

**Group Against Gas (GAG) Kyogle Submission on Coal Seam Gas to Kyogle
Council
November 1st 2011**

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Foreword:

In this submission to Council, GAG has chosen to firstly present the key points and recommendations contained in our submission to the Legislative Council on the issue of coal seam gas. We have then included excerpts from our Inquiry submission that highlight three of the major concerns of our group in relation to coal seam gas extraction:

1. Impacts on water resources.
2. Impacts on agriculture and natural areas.
3. Impacts on local communities.

The full submission made to the parliamentary Inquiry is also provided for your information.

Key Points:

- The threats to vital ground and surface water systems and food producing land posed by coal seam gas (CSG) developments are unacceptable. It is crucial that water and food security be prioritised over gas production, particularly when these resources are so scarce in Australia, and when they are under increasing threat from human population growth and climate change.
- The Northern Rivers region is renowned for its natural values, visual beauty and vibrant, innovative communities- industrial CSG development is not compatible with these qualities and would destroy the very essence of our region. This clash of values is epitomised by the proposal to put a gas transmission pipeline right through the middle of one of the region's precious World Heritage Areas.
- The rush to coal seam gas is not about energy security for NSW, it is all about making money from export of gas to overseas markets. The company Metgasco

has plans for a 90PJ export facility supplied by Northern Rivers coal seam gas production which would require in excess of 1500 gas wells, whilst it's planned local power station requires 40-55 wells.

- The recent regulatory changes to the rules governing coal seam gas activities in NSW do not adequately address any of the significant risks posed by this industry. Significant overhaul of relevant legislation and regulation is needed to effectively manage the impacts of the CSG industry.
- The health and well being of individuals and communities are being drastically affected by industrial gas production in Queensland and the USA. Northern Rivers residents do not want this industry expanding out of control across our region or state, as evidenced by the many anti-CSG groups that have formed, the thousands of people who have attended anti-CSG events and the opposition from six out of the seven local councils in the region.
- The ecosystem services, biodiversity conservation, tourism and public enjoyment values of public lands are threatened by coal seam gas developments on or adjacent to these lands. There are significant areas of public lands that are likely to be damaged and degraded by any expansion of the coal seam gas industry in the Northern Rivers and across the state.

Recommendations:

- All CSG activity in NSW should be stopped to allow for comprehensive, rigorous, independent studies into the environmental, social and health impacts of the industry. The industry should not be recommenced until all negative impacts are addressed and resolved to the satisfaction of all stakeholders.
- There should be a complete prohibition on any CSG activity on or adjacent to high conservation value lands, wetlands, beneficial use aquifers, residential areas and homes, important food producing areas and public lands.
- Legislative and regulatory changes should be introduced to properly address the threats to the natural environment, local communities, water supplies, food production and human health. The rights of landholders to refuse CSG exploration and production should be enshrined in the *Petroleum Onshore Act*

1991.

- There should be full, independent assessment of the hydrogeological character of any areas that are proposed for coal seam gas exploration, before any exploration or production takes place.
- Any CSG activity should have to comply with all relevant environmental legislation, including chemical use, water management and native vegetation laws. Communities should have the legal right to enforce and challenge environmental laws under which the industry operates.
- The state government should invest in renewable energy alternatives rather than supporting the expansion of the CSG industry, thereby entrenching the state's dependence on fossil fuels and greenhouse gas emitting technologies.
- The NSW government regional land use strategy initiative should be extended to parts of NSW such as the Northern Rivers where there are proposals for significant expansion of CSG production.

Introduction

Group Against Gas (GAG) Kyogle was founded in early 2011 in response to community concerns about reports that the proposed Lions Way gas pipeline would be constructed in the Kyogle district. The group now has around 200 members who meet on a regular basis to organise ways to raise awareness in the community about issues related to coal seam gas and to work together to protect our land and water from the potential threats from this industry. We believe that there is clear evidence that indicates that this industry has numerous negative impacts on land and water resources, natural ecosystems, and community health and well being and we are strongly opposed to any expansion of the industry in our region.

GAG believes that Kyogle Council has an important role to play both in representing the interests of the local community to state and federal governments and in taking a strong stance in opposing expansion of the CSG industry at the local level. We would very much like to see Council taking an active role in preventing harm to existing industries, local communities and the well being and livelihoods of local residents. We call on Council to follow the actions of Moree and Murwillumbah Councils in

imposing a veto on coal seam gas activities on any Kyogle Council land. This would include refusing Metgasco access to the Lion's Road for the construction of the proposed Casino-Ipswich gas transmission pipeline.

The following sections highlight some of the serious concerns we have about the impacts of the coal seam gas industry and we trust that Council will find this information useful in compiling its submission to the Legislative Council Inquiry. GAG would like to thank Council for the opportunity to make this submission and hope that you will listen carefully to the concerns of our community and take appropriate action to address these concerns.

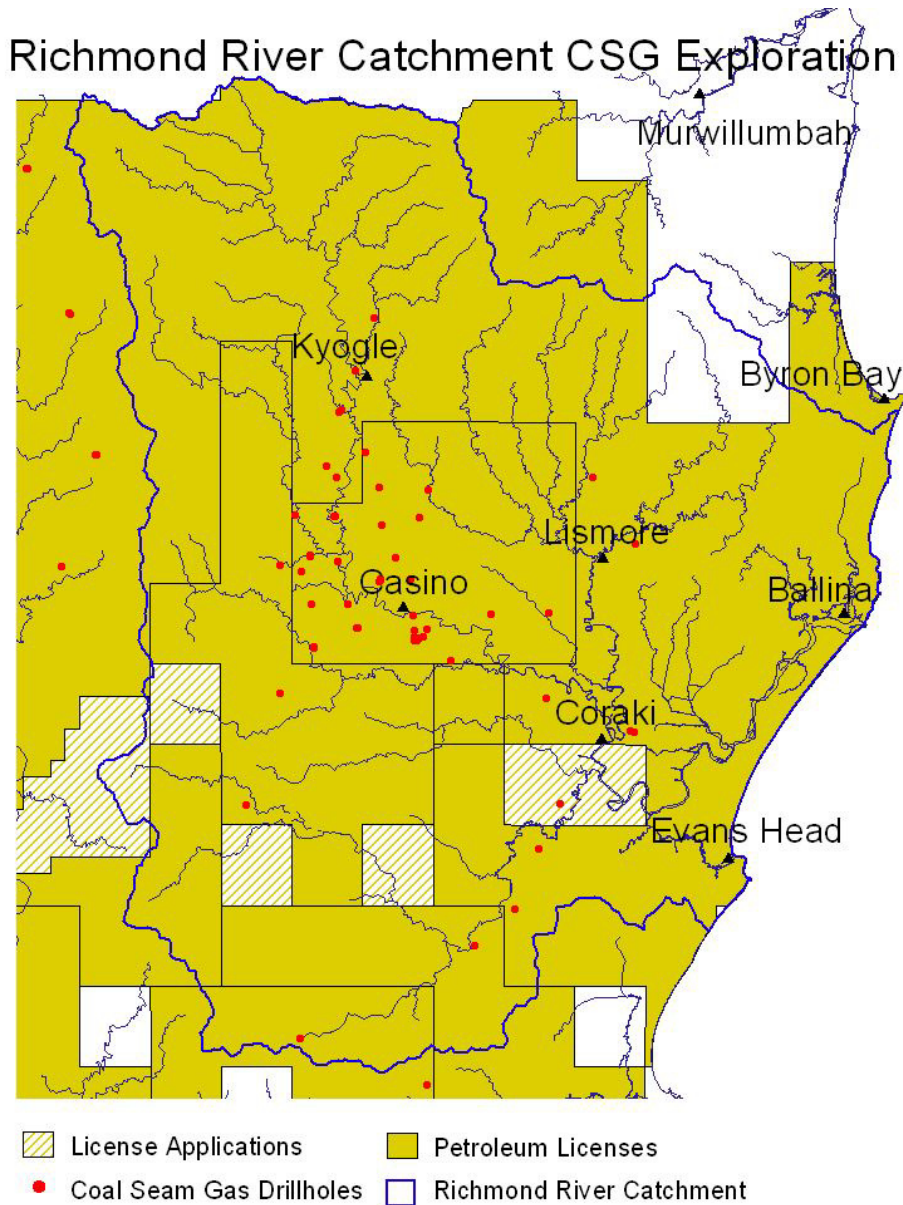


Figure One: CSG Exploration in the Richmond River catchment

1. Impacts on water resources:

The Kyogle Council LGA covers a significant portion of the Richmond and Clarence River catchments and any coal seam gas activities in the region are likely to be focused along the creek and river valleys of the catchments. A map of the current exploration activities (figure one) in the region highlights that most exploration to date has taken place in the fertile valley flats, having ramifications for both water quality and agricultural production. The proposed pipeline through the Border Ranges would involve numerous crossings of the pristine headwaters that come straight out of the Border Ranges National Park. Adverse impacts on waterways from CSG operations would have flow on effects on natural ecosystems, agricultural production and residential water supplies.

The concerns we detailed in our submission to the Inquiry are as follows:

“Effect on ground and surface water systems

Groundwater risks

There now exists a large body of evidence that shows that coal seam gas (CSG) activities pose a range of significant threats to ground and surface water systems. The Australian Government’s National Water Commission Policy Statement¹ clearly states that there will be a range of serious negative impacts on ground and surface water systems including: depletion of already over allocated connected ground and surface water systems; changes in water pressures and therefore availability; land subsidence over large areas; alteration of natural flow patterns and river and wetland health from release of waste water; cross-contamination of aquifers; and changes in beneficial uses characteristics of aquifers.

Australia is the driest inhabited continent on Earth and at the heart of the continent’s water supply are our underground aquifers. The large volumes of water that must be

¹ Australian Government National Water Commission, ‘The Coal Seam Gas and water challenge’, August 2011.

extracted from the coal seam to facilitate gas flow can result in the lowering of adjoining aquifers or shallower, alluvial systems². Ross Dunn, a spokesperson for the petroleum industry group APPEA, has said: “drilling will, to varying degrees, impact on adjoining aquifers- the extent of impact and whether the impact can be managed is the question”. Dunn goes on to say: “the intent of saying that is to make it clear that we have never shied away from the fact that there will be impacts on aquifers”.³ Evidence from the Powder River Basin in the Wyoming/Montana region of the USA records drops of up to 200 feet in drinking water wells adjacent to coal bed methane production sites in the USA⁴, whilst in Queensland drops of several metres⁵ have already been recorded in farm bores. The removal of large volumes of water from the underground water system can also lead to a decrease in base-flow to creeks and rivers that are recharged from groundwater flows.⁶ Australians know how precious water is, it is therefore our responsibility to protect and preserve all water resources for the very future that our descendants depend upon.

As a result of connectivity between coal seams and other aquifers containing higher quality water, there is also the risk of inter-aquifer transfer of poor quality water from the coal seam, which would pollute other aquifers and render them unusable for agriculture, town water supplies and stock watering⁷. If cross-contamination occurred, high quality aquifers could be contaminated, or their chemistry altered, through exposure to air, gas, toxic fracking chemicals and drilling fluids, or the

² Groundwater (Deep Aquifer Modelling) for Santos GLNG Project - Environmental Impact Statement 31/3/2009

[http://www.glng.com.au/library/EIS/Appendices/P2_Groundwater%20\(Deep\)%20FINAL%20PUBLIC](http://www.glng.com.au/library/EIS/Appendices/P2_Groundwater%20(Deep)%20FINAL%20PUBLIC) .pdf appendix P2 section 3.4.2; Hillier, J.R. Groundwater connections between the Walloon Coal Measures and the Alluvium of the Condamine River, August 2010

³ See article on front page of The Sydney morning Herald on the 3rd August 2011 entitled “Coal Seam Damage to Water Inevitable”.

⁴ [Western Organization of Resource Councils \(WORC\)](#). 2003. Factsheet. *Coalbed methane development: Boon or bane for Rural Residents*.

⁵ Four Corners Gas rush program:
<http://www.abc.net.au/4corners/content/2011/s3141787.htm>

⁶ Northern Geoscience: Draft report on Hydrogeological investigations Dooralong & Yarramalong Valleys, Wyong NSW.

⁷ Mavroudis, D. Downhole Environmental Risks Associated with Drilling and Well Completion Practices in the Cooper/Eromanga Basins, PIRSA 2001

release of natural compounds like BTEX, heavy metals and radionuclides that are present in the coal seam, many of which are known to have significant human health impacts⁸. There have now been at least four identified instances of toxic BTEX chemicals being found in wells or water monitoring bores at Queensland CSG operations⁹. The company Origin has been unable to explain where the BTEX found in one of its fracked exploration wells may have come from, and maintains that these chemicals are not present in drilling or fracking fluids¹⁰.

The groundwater impacts of CSG activities are of particular concern given the thousands of wells that are planned across the eastern seaboard of Australia, the speed at which they are being constructed, the lack of independent monitoring of well construction and the risk of failure of bore casings and cement bore seals over time under saline groundwater conditions. According to a JP Morgan¹¹ report into the effects of the CSG industry on water systems in Queensland, there is a significant risk of gas migrating from coal seams to overlying aquifers where a pathway exists. This “process of gas migration usually occurs in areas at a distance from the CSG well where depressurisation is lower. As such, the gas does not flow at high pressure to the surface and instead migrates away from gas fields through natural geological pathways or via artificial conduits such as man-made water bore wells. The build up of gas in water bores can result in large uncontrolled releases of gas which may pose a risk to public health and safety”.

Another concern in relation to possible groundwater impacts is drilling of substandard wells and that the longevity of well casings cannot be assured. A former long-term hydrologist with the Queensland government has stated¹² that there may be problems with up to five per cent of CSG wells being drilled in Queensland, which would lead to issues of contamination and depletion. Unlike the drilling of water bores

⁸ Loyd-Smith, M. & Senjen, R. (National Toxics Network) 2011, Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate

⁹ [http://www.smh.com.au/environment/toxins-found-at-third-site-as-fracking-fears-build-20101118-](http://www.smh.com.au/environment/toxins-found-at-third-site-as-fracking-fears-build-20101118-17zfv.html)

[17zfv.html](http://www.lngworldnews.com/australia-arrow-finds-traces-of-btex/), <http://www.lngworldnews.com/australia-arrow-finds-traces-of-btex/>,

¹⁰ <http://origintogogether.com/your-questions/faqs/#fracking>

¹¹ JP Morgan **ESG and the Energy Sector** Water Concerns: QLD Coal Seam Gas Developments Report Summary

¹² <http://news.ninensn.com.au/national/8214369/gas-wells-could-leak-chemicals-into-water>

in the Great Artesian Basin (GAB) where an inspector attends every drilling event¹³, there is no independent monitoring of the drilling procedures for thousands of gas wells being drilled in the GAB across Queensland. A study by Mavroukis (2001) maintains that the isolation of boreholes drilled for gas extraction from other beneficial use aquifers cannot be guaranteed in the long term due to failure of the cement drill casings. There are many mechanisms present in the underground environment that can contribute to deterioration of the cement that maintains zonal isolation between different underground formations penetrated during drilling. The most significant of these mechanisms is cement carbonation, whereby the cement casings deteriorate as a result of the saline water environment underground. The recent Senate Inquiry hearings into CSG held in Narrabri¹⁴ explored the issue of casing failure and detailed instances where saline underground water has resulted in deterioration of water well casings which led to connection between previously unconnected aquifers and contamination of the GAB. In the long term, this raises serious questions about the possibility of depletion and contamination of beneficial use aquifers and who would be liable for the remediation of failed bores, when in many instances the company responsible for their drilling may be long gone. These types of well failures are now showing up in 50 to 100 year old wells in New York State (USA)¹⁵.

At present, there is insufficient understanding of the interconnectivity between coal seams and other aquifers to know what the full implications of dewatering coal seams will be. The baseline data on existing groundwater levels is currently very limited, and whilst some companies are monitoring groundwater draw down, this information is not publicly available and there is no independent monitoring. **We believe that there is an imperative on government to undertake full, independent assessment of the hydro geological character of any areas that are proposed for coal seam gas exploration, before any exploration or production takes place, to ensure that there will be no risk of contamination or depletion of beneficial use aquifers from CSG extraction.** It is vital that any such assessment be truly independent, not undertaken by scientists who have links with, or are resourced by,

¹³ Four Corners Gas rush program:

<http://www.abc.net.au/4corners/content/2011/s3141787.htm>

¹⁴ RURAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE **Management of the Murray-Darling Basin system** (Public) TUESDAY, 2 AUGUST 2011

NARRABRI

¹⁵ Ibid

the minerals industry or mining companies, such as the proposed GISERA research initiative¹⁶ where major research into CSG impacts is being funded by the proponents of the largest CSG project in Queensland.

The cumulative impacts of large-scale projects and large numbers of projects also need to be considered. For instance, the proposal for a large project by the company Eastern Star Gas in the Pilliga region in north west New South Wales covers an important area for recharge of the Great Artesian Basin (GAB), and the Basin is already likely to be seriously impacted by the thousands of wells drilled in regions of the GAB in Queensland. The Australian Government Water Group Advice¹⁷ on EPBC Act referrals for major CSG projects in Queensland clearly states that “it can be concluded from the proponents’ modelling that the legacy effects of the CSG developments are considerable, with at least 1,000 years passing before this part of the GAB will return to pre-CSG levels.” We believe that governments cannot afford to ignore advice such as this and allow massive projects to go ahead without clearly modeling the impacts they will have on other users of groundwater supplies. Decisions on coal seam gas developments should take into account *all* of the impacts on *all* the affected parties dependent on groundwater including natural areas, other industries and human populations.

Surface Waters

The disposal of the wastewater extracted from the coal seam also represents a major threat to surface water systems. This water is often highly saline- for instance a Queensland company estimates that each mega litre (one million litres) of waste water brings up 5 - 8 tonnes of salt¹⁸, whilst the Queensland government estimates that 126,000 - 216,000 mega litres of produced water will be extracted per year in Queensland gas fields including 630,000 - 1,728,000 tonnes of salt. This water

¹⁶ ‘First ever coal seam gas scientific research alliance established’, CSIRO website, <http://www.csiro.au/news/Coal-seam-gas-research-alliance.html>

¹⁷ <http://www.sixdegrees.org.au/sites/sixdegrees.org.au/files/Draft%20Water%20Group%20Response%20on%20EPBC%20Act%20Referrals.pdf>

¹⁸ Arrow Energy: Water and Salt Management, June 2010. http://www.arrowenergy.com.au/icms_docs/73090_Water_and_salt_management_brochure.pdf

contains residues of the often toxic chemicals used in drilling and fracking processes as well as many other contaminants that are naturally present in coal seams such as heavy metals, BTEX compounds (benzene, toluene, ethyl benzene and xylene), and radioactive substances. There is no totally safe or adequate method of disposal of this toxic water or the massive quantities of salt that result from water treatment processes. Some of the currently used and proposed methods of disposal include irrigation of crops, storage in evaporation facilities, treatment and release of treated waters into waterways, and re-injection into aquifers. All of these disposal methods pose serious risks to either ground and/or surface waters and in some cases soils. The use of produced water for irrigation of cropping land has been undertaken in other jurisdictions¹⁹, however, there are critical barriers to the use of produced water for crop irrigation and stock watering which include the salinity, sodicity, electric conductivity, pH and toxicity of this water²⁰. As the Energy Lab²¹ (USA) reports: "Perhaps the most significant barrier to using produced water for agricultural purposes involves the salt content of the water. Most crops do not tolerate much salt, and sustained irrigation with salty water can damage soil properties." As Sessoms notes²², there are a limited range of crops that can be grown on soils irrigated with produced water, thereby limiting the diversity of produce grown in areas where CSG production occurs if produced water is used in irrigation.

Whilst CSG wastewater can be treated to remove salts by reverse osmosis, this is a costly and energy intensive process and there remains the problem of how to dispose of the concentrated brine or salt residue from the process. It has been estimated that reverse osmosis treatment of brackish water (5000mg/l TDS)²³ costs between AU\$330-630 per ML of water²⁴, with the energy consumption estimated to

¹⁹ Produced Water Management Technology Descriptions

<http://www.netl.doe.gov/technologies/pwmis/techdesc/aguse/index.html>

²⁰ Sessoms, H.N., Bauder, J.W., Keith, K. and Pearson, K.E. 2002. Chemical Changes in Coal Bed Methane Product Water Over Time. Department of Land Resources and Environmental Sciences, Montana State University. Montana: Montana State University.

²¹ [same](#) as 11 above

²² Sessoms, as 13 above

²³ Aqueous solutions-experts in water treatment solutions

http://www.aqueoussolutions.com.au/desal_faq.htm

²⁴ Clarke, D. 2008. South Australia's Proposed Desalination Plant.

be some 1 kWhr per .001ML of fresh water produced. In a project such as the proposed Narrabri Gas Field in northwest NSW, based on a rate of water production of .16ML per CSG well, per day (given by the proponent in project documents²⁵), the 1100 wells in the proposed gas field would produce up to 176 ML per day²⁶. To treat the 176ML produced each day, given the lowest of the above estimates and a treated water (permeate) recovery rate of seventy per cent²⁷, would cost some \$58,080- and use 123,200kWhr of power *per day*. In this project the estimated amount of salt/brine that would be produced each day is in the region of 52 ML, which means over one year some 18,980 ML of concentrate would need to be stored and/or disposed of, for each and every year of operation. There is at present *no solution* for the long-term disposal of these salts.

A further problem with reverse osmosis treatment is that it does not remove the smaller organic compounds found in CSG water. At present, water that is treated by reverse osmosis is being released into Queensland waterways²⁸, waterways that are part of the Murray Darling Basin and that are used downstream in NSW for a range of agricultural uses as well as town water supplies. This water is likely to contain organic compounds such as the BTEX group of chemicals that can be toxic in very small amounts and which bioaccumulate in the food chain. This wastewater has been approved for release without any analysis of the cumulative load of organic compounds that are being released into river system and therefore mobilized into natural aquatic systems and subsequently utilized by downstream users²⁹. It is worth noting that many of these organic compounds are toxic in minute amounts and bioaccumulate in the food chain³⁰.

<http://www.geocities.com/daveclarkecb/Australia/SaWater.html#Cost%20of%20desalination>

²⁵ The Bohena Coal Seam Gas Project Review of Environmental Factors: Water Treatment and Disposal Project

²⁶ The Bohena Coal Seam Gas Project Review of Environmental Factors: Water Treatment and Disposal Project

²⁷ as for 18 above, p.16

²⁸ Australia Pacific LNG Pty Limited Environmental Authority {petroleum activities} No. PEN100067807

²⁹ Loyd-Smith, M. & Senjen, R. (National Toxics Network) 2011, Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate

Another option currently in use and proposed for wastewater management is the use of storage and/or evaporation ponds. Some of the risks involved with these options include: spillage onto soil and runoff into waterways from dam leaks and during transport to these facilities via pipeline or tanker; overflow from storages during extreme rainfall events; spray drift onto adjacent lands and waterways; seepage into shallow aquifers; water transport impacts including heavy vehicle traffic with associated noise and road degradation; pipeline impacts such as vegetation clearing, erosion and landscape fragmentation; and animal deaths from exposure to pond water. Even in the early stages of this industry in NSW there have been wildlife deaths in the Pilliga Forest at pond sites, as well as extensive tree death from overflows and seepage of wastewater into adjacent vegetated areas. Whilst evaporation ponds are now banned in NSW, it is not clear whether storage facilities, which have the same risks associated with them, will still be allowed. In addition, evaporation ponds in projects that have already been approved will go ahead, such as the large 12-hectare evaporation facility planned for the environmentally sensitive Casino floodplain in northeast NSW³¹. There are also problems associated with the disposal of the drilling muds produced during drilling activities. In many cases these are being stored in temporary holding ponds, such as the new facility Metgasco has recently lodged a Development Application for in the Casino area³². Again, there is no satisfactory solution to long-term disposal of these substances.

A wastewater disposal method that is currently being trialled in Queensland CSG projects³³ and carried out in the coal bed methane industry in the US³⁴ is re-injection of the produced water back into the depleted coal seam aquifer or injection into other aquifers. This process is costly and energy intensive³⁵ and risks contamination of

³⁰ Ibid

³¹ Metgasco: RVPS and CGP environmental assessment

³² 36 Temporary holding facility DA 2012/0021

³³ Australia Pacific LNG Project Talinga/Orana Environmental Management Plan

[http://www.aplng.com.au/pdf/talinga/Talinga_Att_5_Talinga_aquifer_injection_trial_management_pla](http://www.aplng.com.au/pdf/talinga/Talinga_Att_5_Talinga_aquifer_injection_trial_management_plan.pdf)

n.pdf

³⁴ Farag et al 2010, "Potential effects of coal bed natural gas development on fish and aquatic resources" p.7 from

<http://www.uwyo.edu/wycoopunitsupport/docs/Potential%20Effects%20of%20Coalbed%20Natural%20Gas.pdf>

³⁵ Warrence and Bauder, 2008

beneficial use aquifers with toxic or saline wastewater³⁶. The US Geological Survey has recently published findings that suggest that re-injection processes can be linked to earthquake activity³⁷. *“Earthquakes induced by human activity have been documented in a few locations in the United States, Japan and Canada,”* writes the USGS. *“The cause was injection of fluids into deep wells for waste disposal and secondary recovery of oil and the use of reservoirs for water supplies.”*

A significant concern with all of the proposed methods of wastewater disposal is the possibility that produced water will make its way into natural systems from “overland flow, infiltration or groundwater connections”³⁸. This migration has the potential to seriously impact soils, wetlands, fish populations and aquatic ecosystems. These impacts have been detailed in semi-arid environments in the USA³⁹ similar to the western NSW environment where water is currently released into the ephemeral Bohena creek as part of the Eastern Star Gas pilot production projects⁴⁰.

It is vital that safe and environmentally sound processes are developed to deal with the large volumes of wastewater produced in CSG activities before large-scale CSG production goes ahead. It is not adequate that this industry goes into full-scale production before there is sufficient information available to assess the efficacies and impacts of wastewater management procedures. **If wastewater disposal methods that safeguard human health, ground and surface water systems, soils and vegetation cannot be developed, then this industry should not be allowed to expand in NSW.** The threats to water supply from CSG operations are particularly relevant given the increasing pressure that is being placed on our ground and surface water systems from population growth and climate change.”

³⁶ Australian Government National Water Commission, ‘The Coal Seam Gas and water challenge’, August 2011

³⁷ <http://rt.com/usa/news/fracking-earthquake-virginia-dc-817-061/>

³⁸ Same as no. 22 above, p.7

³⁹ Ibid

⁴⁰ The Bohena Coal Seam Gas Project Review of Environmental Factors Water Treatment and Disposal Project

“CSG mining in Queensland has already resulted in a number of incidences of water contamination. Some examples are:

- The National Toxics Network reported⁴¹ in June this year that permits are provided for the release of wastewater produced in association with the fracking process. As an example, they cited a permit⁴² for Australia Pacific LNG Pty Ltd, which allowed the release of 20 megalitres (ML) per day of treated water, for 18 months, into the Condamine River (which is part of the Murray-Darling Basin⁴³). Toxins listed in the permit included radionuclides as well as persistent bioaccumulative toxic substances, for example nonylphenols, Bisphenol A (BPA), chlorobenzenes, bromides, heavy metals such as lead, cadmium, chromium and mercury, and BTEX. There was no requirement for an assessment of the cumulative load or the potential to contaminate sediment, plants, aquatic species and/or animals prior to release. Although release limits were included for the listed compounds, the majority of these were not based on the ANZECC water guidelines⁴⁴ as
- Energy company AGL was forced to investigate after NSW Greens MP Jeremy Buckingham filmed a ‘soapy residue’ erupting from a gas well near Glen Alpine.⁴⁵
- When QGC fracked their Myrtle 3 well, near Dalby, in 2009, it connected the Springbok aquifer to the coal seam below, the Walloon Coal Measures. QGC reportedly used 130 litres of THPS, a biocide, in the fracking process⁴⁶, allowing the possibility of contaminating the Springbok aquifer.

⁴¹ ¹¹⁸ <http://ntn.org.au/wp-content/uploads/2011/07/NTN-CSG-Report-July-2011.pdf>
many of the chemicals were not listed in the guidelines or were marked as having insufficient data to set a water quality guideline.

⁴² 119 Schedule C, Australian Pacific LNG Pty Ltd Environmental Authority (petroleum activities)
No.PEN100067807

⁴³ ¹²⁰ http://en.wikipedia.org/wiki/Condamine_River

⁴⁴

http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality

⁴⁵ <http://macarthur-chronicle-campbelltown.whereilive.com.au/news/story/agl-study-shows-gas-wellleak-to-be-harmless/>

⁴⁶ <http://www.abc.net.au/news/2011-02-21/farmers-count-cost-of-coal-seam-gas-rush/1951670>

- The ABC reported last month⁴⁷ that BTEX chemicals were found in a monitoring bore at Arrow Energy's fields near Dalby in southern Queensland. Arrow Energy's press release⁴⁸ confirms that the company detected traces of benzene, toluene and xylene in five of 14 shallow bores at Arrow's Tipton West and Daandine gas fields, approx 25 kilometres from Dalby. The samples were taken over three days from 14 purpose installed monitoring bores constructed around CSG dams.

- Eyewitnesses report that during the Queensland floods of early 2011, ponds associated with gas mining in the Surat basin gas fields were covered by floodwater. While no testing of downstream water quality was possible, it is reasonable to assume that pond contents were released into the general floodwaters. The blog comment below⁴⁹ is an example of these reports: "... in the Surat basin gas fields I have photos of evaporation ponds going under floodwater & of course concentrated salts flushed out....another photo of a drill rig & camp going under in a flood in these parts earlier in the month. The landowner asked them not to drill there- showed them the debri from previous floods against the trees. Of course these CSG companies know more than any local landowner."

2. Impacts on agriculture and natural areas:

The Kyogle district predominantly relies on two main industries- agriculture, particularly beef and dairy cattle, and tourism. The region is renowned for it's beautiful natural areas, stunning scenery, rich biodiversity and picturesque rural landscapes. Full-scale CSG production usually involves thousands of wells and wholesale industrialization of rural landscapes. Gas fields are made up of: noisy compressor stations that release toxic gases into the atmosphere day and night; large wastewater-holding dams and treatment plants; and extensive networks of pipelines, cables, and roads connecting each well head. Such massive industrialization is simply not compatible with the natural and rural values of our district. Expansion of this industry in the region would involve loss of agricultural land, loss and fragmentation of native vegetation and significant disruption and even

⁴⁷ <http://www.abc.net.au/news/2011-08-30/more-tests-at-csg-site-after-carcinogens-find/2861614>

⁴⁸ http://www.arrowenergy.com.au/icms_docs/102322_Arrow_Energy_advices_of_monitoring_resu
lts.pdf

⁴⁹ <http://larvatusprodeo.net/2011/01/01/queensland-floods/#comment-254722>

decimation of existing rural and tourist industries. The concerns we outlined to the Inquiry are as follows:

“Impacts on natural areas:

Under the present minerals exploration regime in NSW even those public lands set aside for conservation such as State Conservation Areas, National Parks and water catchment Special Areas are not exempt from mining activities and infrastructure. In the Pilliga forests gas wells and associated infrastructure are proposed for a State Conservation Area (SCA), in the Northern Rivers a proposed major gas pipeline route passes right through the World Heritage listed Border Ranges NP, exploration drilling has recently commenced at Putty adjacent to World Heritage listed Wollemi NP, and exploration activity is planned for Special Areas in the Sydney, Illawarra and Hunter water catchments. Mining is also allowed in State Forests which effectively privatises these areas which are supposed to be multi purpose areas for public enjoyment as well as providing a state owned timber resource. There are extensive areas of public lands in the Northern Rivers that would be under threat if CSG production were expanded in the region.

Projects such as the massive gas field planned for the State Forests and the SCA in the Pilliga region pose a range of threats including loss and fragmentation of vital habitat in an already heavily cleared region; increased spread of noxious weeds and feral pests and predators; and increased threat from bushfires. Gas field developments in natural areas threaten wetland ecosystems and important fauna habitats and effectively turn our remaining bushland remnants into industrial zones, with threats to wildlife from loss of habitat and food resources, high numbers of truck movements, industrial noise and pollution of land and waterways. Traveling stock routes (TSR's), which are already being targeted for pipeline developments and CSG exploration in NSW are particularly vulnerable. They should be protected from CSG developments as they represent important wildlife corridors and refuges for plant and animals in otherwise cleared agricultural landscapes.

The type of industrial development involved in CSG extraction is completely inappropriate for these areas of public lands and totally compromises and threatens the natural values, ecosystem services and biodiversity reservoirs they preserve and maintain for current and future generations. **It is critical that high conservation value areas, drinking water catchments and water supplies, important vegetation remnants and corridors (including TSR's), wetlands and public**

lands, be properly protected from all CSG activities- we call on the government to ban all CSG activity on or adjacent to such areas.”

“Food security and agricultural activity

At a public meeting (attended by 300+ people) in Casino, NSW on Thursday 11th August 2011, concerns were raised by local farmers about the risks of CSG contaminating their produce. Food and water security concerns such as this are the foundation of much of the opposition to the coal seam gas industry in rural regions across the state. Leading Australian researchers, such as the CSIRO, urge us to remember: “groundwater resources in Australia underpin a range of agricultural and mining industries”⁵⁰. Agricultural production, particularly in inland NSW, relies heavily on the already over allocated water systems of the Murray Darling Basin and the Great Artesian Basin and other aquifers, and any depletion or contamination of these water systems will have a huge impact on food production. The Australian Government’s department of Geoscience Australia says that coastal aquifers are an increasingly important resource and that: “Continuing population expansion along Australia’s coastal fringe, combined with significant reduction in rainfall in many coastal catchments, has led to an increasing dependency on coastal groundwater resources”⁵¹.

The loss of valuable arable land as a result of the spread of CSG wells, wastewater storage ponds, treatment facilities, pipelines and access tracks is also having a severe impact on the food producing capabilities of regional Australia. Some of NSW’s most valuable and productive agricultural regions are currently under threat from CSG developments, including the Moree Plains, the Liverpool Plains, and the Northern Rivers. In addition to the loss of land taken up with gas infrastructure, CSG developments can add to erosion issues on farms, result in silting of streams and rivers, cause stock fatalities and disrupt water flows^{52, 53}. There is already a massive proliferation of CSG developments destroying the best food producing

⁵⁰ 83 As viewed by author on August 30th 2011, <http://www.csiro.au/science/Groundwater-hydrology.html>

⁵¹ 8 As viewed by author on August 30th 2011,

<http://www.ga.gov.au/ausgeonews/ausgeonews201009/inbrief.jsp>

⁵² 8 <http://theconversation.edu.au/coal-seam-gas-a-risk-to-food-security-485>

⁵³ 86 http://www.aph.gov.au/Senate/committee/rrat_ctte/murray_darling/submissions/sub07.pdf

areas of Queensland such as the Darling Downs- we have the opportunity in NSW to stop the industry from taking over our vital agricultural lands. Members of Kyogle GAG who are beef and dairy farmers are very concerned about the impacts coal seam gas could have on their best pastureland and waterways. Over many years they have improved their farming practices to take better care of the land and water and make their farm production more environmentally sustainable, yet their land is at risk from gas companies who are able to come onto their properties without landholders having a right to refuse access, and they don't even have to comply with all the legislation that farmers must adhere to, such as the Native Vegetation Act and the Water Management Act. In areas where CSG is located, where there is a nexus between agriculture and mining and we are forced to choose between them **we strongly urge the State Government to prioritise the food and water security of NSW over CSG production by properly protecting all valuable food production areas and beneficial use water systems from CSG activities."**

3. Impacts on local communities:

This industry is already having a serious impact on the Kyogle community even though it is only in the exploration phase. Landholders are horrified at the prospect of the land and water they rely on and their precious natural environment being ruined by this industry. They are stressed and anxious at the lack of control over the land upon which they rely for a living- they are outraged at their inability to refuse mining companies access to their lands. Driving along many of the back roads of the region you will now see 'Lock the Gate' signs, which are the only option farmers have to try to keep gas companies from coming onto their land. Around two hundred people have now joined GAG in an effort to stop this industry from expanding in the Kyogle district. Hundreds have come to the public meetings we organised and over five hundred marched on the National Day of Action Against CSG.

There is an awe-inspiring uprising of ordinary citizens taking place across NSW and Australia on this issue, with farmers standing shoulder to shoulder with environmentalists and the political right joining those from the left in an unprecedented alliance to stop this industry from devastating the very land and water on which we all so fundamentally rely. The following excerpts from our submission to the Inquiry highlight some of the impacts of CSG operations on local communities:

“A recent report into the impacts of mining developments on regional Australia by Professor Kerry Carrington from QUT⁵⁴ highlights the fact that there is at present no mechanism whereby the economic benefits from royalties paid by mining companies can go back into the communities and regions that disproportionately bear the burden of mining development. Carrington’s report details many of the detrimental effects that rapid, poorly planned mining expansion has had in Queensland and Western Australia, including the lack of local job creation with routinisation of fly in, fly out workforces; degradation of transport corridors and other local infrastructure; increased demand on social and health services and massively inflated rent prices. The vast majority (often considered to be greater than 90%) of workers employed by CSG mining are employed specifically for the construction phase of CSG mining⁵⁵. This means that despite claims that CSG mining is a good employer, the reality is that real, ongoing, and reliable employment is reserved for very few people. The actual skills needed for constructing CSG infrastructure are generally specialised, meaning that CSG workers are predominantly fly-in/fly-out contractors, with little if any interest in the living environment of the communities where they are working⁵⁶. Some of the problems in areas where the workforce is predominantly transient include: 2-3 times higher violent crime rates; 2.5 times higher mortality from accidents/ fatigue related incidents; and bad behaviour of workers under the influence of alcohol⁵⁷.

In addition, the presence of transient workers (in what are typically close-knit regional communities) destabilises pre-existing networks of reliable, inter-dependent economic relationships and can have other indirect and often unrecognised consequences on existing community life. For example the jealousy generated by outsiders seemingly (and actually) making large amounts of money from one’s local and often child-hood landscapes and territories; intimidation caused by highly trained people belittling (by inference if not overtly) the skills and expertise of local people;

⁵⁴ Fly IN Fly Out Inquiry from: <http://www.abc.net.au/rn/lifematters/stories/2011/3301265.htm>

⁵⁵ “Employment is typically largest during construction phase” reports the Chamber of Minerals and Energy of Western Australia in January 2005, for further details see:

http://www.peopleforthefuture.com.au/files/files/20_FIFO_Report.pdf

⁵⁶ ⁸⁹ See for example The Central Telegraph, 25th March 2011,

<http://www.centraltelegraph.com.au/story/2011/03/25/farmer-sick-csg-workers-camp/>

⁵⁷ ⁹⁰ Carrington, K., Fly IN Fly Out Inquiry from:

<http://www.abc.net.au/rn/lifematters/stories/2011/3301265.htm>

and a general disregard for local standards of practice, economic regulation, transgenerational realities, and expressions of normality. These feelings of jealousy, intimidation and general disregard, then translate into behavioural and psychological expressions of dysfunction within the families affected by CSG mining⁵⁸. In real terms, this means increased rates of domestic violence, self-harm, and child abuse as disempowering behaviours of disempowered peoples.

Doctors for the Environment⁵⁹ have detailed the increasing incidence of solastalgia and other mental health problems in communities affected by mining activities. Solastalgia is described as “*the distress that is produced by environmental change impacting on people while they are directly connected to their home environment*”. The stresses from uncertainty and lack of control over land; water and air pollution and water shortages; permanent degradation and loss of productive agricultural land; loss of livelihood and landscape amenity; community disruption from transient workers and the pressures of negotiating with powerful mining companies, are leading to increased levels of stress related illnesses, depression and feelings of powerless amongst landholders who are often already under intense pressure from the impacts of extreme weather events such as droughts or floods⁶⁰.

The introduction of a mono-economy into regional townships dramatically impacts the diversity of pre-existing economic involvement in that town and region. Over many years economic networks develop and grow into what is often a fragile though functional web of interdependent economic citizens. In regional settings these economic networks are critically interdependent and especially vulnerable to outside influences, such as CSG mining. Given that the overwhelming majority of CSG employment is required for the construction of mining infrastructure, one can easily see that an influx of employees and employment opportunities will necessarily be limited to those skilled in CSG infrastructure construction which leads to a drain of skilled workers from other industries. Time and time again, local businesses collapse

⁵⁸ ⁹¹ See for example The Sun Herald, June 24th 2011, <http://www.heraldsun.com.au/business/businesssmarts/moneys-good-but-fly-in-fly-out-mine-workers-sex-lives-suffering-experts-warn/story-fn7j1d0x-1226081548539>

⁵⁹ ⁹² **Submission to the Rural Affairs and Transport References Committee Inquiry** into management of the Murray Darling Basin – impact of mining coal seam gas **27 JUNE 2011** Submission from Doctors for the Environment Australia Inc. <http://www.dea.org.au>

⁶⁰ Ibid

because they are simply unable to compete for the staff⁶¹. Employees are too often, though understandably, drawn to the immediate benefits of working in a temporary CSG mining industry, while in the long-term, local businesses consequently shut down. In the end a community is likely to be left with closed businesses and the abandoned aftermath of CSG extraction.

Some mining companies acknowledge the social impacts of mining as evidenced by the following statement from a Santos executive: “Positive and negative social impacts will typically be experienced by a community if the nature, magnitude, timing and duration of a social change are more than they are able and willing to manage”⁶². However, this statement really misses the mark in terms of who is responsible, placing the responsibility for “negative social impacts” squarely on communities rather than companies and government, and exemplifies the arrogance and belligerence with which such companies view the impact of their industry on Australian communities. It is increasingly clear that governments are not managing the social change impacts of mining on regional communities and companies are not being required to take responsibility for reducing these impacts.

There is an urgent need to direct serious resources to address infrastructure, services, social and community issues being experienced by mining regions and to make any use of non-resident workforces more sustainable. NSW has the opportunity to properly plan for these impacts before there is any further expansion in the CSG industry in this state. The federal government is currently undertaking an inquiry into the impact of fly-in, fly-out workers⁶³ on regional communities, chaired by Tony Windsor, the member for New England, whose electorate is affected by CSG exploration. It would be valuable for the state government to take note of the outcomes of this Inquiry so that NSW does not end up with the problems being faced in Queensland and Western Australia’s mining regions.

Expansion of CSG activities in an area such as the Northern Rivers is likely to reduce

⁶¹ Ibid

⁶² Page 23 *Santos GLNG Final Report: Social Impact Assessment*, 15th February 2009, http://www.glng.com.au/library/EIS/Appendices/Z_Social%20Impact%20Assessment%20FINAL%20PUBLIC.pdf

⁶³ See ABC New England North West News, 26th August, 2011, <http://www.abc.net.au/news/2011-08-26/csg-inquiry-prompts-plea-for-aquifer-protection/2857200/?site=newengland§ion=news>

the diversity and variety of the regional economy and negatively impact a range of industries that are integral to the region, including beef and cattle farming, sugar cane production, as well as orchardists, nut producers, organic farmers, artisan farmers, and nature based tourist activities and accommodation. The whole appeal of this region is the productive land, scenic landscapes, clean waterways and large areas of remaining natural areas- these values are likely to be massively degraded by expansion of CSG activities in the region. There is widespread opposition to the CSG industry from people across the region and there is an urgent need for communities to have a say in how the region is developed. **We call on this Inquiry to extend the present regional land use strategy initiatives to our region so that we, as a community, get to have an input into the planning of the future regional development of the Northern Rivers.'**

"Local Government Impacts

A significant impact of the CSG industry that is often ignored is the impact on local public infrastructure – especially roads. Our NSW inquiry should be aware that each CSG well requires literally hundreds of trucks, each in excess of 20 tones, for standard construction and operations⁶⁴. Notwithstanding the particulate and chemical pollutants that trucks bring⁶⁵ to an area, is the economic impact of physically accommodating such vehicles on our roads. The roads we refer to are the smaller regional roads, of communities throughout regional and remote NSW. Local councils usually maintain these minor roads, without support from state or federal government. In simple terms, it is the ratepayers of a region who are the primary funders for the roads that are supposed to carry these CSG mining trucks. There should be adequate provisions for CSG companies to recompense local council for maintenance of all public roads, major or minor, which are used by those companies for the construction and maintenance of their wells, pipelines and other infrastructure.

It is unacceptable that local Government and local communities are currently largely excluded from planning and approval processes for CSG activities. In the Northern Rivers region, six out of the seven local councils have asked for a general moratorium on CSG extraction, with Murwillumbah council going further and

⁶⁴ ⁹⁸ As shown for example in the documentary *Gasland*, by Josh Fox, 2010.

⁶⁵ ⁹⁹ As discussed in interviews with human health experts in the documentary *Split Estate*, by Bullfrog Films, 2011.

imposing a moratorium on any CSG activity on council land. We believe that local councils and communities should have more input into planning and assessment approvals processes for CSG activities.”