



**HP TRIM Document or Email : Z13/69174 : ESP - Environmental Assessment and Protection - Health - Letter and Submission to NSW Chief Scientist & Engineer Professor Mary O 'Kane regarding the CSG .**

**Sue Allport** to: 'csg.review@chiefscientist.nsw.gov.au'

26/04/2013 10:28 AM

History: This message has been replied to and forwarded.

Good morning Professor Mary O'Kane

Please find attached, a letter and copy of Wollongong City Council's paper prepared on Coal Seam Gas which we would like included as a submission to your review. The issues identified in the paper have not been adequately addressed in the measures announced to date to regulate the Coal Seam Gas industry and should be reconsidered in your review.

Please contact Renee Campbell, Manager Environment Strategy & Planning on 4227 7331 should you require any further information.

Kind regards  
Sue Allport

| Personal Assistant [Acting] to Manager Environment Strategy & Planning

Environment Strategy & Planning Division | Wollongong City Council

41 Burelli Street | Wollongong | NSW | 2500

| p (02) 4227 7321 | e sallport@wollongong.nsw.gov.au |

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ESP - ~ Letter and Submission to NSW Chief Scientist & Engineer Professor Mary O Kane regarding the CSG.DOC

Professor Mary O’Kane  
NSW Chief Scientist & Engineer  
Office of the NSW Chief Scientist & Engineer  
E: csg.review@chiefscientist.nsw.gov.au

Our Ref: Z13/69174  
File: ESP-070.02.003  
Date: 15 April 2013

Dear Professor O’Kane

## **COAL SEAM GAS**

Wollongong City Council was pleased to hear that the NSW Premier Barry O’Farrell has requested the Chief Scientist and Engineer to conduct an independent review of coal seam gas activities in NSW with a focus on the impacts of these activities on human health and the environment.

Council has previously prepared a paper on Coal Seam Gas which was submitted to the Parliamentary Inquiry conducted by the General Purpose Standing Committee No. 5 in 2011.

Please find attached a copy of this paper, which we would like included as a submission to your review. The issues identified in the paper have not been adequately addressed in the measures announced to date to regulate the Coal Seam Gas industry and should be reconsidered in your review.

Please contact Renee Campbell, Manager Environment Strategy and Planning on 4227 7331 should you require any further information.

**Yours faithfully**

**David Farmer**  
**General Manager**  
Wollongong City Council

## **NSW General Purpose Standing Committee No. 5**

### **Inquiry into Coal Seam Gas**

#### **Submission by Wollongong City Council**

#### **Summary**

The imminence of coal seam gas (CSG) activities starting in Wollongong is causing much community concern. Wollongong City Council has responded to this concern by declaring its position on CSG, which acknowledges that there is much uncertainty about the environmental impacts of CSG activities at the State-wide or regional level. This submission articulates the basis for this position, addressing the Terms of Reference of the CSG Inquiry that are relevant. A series of questions that the Inquiry needs to address are raised and some recommendations made. Council is also calling for the NSW Government to exercise the Precautionary Principle, and rule out CSG activities in the water catchment areas in the City of Wollongong.

#### **Introduction**

The adverse impacts potentially arising from the exploration and mining of CSG have become a major issue for the community in recent years. Wollongong City Council is concerned that CSG activities in New South Wales could be allowed to intensify, without any meaningful effort being made to resolve the community's concerns. It therefore welcomes this inquiry and hopes that it will lead to changes within the CSG industry that can provide economic growth and opportunity for the State, but not at the expense of environmental sustainability.

Council is making this submission because it is directly affected by CSG activities. Petroleum Exploration Licences allowing CSG activities exist over its entire local government area. In 2009, the State Government approved a proposal for 15 exploration boreholes in an area of significant environmental value in the north of the Wollongong Local Government Area (LGA), which includes parts of a drinking water catchment. An application is currently with the State for another borehole to be added to this approval. There has been significant opposition to this proposal from the local community.

Council has taken action to address the community's concern on this matter. This includes declaring its position on CSG, and making a decision to provide a submission to the CSG Inquiry stating its position, and to approach other neighbouring councils to commit to a similar position. Council resolutions demonstrating its position on CSG are:

*"Council expresses its concerns that the short-term and long-term environmental impacts of Coal Seam Gas (CSG) are not well understood, at either a State-wide or regional level."*

*"Council acknowledges there is widespread community concern about and opposition to CGS in the Illawarra."*

*"Council urges the State Government to rule out CSG activities in the water catchment areas in the City of Wollongong."*

This submission reflects the resolutions passed by Council. It consists of two parts. The first part addresses why Council believes that the short-term and long-term environmental impacts of CSG are not well understood at the State-wide or regional level, and the potential consequences of this uncertainty on the way that CSG activities are currently managed. The second part focuses specifically on issues relating to CSG activities in the water catchment areas of Wollongong, and why Council is calling for a stop to these activities.

## **Part 1: Uncertainty about the Short-term and Long-term Environmental Impacts of CSG Activities**

Council notes that most of the commentary on the potential adverse impacts of CSG activities has related to environmental issues. This is not only at the grassroots level, but also amongst those with relatively high profiles. Recently, the matter was raised by a Federal Parliamentarian, with a call for the Commonwealth to become more closely involved. The claims, and counter claims which are often made, are clear indication that the potential impacts of this industry are not well understood.

Council further notes that there is concern that even if impacts of CSG activities could be managed effectively in individual cases, the potential cumulative effect of multiple developments over the landscape scale is uncertain. A number of authoritative sources have recently cautioned that this issue has not received enough attention as the industry is being allowed to grow. Council's resolution that the short and long term environmental impacts of CSG are not well understood at the State or regional level acknowledges this concern.

Council has searched extensively for reliable, peer reviewed literature on the environmental impacts of CSG activity in Australia, or elsewhere. Very little information of this type has been found. Many anecdotal and interest group reports can be found, but much of this information cannot always be independently verified. The relevance of reports of the situation overseas, or indeed in other parts of Australia, to the potential impacts in NSW must also be questioned. The lack of credible, independent information about this industry in NSW does not help in allaying the community's concerns.

The major areas where Council believes there is uncertainty and the potential consequences of this uncertainty on the way CSG activities are managed in NSW are presented below. This is done by addressing the Inquiry's TOR's that are relevant to environmental impacts.

### Effect on Ground Water and Surface Water Systems (TOR 1 a)

Council notes that one of the biggest perceived risks of the CSG industry is the threat to water resources. In a dry continent such as Australia, water is a highly valued commodity, and any threats to this resource, perceived or otherwise, is likely to generate much anxiety. Both water quantity and quality issues are of concern.

#### *Water Quantity*

One of the major concerns is that CSG activities could deplete surface or ground water resources that could be utilised for drinking, agricultural or other purposes. Surface or ground water losses have been reported in places where CSG or other mining activities are taking place, but often there are claims that mining activities are not responsible.

Council understands that CSG extraction can occur from geological layers that are well separated from other overlying layers containing the useful water reserves, and that there needs to be a connection between them, either occurring naturally or induced through CSG activities, for impacts to occur. The level and timeframes of potential interaction between the various geological layers and their water bodies, and the role of CSG activities within this scenario, is a matter of constant debate, and one which needs to be settled.

Concern about the impacts of CSG activities on water have also recently been raised by those who have been within this industry. In the Sydney Morning Herald of 28 October 2011, for example, a hydrogeologist formerly employed by the CSG industry, questioned whether the cumulative effects of multiple projects on water resources at the regional scale, and the long timeframes over which they could occur, had been adequately considered.

CSG operations involve drilling through various overlying geological layers to penetrate the deeper CSG layer and possibly fracturing this layer to extract the gas. To an ordinary person, this appears to be an obvious means of connecting the geological layers, including those containing the useful water resources. CSG operators, however, claim to have the technology that can isolate the sensitive water bearing layers from any potential adverse impacts, but details are vague.

None of these claims and counter claims appears to have been fully resolved, leaving many questions that still need an objective answer. Some of these in relation to water quantity are:

1. For the regions of NSW where CSG activities occur or could occur, is enough known about the existing hydrogeological connectivity?
2. Will CSG activities affect the existing hydrogeological connectivities or induce additional ones where none existed?
3. What will be the impact of multiple CSG projects on water resources at the landscape or regional scale?
4. What are the timeframes over which CSG impacts can be expected to occur?

#### *Water Quality*

Impacts on water quality are noted to be another matter of concern. Large quantities of water of poor quality, known in the industry as “produced water”, can be brought to the surface through CSG activities. Some sources predict that, at the national scale, this amount could be more than half of all the water extracted from the Great Artesian Basin. The management of all this additional water will be no ordinary matter at the landscape scale.

The “produced water” will have been in close contact with coal material for long periods of time, and can be expected to contain higher concentrations of materials such as salts, heavy metals and hydrocarbons than other surface and ground water bodies. Some of these substances are of concern for human health and the environment. However, very little information is available to the public on the exact composition of water extracted through CSG activities. Therefore, the potential impacts of this water are not well understood.

How the “produced water” is managed once it is brought to the surface will also have a major bearing on its potential environmental impacts. However, there appears to be no industry standard or guidelines in Australia for the management of water produced through CSG activities. Council's own research shows the CSG industry could be using a multitude of methods. These include transport to off-site locations, evaporation on-site, treatment on-site to remove impurities, and discharge of treated water to surrounding water bodies. The impact of such practices on water quality at the landscape scale when multiple projects are involved is not well understood.

The salt content of “produced water” can also be particularly high, and the implications of this on soil and land resources are important. Soil salinity is one of the greatest challenges of land resource utilisation in Australia. The introduction of more salt into the landscape through CSG activities will add to this challenge.

Questions on CSG impacts on water quality are:

5. Is enough known about the composition of “produced water” that could result from CSG activities in NSW?
6. Can the “produced water” be managed without any adverse impacts on water quality at the landscape scale?
7. Should NSW set minimum standards for the disposal of water produced through CSG activities?
8. What is the implication of the salt produced through CSG activities on salinity issues at the landscape scale?

#### Effects related to the use of chemicals (TOR 1 b)

Council notes that much of the concern on chemicals relates to the use of chemicals in the process known as hydraulic fracturing, and the potential impact of these chemicals on water resources. While the NSW Government has banned the use of BTEX chemicals, not much is known about what else is used or might be used in CSG activities.

The legislation governing this industry does not require the chemicals used in hydraulic fracturing to be declared or approved. Therefore, other chemicals of concern could be introduced without much scrutiny. There could also be chemicals used for other processes besides hydraulic fracturing and not much is known about these either.

The concern with chemicals is not so much that they are being used per se, but more so about the context in which they might be used. CSG activities can occur in areas in close proximity to areas of significant environmental value or sensitive landuses such as drinking water supply. The approval to allow the use of some of these yet unknown chemicals can be a big risk for these land values. Approval authorities must consider whether it is prudent to take this risk.

Questions in relation to the use of chemicals are:

9. What chemicals can potentially be used in CSG activities and should their use be regulated?
10. What are the risks associated with the use of these chemicals and can these risks be adequately managed?
11. Are there sensitive areas in NSW where the use of chemicals should be completely ruled out?

#### Effects related to hydraulic fracturing (TOR 1 c)

Council understands “hydraulic fracturing” refers to the use of fluids under high pressure to fracture and create pathways for the gas to flow within the CSG layer. These fluids could contain undesirable chemicals, and the concerns relating to the use of chemicals have already been described in the previous section. An additional concern related specifically to the use of chemicals in hydraulic fracturing is uncertainty about the recovery of chemicals. Whether the chemicals are fully recovered at the end of the process or whether some are entrained underground is not known. If the latter is the case, then the ultimate fate of these entrained substances is of concern.

Fracturing has also recently been linked with land stability problems. The question must be asked by the Inquiry whether hydraulic fracturing can be allowed in NSW without the risk of land instability in the future. Many of the areas considered suitable for CSG activities also have various other coal mining operations. The combined effect of these different operations on land stability at the landscape scale must be considered.

Council understands that hydraulic fracturing is not the only process that can be used to create the pathways for the gas to flow. Alternative methods such as directional drilling may also be used in some operations. Issues relating to land instability from these alternative methods must also be considered in addition to those arising from hydraulic fracturing.

Questions under hydraulic fracturing are:

12. Is enough known about the ultimate fate of chemicals used in hydraulic fracturing?
13. What is the long term effect of hydraulic fracturing on land stability at the landscape scale, and where other mining operations are in existence?
14. What are the impacts of methods alternative to hydraulic fracturing?

#### Nature and effectiveness of remediation required under the Act (TOR 1 e)

The Petroleum (Onshore) Act 1991 No. 84 provides for some remediation of impacts under Part 6 of the Act, Protection of the Environment. However, these requirements are general, relating mostly to land restoration and revegetation of the disturbed land, and not specifically to the potential adverse impacts arising from CSG activities that have been described earlier. The requirements are therefore believed to be inadequate.

The Act also has provisions for the Minister to impose conditions on a petroleum title relating to protection of the environment. It is assumed this can include requirements relating to some remediation activities. However, Council is concerned that if the potential adverse impacts of CSG activities are not fully understood, the Minister is unlikely to be in a position to include conditions for the effective remediation of those impacts.

There is also provision under the Act for the Minister to make regulations, including those relating to environmental protection measures. But an inspection of the Petroleum (Onshore) Regulations shows that these matters are currently not adequately covered.

There are further provisions for environmental protection under the related State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007. Under section 14, the consent authority may impose conditions to ensure activities are undertaken in an environmentally responsible manner. However, the requirement is only to ensure that adverse environmental impacts are avoided or minimised to the greatest extent practicable. The inclusion of the phrase "to the greatest extent practicable" is inappropriate, as it suggests that environmental impacts considered acceptable are subject to negotiation.

Questions to be addressed include:

15. Is there sufficient recognition of all the potential adverse impacts of CSG activities in the remediation requirements of the Act?
16. What is the interpretation of the phrase "to the greatest extent practicable" in issuing consent for CSG activities by consent authorities?

#### Effect on greenhouse gas and other emissions (TOR 1 f)

The push towards CSG development appears to be given further impetus by climate change and greenhouse concerns and the search for cleaner energy sources. CSG is perceived to be a cleaner source of energy and features strongly in the mix of options being considered by the NSW Government to fuel the State's future.

While this may be true, it is unclear whether the assessment of the relative greenhouse footprints considers the whole cycle of operations associated with the CSG industry. Concerns about incomplete recovery of the methane gas released through CSG activities and fugitive emissions have been raised.

In a recent article published in the prestigious Proceedings of the National Academy of Sciences, methane concentrations in ground water wells was correlated with proximity to CSG operations, suggesting that gas leakages do occur. This is of concern, particularly as the gas wells had protection casings in place. If leakages can occur despite using the standard technology, then the contribution of the fugitive emissions to the greenhouse footprint of CSG must be considered when assessing it against alternative industries.

The energy associated with other aspects of production of CSG must be considered as well. If more stringent environmental controls (for example, the requirement to treat “produced water” to a certain high quality) are required to be met, then there can be considerable amounts of energy expended in meeting these requirements when producing CSG. These energy needs must be factored into the greenhouse footprint calculations.

Questions to be addressed are:

17. Are fugitive emissions of gas likely in CSG operations, and if so, what will be their impact on the greenhouse effect?
18. Are all the current and likely future operations associated with CSG production factored into assessing its greenhouse footprint?

Local Government including local planning control mechanisms (TOR 2e) and The interaction of the Act with other legislation and regulations (TOR 4)

These two TORs are considered together as the issues on these two matters are inter-linked.

The first issue relates to inadequate local government involvement when CSG activities are approved. The State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 allows CSG exploration activities to occur anywhere in NSW without consent. Development approval may be required but this would not be directly from local government. This would be under what used to be Part 3A (or the current substitute provisions for this part) or Part 5 of the Environmental Planning and Assessment (EPA) Act 1979. Under Part 3A (or the current substitute arrangements) development applications are considered by other relevant planning bodies, and under Part 5, the approval authority would be the NSW Govt agency administering the Petroleum (Onshore) Act 1991. These approval streams may afford local government the opportunity to comment on a proposal, but not the right of refusal.

The second issue is the lack of regard for landuse compatibility in the initial stages of CSG activities. Local Government has a wealth of knowledge on landuse constraints and demands within its local government area, and goes to considerable lengths to prepare Local Environment Plans (LEPs) to manage landuse conflicts within its jurisdiction. However, under the Petroleum (Onshore) Act 1991 and supporting legislation, there is no requirement to consider landuse compatibility when allowing CSG exploration activities in an area. This implies that landuse conflicts are not expected to arise from CSG which are limited to exploration activities, but this is not necessarily the case in every situation.

When CSG activities reach the production stage, development consent is required and consent authorities are then required to consider the compatibility of the activity with the surrounding landuse. Council is concerned that this may be too late in the process to consider landuse compatibility issues. Initial approval for exploration may create industry expectation that should exploration be found to be commercially viable, production approval is guaranteed. Council believes that landuse compatibility should be considered from the beginning exploration stage.

The interaction of the Act with EPA Act (1979) also needs review. Under the current framework, licences and leases for exploration or production are issued under the Petroleum (Onshore) Act and development approval is required under the EPA Act 1979, not always in the sequence that is best for the environment. For example, licences for initial CSG activities (including exploration and assessment) can be issued without prior development approval, where as production licences require development consent to be obtained first. Again, the issuing of licences for exploration activities without prior development approval could create an expectation that development approval will follow automatically. The Petroleum (Onshore) Act 1991 is silent on the consequences if development approval for exploration activities is refused after a licence has been issued.

Questions that need to be addressed on this matter are:

19. In light of the potential adverse impacts arising from CSG exploration activities, should they be allowed without consent?
20. Should landuse compatibility become a major consideration for all CSG activities and not only for production activities?
21. How can the licensing and development approval framework be reviewed to ensure that development approval is issued concurrently with licensing for all CSG activities, including exploration activities?

#### *Recommendations under Part 1*

*The Inquiry address Questions 1 to 21 in determining the significance of environmental impacts of CSG activities, in particular their cumulative impacts at the landscape scale.*

*In light of the potential adverse environmental impacts, the Inquiry determine whether sensitive areas should be identified in NSW where CSG activities are to be ruled out.*

*The Inquiry determine the regulatory minimum standards that should be prescribed for environmental protection in areas where CSG activities are to be permitted.*

*The legislative framework be reviewed to allow rigorous environmental assessment at all stages of CSG development and production, including exploration of activities.*

*The Inquiry consider ways to improve the community's understanding of CSG activities and impacts.*

#### **Part 2: CSG Activities in the Water Catchment Areas of Wollongong**

In September 2009, the NSW Government approved the Apex Exploration Drilling project, which allows 15 exploration boreholes in the Wollongong LGA. This is in an area of the Illawarra Escarpment, including some Sydney Catchment Authority land, which is used for the supply of drinking water. Whilst any exploration activity is yet to start, an application to add another borehole to the existing approval is currently being considered. This additional borehole is also proposed to be located in Sydney Catchment Authority land. Council acknowledges that there is widespread community concern and opposition to CSG activities in the Illawarra. Whilst all land approved or proposed for exploration activity in the Illawarra has significant environment value, Council is particularly concerned about CSG activities being approved in the water catchment areas of the city. These areas should be considered as particularly sensitive environmental areas, and for the reasons presented in the first part of this submission, the Precautionary Principle should be used to rule out CSG activities in these areas. This part of the submission explains the basis for this position.

### Significance of the Water Catchment Areas

Much of the land in Wollongong's water catchment areas that is used for drinking water supply is zoned E2 (Environment Conservation). This zoning recognises not only the valuable biodiversity of the area (some of which is protected by legislation), but also the importance of protecting the land to maintain the quality of the water supply for a significant sector of Sydney and the Illawarra population. Only a limited number of land uses are allowed in this zone, and mining or exploration activities are not permitted. However, these activities are permitted under the State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 in any area of New South Wales.

These water catchment areas are also subject to the State Environment Planning Policy (Sydney Drinking Water Catchment) 2011, which requires any proposed activity to demonstrate that it will have neutral or beneficial effect on the catchment. Even with the most stringent environmental controls, it will be hard to argue that CSG activities will have only a neutral or beneficial effect on the environment in these catchments. However, the requirements of this SEPP are overridden by the State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, which appears to take precedence.

### Extent of Community Concern on CSG activities in the Illawarra

The extent of the community concern on CSG activities starting in the Illawarra is reflected by the increase in the number of community submissions made to the NSW Planning Assessment Commission in its recent consideration of the proposal to have another borehole added to the 15 already approved. In 2009, only three submissions were made. However, this number increased to 1,045 this year, reflecting the level of concern currently felt by the community.

There have been other activities that demonstrate the level of community anxiety with CSG activities in the Illawarra. These include a protest gathering on Austinmer Beach on 29 May 2011, and a march along the Sea Cliff Bridge on 16 October 2011, which attracted about 3000 participants. Council also received a petition from the local community opposing CSG activities in the Wollongong LGA, which Council has forwarded to the NSW Premier.

### Some Specific Issues of CSG activities in Water Catchment Areas

In addition to the concerns raised generally in the first part of this submission, Council is concerned that there is no specific recognition of the sensitivity of drinking water catchment areas in issuing licences for CSG activity. The Petroleum (Onshore) Act 1991 does not contain any references to water catchment areas, with the only mention of this issue appearing in the SEPP (Mining, Petroleum Production and Extractive Industries) 2007. Under Section 14 of this SEPP, consent authorities may issue conditions to ensure that impacts on water resources are avoided or minimised to the greatest extent practicable. However, this requirement is not invoked if consent is not required, as would be the case for CSG exploration activities. If consent is required, then again the use of the phrase "to the greatest practicable" suggests that some impacts can be allowed.

There is no doubt that CSG activities, even if they are only exploration activities, will involve a level of catchment disturbance that can not be argued to have only a neutral or beneficial effect on water catchments. However, the presiding SEPP (Mining, Petroleum Production and Extractive Industries) 2007 does not require neutral or beneficial effects to be demonstrated, which means that water catchment areas can be subjected to the risk of adverse impacts. This situation is not acceptable to Council.

Consideration of exploration proposals in water catchment areas in isolation from implications of further development of CSG activities in those locations is also not appropriate. This appears to be the practice currently. If there are impacts (however small or big) with exploration activities, then those impacts can surely only magnify if CSG activities intensify with commercial production. Therefore, it seems inappropriate to allow CSG exploration in drinking water catchment areas, when commercial production is unlikely to be approved.

In view of the concerns raised, Council urges the NSW Government to exercise the Precautionary Principle and rule out CSG activities in the water catchment areas in the City of Wollongong. Section 70 of the Petroleum (Onshore) Act 1991 has provision for certain areas to be exempted from mining activities. Council urges the Minister responsible for this Act to include drinking water catchment areas in this category.

*Recommendation under Part 2*

*The Precautionary Principle be exercised in ruling out CSG activities in the drinking water catchment areas in the City of Wollongong.*

**Conclusion**

Wollongong City Council believes the CSG Inquiry is timely given the level of community concern with this industry, and appreciates the opportunity to make this submission. Council has raised a series of 21 questions for the Inquiry in relation to concern about CSG activities in general. Some recommendations on how the issues raised may be managed are made. In regard to the drinking water catchments of the city, Council is urging the exercise of the Precautionary Principle and the ruling out of all CSG activities in these areas.



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Health - Letter and Submission to NSW Chief Scientist & Engineer  
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**Sue Allport** to: 'csg.review@chiefscientist.nsw.gov.au'

26/04/2013 10:47 AM

History: This message has been forwarded.

Good Morning Professor O'Kane

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Many thanks

Sue

Kind regards  
Sue Allport

|Personal Assistant [Acting] to Manager Environment Strategy & Planning  
Environment Strategy & Planning Division | Wollongong City Council  
41 Burelli Street |Wollongong | NSW |2500  
| p (02) 4227 7321 | e sallport@wollongong.nsw.gov.au|

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Professor Mary O'Kane  
NSW Chief Scientist & Engineer  
Office of the NSW Chief Scientist & Engineer  
E: csg.review@chiefscientist.nsw.gov.au

**Our Ref:**  
**File:**  
**Date:**

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**Yours faithfully**



**David Farmer**  
**General Manager**  
Wollongong City Council

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#### **Submission by Wollongong City Council**

#### **Summary**

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This submission reflects the resolutions passed by Council. It consists of two parts. The first part addresses why Council believes that the short-term and long-term environmental impacts of CSG are not well understood at the State-wide or regional level, and the potential consequences of this uncertainty on the way that CSG activities are currently managed. The second part focuses specifically on issues relating to CSG activities in the water catchment areas of Wollongong, and why Council is calling for a stop to these activities.

## **Part 1: Uncertainty about the Short-term and Long-term Environmental Impacts of CSG Activities**

Council notes that most of the commentary on the potential adverse impacts of CSG activities has related to environmental issues. This is not only at the grassroots level, but also amongst those with relatively high profiles. Recently, the matter was raised by a Federal Parliamentarian, with a call for the Commonwealth to become more closely involved. The claims, and counter claims which are often made, are clear indication that the potential impacts of this industry are not well understood.

Council further notes that there is concern that even if impacts of CSG activities could be managed effectively in individual cases, the potential cumulative effect of multiple developments over the landscape scale is uncertain. A number of authoritative sources have recently cautioned that this issue has not received enough attention as the industry is being allowed to grow. Council's resolution that the short and long term environmental impacts of CSG are not well understood at the State or regional level acknowledges this concern.

Council has searched extensively for reliable, peer reviewed literature on the environmental impacts of CSG activity in Australia, or elsewhere. Very little information of this type has been found. Many anecdotal and interest group reports can be found, but much of this information cannot always be independently verified. The relevance of reports of the situation overseas, or indeed in other parts of Australia, to the potential impacts in NSW must also be questioned. The lack of credible, independent information about this industry in NSW does not help in allaying the community's concerns.

The major areas where Council believes there is uncertainty and the potential consequences of this uncertainty on the way CSG activities are managed in NSW are presented below. This is done by addressing the Inquiry's TOR's that are relevant to environmental impacts.

### Effect on Ground Water and Surface Water Systems (TOR 1 a)

Council notes that one of the biggest perceived risks of the CSG industry is the threat to water resources. In a dry continent such as Australia, water is a highly valued commodity, and any threats to this resource, perceived or otherwise, is likely to generate much anxiety. Both water quantity and quality issues are of concern.

#### *Water Quantity*

One of the major concerns is that CSG activities could deplete surface or ground water resources that could be utilised for drinking, agricultural or other purposes. Surface or ground water losses have been reported in places where CSG or other mining activities are taking place, but often there are claims that mining activities are not responsible.

Council understands that CSG extraction can occur from geological layers that are well separated from other overlying layers containing the useful water reserves, and that there needs to be a connection between them, either occurring naturally or induced through CSG activities, for impacts to occur. The level and timeframes of potential interaction between the various geological layers and their water bodies, and the role of CSG activities within this scenario, is a matter of constant debate, and one which needs to be settled.

Concern about the impacts of CSG activities on water have also recently been raised by those who have been within this industry. In the Sydney Morning Herald of 28 October 2011, for example, a hydrogeologist formerly employed by the CSG industry, questioned whether the cumulative effects of multiple projects on water resources at the regional scale, and the long timeframes over which they could occur, had been adequately considered.

CSG operations involve drilling through various overlying geological layers to penetrate the deeper CSG layer and possibly fracturing this layer to extract the gas. To an ordinary person, this appears to be an obvious means of connecting the geological layers, including those containing the useful water resources. CSG operators, however, claim to have the technology that can isolate the sensitive water bearing layers from any potential adverse impacts, but details are vague.

None of these claims and counter claims appears to have been fully resolved, leaving many questions that still need an objective answer. Some of these in relation to water quantity are:

1. For the regions of NSW where CSG activities occur or could occur, is enough known about the existing hydrogeological connectivity?
2. Will CSG activities affect the existing hydrogeological connectivities or induce additional ones where none existed?
3. What will be the impact of multiple CSG projects on water resources at the landscape or regional scale?
4. What are the timeframes over which CSG impacts can be expected to occur?

#### *Water Quality*

Impacts on water quality are noted to be another matter of concern. Large quantities of water of poor quality, known in the industry as “produced water”, can be brought to the surface through CSG activities. Some sources predict that, at the national scale, this amount could be more than half of all the water extracted from the Great Artesian Basin. The management of all this additional water will be no ordinary matter at the landscape scale.

The “produced water” will have been in close contact with coal material for long periods of time, and can be expected to contain higher concentrations of materials such as salts, heavy metals and hydrocarbons than other surface and ground water bodies. Some of these substances are of concern for human health and the environment. However, very little information is available to the public on the exact composition of water extracted through CSG activities. Therefore, the potential impacts of this water are not well understood.

How the “produced water” is managed once it is brought to the surface will also have a major bearing on its potential environmental impacts. However, there appears to be no industry standard or guidelines in Australia for the management of water produced through CSG activities. Council's own research shows the CSG industry could be using a multitude of methods. These include transport to off-site locations, evaporation on-site, treatment on-site to remove impurities, and discharge of treated water to surrounding water bodies. The impact of such practices on water quality at the landscape scale when multiple projects are involved is not well understood.

The salt content of “produced water” can also be particularly high, and the implications of this on soil and land resources are important. Soil salinity is one of the greatest challenges of land resource utilisation in Australia. The introduction of more salt into the landscape through CSG activities will add to this challenge.

Questions on CSG impacts on water quality are:

5. Is enough known about the composition of “produced water” that could result from CSG activities in NSW?
6. Can the “produced water” be managed without any adverse impacts on water quality at the landscape scale?
7. Should NSW set minimum standards for the disposal of water produced through CSG activities?
8. What is the implication of the salt produced through CSG activities on salinity issues at the landscape scale?

Effects related to the use of chemicals (TOR 1 b)

Council notes that much of the concern on chemicals relates to the use of chemicals in the process known as hydraulic fracturing, and the potential impact of these chemicals on water resources. While the NSW Government has banned the use of BTEX chemicals, not much is known about what else is used or might be used in CSG activities.

The legislation governing this industry does not require the chemicals used in hydraulic fracturing to be declared or approved. Therefore, other chemicals of concern could be introduced without much scrutiny. There could also be chemicals used for other processes besides hydraulic fracturing and not much is known about these either.

The concern with chemicals is not so much that they are being used per se, but more so about the context in which they might be used. CSG activities can occur in areas in close proximity to areas of significant environmental value or sensitive landuses such as drinking water supply. The approval to allow the use of some of these yet unknown chemicals can be a big risk for these land values. Approval authorities must consider whether it is prudent to take this risk.

Questions in relation to the use of chemicals are:

9. What chemicals can potentially be used in CSG activities and should their use be regulated?
10. What are the risks associated with the use of these chemicals and can these risks be adequately managed?
11. Are there sensitive areas in NSW where the use of chemicals should be completely ruled out?

Effects related to hydraulic fracturing (TOR 1 c)

Council understands “hydraulic fracturing” refers to the use of fluids under high pressure to fracture and create pathways for the gas to flow within the CSG layer. These fluids could contain undesirable chemicals, and the concerns relating to the use of chemicals have already been described in the previous section. An additional concern related specifically to the use of chemicals in hydraulic fracturing is uncertainty about the recovery of chemicals. Whether the chemicals are fully recovered at the end of the process or whether some are entrained underground is not known. If the latter is the case, then the ultimate fate of these entrained substances is of concern.

Fracturing has also recently been linked with land stability problems. The question must be asked by the Inquiry whether hydraulic fracturing can be allowed in NSW without the risk of land instability in the future. Many of the areas considered suitable for CSG activities also have various other coal mining operations. The combined effect of these different operations on land stability at the landscape scale must be considered.

Council understands that hydraulic fracturing is not the only process that can be used to create the pathways for the gas to flow. Alternative methods such as directional drilling may also be used in some operations. Issues relating to land instability from these alternative methods must also be considered in addition to those arising from hydraulic fracturing.

Questions under hydraulic fracturing are:

12. Is enough known about the ultimate fate of chemicals used in hydraulic fracturing?
13. What is the long term effect of hydraulic fracturing on land stability at the landscape scale, and where other mining operations are in existence?
14. What are the impacts of methods alternative to hydraulic fracturing?

#### Nature and effectiveness of remediation required under the Act (TOR 1 e)

The Petroleum (Onshore) Act 1991 No. 84 provides for some remediation of impacts under Part 6 of the Act, Protection of the Environment. However, these requirements are general, relating mostly to land restoration and revegetation of the disturbed land, and not specifically to the potential adverse impacts arising from CSG activities that have been described earlier. The requirements are therefore believed to be inadequate.

The Act also has provisions for the Minister to impose conditions on a petroleum title relating to protection of the environment. It is assumed this can include requirements relating to some remediation activities. However, Council is concerned that if the potential adverse impacts of CSG activities are not fully understood, the Minister is unlikely to be in a position to include conditions for the effective remediation of those impacts.

There is also provision under the Act for the Minister to make regulations, including those relating to environmental protection measures. But an inspection of the Petroleum (Onshore) Regulations shows that these matters are currently not adequately covered.

There are further provisions for environmental protection under the related State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007. Under section 14, the consent authority may impose conditions to ensure activities are undertaken in an environmentally responsible manner. However, the requirement is only to ensure that adverse environmental impacts are avoided or minimised to the greatest extent practicable. The inclusion of the phrase "to the greatest extent practicable" is inappropriate, as it suggests that environmental impacts considered acceptable are subject to negotiation.

Questions to be addressed include:

15. Is there sufficient recognition of all the potential adverse impacts of CSG activities in the remediation requirements of the Act?
16. What is the interpretation of the phrase "to the greatest extent practicable" in issuing consent for CSG activities by consent authorities?

#### Effect on greenhouse gas and other emissions (TOR 1 f)

The push towards CSG development appears to be given further impetus by climate change and greenhouse concerns and the search for cleaner energy sources. CSG is perceived to be a cleaner source of energy and features strongly in the mix of options being considered by the NSW Government to fuel the State's future.

While this may be true, it is unclear whether the assessment of the relative greenhouse footprints considers the whole cycle of operations associated with the CSG industry. Concerns about incomplete recovery of the methane gas released through CSG activities and fugitive emissions have been raised.

In a recent article published in the prestigious Proceedings of the National Academy of Sciences, methane concentrations in ground water wells was correlated with proximity to CSG operations, suggesting that gas leakages do occur. This is of concern, particularly as the gas wells had protection casings in place. If leakages can occur despite using the standard technology, then the contribution of the fugitive emissions to the greenhouse footprint of CSG must be considered when assessing it against alternative industries.

The energy associated with other aspects of production of CSG must be considered as well. If more stringent environmental controls (for example, the requirement to treat “produced water” to a certain high quality) are required to be met, then there can be considerable amounts of energy expended in meeting these requirements when producing CSG. These energy needs must be factored into the greenhouse footprint calculations.

Questions to be addressed are:

17. Are fugitive emissions of gas likely in CSG operations, and if so, what will be their impact on the greenhouse effect?
18. Are all the current and likely future operations associated with CSG production factored into assessing its greenhouse footprint?

Local Government including local planning control mechanisms (TOR 2e) and The interaction of the Act with other legislation and regulations (TOR 4)

These two TORs are considered together as the issues on these two matters are inter-linked.

The first issue relates to inadequate local government involvement when CSG activities are approved. The State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 allows CSG exploration activities to occur anywhere in NSW without consent. Development approval may be required but this would not be directly from local government. This would be under what used to be Part 3A (or the current substitute provisions for this part) or Part 5 of the Environmental Planning and Assessment (EPA) Act 1979. Under Part 3A (or the current substitute arrangements) development applications are considered by other relevant planning bodies, and under Part 5, the approval authority would be the NSW Govt agency administering the Petroleum (Onshore) Act 1991. These approval streams may afford local government the opportunity to comment on a proposal, but not the right of refusal.

The second issue is the lack of regard for landuse compatibility in the initial stages of CSG activities. Local Government has a wealth of knowledge on landuse constraints and demands within its local government area, and goes to considerable lengths to prepare Local Environment Plans (LEPs) to manage landuse conflicts within its jurisdiction. However, under the Petroleum (Onshore) Act 1991 and supporting legislation, there is no requirement to consider landuse compatibility when allowing CSG exploration activities in an area. This implies that landuse conflicts are not expected to arise from CSG which are limited to exploration activities, but this is not necessarily the case in every situation.

When CSG activities reach the production stage, development consent is required and consent authorities are then required to consider the compatibility of the activity with the surrounding landuse. Council is concerned that this may be too late in the process to consider landuse compatibility issues. Initial approval for exploration may create industry expectation that should exploration be found to be commercially viable, production approval is guaranteed. Council believes that landuse compatibility should be considered from the beginning exploration stage.

The interaction of the Act with EPA Act (1979) also needs review. Under the current framework, licences and leases for exploration or production are issued under the Petroleum (Onshore) Act and development approval is required under the EPA Act 1979, not always in the sequence that is best for the environment. For example, licences for initial CSG activities (including exploration and assessment) can be issued without prior development approval, where as production licences require development consent to be obtained first. Again, the issuing of licences for exploration activities without prior development approval could create an expectation that development approval will follow automatically. The Petroleum (Onshore) Act 1991 is silent on the consequences if development approval for exploration activities is refused after a licence has been issued.

Questions that need to be addressed on this matter are:

19. In light of the potential adverse impacts arising from CSG exploration activities, should they be allowed without consent?
20. Should landuse compatibility become a major consideration for all CSG activities and not only for production activities?
21. How can the licensing and development approval framework be reviewed to ensure that development approval is issued concurrently with licensing for all CSG activities, including exploration activities?

#### *Recommendations under Part 1*

*The Inquiry address Questions 1 to 21 in determining the significance of environmental impacts of CSG activities, in particular their cumulative impacts at the landscape scale.*

*In light of the potential adverse environmental impacts, the Inquiry determine whether sensitive areas should be identified in NSW where CSG activities are to be ruled out.*

*The Inquiry determine the regulatory minimum standards that should be prescribed for environmental protection in areas where CSG activities are to be permitted.*

*The legislative framework be reviewed to allow rigorous environmental assessment at all stages of CSG development and production, including exploration of activities.*

*The Inquiry consider ways to improve the community's understanding of CSG activities and impacts.*

#### **Part 2: CSG Activities in the Water Catchment Areas of Wollongong**

In September 2009, the NSW Government approved the Apex Exploration Drilling project, which allows 15 exploration boreholes in the Wollongong LGA. This is in an area of the Illawarra Escarpment, including some Sydney Catchment Authority land, which is used for the supply of drinking water. Whilst any exploration activity is yet to start, an application to add another borehole to the existing approval is currently being considered. This additional borehole is also proposed to be located in Sydney Catchment Authority land. Council acknowledges that there is widespread community concern and opposition to CSG activities in the Illawarra. Whilst all land approved or proposed for exploration activity in the Illawarra has significant environment value, Council is particularly concerned about CSG activities being approved in the water catchment areas of the city. These areas should be considered as particularly sensitive environmental areas, and for the reasons presented in the first part of this submission, the Precautionary Principle should be used to rule out CSG activities in these areas. This part of the submission explains the basis for this position.

### Significance of the Water Catchment Areas

Much of the land in Wollongong's water catchment areas that is used for drinking water supply is zoned E2 (Environment Conservation). This zoning recognises not only the valuable biodiversity of the area (some of which is protected by legislation), but also the importance of protecting the land to maintain the quality of the water supply for a significant sector of Sydney and the Illawarra population. Only a limited number of land uses are allowed in this zone, and mining or exploration activities are not permitted. However, these activities are permitted under the State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 in any area of New South Wales.

These water catchment areas are also subject to the State Environment Planning Policy (Sydney Drinking Water Catchment) 2011, which requires any proposed activity to demonstrate that it will have neutral or beneficial effect on the catchment. Even with the most stringent environmental controls, it will be hard to argue that CSG activities will have only a neutral or beneficial effect on the environment in these catchments. However, the requirements of this SEPP are overridden by the State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, which appears to take precedence.

### Extent of Community Concern on CSG activities in the Illawarra

The extent of the community concern on CSG activities starting in the Illawarra is reflected by the increase in the number of community submissions made to the NSW Planning Assessment Commission in its recent consideration of the proposal to have another borehole added to the 15 already approved. In 2009, only three submissions were made. However, this number increased to 1,045 this year, reflecting the level of concern currently felt by the community.

There have been other activities that demonstrate the level of community anxiety with CSG activities in the Illawarra. These include a protest gathering on Austinmer Beach on 29 May 2011, and a march along the Sea Cliff Bridge on 16 October 2011, which attracted about 3000 participants. Council also received a petition from the local community opposing CSG activities in the Wollongong LGA, which Council has forwarded to the NSW Premier.

### Some Specific Issues of CSG activities in Water Catchment Areas

In addition to the concerns raised generally in the first part of this submission, Council is concerned that there is no specific recognition of the sensitivity of drinking water catchment areas in issuing licences for CSG activity. The Petroleum (Onshore) Act 1991 does not contain any references to water catchment areas, with the only mention of this issue appearing in the SEPP (Mining, Petroleum Production and Extractive Industries) 2007. Under Section 14 of this SEPP, consent authorities may issue conditions to ensure that impacts on water resources are avoided or minimised to the greatest extent practicable. However, this requirement is not invoked if consent is not required, as would be the case for CSG exploration activities. If consent is required, then again the use of the phrase "to the greatest practicable" suggests that some impacts can be allowed.

There is no doubt that CSG activities, even if they are only exploration activities, will involve a level of catchment disturbance that can not be argued to have only a neutral or beneficial effect on water catchments. However, the presiding SEPP (Mining, Petroleum Production and Extractive Industries) 2007 does not require neutral or beneficial effects to be demonstrated, which means that water catchment areas can be subjected to the risk of adverse impacts. This situation is not acceptable to Council.

Consideration of exploration proposals in water catchment areas in isolation from implications of further development of CSG activities in those locations is also not appropriate. This appears to be the practice currently. If there are impacts (however small or big) with exploration activities, then those impacts can surely only magnify if CSG activities intensify with commercial production. Therefore, it seems inappropriate to allow CSG exploration in drinking water catchment areas, when commercial production is unlikely to be approved.

In view of the concerns raised, Council urges the NSW Government to exercise the Precautionary Principle and rule out CSG activities in the water catchment areas in the City of Wollongong. Section 70 of the Petroleum (Onshore) Act 1991 has provision for certain areas to be exempted from mining activities. Council urges the Minister responsible for this Act to include drinking water catchment areas in this category.

#### *Recommendation under Part 2*

*The Precautionary Principle be exercised in ruling out CSG activities in the drinking water catchment areas in the City of Wollongong.*

#### **Conclusion**

Wollongong City Council believes the CSG Inquiry is timely given the level of community concern with this industry, and appreciates the opportunity to make this submission. Council has raised a series of 21 questions for the Inquiry in relation to concern about CSG activities in general. Some recommendations on how the issues raised may be managed are made. In regard to the drinking water catchments of the city, Council is urging the exercise of the Precautionary Principle and the ruling out of all CSG activities in these areas.