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AUSTRALIANS WORKING TOGETHER TO PROTECT OUR LAND, WATER, AND FUTURE

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**Submission: Narrabri Gas Project**

Thank you for the opportunity to make this submission. Lock the Gate Alliance is a network of hundreds of community groups and tens of thousands of individuals across Australia concerned about the environmental and social harms of coal and unconventional gas mining. Lock the Gate objects to this project. Its environmental impacts will last for generations and outweigh its short-term mainly economic benefits which will accrue largely to Santos and to a small number of people and businesses at the expense of others. Below we provide a summary of our main concerns with this project and the problems with the Department's Assessment Report and proposed conditions of consent.

This project is the most controversial in the history of the Environmental Planning and Assessment Act. Of the 22,721 submissions to the Environmental Impact Statement, 98% were objections. The majority of submissions from the local area (295 out of 470) were objections, too. The Department is subtly condescending about these objections, implying that people don't understand the issues at stake. In reality, there is an unmistakeable public rejection of this industry and this project in the local area, the region and New South Wales more broadly.

The IPC has been given only 12 weeks to determine this project, absorbing the import of thousands of submissions and thousands of pages of assessment. Since the Response to Submissions was published in 2018, Santos has been in detailed discussion with the Department and the other agencies. The general community has not been invited to take part in these discussions and like the IPC has been presented with a series of pieces of advice, response and last minute information and a dissatisfying Assessment Report that glosses over many of the questions the public has asked about this project, and which remain unanswered.

Much of this project is situated on public land, a beloved local forest of national significance. The Assessment Report refers to the *Brigalow Belt Nandewar Community Conservation Area Act 2005* (BNCCA Act), and the fact that much of the project area is within Zone 4 of that Act, which is, in the words of the Assessment Report "expressly zoned for forestry, recreation and mineral extraction" (page xv). The assessment report contends that this means, "there is greater strategic support for the use of this land for the project that there is for its permanent protection for conservation."

In a typical act of omission, the Assessment Report does *not* refer to the *Brigalow and Nandewar Community Conservation Area Agreement 2009* under which the Pilliga is managed. It's not clear if that agreement informed the Department's assessment at all. The Agreement is created under the *BNCCA Act* to provide a coordinated framework to manage lands, including public land subject to this project proposal. The first of the high level strategic aims in Section 8.1 of the *Brigalow and Nandewar Community Conservation Area Agreement 2009* is that all zones are to be managed "for social, economic and environmental sustainability, based on the principle of intergenerational

equity." There are other relevant provisions of the agreement about ecologically sustainable development, connection to country, Aboriginal access to land for cultural use and biodiversity management that is responsive to the changing climate. None of this "strategic context" is provided by the Department.

The Minister imposed a "statement of expectations" on the IPC on 1 May and the IPC subsequently entered into a memorandum of understanding with the Department on 14 May. These documents cannot override the IPC's statutory duty to determine this project in the public interest. It is not appropriate for the Department's Assessment Report to be granted greater weight in the IPC's consideration than other matters that the Commission is charged with considering, including our submissions. In any case, the Department has not fulfilled its commitments under this MOU, which include that "DPIE will ensure that its assessment and advice is sufficient and appropriate to support the Commission in exercising its functions under the Act." The Assessment Report is not sufficient to support the Commission in the exercise of its functions under the Act, because it misrepresents or leaves out altogether important matters that the Commission is required to consider.

# Summary of major issues

## Inadequacy of assessment and regulatory regime

- The Department's Assessment Report provides no assessment of the project against the principles of ecologically sustainable development. Approval of this project would not be consistent with the principle of inter-generational equity, the principle of improved valuation or the precautionary principle.
- Half of the Chief Scientist's recommendations for managing the impacts of coal seam gas have not been implemented, including the crucial recommendations 8, 9, 11, 12 and 13.
- The Chief Scientist's Recommendation 13 fundamentally required the identification of baseline conditions and predicted impacts to water resources "before activities start" whereas the proposal for the Narrabri gas project is to grant consent and begin activities before establishing baseline conditions and identifying impacts.
- Environmental insurance is not available nor proposed to be required, leaving downstream landholders carrying the burden of risk.
- There are many aspects of the assessment, including groundwater characteristics, faulting, methane, biodiversity and air quality, where baseline data has not been collected, presented and analysed over the four years this assessment has been underway but where such data is now proposed to be included in management plans prior to production.

## Inadequate data and unacceptable groundwater impacts

- The Assessment relies on predictions of a Class 1 groundwater model which the Department and the DPIE Water agency have both admitted is incapable of accurately predicting impacts on groundwater locally and which both stated five years ago would not be suitable to assess a full-scale CSG production project.
- This means that the scale of impact on the Pilliga Sandstone, Namoi alluvium and water users in the Gunnedah Oxley Basin is unknown, though it may be serious and irreversible.
- The Department claims the project "complies" with the minimal impact criteria of the Aquifer Interference Policy when in fact the model is not capable of providing "output at the

scale and accuracy to assess the project's impacts against the minimal impact considerations of the Aquifer Interference Policy" (DPIE Water submission 2017).

- There is no clear explanation for why a decade of exploration and appraisal and four years of environmental study was not able to provide the data that is now proposed to be collected during Phase 1 of the gasfield.
- The proponent told the Water Expert Panel that "data from appraisal wells does not provide information that can help inform groundwater models and is not proposed to be provided." Given this, and the malleable wording of the proposed consent conditions it is unclear how or if the groundwater model will be upgraded to a suitable confidence level.
- The Commission is being asked to grant consent without knowing the impact of the project on the productive Namoi Alluvium, given the stark divergence in modelling parameters between Santos' model and the one used for the Lower Namoi Alluvium Water Sharing Plan.
- Santos told the WEP that "In all recorded cases of methane in groundwater outside the coal measures, including in the alluvium aquifers, concentrations are below 10 ppm." This statement is repeated by the Department in its Assessment Report but it is not true. The presence of methane in local bores indicates greater aquifer connectivity allowed for in Santos' modelling and the Department's Assessment Report.
- The Assessment Report provides no consideration of the impact of the gasfield on landholders to the east of the project area who rely on Gunnedah Oxley Basin water.
- DPIE Water's advice on groundwater trigger and response actions included among the recommended responses that the proponent should "consult with DP&E as to the requirement to re-apply for project approval." There is no mechanism for this under the Act. Once consent is granted, it will not be able to be revoked except in specific circumstances.
- Given all of the above, and the importance of the water resources at risk, the project poses the risk of unacceptable impacts on water resources and must be refused.

## Poor and unsubstantiated justification

- Claims in the Assessment Report that the project will put "downward pressure on gas prices" have now been retracted by the Department at the public hearing where David Kitto stated that it will *not* reduce gas prices.
- The Assessment Report claim that "using gas to generate dispatchable energy is also likely to help reduce total greenhouse gas emissions in NSW as coal use is phased out" is not backed by evidence or advice from the Environment, Energy and Science Division to this effect.
- Replacing coal fired power stations with gas *may* reduce emissions from electricity generation, but the IPC's task is to ensure they are reduced "to the greatest extent practicable" and no comparative material is provided to compare gas power with other options to replace coal in New South Wales.
- The economic cost benefit analysis indicates that the positive benefit of the project is sensitive to gas price falls. If the price Santos secures for the gas is 30% lower than the $8.40 per GJ modelled in the assessment, the project no longer provides a net benefit to NSW.
- The Assessment Report avoids critical evaluation of claimed economic benefits and so presents some misleading information, for example, using an outdated royalty figure to overstate the maximum contribution to the Community Benefit Fund by a third, rolling company tax into the taxes and royalties claimed to flow to the NSW government and failing to note that if Santos generates onsite electricity to run the gasfield, the gas used in this way would not attract a royalty, further reducing the public benefit.

## Climate change risk

- The Department has not considered whether a 0.9% increase in Australia's annual greenhouse gas emissions is acceptable in the context of NSW and Australia's commitments to reducing emissions. At such a critical turning point for climate change mitigation efforts, there is a prima facie case that any new fossil fuel development should be avoided.
- The Assessment Report does not mention NSW's *Net Zero Plan Stage 1: 2020-2030*, which sets the aspirational goal of replacing 10% of the gas in the current network with hydrogen.
- The UN Environment Program has estimated that to achieve the Paris Climate Agreement goal of keeping average global warming well below 2 degrees, global gas production needs to peak by 2030 and decline after that. To meet the safer 1.5 degrees warming limit, gas production needs to peak this year.[1]
- The 1 in 70 chance that there will be a loss of containment creating a fire during the life of the gasfield cited in the assessment material is unacceptably high and also appears to have ignored the underlying intensification of fire risk associated with climate change.

## Salt waste

- Experts, community members and the EPA have raised concerns about the unknown destiny of large volumes of salt waste produced by the project and despite repeated requests to do so, Santos has not offered a practical and effective plan for disposal or use of this salt.
- Prof Stuart Khan has advised that disposal of this salt in landfill will "inevitably" create leachate since salt is water soluble and the environment impact of this inevitability is not considered in any of the assessment material provided to the IPC.
- The unknown destiny of this huge volume of salt waste and lack of any information indicating it can be safely dealt with means the consent must be refused.

## Social impacts

- The social impacts of the project will be considerable, including impacts on housing affordability, equity and mental health and potentially crime rates.
- The Department does not appear to have been responsive to the recommendations made by its social impact assessment reviewer, Professor Deanna Kemp.

## Biodiversity

- The project will have an unacceptable impact on biodiversity in the eastern Pilliga, including species that are threatened with extinction at the state and Federal level.
- The biodiversity assessment has failed to meaningfully describe the potential impacts on the gasfield on the habitat and survival of threatened species for which the forest is a stronghold, like the Pilliga Mouse and south-eastern long-eared bat (*Nyctophilus corbeni*).
- For these and other species the assessment failed to follow the "avoid, mitigate, offset" hierarchy and the proposed biodiversity offset strategy does not comply with the relevant guidelines.

[1] UNEP, *The Production Gap Report*. 2019.

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## Ecologically sustainable development

The Department's Assessment report does not mention or provide any consideration of the principles of ecologically sustainable development. This is surprising considering that the IPC specifically asked the Department last year to improve and expand its information about and consideration of these matters for the nearby Vickery coal mine.

Several of the ESD principles are relevant to this project. Definitions below are taken from section 6 of the *Protection of the Environment Administration Act 1991*:

**Precautionary principle:** "If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation." This principle is relevant to this development in several ways. Notably there is lack of scientific certainty about the scale and severity of groundwater impacts, but measures to understand, prevent or mitigate this potentially serious and irreversible damage are proposed to be postponed till after approval is granted and the project underway. In addition, there is considerable scientific uncertainty about the contribution this project will make to global warming and the environmental stresses already affecting the Pilliga forest, both of which are serious and irreversible environmental damage.

**Inter-generational equity**: "That the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations." It is already arguable that the health, diversity and productivity of the Pilliga will not be maintained, let alone enhanced, for the benefit of future generations without positive intervention at this point. The majority of the jobs to be created by this project will last for just 3-4 years and will be filled by people from outside the area to be impacted. The groundwater impacts, in contrast, will last for several centuries, as will global warming. If the impacts of this project contribute to and hasten the extinction trajectory of koalas in the Pilliga, future generations will be deprived of knowing that iconic creature. The Chief Scientist's relevant recommendation that there be a long-term environmental rehabilitation fund established to ensure sufficient means are available to manage long-term environmental degradation from mining has not been fulfilled.

**Improved valuation and polluter pays**: We note that among the Chief Scientist's recommendations that have not been implemented by the NSW Government is that the industry be operated on a cost-recovery basis. In addition, the Department should have provided information about the degree to which the cost of the pollution caused by this project, notably its greenhouse pollution but also its air toxics, will be borne by the proponent, or by the public or some other entity.

## Gomeroi/Gamilaraay country

The land subject to this gasfield proposal is the land of Gomeroi/Gamilaraay people. The Community Conservation Area Agreement under which the state forest and conservation areas that dominate the project area are supposed to be managed places considerable weight on the promotion of Aboriginal access to land and involvement in land management. Lock the Gate will be guided by Aboriginal people in our advocacy for the protection of Aboriginal cultural heritage and promotion of Aboriginal social, spiritual and economic wellbeing. We are concerned that there has been minimal consultation with Aboriginal people about this project since the development of the EIS three years ago and that the social impact management plan provides little opportunity for improvement in the social conditions of Aboriginal people living in Narrabri Shire.

Lock the Gate supports the Gomeroi Native Title Applicant's assertion that the Gomeroi people are the custodians for the country on which the project is taking place. The Aboriginal cultural heritage impact assessment did not involve detailed ground surveys for heritage values, whether sites, ecological values or landscape values but instead relied on existing data and landscape mapping, the latter of which has not apparently been used to inform project design. Many Gomeroi people have spoken out in opposition to the project and their interest in it extends beyond artefacts to the forest, its flora and wildlife, social cohesion and the water resources of the region that are put at risk of harm by this project. Santos must agree that it is Gomeroi people who are to make decisions about heritage values and surveys and ensure cross-cultural training for all people working on the site.

## Chief Scientist's review

The Department's Assessment Report mentions the Chief Scientist's review but does not address the substantial gaps in the Government's implementation of that review's recommendations. In our view, the Government's failure to implement the Chief Scientist's recommendation has made consent for this project untenable.

The recommendations made by the review were complicated in their construction, but there is no doubt that implementation remains incomplete. An inquiry in the Legislative Council reported in February that half of the 16 recommendations had not been implemented at all and only two had been fully implemented.[2]

At paragraph 240, the Assessment Report states, "As outlined in Section 4, the review concluded that provided drilling occurs in areas where the geology and hydrogeology can be characterised adequately, and provided that appropriate engineering and scientific practices are used to manage the storage, transport, reuse or disposal of produced water and salts, the risks associated with coal seam gas development can be appropriately managed." The Assessment Report does not again mention the Chief Scientist's Review but we note that neither of the conditions in the sentence above are met for this project. The Water Expert Panel discusses some of the review's findings, and those findings are also crucial to conditions of consent requested by Narrabri Shire Council. We note for example, that the Water Expert Panel (WEP) final report (February 2020) notes that:

> The O'Kane Review was rightly concerned to ensure that 'drilling is allowed only in areas where the geology and hydrogeology can be characterised adequately'. Based on the information available to date, the WEP is not confident that the information provided in the NGP EIS on the structural setting of the NGP, meets the threshold of being 'adequately characterised'.
>
> Why is this of concern? The presence, or absence of faulting can have an impact not only on groundwater flow but also on the risk of gas migration and pollution of aquifers. As stated earlier, if the area is within a compressive regime, then the faults may not be transmissive, but the lack of evidence to support the compressive model, for example through geomechanical analysis of core or downhole measurements, is seen as a weakness.

[2] NSW Legislative Council Portfolio Committee 4. *Final Report - Report No 42 - Implementation of the recommendations of the NSW Chief Scientist on CSG activities*. February 2020. https://www.parliament.nsw.gov.au/committees/inquiries/Pages/inquiry-details.aspx?pk=2557#tab-reportsandgovernmentresponses

The WEP clearly does not consider this to be a fatal weakness, but it is one among a series of problems with the project and Santos' assessment of it that are raised by the WEP and not addressed by the Department.

We highlight here some of the key recommendations of the Chief Scientist's review that have not been implemented which are pertinent to this project.

> ***Recommendation 5: That Government use its planning powers and capability to designate those areas of the State in which CSG activity is permitted to occur*.**
>
> The Government has created a "strategic release framework" to provide for triple bottom line consideration prior to the release of new areas for gas or coal exploration. Crucially, however, the 12 petroleum exploration licences all pre-date this framework and the Chief Scientist's review. These licences, including PEL238 which hosts this proposal are all expired and cover areas of strategic farmland, Dark Sky Park, towns and waterways that it would be difficult to image being released via the strategic release framework.
>
> ***Recommendation 8: That Government move towards a target and outcome-focused regulatory system, the third element of which is automatic monitoring processes that can provide data (sent to and held in the openly accessible Whole-of-Environment Data Repository) which will help detect cumulative impacts at project, regional and sedimentary basin scales which can be used to inform the targets and the planning process.***
>
> Such a system is not in place.
>
> ***Recommendation 9: That Government consider a robust and comprehensive policy of appropriate insurance and environmental risk coverage of the CSG industry to ensure financial protection short and long term. Government should examine the potential adoption of a three-layered policy of security deposits, enhanced insurance coverage, and an environmental rehabilitation fund.***
>
> There is no "comprehensive policy of appropriate insurance and environmental risk coverage of the CSG industry" in place. Environmental risk insurance appears to be unavailable to the industry and it is unclear if public liability insurance covers downstream environmental and commercial damage to third parties. The EPA has stated that "Operators choosing not to hold relevant insurance will be required to instead prove to the EPA the existence of sufficient potential clean up funds."[3] The agency has clarified with us that this arrangement will extend only to matters covered by licencing under the *Protection of the Environment Operations Act* and not, for example, loss and damage from fire caused by the gasfield.
>
> ***Recommendation 11: That Government develop a centralised Risk Management and Prediction Tool for extractive industries in NSW. This would include a risk register, a database of event histories, and an archive of Trigger Action Response Plans. The tool would be updated annually based on Government and company reporting and would include information on risk management and control approaches and draw on data from the Whole-of-Environment Data Repository for the State.***

[3] Safeguarding Future Environmental Liabilities from Coal Seam Gas Activities in NSW. February 2020. https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/licensing/19p1963-safeguarding-environmental-liabilities-csg.pdf?la=en&hash=2028986E1FABE3C61600D753847883C4E20CBC29

This tool was expressly proposed to be used for assessing development proposals like this and monitoring compliance with conditions. It has not been implemented.

***Recommendation 12: That Government establish a standing expert advisory body on CSG (possibly extended to all the extractive industries).***

This body was to play a crucial role in advising government about impacts, modelling approaches, research and where CSG would be permitted to occur. It has not been created.

***Recommendation 13: A formal mechanism with five steps including, inter alia, "Companies or organisations seeking to mine, extract CSG or irrigate as part of their initial and ongoing approvals processes should, in concert with the regulator, identify impacts to water resources, their pathways, their consequence and their likelihood, as well as the baseline conditions and their risk trigger thresholds before activities start. These analyses and systems should be incorporated in project management plans to meet regulator-agreed targets. Appropriate monitoring and characterisation systems would be developed as part of these project management plans and then installed. The monitors would measure baseline conditions and detect changes to these, as well as providing data on impacts and triggered risk thresholds."***

This recommendation fundamentally requires the identification of baseline conditions and predicted impacts to water resources "before activities start" whereas the proposal for the Narrabri gas project is to grant consent and begin activities before establishing baseline conditions and identifying impacts.

## Insurance

The Chief Scientist's review into coal seam gas obtained specific advice about insurance in May 2014 in part because of how often this issue had been raised by the public. That advice noted that the oil and gas industries are often self-insured or under-insured and while some companies may take up accidental pollution insurance, "it is broadly acknowledged that in NSW when it comes to CSG companies, takeup of such coverage is uneven at best. It is also recognised by both industry and government that there is no mechanism to address unforeseen and/or long term environmental impacts potentially attributed to these gas extraction activities."[4] That review also noted that "Comprehensive pollution legal liability insurance policy is now available in the market which covers pollution and natural resource damage on and off site."

The Chief Scientist's background paper on insurance also noted that "Strengthening the environmental risk assessment of projects at application stage should be given appropriate consideration." With this project, the Government is neither accurately assessing impacts nor requiring insurance, which is a recipe for conflict and damage.

In October 2019, Santos was asked to respond to Narrabri Shire council's request that, "The Proponent shall carry pollution legal liability insurance that covers pollution and natural resource damage both on-site and off-site including groundwater contamination and for the benefit of the insured, third parties, and contractors." Santos' response does not commit to obtaining and holding

[4] NSW Chief Scientist and Engineer. May 2014. "Environmental risk & responsibility and insurance arrangements for the NSW CSG industry."

pollution liability insurance. Santos says in this response, "It is the proponent's understanding that the NSW Government is currently finalising a proposal to address this recommendation."

## Groundwater

In the Namoi Valley, 43% of the annual water usage is groundwater. It is the lifeblood of individual landholders, communities and the agricultural industry. Mean annual groundwater usage in the Namoi Valley from 2006-07 to 2013-14 is estimated to have been 165 GL per year.

One of the major matters in contention for this project is the effect on productive overlying aquifers of the withdrawal of 37.5 billion litres of water from the coal seams deep below them. What the Department's Assessment Report glosses over ("The Narrabri Gas Project does not propose to extract any water from these valuable aquifers"), but Santos' assessment material admits, is that the bulk of this 37.5 gigalitres *will* be gradually replaced in the coal seam by water from the Pilliga Sandstone. The reason that Santos and the Department can argue the impacts on water users will be minimal is that the speed at which this replacement occurs will be very slow, and therefore, the drawdown and loss of pressure are "unlikely to be noticed." But this assessment relies on a model that is not informed by geological and hydrological information specific to the area. If there are transmissive faults present, for example, the speed at which depressurisation and downward movement of water occur will be faster and the impact will be greater. It is for this reason that the Water Expert Panel retained by the Department said it was "concerned that the EIS model may have poor predictive capacity in relation to the impact of production of the surrounding impacted water sources." It is completely unacceptable for a project of this magnitude, with impacts that will last for generations to be granted consent on the basis of an assessment that does not use relevant and crucial local data to inform its conclusions.

The Department presents the work undertaken to assess the groundwater impacts of this project as "comprehensive" but the public would have more confidence in their conclusions if they were upfront and candid about the serious deficiencies of the information provided by Santos. The Assessment report admits that, "there are still some unknowns about the hydrogeology of the project area," relating to:

- how the water resources in different hydrogeological layers will react to coal seam gas development, particularly at a local scale; and
- how the pumping of large amounts of water from the coal seams to enable the gas to be extracted could affect the shallower, more highly valued, aquifers.

These two questions, we submit, should have been among the chief concerns of the proponent's groundwater assessment.

We note that the impact of CSG causing a drawdown on productive overlying aquifers is well established. For example, in December 2012, the CSIRO noted with relation to CSG extraction occurring in Queensland: "The groundwater extraction for CSG occurs in the Walloon Coal Measures. Impacts on other layers from CSG-related development are likely to occur by changes to the rate of groundwater movement between different layers (vertical leakage), which will cause changes in groundwater levels where groundwater is extracted and in layers above and below."[5]

[5] Smerdon et al, (2012). *Water Resource Assessment for the Great Artesian Basin, A report to the Australian Government from the CSIRO Great Artesian Basin Water Resource Assessment*. CSIRO.

The same assessment looked across the GAB for evidence of vertical leakage induced by bores:

> In multi-layered groundwater basins such as the GAB, vertical leakage can occur naturally by groundwater flow across layers (cross-formational flow) or be induced due to flow within or outside the bore casing within drill-holes. The latter mechanism has been studied for bores in in the GAB for parts of the Eromanga Basin and the Surat Basin (Habermehl, 2009) but the net effect on the water budget of the GAB is unknown. In Queensland, 10 bores out of the 68 bores investigated showed leakage and in New South Wales, 12 bores out of the 31 bores investigated showed leakage.

Extraordinarily, the Department argues that groundwater information of this nature is "unable to be determined until pumping commences from the gas wells and the water pressure in the coal seams is reduced." Essentially, they argue there cannot be an adequate groundwater assessment until the impact is underway. This approach is utterly at odds with the precautionary principle, namely that "if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation." (*PEA Act* s6).

In 2017, DPIE water described Santos' model as not able to provide output at the scale and accuracy to assess the project's impacts against the Aquifer Interference Policy. This assessment has not changed and the Department's description of the model as "fit for purpose" is misleading. Even more misleading is the Department's claims that "Predicted drawdown can be compared against the 'minimal harm considerations' in the AIP" (para 297) and that drawdown "complies within the minimal impact considerations in the AIP" (para 301). This is blatantly misleading as it directly contradicts DPIE Water advice. Such comments undermine confidence in the objectivity and accuracy of the Department's assessment.

In August 2019 DPIE Water said, "The current uncalibrated groundwater model is a Class 1 model and is not precise in its prediction. This is because Class 1 models have a high level of inaccuracy." The advice clarifies that the Water Division believes that Santos can collect the required data after the project is determined. We believe it is a reckless and inappropriate course of action to grant consent to the full scale gasfield on this basis. The scale of this project and the importance of the water sources at risk require the application of the precautionary principle: namely that "where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation" (*POEA Act* 6 (2) a). It is implicit in the consent conditions proposed by the Department that development of 25 more appraisal wells will allow Santos to collect sufficient further data to calibrate the groundwater model so that it is able to accurately predict impacts to groundwater. We would point out that the proponent has already drilled twice this number of wells in the project area and that seismic and other survey activity has been undertaken. There is no clear explanation for why that previous exploration and appraisal process was not able to provide data that will be able to be gathered during the proposed Phase 1 of the gasfield.

The WEP asked Santos why it had not provided data from its previous appraisal program to inform the groundwater assessment in the EIS. Santos' response states that "data from appraisal wells does not provide information that can help inform groundwater models and is not proposed to be provided" (Santos' response to WEP questions page 2).

This statement directly contradicts the assurances that were given by the Department in its Assessment report for the Dewhurst and Bibblewindi pilots six years ago. At that time, the Office of

Water told the Department that Class 1 model "would only be acceptable where activities are demonstrated to be particularly low risk" and was urging that Santos upgrade its model:

> The Department notes that the proposed development and the [Exploration and Appraisal] Program more broadly are appraisal activities and not a CSG production development. One aim of appraisal programs is to collect sufficient data to evaluate the potential groundwater impacts that would occur as a result of CSG production. NOW notes, and the Department concurs, that while Santos's model is not suitable for making the required predictions of groundwater impacts for a larger production project, the risks associated with predicting the impacts of an appraisal pilot are much lower than the risks associated with impacts of full-scale CSG production.[6]

We note that DPIE Water's advice on conditions refers to previous advice it has provided about groundwater trigger and response actions and that these recommended responses include the quite serious proposal for several groundwater formations that if re-assessment is triggered and shows impacts on greater than the Level 1 minimal impact considerations in the Aquifer Interference Policy, the proponent should "consult with DP&E as to the requirement to re-apply for project approval." The Commission should clarify what the agency means by this as we are not aware of a mechanism by which a development consent could be revoked in this way. If there is this degree of concern about the unknown impacts of Phase 2 of the project, then consent cannot be granted.

## Lower Namoi Alluvium

The WEP report identifies significant problems with the modelling and assessment as it related to the Lower Namoi Alluvium (LNA). It identifies that there will be loss from the Lower Namoi Alluvium and Santos needs to "specify the level of entitlement required" from this water source.

The Department uses the Sustainable Diversion Limits of the productive aquifers as context to downplay the scale of the volume of water to be taken by Santos for the gasfield. Conversely, the Assessment Report fails to mention DPIE Water's warning that "acquisition by Santos of licences in some groundwater sources is not guaranteed, as some sources are fully allocated with high competition for groundwater entitlement." This is a warning echoed by the Department's Water Expert Panel.

There are marked divergences in Santos' modelling parameters from the water sharing plan model for the Lower Namoi Alluvium: "LNA leakage from the artesian aquifer is estimated at 7.9 GL/year by the water sharing plan model compared to 1.1 GL/year in the EIS model. However, this is for observed dynamic heads. For the fixed head (akin to the average heads approach modelled in the EIS) Merrick (2001) estimated a flux of 10.3 GL/year" (Water Expert Panel Report). The implications of this could be serious for water users in the Lower Namoi Alluvium, as the Water Expert Panel identifies. WEP recommends that, "if the project is approved and prior to construction, Santos specifies the level of entitlement required from the LNA and assesses the potential impact of that entitlement on access of existing users and groundwater trading under a range of climactic conditions." The Aquifer Interference Policy requires that this work be undertaken as part of the assessment process, not subsequent to approval.

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[6] Department of Planning and Environment. State Significant Development Assessment Report: Bibblewindi Gas Exploration Pilot Expansion. May 2014. https://majorprojects.accelo.com/public/5bb8cf5bdfc2e43633ed030895e5fceb/Bibblewindi%20Gas%20Exploration%20Pilot%20Expansion_Secretary's%20Report.pdf.

It is unacceptable that such work should not have been undertaken already and presented to the Independent Planning Commission as part of its consideration of this project. The Commission is being asked to grant consent without knowing the impact of the project on the productive Namoi Alluvium. It is absurd for the Department to propose a performance measure of "Negligible environmental consequences beyond those predicted in the EIS," for the Namoi alluvium, given the clear finding by the Water Expert Panel that the environmental consequences for the Lower Namoi Alluvium are not described by the EIS.

As part of the condition requiring upgrade of the groundwater model to one that can accurately predict impacts on local groundwater, the Department specifies that Santos must include "consideration of leakage from the GAB to the Lower Namoi Groundwater Source *using the heads predicted by the EIS model*." It is concerning if the Department is proposing to write into the conditions of consent a requirement to use inaccurate modelling parameters that underestimate impacts on productive groundwater.

It is completely unacceptable for this basic level of assessment and evaluation to be deferred until after consent is granted. This information should be material to the decision to grant or refuse consent and without it, the IPC must refuse.

## Groundwater chemistry

The Water Expert Panel (WEP) sought information from Santos about gas composition, especially carbon dioxide, but the company has declined to provide such information on the grounds that "detailed spatial information of gas is commercial in confidence." Santos has a controlling stake in every one of the petroleum exploration licences in the region and that no competitor has sought to explore in the region for several years. Rather than simply accepting Santos' secrecy about this issue, public authorities need to insist that this information be disclosed, given that it is material both to the environmental impacts of the gasfield and its commercial justification.

The WEP also had difficulty in getting information about methane in bores. They conclude it is not likely to be "a major issue," "but it cannot be totally discounted at this stage, given the limited baseline information on gas occurrences." They observe elevated methane in non-coal Triassic formations and in water derived from the Namoi alluvium and suggest that "it would be prudent to fully document these occurrences and determine their likely source, prior to major CSG developments in the area" and "to document known occurrences of methane and the surface or in wells or water bodies in the Narrabri region prior to commencement."

Given that methane migration has been raised as a significant concern by landholders and the broader community, it is unacceptable to defer proper assessment of this issue to after the granting of consent. One of the performance measures proposed in the conditions of consent is "Negligible change to baseline methane levels in groundwater user bores," but how can this measure possibly be tested without the above information being established? It is proposed that the Water Management Plan include a Surface Water Management Plan that includes "detailed baseline data" for, among other things, natural methane leaks and accumulations. Similarly, the Groundwater Management Plan is supposed to provide "detailed baseline data" concerning "natural methane leaks and accumulations, including in privately-owned bores and monitoring bores." It is proposed that this be based on three years of data only "where available" which makes it very unclear how and when an adequate baseline will be established.

Santos told the Water Expert panel that, "In general, methane is observed at low and varying levels in all formations above the target formations, though the majority of groundwater samples from

across the monitoring network do not record any hydrocarbons above the level of reporting." They further told the WEP that, "In all recorded cases of methane in groundwater outside the coal measures, including in the alluvium aquifers, concentrations are below 10 ppm." This is statement is repeated by the Department in its Assessment Report, but it is not true.

A recent paper in *Science of the Total Environment* (Iverach et al, 2020) raises evidence that Santos and the Department appear to have overlooked. The authors demonstrate that the rate of oxidation observed in methane present in the Lower Namoi Alluvium "is consistent with the hypothesis that the primary source of CH4 in the alluvium can be traced back to the formations underlying the GAB."[7] Contrary to Santos' claim that "All recorded cases of methane in groundwater outside the coal measures have been below 10 parts per million (ppm)," methane concentrations in the samples collected for the Iverach paper ranged from 520ppm to 3,427ppm.

The authors use seismic data collected by Santos' former partner in CSG exploration in the region, Eastern Star Gas (ESG), to partly explain their finding that the methane in the alluvium is coming from the coal seams: they examine the Wilga Park anticline, igneous intrusions and faults planes identified in ESG's own seismic data and find methane migration pathways in each. Contrary to the information presented by Santos, "Some of these fractures in the ESG seismic section propagate into the top of the Purlawaugh Formation and into the Pilliga Sandstone."

The authors' findings reveal "a spatial trend with higher CH4 concentrations in the south of the study area" in areas that coincide with the locations of important faults, igneous intrusions and permeable facies identified in the study area, as well as locations of wells drilled by ESG for gas exploration.

Given that the company has been exploring for gas in the area for a decade and assessing this production project for four years but has not yet managed to collect and produce such data, the public cannot have confidence that this data will be fit for the purpose of determining Santos meets the performance criteria.

The "very low presence of sulphate in the target aquifers," is cited as a reason to not be concerned about the risk of sulphate-reducing bacteria. But the target aquifers are not the only formations that will be drilled. The *Drilling Fluid Risk Evaluation* conducted for Santos for its Dewhurst pilot (the consent for which is proposed to be rolled into this consent) stated that "Due to the naturally elevated background levels of sodium and sulphate within the shallow groundwater system (Narrabri sediments) the dissolution of sodium and sulphate from drilling muds is not anticipated to have a measurable impact on groundwater quality." (*Dewhurst Gas Exploration Pilot Expansion Response to Submissions* Appendix 3).

Furthermore, the drilling fluid used by Santos in its operations *introduces* sulphate to the groundwater. For the pilot project assessment, Santos argued that the presence of sulphate-reducing bacteria was a factor that would limit the spread of sulphate. The drilling fluids contain biocides designed to inhibit these microbes, but the assessment material does not seem to have included any serious investigation into this issue and the effectiveness of Santos' strategy. This is an important issue for nearby landholders. If populations of sulphate-reducing bacteria are stimulated by the sulphate in the drilling fluid, it could lead to corrosion of both the metal and cement components of the equipment and casing, leading to failure and groundwater contamination pathways.

[7] Iverach et al. (2020). https://www.sciencedirect.com/science/article/pii/S0048969719349198#m0010

## GAB recharge

The Department's Assessment Report is disappointingly selective in its presentation of information. It seeks to downplay the importance of the Great Artesian Basin Southern Recharge where it outcrops in the Pilliga by comparing it to the larger rates of recharge to the south in the Warrumbungles:

> The project area, as with the entire region, is within a recharge area for the GAB. However, recent modelling by GISERA indicates that the project area is located within a comparatively low recharge zone (less than 5 mm per year), as the Pilliga Sandstone outcropping is limited in the area and rainfall is relatively low. Primary recharge in the region (more than 40 mm/yr) occurs via the Warrumbungles, located to the south of the project area, where higher rainfall and greater outcropping exists (see Figure 21 and Figure 22).

According to the Department, "The WEP accepts that the project area is not a significant recharge zone for the GAB," but nowhere in the WEP panel report is this phrasing "not significant" used. They do observe that, "The volume of water that provides the recharge in the NGP area to be developed by Santos is relatively small compared to that of the dominant area of recharge in NSW to the south." These are observations of relative recharge rates *within* the Pilliga Sandstone. In contrast, the NSW Department of Planning, Industry and Environment's own *Southern and Eastern Recharge Groundwater Sources Literature Review and Recommended Recharge Rates* (February 2020) clearly identifies that the majority of groundwater recharge for the GAB in New South Wales "occurs along the elevated eastern margins of the GAB where sandstone aquifers (predominantly the Pilliga Sandstone and permeable layers in the Keelindi Beds) outcrop or subcrop" (page 20). That is to say, the Pilliga Sandstone, including the area affected by this project supplies the majority of GAB recharge in New South Wales.

To support the claim that the Narrabri project is "not in a major recharge area" of the GAB, the Assessment Report includes grainy reproductions of images from unreferenced material from GISERA (Figures 21 and 22). The grainy reproduction was supplied by Santos in answer to WEP questions about the company's contention that the Pilliga Sandstone was not a "major" recharge area of the GAB. This would have been clear to the Department if they had viewed the source of Santos' supplied image of GAB recharge which they reproduce as Figure 22 in the Assessment Report.

Figure 22 shows only a narrow band of the eastern part of the GAB to compare the estimated 5mm a year recharge in the Pilliga Sandstone to the estimated 40mm a year in the Warrumbungles to the south. Had Santos and the Department provided the entire map from the source study for the image, the impression created about the relative importance of the Pilliga would have been very different, as Figure 1 below shows.

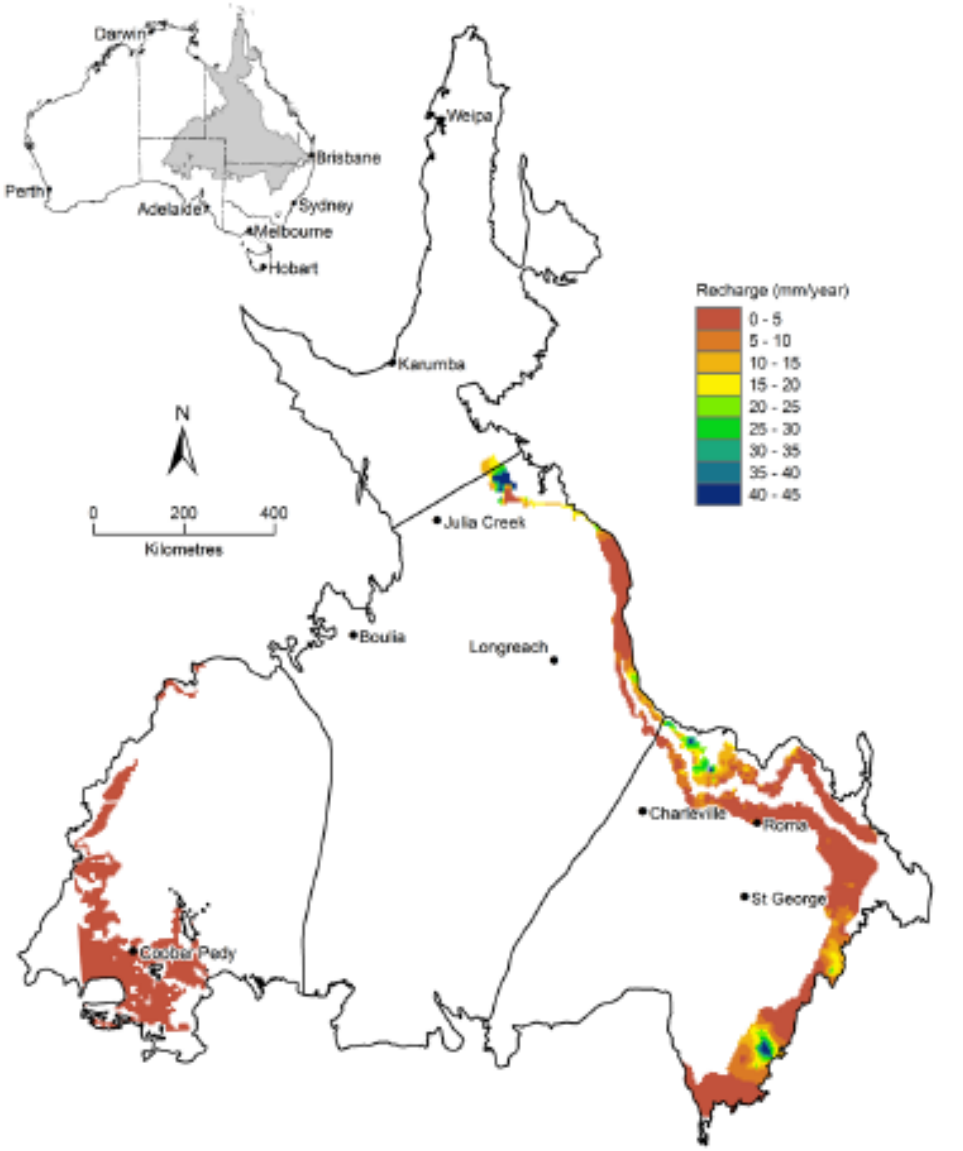
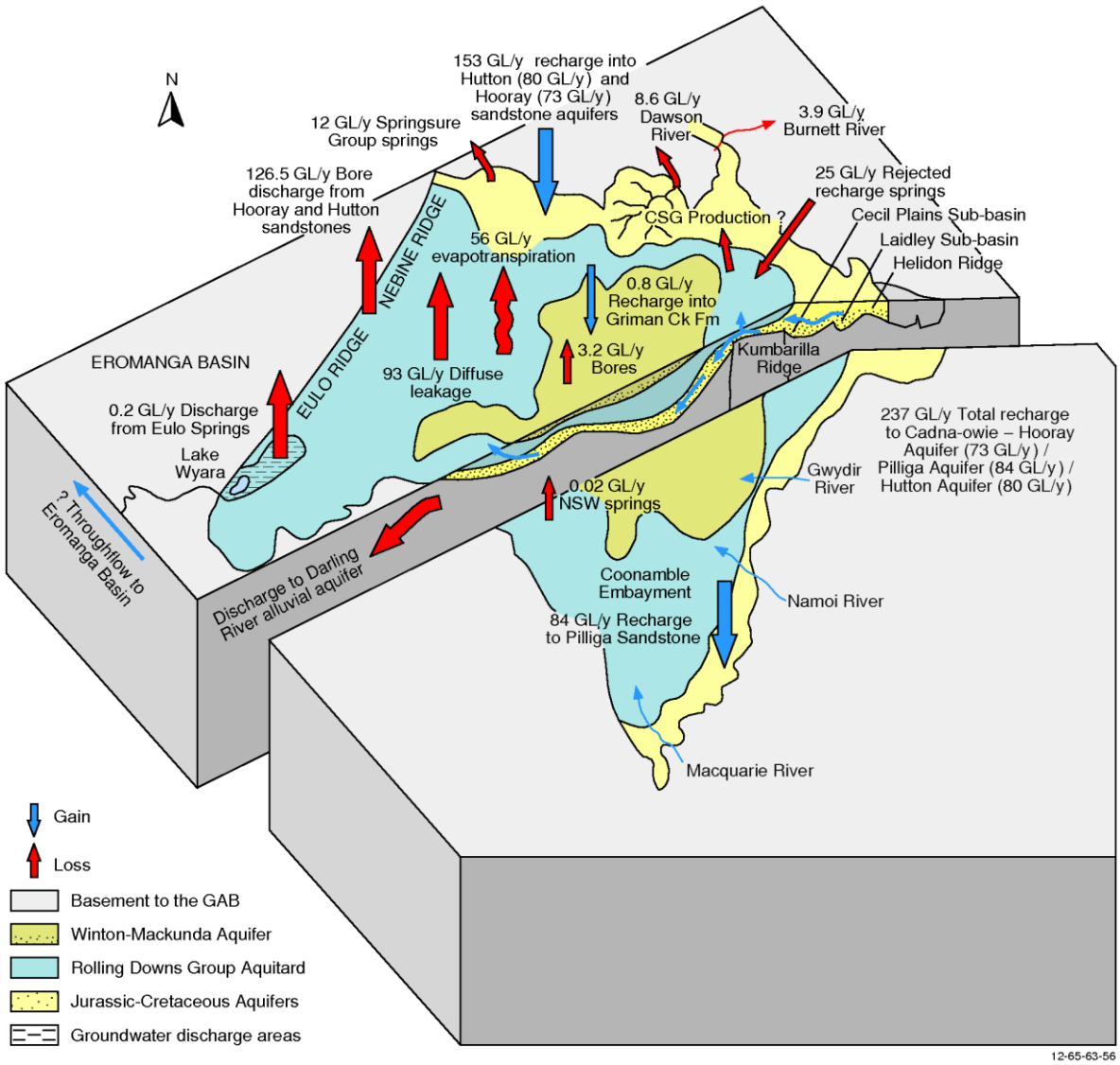



Figure 7.9 Groundwater recharge estimated by the chloride-mass-balance method to Cadna-owie – Hooray and Hutton aquifers

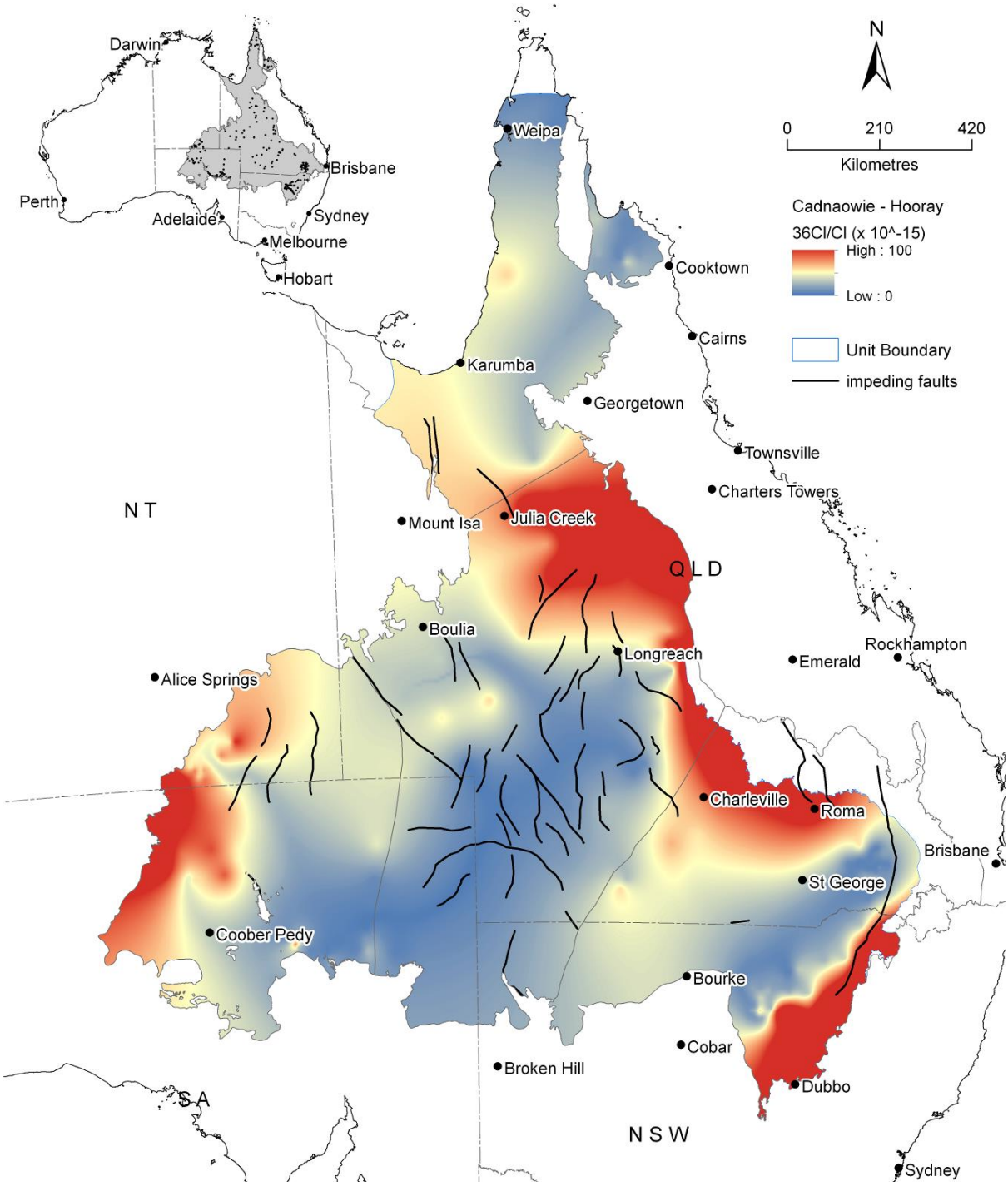
*Figure 1: GAB recharge map taken from Ransley et al 2012. "Hydrostratigraphy, hydrogeology and system conceptualisation of the Great Artesian Basin"*

We note that the same series of 2012 CSIRO reports, *Water Resource Assessment for the Great Artesian Basin* (Smerdon et al 2012), used a range of maps and diagrams to represent best available knowledge of the GAB recharge areas, including the below, clearly noting the significance of the recharge to the Pilliga Sandstone.[8]

[8] Smerdon et al, (2012). Water Resource Assessment for the Great Artesian Basin, A report to the Australian Government from the CSIRO Great Artesian Basin Water Resource Assessment, CSIRO




From Smerdon et al 2012: **Figure 5.5 Hydrogeological framework and groundwater balance of the Surat Basin**




From Smerdon et al 2012: **Figure 4.5 Ratio of chlorine – 36 to chloride in the Cadna-owie -Hooray Aquifer and equivalents. High values are indicative of recharge areas.**

## Faulting

One of the serious deficiencies of the groundwater assessment conducted by Santos is that it did not include geological faults in the model that could increase transmissivity between the coal seams and the overlying aquifers. A report prepared for the Chief Scientist's review of Coal Seam Gas in 2014 said that, "Considerable work is required to understand if fracture networks would allow the movement of groundwater from the coal measures to adjacent aquifers in association with CSG

development."[9] It appears that Santos was not willing to undertake this "considerable work" in the area being targeted for coal seam gas development in the Pilliga and surrounds. The WEP panel remarked that, "the information provided on faulting and tectonic (including neotectonic) processes in the EIS is considered sparse."

Once again, the Department has glossed over this issue in its Assessment Report. The Department says, "The WEP also concludes that it is unlikely that faulting constitutes a major risk to the project, with any such faulting unlikely to have a major impact on groundwater flows" (para 288), but that is not a faithful report of the WEP's comments on this issue. In fact, the Water Expert Panel advised the Department that the presence of geological faults could create "an impact on groundwater flow that would not be evident in the model." The WEP actually cites evidence of new faulting in the region and the experience of major impacts of faults on the occurrence of natural leakage of methane in the Queensland gasfields.

As already discussed, seismic data collected by Santos' former coal seam gas partner Eastern Star Gas has been used by scientists to better understand the presence of methane in the Namoi Alluvium and the GAB Southern Recharge nearby to this project. That research identified "A north-south seismic section along the axis of the [Wilga Park] anticline maps faults that cut into the Pilliga Sandstone and a volcanic plug that extends from the regional basement and passes upwards through the Maules Creek Formation and Hoskissons coal seam into the base of the Pilliga sandstone."[10]

This is evidence that not only did Santos not collect new data to properly assess this gasfield, the company did not even use existing data to do so. The Water Expert Panel recommended "detailed geological mapping and seismic investigation be conducted prior to selecting final well locations." Again, we appeal to the IPC to apply the precautionary principle. Santos has presented its gasfield as having negligible impacts on the Pilliga Sandstone and the Namoi Alluvium on the basis that it did not conduct adequate studies that would have accurately described these impacts. It is simply unacceptable for full development of coal seam gas in the Pilliga to be granted development consent on this basis.

## Gunnedah Oxley Basin

DPIE Water provided advice to the Department to the effect that the data presented in the Water Baseline Report was not sufficient to adequately determine thresholds to identify change in the condition of the water resources, especially for Gunnedah-Oxley Basin aquifers where there is very limited existing information available.

The Department's Assessment report says of the Gunnedah Oxley Basin, "This water source is not significantly used in the region due to its depth and poor water quality" (para 307). It may be true that the GOB is not widely used, but it *is used by some* and the Department has made no attempt at all to consider the impact of this gasfield on users of the deep aquifers of the Gunnedah Oxley Basin immediately to the east of the project area. The water users rely on GOB water for their livelihoods and have not had any contact from Santos to discuss and assess the potential impact of gasfield dewatering on their farms and livelihoods.

[9] Ward and Kelly, 2013. *Background Paper on New South Wales Geology With a Focus on Basins Containing Coal Seam Gas Resources*.
[10] Iverach et al. (2020). https://www.sciencedirect.com/science/article/pii/S0048969719349198#m0010

Lock the Gate has been in contact with several of these water users and they report that they have not had contact from Santos or the government about the risk to their water bores from coal seam dewatering below them.

## Entitlements and licences

The Department asserts that, "there is adequate depth in the market for all affected water sources to accommodate the relatively small water take associated with the project." This is contrary to DPIE Water's warning that "the acquisition by Santos of licences in some groundwater sources is not guaranteed, as some sources are fully allocated with high competition for groundwater entitlement" and to remarks by the WEP about the limited historical trading in the productive groundwater sources that will be affected by the project.

We are alarmed that the Department has not addressed the concerns raised by the WEP about the disparity between Santos' model and the model of the Lower Namoi Alluvium, and the WEP's contention that Santos will need to acquire entitlements in the Lower Namoi Alluvium to account for an unknown scale of drawdown. No mention is made elsewhere of entitlements needed in the Lower Namoi Alluvium. As the WEP remarks "the impacts which the EIS describes as insignificant, may in fact be volumetrically large."

In a discussion of the unquantified drawdown likely to be caused by the gasfield in the Lower Namoi Alluvium, the WEP observes that "it would be risky for the project to assume whatever the NGP requires will be available" (223 of PDF) because while not large in comparison to current usage, it is "likely to be large in comparison to the historic trading patterns."

We are also concerned about the ability of the proponent to obtain entitlements in the Southern Recharge of the Great Artesian Basin. It is evident from the transcript of the Department's meeting with the IPC that the Department was unaware that while it was assessing the Narrabri gas project, the Water Division was conducting a statutory review of the water sharing plan for NSW GAB groundwater sources. That review included a literature review of estimated recharge rates in the southern and eastern recharge aquifers of the GAB which may have been useful for the Department to read to understand the important role of the project area in GAB recharge. As part of the water sharing plan review, the volume of stock and domestic water entitlements in the southern recharge was significantly increased such that the water source is now, in the new water sharing plan that was gazetted at the beginning of July 2002, over-allocated by 1,500ML a year.

There has not been a serious engagement by the proponent or the Department in the question of whether Santos will be able to obtain entitlements to account for its expected take from the GAB southern recharge. Santos has argued that acquisition of these entitlements can be deferred, the effect of dewatering will essentially be unstoppable once it takes place. We note that the Department's draft conditions have ignored DPIE Water's recommendation to address this risk, that the consent conditions "require Santos to obtain the entitlement at least one year prior to the commencement of the relevant stage."

## Groundwater triggers

In August 2019, DPIE Water advised that, "The proposed groundwater monitoring triggers need to be improved as they do not provide enough early warning to allow for appropriate management measures to be implemented." We are concerned that advice from that agency about trigger and response actions has not been included by the Department in the Assessment Report or the conditions of consent.

That agency proposed “management response triggers” be imposed on the gas field in accordance with its earlier advice which is Attachment B to document OUT18/6607 dated October 2018 and included extensive recommendations for triggers and response actions to address uncertainty about groundwater impacts. In the nearly two years subsequent to this advice, Santos has resisted complying with DPIE Water’s advice on monitoring, model calibration and triggers. No further update has been publicly provided by Santos or the Department, but a consent condition requires the development of triggers.

We are very concerned that the stringent triggers proposed by DPIE Water cannot practically be implemented once a development consent has been granted for full-scale development of the gasfield. The action responses requested in that document for several groundwater formations state that if re-assessment is triggered and shows impacts on greater than the Level 1 minimal impact considerations in the Aquifer Interference Policy, then “the proponent consult with DP&E as to the requirement to re-apply for project approval.”

We believe the IPC needs to seek clarification from DPIE Water about the practical implementation of this advice, since “reapplying for project approval” is not a mechanism provided for in the Environmental Planning and Assessment Act 1979. The triggers advice speaks to the considerable uncertainty about the scale of impacts that will occur as a result of this gasfield. The fact that Santos has not agreed to these triggers and the Department has not included them in the draft consent conditions leaves this enormous uncertainty and the risk it carries on the shoulders of existing water users in the region. We suggest that the only practical legal way to implement DPIE Water advice is to treat Phases 1 and 2 of this project as requiring separate development consents, with Phase 2 to be considered only after the data collection, model calibration and full assessment proposed in the consent conditions is complete and proper enforceable trigger levels agreed.

## Hazards and fires

The Commission heard during the public hearing into this project about the concerns of local Rural Fire Service volunteers and leaders about the effect of fire in the Pilliga on the gasfield and the risk of the project starting a fire. Appendix E5 to the Assessment Report states that for this project “the likelihood of a loss of containment creating a fire is estimated at once in 70 years.”

This is a substantial risk and amounts to a 35% chance there will be a loss of containment creating a fire during the life of the gasfield. However, as outlined in the attached advice from Climate Risk, the fire risk assessment for the gasfield failed to include the underlying intensification of fire risk associated with climate change. According to Dr Karl Mallon, there will be a 150% increase in the probability of bushfire conditions in the area local to the gasfield under IPCC’s Representative Concentration Pathway 8.5, which is the current global emissions trajectory. Dr Mallon advises that “This would have an impact on estimated bushfire ignition probability of 1 in 70 years notes in the document titled “Question to Santos - Email of 2 September 2019” in principle raising the probability to 1 in 28 years – i.e. climate change could results in a reasonably high probability of the project starting a bushfire during its lifetime.”

## Waste and salt

One of the major environmental risks of this project is the huge volume of waste salt that it will produce, which still has no clear destiny. This is an issue that has been consistently raised by experts,

community members and the EPA and despite repeated requests to do so, Santos has not prepared a practical and effective plan for disposal or use of this salt.

The EPA's submission to the Environmental Impact Statement dated 1 June 2017, requested Santos "identify the facilities where the salt waste is to be disposed and demonstrate capacity and capability of those facilities to handle the salt." This information was not provided, and in the EPA's advice on the Response to Submissions, dated 4 July 2018, the recommendation was reiterated as necessary "prior to determination." The EPA also remarked in its 2018 advice, "The EPA expects that many, if not all, landfill facilities in the local government area will not have the capacity to receive the quantity of salt (and other waste) generated by the project. Furthermore, sites with capacity may not be capable of managing that salt in an environmentally satisfactory manner because they may be un-lined or not have an operating leachate management system."

As the EPA has pointed out, Councils can refuse to accept this salt waste and Narrabri Council requested a condition of consent prohibiting the disposal of salt at local facilities. The Assessment Report states that "Santos reports that there are 11 licensed solid waste disposal facilities within a 150 kilometre radius of the site." (Paragraph 396). In October 2019, Santos' response to issues raised by Narrabri Council states that "Santos understands that the Narrabri Waste Management Facility does not have the capacity, or appropriate design/construction, to accept Santos' salt waste." But claims that "The proponent has identified six NSW landfills within a 150 km radius from the project and a further four from 150km to 200km of the project that are licensed to accept general solid (non-putrescible) waste. In the event that none of the ten options identified within 200km of the project are able to accept the waste, a number of alternative options exist in the greater Sydney region." There is no evidence that Santos or the Department are aware of whether the other 10 facilities within 200km have, unlike Narrabri, the capacity and capability to accept Santos' salt waste and in what quantities.

The Department claims that the EPA "Supports recommended conditions" but we note that the condition upon which the EPA provided comment regarding the salt disposal study does not appear to specify that this study only needs to be prepared prior to commencement of Phase 2. The public has not been provided with the previous draft of conditions upon which the EPA provided comment so it is not clear if the EPA still considers this an issue that must be addressed up front, as previously.

Prof Stuart Khan's evidence, submitted by the EDO on behalf of the North West Alliance, raises serious questions about the classification of this salt mass as "general solid waste" in accordance with the waste classification guidelines. Discussion of this classification has focused on the concentrations of metals and other contaminants in the salt waste, which is still under question, but Professor Khan highlights the difficulty that unlike other forms of "general solid waste" the salt produced by Santos' reverse osmosis plant will be water soluble, making it inappropriate for disposal at a general landfill facility. Professor Khan contends that the solid waste guideline is not fit for the purpose of classifying this waste and states in his submission that "The NSW Waste Classification Guidelines cannot be reasonably applied to hundreds of thousands of tonnes of CSG salt, and attempts to use them for that purpose will inevitably lead to the production of highly saline leachate and an associated high risk of seriously contaminated groundwater and surface water." Needless to say, without a known location for this disposal, the environment impact of this inevitable leachate is not considered in any of the assessment material provided to the IPC.

## Gas prices and supply

We note the Department's statement at the public hearing DPIE that "no one is saying Narrabri gas will reduce prices." This is an important admission and contradicts the implication in the Assessment Report that the project will "strengthen energy security" by "increasing competition in the domestic gas market and putting downward pressure on gas prices."

The issues of pricing and supply are distinct in this situation.

The Department claims that, "the closure of several coal-fired power stations in NSW (Liddell, Vales Point, Eraring and Bayswater) could increase the demand for gas in the electricity sector as new gas-peaking power stations are built to provide dispatchable energy to the NEM." None of the assessment material provided by Santos demonstrates that the Narrabri gasfield is necessary for this purpose and no advice has been provided by the Energy and Climate Change Division of the Department to this effect. We discuss this in more detail in the following section on greenhouse emissions.

The expectation that eastern Australia will experience "supply gaps" for gas is central to the justification of this gasfield, but the Department's discussion of this issue in its Assessment Report is one sided and naïve. Appendix E7 to the Assessment Report (Santos' "Update on Strategic context") cites the causes of high gas prices as decline of Gippsland, less accessible reserves, delayed development of supplies, regulatory impediments to onshore gas in Victoria and transportation costs. It fails to mention the primary cause of high gas prices acknowledged by everyone else: the opening up LNG exports in Queensland, particularly by Santos as part of its Gladstone LNG joint venture. This document cites "diversion of gas from the Cooper Basin to fulfil LNG export contracts" as among the reasons NSW users have or will experience difficulty obtaining gas, without mentioning that it was Santos that orchestrated this diversion and it was Santos' own export contracts that needed extra gas to be fulfilled.

Claims about gas supply constraints need to be understood in context. The Eastern Gas Region is simultaneously producing record volumes of gas and continually predicted to be under threat of supply shortfalls. Supply of natural gas in the Eastern Gas Region has tightened since the Queensland LNG export projects do not rely solely on new supply, but draw on reserves from the Eastern Gas Region (Australian Energy Regulator, 2017).

According to Alistair Davey's report for Pegasus Economics, the estimated production costs of the Narrabri Gas Project of $6.40 per gigajoule, with a delivered cost to Sydney somewhere in the order of $7.60 to $8.40 per GJ makes it a comparatively high cost gas development. There are 15 developed and 15 undeveloped Eastern Gas Region gas projects with lower estimated production costs than the Narrabri Gas Project.

Indeed, while the Department describes Narrabri gasfield in terms of "additional supplies" of gas, the economic assessment material provided to them by Santos (Appendix H2 – B) makes it clear that "In analysing the economic impact of the Narrabri Gas Project, **it was assumed that the project did not add to total gas supply at a national level."** Furthermore, Santos clarifies, in the economic assessment "**it was assumed that the project itself did not drive change to gas market prices."** (Page 8 of the PDF Appendix H2 – B).

For detailed consideration of this issue, we refer the IPC to advice and submissions provided by Pegasus Economics and the Institute for Energy Economics and Financial Analysis.

## Greenhouse

The Department asserts that “the greenhouse gas emissions associated with gas use in NSW are likely to continue, whether the Narrabri Gas Project is approved or not” somewhat contradicting their assertions that gas supply will suffer without the project. No analysis is provided to substantiate this claim and such analysis is necessary given the irreversibility of climate change and the extremely challenging mitigation effort required of NSW, Australia and the world to meet the goals of the Paris climate agreement. The NSW Government established the NSW Climate Change Council as an advisory body to the Minister for the Environment and the Department to provide independent, expert insight on climate change-related issues. This body does not appear to have been approached for advice, and nor does the Environment, Energy and Science Division of the Department.

The Assessment Report is critical of submissions that make general comments about gas developments without specifically indicating how they apply to the Narrabri Gas Project, but indulges in generalisations of the same kind in its consideration of “strategic energy planning” and the greenhouse impact of this project.

The Department claims that “using gas to generate dispatchable energy is also likely to help reduce total greenhouse gas emissions in NSW as coal use is phased out” without providing any material to substantiate this claim or demonstrate that this would not occur without the Narrabri gas project going ahead. The Department makes generalised claims about the usefulness of gas fired electricity without investigating how the Narrabri gas project fits into such claims, and whether gas-fired electricity is displacing coal, or lower carbon electricity options. The Assessment Report fails to describe in detail how much gas NSW currently uses in each sector and demand trends.

The Department says Narrabri Gas is “critical” for energy security, but in January this year, Premier Berejiklian said to the contrary that Narrabri is one of “two or three options” including an already approved gas import terminal at Port Kembla, concluding that “One of those three things will satisfy our arrangements.” Section 90 of the Assessment Report concedes this point. The actual data on electricity in New South Wales over the last decade indicates that the role of gas may be growing smaller, as shown in Figure 3.

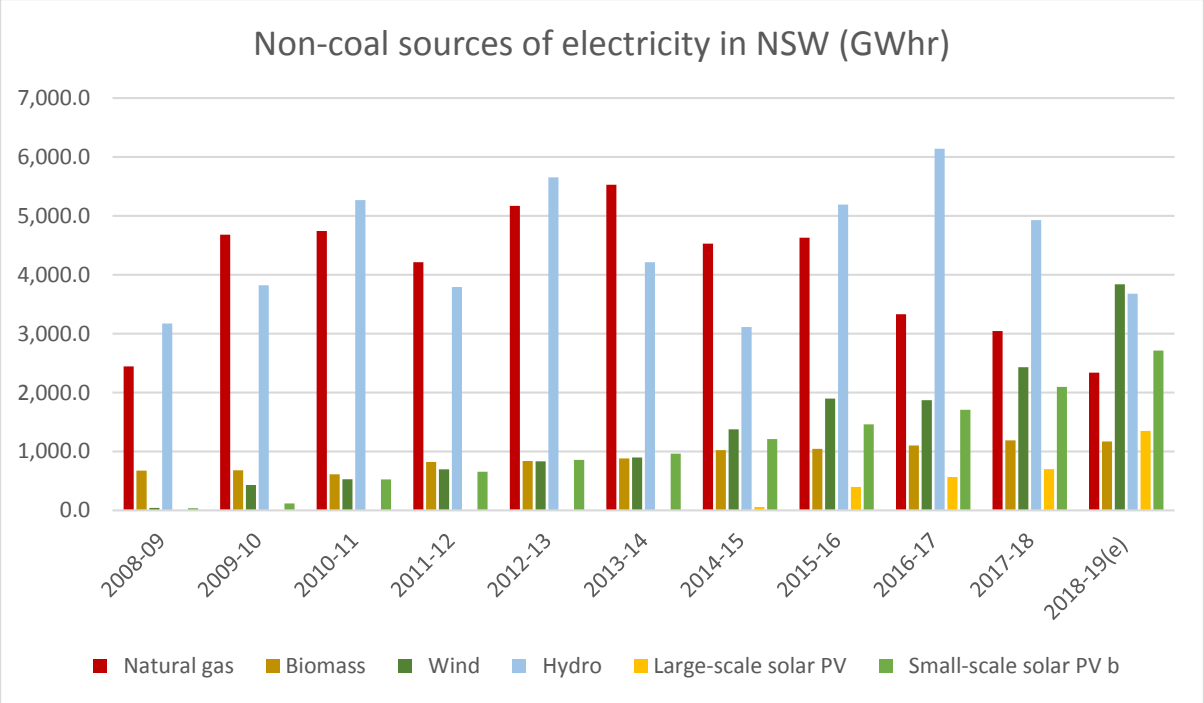



*Figure 2: Non-coal electricity generation in NSW since 2008/09. Source: Australian Energy Statistics*

The Assessment Report claims that AEMO "forecasts that gas use in NSW is likely to remain strong" but fails to accurately convey the very different potential pathways identified by AEMO for the future of power, nor the greenhouse implications of these forecasts in the context of NSW and Australia's climate change commitments. AEMO's 2020 *Integrated Systems Plan* is currently being finalised, incorporating NSW's new Renewable Energy Zones into its plans. The draft plan, released in November last year identified that "New flexible gas generators could also play a greater role if gas prices materially reduce." This is a significant caveat given the price of Narrabri gas. The interconnectors currently being planned and built are going to further reduce reliance on gas in the National Electricity Market.[11] Furthermore, the Department's Assessment Report does not mention the state's *Net Zero Plan Stage 1: 2020-2030*, which sets the aspirational goal of replacing 10% of the gas in the current network with hydrogen.

The IPC is charged with ensuring that greenhouse gas emissions are minimised "to the greatest extent practicable" but the Department does not provide information to enable the Commission to form this view.

Total greenhouse gas emissions produced by the project could be 127.8 million tonnes of carbon dioxide equivalent, or 5 million tonnes a year. Bizarrely, the Department describes this addition of greenhouse gases to the atmosphere as "driving down NSW GHG emissions and working towards a low carbon future."

It is apparent from the Department's assessment report that it considers a 0.9% increase in Australia's greenhouse gas emissions as acceptable, but Australia has committed to substantially *reducing* its domestic greenhouse emissions. One mention is made of the Paris climate agreement in the Assessment Report (in paragraph 535) but just how increasing Australia and NSW's greenhouse emissions by proceeding with this project fits into NSW and Australia's greenhouse and climate change policies and commitments is left unaddressed. Evidence provided to the Commission by Prof

[11] AEMO. Draft 2020 Integrated Systems Plan.

Penny Sackett indicates that achieving Australia and NSW's emissions reduction targets of the current decade will require annual reductions of 7.5Mt and 2.4 Mt respectively. In this context, emissions from the Narrabri gasfield represent 14-18% or 26-44% of those annual cuts, but in the wrong direction.

Globally, the UN Environment Program has warned that gas production is on track to exceed carbon budgets consistent with meeting the Paris climate agreement. UNEP's *Production Gap Report* in 2019 found that, "With average lifetimes of 20 years or longer for pipelines, terminals, wells, and platforms, the time to begin planning for a wind-down of gas production is, as with other fossil fuels, already upon us." Their report found that to achieve the Paris Climate Agreement goal of keeping average global warming well below 2 degrees, global gas production needs to peak by 2030 and decline after that. To meet the safer 1.5 degrees warming limit, gas production needs to peak this year.[12]

Given three years of water data and development are requested by DPIE Water, it is not to be expected that phase two of this gasfield could possibly begin until at least 2024 and it's likely to be later. This means that the gasfield could be expected to still be producing and leaking gas up to and potentially beyond the NSW government's deadline to achieve "net zero" emissions. There has been no attempt by the Department to seriously address this issue and this context.

## Biodiversity

The Department's Assessment Report doesn't provide information to allow an informed decision about the impact of this project on biodiversity and the significance of the Pilliga forest. Only limited surveys were actually undertaken as part of the assessment of the gasfield, but these found 10 threatened plants and 35 threatened fauna in the gasfield area, including pygmy possums, koalas and Pilliga mouse. We are provided with numbers of hectares of each plant community type to be cleared, and what percentage that represents of that type in the project area overall, but no further context is provided. The Department uses this basic assessment to conclude that, "that the project is unlikely to significantly impact any of the identified threatened fauna species," but there is no consideration given to the distribution of species in the forest and the indirect impact on them of occupation of the forest by the gasfield such as habitat fragmentation and increased feral predation.

For example, the Pilliga is crucially important to the nationally threatened south-eastern long-eared bat and Pilliga Mouse. Virtually the entire population of the Pilliga Mouse lives in the Pilliga, but the Department does not engage at all with the impact of the gasfield on the availability and fragmentation of habitat for this species. Pilliga East has also been identified as a "distinct stronghold" for the south-eastern long-eared bat (*Nyctophilus corbeni*) in the conservation advice for that species which is not mentioned by the Department.[13] That conservation advice also makes clear that the species needs large areas of intact habitat and clearing and degradation of habitat is the key threat to its survival. Rather than assessing these ecological values and considering whether the impact on these species is acceptable or could be avoided, avoiding impacts on these species,

[12] UNEP, *The Production Gap Report*. 2019.
[13] DOEE Conservation Advice *Nyctophilus corbeni* http://www.environment.gov.au/biodiversity/threatened/species/pubs/83395-conservation_advice-01102015.pdf and Milledge David The Ecological Values of Pilliga East Forest and Threats Posed by Coal Seam Gas Mining 2011-12. https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/03/narrabri-gas-project/comments/200716-noth-west-alliance-d-milledge-1.pdf

the Department assumes from the outset that whatever impact is proposed is acceptable and can be offset.

The "avoid, mitigate, offset" hierarchy therefore is not adhered to. The assessment proceeds immediately to offsetting the presumed area of impact without considering any avoidance or mitigation. Santos tried to argue that is should not have to meet this offset obligation through like for like land based offsets but this argument has not been accepted. Nevertheless, no actual offset areas are presented for consideration by the panel as to their suitability to achieve the task of compensating for the loss of close to a thousand hectares of vegetation in the Pilliga. The Department makes no mention in its assessment report of the Biodiversity Conservation Division's finding that the offset strategy doesn't conform to the relevant guidelines. We do not believe that the proponent will be able to put together a package that can effectively offset the impacts of this gasfield in the Pilliga given its unique role in the landscape. With the absence of any offset properties actually being identified and given the warnings of likely species extinction in the Pilliga, the precautionary principle must prevail and "lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."

No ecological value, no matter how rare or threatened, is afforded a clear exclusion from clearing under the proposed Field Development Protocol. Weeping Myall Woodlands, for example, is highly fragmented and estimated to have reduced by more than 90% from its pre-European extent.[14]

The Department's Assessment Report also makes no mention of the recent catastrophic bushfires which have fundamentally altered the status of many species. A paper recently published in Nature found that in the course of the fires, seventy taxa had a substantial proportion (>30%) of habitat impacted and 21 of these were already listed as threatened with extinction. That paper argues that "To avoid further species declines, Australia must urgently reassess the extinction vulnerability of fire-impacted species and assist the recovery of populations in both burnt and unburnt areas. Population recovery requires multipronged strategies aimed at ameliorating current and fire-induced threats, including proactively protecting unburnt habitats."[15] As a consent authority, the IPC must consider this crucial environmental context when determining this project. Unfortunately, the Department has not provided the necessary information to make this consideration.

We refer the Commission to expert advice from David Paull and David Milledge submitted by EDO on behalf of the North West Alliance and to the submissions of bushwalkers, bird observers and field naturalists intimate with the Pilliga for detailed consideration of the acceptable biodiversity impacts of this project.

## Economics

The Assessment Report claims that the project will generate "more than $3 billion for the NSW Government in royalties and taxes" but this figure includes projected company tax of $1.3b which is paid to the Commonwealth Government. The claimed $120 million for the Community Benefit Fund is based on an inflated royalty estimate of $1.2 billion over the life of the gasfield, but the material provided in the EIS actually cites a total royalty contribution of $821 million, meaning the Community Benefit Fund at best would receive $82 million over 25 years, assuming the royalty calculation is fair. Unlike coal royalties, petroleum producers are able to claim deductions for

[14] DOEE Weeping Myall Woodlands Policy Statement 3.17. 2009.
[15] Ward et al. July 2020. "Impact of 2019–2020 mega-fires on Australian fauna habitat" *Nature and Ecology*. https://www.nature.com/articles/s41559-020-1251-1

processing and other costs. No detail is provided in the EIS about how the royalty total was calculated, but it seems at the upper end of what might be expected, given the assumed gas price of $8.70 per GJ in the economic assessment and the base royalty rate of 10% of value, before deductions. We note, too, that if Santos pursues the option of generating electricity for running the gasfield onsite, it will not, under section 87 of the *Petroleum (Onshore) Act 1989* attract a royalty payment. Additionally, production of gas from the 25 appraisal wells in Phase 1 are unlikely to attract a royalty if the gas is used under the beneficial use provisions of the Petroleum Regulation.

The material provided by Santos in answering the expert review indicates that changing the assumptions in the assessment reverses the purported economic benefit of the project. The claimed benefits are sensitive to Santos' degree of foreign ownership, its sharing of benefits with a joint venture partner and the price of gas. If the project does not generate a profit, it will not contribute to tax revenue.

The EIS assumed 87% domestic ownership of Santos and Appendix H2 - B indicates that a 5% reduction in Australian ownership would reduce net value of the project by six percent. The reviewer requested details of joint venture partners but did not get them. Santos calculated that if the benefits of the project were shared 80/20 with another non-domestic company, and Santos was 87% Australian owned, the net value of the project would be 20 percent lower.

The tables summarising the cost benefit analysis indicate how narrow the results are. A 10% reduction in production levels takes the claimed net benefit to Australia below a million dollars, and that's assuming 87% of Santos is owned domestically. Under that scenario, the NSW net present value is less than half a million dollars. As Table 4 makes clear, this project won't result in a net benefit if gas prices do not fall by 30%.

## Social impacts

The negative social impacts of this project will be considerable. Some of the impacts that concern out network include:

- **The impact on housing and accommodation availability and affordability**

  Such impacts are described by the EIS during the construction phase as "possible" and during operation phase as "almost certain" (Chapter 26, p.24). This will disproportionately impact people with lower incomes and Aboriginal people, who are more likely to be renters.

- **The mental health impact on landholders** and others in fear of impacts of the project on their resources.

  This impact is exacerbated by the Department and Santos failing to engage with these concerns in any meaningful way. We note that Narrabri LGA already has higher rates of intentional self-harm hospitalisations, and other mental health issues than the rest of New South Wales. Professor Alison Ziller's expert advice submitted by the Environmental Defenders Office for the North West Alliance notes that Narrabri LGA is in the highest quintile for excessive alcohol consumption, premature mortality by suicide and self-inflicted injuries relative to other NSW Local Government Areas. Professor Kemp's advice cited peer-reviewed research about the mental health impacts of CSG but observed that there is "little acknowledgement within the NGP SIA of the potential impacts of the project on the mental health of the community in which the project is located." Santos dismissed questions about

mental health from the social impact expert retained by the Department as "out of scope" of their social impact assessment.

- **Unequal distribution of financial benefits for the project within the community**

  This issue is also raised by Professor Kemp and is not addressed by the proponent or the Department. It will be exacerbated by a lack of transparency and inclusivity by the proponent and by the likely unequal distribution of harms, which will particularly impact vulnerable people, Aboriginal people and women. Provision of sporting club sponsorships and other short-term cash injections serve the proponent's purposes but will not provide for lasting and strategic social improvement beyond the life of the gasfield and in areas that do not attract publicity.

- **Impact of masculinisation of the population**

  Rates of domestic assault, and apprehended violence order breaches have increased in Narrabri over the last five years and may be exacerbated by the "masculinisation" of the community with the arrival of a predominantly male workforce. We note that Prof Kemp's advice observed that the Social Impact Assessment "is limited in its engagement with issues of vulnerability, gender and Indigenous peoples."

- **Community conflict**

  In answer to the question from the social impact reviewer "how will ongoing tension and levels of tension and conflict be monitored and if necessary managed?" Santos says only that it will monitor and address this through existing channels, and adds that "It is also recognised that well organised and funded protest groups, comprising predominately non-residential members, may negatively impact community wellbeing when present in the project area." (Appendix H4 –B). This is precisely the kind of disengaged and dismissive reaction that will worsen the social impacts of the development.

The Department sought review of Santos' Social Impact Assessment from social impact expert Professor Deanna Kemp and summarises Prof Kemp's advice in the Assessment Report in this way: "Prof Kemp considers that, overall, the negative social impacts of the project can be appropriately managed, and that many of the residual issues can be dealt with through a Social Impact Management Plan (SIMP) and appropriate conditions of consent."

What Professor Kemp's advice actually says is:

> the social impacts and risks posed by the NGP can in general be adaptively managed if leading practice measures are adopted. Therefore, should the project be approved, conditions are warranted to ensure the NGP operates inclusive of all stakeholders, and that the proponent is responsive to concerns that are material to the community. The recommended measures are not discrete, but are interrelated. They are repeated below, grouped according to theme, and represent key opportunities to support social performance.

She provides detailed recommendations for what the Social Impact Management Plan must include to achieve this.

We note that Prof Kemp also advised that, “It will be critical to public trust in the proponent and in the NSW Government that the documents supplied through the assessment process prove to be a reliable and credible account and assessment.”

Job-creation is among the key benefits claimed for this project, with an expected increase employment in Moree-Narrabri area by “an average of 190 FTE job years each year” and an average 322 FTE job years each year in the rest of the state. However, this increase comes at other industries’ expense. The updated economic impact assessment dated September 2018 and provided in Appendix H2 - B Actually shows a loss of manufacturing jobs in NSW and the local area in Table 2.2 “The negative impacts shown to agriculture and forestry, mining and manufacturing are small and are likely mainly due to the competition for labour and small increases in local costs.”

## The Department’s proposed consent conditions

Below we provide some responses to the proposed conditions of consent, including where agencies or experts have made specific requests that the Department has not included.

The conditions of the development consent reflect the usual arrangements for development consents, which gives the Department of Planning the authority for enforcing conditions, approving management plans and issuing directions.

But in New South Wales, the EPA is the “lead regulator” for gas, and is granted power to enforce conditions not just of its own Environment Protection Licences, but of development consents and petroleum licences (except for work safety conditions).

There is no engagement by the Department with this regulatory arrangement, and the conditions of consent grant the Planning Secretary broad powers to approve, amend and delay management plans, issue written directions and vary the requirements of the conditions. It appears to us inefficient and impractical for the EPA to be tasked with enforcing the consent but not be granted any powers under it.

Proposed condition A23, for example, gives the planning secretary power to cut out other agencies and parties that would otherwise have involvement in management plans.

The EPA specifically recommended that vague phrases like “all reasonable and feasible measures,” “as soon as practicable” “to the greatest extent practicable” and “as soon as reasonably practicable” be replaced with measurable and quantifiable measures or methods yet these phrases persist in the draft conditions.

The EPA also requested quite specific conditions to monitor and manage impacts on surface water, including specific performance criteria for downstream water quality and specific requirements for the discharge of water into Bohena Creek that have not been adopted. These include:

- Location of the flow gauging station and downstream monitoring
- Inclusion of triggers for the commencing and stopping of discharge

The draft consent introduces the concept of phased onset of the gasfield project, with Phase 1 comprising “ongoing exploration and appraisal activities,” Phase 2 being development of the full gasfield, Phase 3 being operation of the gasfield and Phase 4 decommissioning. Many conditions are framed around the start of one or another of these phases but the distinction between Phase 1 and Phase 2 is not entirely clear, especially since the note indicates phases can occur concurrently and Santos will be permitted to commercially utilise gas from appraisal wells under NSW regulations.

There are already 69 wells listed in the Assessment Report as being available for Santos' future use, and phase 1 will allow them to drill 25 more. So, the Department's position is that Santos can operate 94 "appraisal wells" and burn this gas, royalty free, commercially in its own power station at Wilga Park before they get a production licence or complete many of their management plans.

We note that the definition of "production well" is "a well for gas and water extraction, for the purpose of commercial gas production and/or use" and by that definition, Santos already has several production wells operating in the Pilliga. Is the granting of a production lease the trigger for the commencement of Phase 2 and the requirements it brings? The line is not clear and there is no clear condition limiting the number of wells, volume of gas and volume of water to be removed as part of Phase 1.

Several important Management Plans are not required by the conditions to be prepared until prior to the start of Phase 2, including the Air Quality and Greenhouse Management Plan and the Social Impact Management Plan. Given the risk of environmental and social harm during Phase 1, such delay seems unnecessary and irresponsible.

The EPA requested an "Air Quality Verification assessment" to be prepared before Phase 2 begins providing a detailed description of all processing plant, demonstration of best practice emissions performance of this plant, dispersal modelling of air pollution based on this plant design and demonstration that all of the above will comply with prescribed concentrations in the *POEO Clean Air Regulation*. This does not appear to have been included by the Department.

In Table 5, condition B19 the Nitrogen dioxide limits are expressed as micrograms per cubic metre. These should be expressed as parts per million to ensure compliance with the relevant air quality standard which is expressed in those units. Use of a UK conversion table for converting ppb of Nitrogen dioxide to micrograms per cubic metre indicates the levels in Table 5 may be above the national standard.

The EPA also requested "a periodic independent audit of the leak detection and repair program, in addition to ongoing periodic monitoring and reporting of trace VOC compounds" but this has not been included.

Condition B37 only requires the update of the groundwater model prior to Phase 2. Crucially, this condition does not specify that the model must achieve Class 2 or 3 confidence level. Crucially, too, it requires "consideration of leakage from the GAB to the Lower Namoi Groundwater Source" but specifies that this be done "using the heads predicted by the EIS model" which is a matter of contention since these estimate substantially less upward leakage from the Pilliga Sandstone than the model used by the Government for its Water Sharing Plan.

The final "Advice on conditions" from DPIE Water, dated October 2019, includes specific requests not included by the Department in its draft conditions of consent. DPIE Water recommended:

- That the conditions clearly articulate that the work programs for baseline data acquisition and modelling work must be defined prior to the start of Phase 1 (exploration drilling and appraisal).
- That consent conditions should include direct reference to a groundwater modelling plan which is approved prior to the start of Phase 1 and which clearly describes the timing for data acquisition which will be used in the modelling work.
- That a trigger action response plan includes tiered triggers linked to monitoring sites with increasing levels of risk management based on the water source.

- That Programs for the implementation of the Surface Management Plan and the Groundwater Management Plan are ***in place prior to the start of Phase 1*** to enable "***the collection of comprehensive baseline data prior to the production phase.***
- ***That there be "at least three years of monitoring data collected prior to Phase 2"*** and Santos ***should be required to establish the programs some years ahead of the transition to Phase 2.***
- That the consent conditions require Santos to obtain the entitlement at least ***one year prior to the commencement of the relevant stage.***
- An additional condition is required on the metering of any take so that Santos is compliant with the NSW *Non-Urban Water Metering Policy and the Water Management (General) Regulation 2018* and subsequent amendments.

The groundwater model must be updated before Phase 2, but the conditions don't require it to achieve Level 2 or 3 confidence level prior to Phase 2, rather, the update must "include all reasonable and feasible measures to improve the model to meet the requirements of a Class 2 and Class 3 confidence level model (as per the Australian Groundwater Modelling Guidelines) as soon as is reasonable and feasible" (Cond B37 (e)).

We note that there were conditions of consent imposed on Santos' most recently approved pilot wells approved at Dewhurst and Bibblewindi that required Santos to, prior to "revise its Groundwater Monitoring and Modelling Plan to include a description of the monitoring specific to the development, and provide consideration of the future development of the groundwater model to a Cass 2 (sic) or 3 model in accordance with the Australia Groundwater Modelling Guidelines and to a standard required by the NSW aquifer Interference Policy to the satisfaction of the Secretary." A compliance audit of the Dewhurst consent in 2016 reported that Santos advised the audit that,

> "following the issuing of the development consent they have given consideration to the development of a Class 2 or 3 Groundwater model and it is of the view that it is not feasible at this point in time as 20 years of groundwater monitoring data would be required to inform such a model. Santos has discussed this requirement with DPI Water (formerly The Office of Water) and agreement had not been reached at the time of the audit between both parties."[16]

B38 (d) (iv) requires the preparation of a Groundwater Management Plan which includes, "detailed baseline data of hydrogeology and groundwater levels, formation parameters (such as hydraulic conductivity, storage and yield) and quality for groundwater resources potentially impacted by the development (based on at least 3 years of monitoring data)" and it is also stated that the GMP must include "a program for baseline data acquisition (works and timing) for the required groundwater model updates," These two provisions seem at odds with each other. If the GMP is to include three years of detailed baseline monitoring data of groundwater levels, hydraulic conductivity, storage, yield and quality for groundwater resources potentially impacted by development, collected and presented in the plan prior to the commencement of Phase 1, then why can't the groundwater model be updated with this data at the same time?

The Water Expert Panel recommended that the transient model be released for public comment but this provision has not been included by the Department.

[16] Compliance Audit Report: Dewhurst development consent. April 2016 https://narrabrigasproject.com.au/uploads/2015/06/160428_DEWHURST-AUDIT-REPORT-Consolidated-28-April-New.pdf

There are other contradictions. The Water Management Plan must be prepared prior to the onset of Phase 1, and includes a Salt Management Plan which is to include "a program for investigating and implementing beneficial reuse options for the salt product, in accordance with the Produced Salt Beneficial Reuse and Disposal Study." But the Produced Salt Beneficial Reuse and Disposal Study of condition B65 is not required to be prepared until prior to the start of Phase 2, which seems late, given there have been no estimates provided of the salt production likely to occur as a result of Phase 1.

It is clear from a series of submissions made by Narrabri Shire Council that its support for this project is conditional. The Council's most recent advice, dated 28 April 2020, again requests specific conditions that are not included in the Department's draft consent.

- That a long-term study dealing specifically with deterioration of CSG wells and assessing the impact of abandoned CSG wells over extended timeframes be undertaken to the satisfaction of the NSW Chief Scientist & Engineer.
- That the Proponent pay for independent third-party monitoring of decommissioned coal seam gas wells.
- The application of a three-layered policy of security deposits, enhanced insurance coverage, and an environmental rehabilitation fund or an alternative to the satisfaction of the NSW Chief Scientist & Engineer.
- That the EPA satisfies itself that the facilities to be utilised for waste salt disposal have long-term capacity to accept it and adequate contingency planning is in place for disposal of waste salt.

## Conclusion

It is not in the public interest to allow Santos to build an 850 well production gasfield in the Pilliga forest. The impacts of this proposal on groundwater, biodiversity and the climate have been poorly assessed and considered by the Department of Planning. They are both serious and irreversible. Furthermore, the purported justification for the project is built on generalisations and exaggerations. The unacceptability of the impacts of this project should be apparent to the IPC in the overwhelming opposition to it expressed by the local community, the region and people and organisations from across New South Wales, ranging from NSW Farmers and the Country Women's Association, to business groups, to Gomeroi people from all over the region and local landholders living near the project, to birdwatchers and large environmental advocacy organisations. These objections are of a scale and breadth unprecedented in New South Wales planning processes and cannot be ignored.

We urge the Commission to reject the project.

Climate Risk

20 July 2020

Georgina Woods
NSW Coordinator,
Lock the Gate Alliance

Dear Ms Woods,

In response to your request for considerations regarding climate change with respect to the proposed Narrabri Gas project I have noted several gaps in the project documentation that you may wish to raise with the Independent Planning Commission.

The most obvious question is the reason climate change exacerbation of environmental hazards been omitted from the 'Hazard and risk assessment report, Appendix S' of the Environmental Impact Statement? GHD offers **climate change** modelling, impact analysis, risk and vulnerability studies as a standard service and is a founding member the Infrastructure Sustainability Council of Australia (ISCA) which requires climate impacts to be analysed in project ratings. So it's very odd that this report makes not a single mention of 'climate change.' Inclusion

Following on from the above. Appendix S makes reference to bushfire risks, but does not include climate change impacts in the analysis of risk. Climate change will tend to increase the probability of days when bushfires are possible. I have attached a report I have produced considering the projections from one of the CORDEX international climate models downscaled to the area which suggests a 150% increase in the probability of bushfire conditions under IPCC's Representative Concentration Pathway 8.5, which is the current global emissions trajectory. This would have an impact on estimated bushfire ignition probability of 1 in 70 years notes in the document titled "Question to Santos - Email of 2 September 2019"[1], in principle raising the probability to 1 in 28 years – i.e. climate change could results in a reasonably high probability of the project starting a bushfire during its lifetime.

While Appendix S refers to management plans regarding fire-fighting, and plant management the analysis again fails to consider the ability of the facility and its staff to cope with a pyro-cumulus events which show clear trends to increase in parts of Australia (Dowdy et al 2019)[2] under various climate models. Such events are considered unfightable fires.

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1 https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-6456%2120200611T033526.639%20GMT

2 https://www.nature.com/articles/s41598-019-46362-x

Climate Risk

With regard to the above I would draw your attention to the recent guilty plea by the US based Pacific Gas and Electric (PG&E) for causing the death of 84 people during an ignition caused during 2018 fires in California. It may be worth checking that the company's insurance extends to cover such outcomes if climate change impacts have not been considered.

With regard to subsidence risk, again there is no reference to climate change in Appendix S. Climate change can exacerbate drought conditions which can cause subsidence in clay soils. According to various mapping, this area does have soils which are susceptible to subsidence. In the attached EasyXDI report, the subsidence risk will proximately double over the next 30 years under the models used. This would have a bearing on risks associated with subsidence - pipe cracking and so forth – which should be re-calculated in light of climate change.

Extreme Temperatures: In Appendix S, table 2.11 notes that the risk analysis has been conducted 25 degrees Celsius. It would have been useful to see an analysis under severe temperature conditions above 40°C or even approaching 50°C. For example, at these temperatures electronic systems can fail to operate (in the same way that mobile phone stops working if left in the sun). It would be important to demonstrate that the safety measures specified for all hazards would occur if there were a failure of electronic control systems in extreme temperatures.

Finally I would suggest that including climate change is now a rather mainstream expectation for infrastructure development. For example the NSW State Infrastructure Strategy for 2018-2018[3] states:

> *NSW's future prosperity depends on its ability, and willingness, to get the maximum economic and social benefit from existing and new infrastructure assets. To do this, good practices need to be applied to infrastructure planning, assessment, procurement, construction and management:*
> *• to meet rising demand for public services*
> *• to support longer term plans for jobs and housing prepared by the Greater Sydney Commission and the Department of Planning and Environment*
> *• to anticipate and respond to megatrends, including taking advantage of opportunities generated by technological transformation and managing threats such as climate change.*

I trust these observations assist you in your considerations of the relevance of climate change to the proposed development.

Kind Regards

Dr Karl Mallon, Director of Science, Climate Risk p/l

[3] https://insw-sis.visualise.today/documents/INSW_2018SIS_BuildingMomentum.pdf