

LOCK THE GATE ALLIANCE

AUSTRALIANS WORKING TOGETHER TO PROTECT OUR LAND, WATER, AND FUTURE 

Reply to: Georgina Woods

15 December 2017

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Senate Standing Committees on Environment and Communications
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Canberra ACT 2600

Submission: Adequacy of regulatory framework governing water use by the extractive industry

Thanks very much for the opportunity to make a submission to this inquiry.

Lock the Gate Alliance is a network of hundreds of community groups and tens of thousands of individuals around the country who are concerned about the impacts of inappropriate coal and gas mining.

The gaps and deficiencies in the regulatory framework for water use by coal and gas mining is a high priority concern for Lock the Gate Alliance and the communities and landholders with which we work.

We have undertaken considerable research into the scale and consequences of water use by coal and gas mining in regions targeted by those industries. This submission is largely limited to issues and activities in New South Wales, Queensland and the Northern Territory, but we encourage the Committee to seek and obtain reviews and research into this matter across the country as our input is far from comprehensive. We would be very happy to present our perspective on this issue at public hearings of this inquiry.

The intergovernmental agreement on a National Water Initiative (NWI) in 2004 committed all Australian Governments to the establishment of a National Water Commission.¹ The Commission was an independent, statutory body that provided advice to COAG on national water issues and assisted in the implementation of the National Water Initiative. The Commission was abolished by the current Government in 2015 and its absence has left a dangerous hole in Australia's water policy and management framework. States and territories have not consistently met the agreements laid out in the NWI for water planning that is transparent, sustainable and which recognises Indigenous water needs.

The Commission produced annual review of environmental water management, performance reviews on the management of rural and urban water and annual reports on the Commission's own activities. The last annual review prepared before the Commission was abolished, in 2014, provides a useful overview of the uneven and inconsistent approaches the states and territories take to managing extraction of water for mining industries, with several key states and territories not having

¹ See here <http://www.agriculture.gov.au/SiteCollectionDocuments/water/Intergovernmental-Agreement-on-a-national-water-initiative.pdf>

volumetric entitlement systems in place that ensure the mining industry is accountable for its water take and that this take is kept within sustainable diversion limits.

Lock the Gate has argued since the water trigger was adopted that it needs to be expanded to include all forms of unconventional gas extraction. The restricted application of the water trigger to large coal and coal seam gas mining came about largely because at the time it was adopted, coal seam gas dominated discussion about unconventional gas in Australia. But unconventional drilling for shale and tight gas is water intensive and comes with similar or even worse damage to water resources.

We note that no large coal or coal seam gas projects have been refused approval under the water trigger since its creation and have concern that some of the current bilateral assessment agreements under the EPBC Act mean the Commonwealth is failing to conduct its own independent assessment and decision making under this crucial law.

Many of the bioregional assessments being undertaken by the Independent Expert Scientific Committee that were charged with investigating the cumulative impact of coal and CSG mining activities in regions such as the Galilee Basin, Western Downs, Namoi and Hunter are incomplete, and yet individual projects continue to be approved.

Social, economic and environmental impacts of extractive projects' take and use of water

Hunter region

In the Hunter region of New South Wales, the coal mining industry is a large-scale user of both surface and groundwater. Since 1981, the area of the Valley cut open by mines has increased from 1,724ha to more than 31,500ha, or over 16 per cent of the upper Hunter Valley floor. The 26 coal mines and mine complexes currently operating in the Hunter comprise 42 open cuts pits and 15 underground works and produce about 142 million tonnes of saleable coal. To run these operations, large volumes of water are needed to wash and prepare the coal and suppress the dust that impacts on the towns and villages of the region.

Extensive open-cut mining is altering the hydrology of the Hunter and putting agriculture and the mining industry itself at risk of water constraints. There has been a significant shift in water usage over the last 10-15 years. Coal companies now hold water access licences comprising 55 percent of available high security water in the Hunter Regulated River Water Sharing Plan.² Nevertheless, the agricultural industry in the region is substantial and produces beef, cereal crops, lucerne and dairy, as well as wine. The Department of Primary Industries put the combined value of agricultural production in the region at over \$460 million. The region produces 28% of the state's stud horses, 13% of its milk and 6% of its beef.³

The water actually used by the coal mining industry in the Hunter is generally considerably less than its entitlements in years when water is plentiful. The industry also generally operates below its approved coal production capacity. A report prepared for Lock the Gate in 2014 found that if the 26

² See Lock the Gate's report "Unfair Shares" http://www.lockthegate.org.au/unfair_shares

³ See DPI NSW "Upper Hunter Region Agricultural Profile" https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0018/471024/Upper-hunter-region-agricultural-profile.pdf

mines of the Hunter increased production to meet approved capacity, water use would increase from roughly 90GL annually to over 130GL.

In 2014 Infrastructure NSW also identified this trend – the shift in water utilisation in the Hunter from predominately irrigated agriculture to predominately mining, particularly the high security licences. A study was commissioned to investigate the potential economic risk of future drought and water scarcity using mining royalties as a proxy under different drought and commodity export price scenarios over the next 20 years. Infrastructure NSW concluded that constraints in water supply may have a significant adverse impact on the economy.

The experiences of irrigators and coal mines during the last major drought in 2003-07, which coincided with a major expansion of coal mining, provides some insight into the dynamics of water sharing between the coal industry and other users in the Valley in times of water scarcity.

Water allocations under general security licences were significantly reduced for the two years between July 2006 and July 2008. In July 2006, an 8 percent allocation was announced for general security licences, which was incrementally increased to 35 percent from April to July 2007. In July 2007, a zero general security allocation was announced which was incrementally increased to 100 percent by February 2008. During the drought, allocations under high security licences were also reduced, but to a much lesser extent. In July 2006, high security allocations were reduced to 79 percent and then incrementally increased to 92 percent from April to July 2007. In July 2007, high security allocations were then reduced to 75 percent, incrementally increasing to 100 percent by January 2008.

Despite Hunter coal mines generally having extensive storage capacity in mine voids and other on-site storages, during the 2003-07 drought at least one mine near Muswellbrook was reported to have “briefly stopped production due to a water shortage, while another placed the workforce on notice of potential stoppage unless rain was forthcoming.”⁴ It’s not clear how widespread the impact on the coal mines was, but Anglo American’s Water Management Plan for the Drayton mine refers to the “excessively dry period between 2003 to 2007 when other coal mines in the region were experiencing the effects which resulted in reduction in production levels.”

Sydney catchment

Underground coal mining has been occurring in Sydney’s drinking water catchment for many decades, but in the last fifteen years the scale of mining and expanded use of longwall technique has led to considerably more intense environmental impacts, with potentially severe future risk for Australia’s largest city.

In the five major drinking water catchments that are specially managed to provide drinking water for 4.5 million people in Sydney, the Illawarra, Blue Mountains, Southern Highlands, Goulburn and Shoalhaven regions, underground coal mining is still expanding, despite mounting evidence it is affecting the quality and quantity of water in the catchment.

The water lost from Sydney’s catchment to these mines is not extracted for the *purposes* of mining, but taken incidentally as a result of the altered geology caused by large scale longwall mining operations.

⁴ Connor, L., Higginbotham, N., Freeman, S., & Albrecht, G., 2008. Watercourses and Discourses: Coalmining in the Upper Hunter Valley, New South Wales. *Oceania*. 78 (1), 76-90.

The 2016 Catchment audit, tabled in NSW Parliament on 8 August, warned that, “The cumulative, and possibly accelerated, impact of mining on flow regimes in the Catchment is likely linked to the increased prevalence of the current longwall methods of underground mining.”

Expanded mining proposals in the Special Areas of the catchment, including new areas of longwalls at Dendrobium and the Russell Vale have been opposed by WaterNSW on the grounds they pose unacceptable risks to the water flowing into Sydney’s dams.

A long-awaited technical report into the impacts of the Dendrobium underground coal mine in the Metropolitan Special Area of Sydney’s drinking water catchment was released in 2017 and confirmed seam to surface connected fracturing, groundwater diversion and drainage, landscape slippage and valley bulging causing fracture pathways for leakage from below the reservoirs that provide Sydney’s drinking water.⁵ Rainfall that should be feeding Sydney’s dams and drinking water supply is being drawn into the mining goafs beneath the surface, raising considerable strategic risk for Australia’s biggest city in the context of rising populations and long-term drying trends brought by climate change. The report found that it is feasible that there is a hydraulic connection between mine workings at Dendrobium and the Avon and Cordeaux dams themselves, though there’s not enough data to know for sure. A further expansion of Dendrobium mine is currently being proposed by South32.

For the proposed Russell Vale expansion, WaterNSW described the predicted loss from the surface flow into Cataract Dam of 7.3ML per day as “unacceptable” particularly during dry periods, since the loss of water to this mine would be up to 10% of the flow in the Cataract catchment. A review of the project by the NSW Planning Assessment Commission found that its environmental impacts are likely to outweigh its economic benefits, but the project has not been formally withdrawn and there is no threshold trigger in NSW regulation to prevent it being approved to proceed at this stage.

Coal seam gas in Queensland

In Queensland, section 185 of the *Petroleum and Gas (Production and Safety Act 2004)* petroleum producers enjoy “statutory underground water rights” which is the right to take unlimited volumes of groundwater without licences to do so where the removal of groundwater is necessary to the process of extracting coal seam gas. Other water users would be required to obtain licences to take this water.

The roll-out of coal seam gas wells and water removal in southern Queensland has not proceeded as quickly as was feared and expected in 2012, though it has still been extensive and has resulted in widespread environmental harm. In 2016, the *Underground Water Impact Report* for the Surat Cumulative Management Area where CSG production has been concentrated, estimated that CSG water extraction in the region has increased to about 65,000ML per year. Water extraction for all other uses in the region combined is estimated at 203,000ML per annum. Over the life of the industry, up to 2060, it’s predicted the total water extraction will be 3,570GL.

As a result of this dewatering, the Condamine alluvial aquifer is expected to lose 1,160ML per year. At this stage, the modelling is not predicting that this loss will cause water levels to decline by more than the “trigger threshold” for impairment of water bores. In Queensland, the trigger threshold is five metres for consolidated aquifers and two metres for unconsolidated aquifers, which is generally how the Condamine alluvium is characterised. Across all the other groundwater sources affected by the industry, though, around 459 water bores are predicted to be affected in the long-term.

⁵ NSW Department of Planning and Environment. March 2017. “Height of Cracking, Dendrobium Area 3B” Available here: http://planspolicies.planning.nsw.gov.au/index.pl?action=view_job&job_id=7441

Of these, 91 water bores have been predicted in the 2016 *Underground Water Impact Report* as being affected within three years of CSG dewatering operations. Though the *Queensland Water Act 2000*, mandates “make good” agreements with landholders affected by this loss of water, the negotiation and resolution of these agreements is not timely nor always satisfactory. In the four years following the first *Underground Water Impact Report*, there had still not been resolution for the owners of 34 bores predicted to experience more than five metres drawdown. Landholders in the area report protracted negotiations that are unbalanced and deliver poor outcomes.

It is only the *volume* of water that must be made good by a resource tenure holder. Landholders can be left with changed water quality and pressure in the new “make good” bores. Replacement bores to deliver make good water are being drilled into aquifers like the Hutton Springbok/Walloon and Precipice Sandstones GAB aquifers, which landholders are concerned may be either already overallocated or may become so in the future.

As previously outlined, the CSG industry is currently allowed to extract in excess of 65,000ML/annum and this has resulted in a depressurisation of the Hutton and the Springbok/Walloon Sandstone aquifers to the extent that the agricultural sector is not permitted to construct any new bores into these two aquifers for agriculture, intensive animal production or irrigation uses. All new bores for agriculture or intensive animal production or irrigation use must be drilled into the Precipice Sandstone aquifer. Furthermore, the new *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017* only provides for 840ML of General Reserve Unallocated Water entitlement in the Precipice Sandstone aquifer for agricultural development. Once this water is taken up there is no more water for agriculture, though the CSG industry will still be able to exercise its “underground water rights” and develop new gas fields.

Coal seam gas extraction in Queensland is impacting on Great Artesian Basin aquifers. The Walloon Coal Measures are the target seams for gas extraction and have been extensively dewatered, despite being previously relied upon by agricultural enterprises. Above and below the Walloons are productive GAB aquifers including the Hutton sandstone above and the Precipice Sandstone below.

In 1999, the Australian, Queensland, South Australian, New South Wales and Northern Territory Governments committed to a 15 year joint program to sustainably manage the groundwater resources of the Great Artesian Basin (GAB) called the Great Artesian Basin Sustainability Initiative (GABSI). Over the subsequent years, Governments have spent \$238.68 million in restoring pressure and saving water in the GAB, by capping and piping uncontrolled bores, resulting in an estimated annual water saving of over 200GL.⁶

There is predicted to be a loss of pressure and drawdown in Queensland GAB aquifers as a result of CSG extraction. The onset of this loss will be delayed and the duration long. Water and pressure decline is already being exacerbated by declining rainfall over much of the recharge area of the GAB in Queensland between 1990 and 2011.⁷

The flow-on effects of drawdown as a result of coal seam gas extraction are also predicted to have long term effects on Great Artesian Basin discharge springs. These springs are a nationally threatened ecological community and host important, often endemic, biodiversity. They are also

⁶ SKM GABSI Value for Money Review. January 2014.

<https://www.environment.gov.au/system/files/resources/03562d91-79e1-48ab-bd29-75d6c81e2f55/files/gabsi-vfm-review.pdf>

⁷ Qld DNRm. *Underground Water Impact Report 2016*.

https://www.dnrm.qld.gov.au/data/assets/pdf_file/0007/345616/uwir-surat-basin-2016.pdf

known to be important cultural and social sites for First Nations people. In Queensland, for example, 150 Indigenous cultural heritage sites have been recorded in relation to GAB spring wetlands.⁸ As well as being a listed threatened communities, several flora and fauna species that live in GAB springs are listed as endangered. The National Recovery Plan for GAB discharge springs identified drawdown resulting from domestic, agricultural and mining and coal seam gas extraction as the greatest threatening process for these communities.

The *Surat Underground Water Impact Report 2012* outlined the predicted impacts of petroleum and gas operations on GAB springs vents and springs complexes in the Surat Cumulative Management Area (CMA). There are also 43 “watercourse springs” contributing to the base flows of watercourses in the CMA. The report identified five springs complexes where pressure impacts were predicted at more than 0.2 metres. At two of these sites, a relocation of stock & domestic bores has mitigated the risk. For the other three sites (Lucky Last, Springrock Creek & Yebna) more investigations were needed. Petroleum and gas tenure holders are required to assess mitigation options at these five sites and report these outcomes to the Queensland Government.

With four years of investigation into these springs already elapsed and potentially another four years of investigation to be undertaken, we question whether the Queensland Government is really committed to spring protection and would intervene to halt adjacent CSG production if that what was required to protect spring complexes.

Coal mining in Queensland

The Queensland Government has now extended the largesse already enjoyed by CSG mining companies to all forms of mining and changed the law so that water that is taken in the process of mining, called “associated water,” no longer needs to be licenced.

The statutory underground water rights for mining operations require operators that had already applied for mining authorities by 6 December 2016, to obtain an “Associated Water Licence” to take “associated water” during a mining operation. Otherwise, new mining proponents have a statutory right to take unlimited volumes of “associated water” from underground aquifers. This right may be activated by holders of a mining lease or a mineral development licence, who have submitted an Underground Water Impact Report and Baseline Assessment Plan under Chapter 3 of the *Water Act 2000*.

The dewatering permit granted to Adani’s Carmichael coal mine, for example, is valid through to 2077 and its 100 conditions provide no volumetric limits on the amount of groundwater, or any triggers to halt mining operations. Adani’s mine was also exempted from needing to subject the grant of their “associated water licence application” to public notification, which therefore also took away community internal review and appeal rights.

Like the coal seam gas operations in the south, coal mining in the Galilee Basin generally, and Adani’s mine in particular, are expected to draw down water from GAB discharge springs, including draw down of 1 metre at the nearby Doongmabulla Spring Complex. Adani’s environmental assessment material estimated a 4-30% reduction in flows for mound springs, and up to 25% increase in the cease-to-flow period for non-mound springs as a result of drawdown caused by the mine.

⁸ SKM GABSI Value for Money Review. January 2014.

<https://www.environment.gov.au/system/files/resources/03562d91-79e1-48ab-bd29-75d6c81e2f55/files/gabsi-vfm-review.pdf>

In recognition that the mine will draw down GAB water, the EPBC approval granted to Adani's Carmichael project requires the company to offset this loss by returning *at least* 730ML of water to the GAB annually for five years, such that there is a measurable outcome for the GAB. Adani has submitted a proposed offset strategy to the Federal Government via the CSIRO, which proposing tendering to pay landholders to cap free artesian bores in a program that mimics the Great Artesian Basin Sustainability Initiative. It is not clear if this program has been agreed to by the Federal Environment Minister, as Adani's approval stipulates.

The removal of large quantities of groundwater and extensive open cut mining over such a large area will not only affect groundwater but will fundamentally change the Carmichael River. The river will lose 25 percent of its catchment area, lose groundwater discharge into the river, and the proportion time the river experiences zero flow will increase. At least 65 springs will be affected and the Carmichael River will experience 1-4 metres of drawdown. The combined effect of drawdown and lost baseflow of 1,000ML will increase zero flow periods of the river by 30-60%. Impacts on the river are predicted to extend 10km upstream and 25km downstream of the mine.

The huge volume of water required to run the mine means that even with groundwater inflow on a huge scale, the company still intends to undertake harvesting of up to 12,500ML per annum of surface water flows from the Belyando River, which will reduce flood-flows by two-thirds.

Carmichael is not the only coal mine approved for the Galilee Basin. There are six approved, a seventh still seeking approval from the Queensland Coordinator General and two others that were in the early stages of consideration in 2013 when Lock the Gate commissioned research into the combined effect these mines on groundwater in the region. Together, the mines proposed for the Galilee Basin comprised 34 open cut pits and 11 underground mines along a 270 kilometre north-south strike, to produce over 300 million tonnes of coal per annum. The resulting report, *Draining the Lifeblood*, initially found that if all nine proposed mines were development, together they would extract a total 869 – 1,354GL of water over the course of decades of mining in an area highly dependent on groundwater.

The close proximity of the approved Alpha, Kevin's Corner, China First and South Galilee mines means there would be significant overlap between their cones of groundwater drawdown, leading to compounded impacts on the area's groundwater levels. The mine proponents acknowledge in their documentation that three of these mines, Alpha, Kevin's Corner and China First, would together result in a combined 5m drawdown contour that would extend for an area 30km by 100km, elongated north-south.

To date, the Queensland Government has still not developed a hydrology model to assess the cumulative impacts of all nine mines, should they progress to production.

New Acland Stage 3

The New Acland coal mine has already decimated the former agricultural village of Acland. It has caused extensive hardship, damaged community members' physical and mental health, as well as their livelihoods and eroded the once-thriving and cohesive rural community. The highly controversial Stage 3 of the project is currently being reconsidered by the Queensland Government after adverse findings in the Queensland Land Court. New Acland Stage 3 is the only mining project to have ever had a Land Court decision that the mine should not proceed and this decision, in May 2017, was largely a result of the considerable consequences the mine would have on groundwater aquifers used by surrounding farmers.

Northern Territory

The Northern Territory currently has a moratorium on fracking and is conducting a broad ranging inquiry into the environmental, social and economic consequences of unconventional gas development which is expected to finalise its report to the Government in March 2018.

The large scale development of unconventional gas envisaged for the Northern Territory would be for shale gas. Extraction of shale gas requires huge volumes of water and is not assessed or determined under the EPBC Act's water trigger.

The viability of an aquifer depends on the frequency of its recharge. A strategic analysis paper on the "Use and Management of Ancient Water in Northern Australia" by Future Directions International reviewed the literature on recharge rates of Northern Australian groundwater and found that for several crucial water sources recharge takes place over millennia – a finding with has significant implications for proposed large scale extraction of water for the shale gas industry.

The paper noted,

The Alice Springs water supply in central Australia, and much of its surrounds, is taken from the Mereenie aquifer system; a sequence of sandstones in the Amadeus basin, which consists of water that is somewhere between 10,000 and 30,000 years old. A water balance for the Amadeus basin, compiled as part of the 2005 water resource strategy, indicates that all extraction from the aquifer is a net loss of water since any natural inflows are approximately cancelled out by evapotranspiration and outflow to other parts of the aquifer.⁹

Shale gas is hugely water intensive. In the United States, the industry uses up to 36.6ML of water per well.¹⁰ A report produced for the Australian Council of Learned Academies uses a lower figure, 15ML per well, to estimate the volume of water that could be required to be used if shale gas proceeds. In the Amadeus Basin, that report estimated that fracking for shale gas could use 7,600ML of this ancient water per year.¹¹

Much of the Northern Territory is heavily or almost totally reliant on groundwater. Alice Springs, Darwin, Katherine and Tennant Creek all have borefields to source town water, with Alice Springs and Tennant Creek completely reliant on groundwater.

Section 7 of the *NT Water Act 1992* broadly exempts the mining and petroleum industries from several important provisions of the act, including the requirement to have surface and groundwater licences, prohibitions on unlicensed drilling, interference with or obstruction of water ways and pollution of groundwater and surface water if that water remains on the site of the mining activity. Mining companies exploring and mining for minerals or extractive minerals, oil, or gas can take surface and groundwater water without a licence, drill and construct bores without a licence, construct a dam or alter the flow of a waterway without a permit.

⁹ Future Directions International. October 2017. <http://www.futuredirections.org.au/wp-content/uploads/2017/10/FDI-SAP-The-Use-and-Management-of-Ancient-Water-in-Northern-Australia-FINAL.pdf>

¹⁰ Gallegos et al, 2015, Hydraulic fracturing water use variability in the United States and potential environmental implications, *Water Resources Research Journal*.

¹¹ Frog Tech. January 2013. "Potential Geological Risks Associated with Shale Gas Production in Australia" https://www.acola.org.au/PDF/SAF06FINAL/Frogtech_Shale_Gas_Geology_and_Risks%20Jan2013.pdf

Gaps in the regulatory framework

The Committee is charged with inquiring into “any gaps in the regulatory framework which may lead to adverse social, economic or environmental outcomes, as a result of the take and use of water by extractive projects.”

Some of these gaps will be obvious from the regional summaries provided above, but they are worth reiterating. Different states and territories take different approaches to licencing the extraction of water for coal and gas mining and how to price that water.

In New South Wales, water access licences are required for the removal of any surface or groundwater that is part of a Water Sharing Plan under the *Water Management Act 2000*. That Act includes the principles of Ecologically Sustainable Development among its objects and is supposed to manage the use of water for the benefit of present and future generations, including benefits to the environment, urban communities, industry, fisheries, agriculture and recreation as well as cultural heritage and Aboriginal people in relation to their spiritual, social, customary and economic use of land and water.

Lock the Gate believes that Queensland needs strict overall limits on the volume of water that can be extracted from the Great Artesian Basin for mining and unconventional gas and that the GAB should have oversight cross-jurisdictional management to prevent widespread loss of the important gains made by the Great Artesian Basin Sustainability Initiative (GABSI) in restoring pressure to this crucial water resource. Between 1999 and June 2017, when the scheme closed, GABSI saw investment of half a billion dollars by the Commonwealth, Queensland, New South Wales and South Australian Governments that led to the upgrade of more than 750 bores, decommissioning of over 21,000km of bore drains, installation of new pipes and an annual water saving of over 250GL of water.

We are also concerned about the risks from aquifer “re injection” – reinjecting water extracted during the course of gas mining back into the aquifers from which it was removed. This process being trialled in Queensland and proposed in New South Wales. Considerable research from the United States, where it is widespread has linked this practice with dramatic increases in earthquakes and other seismic activity.

With the time available to us to prepare this submission, we were not able to provide comprehensive information about the crucial matters to be addressed in the terms of reference of this inquiry.

We encourage the Committee to collect evidence from state agencies, water scientists and public policy experts on water management and provide recommendations that improve the coherence, consistency and effectiveness of regulatory framework governing water use by the extractive industry.