

The Secretary

Department of Planning and Environment NSW

RE: NARRABRI GAS PROJECT - WATER IMPACT ASSESSMENT

Dear Sir/Madam

**The Santos EIS for Narrabri Gas Project Appendices F and G have failed to correctly risk assess the groundwater impacts of Narrabri Gas Project on irrigation, domestic and stock water users and groundwater dependent ecosystems. This is serious because there are over 4,000 bores within 30 km of Leewood, including Narrabri town water supply.**

Santos EIS claims their modelling indicates there will be less than 0.5m drop in the Pilliga Sandstone aquifer because of the assumptions that there are 'relatively impervious rock layers' between the target coal seam and the aquifer. The vertical hydraulic conductivity values are too conservative. The Namoi Water Catchment Study Phase 2 conducted by Schlumberger indicates there is no such impervious layer:

*Hydrogeological characterisation*

**Table 7.11 Summary of parameters for each geological unit**

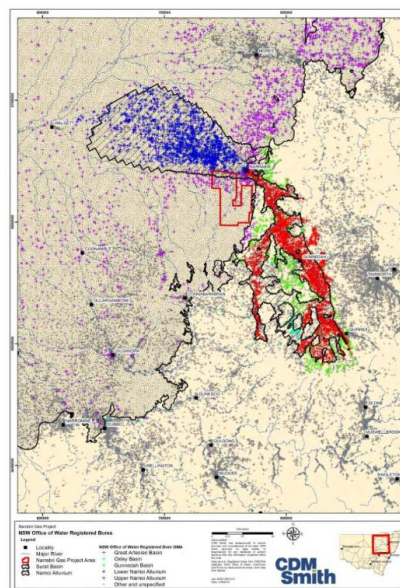
Geological units	Hydrogeological significance	Horizontal hydraulic conductivity, $K_h$ (m/d)	Vertical hydraulic conductivity, $K_v$ (m/d)	Specific yield, $S_y$ (-)	Specific storage, $S_s$ (1/m)
Narrabri Formation	Significant Aquifer	0.1–30 <sup>a</sup> (6.3 <sup>a</sup> )	0.000001.7–0.037 <sup>f</sup> (0.0003 <sup>f</sup> )	0.005–0.1 <sup>a</sup>	0.000005 <sup>a</sup>
Gunnedah Formation	Significant Aquifer	0.05–30 <sup>a</sup> (7.1 <sup>a</sup> )	3.5 to 7.2 <sup>a</sup>	0.15 <sup>a</sup>	0.000001–0.0005 <sup>a</sup>
Lower Namoi / Weathered Horizon	Significant Aquifer	0.0009–8.6 <sup>a</sup>	0.009–0.9 <sup>a</sup>	0.15 <sup>a</sup>	0.000001–0.0005 <sup>a</sup>
Fractured rock horizon	Aquifer	0.01–10 <sup>a</sup>	0.001–0.1 <sup>a</sup>	0.01 <sup>a</sup>	0.00001 <sup>a</sup>
Great Artesian Basin	Aquifer	0.004–0.265 <sup>b</sup>	0.000015–0.0002 <sup>b</sup>	0.1 <sup>a</sup>	0.0001–0.00001 <sup>a</sup>
Pilliga Sandstone	Aquifer	0.004–0.265 <sup>b</sup>	0.000015–0.0002 <sup>b</sup>	0.1 <sup>a</sup>	0.000005 <sup>a</sup>
Purlawugh Formation	Aquifer	0.004–0.02 <sup>a</sup>	0.000015–0.001 <sup>a</sup>	0.001 <sup>a</sup>	0.000005 <sup>a</sup>
Garrawilla Volcanics	Minor Aquifer	0.001–0.04 <sup>a</sup>	0.000006–0.001 <sup>a</sup>	0.002 <sup>a</sup>	0.000005 <sup>a</sup>
Napperby and Deriah Formation	Minor Aquifer	0.001 to 0.04 <sup>b</sup>	0.000006 to 0.71 <sup>b</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Digby Formation	Minor Aquifer	0.9 to 1.5 <sup>c</sup>	0.62 to 0.71 <sup>c</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Upper Black Jack	Aquitard	0.0003–1.1 <sup>d</sup>	0.19–0.59 <sup>d</sup>	0.1 <sup>a</sup>	0.00001 <sup>a</sup>
Hoskisson's seam	Aquifer	0.13 to 3.3 <sup>e</sup>	0.00022 to 0.002 <sup>e</sup>	0.2 <sup>a</sup>	0.0001 <sup>a</sup>
Middle Black Jack	Aquitard	0.0015 to 0.047 <sup>d</sup>	0.005 to 0.4 <sup>d</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Melville's seam	Aquifer	0.02 <sup>d</sup>	0.005 to 0.4 <sup>d</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Lower Black Jack	Aquitard	0.0015 to 0.047 <sup>d</sup>	0.005 to 0.4 <sup>d</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Watermark and Porcupine Formations	Aquitard	0.0009–0.00014 <sup>d</sup>	0.00009–0.0014 <sup>d</sup>	0.01	0.00001 <sup>a</sup>
Mauls Creek Formation	Aquifer	0.13 to 3.3 <sup>e</sup>	0.00022 to 0.002 <sup>e</sup>	0.1 <sup>a</sup>	0.0001 <sup>a</sup>
Leard Formation	Aquitard	0.009–0.25 <sup>f</sup>	0.0009–0.025 <sup>f</sup>	0.01 <sup>a</sup>	0.00001 <sup>a</sup>

Refs: a = NSW Office of Water (2010), b = Aquaterra (2009), c = Golder Associates (2008), d = Golder Associates (2010), e = GABCC (2010), f = Freeze and Cherry (1979), g = GeoTerra (2008)

Furthermore the EIS is deficient in the following regards:

I. Santos has made a subjective risk assessment of the induced connectivity between the Pilliga sandstone aquifer and toxic coal seam target water accessed by gas wells - with no data presented. There is no well integrity data presented to back up their assessment either

8. If Santos is wrong about water damage the bores most likely to be impacted will be those in the east Gunnedah Basin GMA first.



9. Santos admit to induced groundwater flow from the pure Southern GAB recharge into the deeper lower quality Gunnedah-Oxley Basin groundwater, but conclude from their water model assumptions that this induction is minimal and over 100s of years. Frankly, this is wishful thinking based on a water model with faulty assumptions of low conductivity and no interconnectivity being caused by drilling and fracturing.

10. Santos admit to water being induced from the Namoi Alluvium into the Pilliga sandstone aquifer and thence into the de-watered Gunnedah basin - they say this is a 'good thing' since it will improve the Gunnedah basin water!!!

11. There is no assessment of the super alkaline Purlewaugh Formation water that could be conducted through layers through drilling, induced connectivity, induced water flows and well casing failure.

Yours sincerely

Dave Smith

Narrabri

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