From: **Carmel Flint** <carmelflint@tpg.com.au>
Date: 16 September 2014 14:46
Subject: Follow up from Chief Scientist meeting
To: jaclyn.aldenhoven@chiefscientist.nsw.gov.au
Cc: george woods <georgewoods79@gmail.com>

Hi Jaclyn,

After the meeting with the Chief Scientist recently, we undertook to provide some more information on a range of topics covered. I have attached a short report which covers that information.

I would appreciate it if you could ensure the Chief Scientist is directly provided with a copy of this information.

We talked at the meeting about landholder experiences in Qld, and we recommend that the Chief Scientist/staff make contact with the following people to get an overview of how the system there affects landholders:

- PHD Student Anna Phelan has surveyed approx 400 landholders about their experience - her contact 0433 960500, anna.phelan@qut.edu.au
- Lestar Manning from P&E Lawyers has represented numerous landholders in access agreements - 07 54780155
- George Housen is a paralegal who has also supported numerous landholders in negotiations - 07 46321024

For some direct landholder voices from the Qld gasfields, you can watch several short videos here, and more will be uploaded in the next few days.

If there is any other information you are seeking, please feel free to contact me at any time.

Many thanks,

Carmel

Follow Up Information to Meeting with NSW Chief Scientist

Lock the Gate Alliance, 16th September 2014

Carmel Flint, Campaign Co-ordinator, 0400 521474, carmelflint@tpg.com.au

Recommendations in the final report

We believe it is crucial that the recommendations ensure that there is the proper application of the precautionary principle. The scale and intensity of the CSG industry, and the risks and land use conflicts which it creates, cannot be resolved by relying on engineering or monitoring alone. Adaptive management as THE PRIMARY management tool is not only contrary to our legislative framework, but it is inadequate to prevent major damage from CSG in important areas.

The level of regulatory capture of government agencies by the CSG industry and the failure of compliance and enforcement to date, mean that the highest priority must be on prevention of harm and the protection of significant landscape attributes.

Therefore, we believe the recommendations should address:

1) Environmental zoning - best practice in environmental planning requires the identification of sensitive areas and the delineation of different environmental zones to prevent land use conflict and high risk. This is the single most important measure needed to regulate the CSG industry - proper no-go zones to exclude CSG mining from important farmlands, sensitive water resources, around homes and in key natural areas.

2) Checks and balances - there are no checks and balance in the approvals process at present. There should be proper legal objection processes available when exploration licences are first issued, concurrence roles for other government agencies in final project approvals, and merits appeal rights for the community.

3) Stating uncertainty - it is apparent that the 'science' on CSG is far from settled, and there is still a very large degree of uncertainty. We consider it vital that the report does not purport to suggest the science is settled or that CSG can now be deemed 'safe'. It is important that the report clearly identifies the uncertainty still associated with the industry and scopes out its own limitations.

Upfront studies, data and baselines

We support the recommendations for a rehabilitation fund, a Water Impacts Commission, a state-wide subsidence study, groundwater characterisation studies and an open state-wide data repository, as previously recommended by the Chief Scientist. However, coal seam gas projects are continuing in their operation, assessment and development ahead of this work being undertaken, contrary to the Chief Scientist's recommendation and at considerable risk.

According to the initial report "baseline data is missing for many projects, and interpolation methods must be used to establish these. Without accurate baseline understanding, efforts to attribute impacts to activities can be fraught." More than twelve months later this is still the case.

Lock the Gate believes that this warrants a rethink of the Chief Scientists' general approach that projects need not be halted while research is underway – projects have now outstripped the research and must be suspended.

In short, the Government is not implementing the recommendation that broadscale baseline assessments on groundwater and subsidence be conducted upfront, prior to large-scale coal seam gas being undertaken. We believe this should be taken into consideration in the development of the final recommendations. Attachment 4 sets out the recommendations made by the Chief Scientist to date, and provides feedback on each of them.

Health

Health risks clearly require a precautionary approach. The lack of precaution in unconventional gas development in the US has been notable. In particular, some recent research from two US Universities - Colombia University and MIT - adds to existing concerns through its finding that proximity to fracking increased the likelihood of low birth weight by more than half, from about 5.6 percent to more than 9 percent. The chances of a low Apgar score, a summary measure of the health of newborn children, roughly doubled, to more than 5 percent. As the researchers conclude, more research is required - but drilling should not be occurring near rural homes, towns or villages while such uncertainties exist. Health Impact Assessments should be required prior to any CSG drilling project being approved.

We are concerned that no dedicated investigation has been made into the air pollution from coal seam gas activities to date. The emissions from coal seam gas flaring include large quantities of methane and noxious emissions, including nitrogen oxides, volatile organic compounds and hazardous air pollutants. The Commonwealth process to revise the air quality and toxics NEPM appears to have stalled, and New South Wales' EPA is not setting and enforcing adequate standards. No limits have been imposed by the New South Wales EPA on release of these dangerous pollutants from flaring in Gloucester and the Pilliga, in Environment Protection Licences that were just granted earlier this year, and in Camden, only some air pollution contaminants are limited.

Agricultural Impacts

Apart from direct alienation of land, competition for water and risks of contamination, there are numerous other agricultural impacts which need to be considered. Increases in traffic and disturbance, which are frequently extensive during gas drilling, workover, and management, can negatively impact on livestock calving rates and weight. Any changes in these measures can push already marginal operations to become unviable.

The persistent failure of CSG workers to close gates creates massive problems for landholders, with livestock escaping into different paddocks, and landholders having to work to get them back again. Some landholders have de-stocked because it is impossible to manage livestock in those circumstances.

Allan Leech, a farmer from Queensland, has been severely impacted by African Lovegrass invasion onto his property following CSG drilling, and has had to destock and find work off the property. He is now in a legal battle with the gas company to seek compensation. His lawyer has stated that wash down requirements in Qld are inadequate, and called for strict liability such that if a company causes

the introduction or spread of weeds and a landholder suffers, then they are fairly compensated without having to go through a costly legal process.

The spread of invasive weeds has the potential to reduce productivity on a vast scale following CSG drilling, and there should be the strictest possible legal controls put in place specifying rigorous wash down procedures and standards, and strict liability for any subsequent weed contamination.

There is also the very real and serious risk of other invasive pests being imported into Australia and spread via mining equipment. A recent outbreak of fire ants in Gladstone has been attributed to construction cargo imported for the gas plants on Curtis Island.

Biodiversity

CSG mining leads to a major intensification of land use and substantial increases in habitat fragmentation. In both Qld and NSW, companies appear to select forested public lands as the first targets for gas drilling. In the Pilliga in NSW, they plan to place many of hundreds of wells in the largest stand of temperate woodland left in eastern Australia. In Qld, numerous State Forests are now criss-crossed by roads, pipelines and well pads. However, vegetation remnants across freehold land will also be subject to similar disturbance.

There is also substantial direct clearance and loss of vegetation as a result of CSG mining. The cumulative impacts in the context of already declining biodiversity are severe. This is particularly relevant given the scale and intensity of CSG development thus far in Australia. For example, the APLNG project in Qld gained approval for 10,000 gas wells across 570,000 hectares of land. The development was so vast, that the proponent was only able to provide a vague 'estimate' of the direct impacts on native vegetation, and concluded that it was not possible to predict these impacts 'with any precision'.

The impacts of land use intensification and habitat loss and fragmentation on biodiversity are well canvassed in the scientific literature. They have been shown to lead to direct loss and decline in native populations, increased predation and invasion of weeds and feral animals.

The protection of threatened species and native vegetation is one of the primary goals of our environmental statutes. However, if CSG mining follows the same pattern in NSW as in Qld, those laws will barely warrant consideration. Currently in NSW, any clearing authorised under the *Petroleum (Onshore) Act 1991* is exempt from the operation of the Native Vegetation Act 2013, by virtue of s25 of that Act. Therefore, CSG operations are not subject to even the most basic laws protecting native vegetation. As far as threatened species go, the Office of Environment and Heritage does not have a concurrence role for exploration drilling or for major project approvals.

The risks to biodiversity from CSG mining are substantial, and the measures in place to prevent and/or mitigate those risks are demonstrably inadequate. All relevant environmental laws should apply in full, and there should be no special exemptions for CSG drilling.

Groundwater Biodiversity

Stygofauna are microscopic groundwater biota that show high levels of endemicity. They are believed to play a role in filtering groundwater and they are considered highly sensitive to any

changes in water quality or depth. They are also likely to be extremely sensitive to invasive biota possibly transported via drilling equipment.

Endemic stygofauna in Western Australia are a major consideration in mining applications. Western Australia has developed two detailed guidelines to direct stygofauna assessments:

- Environmental Assessment Guideline for Consideration of Subterranean Fauna in Groundwater and Caves during Environmental Impact Assessments in Western Australia. (2013)
- Sampling Methods and Survey considerations for Subterranean Fauna in Western Australia. Guideline No. 54a – Technical appendix to Guidance Statement No. 54 (released in 2007)

Endemic stygofauna were recently discovered by an independent ecologist, Peter Serov, in aquifers in the Pilliga, but pilot production drilling has since been approved without any further assessment or sampling. Similar rigorous guidelines for assessing stygofauna in use in WA should be adopted in NSW prior to CSG development.

Groundwater

Expert hydrogeological advice provided to us indicates that at least three years of robust groundwater monitoring data is required to develop a valid groundwater model. We believe that there should be a minimum specification that at least 3 years data is required prior to a groundwater model being accepted as the basis for a CSG development application. A minimum of three years of monitoring must be compulsory prior to approval of CSG projects.

Dedicated work was undertaken on Sydney's drinking water catchment and the Government has announced groundwater characterisation and mapping projects for the Gunnedah Basin, Gloucester and Clarence-Moreton, but members of our network rely for their livelihoods on the recharge of the Great Artesian Basin. In recognition of the importance of this resource, hydrogeological models must be developed based on at least three years of data monitoring, including deep aquifers, to establish a robust seasonal baseline from which to monitor changes, before drilling commences in the recharge area of the Great Artesian Basin.

Chemicals

Even though NICNAS is still not complete, we believe that a standard can and should be set which requires proper upfront hazard assessments of all chemicals prior to use, and that there is a prohibition placed on any that are a threat to the environment or human health.

ICAC Recommendations

There are two relevant ICAC recommendations in their report 'Reducing the Opportunities and Incentives for Corruption in the State's Management of Coal Resources' 2013:

> Recommendation 7 - That the steering group is given the resources to establish an assessment panel and working groups, as required, that can provide additional information and analyses to make quality recommendations to the NSW Government.

> Recommendation 8 - That the assessment panel provides a triple bottom line assessment of the environmental, social and economic factors of allocating an EL and reports its findings to the steering group.

We believe a triple bottom line assessment at the EL stage of the process is also warranted for petroleum licences, as an important safeguard against corruption.

In addition, the ICAC Report 'Anti-corruption Safeguards and the NSW Planning System' 2012, including the following as Recommendation 16:

> That the NSW Government considers expanding the categories of development subject to third party merit appeals to include private sector development that:
> - „„is significant and controversial
> - „„ represents a significant departure from existing development standards
> - „„ is the subject of a voluntary planning agreement.

Furthermore, the ICAC Submission into the proposed new Planning System for NSW, stated that:

> *"The limited availability of third party appeal rights under the proposed system means that an important disincentive for corrupt decision-making is absent. Third party appeal rights deter corrupt approaches because there can be no guarantee that any favouritism sought will succeed. Third party appeal rights also create a perceived threat that corrupt conduct will be detected. Consequently, the opportunity for self interested behaviour is minimised. The ability to overturn unmeritorious decisions also helps participants maintain faith in the system by promoting certainty*".

We strongly believe that there is an urgent need to introduce a triple bottom line assessment into both the coal and petroleum exploration assessment processes and to ensure that third party merits appeal rights are available for all major coal and gas projects. We believe that ICAC has made a strong case for both, and given the shocking and far-reaching nature of the corruption that has been unveiled by ICAC, we believe it is incumbent on all NSW decision-makers and advisors to do everything in their power to ensure that such events never happen again and that ICAC recommendations are fully implemented.

Salt

We were extremely concerned at the paltry penalties imposed by the EPA on Santos for polluting two groundwater aquifers in the Pilliga due to leaking water storages. The event raises serious questions about the weight, or lack thereof, that EPA put on salinisation of groundwater. They do not appear to properly recognise salt as a pollutant, which is likely to be a major problem in the context of regulating the CSG industry. We have attached a short chronological outline of the Pilliga aquifer contamination event and how it unfolded, and a summary of our concerns with how it was handled by the EPA (see Attachments 1 & 2).

The risk of CSG wastewater leaching through soils and mobilising heavy metals such as uranium is a risk that had not previously been properly understood, and which has major implications. It leads to increased need for environmental zonings to prevent developments in sensitive areas and far stricter controls and greater penalties for spills and leaks.

Insurance

We appreciate the work that the Chief Scientist has conducted to date on insurance. We believe that self-insurance is completely inadequate to address the risks of the CSG industry.

We recommend that NSW Treasury and others commission a Licenced Insurance Broker and registered Financial Services Adviser that specialises in environmental liability to advise the NSW Government on the best path forward. We consider it important that the definition of 'Environmental Insurance' published in March 2013 by Lexis Nexis in the International Environmental Law Community should be referenced for the purposes of consideration in NSW. Further analysis should also be conducted on insurable options available internationally.

However, perhaps our greatest concern in relation to the CSG is the fact that some risks appear to uninsurable. For example, several graziers have reached an impasse when it comes to insuring against risks of contamination to livestock.

National Vendor Declarations (NVDs) are the main document behind Australia's meat and livestock food safety reputation. Livestock producers are required to sign NVDs to provide a guarantee of food safety to purchasers from the paddock to the plate.

The major implications for landholders and livestock producers in relation to CSG mining and NVDs, are that:

1. The onus of proof in any contamination event is almost certain to reside with the landholder.
2. The inadequacies of baseline monitoring by companies and the prohibitive costs of monitoring for landholders, means that proving contamination is likely to be extremely difficulty.
3. Farmers who sign National Vendor Declarations for livestock that may have been contaminated by contact with CSG waste are likely to be liable for any harm incurred.
4. CSG companies are refusing to include provisions in access agreements to accept liability for any contamination that may occur.
5. CSG companies in Australia are under-insured and do not have adequate insurance to cover the types of risks that CSG activities bring in relation to livestock.
6. Some graziers have reported that insurers have examined the risk to them of CSG contamination and found it too high to offer insurance.

Notably, a report by the Rural Industries Research and Development Corporation cites a case study in Qld where a beef producer was advised by their supply chain partners that they would be liable for any contamination caused by CSG activities. Neither the CSG company nor the insurer would agree to indemnify the landholder against that risk.

Legal advice received by the landholder was that the Conduct and Compensation Agreement on offer from the CSG company only provided indemnity to a shelf company and that the agreement waived future compensation rights. Any compensation for a contamination event would need to be pursued through the Courts.

Many beef producers in Qld have undoubtedly been forced into access agreements without any understanding of the potential impacts to them in the event of contamination, and without any indemnity being provided by the company.

The issues which will need to be addressed include -

- CSG companies only providing indemnity to shelf companies
- CSG companies only offering agreements that waive future compensation rights
- Insurers refusing to indemnify landholders against contamination risk
- Livestock producers retaining full liability for any contamination caused by CSG companies

Queensland

For some direct voices from the Qld gasfields, you can watch several short videos here. These are provided for private viewing only at this point, and are not for further distribution. More will be uploaded over the coming weeks. If you would like to refer to these in any public way, please make contact with Carmel (0400 521474) and we can discuss how best to do that.

To get advice on how CSG is being experienced on the ground in Queensland, we recommend you contact PHD student Anna Phelan, at the Queensland University of Technology. Her contacts are 0433 960500 and anna.phelan@qut.edu.au. We understand she has surveyed approx 400 landholders.

We also recommend Lestar Manning from P&E Lawyers. They have represented numerous landholders in their dealings with gas companies, and have a good understanding of the issues. Their contacts are 07 54790155 or email reception@paelaw.com. Similarly, George Houen is a paralegal who has represented many landholders in their dealings with gas companies. He can be contacted on 07 46321024. In addition, Peter Shannon from Shine Lawyers is also likely to be able to provide a solid overview of landholder experience and the weaknesses in regulation in Qld.

Best practice

We would like the review to acknowledge and outline how NSW is not currently meeting the basic leading practices set out in COAG's 2013 *National Harmonised Regulatory Framework for Natural Gas from Coal Seams.* Likewise, there are standards established South Australia that are more stringent than New South Wales, and practises being adopted after the fact in the United States and in other countries that are a higher standard than New South Wales applies. Examples include:

- From January next year, the United States EPA will impose a ban on flaring from unconventional gasfields, except in the case of emergencies. Flaring is a major source of harmful toxic and carcinogenic pollutants from coal seam gas
- The COAG framework requires comprehensive environmental impact assessment, including rigorous chemical, health and safety and water risk assessments. The current NSW REF and Codes of Practice processes touch on these matters but are far from a comprehensive assessment and are neither transparent nor rigourous. Fracking of four wells in Gloucester has been approved to begin without an Environmental Impact Statement, despite serious concerns over the volatile geology of the area and no health assessment is currently required at all for coal seam gas projects.
- South Australia requires the consent of landholders for activities on their land.
- France and Bulgaria have both banned hydraulic fracturing, as have some jurisdictions in the United States.

In addition, for many of the practices already recommended by the review, the public cannot easily find information about whether these are in place in New South Wales. We would like the final report to clearly outline in a table the practices already recommended, the current approach in New South Wales, and the best practice adopted in other Australian jurisdictions or overseas.

Other Forms of Unconventional Gas

We recognise that the Chief Scientist was asked to review CSG only, and that the scope did not cover other forms of unconventional gas. However, the tight gas drilling at the Rosella well at Bentley in northern NSW revealed a set of major loopholes around other unconventional gas drilling, leading to a very poor regulatory outcome. For example, the recent government policies that have been introduced to address CSG mining that did not apply to the tight gas drilling at Bentley include:

- *Code of Practice for Coal Seam Gas Well Integrity 2012*
- *Protection of the Environment Operations Amendment (Scheduled Activities) Regulation 2013*
- CSG Exclusion Zones in the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007
- *Code of Practice for Coal Seam Gas Fracture Stimulation 2012*
- *Gateway process in the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2007*
- *Federal water trigger contained in the Environment Protection and Biodiversity Conservation Amendment Act 2013*

Notably, the CSG company in question at Bentley even went so far as to repeatedly claim that the tight gas drilling it was conducting at Bentley was 'conventional', and, on close inspection, it is apparent there is nothing in NSW regulation to distinguish between conventional and unconventional gas sources. We recommend that there should be regulatory consistency, and that the final report by the Chief Scientist should ensure that regulations for all forms of unconventional gas drilling are harmonised, and that there are clear definitions of what constitutes unconventional gas mining. See Attachment 3 for a summary of the regulatory issues surrounding tight gas drilling at Bentley.

Attachment 1 - Pilliga Water Storage Leak, Timeline:

January 2011 - Local resident first lodges a complaint about holes in the liner at Pond 2, Bibblewindi Water Treatment Plant[1]

28th October 2011 - Northern Inland Council for the Environment makes a complaint re Bibblewindi WTP and dead vegetation[2]

Late December 2011/Early 2012 - Multiple complaints from local landholders to Santos and the NSW Govt re problems with ponds, liners at Bibblewindi WTP

18th May 2012 - EPA receives letter from Santos re concerns about pond liner integrity[3]

May 2012 - An electrical survey of the liner of Pond 3 by Santos reveals *'a direct connection between the saline water in the pond and the sub grade beneath the liner*[4]'.

February 2013 - Bores adjoining the Bibblewindi WTP sampled by Santos[5]

March 26th 2013 - EPA informed by Santos about water sampling results[6]

March 18th 2014 - EPA puts a notification on its website that Santos have been fined $1,500 for water pollution

[1] The Truth Spills Out, A Case Study of Coal Seam Gas Mining in the Pilliga
[2] The Truth Spills Out, A Case Study of Coal Seam Gas Mining in the Pilliga
[3] Page 7, EPA Investigation Report
[4] Page 7, EPA Investigation Report
[5] Page 1, EPA Investigation Report
[6] Page 1, EPA Investigation Report

Attachment 2: Key Points from the EPA Investigation Report into Bibblewindi Leaking Water Storage

1. **There has been pollution of not one, but two, groundwater aquifers.**

   'Pollution of two groundwater aquifers (shallow and deep) as a result of leaking ponds at the Bibblewindi Water Treatment Facility...'[7] The shallow aquifer is located at approximately 20m depth and the deep aquifer at approximately 35m depth[8]

2. **Santos have added extra wastewater to Pond 3 since they took over the project, and it is still in use as storage for highly contaminated water.**

   "The only addition of water to Pond 3 has been the transfer of water from Ponds 1 and 2, to allow decommissioning of these ponds, and small additions from the shut in wells that is necessary to keep the pressure down in these wells."[9]

3. **The salt levels in Pond 3 are similar to seawater[10], and the shallow aquifer is now almost as saline as the Pond as a result of the contamination.**

   The Table on page 3, shows a recorded level of Total Dissolved Solids (TDS) at Bore 12 S of 22,900 mg/L. Page 3 states that TDS levels in Pond 3 have been recorded at 30,044 mg/L.

4. **The EPA did not conduct any of its own testing but relied solely on information commissioned and provided by the company under investigation - Santos.**

   On page 9, under subtitles 'Pollutes' and 'Cause or Permit', EPA lists the evidence relied upon, and refers only to information provided by Santos or consultants to Santos.

5. **There are *'four registered groundwater bores that are located within 5km of the site'*[11].**

6. **The trial attempt by Santos at so-called 'remediation' by pumping out the aquifer failed, confirming that there is no sure method to address the contamination.**

   "*The results of the trial concluded that recovering the perched water by abstraction in the surrounding shallow perched bores is impractical*"[12].

7. **The NSW Office of Water do not seem to have been given full access to the Technical Report to properly review the risks, despite requesting a copy.**

   At a meeting between the NSW Office of Water and the EPA about water seepage rates, NOW noted in relation to the 'hydrological definition study' that it *'would need to fully review the documents to be able to provide a full report*', but *'As the report was obtained under Notice, the EPA cannot forward this report on*'[13].

8. ***"Vegetation communities surrounding Pond 3 are likely to utilise the shallow alluvial groundwater."*[14]**

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[7] Page 1, Under section titled 'Allegation'
[8] Page 3, Under section titled 'Issue 1 - Elevated EC and TDS Issues'
[9] Page 5, Third paragraph
[10] TDS of seawater is approximately 35,000 mg/L http://www.salinitymanagement.org/Salinity%20Management%20Guide/ls/ls_3d.html
[11] Page 5, Under section titled 'Health and Community Concerns'
[12] Page 9, second last dot point
[13] Page 5, under section titled 'Information about the groundwater aquifers'.
[14] Page 8, Under section titled 'Vegetation concerns'

ATTACHMENT 3: REGULATORY LOOPHOLES AND MISINFORMATION RELATING TO TIGHT GAS DRILLING AT BENTLEY

Summary

- Metgasco have misrepresented the drilling planned at Bentley, obtaining an approval for conventional drilling, when it is in fact unconventional tight sands gas that is being sought.
- The last tight sands well drilled by Metgasco in the region, the Kingfisher well, is currently under investigation after a high risk incident and well integrity failure.
- The new measures to regulate CSG drilling do not apply to tight gas drilling, which is caught by a regulatory loophole that results in very weak environmental protections.

Tight Gas Extraction

- Tight gas (or tight sands gas) is a form of unconventional gas similar to CSG where unconventional techniques, and large numbers of wells, are required to extract commercial quantities of gas. Tight gas is found in low permeability sandstone rocks.
- Tight gas drilling can have additional environmental risks and impacts compared to CSG - it always requires some form of stimulation such as hydraulic fracturing. It can also involve other risky techniques such as acidation, and generally requires far greater quantities of water, proppants and chemicals in hydro-fracking processes than CSG.
- Tight gas drilling is relatively untested in NSW - we understand there has only ever been one other tight gas well drilled in NSW, the Metgasco Kingfisher E01 well, near Casino.

Northern Rivers Tight Gas Reserves

- Industry documents and Metgasco themselves have indicated that they expect the majority of sandstone rock strata in the Northern Rivers to be tight gas requiring stimulation.
- According to Bailleiu Research *"Early indications are that the sandstone reservoirs of the Clarence-Moreton are relatively tight – permeability and porosity of some or most reservoirs may need some form of stimulation to achieve commercial flow rates"*[15]
- According to the Metgasco Chairman *"Given the fact that there's a geological reality in this region that the rocks are pretty tight and not very permeable, it is possible the only way economic production can be gained from what looks like a very vast gas resource is that some level of hydraulic fracturing is carried out*[16]*."*

Kingfisher E01 Well Blowout Investigation

- The last tight gas well drilled by Metgasco is currently under investigation following a high risk incident where 200 m of steel drill pipe was forcibly ejected into the air during decommissioning.
- As this briefing note will show, the Kingfisher well targeted the same tight gas formations that will be targeted at Bentley, and it was fracked in 2010.
- The Kingfisher well also experienced serious integrity problems that appear to have been ignored during its operation. According to the Mines Safety Unit "*Loss of integrity in the well meant that gas under pressure could migrate between the inside and outside of the casing. This had been known during the operating life of the well."*

Rosella E01 Approval at Bentley

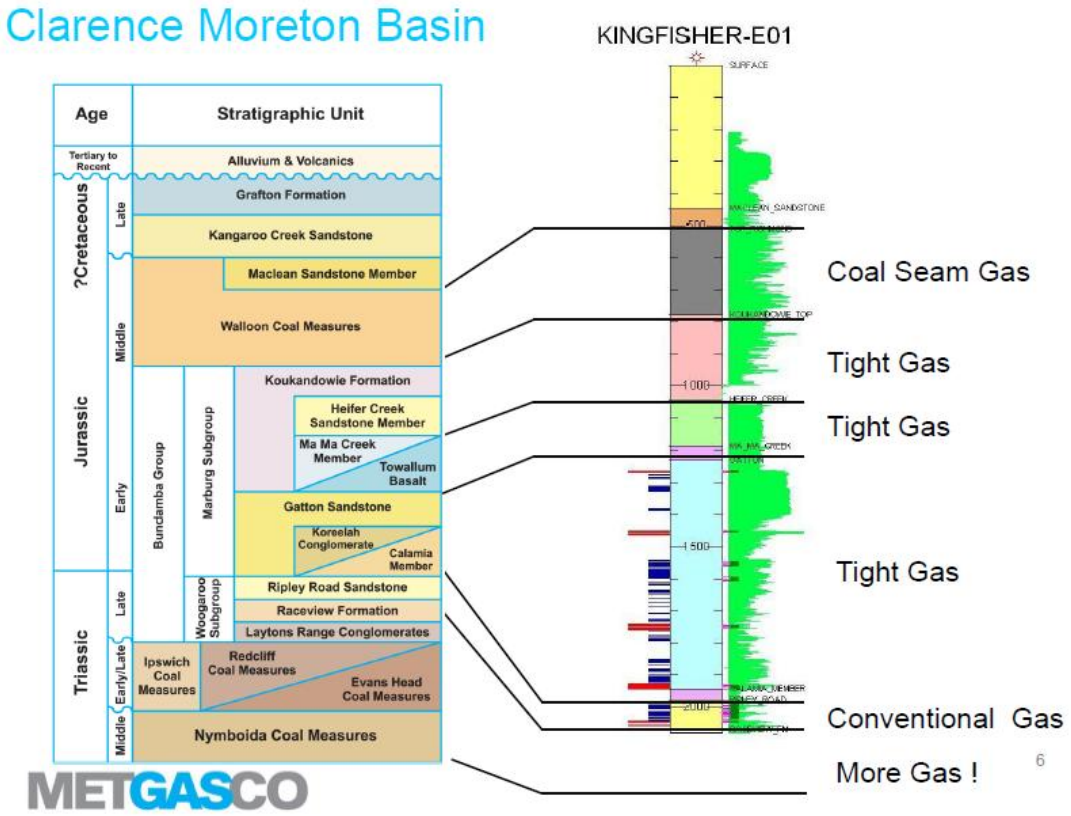
- The REF, dated March 2013, obtained by Metgasco is titled 'Rosella E01, Conventional Gas Exploration Well'. The activity type is listed as 'Conventional Gas Exploration Well'.

[15] Bailleau Research, Stockbroking Report on Metgasco Ltd, June 2011.
[16] ABC Radio Interview, 2/10/2013

- There is no mention anywhere in the REF of tight gas, tight sands gas, unconventional gas or the potential for future hydraulic fracturing or stimulation to obtain that gas.
- The REF describes the 'primary objective' of the drilling as the Ripley Road Sandstone, and the shallower Gatton Sandstone and Laytons Range Conglomerates as secondary objectives.
- It does not mention anywhere that the Gatton Sandstone and Laytons Range Conglomerates are unconventional tight gas resources that are likely to require stimulation.

Previous Metgasco Characterisation of the Tight Gas Resource

- The following schematic provides a profile view of the Clarence Moreton Basin produced by Metgasco to depict gas reserves at the Kingfisher well.
- It reveals the large number of strata that qualify as tight gas reserves, including the Gatton Sandstone. In comparison, the possible 'conventional' gas reserve, is present only in a single strata, the Ripley Road Sandstone[17].



Evidence that Rosella is Targeting Tight Gas

- In a release to the ASX in April 2014, Metgasco admit that *'The Rosella E01 well will test the commercially high risk conventional and tight gas potential of the larger Greater Mackellar structure and follows the discovery of gas in sands in the Kingfisher E01 well in 2009'*[18].
- In a release to the ASX from October 2013, Metgasco admit that the potential mean volume of gas in place in the tight gas-bearing Gatton Sandstone at the Rosella well is twice as much as it is in the Ripley Road Sandstone. They state that *'the prospect.....hold a potential mean volume of 1,304 BCF of gas in place, comprising an estimated 456 BCF in the Ripley Road sandstone and 848 BCF in the Gatton Sandstone*'.
- They admit the Gatton sandstone is *'low permeability*' (ie tight gas) and *' in the event that it is later determined that hydraulic fracturing has the potential to increase the economic potential of the well, provision will be made for later well re-entry and fracture stimulation*'.

[17] Metgasco Presentation to Rodman & Renshaw Conference, September 2010
[18] http://www.asx.com.au/asxpdf/20140408/pdf/42nwf2swby6sss.pdf

- In February 2014, the Office of Coal Seam Gas confirmed that the targeted resource is indeed 'tight sands' gas: *'The REF characterises the proposed Rosella E01 well as a conventional gas exploration activity, as it is not targeting coal seams. However the Office of Coal Seam Gas notes that the structure being targeted is a tight sands formation and any gas extraction from this structure would likely be by unconventional means'*[19].
- However, the OCSG failed to act on this insight, and did not require Metgasco to revise the REF to ensure that it was accurate prior to approval.

False and Misleading Information

- It is an offence under s283 of the NSW Environmental Planning and Assessment Regulation 2000 for a person to make *'any statement, knowing it to be false or misleading in an important respect, in or in connection with any document lodged with the Director General or a consent authority.....*'
- We contend that Metgasco have deliberately misled the NSW Government on this matter, given that their later ASX statements contradict so starkly the REF on which they have obtained the approval and based on the conclusion reached by the Department.

Regulatory loopholes

- There is a regulatory loophole surrounding tight gas drilling, which means that it is currently very poorly understood and poorly regulated.
- Over the last 2 years, there have been a number of new laws and regulations introduced to better regulate CSG drilling. However, none of these apply to tight gas drilling, which given it is 'unconventional', comes with many of the same risks as unconventional CSG drilling.
- Measures that do not apply to the Rosella well, include:
    - *Code of Practice for Coal Seam Gas Well Integrity 2012*
    - *Protection of the Environment Operations Amendment (Scheduled Activities) Regulation 2013*
    - CSG Exclusion Zones in the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007
    - *Code of Practice for Coal Seam Gas Fracture Stimulation 2012*
    - *Gateway process in the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2007*
    - *Independent Review of CSG Activities in NSW, by the NSW Chief Scientist*
    - *Federal water trigger contained in the Environment Protection and Biodiversity Conservation Amendment Act 2013*

Metgasco's History of Gas Exploration

- In addition to the Kingfisher well blowout, there have been numerous other environmental failures by Metgasco with past CSG drilling activities.
- These include - Torn liners in drilling waste ponds; Operating holding ponds without a current development consent; Failure to comply with government directives to provide details of water management practices; Dumping CSG wastewater into the local sewage treatment works without proper approvals.

[19] Department of Trade & Investment, Assessment Report: Reasons for Decision, PEL 16, Metgasco Rosella Conventional Gas Exploration Well

Attachment 4: Summary status of Recommendations so far

Chief scientists' recommendations	Current situation	Lock the Gate input
Establish a regime for extraction of coal seam gas that is world class, including: • an insistence on **industry best practice at all stages of CSG extraction**, • rigorous, high-level monitoring and stringent compliance inspections; **hefty penalties for licences breaches, including possible licence revocation** • having a fair system for managing land access and compensation for those whose land is affected • adjusting on a regular basis industry levies, bonds and insurance to make sure all financial costs of overseeing the State's coal seam gas system and maintaining infrastructure are covered, as are all contingencies and making sure industry understands that fees can be adjusted at annual notice.[20]	There are several Australian best-practice guidelines or examples that are not being followed here, particularly regarding transparency, disclosure, assessment and land holder access (see right) AGL have repeated breached their licence conditions in Camden but have recieved small fines in some instances and in the latest, an enforceable undertaking. The current land access system is not fair and needs urgent reform. There is no systematic approach to levies and bonds to ensure that mining impacts are cleaned up and impacted people are compensated.	The COAG SCER harmonised framework for CSG proposed adoption of "leading practices" which are not in place in NSW. These include comprehensive environmental impact assessment, rigorous chemical, health and safety and water risk assessments; baseline and ongoing monitoring for all vulnerable water resources; geological assessment as part of well development and hydraulic fracturing planning processes;[21] The current REF and Codes of Practice touch on geology, risk, health and chemicals, but these do not constitute "assessment" in our view. The South Australian best practice framework for unconventional gas includes "Potentially affected people and organisations can object to land access" The regulator can prevent and stop operations, require restitution or rehabilitation, levy fines and cancel licences; and industry compliance records are made public, so the efficacy of regulation is transparent Other examples of best practice globally that are not in place in NSW include: a ban on flaring except in emergencies (coming into force in the US in January 2015): a blanket ban on fracking (France, Bulgaria) a ban on fracking in water preserves (Germany); full disclosure of chemicals. A best practice paper prepared in Queensland lists "secure community consent" among best practices for coal seam gas[22]
Developing a system within government to assess cumulative impacts of multiple industries operating in sensitive environments.[23]	There is no system for this in NSW.	This is needed upfront, not along the way. In Broke, Denman and Gloucester this is particularly needed.
Commission the design and establishment of an open whole-of-environment data repository for all	There is no central, comprehensive, spatially-enabled, open, whole-of-	This is needed upfront, not after the activities are already commenced to inform communities and foster

[20] Initial report.
[21] COAG Harmonised Framework for CSG 2013.
[22] Paper on best practice CSG for Queensland: http://www.law.uq.edu.au/documents/cimel/Regulatory-Best-Practice-for-Coal-Seam-Gas-in-Queensland-Briefing-Paper.pdf
[23] Initial report.

State environment data – including all data collected according to legislative and regulatory requirements[24] associated with water management, gas extraction, mining, manufacturing, and chemical processing activities.	environment data repository	engagement.
A **pre-major-CSG** whole-of-State subsidence baseline be calculated using appropriate remote sensing data going back, say, 15 years. And that, from 2013 onwards, an annual whole-of-State subsidence map be produced so that the State's patterns can be traced for the purpose of understanding and addressing any significant cumulative subsidence.[25]	This is not in place	Major CSG is approved for Gloucester, operating in Camden and seeking approval in the Pilliga. The final report must insist that data and assessment of this nature occurs upfront – we are years behind already.
All coal seam gas industry personnel including subcontractors working in operational roles be subject to mandatory training and certification requirements and that these mandatory training and certification requirements be included in the codes of practice relevant to CSG.[26]		Suggest the CSG review include information for the public about the status of these practices in New South Wales.
Strengthen industry insurance requirements to guard against possible environmental damage from CSG activities, including examine the potential adoption of a three-layered policy of security deposits, enhanced insurance coverage and an environmental rehabilitation fund to address unforeseen or long-term environmental impacts and remediation.[27]	This is not in place.	A rehabilitation fund is crucially needed for both coal and coal seam gas. A recent audit in Queensland showed the Government faced huge liability for clean-up bills from mines. Extensive buy-outs were recently necessary in the Tara estates in Qld after chronic health problems. Explosions and other incidents are known to occur at unconventional gas wells. In the coal industry, we are aware of mines continuing on “care and maintenance” to avoid having to initiate rehabilitation activities.
Collect data in a central repository and have frequent review of data regionally or across sedimentary basins by an expert committee.[28]	Unknown but unlikely to be occurring.	
Companies or organisations seeking to mine, extract CSG or irrigate as part of their initial and ongoing approvals processes should, in concert with the appropriate regulator, identify impacts to water resources, their pathways, their consequence and their likelihood,	Will likely argue that this occurs, but it does not.	Baseline means before the activities start. With activities underway, approved and being planned, this intensifies the need for no-go zones.

[24] Initial report.
[25] Initial report.
[26] Initial report.
[27] Insurance and risk report. May 2014.
[28] Groundwater monitoring report. June 2014.

as well as the **baseline conditions before activities start.** [29]		
Commission formal characterisation of the groundwater of New South Wales.[30]	This has recently been announced for just three Basins: Gunnedah, Gloucester and Clarence-Moreton. It is not being done in the Sydney Basin and Hunter Valley, where impacts and activities are already advanced.	It is crucial that this occur prior to any further approvals, and that it include the Great Artesian Basin and the Sydney Basin.
Construct and maintain a variety of models of each region that address cumulative impacts and that are fed into the planning and approvals process.[31]	Groundwater modelling recent announced, but only for some regions.	Other cumulative impact models, particularly air emissions, are needed.
Establish an expertise-based, independent statutory authority such as a NSW Water Resources Impacts Commission that can bring together regulatory and technical oversight, research and development ability, and the necessary information and communication technology prowess.[32]	Not occurring.	This would be welcome, but we strongly maintain that there should be no go areas established for important water resources (drinking water catchments, productive aquifers, GAB recharge) and that the management of impacts occur outside these protection zones.
Whole-of-catchment data repository and monitoring system, commissioning of "computational models" to assess the impacts of mining on quantity and quality of water in Sydney's catchment, and convening an "expert group" to "advise" on cumulative impacts of same.[33]	No occurring.	The report did not recommend existing activities be halted, but was silent on the mines currently proposed, more than one of which is contrary to recommendations by the Sydney Catchment Authority.

[29] Groundwater monitoring report. June 2014.
[30] Groundwater monitoring report. June 2014.
[31] Groundwater monitoring report. June 2014.
[32] Groundwater monitoring report. June 2014.
[33] Catchment report. May 2014.