

**Submission
No 554**

INQUIRY INTO COAL SEAM GAS

Organisation: Armidale Branch National Parks Association of NSW
Date received: 7/09/2011

Coal seam gas (Inquiry)

Submission to NSW Upper House Inquiry into coal seam gas.

The Director,
General Purpose Standing Committee No. 5
Parliament House, Macquarie St, Sydney NSW 2000.

Submission to NSW Upper House Inquiry into coal seam gas.

The National Parks Association of NSW – Armidale Branch wishes to make submissions to the General Purpose Standing Committee No. 5 on the environmental, economic and social impacts of coal seam gas (CSG) activities, including exploration and commercial extraction activities, allowable under the NSW Petroleum (Onshore) Act 1991 (the Act).

We will outline our serious concerns about environmental impacts of coal seam gas activities, particularly in regard to Terms of Reference Number 1a) and 1d), using the example of known and demonstrated impacts of existing and proposed ESG extraction by Eastern Star Gas on the Pilliga forests near Narrabri.

Terms of Reference 1a). Effect on ground and surface water systems:

Coal seam gas extraction poses an unacceptable risk to the Great Artesian Basin (GAB) and to ground and surface water systems (aquifers) above the coal resources of the Surat and Bowen basins in Queensland and NSW. It cannot help but intercept and affect some of the aquifers with probably irreversible impacts.

Drilling of numerous boreholes on a 500m grid pattern over vast areas, to depths of 1000m (1km below ground!) is likely to pose the following risks:

- Cross contamination of aquifers and surface water from leakage of drilling and fracking fluids, and of highly saline contaminated water produced from the coal seam through corroded or damaged bore casings, as the gas is extracted.
- Cross leakage from one aquifer to another by interceptions with numerous boreholes, leading to cumulative slowly spreading contamination of large parts of the recharge areas of the GAB.
- Draw down of aquifer and bore levels from leakage in to the coal seam after gas extraction
- Draw down of aquifers from the extraction of huge amounts of bore water needed for the drilling and extraction processes of coal seam gas mining, adding to over-extraction problems in the Murray-Darling Basin
- Contamination of surface and underground water by leakage and escape from storage dams of the large amount of highly saline and contaminated water produced from the coal seam as the gas is extracted.

NSW and Queensland Governments' ban on fracking (BTEX) chemicals, and proponents' promises not to frack provide no assurance - the proponents' environmental assessments all imply that they will not frack unless necessary/unavoidable - and it almost certainly will be necessary for full economical exploitation of the resource, as demonstrated in the industry in the USA. (see video documentary Gaslands)

The Federal Environment Minister Tony Burke's solution, imposing over 300 conditions on some CSG approvals in Queensland, similarly does not engender confidence. It cannot apply to pre-existing approvals. It does not address the cumulative impacts of hundreds of gas wells over vast areas, but instead merely reinforces inadequate State laws which require only site-specific studies to identify impacts and the means to mitigate them for each separate mining site application. There is no way under existing State and Federal environment laws to truly identify and address the cumulative effects of the proposed vast expansion of industrial coal seam gas extraction in eastern Australia.

There can be no certainty that proponents of the CSG industry can identify the porosity or connectivity of each coal seam and each aquifer that they operate on, that they will fully and honestly monitor and reveal

results, and that they will cease operations and remediate any problems found, as Tony Burke's conditions imply. If cross contamination and leakage of aquifers occurs, remediation will be impossible. You can't unscramble broken eggs.

The risks of environmental damage:

The risk of irreversible damage to the GAB has been highlighted by previous independent hydrological studies. The study by John Hillier of the Walloon coal measures found that there was hydraulic connectivity between the Walloon coal measures and the alluvial groundwater, and that there was a substantial risk that de-watering of the coal measure would lead to movement of water from the alluvium to the coal measure. The application of a conceptual hydraulic model to the Central Coast water catchments, by Northern Geoscience in 2005, similarly found that de-watering of the coal seams in the valleys would impact on the overlying groundwater resource.

The cumulative impacts of the coal seam gas industry on water resources across NSW and Queensland are likely to be severe and irreversible. In their report to the Australian Government in 2010, Geoscience Australia wrote that:

“However, we consider that the overriding issue in CSG development is the uncertainty surrounding the potential cumulative, regional scale impacts of multiple developments. The information provided in the assessed EIS documents is not fully adequate for understanding the likely impacts of widespread CSG development across the Surat and Bowen Basins; nor will any level of information or modelling that can be provided by individual proponents. We consider that a regional scale, multilayer groundwater flow model which incorporates data from both private and public sector sources is necessary to inform this understanding. We emphasise, however, that no matter how thorough a model or detailed the underlying data, any modelled outcomes will be accompanied by high inherent uncertainties until sufficient CSG production data is available to calibrate the groundwater model” .

These scientific studies should ring alarm bells for all policy and regulatory agencies, and should mandate a slow-down in the indecent rush to approve any and all coal seam gas mining propositions.

The best example of inadequate regulatory processes in NSW is the existing and proposed ESG extraction activities by Eastern Star Gas in the Pilliga forests near Narrabri, conducted on an exploration license, which is understood to have recently expired.

Eastern Star Gas (ESG) is currently conducting coal seam gas exploration and pilot production activities in Petroleum Exploration Licence 238 (PEL238) and Petroleum Assessment Lease 2 (PAL2). These two titles cover an area of approximately 819,234 hectares in north-western NSW around Narrabri, located within the Murray-Darling Basin. The petroleum titles are centred over the area of forest known as the Pilliga Forest. They encompass a number of tenures, including State Forest, State Conservation Areas, other Crown Lands, and private land.

Coal seam gas exploration and pilot production by Eastern Star Gas in the Narrabri area to date has involved:

- 1) The drilling and on-going management of more than 92 coal seam gas bores and coreholes
- 2) The conduct of 482km of seismic surveys
- 3) The construction and management of 56.6km of gas and water gathering pipelines
- 4) The development and management of five pilot production gas fields, encompassing 35 pilot production bores
- 5) The construction and management of a gas-fired power station at Wilga Park, including an upgrade of the station from 10MW to 40MW
- 6) The construction and operation of 1 reverse osmosis unit
- 7) The construction and management of 13 major water treatment dams/impoundments and numerous drill ponds

- 8) The discharge of treated produced water into the Bohena Ck, part of the Murray-Darling Basin.
- 9) The bull-dozing of numerous roads and tracks to facilitate the construction and operation of works listed above.

All of these works have been undertaken without obtaining a production licence, but have been conducted within exploration and assessment leases on public land. This indicates that even at the exploration phase, there are widespread impacts from coal seam gas activities – impacts which remain unassessed and mostly unmonitored by NSW authorities.

During exploration there are very limited environmental assessment requirements, and no requirements for public exhibition of either licences or of any other approvals prior to works being undertaken. There is no requirement for a full development consent for exploration activities under the NSW Environmental Planning and Assessment Act 1979. In addition, in NSW coal seam gas exploration is exempt from numerous key environmental statutes that are placed on agricultural industries, including the Native Vegetation Act 2003 and the Water Management Act 2000.

Example of poor management of 'produced' water and resulting environmental impact in the Pilliga forests:

There has been very poor management of 'produced' water during the course of the exploratory and other activities in the Pilliga Forests. There have been numerous reported incidents of saline water spillage from ponds that has led to extensive tree deaths in adjoining areas. These areas are still visible today, and have never been rehabilitated despite being notified to the Environment Protection Authority and its successors in the Department of Environment and Heritage.

Drill ponds, which are located adjacent to well-heads to store water for drilling and to also store produced water, are still frequently unlined, thus allowing potentially toxic water to directly contaminate the soil. There have been numerous reports of unlined drill ponds in the Pilliga and there are still at least three such ponds without liners currently present in the area.

A recent visit to a well-pad in the Pilliga revealed extraordinarily poor water management, with extensive leakage all around the site. Salt scalds are frequently visible at well-pads as a result of poor or absent water management.

There have been a number of reports of drill ponds overflowing during rain events, and then polluting adjacent bushland and potentially creek lines. It is clear that the methods that are used are not sufficient to withstand major flood events.

There have been 13 major water impoundments and evaporation ponds constructed as part of the Narrabri coal seam gas exploration. These include some very large impoundments over 3 hectares in size. Some of these impoundments contain produced water that is highly saline and likely to include other natural toxins or artificial contaminants due to drilling methods. Others contain produced water that has been treated with reverse osmosis, and still others contain concentrated brine that is one of the products of the Reverse Osmosis process.

Neither these impoundments nor the smaller drill ponds that are associated with each well-pad are secured from animals entering to bathe in or drink the water. Birds are frequently seen in and around these areas, and birds and bats in particular have easy access as there is no exclusion from above. Fencing to exclude terrestrial fauna is usually inadequate to the task.

This is a particularly serious environmental risk in the Pilliga, where creeks are ephemeral and surface water is very rare except after rain. As a result, animals tend to congregate around any watering point, including artificial watering points. Local landholders have recorded dead kangaroos near saline water storages.

Presently, in the Pilliga, produced water that is treated with reverse osmosis is discharged into the

Bohena Ck., an ephemeral creek with a shallow alluvial aquifer that discharges into the Namoi River, part of the Murray-Darling Basin.

Eastern Star Gas claims that up to 1Ml per day is discharged into the creek. There is no monitoring conducted of the quality of the water that is discharged, nor of the impacts of the discharge on the ecological character of the creek. The only requirement is that ESG conduct 'visual' inspections of the creek. However, it is apparent that such discharge has the potential both to substantially reduce water quality and to dramatically alter the ecological nature of the creek from ephemeral to permanently saturated.

If Eastern Star Gas were to go to full production and place 1,100 well-heads in the Pilliga forest, there would be vastly increased volumes of water, possibly contaminated, that are likely to be discharged into local creek systems, with major risks to the creek systems of the Murray-Darling Basin. The Pilliga is the southern recharge area for the Great Artesian Basin, and its surface waters and shallow aquifers are also an important part of the Murray-Darling Basin.

It is recognised by all parties that there are great uncertainties and risks associated with coal seam gas extraction and water resources. Very substantial independent investigations and detailed hydrological modelling are required prior to any further advances in this industry. The industry should not proceed while additional data is collected, because the damage may well have been done by the time that data is in. It is essential that such work is now conducted before there is any further exploration in NSW, and certainly before any production projects are approved.

Hillier advised that there needed to be a comprehensive monitoring network established to obtain heads at various depths in the Walloon Coal Measures, and that there needed to be a detailed study to determine the horizontal and vertical permeability of various beds in the Walloon Coal Measures. These are the types of studies that should be required before coal seam gas exploration and production occurs. However, such studies are still not required, either in NSW, or elsewhere - even when an environmental assessment is prepared for a mining license application

We understand that there are new groundwater assessment techniques being utilised in the United States, that involve electro-kinetic methods that can provide far more reliable maps of aquifers and the connectivity between them. We believe that there should be a mandatory requirement for the application of the newest and best available technologies to assess and model the likely impacts of coal seam gas extraction before any approvals are issued. The work should be conducted independent of the companies – as experience shows that consultants working for the proponents are inherently captured and cannot provide independent studies.

Negative impacts on aquifers represent a major and widespread threat to farming in the Murray-Darling Basin, particularly to stock and domestic water. Given the threats that are already posed to farm water supplies by climate change and previous over-allocation, there is simply no excuse for risking expansion of a new industry that adds to those threats. The future of our farming communities and food production is at stake.

Commonwealth and NSW legislation governing assessment and approval processes demonstrably lack capacity to consider fully and appropriately these huge developments in a relatively new industry, which is proceeding on old exploration licenses issued decades ago without any effective environmental assessment or regulation, and with little monitoring of compliance.

We therefore urge the Standing Committee No 5 to seriously consider the above submission on the Terms of Reference 1a). Effect on ground and surface water systems, and recommend a full moratorium on further development of the coal seam gas industry in NSW until there is a rigorous, full and independent scientific inquiry into its impacts.

Terms of Reference 1d) Effect on Crown Lands including travelling stock routes and State forests

Armidale Branch National Parks Association of NSW is deeply concerned at the potential horrendous environmental impacts of proposed coal seam gas extraction on the vegetation and ecosystems of the Pilliga forests, largely State forest and Crown land, and on the travelling stock routes and reserves (TSRs) targeted for pipelines and exploratory drilling.

Risks to the environment: CSG mining and infrastructure represents a major threat to the conservation values of natural areas on Crown land, State Forests and TSRs in the State of NSW :

1. It leads to extensive clearing and fragmentation of native bushland and threatened species habitat and increases the risk of catastrophic bushfires - severe impacts which cannot be mitigated
2. It transforms major vegetation remnants, refuges and corridors into industrial zones and severely fragmented remnants which will be unable to support their previous biodiversity
3. It represents a major threat to wetland systems, even distant ones that are hydrologically connected.
4. Even protected areas and public lands are not safe – CSG exploration and mining can occur in areas bordering National Parks, and is permitted in State Conservation Areas and State Forests and other Crown land such as TSRs.

In the Namoi Catchment in NSW, the coal seam gas industry is poised to impact not only on the best farmland but also the best high conservation value bushland, and it looks set to simultaneously degrade both the productive base and the ecological base of our State. Public land such as State Forests, State Conservation Areas and travelling stock routes and reserves in the Pilliga forests and beyond are being targeted first, but the CSG industry is also promising to expand rapidly to explore in adjacent private land. This has prompted serious concern and opposition from landowners about access rights and impacts on water resources and food production, which will doubtless be addressed by NSW Farmers' submissions.

The Pilliga is the largest temperate woodland left in eastern Australia. It is one of the Murray Darling Basin's most important natural assets and an important recharge area for the Great Artesian Basin. It is an iconic 'million wild acres', some 500,000 hectares in size, and it has recognised national and international conservation significance. It is located in a national biodiversity hotspot, the Brigalow Belt South Bioregion, contains an internationally listed Important Bird Area, and provides habitat for up to 30 listed matters of national environment significance and up to 48 threatened species and communities under NSW legislation.

Coal seam gas exploration and production as proposed by Eastern Star Gas (soon to be Santos) in the Pilliga will lead to major clearing and fragmentation of native vegetation with very severe impacts on biodiversity. Even during the exploration phase, the following impacts have occurred: clearing of 150 hectares of native vegetation, heavy fragmentation of 1,700ha of native vegetation, clearing of habitat for NSW and nationally-listed species and an increased footprint across 44,000ha of native vegetation.

If the full production project that is proposed by Eastern Star Gas is approved, it would allow clearing of at least 2,400 hectares of native vegetation and the fragmentation of an area of 85,000 hectares. Over 1000 well-pads would be cleared to a size of 1.2 hectares, some 1,000km of pipelines would be cleared, and there would be additional clearing for roads, tracks and infrastructure. Well-pads would be placed on a 500m grid, effectively carving up the most intact patch of bush in western NSW into a highly fragmented industrial zone of unsustainable remnants.

The impacts of coal seam gas extraction on native vegetation and biodiversity in the Pilliga will be severe and irreversible. Similar impacts will occur in other remnants of vegetation in the Murray-Darling Basin as the industry rushes to expand operations. This cannot be considered an ecologically sustainable development. It gives grounds for the Inquiry to recommend a full moratorium on current coal seam gas development plans in NSW until risks and impacts are fully and scientifically studied

Impacts on the environment: Weed and pest animal invasion:

There is already evidence from the exploration phase that coal seam gas extraction leads directly to increased weed invasion, which will degrade the entire ecological value of the Pilliga forests.

Exploratory well-pads are now dominated by weeds and they have not been rehabilitated. Similarly, roads and tracks on a grid pattern are known to lead to the ingress of feral animals such as feral pigs and foxes.

Impacts on the environment: Dramatically increased fire risk

The Pilliga Forest is already a highly fire prone environment subject to wildfires ignited by lightning strikes in frequent summer storms.

Coal seam gas development, especially the proposal for 1,100 well-heads and 1,000km of pipelines, will lead to a major increase in fire risk in the Pilliga. The project would lead to a substantial increase in ignition sources with the introduction of numerous vehicles, machinery and people into the area. It will also introduce a highly flammable gas, methane, into the equation.

Frequent methane leakages from well-heads and pipes have been discovered in NSW and Queensland. Methane has already been reported leaking from pipes in the Pilliga, even in the exploration phase. Furthermore, experience from America shows that there are frequently fires associated with gas fields.

An increase in fire risk in the Pilliga is likely to lead to an increase in both frequency and intensity of fires. Given that the Pilliga area is already known for extremely hot burns that travel vast distances in short time frames, any increase in risk must be considered a potentially serious threat to both human safety and to native wildlife and biodiversity in the area.

We believe the location of a gigantic gas field in such a fire prone environment may lead to catastrophic fire events, and consider the proposal both irresponsible and inappropriate for the location.

Impacts on the environment: location of pipelines to Wellington and Newcastle, using TSRs

Spokespersons for the Government, NSW Farmers and Eastern Star gas have indicated that they prefer that pipelines for delivery of gas to Wellington for a new gas-fired power station, and to Newcastle for export of liquefied gas, to be located on public land, especially on roadsides and TSRs where possible.

Armidale National Parks Association of NSW strongly opposes this idea. It is yet another attack on sustainable ecological management of our natural areas/ fragile ecosystems. We are campaigning for all TSRs to be appropriately managed by one authority such as the Livestock Health and Pest Authorities for both travelling stock and for their acknowledged vital environmental values as corridors and refuges.

TSRs often contain the last remnants of local vegetation types in the largely cleared agricultural landscapes of NSW. They are vital refuges for flora and fauna. They provide vital connectivity between other surviving patches of bush on public and private land, essential for survival of flora and fauna in a landscape beset by development and global warming effects, essential for ecological sustainability.

The impact of pipelines on TSRs will adversely affect their integrity, and will destroy their environmental values outlined above

Therefore it is unacceptable that TSRs be targeted as easy public land options for location of utilities and infrastructure like pipelines and power lines.

We ask that the Inquiry recommend that pipelines for delivery of coal seam gas be sited on already cleared land as far as possible, and that they particularly avoid routes that involve clearing of vegetation on TSRs.

Conclusion: Armidale Branch of the National Parks Association of NSW is grateful for the opportunity to make this submission. We ask that the Inquiry give it full consideration and that you make the following recommendations in your final report:

1. A full moratorium on all forms of coal seam gas drilling until the environmental, social and health impacts have been rigorously and independently assessed.
2. Coal seam gas exploration and mining to be made subject to all relevant environmental legislation, including the native vegetation and water management laws.
3. The provision of standing to ensure that the community has full legal rights to challenge and enforce environmental laws under which coal seam gas companies are operating.
4. The provision of a right in the Petroleum (Onshore) Act to allow landholders to refuse consent for coal seam gas exploration or production on their land.
5. A prohibition on coal seam gas exploration and mining in important bushland, valuable farmland, groundwater aquifers, residential areas and public lands.
6. A requirement that all chemicals used in coal seam gas drilling or fracking must be assessed by the chemical regulator for use for that purpose before being approved for use.

Ends Armidale Branch National Parks of NSW Submission to NSW Upper House Inquiry into coal seam gas.

Submission compiled by Beth Williams, Project Officer and Life Member of Armidale Branch,
National Parks Association of NSW

7th September 2011