natural fit with irrigation, with release as an option when irrigation capacity may be rain-affected. Next slide.

5  
10 On the other side of the equation, the project may produce the equivalent of a single B-Double truck of salt per day, on average 47 and a half tonnes. Some of the salt being removed from the environment is planned to go to accredited landfill sites; some, like sodium bicarbonate or baking soda, may be recovered for beneficial use. We noted that the water expert panel expressed some ambiguity of the total amount of salt that's potentially being produced.

15  
20 Santos is confident that the dig's salt waste volume will average 47 tonnes a day, and, critically, many of the calculations presented in the public domain have so far only considered the water chemistry of existing Leewood pond waters and not the site of the produced water itself, and this is not representative of the produced water's salinity. The value of 47 tonnes a day is derived from our current data from wellhead samples, that is, from over 250 actual produced water sample analyses. On this basis, Santos is confident that salt estimates provided both to the EIS and to the water expert panel are correct. Next slide, please.

25  
30 Now, these processes and procedures are already in action at Leewood. Trials and exploration activities have already generated some produced water, and this has been processed at the commissioned water treatment plant, and a successful crop of lucerne has been produced. And with that, I will leave you – thank you for listening – and hand back to you, Nick.

MR FOX: Thank you, Richard, and thank you, Detlef. I will now hand over to Michael Zed to go through our drilling and well integrity.

35  
40 MR M. ZED: Thank you, Nick. Good afternoon. My name is Michael Zed. I hold the position of CSG project lead for Santos' onshore drilling and completions team. I have over 15 years in working in the oil and gas industry and held a number of well engineering wells across both conventional and CSG operations. I will be providing an overview of Santos' approach to drilling and well integrity for coal seam gas wells. Well integrity is critical, from well construction through to abandonment and rehabilitation of the site. World-leading technology and industry best practices are applied throughout the well's life cycle to ensure natural gas is produced safely and the groundwater is protected for our local communities. Next slide.

45 Santos' standards for wells designed, from construction to decommissioning, meet or exceed Australian regulatory requirements governed by each state. Well designs have to meet the New South Wales regulations and the New South Wales code of

practice, which are some of the strictest in Australia onshore. The engineering designs need to be reviewed and approved by the New South Wales Resources Regulator before commencing any drilling activities. Santos also follows industry standards and best practices, including the American Petroleum Institute and also  
5 relevant Australian standards. Those standards include clear specifications for well design, construction and decommissioning. Next slide, please.

The New South Wales Code of Practice for Coal Seam Gas Well Integrity specifies the mandatory practices for well design and construction. The water expert panel  
10 concluded that the current regulatory framework for coal seam gas well integrity provides reassurance that the likelihood of potential harm to humans and the environment is low subject to the implementation and enforcement of these regulations. Santos will continue to comply with the New South Wales code of practice and looks forward to engaging in any process to update the New South  
15 Wales code of practice to ensure it remains, over the time, reflective of industry best practices and consistent with other regulatory frameworks, such as the December 2019 update to its Queensland equivalent code of practice for the construction and abandonment of petroleum wells and associated bores in Queensland.

The 2019 update to the Queensland code of practice has demonstrated to be  
20 effective, and this stable and mature regulatory framework has helped the Queensland CSG industry to operate safely and without harm to the water resources or the environment since 1996 while drilling nearly 11,500 coal seam gas wells. Next slide, please. I have a short video which runs through how a coal seam gas well  
25 is drilled.

## **VIDEO SHOWN**

30  
MR ZED: Just a few additional points on the drilling process not mentioned in the video. The surface casing cement is pumped back to surface, as one of the primary functions is to protect aquifers in the surface hole section. The production casing cement is pumped past the surface casing chute, which eliminates crossflow of the  
35 zones behind the casing, and the cement acts as a permanent barrier. Next slide, please.

Some of the well design considerations are reviewed on a well-by-well basis:  
40 drilling risks and how the design is going to mitigate potential issues like formations requiring isolation, such as an aquifer; local considerations in the drilling location, such as sensitive receptors of waterways, vegetation and the public, such as homesteads. Depending on the objective, there are many different types of wells that we can use on a project to minimise our operational footprint on the environment. The well type could be a vertical, horizontal or multilateral well, and trajectories in  
45 some cases are utilised to work within environmental constraints and landholder considerations.

Wellheads appropriately rated, casing depths, sizes, rating and a number of strings are decided depending on the identification of drilling risks, such as formations requiring isolation, and the total depth drilled in a well is usually based off the target formation and the production requirements for producing the well. The cement slurries are engineered and performance-tested to the specific parameters of the well to ensure consistent performance and zonal isolation and structural integrity are achieved without cement degradation as a function of time. Mechanical properties of the cement sheet and the cement plugs for abandonment are tested and engineered to ensure zonal isolation compliance for the life of the well. Next slide, please.

Santos uses state of the art technology and a robust multibarrier and tested system of cement and steel casing to ensure isolation between the well and the surrounding environment. Santos has a structured monitoring and maintenance program to manage well integrity. The water expert panel considered the potential corrosion risks to CSG wells and from their review did not believe that corrosion presents a significant risk to the project and could be effectively mitigated by using suitable materials if necessary. Next slide, please.

The well design engineering rigour continues until the site is reinstated back to its original use and handed back to the landholder. Plug and decommissioning relies on a robust well integrity life cycle approach, as this process occurs at the end of the well's life. The New South Wales code of practice states:

*CSG well abandonment must ensure the environmentally sound and safe isolation of the well, protection of groundwater resources, isolation of the productive formations from other formations, and the proper removal of surface equipment.*

A plug and abandonment design is reviewed and approved by the New South Wales Resources Regulator before commencing. The abandonment process is – in principle, involves filling the well wall from the bottom to the surface with pumping pressure cement in plug stages. Once the top of a cement plug is inside the casing, it is left to set, pressure-tested to confirm the open hole is isolated and no gas migration to surface. Finally, the well is monitored for pressure build-up or gas flow after the well has been cemented before commencing the wellhead removal and site restoration.

The water expert panel believes that long-term risks to groundwater resources after decommissioning are low and that the primary strategy for decommissioning should be to ensure that wells are plugged and abandoned using the best available technology and to the satisfaction of the regulator. Next slide, please.

The last step in a decommissioning, abandonment and rehabilitation process is to reinstate the site back to its original use. So after the plug and abandonment has been completed, Santos works with the landholder and regulator to determine the revegetation strategy for the site. The wellhead and casings are cut off at ground level, an abandonment marker is welded to the casing for future reference, and all of

the infrastructure is removed from the site. The New South Wales Resources Regulator once again reviews and signs off on this rehabbed site. Thanks.

5 MR FOX: Thank you, Michael. I'd like to now hand over to Russell Mills from GHD to provide an overview of the hazard and risk assessment for the project.

10 MR R. MILLS: Good afternoon. My name is Russell Mills. I was the lead for the technical assessment undertaken of hazards and risks for the project. The – I have 34 years experience in relevant industries, including coal seam gas well gas production, refining chemicals and petrochemicals, and hazardous material storage and transport. I have extensive consulting experience involving qualitative and quantitative risk analysis, process and operational risk management, and having been involved in a number of major hazard facility safety cases. I'm an experienced PHA leader including facilitator for numerous technical safety studies. I'm currently an approved PHA study facilitator for the New South Wales DPIE. I also represent GHD on the Queensland CSG Industry Safer Together Forum where I'm a member of the process safety working group. Next slide, please.

20 The assessment approach we adopted complied with the SEARs issued by the DPIE for this project. The steps in the assessment approach are set out in the multilevel risk assessment guidelines you can see in the graphic, and involved several steps. The first step involved the preliminary risk screening for the transport and handling of dangerous goods. This followed the guidelines set out in the New South Wales State Environmental Planning Policy, SEPP 33 and concluded that the development is potentially hazardous. The second step involved a hazard identification study which led to the selection of loss of containment events for flammable gas, gases, liquid chemicals and large quantities of water.

30 Step 3 involved, based on the hazards and risks identified, conducting a preliminary hazards analysis using New South Wales Hazardous Industry Planning Advisory Papers number 6 for undertaking hazard analysis and number 4 for providing the relevant risk criteria for compliance. An additional requirement of the SEARs for hazards and risks was to undertake a bushfire risk assessment to determine the project impact on people and property and the biophysical environment. Next slide, please. The hazards and risk assessment presented in an appendix of the EIS made the following key findings. All activities involving the storage, handling and transport of dangerous goods comply with SEPP 33.

40 The presence of large quantities of methane triggers a PHA covering all dangerous goods. The PHA provided a rigorous assessment of the hazards and risks covering all dangerous goods classes present in the project. For methane gas, the assessment included the gas release likelihood and an analysis of worst case consequences. The project is compliant with the HIPAP 4 criteria for individual fatality and injury risk resulting from heat radiation and explosion over-pressure, and also with the HIPAP 4 societal risk criteria. There is no cumulative risk to a given sensitive receiver from multiple production roles. The impact distance of any well is approximately 50

metres but as specified in the field development protocol the separation distance between wells is at least 750 metres.

- 5 Bushfire risk was assessed as medium during the construction and operational phases of the project. This is based on a remote likelihood of the project starting a fire but with the potential for a major consequence if a fire did occur. It should be noted that Santos and its contractors working in the Pilliga Forest have identified five naturally occurring bushfires since 2014, and by their presence and early reporting to the RFS they have reduced the significance of the fires for their impact on the environment and local communities. Next slide, please. The hazards and risk assessment was reviewed by Mr Skinner and the department's hazards unit. Their assessment report concluded that they are satisfied that hazards can be appropriately managed and have recommended a number of conditions to manage these risks.
- 10
- 15 The independent expert review concluded that the public safety aspects of the proposed NGP appeared to have been addressed in the EIS, principally chapter 25 and appendix S, and in the applicant's responses to the questions raised during the review. The key points from the independent expert review include, firstly, a fire hazard analysis or FHA is required. The scope will include a quantitative risk assessment, including risk contours for Leewood central gas processing facility, a HAZOP of the detailed design, confirmation of the setback distances of the wellheads and leeward from their boundaries, optimisation of the well pad layouts to minimise any safety risks to the public.
- 20
- 25 (2) Hazard audits undertaken by independent auditors prior to the start-up and then periodic hazard audits during operation. (3) A development of a safety management system for the project. (4) A bushfire management plan including an independent audit of the controls prior to commissioning. Next slide, please. During the technical review some specific questions were raised about the risks from the
- 30 Leewood central gas processing facility and the medium pressure pipeline coming from Bibblewindi to the sensitive receivers around these facilities. These risks were addressed in a quantitative risk assessment and involved undertaking risk modelling with software approved by the DPIE for this application.
- 35 The key findings of the risk assessment are shown in the three plots on the slide. Plot 1 shows the Leewood facility. Plot 2 shows the medium pressure pipeline from Bibblewindi to Leewood. And plot 3 shows Leewood heat radiation. The results show that these facilities meet the HIPAP 4 criteria for individual fatality and injury risk. Next slide, please. I'll go just – sorry, one back – one slide. I should note it is
- 40 a finding of the independent expert review that the five by 10 to the minus five per year risk contour around Leewood shown as the green line in plot 1 extends slightly outside the site boundary. And Santos agrees that the final design will address this to ensure that the contour will be within the facility. Thank you. Next slide.
- 45 Different HIPAP 4 risk criteria apply to sensitive receivers based on the type of receiver and their location in relation to the acceptable thresholds for individual fatality risk and heat radiation and over-pressure injury risk. As noted in the

previous slide, the risk thresholds are represented as contours around a facility. The relevant criteria are summarised in the table. Compliance with HIPAP 4 requires the sensitive receiver type to fall outside the risk contour produced by the facility. For this project, the only facilities which could produce a risk contour in proximity to sensitive receivers are Leewood and the Bibblewindi to Leewood medium pressure pipeline.

As shown in the table, the project complies with all HIPAP 4 risk criteria for both individual fatality risk and heat radiation and explosion over-pressure injury risk. The project therefore poses an acceptable risk to the public safety based on the DPIE risk criteria. Thank you.

MR FOX: Thank you, Russell. I'll now hand over to Marty Sullivan from Eco Logical who will provide an overview of the ecology for the project area. Thank you, Marty.

MR M. O'SULLIVAN: Thanks Nick. Good afternoon. My name is Marty, and I'm a principal ecologist with Eco Logical Australia. I have more than 15 years experience in biodiversity management, vegetation mapping and conservation assessment. I've led all aspects of the biodiversity assessment at the Narrabri Gas Project since 2010 which has included more than 100 technical surveys and studies. At Eco Logical Australia I'm the technical lead for a team of more than 80 ecologists across the country, and I'm regularly engaged for my expertise in vegetation mapping by the state government to prepare reserve-scale vegetation maps including for a number of reserves in Narrabri. Next slide, please.

More than half of the project area is located within the Pilliga which is the largest remnant native forest in New South Wales west of the Divide covering half a million hectares. The part of the Pilliga in which the project is located has a long history of forestry activities including more than 1000 kilometres of roads. As part of the Brigalow and Nandewar Community Conservation Area Act process in 2005 the part of the project area located in state forest was specifically zoned for resource extraction including petroleum activities. When at full production the activities of the project will cover less than half a per cent of the Pilliga and about one per cent of the 95,000 hectare area.

Importantly, biodiversity impacts can be avoided and minimised at the site scale by micrositing surface infrastructure. We found that the species and ecosystems of the Pilliga will continue to function as they currently do without habitat fragmentation or significant impacts to any state or federally listed species, population or community and this view is supported by the department in their assessment report. And finally, once infrastructure is decommissioned the land will be returned to its natural state. Partial rehabilitation monitoring that we've been conducting since 2004 has shown that the sites are on a solid trajectory to reaching their natural state within reasonable timeframes.

Next slide, please. So, for context, the project is located in the north-east of the Pilliga, with the majority being state forest and some freehold land. The north-west of the project area is predominantly agricultural land with scattered native vegetation, including Brigalow, a threatened ecological community. The project specifically excludes Brigalow Nature Reserve in the north-west and Pilliga East State Conservation Area in the south. And, importantly, approximately half of the Pilliga is conserved in national parks of state.

Next slide, please. Key findings of our assessment were that due to the relatively small impact on native vegetation, threatened flora populations, threatened ecological communities, fauna species in their habitat, due to the narrow widths of linear infrastructure and progressive rehabilitation not causing habitat fragmentation and the implementation of mitigation measures, that there will be no significant impact on threatened species, populations or communities under state or federal legislation, and this view was supported by the department in their assessment report. And following avoidance, minimisation and mitigation of impacts, all residual impacts to biodiversity will be offset in accordance with government policy.

Next slide, please. Works undertaken for the biodiversity components of the EIS draw upon more than 13,000 hours of field survey effort, which, to my knowledge, is more baseline work than has ever been undertaken for a development project in New South Wales. Through our comprehensive threatened flora survey and population modelling, we identified 10 threatened flora species, only two of which were known to occur prior to surveys. We undertook fauna survey for all fauna groups, including targeted survey for a range of key species including koala, Pilliga mouse and spotted-tailed quoll. We identified a large diversity of threatened fauna species, including 18 threatened birds, 11 threatened mammals and one threatened reptile.

And through the work we undertook to prepare detailed vegetation mapping, we identified four threatened ecological communities, being Brigalow, Weeping Myall, Fuzzy Box and Carbeen Open Forest. We prepared a series of key mapping and modelling data sets which underpin our assessment. This includes vegetation mapping undertaken at a one-to-10,000 scale, which is the most detailed vegetation mapping of Pilliga, and ecologically – ecological sensitivity analysis, which is the approach we designed to understand ecological constraints in the landscape, and it forms an integral part of the field development protocol.

Next slide, please. Our approach to the assessment of biodiversity impacts is robust and was undertaken in accordance with the Framework for Biodiversity Assessment. Unlike more traditional resource projects, the precise location of surface infrastructure is unknown and is guided by progressive exploration, appraisal and development. This led Santos to engage a specialist sub-consultant to develop upper disturbance limits based on a rule set and a range of development scenarios.

The avoidance of significant ecological values has been prioritised in every stage of the assessment, including the upper disturbance limits. The EIS has assumed worst case and that all limits for every ecological feature, including vegetation, habitat and

threatened species individuals, will be cleared, and this is the impact that has been assessed in the EIS. Importantly, our approach is conservative and robust so that Santos will not need to increase disturbance limits.

5 Next slide, please. The biodiversity offset package for the project will ensure that residual impacts following avoidance, minimisation and mitigation of impacts are offset to ensure no net loss to biodiversity. Santos has provided offsets for indirect impacts and cumulative impacts, which are those being from prior exploration activities which will be carried forward as part of the project, and this is not required by policy. Biodiversity offsets for the project are determined in the language of credits, and there are two types of credit.

15 We have ecosystem credits, which are for vegetation and threatened species habitat, and species credits, which are for all threatened flora and a subset of threatened fauna species which cannot reliably predicted based on habitat alone. The project requires over 66,000 ecosystem credits, which is equivalent to nearly six and a half thousand hectares of land. The project also requires a considerable number of species credits, with nearly one and a half million flora species credits and 140,000 fauna species credits. In addition, Santos is committed to offsetting large hollows, which are scarce in the landscape, through a variety of means, including nest boxes, hollow or tree salvage.

25 We proposed to the department that successful rehabilitation should be able to reduce our offset liability, and they agreed in part by allowing rehabilitation to offset impacts once a 70 per cent threshold for phase 2 has been reached. Through ongoing monitoring, we can clearly demonstrate that partial rehabilitation sites are achieving approximately 70 per cent of the reference site condition within short timeframes. Our proposed biodiversity offset package includes a combination of land-based offsets, supplementary measures and contributions to the biodiversity offset fund.

30 Next slide, please. So, in conclusion, the project is consistent with strategic land use planning objectives in the region, and this has been supported by the department in their assessment report. Our biodiversity assessment is comprehensive and has been prepared in accordance with relevant guidelines, methodologies and policies. The field development protocol is critical in avoiding and minimising impacts to biodiversity values when selecting specific sites and site scale, and this approach has been endorsed by the department in their assessment report.

40 The upper disturbance limits are conservative and robust and provide confidence in the assessment approach. Importantly, there will be no significant impact on threatened species, populations and communities under the state – under state or federal legislation, and this view is supported by the department in their assessment report. And, finally, all residual biodiversity impacts will be offset in accordance with policy. Thank you.

45 MR FOX: Thank you, Marty. That concludes the formal presentation. I'll hand back to you, Chair, for any questions.

MR O'CONNOR: Thank you very much, Nick, for that presentation from your team. We certainly had the benefit of reading the department's environmental assessment report and a lot of other documentation, but I found that quite informative. We do have a number of questions, mainly arising from the  
5 presentation we had earlier today from the Department of Planning. There are a couple of things that came out of that discussion that we thought were relevant to raise with yourselves.

10 So I might start with a couple of questions, then hand over to my fellow commissioners as they'll have some questions as well. There was mention made in that presentation regarding the potential for salt to be – some sort of beneficial reuse. And from the department's presentation this morning, we understand Santos and others in the Queensland coal seam gas industry have stockpiled supplies of salt because of the potential for reuse and investigating those reuse options. We'd just  
15 like to hear from your experience in Queensland what sort of progress you're making with those investigations and what are some of the options that you're looking at.

MS WINTERS: Chair, it's Tracey Winters here. Look, we can certainly provide you with a response on what's happening with salt in Queensland. We're probably  
20 not in a position to do that today, just to make sure that we give you very accurate information. When it comes to Narrabri, we're in the process of considering, you know, a beneficial reuse option there, but we haven't – we're not – it remains a commercial-in-confidence issue and, again, we'll take that away and come back to you. But certainly in the case of Narrabri, we are making very good progress on that  
25 front and we can give you a – you know, we'll also give you the details for the Queensland salt stockpiles and so on in – you know, promptly after this meeting.

MR O'CONNOR: Thank you, Tracey. That would be much appreciated. I noted in the EIS and in the department's assessment report there's two options outlined for  
30 how power will be secured for the operations. One has already been mentioned in that presentation, the Wilga Power Station. And the other: you might generate your – have your own power generation scheme. Can you just update us whether there's any further information you can provide about the status of which one of those two options might be the favoured approach.

35

MS WINTERS: Nick, it's Tracey here. I don't know whether you can help on that one or whether that – or we need to take that on notice as well because that would be a question relating to the project design.

40 MR FOX: Yes, correct, Tracey. Probably best we take it on notice for now. We're still going through design options, so we could provide a more accurate answer .....

MR O'CONNOR: Thank you for that, and this next question may also be one you want to take on notice. There again are two options for the power – sorry, the  
45 pipeline that will distribute this gas into the network, and, again, that's not part of this project, but we were just wondering whether there's any progress been made

identifying which is the favoured option or if it's still completely unknown which one might be the subject of the future applications.

5 MS WINTERS: Chair, I can say that we're continuing to work with APEA, you know, on that – the potential for that project; however the Hunter gas pipeline, which is the second option, already has a development consent, so at the moment, we – there – we have multiple evacuation pathways, including – you would probably be aware that we have a memorandum of understanding with a company for a proposed – that's proposing a fertiliser plant on the Narrabri industrial estate, and so those  
10 options are still, you know, project – under project consideration.

MR O'CONNOR: Okay. And having mentioned that fertiliser plant – thanks for raising that – there is, we understand, a commitment from the company, from Santos, to make the gas that would be obtained if this project is approved 100 per cent for  
15 domestic use rather than looking at export overseas. Is - - -

MS WINTERS: That's correct, yes.

20 MR O'CONNOR: ..... confirm that.

MS WINTERS: Yes. And, in fact, we wrote in February this year to the department, to the relevant section for petroleum titles, confirming to them that Santos would have no objection to a condition being placed on any future production tenure in relation to making the gas 100 per cent sold into the domestic market, as it  
25 were. That's right.

MR O'CONNOR: Are you able to make that correspondence available to us?

30 MS WINTERS: Yes, we can.

MR O'CONNOR: Great. Thank you. John, would you have any questions you'd like to pose? You need to come off mute, John.

35 MR J. HANN: I'm sorry. It's John Hann here. Thank you, Steve. Look, I have a couple of questions if you could bear with me. The first relates to the groundwater studies and particularly the assumptions around the fact that the coal seams are hydraulically isolated, and, look, we do appreciate that, as is well pointed out - that all of the information – all the data that you would like to have is not in hand at this time. The water expert panel has stated that this is not going to be known, in other  
40 words, a confirmation of the hydraulic isolation, if you like, of the coal seams won't be known until you're in full production, so the interest we have is if you can explain when you do gather that data, when you're in full production, assuming this is approved, how will that then be fed into the model and how will that be made available to the regulator and also the transparency for the community?  
45

MS WINTERS: Nick, can I hand that one to you, please.

MR FOX: Certainly. We'll provide a more detailed answer to that going forward, but the monitoring for groundwater does not stop once the project is approved; it's ongoing throughout the field life, and we update the water model, as the department has pointed out - provide an update to that model every three years to make  
5 assessments, so the transparency's there, as well.

MR HANN: And so that the model itself – there'll be one model, as we understand it, in other words, the regulator, the EPA, wouldn't have their own model. There'll be one model that's effectively controlled by the operator, Santos, but that data and  
10 the ability to understand how the model works and its implications and any adjustments – that would be available to the EPA and/or – and also the wider community.

MR FOX: Absolutely, yes. Yes, and the model is – that model that's agreed, we  
15 use that model, and then it does – it is updated as the data – so it's a live model, as such, similar to what we have for our regional groundwater studies in Queensland. That model is actually owned by the office of groundwater impact assessment ..... part of the government, and we provide updates to that model every year, and then every three years it's published again to the community.

20

MR HANN: Okay. Thank you very much. Steve, I've got a couple of other questions, or did you want to follow a particular theme?

MR O'CONNOR: No, no, by all means, you go ahead, John.  
25

MR HANN: Well, look, this is actually on to the gas price impacts, and I think it goes to Alan Smart, your economics consultant, and he did – obviously, it's documented, particularly in the most recent department's assessment report but I think in your slide 21. You talk about downward prices, in other words, that this  
30 particular facility, with the supply of gas domestically to the eastern states, would have a downward price effect. Just wondering if you could elaborate on that for us.

MS WINTERS: Alan, I'll take that one. So, John, we'll give you a response in writing to that question, but in particular, 100 per cent of the gas is going to be  
35 supplied into the domestic market. The – I'll give you two sort of reference points, one being that the ACCCs report – and I can't remember exactly which one it is – has said that southern customers pay \$2 to \$4 per gigajoule more for gas because of the transportation from South Australia or Queensland into New South Wales and South Australian markets, so developing the gas locally, we will, you know, put downward  
40 pressure on those local prices.

And the other reference point I'd give is EnergyQuest's analysis for the New South Wales Business Chamber's Running on Empty report that was released in December 2019, in which they list a number of enterprises in New South Wales, including the  
45 commercial bakery example that I gave, where, in the case of the commercial baker in New South Wales, pays \$26,400 more per year than the same commercial baker in business would in Brisbane because of this issue of developing resources close to

market. So that's a part of the story. There's more to it, and we will come back to you. I'm sure Alan will be able to put a very good response back to you in writing.

5 MR HANN: Okay. Thank you very much, Tracey. Steve, for the moment, that's all from me.

MR O'CONNOR: Okay. We might hand over to Snow if you've got some questions.

10 PROF S. BARLOW: Thank you, Steve. Look, if you don't mind, can I just ask a follow-up question to John's last question regarding the downward pressure on prices. What proportion of the proposed production from this gas field would be used by a fertiliser plant if it was constructed in Narrabri?

15 MS WINTERS: I – Mr Barlow, I'll have to come back to you on that. I don't have the – I don't have the volumes off the top of my head, actually, so we'll come back to you in writing on that one.

20 PROF BARLOW: Thank you. Okay. The other question I have regards fugitive emissions. In your EIS, you didn't really make any substantive comments about putative emission, but the water expert panel did have a qualitative project – qualitative discussion about the varying CO2 levels that are in coal seam gas. So can you tell us, you know, from the 60 wells you've drilled so far, how much CO2 is in the Narrabri coal seam gas and what you would do with that at production stage?

25 MS WINTERS: Nick, can I hand that one to you, please.

30 MR FOX: Yes, Tracey. I will provide you in formal writing exactly how much CO2 is actually in the gas. Off the top of my head I can't remember exactly, because it does vary across different wells drilled. And we are looking at different options. So I will provide a more formal answer to that, if that's okay.

PROF BARLOW: Thank you. Thank you. And have you added – can I ask, have you added that into your estimate of the greenhouse gas costs of the project to date?

35 MR FOX: That will be inclusive in the greenhouse gas modelling, yes.

40 PROF BARLOW: Thank you. Okay, next question I have is we're aware that the climate is moving on a bit and the chance of extreme events – you have modelled your saltwater retention ponds at one in 100 year event, but have you considered the chances of a perhaps more unlikely event there, the sort of events that occurred quite recently in Central Queensland and even closer, whether your current designs are actually fit for purpose in terms of the rainfall event that you might get there and what that impact might be both on the capacity of your saltwater retention ponds, but  
45 also if you're stockpiling salt there, how are you going to deal with that?

MS WINTERS: Nick, I will leave that one – I will hand that one to you.

MR FOX: So I'm not ..... undertaken any modelling or assessment of greater weather events than the ones that we've included in the EIS. The salt retention ponds are covered, you would have noticed, so we can rule out direct impact on rain from that. From a flooding perspective, we would have to look at some additional  
5 modelling if we were to look at extreme events beyond one in 100 years. Bearing in mind across all our operation in Santos, we do actually engage the Bureau of Meteorology to provide flood prediction analysis for all our sites and activities just to ensure that we can modify our practices or activities to ensure that they minimise impact from extreme events or even just ..... events. But I think – I will do some –  
10 we will ..... any additional modelling beyond that, and I will get back .....

PROF BARLOW: Yes. I would appreciate that. Thank you. And finally – it could be a trivial question. We seem – we know in assessment report that it was stated that there would be, you know, finding a total of 425 pads. But somewhere else in either  
15 the assessment report or the EIS was a figure of 450. We're not quite sure what the difference between those two figures is.

MS WINTERS: I will hand that one over to you. I'm not aware of that discrepancy.

20 MR FOX: Yes, I'm not aware of the discrepancy either, so we are looking at a maximum of 425 new wellheads - - -

MR HANN: I might be able to help you there, Nick, in that if you refer – and I'm not expecting you to do it now – but it's in table 3 of the department's assessment  
25 report. It says – it says under a section in the left-hand column, it says gas field, and it's like a summary table of your proposed facilities and the metrics around those, and it says, up to 450 well pads. And yet throughout most of the other documentation it talks of 425. So we just wanted to check with you whether there's  
30 – whether there's new well pads, there's 425 but there will be 450 in total, or just perhaps it's a – not quite correct, not quite consistent in the AR, in the assessment report.

MR FOX: I will – yes. We will look at that. It may be just a minor error, but we will look at it. Thank you.

35 MR HANN: Okay. Thank you very much.

PROF BARLOW: Thank you. That's my questions.

40 MR O'CONNOR: And – thank you. Thank you, sir. And just following from that last question, there were a number of existing wells that you've been operating – I think the number 63 or in that vicinity. Are you considering those wells will eventually become production wells, or any of those, or is it – they all to be excluded from those calculations?

45 MS WINTERS: Nick, can you take that one, please.

MR FOX: Yes, Tracey. You're about right. It's around just over 60 wells we have currently operating. They will be – potentially some of those will be converted to production wells as well, so the maximum we are looking at is – would have to be at least ..... predominantly new wells, and our maximum 425 well pads. I mean, that's  
5 .....

MR O'CONNOR: Okay. Thank you. I just want to check with Casey and Steve – do either of you have any questions that you would like us to ask for Santos?

10 MS JOSHUA: Nothing from me, thanks.

MR BARRY: Yes. I'm okay too, thank you.

MR O'CONNOR: Okay. So that, I think, brings us to the end of the questions that  
15 we had. I noted, Tracey, in your opening statement you said you were looking for some guidance in relation to the presentation that will happen as part of the public hearing that we would be looking for Santos to give a presentation.

MS WINTERS: .....  
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MR O'CONNOR: And we've had the benefit of seeing the presentation you've given us this afternoon. I will take that question on notice, talk to my fellow Commissioners and the IPC staff, and we will get back to you in terms of both the  
25 sorts of things we would like you to cover and the length of time that you might be allocated. We will also have the department of planning doing a presentation at the public hearing, so we need to coordinate with them as well, just to make sure, you know, there's not overlap, duplication, etcetera, we're making the more efficient use of the time. So anything else you need to know from us at this stage?

30 MR HANN: Yes. Could I just interrupt. Have we covered off enough on the status of the pipeline and the power? Have we got everything we wanted from today's discussion on that?

MR O'CONNOR: No. I think the response was they will come back to us with  
35 some more details.

MR HANN: Okay. All right. Thank you.

MR O'CONNOR: Thank you, John. Sorry, Tracey. Over to you.  
40

MS WINTERS: No, that's fine. Thank you very much, Chair. The – so the only other thing would be when you come back to us on the public hearing process, we assume that there will at some point also be a – questions that you will want to ask us after the other – you know, after the other presenters. So if you could also just give  
45 us some guidance on, you know, how you want us to do those sorts of things as well, we would appreciate it.

MR O'CONNOR: Yes. Almost certainly going to be follow-up questions we will have after hearing the various presentations that might be for the department and for yourselves, so we could be confident we would have further questions, and we will explain what sort of process we will go through and the timing expectations  
5 associated with that. If there's nothing further, I might call this briefing session to an end. Thank transcript for their transcribing it for us. And look forward to seeing you at the public hearing.

10 MS WINTERS: Thank you very much.

MR O'CONNOR: Bye.

UNIDENTIFIED MALE: Thank you.

15 UNIDENTIFIED MALE: Goodbye.

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**[3.44 pm]**