Smart Upstart's submission in response to Santos' Narrabri Gas Project's Environmental Impact Statement (EIS)

[Special acknowledgement to Mr. Ian Sutton for his contribution to the research]

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I reject the EIS submitted by Santos, and the development of Coal Seam Gas in NSW for the following reasons:

1. Climate Change Mitigation
2. Protecting the integrity of the Great Artesian Basin (GAS)
    a. Interconnectedness of Aquifers
    b. Risk of losing pressure within the GAB
3. Environmental dangers and Risks
    a. Surface water Pollution
    b. Groundwater contamination and security
4. The Australian Constitution

1. Climate Change Mitigation

The Pilliga Scrub, NSW's largest inland forest is keeping the desert at bay.
There is extensive, analogous research and evidence to support that this water sensitive, 500,000 hectare, 900 flora and fauna ecosystem creates precipitation, which contributes to the formation of clouds; and, to the creation of large, inland low pressure systems which circulates atmospheric currents that keep inland, desert-prone areas healthy.[1]

Understanding the contribution that large natural ecosystems play in the maintenance of healthy atmospheric circulation of water is central to our national

[1] "How water vapor condensation influences atmospheric pressure and dynamics" http://www.atmos-chem-phys.net/13/1039/2013/acp-13-1039-2013.html

contribution to Climate change mitigation strategy.

Santos cannot provide any assurance that the proposed 850 casings drilled through the many sandstone / siltstone aquifer layers will be maintained, forever. In this, we can reasonably assume that the systematic reduction of water pressure where the coal seam lies, will, over time be distributed through the various aquifers, leading to a permanent drop in bore water pressure, and the dropping of the water table as we have seen in Queensland in areas where CSG is present. This risks a total drying up of the land, the destruction of habitat, the destruction of communities who rely on this water, and contribute to desertification in the long term.

2. The Great Artesian Basin

It has been documented extensively that the Pilliga is one of the main recharge areas for the Great Artesian Basin (GAB). This is easy to understand. With an altitude of 160 - 190m above sea level, and ground cover 75% composed of quartz, this ecosystem has been calling in the rains for hundreds of thousands of years, with a cumulative contribution to the GAB that has established complex water networks that run over 1000m below the surface.

The continental uplift in the formation of the Great Dividing Range predicates a certain fracturing and aquifer inter-connectness. Local anecdotes suggest that when bores in the Narrabri area were capped in the 1960s, bores that had run dry as far west as Bourke began to flow again. Whilst this may not appear to be related to Aquifer systems that run deeper that surface bore water, where no evidence to the contrary is definitively shown, it is reasonable to assume that this dynamic of interconnectedness exists at deeper levels.

a. Interconnectedness of Aquifers

In 2008, Queensland's Department of Infrastructure and Planning (DIP) commissioned the University of Queensland's CWIMI (The Centre for Water in the

Minerals Industry) to produce a scoping paper to develop a better understanding of the potential risks posed to regional and local aquifer systems by the development of a coal seam gas-based Liquefied Natural Gas (LNG) industry in Queensland. The objectives of the study were to:

- Provide background information on potential groundwater impacts resulting from the expansion of the coal seam gas (CSG) industry;
- Provide a broad estimate of water production (and uncertainties) resulting from expansion of the CSG industry; and
- Propose an approach for effective monitoring of groundwater impacts due to CSG production.

Found at:
http://lockthegate.org.au/documents/doc-279-scoping-study---groundwater-impacts-of-csg.pdf

The conclusion of the study was that **"there are significant data limitations relating to coal seams and surrounding aquifers that must be dealt with to inform policy development with confidence".** In short, the conclusion of this study was that there is not enough data to say with any degree of certainty that CSG mining is not damaging the environment, what the extent of that damage might be, or the long term impacts of CSG practices. Despite the findings of this report, the Queensland government has approved over 3700 CSG projects across the state, with an estimated 30,000 to be developed in the coming years.

All Australian territories including NSW and Victoria may draw on the findings of the CWIMI as reasonable support for the proposition that until a comprehensive and qualified study has been conducted to definitively show that the CSG industry can be responsibility developed, without harm to the environment, that the precautionary principal MUST apply.

b. Risk of losing pressure within the GAB

"Using a simple spatial overlay, the main recharge zones (> 1mm/yr) of the GAB [Great Artesian Basin] *which provide pressure to the remainder of the GAB are 69% covered with gas, coal seam gas (CSG) leases. Typically CSG production involves dewatering (pumping) of coal seams to allow methane gas to be extracted (the water is a waste product of production called produced water). There is proven downwards connection between sub basins of the GAB and many of its underlying petrochemical rich basins (Surat has 10% connection; Eromanga has up to 50% connection). It follows that dewatering of aquifers under the GAB where proven connectivity exists can ultimately reduce pressure heads in the critical recharge areas of the GAB and reduce or halt water flow at its numerous bores and springs.*

The significance of the recharge zones to the GAB is not so much as an immediate water supply to central parts of the basin and natural discharge areas, but that they provide the pressure head (or weight of water) required to drive the water to the surface. Removal of this pressure through water abstraction associated particularly with Coal Seam Gas (where local drawdown of in excess of 1000 m can be experienced around gas fields) risks removing the driving force of many of the free flowing artesian bores and springs in the GAB."[2]

3. Environmental dangers and risks

a. Surface water pollution

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[2] GREAT ARTESIAN BASIN RECHARGE SYSTEMS AND EXTENT OF PETROLEUM AND GAS LEASES SECOND EDITION
Prepared for THE ARTESIAN BORE WATER USERS ASSOCIATION
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Produced water spills from pipes and containment structures have the potential to sterilise soil and affect vegetation, which has already occurred even in the exploratory stages, producing irreversible damage to the effected areas. Basically, once an area has been contaminated by heavy metal salts and minerals, nothing grows, and it cannot be regenerated. Further, if the spilled produced water enters a watercourse it may have ecological impacts on downstream aquatic systems, with widespread, irreversible damage on flora and fauna.

CSG projects that rely on the surface disposal (e.g. through irrigation) of their produced water, are most certainly assured to increase in salinity of soil, with other produced water contaminants likely leading to the impairment or complete breakdown of affected ecologies and the broader, interconnected ecosystem.

b. Groundwater contamination and security The contamination of aquifers from produced water is one of the greatest long-term concerns associated with CSG. The cracking and eventual decomposition of CSG casings passing through many aquifer layers to connect with the coal seams, effectively increase connectivity between aquifers, precipitating vertical migration of produced water through cracks, faults and wells; whilst lowering water pressure (depressurisation). This depressurisation has the potential to cause a drawdown of higher-quality near- surface supplies to lower groundwater systems, resulting in the reduction of surface water flows in connected streams. This risks a reduction in the quality and quantity of groundwater aquifers, springs, hanging swamps, irrigation and grazing lands.[3]

Finally, it can be argued, that in light of the mountains of information provided which demonstrate that development of CSG cannot be responsibly undertaken in the Pilliga, that a ruling in favour of the NGP EIS would be illegal.

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[3] *(Williams et al. 2012, p. 42)*

4. The Australian Constitution

Enshrined in the Australian constitution,

Chapter 4 - Finance and Trade

Section 100 - Nor abridge right to use water

The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.

Where this can be shown to run contrary to the NSW Onshore Petroleum's Act (1991), in which

- The Minister may grant a petroleum title over any onshore area within the State (NSW), (1. Sec 9)

and

- In the case of dispute as to whether land is or is not under cultivation within the meaning of this section, the Minister's decision on the matter is final. (4. Sec 71)

The minister MUST defer to the Australian Constitution, *Chapter 5 – The States Section 109 - Inconsistency of laws*

When a law of a State is inconsistent with a law of the Commonwealth, the latter shall prevail, and the former shall, to the extent of the inconsistency, be invalid.

That is to say, the State cannot, by law abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.

In the event that the development is approved, there will be a tsunami of local opposition, anecdotally ~93% of people in and around the Narrabri area opposed to the Narrabri Gas Project. Legal challenges may and will be mounted, to ensure this project does not proceed.

Any endorsement of CSG activity by the NSW Department of Trade and Investment, and their Department of Primary Industries is not only irresponsible, but in direct contravention of their remit, which includes:

“Safe and responsible mining and effective environmental management for minerals and petroleum industries.”