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This is a submission to the Narrabri Gas Project (NGP) EIS, currently with the Department of Planning and Environment (DoPE). Thank you for the opportunity to comment.

I strongly object to this project and am of the opinion that it should not progress to the production phase.

INTRODUCTION

This submission comes from "Tara" pictured in Figure 1:

Fig 1 "Tara, Tooraweenah, NSW, looking east to the Warrumbungles from the homestead compound.

The author, who lives at "Tara", has travelled to the Narrabri Gas Project and several gas projects in southern Queensland and is aware of the industrialisation associated with the Coal Seam Gas (CSG) industry, as seen in the Fairview Gasfield east of Injune in Figure 2 and at Ruby Jo gasfield, Figure 3. Some of us at "Tara" sleep on a gauzed in verandah all year round (by choice) and there are nights where the silence is "deafening". Many overnighht guests comment on this and how well they sleep here.

In 2010, Santos carried out seismic testing on three perimeter roads of "Tara" and so our journey of investigation into the CSG industry began. "Tara" is situated on PEL 462 to the south of the Narrabri Gas

Project and, and is the most south western gas tenement in Santos's seven gasfield, shareholder projected plan, for the north west of NSW shown in Fig 4. [1]

Fig 2 Fairview Gasfield Hub July 2014

Fig 3 Ruby Jo Processing plant, Qld, from QGC website listed June 2014

The residents here (all living creatures) have much to lose from the impacts of new sounds, odours, visual stimuli and changes to the soil, water and air that supports their lives.

This describes briefly the selfish, aesthetic reasons why I fear the development of the CSG/unconventional gas industry taking hold in north west NSW. In addition to this I lament the pending environmental damage as well as the thousands of hours of my life spent labouring over understanding and debating this industry for the last

seven years, which could have been so much more satisfyingly spent in professional pursuits. Multiply this by all the gifted, intelligent people I have met on this path, who have likewise derailed their "normal" lives for this purpose. The labour attrition cost to the country is enormous. But it is impossible to stand aside and allow the unconventional gas industry to progress. Once the far-reaching dangers are learned, they cannot be un-learned. Alice has stepped through the looking glass and the path is set.

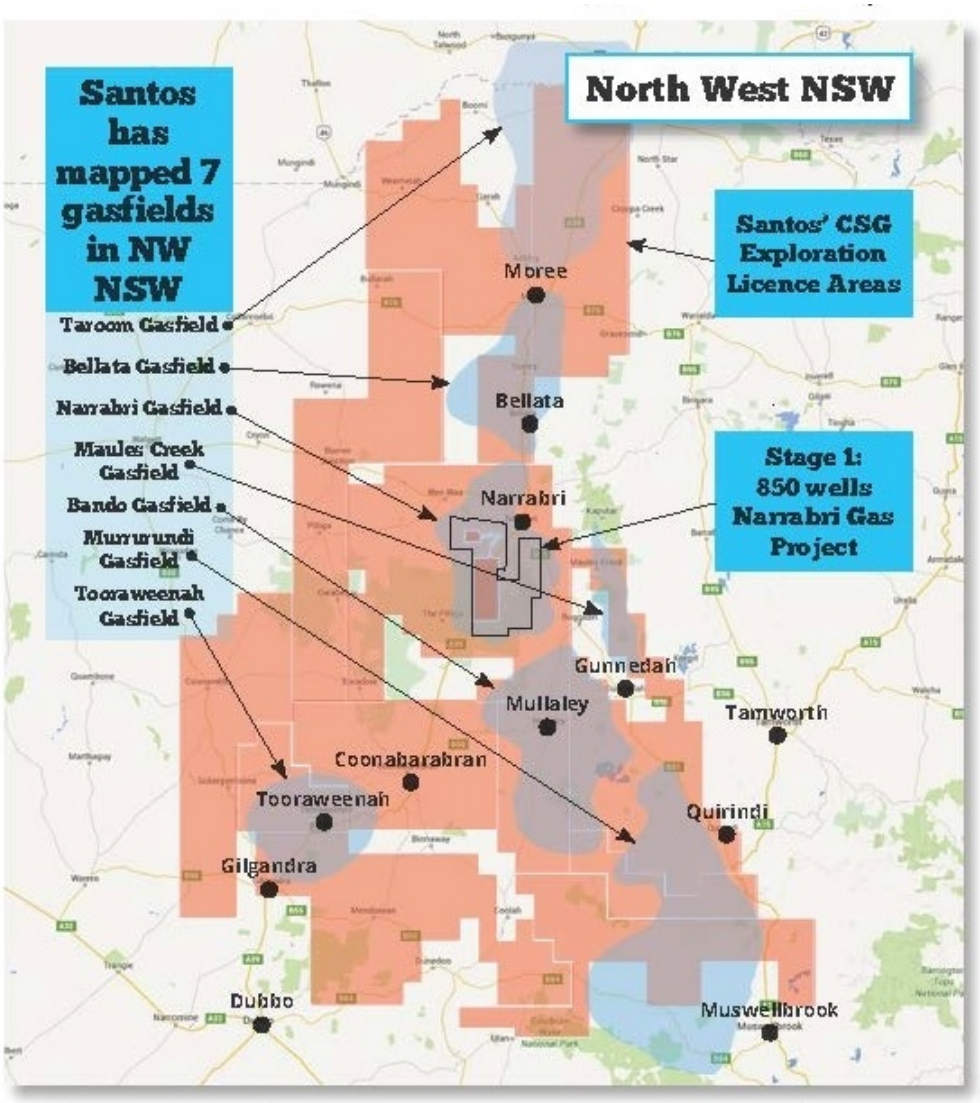


Fig 4. Santos PEL Tenements and Projected Gasfields modified from Presentations to Shareholders in 2011 and 2014. [1]

Before progressing to my discussion of the NGP EIS, the legitimacy of the right for a resident of PEL 462 to view this development as one that has direct personal implications, is explained by the following:

- This EIS is centred completely on PEL 238 in the Narrabri region. There are assurances in Chapter 9.1 of the EIS, "In July **2013**, Santos announced that the focus of operations in NSW was to be in PEL 238 and that the company was seeking approval for a more focused exploration and appraisal program targeting areas in and around the Pilliga Forest to ascertain the commercial and technical viability of the project", they then clearly depicted future expansion potential, of seven gas basins, to would-be investors in their **2014** investor seminar. Having explored PEL 238, they now wish to develop it, but the long term plan outlined in 2014 **has not been dismissed**.

- In addition, the EIS Executive Summary eludes to expansion of the industry on Page ES 7, when giving reasons for the "preferred location for the project", quote "This area also provides the proponent with an opportunity to further develop existing infrastructure in an area where gas resources are located". Figure 4 shows the proximity of the Tooraweenah Basin in the Gilgandra Shire, to the NGP. The western path of the mooted APA Group's pipeline to transport the NGP gas to the Moomba-Sydney pipeline, also heightens my interest.
- The APA pipeline, although not being assessed here, is an integral part of the infrastructure required for the success of the NGP. Is the cost of the APA pipeline recovered with the establishment of only the one NGP gasfield or does the cost of this connecting gas pipeline have to spread over the development of further gasfields in the north west NSW Santos tenements?
  Is the Pilliga to Moomba/Sydney pipeline (Western Slopes Pipeline) viable for just one 850 well gasfield? Honesty here is important.

The development of the NGP is the first step in the proving up of a vast coal seam gas resource in the north west of NSW. It is disingenuous to pretend otherwise. As primary producers in the path of a potential mining development, we are concerned by the security issues of environmental destruction and conflicts of land use.

Experience of coal seam gas exploration and mining at “Tara”, Tooraweenah is limited to:

- core holes drilled on two neighbouring properties
- seismic testing along local public roadways

The outcomes for local residents, of this relatively benign activity so far, have been:

- a steep learning curve for residents about the potential pros and cons of coal seam gas drilling both short and long term. This equates to large amounts of time not carrying out normal farm activities and/or reduced discretionary time (of which farmers have little)
- anxiety about affected land values due to PEL activity,
- angst regarding potential lost productivity, or inability to remain on properties should ground water be contaminated or depleted (possibly destroyed) if exploration and mining progress
- uncertainty about continued ability to manage land efficiently and as preferred,
- uncertainty to invest in planned developments
- apprehension of unknown geological stability should fracking be used in the gas wells
- possible human and livestock health issues

And in addition for me personally:

- assisting with the formation of a local group to completely investigate the potential of the CSG industry and to help educate local residents
- the expenditure of enormous time and effort to educate myself as fully as possible (including tours locally and in Queensland, trawling and collecting information from all sources, attending regulatory hearings and processes etc)
- the expenditure of more time and effort to express the concerns of my family, neighbours and colleagues, to regulatory bodies, elected parliamentarians and their officials, local council and anyone else who would listen.

All the above takes a human toll. I read the EIS to see if these aspects of social impact had been addressed. I refer to Chapter 26, "Social and Health" and Appendix T2, Section 10. And Appendix T1. I was disappointed. Resolving landholder's angst is limited to abiding by access agreements, which landholders are **forced to negotiate** (other than volunteering to host wells for which they still need to negotiate an access agreement) and/or paying them money. (See Appendix T2 extract below.) To even suggest that imposing an industry into someone's backyard, demanding their time to hash over every detail of that industry's presence, then put up with the establishment disruption and possibly considerable damage resulting from that industry, can be managed by doing it all as nicely as possible and with small remuneration, is simply an insult. Particularly when

that someone had no inclination to add a complex, demanding time use to their already busy farming life. **A landholder's angst could be completely resolved if he had the right to say "NO" to the industry altogether.**

Appendix T2 - *"The key social impacts of the project that could occur if mitigations are not implemented:*

- *Impacts on landholders – location of gas field infrastructure may impact land use, access, productivity, loss of privacy, impacts on lifestyle (noise, light, dust) – the extent of such impacts can only be assessed on a case by case basis as such impacts are dependent on the mix of issues at a particular sensitive receptor. A land access agreement would be negotiated with each land holder that would take into account the range of property specific issues;*
- *Economic impacts – potential for competition for labour, labour shortfalls or increasing cost for labour;"*

And:

"A range of policies, strategies and initiatives would be implemented to minimising negative social impacts, while maximise opportunities and benefits. These policies, strategies and initiatives include:

- *A procurement policy directed at local businesses, suppliers and labour to enable them to participate in the project;*
- *Workforce management strategies to promote the health, safety and wellbeing of the project workforce, and their integration with the Narrabri community;*
- *Housing and accommodation strategies to monitor conditions and adapt as needed;*
- *An Aboriginal engagement policy to maximise employment;*
- *Adherence to the Agreed Principles of Land Access to minimise landholder impacts; and*
- *Fair and reasonable compensation to landholders for work undertaken on their properties, where agreed.*

*The implementation of mitigation and management measures, and the design of the project, **would be effective** in preventing and minimising the potential adverse social impacts of the project. Some limited direct impacts on land use, lifestyle and amenity, and the increase in the non-resident population of Narrabri, would persist during the project construction and operation although the potential adverse social impacts of this increase would be managed. The proponent would monitor social impacts throughout the construction and operation of the project, and would implement the mitigation and management measures described above in a manner that is adaptive to changed conditions or emergent social impacts.*
Further details on mitigation measures are provided in Appendix T1 of the EIS."

I looked for the techniques for landholder satisfaction assurance in Appendix T1 and found:
"7.5 Landholder impact mitigation strategies
*As mentioned in Section 6.2.1 as part of project development **Santos will have in place a Field Development Protocol** which will play an important role in avoiding and minimising impacts on landholders. The Field Development Protocol have been considered in the impact assessment and hence are not listed here as mitigation measures. Negotiation with landholders would occur in accordance with the Agreed Principles of Land Access. A Landholder Engagement Policy would be implemented to facilitate ongoing consultation with landholders regarding the project. Measures to manage noise, dust, traffic and visual amenity impacts to landholders and their properties are discussed in detail within the respective technical studies as appended to the EIS, which are listed in Sections 6.2.1 and 7.9."*

This is truly a circular referencing system. I had written off the Field Development Protocol as "unfinished business" (little detail evident) when reading it previously and did not revisit it!

A major flaw of the EIS, is the manner in which it bounces the reader from one section to another without stating clear outcomes or policies in any of them.

After reading much of the social impact coverage in the EIS, I find that without details of numbers or demographics from whom the data was collected, it is difficult to give credence to the assessments in Tables 22 and 25 of Appendix T1.and to see how remuneration in multiple forms will negate the extensive list of losses the community endures. **Big business and government simply do not understand that there really is more to life than money.**

FAILINGS OF, AND QUERIES ARISING FROM, THE NGP EIS

WATER

As primary producers, the viability of our business and our ability to live and prosper on our farm is predicated on the continued supply of good quality ground and surface water. Any threat to our water supply is also a threat to our way of life, the thirty one year investment we have made in this property and our economic survival. In a broader context, corrupting supplies of good quality water (useful to mankind), which are in short supply in this arid continent, is considered abhorrent and culpable. We view practices, that place water quality and quantity at risk, very seriously and with great caution.

The CSG industry potentially has impacts on multiple aspects of water quality and quantity.

WATER - The Risk Matrix

The Significance Assessment used for Groundwater and Surface Water in Chapter 10 of the EIS, "Approach to the Impact Assessment ", shows a matrix derived using a "sensitivity" scale and a "magnitude" scale. The resultant highest risk rating of "Major" is described as; "Arises when an impact will potentially cause irreversible or widespread harm to an environmental value that is irreplaceable because of its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation".

The most dependable design response resulting in unequivocal avoidance of permanent water damage is **DISALLOWANCE of the activity/project. This may be an option available, but the EIS does not clearly list it**. The management jargon surrounding all of the risk assessment and analysis is unclear and leaves the reader totally unconvinced about intended meanings or outcomes. In contrast, a report written in 2005 for the Australian Gas Alliance, NSW regarding General Hazards of the CSG industry [2] was clear and concise. The seriousness of the issues surrounding the industry were eloquently expressed, not understated nor exaggerated. Twelve years later this approach has been replaced by "waffle words" where everything is monitored, manageable, minimal, within acceptable standards and mitigate-able with no clarity about what or how it will be done.

GROUNDWATER AND SURFACE WATER

In Surface Water Quality, Chapter 12, the potential impacts of the construction and operational phases of the project are discussed. Sections 12.3.2 (construction) Spills quote "Accidental spills of fuel, drilling additives (although mostly biodegradable), produced water, chemicals and / or cement **could impact water quality**" and 12.4.3, (operation) Spills and leaks quote: "Accidental spills of fuel, produced water and / or chemicals **could impact surface water quality**." Other possible sources of surface contamination are listed. Section 12.5.2 then describes a list of management and mitigation actions that will " comprehensively and routinely manage" all these possible contamination occurrences. **These statements clearly indicate that impacts are possible** and in the case of "induced groundwater flows between groundwater sources", the likelihood is "almost certain".

In the real world, planned, documented responses may not be possible in adequate time frames, or be possible at all, to avoid consequences of these "impacts". Official company documents and government sanctioned licences and permits do not of themselves prevent adverse incidents, particularly when they are unexpected and rare.

Risks to groundwater by the NGP (EIS Appendix F) have been determined variously from level 1 (13 risk parameters) to, at worst, level 2 (3 risk parameters). Compared to the "Major" risk rating description above, these are even more easily managed. However, the public are aware that exploration activities, already undertaken in the NGP area, have resulted in the permanent contamination of an aquifer with uranium levels at 20 times the acceptable/safe drinking water level, multiple spills into the environment, some resulting in fines and areas of degradation requiring rehabilitation. Some sites have not recovered after years of rehabilitation attempts and great expense.

These incidents occurred during the exploration period. Regulations controlling the industry are constantly evolving, however, the proponent in recent years has been operating under similar regulatory controls to those in place today and mistakes continue to be made. **We are not convinced that this EIS and the Government's response to it, will create miraculous improvements for trouble free operations, in a much greater numbers of wells.**

The low risk apportioned to ground and surface water damage also, disappointingly, causes the exclusion of water damage from the Cost Benefit analysis in the EIS Appendix U1, Table 2.2. This table conveniently removes water impacts, a difficult to determine and potentially large parameter, from the economic costs associated with the NGP.

WATER - Making Good

Chapter 11 of the EIS, 11.9 Mitigation and Management.

The supply of a clean reliable water source cannot be overstated. Issues to arise with this section of the EIS are:

1. First the degradation of the water supply must be proven to be the result of the actions of the proponent. From previous examples in the Pilliga, Queensland and elsewhere this is difficult to establish and can cause major frustration, inconvenience and cost to the landholder involved. **Reality does not reflect the written intent of the EIS**.
2. Of the ten dot point actions listed to "make good" the water supply (P 11-64 of the EIS), the last two dot points are impracticable:
    - providing an alternate water supply
    - providing compensation, which could be monetary, for impairment of the water supply.

To propose replacing a water supply infers that there is an economic, efficient and possible way to do so. Depending on the damage, a substitute supply may be great distance away and completely impracticable. How is supply replacement assured into the future when the responsible companies may dissolve over time? Depending on the situation, the alternate offer of money compensation for a water supply is ludicrous. Not only does no permanent water on a site mean no-one can survive there, but the value of the land asset is massively reduced, disallowing the owner to sell up and leave. **These two solution methods attract only derision and incredulity from people who truly value and depend upon their local, clean, ground water supplies**.

Anyone relying on ground water will not see this as a satisfactory way to deal with water supply security and will be scathing of regulating bodies that accept and sanction this approach.

Queries:

1. **Can this risk assessment system assure no permanent water impacts?**
2. **If not, can "make good" alternate water supplies persist indefinitely?**
3. **If permanent "make good" supplies are not deemed necessary, why not? Are future generations to be denied water?**
4. **Does the ongoing use of the water risk assessment system offer project closure as a possible solution?**

WATER - Aquifer cross contamination

Given the knowledge that all wells fail, given enough time (some in the first year), and that CSG wells are drilled through all the overlying aquifers used for agriculture and sustaining life, the potential for aquifer cross contamination is unavoidable over time.

Query:

5. **Is the proponent guaranteeing that aquifer cross contamination will not occur and how can they assure this?**

Assurances given in the EIS that water impacts are manageable, lose credibility when it's apparent they are based on "sparse" data as follows from Reference [3], "*It has been well-established that coal seam gas development will result in significant changes in groundwater pressure in the target coal seams. Evidence from predictive modelling and ongoing operations in Queensland indicate that groundwater pressure changes in the coal seams may propagate horizontally and vertically through different aquifer and aquitard formations. It is critical to monitor such changes in the groundwater system for both detecting these changes and also to provide useful data for minimizing uncertainty in the predicted impacts. Management decisions on groundwater changes/impacts caused by gas development should be underpinned by evidence provided by good quality monitoring data.*

The gas industry of Australia is bound to monitor the changes in natural environment and inform regulatory agencies. ***At present, the amount of deep groundwater monitoring data currently available for the Namoi region is sparse, highlighting the importance of investing in collecting groundwater data before, during and after the operation phase of gas industry***."

WATER - Produced Water Management

The water removed from the coal seams to create the required gas flow has been, and continues to be, a major concern for the proponent and we who are scrutinising the CSG industry. Chapter 7 of the EIS, "Produced Water management" outlines the process by which the proponent intends to deal with the water. It is deficient in facts that the public need in order to be confident that the projected tonnes of waste are being dealt with competently.

In June, 2014 a Planning Assessment Committee (PAC) hearing for the Bibblewindi and Dewhurst expansion proposals for the NGP was held. At this hearing I described a visit to the Santos NGP where I asked how the "produced water" would be dealt with. I was given very general statements about "probably reverse osmosis" and the concentrated waste water to be transferred (maybe trucked in 30 plus trucks per day) to an "accredited facility" near Sydney. On further questioning this facility would probably be a disused coal mine. There was no clarification about what was to happen to this waste at the accredited facility or whether containment was assured in the ex-coal mine.

This EIS shows, after another three years, that treatment has advanced, but Santos STILL DOES NOT HAVE CLEAR, SAFE PLANS for the disposal of the toxic mix of produced water/solids from the wells covered in this application. Back then the PAC passed the expansion without insisting on a detailed plan. **It is unsatisfactory, that still no clear disposal plan has been developed. It must be addressed thoroughly with sound processes outlined.**

In Casino where Metgasco illegally sent contaminated water through the Casino sewage plant, were charged, went through the penalty system and then gained the assistance of the authorities (EPA, NSW Office of Water and the Council) to send a further 5 ML through the same facility to get them out of the very unplanned predicament. This shows a flawed, unjust planning system and similar ad hoc outcomes must be avoided.

Query:

6. **Santos have not finalised their produced water plan into a firm executable programme. Will they do so before gaining permission to develop the NGP?**

The projected solid salt waste to land fill is: average output of 17,200 tonnes per year and peak output of 41,975 tonnes per year which over a twenty year project life has the capacity to create significant environmental damage, particularly when all of it could and should remain deeply housed in the earth's crust.

The proponent's solution presented in the EIS:

- *For the peak period in around years two to four - around 117 tonnes per day of which 115 tonnes per day would be extracted through the treatment process **and disposed of off-site to a licensed landfill.** This is the equivalent of around two and a half B-double truckloads of salt per day. The residual two tonnes of salt per day would be contained within the treated water used for beneficial reuse activities (refer Table 7-3 on page 7.26 of the EIS). Approximately 145 tonnes of salt product per day would be generated and transferred to a licensed landfill under a scenario where 12 megalitres per day of treated water is generated.*
- *The long-term average over the 25-year assessment period - around 48 tonnes per day of which around 47 tonnes per day would be extracted through the treatment process and **disposed of off-site to a licensed landfill**. This is the equivalent of just over one B-double truckload of salt per day. The residual one tonne of salt per day would be contained within the treated water used for beneficial use activities as shown in Table 7-3 of the EIS*

One of the beneficial land uses is adding one or two tonnes of salt per day to local roads or paddocks for twenty years. This may lay the dust but it is not a satisfactory salt disposal solution. The salt accumulation in the soil compounds over time [4]. This is a dispersal of a problem not a solution.

The solid waste solution centres on salts and omits consideration of other waste products potentially found in coal seams: BTEX's (Benzene, Toluene, Ethylbenzene and Xylene), "oil and grease (many types of organic chemicals that collectively lend an ‘oily’ property to the water), trace elements such as mercury, arsenic and lead, organic acids and polyaromatic hydrocarbons, radioisotopes such as radium, thorium and uranium may be present, plus drilling fluids may contain a wide range of chemical constituents and these often vary from one operation to another" [4]. These contaminants are in low concentrations but due to the proposed handling technique and storage system, they will be concentrated and accumulated, the consequences of which must be considered.

Queries:

8. **What becomes of all the other toxins in the produced water listed in [4]?** If they reside in the solid salts to landfill, they need to be listed and quantified so that the public is aware of the polluting nature of this "landfill". Currently, only target values of "treated" and "amended" water content is clearly explained in Chapter 7 of the EIS.
9. **Where and what is the name of the accredited facility that is willing to accept this toxic landfill?** This question has been asked of the proponent for at least the last four years and there has never once been a definitive response describing any site address or any receival/storage system in place, for dealing with the enormous amounts of toxic material for **long term safe and secure storage**.

10. I repeatedly read of a **"Produced Water Management Plan" and an "Irrigation Management Plan"** in Chapter 7 and Appendix G2 Concept and Irrigation Design, Appendix G3 Water Monitoring Plan, but could not find them. **Do they exist and if not why not?**

It was anticipated that this EIS would finally outline a clear detailed waste destination solution and it does not. It also fails to be open about the toxic nature and content of the produced waste.

Many areas of Australia's soils have salinity problems that limit agricultural production when not addressed. Primary producers are aware of the potential for production loss when salt levels rise. **All the salt, and its associated toxins from the coal seam should remain buried at depth.** Once brought to the surface, they simply increase surface salinity and pollution risk. **Bohena Creek "managed release" should not be an option. (**Fig 7.4 in the EIS). This water results from Stage 5 of the treatment process (i.e. has not been "amended") and is not considered of high enough quality to be used as irrigation water. Why then can it be discharged into a running creek? It brings to mind the slogan " the solution to pollution is dilution". The pollutants still have to end up somewhere, in an environment that had lower levels prior to this industry's inception. Put simply, the **produced water creates a huge net cost to the environment.**

To quote Stuart Khan & Geena Kordek reporting to the Office of Chief Scientist and Engineer[4], *"Disposal by landfill or land application poses environmental risks unlikely to be manageable over the long term. This is because the hazardous substances (salts) in produced water are non-degradable and their ongoing effective containment may only be achieved for a finite period.* ***Long term land application will result in ever increasing risks to soil and water."***

The produced water treatment plant is designed for a maximum through-put of 14 megalitres per day and at peak production, expects to handle 10 megalitres per day (a 4 unit buffer capacity. P 17 of the EIS). The flow of produced water is continuous during gas production. Operational considerations state" *that there will be a high level of control and operational flexibility to vary the volume of treated water being produced to meet environmental conditions. If there is limited opportunity for beneficial reuse of the treated water (e.g. in extended significant rainfall conditions preventing irrigation or other beneficial uses), and Bohena Creek is not flowing at equal to or greater than 100 megalitres per day to allow for managed release, then the produced water storage ponds can be used as storage buffers"*

Queries:

11. **What is the management plan if the produced water treatment plant breaks down and pondage fills to capacity? Does gas extraction/production stop? In the extreme circumstance (rarer than a 1 in 100 year event) that this breakdown scenario is accompanied by a deluge rain event, is spare pond capacity assured to deal with it?** Appendix C Field Development Protocol, 10.9 Flooding and Geomorphology assurances about "*large ponds and dams will be located outside of the one percent AEP to ensure long term protection of these assets and to minimise impact from the project on surface flow during large flood events."* fails to give meaningful detail.
12. **There is a major oversight/understatement of the true nature of the solids destined to be deposited in landfill. What consideration of long term consequences is to be made?**
13. **Will the recipients of Beneficial Use water for irrigation be compelled to receive previously agreed volumes produced water when extended wet periods occur?**

LAND ACCESS:

As a freehold landowner, it is difficult knowing how little tenure we have over our freehold titles. As stated on previously on Page 5, landholders would feel empowered if they had the right to say "No" to competing users

of their land. The EIS is not able to change this national dilemma but it is also not transparent about the actions it is willing to take to woo hosts for their industry.

In Chapter 9.1.1 "*In March 2014, Santos, AGL, NSW Farmers, Cotton Australia, and the NSW Irrigators Council documented a set of principles in NSW (Principles of Land Access) that recognises the position that it will not undertake drilling activities on private land without the consent of the landholder. In September 2015, the Country Women's Association and Dairy Connect also became signatories to the agreement. The Principles of Land Access is intended to give the community further confidence that Santos seeks respectful, long-term relationships with landholders.*"

- **They fail to mention that other essential infrastructure such as roads, pipelines, easements to house pumping stations, telecommunications, power lines etc are not included in the Memorandum of Understanding/Principles of Land Access** . Necessity of property access for wells is reduced by the use of lateral drilling but land access for essential infrastructure will still be pursued.
- **They also do not mention whether this agreement will carry over should the project be sold-on to another entity.** As a new owner would not be a signatory of the agreement, would the agreement stand?
- **Also mentioned is that no Biophysical Strategic Agricultural Land (BSAL) falls in the project area. Because land is not classified BSAL is of little relevance to most primary producers. Because land is not classified BSAL does not mean it has no agricultural value and to infer so is folly.**

ANIMAL HEALTH - Biosecurity and National Vendor Declarations

We husband cattle and sheep at "Tara". Biosecurity is gaining importance rapidly and we anticipate that Biosecurity Plans will be a prerequisite to run stock quite soon in NSW. This added paperwork will be further complicated when having to account for hosted mining companies.

The CSG industry creates many management issues for CSG-hosting primary producers. Mr Bahnisch [5] [9] experienced several of them and was treated shabbily when hosting a pipeline construction through his property in Queensland in 2012. Stock were exposed to and ate/choked on plastic strips, gates were left open, or sometimes mistakenly closed leaving stock without water, mustering was hampered , human waste was deposited in the paddock, and some days he had up to 50 mine vehicles entering and leaving his property.

Other CSG activities on a property will expose CSG industry hosts to varied challenges beyond Mr Bahnisch's pipeline event. For example, Kahn and Kordek [4] also state "*Poorly planned livestock watering with produced water presents risks to animal health and welfare Reuse of produced water for livestock watering requires careful adherence to water quality requirements, generally determined by maximum total dissolved solids concentrations. Exceeding acceptable levels for various types of animals presents risks to the health and welfare of the animals. Furthermore, produced water may also contain toxic trace inorganic chemicals such as lead, mercury and arsenic. Toxic trace organic chemicals such as benzene may also be present".* Weed movement (including new weeds) onto and around a property is also a major threat.

When we sell or move stock off property, we are compulsorily required to make statements about their health and management. In Mr Bahnisch's situation, we would be unable to honestly fill out these forms. I doubt that the security we would have, with other entities on the property, who do not directly answer to us and who are not savvy about agricultural processes , would enable us to guarantee the status of our stock. Do we fill out the forms to the best of our knowledge and hope all is well? As far as I am able to ascertain to date, if we unwillingly host another industry on our property, we are still totally liable for our stock, despite having little or no control over the visiting workers' actions. [8] No Access Agreement will control the day to day activities of individual workers, 100% of the time. Clarifying our liability is itself, a problem. Producer funds were spent by the Meat and Livestock Association and the Cattle Council of Australia to investigate livestock owner's

position in 2014 and the resultant report was considered so sensitive that it could not be released [8]. This does not bode well for the hapless landowner/primary producer.
For ease of operation and peace of mind, it is simply not in a primary producer's best interest to invite the CSG industry (contamination and complication) onto his property.

GAS SUPPLY CRISIS AND UNCONVENTIONAL GAS ECONOMICS
The rationale for the development of the NGP is outlined in Santos's Executive Summary (ES), ES Page 5:

"NSW, which imports more than 95 per cent of its natural gas from other states, is at risk of supply shortages and increasing prices, largely due to Australia's changing natural gas market.

A large proportion of the gas purchased by retailers in NSW is underpinned by long-term contracts with gas producers in other states. Historically, approximately 40 per cent of NSW's natural gas has come from the Cooper Basin in South Australia, approximately 55 per cent has come from Victoria, and up to 5 per cent has come from supplies in NSW.

From 2017 a major shift will occur when all three liquefied natural gas (LNG) facilities in Queensland will reach more stable production levels. The majority of the gas that was previously contracted from the Cooper Basin will no longer be available to supply NSW, as it has been contracted from 2016 to meet some of the supply requirement of these Queensland natural gas facilities.

This absence of alternative sources of gas going forward, coupled with the diversion of gas from the Cooper Basin to fulfil LNG export contracts, means NSW will require the vast majority of its gas to be supplied from Victoria. This reliance on a single supply source may pose significant security of supply risk in the event of an interruption, as occurred in 1998 when there was an event at the Longford gas plant in Victoria that resulted in severe gas shortages across the state.

It is also important to acknowledge that when supply is sourced from interstate, it is outside the control of the NSW Government to effectively manage or influence upstream development approval timelines. Without developing gas of its own, NSW has no ability to manage its own energy supply security in a changing energy market.

The project has the potential to supply up to 200 terajoules of natural gas per day; which is sufficient gas to meet up to half of NSW's natural gas demand. This would provide NSW with a secure, long-term supply of this critical energy source and reduce the state's reliance on contracts with interstate suppliers."

As Santos is one of the main architects of the current manipulated gas supply shortage crisis (as described above and in [6] it is difficult to trust that market forces will not operate and dictate the destination of any new supplies that come online from the NGP. It is legally required that companies optimise returns to their shareholders and Santos will be obliged to fulfil that requirement.

It is an insult to those having gasfields foisted upon them to watch pipelines through their properties take Australian gas to export, while they pay exorbitant prices for the resource because of an unfortunate, but contrived, shortage. It is now becoming evident that even the shortage has been exaggerated: " AEMO's gas "shortfall" was wiped out in just 11 days according to their own updated electricity demand figures." [7].

The discussion around 200 Terajoules being assured to supply up to 50% of NSW domestic and commercial requirements is a misleading representation of the market facts. One stops short of calling it a lie as it is an unknown future prospect, but the gas shortages created in this state are the result of market forces and commercial greed and nothing will change in the future in a free trade market place to which Australia is

committed. In March 2013, I attended a presentation by Santos to the Gilgandra Shire Council. Santos most definitely had no intention of quarantining gas for NSW as they had shareholders interests to consider as a priority (I asked the question). As the months passed that year, the amount of Santos gas potentially being supplied into NSW rose expediently from 0 to 25% to 50% of its needs, as public concern gathered momentum and both the government and Santos were keen to find a plausible 'raison d'être' for the industry's development. Subsequently, Credit Suisse stated, ''Santos now argues that its aim in Gladstone Liquefied Natural Gas was always as much about raising the domestic gas price, and therefore re-rating large parts of the portfolio outside of Gladstone LNG plant, as it was about the project'', Michael West, June 7th, Sydney Morning Herald.

Santos creates the story to meet whichever way the political wind is blowing but their aim is most definitely to maximise profits. There is no altruism in big business. To suggest in the ES that the state can orchestrate the fate of locally mined gas is a farce. The federal government struggles to quarantine our gas supply, so why should the state government succeed?

Query:

14. **Can and will Santos guarantee that NGP will supply 50% of the NSW future gas requirements, should the NGP be allowed to progress?**

Also explained in [7] is that Australia has a gas price crisis, not a supply crisis. There is no need to expand the gas industry. It is a "false" solution and will do little to reduce prices. The expansion of the gas industry is also not consistent with our signing of the Paris Agreement to limit the rising global temperature.

HYDRAULIC FRACTURING

I could find no reference to hydraulic fracturing in the EIS and am aware that the process is not currently planned for the NGP. However, **if the proponent has no intention of ever using this method during gas extraction at the NGP, it would be prudent to firmly state this in the EIS to gain confidence of the public.**

Query:

15. **Is there an iron clad guarantee that hydraulic fracturing will never take place in the NGP?**

<u>OTHER ISSUES OF CONCERN</u>

Having covered the more important areas in the NGP EIS that convince us that an unconventional gas industry is massively risky, unwarranted and totally unwanted in NSW, I will briefly list some other topics that add weight to the already compelling arguments.

CUMULATIVE RISK

Chapter 29 deals with the cumulative risk of the NGP in conjunction with other local existing and proposed projects. A useful assessment tool, Namoi Cumulative Risk Assessment Tool (NCRAT), exists but does not appear to have been accessed by Santos for use in testing the cumulative effects of the NGP plus other mines and major projects, on ten natural resource assets, namely: Land use, Soils, Carbon, Surface water, Groundwater, Vegetation extent, Vegetation type, Vegetation condition (intactness), Vegetation connectivity and Threatened species. More work is warranted in this area.

DARK SKY

Siding Springs Observatory is situated in the Warrumbungle Mountains, visible to the east of "Tara", as seen in Figure 1. It is an asset to the region, both culturally and economically. The flares associated with the NGP will impact the internationally recognised "Dark Sky" status, only recently assigned to the Observatory. The night work activity and flares associated with the NGP will have a detrimental effect on the clear night sky, on which

the Observatory depends. Already the unmanned Bibblewindi flare alone, creates more light pollution than the entire town of Coonabarabran with 3500 people. The US EPA has already banned open flares due to toxic by-products. . Despite Santos's intention to minimise this light impact, enclosed flares should be mandatory.

COST BENEFIT ANAYSIS

Appendix U1, Economic Assessment (Cost Benefit Analysis) P 22 of 46 - the costs associated with "water quality (groundwater) impacts" and "water quality (surface water) impacts" were NOT CONSIDERED due to risk being assessed as "small" and "remote" respectively.
By eliminating water from the analysis, a potentially very costly aspect, i.e. the ruination or at the least depreciation of adjacent businesses and residences and people's deteriorated livelihoods due to water loss or contamination, has not been assessed.

GREENHOUSE GAS EMISSIONS /FUGITIVE EMISSIONS

I have watched as Australia has moved from a progressive renewable energy advocate to its current dinosaur attitude of fossil fuel dominance. While the rest of the world moves toward a lower carbon emissions position through innovation, Australia is now heading for accelerated development of globally significant, new gas and coal export enterprises.

For the CSG industry, there is a growing realisation that in addition to the more obvious and routinely measured carbon emissions, there is far greater methane leakage occurring along the whole production system than previously estimated. [10], [11], [12].
In Chapter 24 of the EIS, page 24-5
"In comparison on a lifecycle basis, where both upstream and downstream emissions are taken into account, energy (such as heat or electricity) produced by ***the combustion of natural gas has significantly lower greenhouse gas emissions than the emissions intensity of the NSW electricity*** *grid (refer to Figure 24-1). Note that:*

- *upstream emissions for fossil fuel supplies are those emitted in the extraction, processing and transportation of the fuel product (i.e. coal or gas)*
- *downstream emissions are those emitted from the combustion of the fuel by the end-user.*

Upstream emissions form only a small proportion of the total lifecycle emissions for energy generation. Consequently, it is the downstream emissions that have by far the greatest bearing on the emissions intensity of the energy."

This bolded conclusion in the EIS above only relates to the parameters measured for this report and fugitive emissions are likely to be underestimated as discussed in [12]:
"But evidence emerging across the globe of "fugitive" emissions from coal seam gas development is raising questions about the industry's image as relatively clean and green — the obvious transition fuel from coal-fired power to renewable energy.

'It depends,' said Mr Forcey, now a specialist researcher with the Melbourne Energy Institute at the University of Melbourne.

'If you release enough of the gas — the methane in that gas into the atmosphere, then gas can be dirtier than coal; more than about 3 per cent emissions, it is actually worse than coal if you are making electricity.'

Alarming studies in the United States have detected methane emissions in some coal seam gas fields of between 2 per cent and 17 per cent.

How much methane is leaking from the coal seam gas fields here? Nobody really knows.

The CSIRO completed a study four years ago but it only focused on the coal seam gas well-heads, not the vast infrastructure of seams and pipelines that now spread throughout the Surat Basin."

I have a simplistic way of looking at the carbon cycle and am yet to meet a strong argument against it: The biosphere has (almost) a finite amount of carbon transferring between its many forms, two of which are carbon dioxide and methane, two of the focal molecules of the greenhouse gas debate. With the exception of major transfers of more carbon into the biosphere by earthquakes, volcanoes and mining, the carbon molecules simply rotate through their many forms, but with no net addition of carbon atoms. With this view, I see no reason to endlessly study changes in biosphere-trapped methane production from livestock, vegetation and water masses, other than to **fine tune the best ratios for the greenhouse contributing carbon entities**. **The major contribution that mankind can therefore make, to lower greenhouse gases, is to STOP DIGGING UP FOSSIL FUELS in all their forms.** Not only will this minimise increases in biosphere carbon, **it will avoid the diminution of the surface and upper water sources that eventually fill the voids left by the removal of the carbon source**, be it coal or gas. And yes I concur that there will be a transition period to minimal fossil fuel use but the political will should be that it happens as soon as possible.

BUSHFIRES

We are assured in the EIS that all activities will be incredibly well managed for bushfire risk. I'm certain that the Council workers who welded in the open air on a Catastrophic Fire Alert day at the Gumin Gumin crossroads near Tooraweenah in 2009 were well versed in fire safety and how to behave on Catastrophic Fire days. They still burned down the Gumin homestead! I do not profess to know fire well, but have witnessed the Warrumbungle National Park Fire, the 45+°C temperatures and roaring winds and there is **NO SAFE NAKED FLAME in these circumstances**. Embers move hundreds and hundreds of meters from their source and ignite new ground. Our Bushfire Services (volunteer and otherwise) are full of experts and still major calamity follows major calamity each bushfire season.

EIS Chapter 25 - 25.1.3

The assessment considered bushfire management activities already undertaken by the proponent as informed by its participation in the Resource Industry Fire Management Group along with further measures to reduce bushfire risk to a level as low as reasonably practicable.

25.2.3 Bushfire risk assessment

*The project area and surrounding landscape contains large area of near contiguous vegetation that have the potential to sustain large bushfires. Bushfires have historically occurred in forested parts of the project area on a decadal basis including year 1951 / 2, 1957 / 8, 1974, 1978, 1982 / 3, 1997 and 2006. Accordingly, a fire starting within the project area has the potential to become a large scale bushfire. Construction and operation of the project would involve activities that are potential sources of ignition including hotworks and operation of machinery. The likelihood of the project activity causing a bushfire is remote given the range of measures proposed in addition to measures already in place as informed by the proponent's participation in the Resource Industry Fire Management Group. These measures would be collated in a **Bushfire Management Plan** described in Section 25.3.*

*A large scale bushfire, whether from project activities or other sources, would present threats including loss of life or injury, loss of property and community infrastructure, and impacts on commercial livelihoods including agriculture. As such, the overall risk associated with a bushfire is considered medium due to the inherent potential consequences, and despite the remote likelihood the project causing a bushfire due to the proponent implementing further measures to reduce **bushfire risk to a level as low as reasonably practicable**.*

A simple way to reduce the bushfire risk to zero for this industry is to not go ahead with it, due to all the major risks previously outlined. Fire is just another one to add.

Queries:

16. **Nowhere in Chapter 25 "Hazard and Risk", do I find, on a catastrophic fire risk day, that flaring in the NGP will be categorically banned. Will it?**

17. Santos exploration activities have been ongoing since 2011**. Why has no Bushfire Management Plan yet been written for this EIS?**

HUMAN HEALTH

I have read with interest (and often alarm) many claims and reports regarding human health impacts of the CSG industry since 2010. Fortunately there are many qualified medical practitioners now adding expert oversight and I remain hopeful that their views will be well considered by the proponent and the DoPE.

Chapter 26 The potential health and wellbeing impacts from the project were assessed through a Health Impact Assessment (refer to Appendix T2). The health impact assessment found that::

- *the residual risk with regard to air quality would be low*
- *the risk impacts to human health due to groundwater flow between target groundwater units and shallow groundwater aquifers would be negligible*
- *no human health impacts are expected due to the generally benign chemical characteristics of the drilling fluids and the low likelihood of a significant loss and migration of drilling fluids occurring*
- *no human health impacts are expected due to the low likelihood of a loss of produced water occurring under the circumstances that would lead to human contact and the generally benign chemical characteristics of produced water, especially given the likely dilution that would occur prior to contact*
- *the human health risk associated with spills of fuels or other chemicals is low*
- *the risk of impacts with regard to land contamination would be generally low because potential land contamination would occur sparsely in the project area and would be readily avoided, mitigated and managed*
- *noise would be managed during construction and operation so that it complies with the noise limits identified in Chapter 19, unless subject to a private negotiated agreement with a landholder. The noise limits would be achieved through the siting of gas field infrastructure and / or the implementation of all reasonable and feasible measures. Given the commitment to meet the relevant noise limits during construction and operation, the residual risk to human health with regard to noise was assessed to be low.*

Considering the above, the overall residual health and wellbeing risk was assessed as low.

Right now, sitting here, I know my health has been impacted by the spectre of this industry on my northern doorstep and the method of the impact is complex and does not appear in the dot points above. Sleep deprivation, succumbed to so that I may write submissions and still fulfil my normal life's roles, is likely to be the main culprit at present. The effect is very real nonetheless. This industry is depressing for many (fortunately I'm tough) and it has already taken lives - arguably indirectly.[13]

CONCLUSION

The paucity of detail and clarity of many areas of the EIS may be satisfactory for a government department to adjudicate the procedure of the NGP to production phase. However, I have not been convinced or had my doubts allayed by reading the opaque, subjective methodology of the many risk assessment procedures used, to draw conclusions of "negligible" or "acceptable" over and over again. If anything my doubts have increased, sensing the "manage as she goes" approach for a risk laden project. If an EIS assessment is not enough reason to set deadlines for the required and must-be-written Management Plans, then what event will spark them?

It's all about risk. Sometimes risk is necessary to progress. There isn't a business manager, or even a life manager (all of us), who does not know about risk and that the "black swan" effects described by economists, are real, despite the adoption of a very risk averse position. In the case of CSG/unconventional gas extraction, NSW does NOT need to risk permanent damage to the environment, particularly scarce water supplies, for a couple of hundred jobs over 20 years and a few royalties. Especially not for gas that ISN'T in short supply and can be replaced by renewable alternatives in time.

Should the NGP progress (as each small increment of the industry has progressed through these regulatory and planning processes to date) there will be an established gasfield in NW NSW. Once established and with ever increasing investment, the controlling body's will to deny the investor further progress is drastically reduced. Denying development once large investments have been made is met by screams of investment insecurity and the economic ruin of the state through investor fear (such as happened after the Bulga/Rio Tinto Warkworth mine expansion determination) or even threats to sue the state. By allowing incremental developments to accumulate, a system of consistent regulatory approval (with conditions) is established which is why the public is so adamant that this project stops before it is of an unstoppable scale.

Nobel laureate in Economics, Daniel Kahneman, in his book, "Thinking, Fast and Slow" [14] explores a "pervasive optimistic bias" to human nature. To quote:

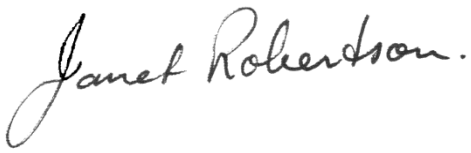
> "*Optimistic individuals play a disproportionate role in shaping our lives. Their decisions make a difference; they are the inventors, the entrepreneurs, the political and military leaders - not average people. They got to where they are by seeking challenges and taking risks. They are talented and they have been lucky, almost certainly luckier than they acknowledge. ... Their experiences of success have confirmed their faith in their judgement and in their ability to control events. Their self-confidence is reinforced by the admiration of others. This reasoning leads to the hypothesis: the people who have the greatest influence on the lives of others are likely to be optimistic and overconfident, and to take more risks than they realise."*

I see the proponent and our politicians in these words. They are shaping our lives in an unwanted risky manner at present.

Politicians and our public servants are there to do the best for the people of NSW. The DoPE is currently in the position to assess and heed the advice from the wealth of knowledge in the submissions for the NGP, and act for the long term well-being of the state. **Please adopt the "Precautionary Principle" and act wisely.**

It makes no sense to risk SO MUCH for SO LITTLE and 98.6% of my local government area neighbours agree with me.

Signed



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Footnote: If I NEVER hear the words "avoid", "minimise", "mitigate", "monitor" and "manage" again, it will be too soon!