



## **NORTHERN INLAND COUNCIL for the ENVIRONMENT**

### **Coonabarabran Local Environment Group Armidale National Parks Association**

#### **SUBMISSION: IMPACTS OF CSG ON THE MURRAY-DARLING**

Please accept this as a submission to the Rural Affairs and Transport References Committee into the impact of mining coal seam gas on management of the Murray-Darling Basin.

This submission is provided on behalf of the Northern Inland Council for the Environment, Friends of the Earth Melbourne, Nature Conservation Council of NSW, The Wilderness Society, the Colong Foundation for Wilderness, Coonabarabran Local Environment Group and the Armidale National Parks Association.

The groups involved in this submission would like an opportunity to present to the Committee in relation to the impacts of coal seam gas on the Murray-Darling Basin.

We would also like to invite the Committee to visit the Pilliga Forest, near Narrabri in north-western NSW, to see first hand the impacts of coal seam gas exploration and pilot production in the Murray-Darling Basin.

There are four map attachments and one additional attachment with photos to this submission, that are provided in separate documents.

If you have any queries in relation to this submission, please contact Carmel Flint,

#### **Introduction**

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We believe that there is substantial evidence to indicate that coal seam gas represents a major threat to the future of the Murray-Darling Basin.

The sheer scale of the proposed industry is a major cause for concern. In NSW, there are already 12.7 million hectares of Petroleum Exploration Licences located within the Murray-Darling Basin (see Map 1).

The scale of the impact should even a small proportion of these proceed to full production will be severe. For example, the Narrabri Coal Seam Gas project that has been put forward by Eastern Star Gas proposes to drill 1,100 wells and construct 1,000km of pipeline within the Pilliga Forest, near Narrabri.

However, it is apparent from looking at coal seam gas potential across the wider area and the

extent of the Eastern Star Gas exploration licence, that this project is likely to expand out to something in the order of 7,000 drill holes and 7,000km of pipeline over time across forest and farmland alike (see Map 2).

Expanding this out across all of the petroleum exploration licences in the Murray-Darling Basin, it is apparent that the industry could well involve tens of thousands of wells and tens of thousands of kilometres of pipeline within a very short time frame.

There is no other modern industry which represents such an extraordinary threat to vast areas of our rural landscapes.

The coal seam gas industry, if allowed to proceed, will convert large sections of the Murray-Darling Basin into industrial zones and pose a severe risk to our water resources, our farmlands, our natural assets, our communities and our way of life.

### **Eastern Star Gas operations around Narrabri**

Eastern Star Gas (ESG) are 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<sup>1</sup> that is 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 accommodated within exploration and assessment leases. This indicates that even at the exploration phase, there are widespread impacts from coal seam gas activities.

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.

### **Environmental impacts of coal seam gas operations**

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<sup>1</sup> Derived from data obtained under licence from <http://www.dpi.nsw.gov.au/minerals/geological/online-services/minview>

The exploration and pilot production activities in the Pilliga Forest and surrounding areas to date provide a detailed case study that enables some of the risks associated with coal seam gas to be investigated.

In particular, numerous environmental failings have been recorded by local landholders during the last 10 years of activities by Eastern Star Gas and its predecessors. The types of failings and impacts that have been revealed over this time are discussed further below, and a set of photos of coal seam gas exploration in the Pilliga are attached.

Map 3 provides a satellite image of the Pilliga showing the location of the proposed 1,100 well-head gas field and of the exploration licence, and Map 4 shows the proposed location of the wells within the forest.

#### Poor management of 'produced' water

There has been very poor management of 'produced' water during the course of the exploratory and other activities in the Pilliga Forest. 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.

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 present in the area currently.

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 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 RO 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. Bohena Ck is an ephemeral creek with a shallow alluvial aquifer that discharges into the Namoi River, part of the Murray-Darling Basin. Eastern Star Gas claim 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 that are likely to be discharged into local creek systems, with major risks to the creek systems of the Murray-Darling Basin.

#### Potential aquifer impacts

There is a substantial risk to aquifers from coal seam gas extraction. 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.

Previous independent studies have confirmed these risks, including the study by John Hillier of the Walloon coal measures which 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. 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”.*

Therefore, 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.

We have been advised that there are new groundwater assessment techniques, that are 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. 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 a new industry that adds to those threats. The future of our farming communities is at stake.

Impacts on aquifers also represent a major threat to wetlands, including Ramsar-listed wetlands, and to groundwater dependent ecosystems. Notably, a recent study for the Namoi Catchment Management Authority has identified most of the woodland vegetation in the Pilliga as having high potential as being a groundwater dependent ecosystem. Therefore, any impacts on groundwater is likely to have substantial repercussions for those woodlands. In the Maules Creek area, there are unique groundwater invertebrates, known as stygofauna, which are highly sensitive to any changes in groundwater. They are thought to play a role in filtering and cleaning groundwater. These fauna are very poorly researched and therefore their full distribution at this stage is unknown, but they are also likely to occur in other parts of the Murray-Darling Basin that have not previously experienced major changes in groundwater levels or chemistry.

There are also additional risks associated with release of chemicals into aquifers due to drilling and hydraulic fracturing. Eastern Star Gas now claim that they do not intend to conduct fracking in the Pilliga, although they have previously described their pilot production wells in the Pilliga as 'the largest fracks ever undertaken in Australia'. They now propose to use predominantly lateral drilling, which comes with its own risks and threats to aquifers.

#### Negative impacts on native vegetation

The impacts of coal seam gas extraction on native vegetation are not well known, however in environments such as the Pilliga, they are likely to be severe.

The Pilliga is the largest temperate woodland left in eastern Australia, and one of the Murray-Darling Basins most important natural assets. It is 'a 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, forms 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.

Experience in the Pilliga indicates that coal seam gas exploration and production leads to major clearing and fragmentation of native vegetation. 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, an increased footprint across 44,000ha of native vegetation.

This has included clearing of habitat for NSW and nationally-listed species. In particular, the Pilliga provides core habitat for:

- The only known population of the endemic and nationally vulnerable Pilliga Mouse
- The largest Koala population in inland NSW
- The only known Black-striped Wallaby population in inland NSW
- The recognised population stronghold for the nationally-vulnerable South-eastern Long-eared Bat
- The recognised population stronghold for the Barking Owl.

If the full production project that is proposed by Eastern Star Gas is approved, it would allow the clearing of at least 2,400 hectares of native vegetation and the fragmentation of an area of 85,000 hectares. 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.

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. 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.

The impacts of coal seam gas on native vegetation and biodiversity in the Pilliga will be severe, and similar impacts will occur in other parts of the Murray-Darling Basin.

There are also potentially serious risks to wetlands and groundwater dependent ecosystems from coal seam gas extraction in the Murray-Darling. Already, projects that have been approved in Queensland will represent a risk to NSW waterways and wetlands.

#### Dramatically increased fire risk

The Pilliga Forest is already a highly fire prone environment. Coal seam gas, 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.

Experience from across NSW and Queensland shows that there are frequent methane leakages from well-heads and pipes. Methane has been reported leaking from pipes already 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.

#### Increased water extraction from over-allocated systems

Coal seam gas extraction requires large volumes of water for both regular drilling and for hydraulic fracturing. Currently, Eastern Star Gas purports to have sunk two wells to produce water for use in these processes. If the full project of 1,100 wells is approved, there will be a much increased demand for water for this purpose. This represents an increased threat to water resources in the Murray-Darling Basin, which are already largely over-allocated. There is no room for another, water hungry industry of this nature.

#### Impacts on Indigenous land rights and cultural values

Coal seam gas represents a substantial threat to Indigenous rights and interests in the Murray-Darling Basin. The Pilliga, for example, has very high cultural heritage significance and contains numerous important cultural sites and landscapes. The industrialisation of the landscape will have a major impact on those sites and values.

Similarly, the interests of Traditional Owners in land are also likely to be severely affected by this industry. It stifles the rights of Traditional Owners and all other landholders to object, to say no, and to prevent coal seam gas where it is opposed by the community.

#### Impacts from associated infrastructure

The coal seam gas proposal in the Pilliga has associated with it two pipelines totalling 600km in length. One pipeline is planned for transporting gas to Newcastle, where Eastern Star Gas proposes to locate an LNG export facility on the north arm of the Hunter River. A second pipeline is planned to Wellington, where Eastern Star Gas proposes to supply gas to a proposed gas-fired

power station.

The pipeline will pass through highly erodible black soil plains around Mullaley and Tambar Springs. This is prime agricultural land that is located on the floodplain, and where previous very small pipelines have led to massive erosion events. This, in turn, leads to major water quality issues in local waterways.

The pipeline also proposes to pass through some of the highest conservation value remnants left in a heavily cleared landscape, including very significant Travelling Stock Routes which are well-recognised as having exceptional natural and cultural heritage values.

The proposed export facility at Kooragang Island is located next to a Ramsar wetland, and proposed dredging to enable access for shipping is likely to negatively impact on both the wetland and on migratory bird species that utilise it as important foraging habitat.

### Fugitive Emissions

Recent research from America has indicated that fugitive methane emissions from shale oil gas and coal seam gas extraction, when fully accounted for, render it much the same as coal with regard to life-cycle greenhouse gas emissions. There is currently no truth in accounting with regard to these emissions nor has there been sufficient research conducted in Australia. A rigorous set of criteria and detailed research project is urgently required to properly quantify the extent of fugitive emissions from coal seam gas in Australia, before the industry is to proceed any further here.

### Social and Economic Impacts

There are major social and economic impacts from coal seam gas. Our experience with exploration in the Narrabri area shows that the process leaves landholders feeling isolated, fearful and vulnerable. Consultation is totally inadequate. There is a grave risk of landholders losing control of their farmland and their water resources. Under the current circumstances, coal seam gas companies can force landholders in to the courts to obtain access to their land. Landholders are effectively abandoned by Governments to face gas companies alone in the courts, dealing with complex legal requirements and processes. Landholders should have the right to say no to coal seam gas exploration, given the serious consequences for their management of their farms.

The purported economic benefits from coal seam gas extraction are limited largely to shareholders, and are not widely distributed across the community. In fact, experience in the Namoi catchment, is that mining leads to many negatives for a community such as soaring rental prices and a vastly changed social character. The types of mining camps that are now being developed in Narrabri and Boggabri for coal miners are also likely to be the types of camps developed for coal seam gas developments. The local communities are frightful and concerned about the impacts these camps of fly-in/fly-out workers will have on their communities.

Communities are left with the costs of coal seam gas extraction – industrialised landscapes, degraded environments, polluted water resources. The benefits go to the few companies who are granted licences to mine our collective resources and export them off-shore.

### **Conclusion**

This submission is based largely on experience with coal seam gas exploration to date in the Pilliga Forest in north-western NSW. Even during the exploration phase, and as outlined above, we have seen severe environmental impacts, extremely poor regulatory control, and a lack of compliance and enforcement with the rules that do apply.

The most important fact, which we would like to stress, is that the intensity of this industry as it spreads out across the landscape is unlike anything we have ever seen before. It is impossible for

poorly-resourced regulatory agencies to have any understanding or oversight of such a vast environmental footprint. It is apparent from our experiences that the regulatory agencies have literally no idea what is occurring on the ground and that the coal seam gas industry is, to that extent, out of control.

In the Namoi Catchment, coal seam gas is targeting both the most productive farmland and the most significant bushland. It looks set to simultaneously degrade both our productive base and our ecological base. It will forever change the nature of rural communities.

We would like to see the Committee recommend an immediate moratorium on coal seam gas exploration and production in the Murray-Darling Basin, and to call for a full and independent scientific inquiry into its impacts.