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### **Submission to the Santos Narrabri Coal Gas Seam Project**

I am writing to register my opposition to the Narrabri Gas Project based on the significant uncertainties and unknowns associated with the above project which have been highlighted in many of the aspects of the Santos Environmental Impact Statement (EIS) reports (undated and untitled on the Planning Departments's website). In an age where there is an urgent need for sustainability and to stimulate our well recognised alternative energy sources given the grave concerns about rising carbon dioxide (CO<sub>2</sub>) levels, salination of our soils, the very real risk of aquifer cross contamination in a major groundwater resource together with the significant public opposition to the project it, is unconscionable for the Regulators to move any further forward with this project.

Turning to the further details of my concerns about uncertainties and unknowns I highlight the following:

As stated on the Agencies website the Narrabri Gas Project involves the progressive development of a coal seam gas field comprising up to 850 gas wells and up to 425 well pads over 20 years. Drilling is proposed to a depth of between 500 to 1200 metres. The project also includes the construction and operation of gas processing and water treatment facilities at the Leewood treatment plant. The project is to envelope a footprint of a disturbance area of 1000 hectares (ha), within a larger area of 95000.ha.

- The 1000 ha disturbance area to date has been calculated largely through a desktop study with limited investigations relative to the area. By definition such calculations are conceptual. In my experience in a project with a conceptual footprint over a large study area the impacts of any development are rarely confined to its planned footprint. Furthermore, it seems highly likely given the history of such projects that there will be further expansion within the larger area over the life of the 20-year project (albeit this is supposition in the view of this writer);
- In a project of this size and over such a large geological footprint there is no certainty that hydraulic fracturing will not be used. While the EIS indicates that the upper geology of the area is predominantly sandstone (where in my experience gas is likely to move relatively freely), the coal seam appears to be at between 500-1200metres below ground, where in my experience, gas would move less freely. What are the predictions and strategies to be utilised if the gas moves significantly less freely? The statements that there will be "no fracking" is not sufficiently supported and lacks strategies to move forward should gas movement through the geology be slower than predicted. If

hydraulic fracturing be required then all the risk assessments will need to be re-evaluated;

- Given the above, the impact on groundwater and land is unknown. Drilling to the depths of 500 to 12000 meters is complex and requires highly skilled drillers and complex drilling equipment. In my experience the performance, longevity and sustainability of well casings and well construction material (e.g metal and high-density polyethylene {HDPE}) is questionable in a saline and methane environment. While it is recognised that HDPE for example is commonly used in a landfill/methane environment, a reliable prediction of service life and degradation of polymer properties over a 20-year period is unknown given the drilling depth, salinity, by products of drilling fluids and the absence of detailed investigation through the conceptual footprint.

Furthermore, the EIS shows that the project area is within the Eastern edge of the Great Artesian Basin. Drilling plans transect the freshwater aquifers including the sandstone recharge zone for the Great Artesian Basin and in my experience is highly likely to result in aquifer cross contamination. This is of very grave concern in a time of increasing droughts where water in the upper aquifer is used for stock watering and irrigation. Contamination in groundwater knows no borders and can travel over a wide area within a geological formation and is especially concerning when the shallow groundwater is currently used for multi purposes including for drinking water;

The reports also show that shallow groundwater in the Gunnedah Basin (in the vicinity of the project) is intensively used for agricultural purposes while deeper groundwater is less exploited because of depth and quality (the latter supports the fact that groundwater is highly saline). Therefore, cross aquifer contamination would have significant impact of the use of the shallow groundwater for agricultural use (there are designated salinity guideline levels in water used for agricultural purposes).

- A further uncertainty is the potential for the release of gas in several ways e.g. stray methane can escape from badly constructed or decommissioned wells or degrading equipment wells and can make its way up the sides of well and contaminate the aquifers, and the upper more permeable soil strata in a forested environment. This point does not seem to be adequately addressed in the EIS or the risk assessments.
- It is estimated that up to 37.5 Gigalitres of saline water from the seam will be extracted over the life of the project, at an average of 4 megalitres (4 000 000 litres) per day. The treatment facility at Leewood has a predicted design capacity of 14 megalitres per day and peak production of waters given as between 4 and 10Mg/L per day to be used for irrigation dust suppression and so on. **Importantly** the report does not provide details of predicated salinity levels post-treatment but a figure of 14000uS/cm (a level commonly found in estuarine areas on outgoing/ incoming tidal cycles) is given in the reports- it is unclear whether this is pre or post treatment. In my experience overflow is highly likely from tanks and ponds when production capacity is stalled either through the well-recognised problems with large scale reverse osmosis plants, other equipment failure and flooding. In such cases saline water will be released.

Chapter 7 of the EIS report provides a brief summation of produce water management. It is vague in that no details are provided on efficacy of treatment and avoids consideration of known and well recognised treatment failures associated with reverse

osmosis techniques. It is evasive in that it does not consider organic compound testing in its regime and misleading in that it gives no consideration to the fundamentals in the use of irrigation waters on agricultural land i.e. while directly influenced by irrigation water quality there are a number of fundamental parameters (soil characteristics, plant salt tolerances and importantly a calculation of leaching factors) that are clearly required prior to usage of treated water for irrigation. This strategy for reuse of waters for irrigation are clearly laid out in *the Australian and New Zealand/Australian Agriculture and Resource Management Council of Australia and New Zealand guidelines 2000* (ANZECC/ARMCANZ) for Fresh and Marine waters and includes a chapter on water use for irrigation purposes. While the guidance is referred to in the reports no details are provided and again the poor quality of reporting on this matter strengthens the fact that this report is conceptual in its nature. The ANZECC/ARMCANZ guidance states that salt accumulation on land is a major factor in the degradation of Australian soils and particularly in the Murray–Darling Basin, and predicts that some 840 000 hectares of the Victorian Section of the Murray–Darling Basin is likely to be salt-affected by the year 2050

- Offsite migration from the Leewood plant. Arriscar Pty Ltd in a report titled *INDEPENDENT REVIEW OF SAFETY RISKS Narrabri Gas Project (SSD 14\_6456) For NSW Department of Planning, Industry and Environment* dated 17 March 2020, has indicated that there is off site migration from the plant onto an adjacent rural residence unless there is a relocation of infrastructure (which I presume will occur), However this indicates that strict planning controls will need to be implemented and recorded on planning notations by Gunnedah Local Government to ensure building development restrictions are strongly implemented
- I understand from your website that there have been significant community responses against the project, many of these from the local community. In weight of public opinion, I personally cannot understand how Regulators can move on with this development application. While I recognise the need to stimulate employment and job creation particularly in regional areas surely Governments have enough experts to develop other strategies for such tasks, I am cognisant that the Federal Government continually warns of looming gas shortages, the experience in other areas of Australia has been that much of Australis gas reserves are contracted overseas and this needs to be recognised in the decision making on employment in regional areas.

On a separate matter another point of relevance is operating licensing conditions which will be required for the operation of the project. My experience with developing operational licences in different jurisdictions is such that conditions are drawn up prior to operating and renewed normally within 1 or 2 years, depending on the State or Territory legislation (as there is no national policy of CSG). Companies can, and do, extend those renewal periods for up to 5 years. This often leads to inadequate scrutiny of the operation given the limited government resourcing for environmental agencies. Licence conditions do provide overarching conditions such as “do not pollute water”. Compliance assessment with such conditions are not well resourced, court proceedings in the event of pollution are drawn out, ultimately resulting in grossly inadequate fines or out of court settlements that do not reflect the environmental harm caused by a pollution event.

*The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) as well as New South Wales Protection of the Environment Administration Act requires the consideration of the precautionary principle in decision making i.e 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. I request that decision makers responsible for ensuring the integrity of the process adhere to the above principle.*

Thank you for considering the above

Jenny Lloyd