



To: North West Alliance and the Independent Planning Commission

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A Response to “200810 Santos comments to IPC following public hearings Final Submission – Section 11.10. Groundwater dependent ecosystems and stygofauna”.

I have been requested by the Environmental Defenders Office, acting on behalf of the North West Alliance to review the aspects of the Santos submission on the Narrabri Gas Project, dated 10 August 2020, and the Department of Planning, Industry and Environment’s (DPIE’s) Response to the IPC’s Questions as they relate to Groundwater Dependent Ecosystems (GDEs).

I have reviewed the responses by Santos and DPIE and found there are a number of key elements that need to be corrected for the record. The Santos response was very brief and provided no new evidence or information that would help understand the GDEs present in the Pilliga or indeed offer any new suggestions that may help mitigate potential impacts to these ecosystems. The response does however display and highlight a number of inaccuracies and issues with the proponent’s understanding of groundwater ecosystems.

The issues with their response are as follows:

- Santos reported that "The stygofauna confirmed by Dr Serov were collected in the Namoi Alluvium." This is not entirely correct. The fauna I collected came from both "the **Permian Pilliga Sandstone** and the **Quaternary alluvial aquifers**" which includes the area within and adjacent to the proposed operations such as the Bohena Creek and the Namoi Alluvium. The significance of this comment by Santos is that it diverts the focus of the subject away from an important component of the biodiversity that would be impacted by any contamination or aquifer structure alteration as a result of proposed operation. The fact that stygofauna have been collected in the deeper Pilliga Sandstone aquifers associated with the area of operation strongly indicate high water quality and a direct connection to the surface and the shallower alluvial aquifers.
- Santos also commented that “stygofauna may be present in the Bohena Creek alluvium”, noting that “if taxa are present in Bohena Creek they are also highly likely to be present in the Namoi Alluvium”. The proponent does not explain why this is important. The comment strongly alludes that if stygofauna are present then they are a common and homogenous community along the length of the Namoi Alluvium and all its tributaries, and therefore not rare or potentially threatened by the proposed operations. If this is the intention of this statement then it is incorrect. In contrast, the stygofauna community consists of a number of

isolated communities both in the shallow alluvials and the deeper Sandstone aquifers. The important point here is that the stygofauna species and populations in the Namoi Valley occur generally in very distinct hotspots within subcatchments that are reliant on very specific water chemistry and it is very likely that the community found in Bohena Creek is taxonomically and genetically different to the other populations found along the Namoi Alluvium due to distinct differences in water chemistry.

- Santos' comments on the listed springs no longer being GDEs is also wrong, as the dominant source of the water is still groundwater even if they are now dams. As Santos did not sample these springs, they have no idea whether the composition of the faunal community within these spring dams still contain groundwater biodiversity. In addition, ecological value is determined not only on specific groundwater fauna but also on the regional importance of that water supply to other fauna such as terrestrial fauna, particularly in arid/semi-arid regions.
- Santos and DPIE have not responded to all of the other issues raised by me concerning the potential groundwater and surface water contamination from the drilling operations or water level impacts to the terrestrial GDEs and water level sensitive surface aquatic fauna due to the proposed drawdowns.

Response to Comments in Appendix B – Opinion of Richard Lancaster SC

In Paragraph 60 Mr Lancaster SC states that:

“NWA Submission identifies a range of potential impacts on ecological matters but does not also identify that those matters are the subject of proposed mechanisms to reduce or mitigate the feared harm.”

and in Paragraph 63 states:

“As another example, the NWA Submission does not address Recommended Conditions B40-B48, which appear to me to be directed to reducing or mitigating ecological impacts”.

The recommended conditions he refers to are required to:

- prevent, minimise and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting on the development;
- provide for the ongoing environmental management of the development; and
- provide detailed performance criteria, including trigger levels for identifying and investigating any potentially adverse impacts associated with the development, on:
 - regional and local aquifers and aquitards (alluvial and hardrock);
 - groundwater dependent ecosystems; and
 - aquatic habitat and stygofauna;

And

Water Management Performance Measures

B35. The Applicant must ensure that the development complies with the water management performance measures in Table 6.

Water management performance measures

- Negligible environmental consequences to the aquifers beyond those predicted in the EIS, including:
 - negligible change in groundwater levels;
 - negligible change in groundwater quality; and
 - negligible impact to other groundwater users
 - No exceedance of the minimal harm considerations in the Aquifer Interference Policy (DPI, 2012)
- Riparian and aquatic ecosystems -
- Negligible change to surface water quality in any watercourse

- Negligible impact on groundwater dependent ecosystems
- Develop site-specific in-stream water quality objectives in Bohena Creek in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) and Using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC, 2006)

In response to these comments it must be noted that the Recommended Conditions B40-B48 do not adequately protect, reduce or mitigate ecological impacts to Groundwater Dependent Ecosystems including the Subterranean (stygo fauna) ecosystem, terrestrial and surface water aquatic ecosystems. The data and analysis provided in the EIS fail to adequately address the requirements listed above for the following reasons in relation to each of the Recommended Conditions:

- *prevent, minimise and/or offset adverse environmental impacts* – There is no Offset Policy for aquatic ecosystems and there are no offsets available for aquatic or subterranean ecosystems, nor is it possible to do so given the unique characteristics of the surface aquatic ecosystems within the Pilliga Forest (CSIRO 2018) and the heterogeneity of the subsurface environment as well as the limited number of waterways and wetlands;
- *set standards and performance measures for acceptable environmental performance* – There are no such standards or measures prescribed for GDEs.
- *require regular monitoring and reporting on the development* – There is no prescribed ongoing monitoring or reporting for stygo fauna or health of the surface waters and wetlands; and
- *provide detailed performance criteria, including trigger levels for identifying and investigating any potentially adverse impacts associated with the development, on:*
 - *groundwater dependent ecosystems* – There are no environmental triggers levels assigned to any of the Groundwater ecosystems or the association of natural water level and water chemistry ranges with specific groundwater ecosystem health. Therefore, in my opinion, they cannot be effectively managed if they are not appropriately monitored; and
 - *aquatic habitat and stygo fauna* – There are no water level or water chemistry trigger levels developed for the range of aquatic species present in either the streams or wetlands and as mentioned previously there is no mention of any water level sensitive species. The limited number of surveys (1 and 2 respectively in 2014 i.e. 6 years ago) conducted on both of these ecosystems was not sufficient to understand natural annual seasonal fluctuations or environmental requirements and cannot be effectively used to set predevelopment baseline ecosystem health standards against which post development health can be assessed.
- The assessment of the subterranean aquatic ecosystem (stygo fauna) based on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) and using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC, 2006) is not appropriate. These guidelines were only developed for surface aquatic ecosystems. Guidelines for stygo fauna need to be developed on an individual aquifer basis and this has not been conducted.

In my opinion, although the intent for a fair, transparent and adequate environmental assessment of all aquatic and groundwater ecosystems is present within the Recommended Conditions as stated by Richard Lancaster SC, my scientific opinion is that the Recommended Conditions B40-B48 do not adequately protect, reduce or mitigate ecological impacts to Groundwater Dependent Ecosystems including the Subterranean (stygo fauna) ecosystem, terrestrial and surface water aquatic ecosystems.

Please let me know if you have any further questions or points that need clarification.

Kind Regards
 Dr Peter Serov
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