



Response to the Inquiry into management of the Murray Darling Basin – Impact of mining coal seam gas

June 2011

AUSTRALIAN LOT FEEDERS' ASSOCIATION (ALFA)

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Executive Summary

The Australian Lot Feeders' Association (ALFA), the peak body for the cattle feedlot industry, appreciates the opportunity to provide input into the management of the Murray Darling Basin from the perspective of Coal Seam Gas (CSG) extraction.

The statistics surrounding the past and future predicted growth of the CSG industry are staggering with an expected 100% increase in forecast production over the next 20 years. In Queensland an estimated 40,000 wells are proposed in the Surat and Bowen basins at 750 metre intervals during this time. Given that water is a by-product of the CSG extraction process, the inquiry into the impacts of the CSG upon the Great Artesian Basin (GAB) is particularly salient.

ALFA concerns regarding CSG are primarily associated with its impacts upon the quantity, quality and pressure of ground water in the GAB. Notably, and despite Government assurances regarding the plethora of environmental license conditions and legislation that has recently been introduced, we remain unconvinced that there is sufficient knowledge to determine the current and cumulative CSG impacts on ground water within the GAB and alluvial aquifers such as the Condamine Alluvium. For instance, we don't believe that there is sufficient understanding of hydraulic connectivity between the coal measures and aquifers, rates of water movement, depth of the coal seam, the thickness confining layers, the effect of faulting or fractures; and the impact of fracking on such connectivity. Further, we are concerned that changes to geological stratum from CSG extraction have not been considered across space and time. ie changes in hydraulic transmissivity as CSG extraction occurs and moves across the landscape is not fully understood. We are also not convinced that current State and Federal legislation will prevent or rectify the potential damage to the GAB from CSG extraction.

Moreover, given the significant royalties received from CSG extraction and the parlous condition of state Government budgets at present, we believe that this conflict of interest has led them to discount long term future concerns regarding ground water impacts in the interests of short term monetary gain. Because of concerns regarding state Government royalties and perceived independence with respect to license approval decisions, along with the rapidly expanding nature of the CSG industry across state boundaries, ALFA believes that there needs to be Federal oversight of the CSG industry to provide consistency and independence.

We believe that whilst the CSG industry may well provide more benefits to state economies and employment than agriculture in the short term, the costs in terms of lost agricultural production, contaminated drinking water, health issues and lost biodiversity may well exceed such amounts. Regardless, cost benefit analysis of license approvals on an individual or cumulative basis is not undertaken so we may never know. Importantly, the full extent of such costs may not be fully understood for decades to come, far too late for Government's or the CSG industry to rectify (even assuming this is possible). In addition, the short term benefits from this finite resource will inevitably be overtaken by the long term value of agricultural production particularly given future world food security requirements. However, whether agriculture will be able to deliver such production in the face of GAB damage due to CSG extraction remains to be seen.

ALFA also believes that increasing concerns regarding ground water contamination from CSG extraction aptly demonstrate that state and federal legislation needs to adopt a more precautionary principle approach. Refusal to recognise such concerns will eventually be to Government's peril, particularly if such contamination of the GAB cannot be 'made good' by the CSG industry –another issue where conjecture abounds.

We also maintain concerns regarding potential market access issues associated with beef residue impacts from the cattle consumption of water contaminated by the fracking chemicals used in the CSG extraction process. Australia currently exports around 65% of production to over 110 markets - trade that was valued at \$4.4 billion in 2010. Notably, whilst the beef industry has recently begun testing for fracking chemicals, our major export customers currently have zero tolerances for such chemicals meaning that any detection may potentially close the market to Australian producers.

Background

The grain fed cattle industry has a value of production of \$2.7bill and employs some 9000 people directly and indirectly. Nearly 25% of Australia's total beef supply, 80% of beef sold in domestic supermarkets and the majority of beef industry growth over the last 10 years has been due to the grain fed cattle sector. Whilst the domestic market is the largest single market for grain fed beef, 65% of production is exported to more than 110 countries throughout the world.

There are approximately 600 accredited feedlots throughout Australia with the majority located in south east QLD; the northern tablelands of NSW and the Riverina area of NSW with expanding numbers in Victoria, South Australia and Western Australia. It is no coincidence that feedlots are located in areas that are in close proximity to cattle, grain supplies and water.

ALFA data states that 29% of feedlots across Qld, NSW and VIC are solely dependent on surface water, 49% dependent on groundwater with the remainder able to access a combination of the two. The availability of ground water is vital for the feedlot industry from a number of different perspectives. It is imperative for cattle survival prior to feedlot entry, for feedlot cattle and general feedlot operations, for a range of inputs included in the cattle ration (grain, oil seeds, legumes, silage, hay and straw) and for future industry expansion. Water in feedlots is used for stock drinking purposes, dust suppression, feed processing, cattle washdown, effluent management, general cleaning; and for staff and office amenities. Of these, stock water consumption is by far the most significant.

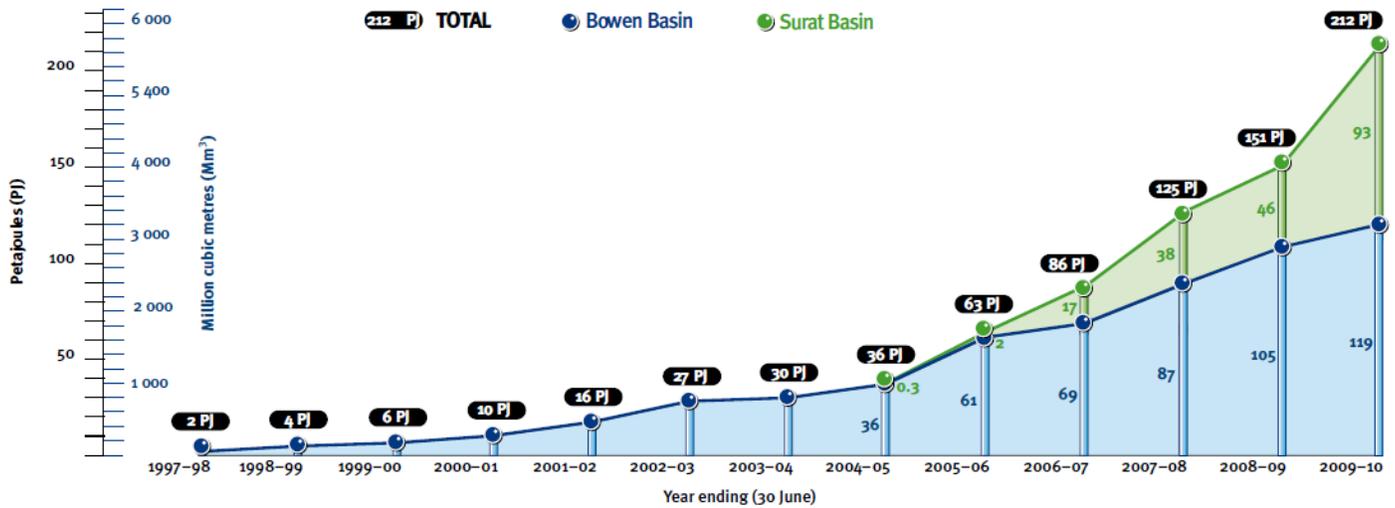
With the world's food demands set to double between now and 2050 due to burgeoning population levels, Australia as a net exporter of agricultural produce has an important role to meet such demand. However, water is likely to become less available in future. Climate change is set to decrease rainfall and increase evaporation levels, increased competition with the environment will reduce water availability while increased competition between industry sectors including the CSG industry will further aggravate water security concerns.

Impacts on ground water quantity and pressure

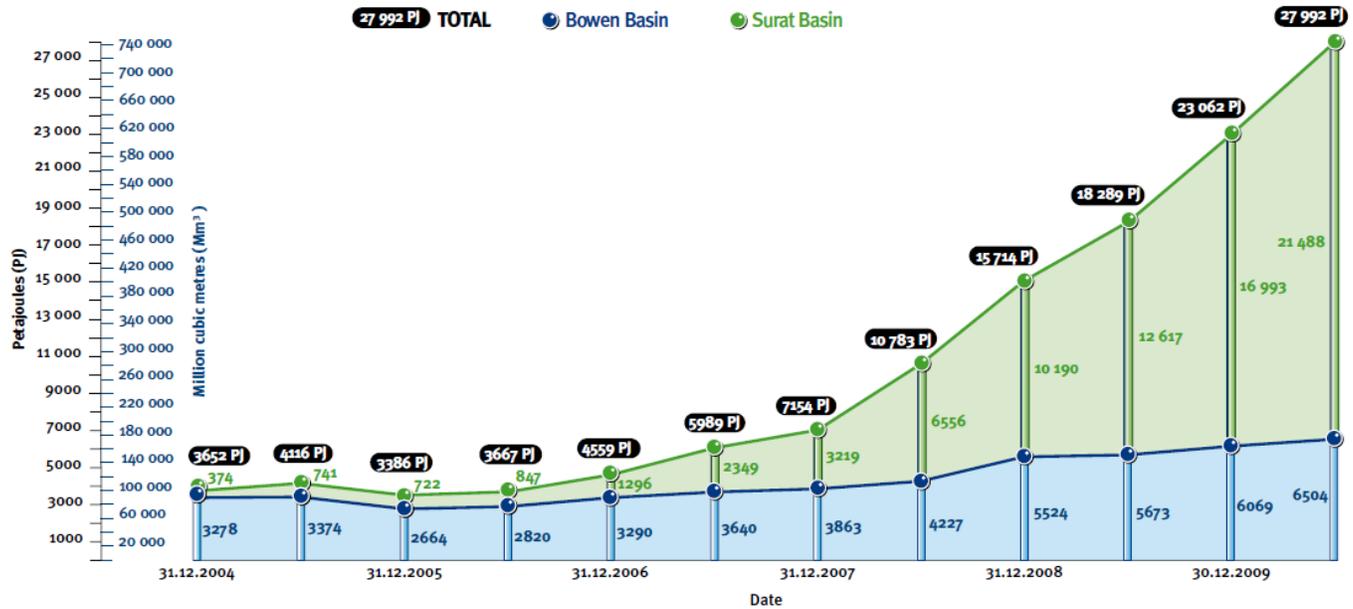
CSG (ie methane) is typically found in the natural fractures and cleats of underground coal seam particles. CSG production involves extracting methane from coal seams by reducing the groundwater pressure that keeps the methane trapped in the coal. A primary by-product of this process is water, which is often rich in salts and other constituents that render it unsuitable for many direct beneficial uses.

The statistics surrounding the past and future predicted growth of the CSG industry are staggering. The CSG industry peak body, states that CSG production has increased from around 375 billion cubic feet in 1986 to around 1.12 Trillion cubic feet (Tcf) in 2008, an amazing 200% increase. By 2029/ 30, CSG production is forecast to increase to 2.233 Trillion cubic feet (another 100% on 2008 levels). The CSIRO estimates that there are between 143-476 Tcf of CSG reserves in Qld alone ie on average another 112 years of production at 2029/ 30 levels. Whilst the CSG industry is currently predominantly located in Queensland and NSW, there is an increasing CSG activity in other states.

Qld CSG production 1997-2010¹



Queensland CSG reserves (proved and probable)²



Given the expected growth in the CSG industry, an enormous amount of water will be extracted. In 2007/08 approximately 13.5 gigalitres (GL) of CSG water was removed from the GAB in Queensland. The Qld Government estimates that in future 126-281 GL of CSG water will be removed by the industry each year placing significant pressure on a resource already stretched to capacity. Around 40,000 CSG wells are proposed over the next 40 years. Notably, the bore discharge from the GAB is currently 27% higher than its sustainable yield (ie 570 ML versus 450 ML). However, it is notable that it is difficult to accurately determine the ground water impact of CSG extraction until site-specific monitoring systems are in operation and baseline well data levels are detailed.

¹ Department of Employment, Economic Development and Innovation (2011), *Queensland coal seam gas overview*. Sourced from the internet 31/5/11; http://www.dme.qld.gov.au/zone_files/coal_files_pdf/new_csg_cc.pdf

² Department of Employment, Economic Development and Innovation (2011), *Queensland coal seam gas overview*. Sourced from the internet 31/5/11; http://www.dme.qld.gov.au/zone_files/coal_files_pdf/new_csg_cc.pdf

ALFA is concerned that CSG activity to remove this water will reduce the quantity and quality of remaining potable water in overlying and underlying aquifers through the interconnectivity that currently exists or via the interconnectivity brought about by hydraulic fracturing undertaken by CSG operators. Industry is particularly concerned that the drilling and fracking process could lead to contamination from fracking chemicals and the reduction in quantity, quality and flow of good quality ground water due to intermingling with inferior quality CSG water found in different sedimentary layers. Further, naturally occurring chemical compounds within the coal seam could be mobilised and through pathways/connectivity find their way to good quality groundwater supplies. It is understood for example that hydraulic connectivity between the Central Condamine Alluvium and both the Walloon Coal Measures and some GAB aquifers has been demonstrated by analysis of bore water levels and water quality data (KCB, draft in review; Hillier, 2010). The dewatering of aquifers may also lead to subsidence issues which could alter overland flow paths initiating new erosion features in susceptible areas. Additionally, subsidence may also change or cause fracturing in aquifers which may alter the hydraulic connectivity.

Inequity between agriculture and CSG operators regarding water management

ALFA acknowledges that the removal of water from CSG activity may well be less than current demands from agriculture and other users. However, agricultural producers have stringent license and water entitlement arrangements in place, are required to pay for water extracted and are prevented from over extracting water. As a result, the resource is used sustainably and equitably. In distinct contrast, CSG companies don't pay for water extracted, can remove whatever water is considered necessary without restriction and in Queensland only have to 'make good' the loss in water quantity if other users are impacted. Importantly, it is nearly impossible under current legislation for other water users to demonstrably prove that the decline in aquifer levels were due to CSG extraction given that aquifer base line levels have not been determined and the burden of proof is with other users who don't have the resources, skills and monetary capabilities to determine cause and effect from CSG activities.

Inadequate legislation and legislative oversight

ALFA acknowledges that the legislation and license approval conditions surrounding CSG extraction has indeed improved in recent years. However, the legislation is inconsistent across jurisdictions, continues to have major gaps and ignores the precautionary principle approach that should be adopted. For instance, the legislation in Queensland (which is likely to be the benchmark for other states), does not seek to prevent CSG ground water impacts and only requires the CSG operator to 'make good' for water quality impacts if declines in aquifer levels also occurs. The lack of adequate legislation and monitoring is particularly pertinent given the litany of alleged contamination incidents and other environmental problems witnessed in both Australia and overseas in recent years.

ALFA is additionally concerned that the Queensland Government licensing tenement/s with CSG companies does not assess the capacity of CSG companies to "make-good" water in the event that their activity unduly affects water quality or quantity. Quite simply in some areas/regions the mechanism to make-good water is not available. We are of the belief that, irrespective of legislative 'make good' requirements, these provisions are unable to be met in reality. This is because;

1. It is debateable whether other ground water users can actively demonstrate cause and effect between CSG activities and negative ground water impact due to the complexities of ground water hydrology and their lack of financial resources and expertise.
2. The legislation is unclear as to whether 'make good' requirements are in perpetuity. This is particularly relevant given the long term cumulative impacts of CSG development and the potential for CSG companies to change hands or become bankrupt.

The upshot is that there is considerable conjecture as to whether the Queensland 'make good' legislative requirements will address the loss of water to other users and damage to the GAB from CSG activity in the long term.

Further, it is not clear if undeveloped water entitlement capacity will be protected should CSG extraction affect the capacity of a bore to provide water. For example, if an approval had been granted to extend a feedlot then that would be considered an 'authorised purpose' and hence would be covered by 'make good' requirements. However, if CSG activity led to a reduction in GAB water supply such that the expansion could no longer be supported then the

'make good' requirement would then be jeopardised. Additionally, previous capacity in the GAB Regional Operating Plan to see groundwater and pressure savings to enable government to release general reserve water has been stymied. This mechanism which provided opportunity for future feedlot expansion beyond current water entitlement is now in doubt. Rather, and instead, the CSG industry is actively lobbying the state government to amend the GAB Regional Operating Plan to bank credits for reinjected treated CSG water to provide it a mechanism for "make-good".

In areas where there exists an overlap between high density water entitlements and expected high density CSG wells, this flaw/gap in the concept of 'make good' is critical. For instance, whilst ALFA understands that a CSG company may need to extend a bore owner's well to ensure water supply, for entitlement bores such extension can only occur to the limit of the aquifer for which the bore holders' water licence exists. If no CSG company has purchased any water entitlement in the various aquifers to offset damage to aquifers. Importantly, there are no further licences available from the Regional Operating Plan and a moratorium also applies on any further overland flow entitlements.

Separation Distances

In the absence of further research, ALFA will be encouraging its members to seek a safe separation distance between CSG wells and their water entitlement bores. There is currently no mandated stand-off distance between water bore for the purpose of stock intensive and a CSG well, yet CSG extraction and hydraulic fracturing are factors which risk bore water quantity, quality and pressure, particularly for those water bores that span the coal measures. There is a misconception that water bores that access overlying aquifers are less at risk than those accessing the aquifers underlying the coal seam. However, many bores accessing the overlying aquifers transverse coal seams as they are converted oil bores.

Reuse of CSG water

Notably, arguments surrounding the reuse of CSG water are largely immaterial given that this does not address the core issue regarding the cumulative and unsustainable removal of water from the GAB in the first instance. Regardless, the majority of water removed by the CSG extraction process is saline and cannot be used for irrigation, livestock consumption purposes, dust suppression or aquifer reinjection unless treated beforehand. Whilst reinjection of treated CSG water into aquifers may lessen the impact of drawdown created by dewatering of the coal seams, it is understood that a significant amount of further technical work is required to determine appropriate reinjection targets, timing and water quality/treatment needs. For example, reinjection of water has significant engineering and sequencing challenges as well as difficult water quality issues including changes in mineral saturation status.

While it is notable that some feedlots in Australia have begun to utilise CSG water, due to high salinity levels it must be considerably 'shandied' with good quality water to be tolerable for livestock. The majority of the feedlot sector considers that CSG water needs to be treated to enable it to be used.

Currently, CSG water must be held in holding ponds whereby evaporation leads to the cumulative build up of chemicals, salt and other contaminants. Industry is concerned about the potential impacts if these minerals and chemicals contaminate soil structures along with surface/ ground water if not disposed correctly. With climate change predictions indicating reduced rainfall (and hence reduced replenishment of the GAB), ALFA does not believe that there is sufficient knowledge and hence justification to support continued CSG ground water extraction particularly in terms of the quantities associated with the Government approvals undertaken to date.

This industry is 'self-regulated' and so a system of constant and random inspections by an independent body, should be immediately introduced. No other industry that has the potential to have such an enormous detrimental impact on the environment – and on our vital, life-giving water – is allowed to conduct their business without stringent inspections.

Apart from ground water impacts from CSG development, ALFA is also concerned about the wider multiplier impacts;

- The sustainability of prime agricultural land from CSG development. Whilst the Queensland Government has determined areas where Strategic Cropping Land exists, the initiative nonetheless does not preclude CSG

development if in fact rehabilitation can be demonstrated. ALFA argues that prime agricultural land should be permanently excluded from CSG development given potential impacts on ground water, world food requirements into the future due to population rises; and because CSG access roads and well infrastructure interrupt arable cropping areas thereby increasing costs of production;

- potential vulnerability of long-term feedlot expansion capacity and the industries which derive employment and income from it. CSG activity may impede the ability of feedlots to expand in future given the unsustainable extraction of ground water via CSG activity jeopardises future water entitlements;
- reduction in agricultural land values due to negative production impacts from affected ground water, property right concerns and a diminution in landscape aesthetics. This is particularly relevant given conceptual development plans approved by the Queensland Government which propose gas field grids with wells spaced as little as 750 m apart over an area from Goondiwindi to Gladstone;
- increased labour competition pressure thereby aggravating the 'cost versus price' squeeze already currently being experienced by the agricultural sector; and
- increased housing competition in rural towns thereby affecting affordability and availability for employees involved in other industries.