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To whom it may concern

**Narrabri Gas Project (SSD 6456; EPBC 2014/7376)
Submission to the NSW Government on the above project**

I am writing in response to the Minister for Planning and Environment's call for public comments on Santos' Narrabri Gas Project.

My expertise is in natural resource management, ecology, and environmental impact assessment and regulation (including the coal seam gas mining industry). Below I outline my comments on elements of the proposed project, referring to select sections of the Environmental Impact Statement (EIS), in particular Chapter 15 – Terrestrial Ecology and Appendix J1.

The Pilliga is widely considered highly significant for NSW and Australia's biodiversity, including for numerous threatened species and ecosystems. Indeed, the proponent themselves state in their EIS that the area has “high ecological and landscape value” (Chapter 15, page 15-17). The size of the patch; its position in the landscape (including its relative isolation from other large patches, and hence vital need to be self sustaining); and its biodiversity value, lead me to conclude that the project is very poorly situated. The potential benefits (for example, local employment opportunities) could be considered to be outweighed by the amount of long-term impact (both spatially and temporally) likely to be caused to this high-value habitat.

Indeed, when talking about dollars alone, it is quite possible the costs of: losing the proposed amounts of habitat; of rehabilitating the environment; mitigating and offsetting impacts; reducing ecosystem services; increasing climate change; and negative financial impacts on local towns outweigh the potential financial benefits to government and the community. In order to be more certain, I would suggest undertaking a cost-benefit style analysis to more clearly define the possible cost scenarios of this development, in a more comprehensive manner than is done in the EIS. This could be funded by the proponent, the NSW Government or Australian Government – regardless of who funds the analysis, the appointment of the analyst must be through an independent, Government-run process. I acknowledge not all environmental and social costs and benefits can be quantified in this way. However, there are precedents for a range of ecological and community costs and benefits being measured using these

types of analyses. Such information, assuming it is also made publicly available, would greatly enhance the transparency of the decision and decision-making abilities of the Minister. Another positive is that it would dispel some of the myths and concerns around positive and negative economic impacts of the proposal.

[I note the proponent has provided both a cost-benefit analysis and a review of macroeconomic impacts expected from the project. From a brief review, it appears these cover only a small subset of the matters mentioned above. Careful examination and consideration of the caveats associated with both these assessments, including which costs and benefits were not able to be included, should be completed by the Department and the Minister.]

Large-scale coal seam gas mining, for the production of liquefied natural gas, is a comparatively new extractive industry in Australia. Its progress has been marred by controversy and in Victoria the fracking has been banned altogether. There have been numerous government, community and industry investigations into the industry, aimed at catching up on a large knowledge gap that has trailed behind development. These ongoing investigations and concerns indicate the industry is still affected by uncertainty and risk (actual or perceived). In the specific case of environmental impact assessment, this is certainly the case.

On top of these concerns, there are two major environmental issues that must be considered when deciding whether to approve or reject this project. One, that the fossil fuel industry is negatively impacting the Australian environment and livelihoods through its contribution to climate change. Two, halting the removal of native habitat is the single most cost effective and important method for protecting what remains of the Australia's biodiversity. The scientific community could not be more clear on these two matters.

Direct impacts

The proponent has defined both 'direct impact' and 'indirect impact' in section 4.11 of Appendix J1. The proponent should clearly state the reasoning (and referenced literature, if any) behind these definitions.

The matter of calculating direct impacts on the environment is not straightforward for large coal seam gas mining projects, a fact acknowledged by the proponent in the EIS itself. The fact that placement of wells is an iterative process that occurs throughout project development makes it difficult to accurately estimate the amount of habitat likely to be removed or impacted prior to an approval decision. There have been a number of approaches that have attempted to deal with this problem in earlier coal seam gas impact assessments, and all appear to rely on some form of modelling to predict the most likely, or 'worst case' maximum amount of impact that could occur.

The main process the proponent has used to calculate what they term 'direct' impacts of gas fields (i.e. primarily the removal of vegetation) is outlined in Section 4.11 of Appendix J1 and Appendix F3 of Appendix J1. The process is described in detail at Appendix F3, and includes probabilistic estimation of impacts from a range of potential development scenarios. This approach is considered much more appropriate than previous approaches used in coal seam gas impact assessment, yet I note that this area of the environmental impact assessment discipline requires much more policy and research attention.

I recommend the Minister closely review this element of the EIS to ascertain whether the estimate of direct impacts is based on a transparent, repeatable and scientifically justified method. This aspect of the impact assessment is even more important than usual, as there is relatively low ability to reduce impacts through avoidance and mitigation. This exact point is made in the EIS – the location of the project [primarily occurring over intact native vegetation] limits “the ability and effectiveness of avoidance methodologies”, page 17, Appendix F3 of Appendix J1. It is also important in this context, to ensure reviewers of the EIS have the relevant expertise to review such matters, including statistical expertise.

Indirect impacts

If my interpretation of the methods used for calculating indirect impacts is correct, my conclusion is that the process is logically flawed. Using various methods the potential area of impact was calculated (and an assumption made that the habitat had the same values as habitat to be removed). Then it appears a 'formula' has been applied to reduce this amount. First down to 25% for reasons outlined in the following paragraph, and in a different scenario, down to 10% – when mitigation measures are employed (refer to Section 4.11.2 in Appendix J1).

The reasons given for assuming indirect impacts would only affect 25% of the modelled buffer zones are that A) the indirect impacts are unlikely to be linear and B) are likely to be greater at the impact source. Assuming these statements are both true, the amount of area impacted *in some way* has not changed from that initially quantified during modelling, and so any use of a formula to reduce the initial modelled amounts is a significant problem. If the proponent is concerned that the initial modelling of indirect impacts is not accurate, I would suggest trying a new method. The entire process from start to finish must be transparent and unbiased.

Why are mitigation measures assumed to reduce indirect impacts to 10%? This formula assumes A) that mitigation measures will be applied in all circumstances (something the proponent cannot commit to doing in all circumstances, based on comments in the EIS) and B) that they will always be successful (there is no evidence provided, from other similar projects or peer reviewed literature, to support this implicit claim). As an example, Table 15-7 proposes that the indirect impacts of well pad construction will only penetrate 5 m into surrounding habitat (with the application of mitigation measures). Whether this can be achieved is highly questionable, and again, evidence should be provided to support this claim.

Similarly, the decision to apply a 10m indirect impact zone for one area, and 50m zone in another, does not appear to be supported by reference to any peer reviewed literature (e.g. literature regarding impact zones for individual species, species assemblages or ecological communities).

Section 15.3 states that indirect impacts from the operational phase were more heavily weighted in calculations than construction impacts. However, section 15.3 does not provide any transparent information about how these perceived differences in indirect impact types were established.

It is also noted in the EIS that final indirect impacts were calculated to be 181.1 ha (following application of the formula mentioned earlier). Does this include the light impacts of flaring gas wells? If so, how large were the impact zones for these and how frequently (spatially and temporally) were they assumed to occur?

Based on above comments, the indirect impacts listed in table 15-7 appear to be flawed in their calculation. The above concerns should be addressed prior to a decision being made by the Minister.

Avoidance and mitigation

Avoidance and mitigation are two steps in the proponent's management of environmental impacts. The overarching approach, as mentioned throughout the EIS, is that environmental values must be avoided first, then mitigated and finally, residual impacts offset. This is in line with government requirements.

However, the methods and parties responsible for selecting sites are not entirely clear. There needs to be more information provided regarding the decision-making process to be employed when determining practicability of an avoidance or mitigation measure versus other constraints or priorities (such as technical or financial priorities).

The Field Development Protocol (Appendix C), which will include an Ecological Scouting Framework, appears to be the primary mechanism for ensuring impacts on biodiversity are avoided or minimised. However, the Protocol does not state anywhere how the proponent will demonstrate that environmental matters have been prioritised over other project priorities/constraints. All language in the EIS, regarding the extent to which environmental impacts will be avoided or minimised is non-binding and apparently based on 'practicability', which is not measurable or defined anywhere in the EIS.

The process of locating gas field infrastructure (wells, pipelines and tracks) appears to be as follows: A concept plan for the location of infrastructure is developed; then adjustments are made based on ecologically sensitive areas and exclusion zones. A series of steps follows, including site inspection and micro-site adjustments based on apparent site-level values. It appears from the process outlined in the Protocol that from the beginning (and apparently prior to implementation of the Ecological Scouting Framework) the proposed infrastructure location has already been identified. It is unclear whether environment has been considered during this initial planning phase, but apparently it's a secondary step (e.g. refer to Figure 5-1, in Appendix C). There is also no clarity around whether the person primarily responsible for implementing the Ecological Scouting Framework has any recourse to *renegotiate* or *reject* the proposed site location.

The above concerns relating to avoidance and mitigation should be addressed in a supplementary EIS or through some other mechanism prior to an approval decision.

Risk

The proponent has provided an Environmental Risk Assessment at Chapter 15, Table 15-22. This does not appear to be an actual risk assessment, as it only tabulates the amount of potential habitat prior to impacts; the hypothetical positive impacts of mitigation and the 'residual risk' (impacts that were not able to be mitigated). This does not actually assess the risk to the environment from the proposed project. For example, it does not outline the potential risk of extinction for each environmental value were the project to be proceeded. Nor does it assess the risk that species assumed unlikely to be impacted actually are impacted. Nor does it assess the risk that mitigation measures are unsuccessful, or the risk that they cannot be implemented. These are just a few of a much larger suite of environmental risks apparently not addressed in the EIS. Note:

There is also a Hazard And Risk Assessment provided at Chapter 25 – it does not identify or address any of the aforementioned risks and is not designed to do so.

The Minister and the Department should conduct, or require, a thorough risk analysis to help ascertain whether the potential environmental impacts of the project are significant/acceptable. Due to the potential for uncertainty around environmental impacts, risk should be a top priority in the Minister's decision.

Sincerely

Jessica Miller