Boris Thorpe
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20/05/17

To the Secretary, Department Planning and Environment NSW
Ms Carolyn McNally

Dear Ms McNally

I **object** to the Narrabri Gas Project. **It should not be approved under any conditions whatsoever.**

As requested by the Mayor of Narrabri Shire, Councillor Cathy Redding, the Narrabri Gas Project EIS should be subjected to a peer review in its entirety.

The Narrabri Gas Project is the largest development ever proposed under the modern planning system, and four times the size of the only other two CSG projects assessed and approved in NSW.

Santos proposes up to 850 wells on 425 well pads over 95,000 hectares. This is more than four times the size of either of the previously approved CSG projects in NSW. The proposal includes a gas processing facility for compression dehydration and treatment of gas, a water management facility for storage and treatment of produced water and brine, possible additional power generation on site, continual flaring (burning off of gas) at two locations, an infrastructure corridor through the forest between Leewood and Bibblewindi, expansion of worker accommodation, discharge of waste water into Bohena Creek, irrigation with treated water and landfill burial of tens of thousands of tonnes of salt.

Santos says construction is expected to start in early 2018, with first gas scheduled for 2019/20, but also make clear it has not decided to go ahead with the project at all. If it goes ahead, it will continue for at least 20 years.

1. Hazard and risk assessment inadequate: I object to the Narrabri Gas Project on the grounds that Santos has not properly assessed the major hazards and risks of the project, in that it has incorrectly applied the techniques of EPP33 and HIPAP 4, when the correct legislation it needs to comply with is Chapter 10 of *the Work Health and Safety Regulation 2011 – Major Hazard Facilities*.

EPP33 and HIPA4 are no longer the relevant legislative standards applicable to major gas/LNG processing plants in NSW. The correct legislation is the *Work Health and Safety Act*.

Leewood gas processing plant needs to be regulated as a licenced major hazard facility and undertake safety case assessment as required by the Work Health and Safety regulation 2011. Santos will be handling over 10% of a 'Schedule 15' chemical i.e. methane. In addition, the gas processing equipment, wells, and compressor stations will generate air toxics. They should be adequately safety-cased.

This legislation requires notification to WorkSafe NSW, licensing, and production of a detailed safety case to ensure onsite and offsite risks to the public, workers, property and

the environment are MINIMISED (as low as reasonably practicable).

The tests applied by the guidelines EPP33 and HIPAP4 are INADEQUATE to ensure safety and risk minimisation to the nearby suburbs of Narrabri. It is noted that a primary school, Narrabri West, is within a few kilometres of the active gas field and approximately 10 kilometres from the Leewood gas processing facility.

Santos has not adequately assessed, and as a consequence, not adequately mitigated the risks to the public, workers, plant and the environment of methane explosion, catastrophic toxic untreated produced water loss of containment, catastrophic air toxics cloud production and plant failure such as well blow outs, pipeline rupture, gas processing plant failure, compressor failure etc.

The Project should be rejected out of hand as inadequately assessed.

I note that even using the incorrect and out-dated legislative techniques, Santos has identified at least one 'sensitive receptor' 350 metres from the boundary of Leewood at risk from 'uncontrolled containment of gases'.

The Melbourne Energy Institute report noted methane had been found to pose "a safety hazard, compromises water quality, can damage pumps and impacts the yield" of affected water bores.

It said "the integrity of dedicated gas wells and other existing bores that were not designed to prevent migratory emissions is an area of concern" and the geology of the Condamine aquifer "increases the risk of migratory emissions occurring".

Helen Bender, whose family owns two properties near the Condamine River at Chinchilla, said they had lost three water bores due to increased methane levels.

"The methane emissions were so high … they were decommissioned … capped and sealed," she said, adding that hundreds of water bores in the Surat Basin had been affected by gas.

Further, Santos has identified a 'moderate' level of bushfire risk with a potential to cause large bushfires. Again, this risk has been subjectively assessed and claimed mitigation measures are un-tested. Santos's own 'risk assessment' may not be acceptable to the surrounding community and protected bushland areas.

There is no analysis whatsoever of lack of containment of air toxics from either catastrophic or normal operation of the gas processing plant at Leewood.

Santos has failed to adequately assess the safety of the untreated toxic coal seam gas produced water dams which are proposed to be re-built at Bibblewindi, nor of the risk of flood or loss of containment at the vast Leewood brine storage dams. Both of these areas risk contamination of the Namoi catchment area and the Narrabri town water source.

Unless an adequate safety case is approved by WorkSafe NSW in accordance with licensing requirements of the Major Hazard facility regulations, this project must be rejected out of hand and NOT approved.

2. Lack of detail: Santos' EIS does not provide maps indicating where these 850 wells and the lines and infrastructure that run between and around them will go. Santos is seeking

consent for this gasfield on the promise that it will decide where the wells will go afterward using a "Field Development Protocol." **No project has ever been assessed this way before in NSW and the constraints Santos propose are weak and subject to change later on**. This is not an appropriate way to assess the largest development project ever undertaken under the Environmental Planning and Assessment Act and the Government must insist that Santos release details to the public about the placement of its wells, pipelines and some other infrastructure.

I also draw your attention to the Aquifer section and the sticky note. I believe that Santos has not properly identified all the aquifers, their depths, behaviour, containing layers and conductivity with the surrounding aquifers or surface water systems as full or even at all, as is directed in the Exploration Licence attached.

3. No economic justification: The significant harm on the social, environmental and economic values of the Narrabri Shire and New South Wales that this project will inflict needs to be weighed against the economic justification for the project, however there is no such economic justification. Santos is one of several large gas companies that threw the east coast gas market and the industries that rely on it into turmoil by opening up CSG fields in Queensland and contracting to sell more gas than those fields can produce to overseas customers. They drove up the price of gas and are plundering supplies previously available to manufacturers and power stations.

The gas produced at Narrabri might be as little as 4.9% of the volume contracted for sale out of Gladstone. It's not going to bring down prices. In fact, it will force prices up, because unconventional gas like CSG is so expensive to produce and yields are so low. Research undertaken by gas company AGL shows that gas from the Pilliga would be the most expensive gas of anywhere in the current east coast gas market. The number of jobs the project will support once the construction is over is just 145. Weighed against damage to the land, and the Great Artesian Basin, this makes no sense. We need sustainable jobs, not plunder for profit.

4. Risk to irreversible damage to Groundwater and the Great Artesian Basin (GAB): Santos' project is expected to remove 37.5GL of groundwater over the life of the gasfield, mostly in the early years. The coal seam needs to be dewatered to release the gas, but this aquifer lies beneath the Pilliga Sandstone, part of the Great Artesian Basin recharge. Santos' EIS admits that the project will result in a loss of water from the GAB recharge aquifer over time. CSG in Queensland has drawn down GAB aquifers already. We can't afford to risk this crucial resource.

The very first Chapter (00) of the EIS, is the whole crux of this entire EIS.
Santos has spent over 90% on this EIS trying to convince the Community and those who are ultimately charged with the decision, that this Project will not impact the waters, the air, the fauna and flora and the humans on and close to the surface of the Great Artesian Basin in an area known as the Southern Recharge of that Basin, that this Project is not going to affect that area in any way.
Gas and produced extracted water heavy in salts is coming from the coal layers within the

Gunnedah/Oxley Basin and that this basin runs under the GAB.
It is equally true that this extracted gas and water are both treated and stored as well as being distributed in one form or another on top of the GAB (Projects Infrastructure and disposal).
The area that this EIS covers is termed the Southern Recharge of the Great Artesian Basin and is a MAJOR RECHARGE AREA for that basin, otherwise it would have another descriptive terminology.
Therefore the Narrabri Gas Project is LOCATED in a MAJOR RECHARGE AREA.

5. Salt – no safe solution for disposal: The water removed from the ground by Santos will be treated, but this creates another problem: what to do with the salt? Peak salt production at Narrabri CSG will be 115 tonnes per day, or two and a half B-double truckloads per day. In the peak year, this would mean the creation of 41,900 tonnes of salt for disposal, which Santos says will take place in landfill.

6. Aboriginal cultural heritage and the Pilliga: The Pilliga is a spiritual, cultural and social icon for Gomeroi/Gamilaraay people. Fragmentation and industrialisation cuts people off from their heritage and connection to country.

7. Biodiversity and the Pilliga: The Pilliga is also the largest temperate woodland in New South Wales. Santos propose clearing nearly 1,000ha of the Pilliga, including habitat for critically endangered Regent honeyeater and for koalas, which are already in decline in the Pilliga. Spread across the whole forest, this clearing will fragment much larger areas of habitat. The gasfield will clear breeding habitat for Pilliga Mouse, which lives nowhere else, and breeding habitat for other wildlife. It will fragment and degrade the forest. Without specific information about where the wells and lines will be located, a proper ecological impact assessment can't be completed. Regardless, the Pilliga is a cherished natural and cultural icon and must be protected from becoming an industrial gasfield.

There are koalas in the Project Area but Santos EIS failed to identify them. Chapter 15 "Terrestrial Ecology Impact assessment" is inadequate and has failed to identify recently observed species. Santos's flora and fauna surveys were also inadequate. Koalas are a threatened species. I object to this Project on the grounds that terrestrial ecological impacts have not been adequately assessed and mitigated. Following a review of Chapter 15 of the Narrabri Gas Project (NGP) Environmental Impact Statement (EIS), a number of serious omissions within the assessment are evident, and several questions regarding the adequacy of the assessment remain unresolved, in particular:

• The adequacy of the methodology used to describe direct impacts is questionable. The lack of a development footprint by which impact could be measured according to 'whole of government' guidelines gives uncertainty to the outcomes.

• Levels of indirect impact have been significantly under-estimated. Using fox predation as a measure, pre-mitigation levels of indirect impact should be at least doubled in magnitude, based on available evidence.

• Survey effort for some key fauna species appears to be deficient and would have

adversely affected the ability of the EIS to adequately account for some species.

• A NSW and Commonwealth-listed threatened ecological community White Box Blakely's Red Gum-Yellow Box Woodland (and derived native grassland) has been mis-identified and presumed to be not present in the study area. New data confirms its presence along Bohena Creek.

• The description of important habitat for a number of key fauna, such as the Regent Honeyeater, Pilliga Mouse, Koala, Black-striped Wallaby and Five-clawed Worm-skink does not appear to be accurate.

• New information regarding the presence of the Koala in the study area discounts the assertion made in the EIS that it is not currently present.

• Due to deficiencies in the survey and assessment for two 'matters for further consideration' (Regent Honeyeater and Five-clawed Worm-skink) statutory requirements under the NSW Biodiversity Offset Policy have not been met.

• Direct impacts upon Brigalow Park State Conservation Area remain uncertain as do the magnitude of indirect impacts upon the adjacent Nature Reserve and existing corridors.

• A Biodiversity Offset Strategy does not provide any surety for how well it will 'retire' the impact of the Project because the strategy provided in the EIS does not provide any like-for-like land-based offsets apart from an unproven rehabilitation plan and rests on the hypothetical efficacy of a feral animal control proposal. The suitability of the offset package with respect to the statutory requirements under the NSW Biodiversity Offset Policy is poor. Based on these findings, the Secretary for the Environment should reject this part of the overall Project assessment as being data-deficient and inadequate under the terms of NSW Biodiversity Offset Policy or request the matters outlined above be addressed by the proponent.

8. Social and health impacts: Santos' social impact assessment is three years old and utterly inadequate. The ***Compendium of health studies*** produced by the Concerned Health Professionals of New York shows mounting evidence for health damage by unconventional gas operations, including water contamination and respiratory illness. The Government must insist that Santos conduct a proper ***health impact assessment*** including modelling exposure pathways, reviewing literature and engagement with the Narrabri community. In Narrabri, this project will have negative impacts on cost-of-living, and the labour and housing markets. The latter is cited in as a benefit of the project but it will not benefit low-income renters. The effect of the project on cost-of-living in the Shire needs to be modelled, assessed and considered, as do the labour dynamics of the project. The project entirely surrounds Yarrie Lake, and Santos propose that wells might come as close as 200m from the Lake.

9. Risks to Air quality: The air quality assessment fails to include health-damaging fine particulate pollution with a diameter of 2.5 microns or less (known as PM2.5). With diesel generators at each well pad and at the water treatment and gas compression plants, there will be significant PM2.5 emissions. The air quality assessment and greenhouse section also fail to model the likely substantial escape of fugitive methane emissions.

What I will draw your attention to, is the very last paragraph about the outgassing from the

produced water.

It is a pity the the EPA/CSIRO could not check the water balance tanks located at the gas fields themselves and the big tank at Bibblewindi. All have open tops and when viewed with the right background have a shimmer coming off them, and have smells: either a heavy coal smell or a Hydrogen sulphide smell emitting from them, so there is a outgassing from the water due to depressurisation of the water at these locations that is releasing the trapped gases including the above mentioned and Methane (which cannot be smelled).

Most of the highest peak CH4 concentrations were measured in close proximity to several CSG wells within the Bibblewindi region of the Pilliga State Forest and the Tintsfield area to the north (the emissions rates from the two Bibblewindi wells were measured separately, as discussed below). Another large spike of about 6.8 ppm CH4 was detected further south in the Dewhurst region during May 2015, which was most likely also due to emissions from a well about 100m away, but we were unable to positively confirm the source with on-pad measurements at the time.

10. Compressor stations: Compressor stations pose dangers due to fugitive emissions, excessive noise and risk of explosions. Experience has shown in Australia and elsewhere globally, that the number of compressor stations may increase. We do not rely on current projections of only two compressor stations for this project.

11. Light pollution- scientific and tourism significance of the Dark sky: light pollution from flares, compressor stations and the water treatment plant will ruin the dark sky needed by the internationally renowned Siding Spring Observatory.

Ref: EIS Appendix Q (GHD) and section 5.3.3; SSD 14_6456

Santos has failed to ensure that vital astronomical assets of the Commonwealth of Australia, and 50 other international research institutions, are not detrimentally impacted by the operation of a large gas field and gas processing equipment to the north of Siding Spring.

Over the years, major public funds have been invested in these world class facilities for astronomy. Australian taxpayers and science institutions are rightly deserving of protection of this asset.

There is no recognition of the cumulative impact of future expansion from PEL238 to other gas licence areas much closer to the observatory.

Santos has not proposed adequate mitigation measures to protect the observatory operations, particularly in not ensuring the clarity of the night sky from light pollution impacting negatively on visible light telescopy, and from not preventing an increase in chemical air pollution impacts on delicate instrumentation and mirror surfaces. It has also not recognised or mitigated chemical air pollution impacts on the Narrabri radio telescope facilities.

There is no recognition in the Santos EIS that air pollution (Chapter 18) at times will concentrate in certain weather conditions, such as during temperature inversions or cloudy, still nights and drift southward towards the observatory. Air pollution from gas fields is well-documented but has not been correctly identified in Chapter 18. It comprises methane, ethane, butane, and some higher hydrocarbons that can form ozone smog in sunlight, especially mixed with flaring combustion products like nitrous oxide. There is also hydrogen sulphide. This air pollution is not documented in the EIS by Santos. Gas field smog is highly corrosive on delicate instrumentation and can cause smog haze.
Santos have failed to propose adequate mitigation measures to minimise the impact of light pollution from flaring operations - in fact, no flare shielding is proposed. Two major flare stacks will likely operate continuously at Bibblewind and Leewood. Santos has under-estimated the likely continuous operation of these stacks and has not proposed adequate shielding.
Santos has under-estimated the amount of light pollution and has contradictory statements in the EIS about the number of flares – at one point it is stated that there will be 'up to 6' (5.3.3) pilot well flares, but in other parts of the EIS it is estimated over 25 pilot flares (Greenhouse Gas Chapter 24) will be operational at any time.

The NSW EPA recommends that flare stacks be shielded but this is not promised by Santos.

Chapter Q mentions the potential high light pollution impact of major flare events but 'talks down' the frequency of such events. This is NOT the experience in the QLD coal seam gas fields. The Santos EIS does not reflect practical on the ground experience of coal seam gas field operations.

The reality of gas fields is that gas supply restrictions mean that gas flaring can occur whenever the market is not drawing gas from the Project. This means that flaring can be a constant feature of an operational gas field. Claims by Santos that flaring will be minimal are simply not supportable.

It is inconceivable that the negative impacts of the Project on Siding Spring would be acceptable to Australian and international astronomers nor to the Australian public who have heavily invested in these world class facilities.

I do not consider light and air pollution that will be caused by the Project has been effectively mitigated by Santos's proposed mitigation measures.

12. Climate change: recent research by the University of Melbourne Energy Institute shows that Australia may be dramatically under-estimating the fugitive methane emissions from unconventional gas, including coal seam gas. It's not needed or useful as a source of energy: we have the technology we need to replace gas with renewable energy sources.

Fugitive emissions have not been properly or fully assessed by Santos in the EIS. I refer you to this Report:

CSG A 'POTENTIAL CLIMATE DISASTER'

"Methane emissions gain less attention than emissions of carbon dioxide in the climate change debate, yet, when it comes to global warming, methane matters.

KEY POINTS from the report:

- CSG extraction could increase uncontrolled gas releases
- Methane is one of the most potent greenhouse gases
- CSG not yet proven to be cleaner than coal

CONCLUSION:

In communities which have been polled on the subject of whether coal seam gas, ie unconventional gas, is appropriate for approval in NSW, in all but one known case **over 90%** of those polled said they want their community to remain gasfield free.

The above is a summary of my reasons for objecting to the Narrabri Gas Project.

I object to this project in its entirety.

Yours faithfully,

Boris Thorpe