



Committee Secretary
Senate Standing Committees on Rural Affairs and Transport
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Re: Submission to the inquiry into impact of mining coal seam gas on management of the Murray Darling Basin.

Dear Committee Secretary,

Queensland Conservation Council welcomes this opportunity to provide our views about the impacts the coal seam gas industry is likely to cause within the Murray Darling Basin.

1. Organisation making this submission

Established in 1969, Queensland Conservation [QCC] is the state's peak environmental organisation that represents 70 member groups located across the state. In collaboration with our member's, QCC's purpose is to raise public awareness about environmental issues and lobby government to improve environmental and natural resource management outcomes across the state.

2. Introduction

Unless managed appropriately, the large scale and rapid expansion of the Queensland CSG industry is likely to cause a wide range of adverse environmental and socio-economic impacts to occur – particularly within the Queensland section of the Murray Darling Basin.

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While the CSG industry has been established in Queensland for over a decade, it has become clearly apparent that the legislative framework introduced to regulate the industry in its early days is not capable of managing the proposed scale of the industry's expansion. This has resulted in the State Government having to develop 'policy on the run' in order to address the wide range of issues that have emerged as a result of the rapid expansion of the CSG industry.

3. Potential impacts to the MDB from CSG development

As mentioned above, there is a wide range of potential environmental and socio-economic impacts that are likely to affect the MDB as a result of the scale and rapid expansion of the Queensland CSG industry.

3.1 Environmental impacts

3.1.1 Impacts to adjacent aquifers

In order to extract gas, the hydrostatic pressure within coal seams must be reduced by removing water contained in the seams to enable the gas to be extracted. This dewatering process will result in substantial volumes of water being removed from coal seams, which is predicted to cause depressurisation and drawdown of water levels in aquifers that are connected to coal seams from which gas is being extracted.

Within the Queensland part of the MDB, CSG is predominantly extracted from the Walloon Coal Measures (WCM), which is demonstrably connected to overlying groundwater resources such as the Central Condamine Alluviums (CCA) and underlying aquifers such as the Great Artesian Basin (GAB). The hydraulic connectivity between the CCA, the WCM and the GAB has been determined by bore water level analysis and water quality data (KCB, draft in review; Hillier, 2010).

As the Murray Darling Basin (MDB) plan applies to alluvial aquifers, the potential loss of water from the CCA due to drawdown that has been induced by dewatering and depressurisation of the WCM from CSG extraction is likely to significantly affect the management of groundwater resources that are part of the Murray Darling Basin.

With many of the predicted 40,000 gas wells in the Surat Basin having to 'bore' through overlying aquifers to access targeted gas seams, there is a significant risk that inter-aquifer exchanges will occur at a greatly increased rate above normal – potentially resulting in significant 'drawdown' of overlying aquifers.

As the quality of water contained in coal seams is generally very poor, there is also a significant risk that adjacent groundwater resources will become contaminated by coal seam water, which could potentially be transferred to adjacent aquifers through a combination of poor gas well construction and operation, increased aquifer connectivity caused by thousands of gas wells and increased drawdown caused by the depressurisation of coal seams.

In areas where the controversial hydraulic fracturing (fracking) process is used, there is serious and unquantified risk that adjacent aquifers will be contaminated either by residual fracking fluids that are not recovered or from the increased mobilisation of naturally occurring toxic substances found within coal seams that may occur following fracking.

The CSG industry frequently states that many of the chemicals utilised in fracking fluids are found in everyday household products that can be bought from supermarkets, which implies that fracking fluids are therefore safe. However according to the National Toxics network, only 2 of the 23 chemicals that APPEA states are used in fracking fluids have ever been tested in Australia.

Consequently, there is a significant risk that CSG extraction will cause impacts to aquifers from where towns and agriculture draw critical water supplies, which will have a significant impact on water resource management in the Queensland part of the Basin.

Recommendation:

The Inquiry should closely examine the risks to the MDB from impacts to adjacent aquifers that could occur as a result of CSG extraction.

3.1.2 Impacts to surface water flows

In some areas within the Queensland section of the MDB, river channels have eroded through underlying formations resulting in direct hydraulic connectivity being established between coal seams and surface waters. In these situations, it is largely unknown to what extent this hydraulic connectivity contributes to maintaining surface water base-flows. Therefore, there is a significant risk that dewatering activities to enable gas extraction in areas where there is demonstrated connectivity between targeted coal seams and surface waters could result in a substantial reduction of base-flows in waterways that are part of the Murray Darling Basin.

As recharge of alluvial aquifers in the Queensland section of the MDB predominantly occurs through rainfall and stream flows, there is also a substantial risk that recharge of aquifers such as the Central Condamine Alluviums will be affected by the reduction of surface water base-flows that has been caused by dewatering of coal seams.

Recommendation:

The Inquiry should closely examine the risks to the MDB from the potential changes to surface water flows that could occur as a result of CSG extraction.

3.1.3 Impacts to the ecological character and condition of waterways

There is a significant risk that ecological characteristics and condition of waterways in the Queensland part of the Murray Darling Basin will be substantially altered by CSG development.

With an increasing number of CSG companies seeking approval to release treated CSG water to rivers and streams, there is a substantial risk this practice will alter the ecological character of waterways by:

- Altering seasonal flow variations from the continual release of treated CSG water to ephemeral waterways; and
- Altering natural water quality from the continual release of highly treated CSG water to waterways

Whilst the reverse osmosis process utilised to treat CSG water can effectively remove salt, it does not effectively remove all other contaminants such as uranium, heavy metals and BTEX and due to this, Queensland regulators (DERM) have set daily permissible levels of contaminants in the treated CSG water that is released to waterways. While the permissible levels of contaminants comply with various national and international water quality standards, there has been no assessment of the potential long-term environmental impacts that could occur such as bioaccumulation of heavy metals within the food chain.

There is also a substantial risk of adverse impacts occurring to waterways from the amount of vegetation clearing that will occur associated with CSG gas wells and supporting infrastructure. Potential impacts include increased sedimentation from erosion of areas cleared for CSG infrastructure and increased salinity.

Recommendation:

The Inquiry should closely examine the risks to the MDB from the changes to the ecological characteristics and condition of waterways that could occur as a result of the CSG industry.

3.1.4 Increased salinity risk

Water that is extracted from coal seams generally contains high concentrations of salt and other toxic substances. In the past, wastewater produced from GSG extraction was disposed into large evaporation ponds; with significant concerns being raised about the potential environmental impact on soils, shallow aquifers and waterways should these ponds fail.

While the state government has now banned evaporation ponds and requires CSG companies to treat CSG associated water to a fit for purpose condition, significant concerns still remain about how the brine effluent that is discharged from Reverse Osmosis water treatment plants will be managed.

Although the state has introduced a hierarchy of preferred brine disposal options, many of these options are either dependent on external market factors or will take considerable time to trial and commercialise. In the meantime, CSG companies are allowed to 'store' brine effluent in holding ponds until more appropriate disposal methods have been developed.

Given the predicted volumes of brine effluent and impediments with developing more appropriate disposal options; it is likely that 'brine holding ponds' will proliferate across the landscape.

As a consequence, there is a significant risk that MDB salinity levels could increase as a result of 'storage' pond wall failure, seepage or overtopping following intense rainfall events.

Recommendation:

The Inquiry should closely examine the risks to the MDB from increased salinity levels that could potentially occur as a result of the CSG industry.

3.1.5 Risks associated with re-injection

The Queensland Government has recently announced that re-injection is its preferred method of managing CSG associated water. While re-injection may potentially lessen some of the impacts that result from dewatering of coal seams, there is a chronic paucity of data or scientific understanding about the environmental risks associated with re-injection.

Consequently, a significant amount of technical work is firstly required to determine the level of environmental risk that is associated with re-injection of CSG water.

Recommendation:

The Inquiry should closely examine the risks to the MDB from re-injection of CSG water

3.1.6 Cumulative impacts

There is a significant risk that a range of cumulative adverse environmental impacts could occur as a result of the CSG industry, which are currently not adequately assessed, quantified or defined under existing state or commonwealth planning and approval processes - particularly over the longer term.

This is primarily due to adverse environmental impacts potentially caused by a proposed CSG development are only assessed on a project by project basis, while the potential regional scale cumulative adverse impacts that could occur from having multiple CSG projects operating alongside one another are largely under assessed and not quantified.

While the state government has introduced provisions to manage potential cumulative groundwater impacts, the fact that cumulative impacts caused by the expansion of the industry are not considered when individual CSG projects are being assessed is a major flaw in the state and commonwealth approval processes – particular in regard to the potential cumulative impacts that could occur to the Murray Darling Basin.

Recommendation:

The Inquiry should closely examine the risks to the MDB from cumulative environmental impacts the CSG industry could potentially cause.

3.2 Socio-economic impacts

Whilst the expansion of the CSG industry is recognised as creating much needed revenue for the state, it has resulted in a range of adverse socio-economic impacts in the areas where it is occurring.

By far the significant socio-economic impact that is occurring from the expansion of the CSG industry is the substantive change of land-use from agriculture to resource extraction, which is likely to occur throughout the Queensland part of the Murray Darling Basin.

Farmers virtually lose control of the day-to-day management of the sections of their properties where CSG infrastructure is located due to roads, pipelines and gas well being incompatible with farming practices, which is likely to result in large tracts of prime agricultural land being taken out of production for up to 30 years.

Other critical socio-economic implications of the CSG industry include, but are not limited to:

- Local businesses, lifestyles and social fabric of communities will be fundamentally changed.
- Community and individual health affected by rapid industrialisation (noise, fumes and dust) of rural areas
- Greater community safety risk from increased vehicle movements and industrial accidents (gas well blowouts)
- Increased risk of environmental incidents affecting agricultural enterprises (groundwater and soil contamination)
- Decline in property values due to CSG infrastructure resulting in inability to sell or get bank loans
- Predominance of fly in fly out (FIFO) workforces results in economic benefits not flowing to the local economy.

- Housing shortages, reduced housing affordability and increased housing rents results in disadvantage for local inhabitants
- Local businesses and farmers unable to attract and retain staff due to higher wages offered by CSG companies
- Impacts of CSG extraction on the sustainability of ground and surface water resources has far reaching environmental and socio-economic consequences

While the CSG industry is predicted to only continue for 20-30 years, the substantive changes to land-uses, community structure and to the environment that will occur during this period has significant implications for the long-term socio-economic well being of the Queensland part of the Basin.

Recommendation:

The Inquiry should closely examine the existing and potential socio-economic impacts to the MDB from the CSG industry.

4. Inadequacies of state and commonwealth legislation

The lack of a robust and integrated legislative framework to appropriately manage the expansion of the CSG industry is a significant issue, which has lead to a range of legislative irregularities, inequities and inadequacies.

For example: the predominant legislation that regulates the CSG industry is the Queensland *Petroleum and Gas Act 2004*, which authorises a right to extract unlimited volumes of groundwater as part of an approved petroleum or gas development activity; all other groundwater users (agriculture, towns and other industries) are regulated under the Queensland *Water Act 2000*, which aims to sustainably manage groundwater resources by placing limits on the volume that can be extracted from aquifers for consumptive purposes.

In other words, the CSG industry is allowed to extract unsustainable volumes of groundwater under the *Petroleum and Gas Act 2004*, whereas all other groundwater users must operate under the *Water Act 2000*, which limits the take of underground water to ensure the long term sustainability of the states groundwater resources.

This legislative discrepancy will result in farmers within the Queensland part of the Murray Darling Basin having their groundwater allocations reduced in accordance with the Sustainable Diversion Limit (SDL) framework under the Murray Darling Basin plan, whereas CSG companies will be able to continue extracting unlimited amounts of groundwater from aquifers that in many cases are the same that farmers draw from.

This is a serious inequity that has significant implications for the way that water resources are managed in the Queensland Part of the Murray Darling Basin.

Along with this discrepancy, the CSG industry is also exempt from many other pieces of legislation that other landholders must abide by.

For example: the CSG industry is exempt from having to comply with the states vegetation management legislation, which has significant implications in context of managing salinity throughout the Murray Darling Basin - particularly in regard to the amount of funding and effort that has been invested by governments and the community in on-ground environmental works to address and reduce salinity risks, which could be quickly undone by the expansion of the CSG industry.

Other than having to comply with the *Environmental Protection and Biodiversity Conservation Act 1994*, the CSG industry is not subject to other pieces of commonwealth legislation. Notably the CSG industry does not have to comply with the *Commonwealth Water Act 2007*, which has the potential to substantially undermine the objectives of the Act being achieved given the scale of impacts that could occur as a result of the industry within the Queensland part of the Basin.

Recommendation:

The Inquiry should closely examine the various state and commonwealth legislation that regulates the CSG industry to determine whether the objectives of the Water Act 2007 are supported.

5. Other critical issues

5.1 Greenhouse gas (GHG) emissions

Research from Cornell University using conservative figures found the emissions profile for unconventional gas is significantly higher than previously thought. During the life cycle of an average coal seam gas well, 3.6 to 7.9% of the total production of the well is emitted to the atmosphere as methane. This is at least 30% more and perhaps more than twice as great as the life-cycle methane emissions estimated for conventional (natural) gas of 1.7% to 6%.

According to the IPCC, methane is some 74 times more damaging to the atmosphere over a 20-year period. Given the amount of methane that could be released to atmosphere from thousands of gas wells, the Inquiry should closely examine the impacts to the Murray Darling Basin that could occur as a result of escalated climate change caused by GHG emissions from the CSG industry – particularly as the MDB is highly vulnerable to climate change as demonstrated by the recent prolonged drought and more recent floods.

Recommendation:

The Inquiry should closely examine the risks to the MDB from escalated climate change potentially caused by GHG emissions from the CSG industry.

5.2 Flawed management approach

Regulators are proposing to manage environmental impacts, particularly to groundwater resources caused by CSG extraction through an adaptive management approach, which essentially focuses on waiting for impacts to occur before changing damaging practices and learning from mistakes made.

Given that some CSG companies have stated that impacts to adjacent groundwater resources may not occur for 50 plus years, it would appear that a management framework that is based on only changing practices once impacts have been detected is a flawed approach – particularly as many of the adverse impacts that may occur to adjacent aquifers are likely to be irreversible.

Recommendation:

The Inquiry should closely examine the risks to the MDB from the adaptive management approach that is used to manage environmental impacts caused by the CSG industry.

6. Conclusion

Due to its scale, the expansion of the CSG industry will result in an array of potential impacts that are likely to have a significant effect on the Murray Darling Basin.

While the CSG industry is forecasted to provide substantial economic benefits, unless the industry is managed appropriately to ensure that potential environmental impacts are avoided and mitigated, it is likely the cost of rehabilitating any environmental degradation that does occur will significantly outweigh the short-term economic benefits that are provided by the industry.

If required, QCC would welcome the opportunity to appear before the Committee.

Regards,

Toby Hutcheon
Executive Director
Queensland Conservation Council

