REPORTS FROM THE DIRECTOR COMMUNITY AND NATURAL RESOURCES

a32 [CNR-CM] Coal Seam Gas Exploration in the Tweed Shire

ORIGIN:

Water

SUMMARY OF REPORT:

This report provides background information on Coal Seam Gas (CSG) exploration and production. In particular, the applicable legislation and jurisdiction, location of existing and proposed extraction titles within the Tweed Shire, and a preliminary discussion on the current body of knowledge.

It is difficult to provide clear guidance on the environmental and health implications of CSG mining. There is extensive negative publicity mainly concerning production methods, however there is limited verifiable information available to guide discussions.

Council is in a difficult position:

- As a consent authority it has no jurisdiction over exploration actions, and the extent of its approval powers on specific production projects is unclear.
- As a landholder it has the same rights as other landholders over whose property a Petroleum Title has been granted.
- As a water supply authority it appears that Council has no additional rights regarding CSG works.
- As it does not have the internal expertise to fully assess the technology and impacts.

RECOMMENDATION:

That Council provides a submission to the draft NSW Government Coal and Gas Strategy advising that the Tweed Community has serious concerns over the prospect of the "Green Cauldron" being utilised for Coal Seam Gas exploration and production because of the lack of clear and understandable advice and information of the technology and its impacts on the environment, the amenity, landholders and water quality.

REPORT:

This report provides background information on CSG development. In particular, the applicable legislation and jurisdiction, location of existing and proposed extraction titles within the Tweed Shire, and a preliminary discussion on the current body of knowledge.

Coal Seam Gas

Coal seam gas, also called coal bed methane (CBM), is mostly methane in composition and is typically attached to the coal along its natural fractures and cleats. This gas is released when pressure on the coal seam is reduced, usually by removal of water from the seam.

Fracking is a process used by oil and gas companies to increase the recovery of underground gas or oil resources. In the case of CSG, fracking involves pumping a fluid comprised of largely water and sand, under pressure into a coal seam. This action fractures the coal seam and increases the gas flow rate by increasing the permeability of the coal. Chemicals may also be used to enhance the process.

Water is a primary by-product of CSG development. The quality of the water ranges from potable to saline and may be rich in other constituents that make it unsuitable for many uses.

Applicable Legislation and Jurisdiction

Exploration for and production of CSG in New South Wales is a state controlled activity, primarily dealt with under the *Mining Act 1992* and the *Petroleum (Onshore) Act 1991* and accompanying Regulations such as *State Environmental Planning Policy SEPP (Mining, Petroleum Production and Extractive Industries) 2007*.

Exploration and production can only be carried out under a Petroleum Title granted by the Minister for Resources and Energy through the NSW Department of Primary Industries (DPI). Petroleum Titles can be either A Petroleum Exploration License(PEL) or a Petroleum Production Lease (PPL). A PEL lasts for up to six years. After which the PEL may be renewed and/or a PPL or Petroleum Assessment Lease may be applied for.

Petroleum Titles contain specific conditions (including environmental conditions) that the Titleholder is required to follow. Failure to follow those conditions can result in implementation of penalties. In granting a Title the Minister must take into account the need to conserve and protect flora, fauna, fish, fisheries and scenic attractions, and may require studies (including environmental impact studies) to be carried out to determine whether to grant a petroleum title.

Under the legislation there are various types of projects that do not require development consent. The relationships between the various planning legislation are complex and their application depends on the unique characteristics of the particular project and project stage.

Unless specifically exempted, petroleum mining and exploration is required to comply with all other consents or approvals under other State and Commonwealth legislation, such as the Commonwealth's Environment Protection and Biodiversity Conservation Act.

It is unclear how water extraction during the CSG production process is controlled, but it appears that proponents do not need to meet all the requirements, in terms of limits on extraction, of the Water Act 1912 or Water Management Act 2010.

Depending on the approval pathway for projects in the Tweed, Council may not be the consent authority and may only be permitted to provide submissions to DPI. In other instances Council may be the consent authority for CSG infrastructure works.

Exploration

DPI is the approval authority for exploration licences. Some low intensity petroleum mining related activities such as exploration are declared to be exempt development in the *State Environmental Planning Policy (Mining Petroleum and Extractive Industries) 2007* do not require any environmental assessment under the *Environmental Planning and Assessment Act 1979.* Thus local Councils do not have any jurisdiction, and local planning instruments such as Local Environmental Plans (LEPs) do not apply to exploration licences.

DPI states on its website that an application for an exploratory licence requires particulars of proposed program of work including measures to protect environment to be supplied with the application. An exploration licence may require that an environmental study such as a Review of Environmental Factors (REF) is carried out, including notifying neighbours, monitoring and site rehabilitation. However, there appears to be no obligation in the legislation for the licence holder to inform landholders of exploration licence application, nor is there a requirement to publicly exhibit applications.

Production

Under the *Petroleum (Onshore) Act 1991*, a Production Lease may only be granted if this would not contravene the *Environmental Planning and Assessment Act 1979* or any other Act.

Where required, development consent must be obtained under the *Environmental Planning and Assessment Act 1979* before a Production Lease can be granted.

Until recently, Part 3A approvals by the State Government provided Councils the opportunity to submit comments only to the proposal. It is unclear whether the recent discontinuation of the Part 3A approval pathway will mean that Councils are the determining authority for all future CSG projects given that the only remaining pathway is through Part 4.

Local Councils are the consent authorities for these Part 4 projects which require public exhibition of an environmental assessment of the project. However, there is no requirement to publically exhibit Production Lease applications.

The application for a Production Lease requires particulars of the ability of the applicant to comply with the provisions of the Petroleum (Onshore) Act and Regulations. It is to include a detailed description of the works to be undertaken including works and activities relating to the rehabilitation of the land either during the carrying out of operations or after they have ceased.

Issues for Landholders

All petroleum (hydrocarbons) on or below the land surface is the property of the Crown, not the land owner. Royalties are generally required to be paid to the Crown for extraction of those resources.

In NSW an Exploration Licence does not entitle the license holder to enter any lands in the area covered by the license without a prior access arrangement with the landholder. The onus is on the license holder to attempt to negotiate access arrangements with the landholder. If access cannot be negotiated, access conditions will be determined by an arbitrator or the Land and Environment Court.

In other states, such as Queensland, an Authority to Prospect (ATP) gives the license holder the right access any property in the area covered by the ATP identified as potentially holding energy reserves.

It is not clear whether it is permissible for a license holder to explore for petroleum under land for which they do not have an access arrangement by drilling horizontally from an adjacent property which has granted access.

Location of existing and proposed Petroleum (Coal Seam Gas) Licenses
Information on existing and proposed petroleum titles has been obtained from the NSW Department of Primary Industries website at www.minerals.nsw.gov.au. The department has provided a GIS based mapping tool "MinView" which contains maps of all titles and applications.

The areas within Tweed Shire where petroleum titles have been issued as of April 2011 are shown in Figure 1. The areas where the department has received an application but has not yet issued a petroleum title are shown in Figure 2. Note that an application for an area in the north-west of the shire had been received by the Department in February 2011, but has subsequently been removed from the website (compare Figures 2 and 3). The reason for its removal is unknown.

According to the Department's website, the existing and proposed titles which encroach on Tweed Shire are all coded PEL (Petroleum Exploration Licence) and are for exploration purposes only. These titles are spread over several local government areas and are not located wholly within the Tweed. The relevant titles are shown in Table 1.

App Number	Title type	Date	Expiry date	Area	Location	Applicant
PELA 134 (1991)	License to explore applied for	Applied: 21-Dec-2010	NA	8 BLOCKS (approx 51,000ha)	About 15 km SSW of MURWILLUMBAH	MACQUARIE ENERGY PTY LTD
PEL 445 (1991)	License to explore granted	Granted: 19-Apr-2004	18-Apr-2013	105 BLOCKS (approx 670,000ha)	About 39 km WNW of LISMORE	BNG PTY. LTD.

Table 1: Current Petroleum Titles which encroach into Tweed Shire (April 2011)

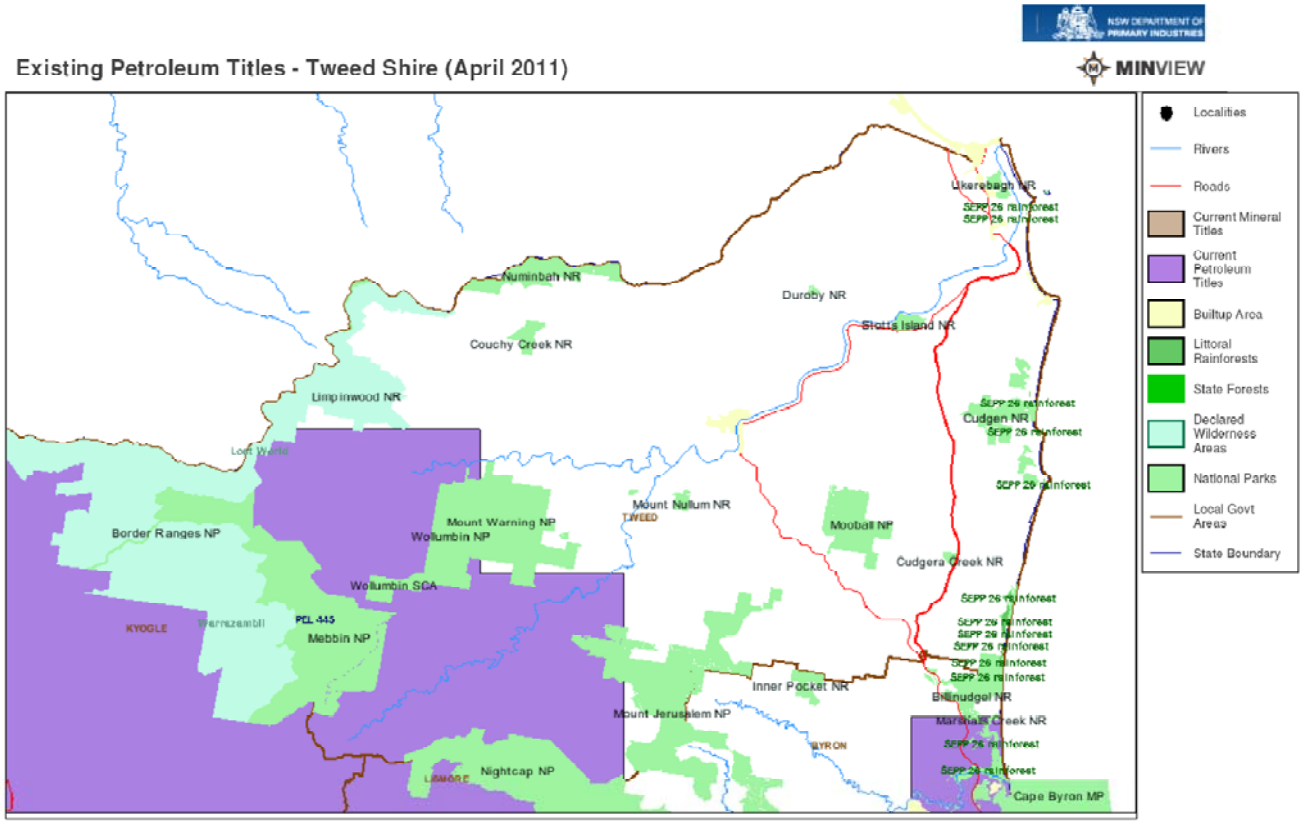

Fig 1: Current Petroleum Titles within and adjacent to Tweed Shire (April 2011)

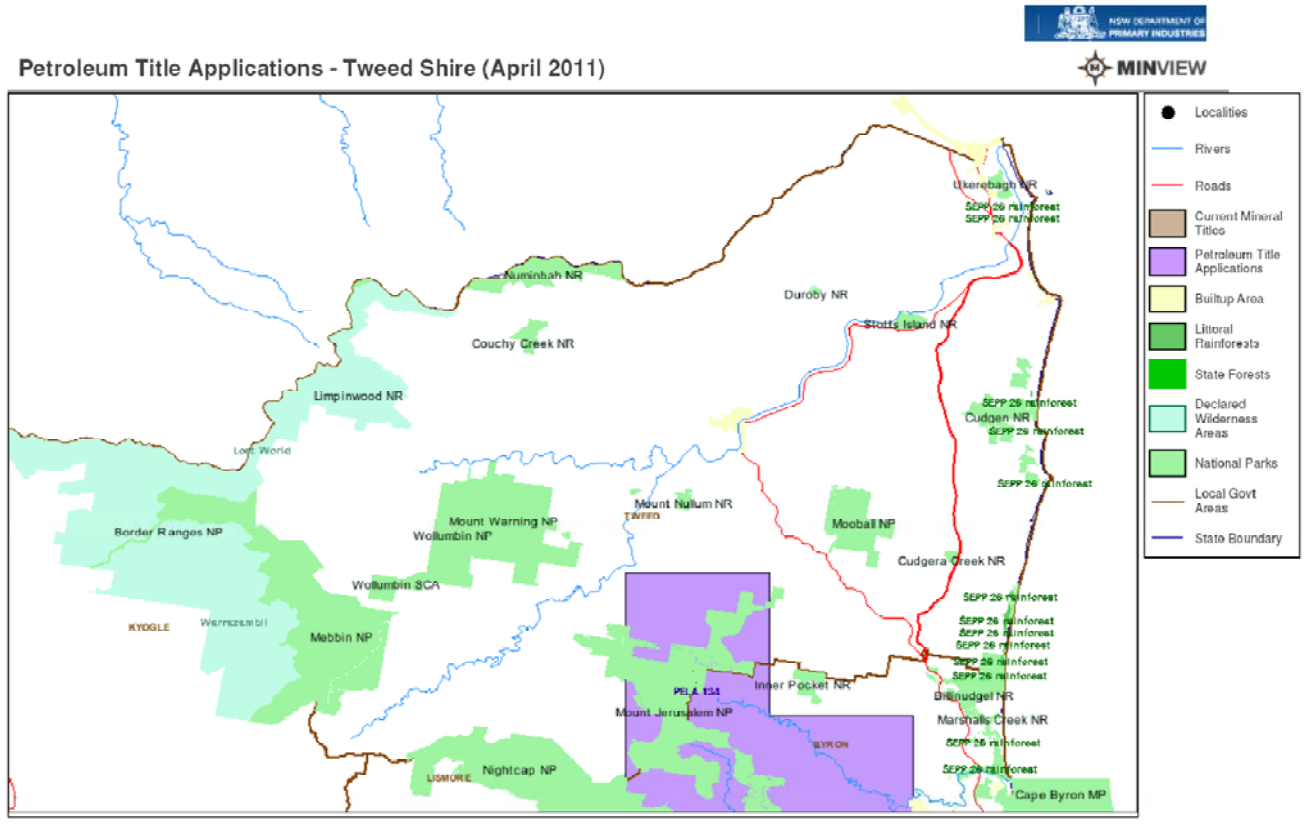

Fig 2: Current Petroleum Title Applications within and adjacent to Tweed Shire (April 2011)

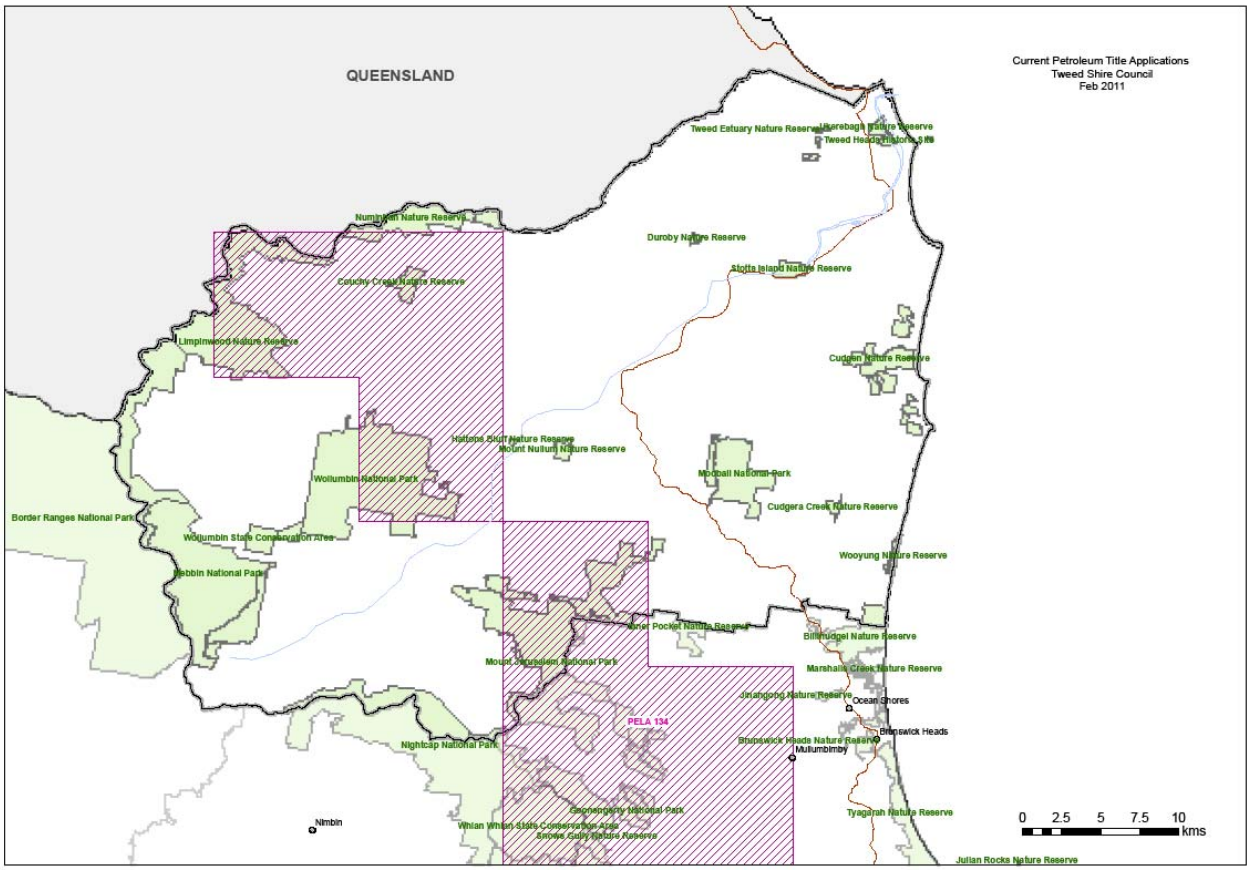

Fig 3: Petroleum Title Applications within and adjacent to Tweed Shire (as reported in February 2011)

Environmental Implications and Impacts to Water

It is difficult to provide clear guidance on the environmental implications to water of CSG mining. There has certainly been extensive negative publicity mainly concerning production methods, however there is limited verifiable information available to guide the debate.

Furthermore, it is not possible to consider all the environmental factors that would arise in the many different CSG projects. Whilst there appear to be many similarities, there are distinct differences that require an individual and extensive environmental assessment for each proposal. There are too many complex variables which would make the type and extent of any environmental impacts to water unique to each project (eg. deposit geology and extent, surrounding layer geology, ground water quantity and quality, surface hydrology, surface conditions and sensitivity, distance to surface watercourses, etc).

The community is concerned about a number of CSG issues including impacts to surface and groundwater sources, use of chemicals in the fracking process, product water management, diminishment of scenic quality, fragmentation of wildlife habitat, displacement of local wildlife habitat, methane leakage/seepage, and landholder rights. Council has received over 20 written statements and numerous telephone calls and presentations at community access regarding these concerns and requesting further information.

Council is in a difficult position:

- As a consent authority it has no jurisdiction over exploration actions, and the extent of its approval powers on specific production projects is unclear.
- As a landholder it has the same rights as other landholders over whose property a Petroleum Title has been granted.
- As a water supply authority it appears that Council has no additional rights regarding CSG works.
- As it does not have the internal expertise to fully assess the technology and impacts.

A number of organisations, more aptly placed than Council to comment on CSG mining, have published their positions. The following sections outline the major concerns raised, in particular those regarding water.

NSW Government - Department of Premier

The Department of Premier requested feedback on their Coal and Gas Strategy Scoping Paper which suggests new rules for CSG exploration licences. The changes suggest deficiencies in the existing approach had been identified – particularly regarding the need for more rigorous community consultation and tighter environmental controls during the approval process.

The changes proposed to the CSG exploration process mean:

- Applicants will now have to submit forward work plans thoroughly detailing any expected environmental impacts. The plans will be reviewed by DECCW and DoP and made public before any drilling occurs;
- I&I will provide DECCW and DoP with the review of environmental factors, including detailed applications for any drilling or related activities such as hydraulic fracturing ('fracking') and must take their recommendations into consideration before approving any licence to drill;
- All chemical additives used in the process of exploring for CSG must be included as part of the review of environmental factors in title applications; and
- The following new community information and consultation conditions will be introduced, requiring licence holders to:
  - Provide detailed information about their activities to all affected Councils and landholders;
  - Establish a hotline for community enquiries; and
  - Distribute I&I information on landholder rights in the process.

It is unclear whether the change of government will alter how or when these changes will be implemented.

National Water Commission

The National Water Commission (NWC) issued a formal position statement on the CSG industry in Australia on 3 December 2010. The Commission has called for industry, governments and planners to adopt a precautionary and more integrated approach to managing water related impacts of CSG developments.

The NWC highlighted the need for:

- These developments to be managed in a way that is consistent with the objectives of the National Water Initiative and considered in approval processes and management practices.
- Current environmental approval processes to be better integrated so as to address many of the issues relating to water and CSG development.

NWC acknowledges that the CSG industry represents a significant economic opportunity for Australia, but if not adequately managed and regulated the industry risks significant long-term and adverse impacts on surface and groundwater systems.

Key risks identified by the NWC stem from the large volumes of water being extracted, the depressurisation of coal seam aquifers, and the disposal of large volumes of treated waste water. In particular the potential cumulative effects of multiple projects are not well understood.

NWC believes these mining activities should operate under the same rules as other water users consistent with the National Water Initiative, which would make water access entitlements available to CSG activities wherever possible; bringing projects into consistent state and territory water planning and management regimes from their inception.

The NWC has produced a Position Statement. The Position Statement sets out eleven principles that the Commission believes governments should apply to managing the impacts of CSG. These principles address water management issues such as long-term reductions in adjacent aquifer pressures and levels, discharges to surface waters, and water produced as a by-product of the extraction process.

National Water Group
The Federal Government's Water Group is mainly concerned about the volume of water to be co-produced with gas extraction, particularly impacts on groundwater systems and their structural integrity, pressure and volume. They are also concerned about changes to aquifer water chemistry, the very significant recovery times for groundwater systems to return to pre gas extraction conditions, effects on surface water hydrology, and land subsidence.

Engineers Australia – Civil Edition Magazine (April 2011)
Cover story in this month's edition is "The issues surrounding Coal Seam Gas Development". The article discusses concerns about access to land for bore holes and gas pipelines, management of the massive amount of associated CSG water and the use of hydraulic fracturing.

Water related issues of concern include:
There are hydro-geological concerns of fracking which mainly revolve around aquifer connectivity between beds of rock and the increased risk of interconnectivity once the rock bed of interest has been fractured. This has the potential to produce unwanted effects such as loss of water from one aquifer to another and cross contamination of different water chemistry between aquifers.

CSG is derived by completely dewatering the coal seam, and hence water management is an important issue for the industry. The article highlights a number of projects where production water has been treated to high standards to supplement various uses from stock watering, irrigation, and even potable town water supply. The article notes that disposal of the concentrated brine waste will require investigation on a case by case basis.

NOROC

The Northern Rivers Regional Organisation of Councils submitted comment to the NSW Government on 3 March 2011. It made the following comments:

1. *NOROC supports in principle the investigation of alternative sources of energy to traditional coal mining, and in particular the potential for coal seam gas to play a critical role in moving to a low carbon economy. On behalf of the Northern Rivers community we emphatically urge that strict environmental controls apply to every stage of the extraction, production and distribution of methane.*

2. *In general, the Scoping Paper provides little information that pertains directly to coal seam gas mining. None of the Government's initiatives to address community concerns target coal seam gas mining, let alone in the Clarence-Moreton Basin. This is despite the Scoping Paper acknowledging that there will be a significant proportional increase in the use of gas, from 19% in 2002 to 30% in 2030.*

3. *Of the four public meetings convened by the Department of Planning so far, none have been in the Northern Rivers. The Department will be aware that in the Northern Rivers there is a rapidly increasing demand for credible, accessible and easily-understood community information regarding coal seam gas mining. Action groups and alliances have been formed, and constituent councils such as Lismore City Council and Rous Water have independently passed resolutions calling for a moratorium on further coal seam gas exploration pending a full and impartial investigation into its effects on the community. These resolutions have been in response to a call for support from the NSW Farmers Association.*

4. *The key issues for NOROC are generally consistent with those raised elsewhere in the state, namely:*

    - *The need to improve management of cumulative impacts such as noise, dust, blasting and lighting impacts, given that even the exploratory drills- operate around the clock for between 20 to 40 days at a time. We are directly involved stakeholders as our member councils have regulatory responsibility for any construction for generation of up to 30 megawatts.*

    - *Protecting the amenity of health of people living in population centres and along the pipeline north. We would view this as an integral part of any strategic environmental assessment (SEA) process, and would encourage this type of assessment be used either in preference or in conjunction with site-specific assessment and management.*

    - *Potential conflicts with existing agricultural land use, the unique and rich biodiversity of the Northern Rivers, the aboriginal heritage of the Bundjalung people of this area and tourism. We are also aware that horizontal drilling can take place at a depth of 2km if landowner consent directly above the ground is not granted.*

- *Site rehabilitation must be undertaken in a progressive and integrated manner, as currently councils do not have complete information as to the location and condition of drilling sites. It is essential that this information be available in future property searches.*

- *Concerns over the treatment and disposal of produced water and the impact of coal seam gas extraction on water tables and aquifers and unintended methane release from existing bores. The broader issues of hydraulic fracturing, the chemicals used and the potential effects on groundwater are of concern, however, we recognise that its use in this region is limited due to the nature of our geology.*

- *The required upgrades to transport infrastructure, in particular track upgrades, the associated impacts on regional and local roads and any ongoing regulatory responsibilities for councils and associated costs.*

- *The Northern Rivers by virtue of its proximity to Queensland has a number of cross-border issues that it has to regularly manage. A pipeline that would deliver gas to Queensland extracted from NSW could come at a cost to the Northern Rivers communities. We would welcome a cost-benefit analysis as proposed in the Scoping Paper.*

With regard to the remainder of the Paper, NOROC is in general agreement with the sections relating to potential initiatives of the NSW Coal and Gas Strategy and invites the Department to actively engage with us and our member councils.

NSW Farmers' Association
The NSW Farmers' Association suggests that a moratorium be placed on all CSG mining in NSW. The Association stresses it is not opposed to mining and CSG development, but simply wants equal treatment under the law, a balanced approach to deciding where and how development occurs, and just terms compensation to all affected landholders when it does go ahead.

The association proposed the following steps to address issues with CSG production:

- Require aquifer interference approvals for any mining or gas activities involving impacts on ground water (as per Section 91 (3) of the Water Act 2000).
- Establish an integrated strategic planning process for mining development that factors in all competing social, environmental and economic values and identifies areas where mining can and cannot occur
- The recently announced development of a strategic plan for coal mining in NSW must be expanded to include all extractive industries and a more meaningful timeframe and planning process.
- In such planning, make explicit, upfront provision for cumulative impacts, including legislated limits to the total mining and gas development possible in regions.
- Ensure that the planning and approval process, including the issuance of exploration licences, incorporates inter-agency discussion, strategy, advice and formal concurrence.

- The implementation of Section 91 (3) of the Water Act 2000 via an Aquifer Interference Regulation administered by the Office of Water such that aquifer interference approvals can be required by the Office of Water for all mining and gas developments involving impacts on ground water.

The following steps were proposed for exploration activities:

- Require an independent scientific process prior to the granting of exploration licences to identify high value natural resources and highly productive agricultural land and rule out the granting of licences in such areas.
- Include an independent body in the assessment process,
- Notify each and every party with a registered interest in the land prior to awarding of licence,
- Provide an initial appeals process prior to the awarding of licences.
- Require licence conditions to be attached to access agreements
- Require agency supervision and accountability regarding compliance with these conditions.
- Provide agency support to landholders in developing access agreements and enforcing access agreements

CSIRO Expert on Coal Seam Reservoirs
Dr Luke Connell from the CSIRO's Earth Science and Resource Engineering department suggests there is potential for aquifer impacts with the horizontal drilling techniques proposed by Metgasco in the Clarence-Moreton basin on the Northern Rivers. He suggests there are a range of things that determine the potential impact on aquifers including how the gas interacts with the aquifer. Usually the gas present is hydrologically separate from aquifers but is very site specific.

Dr Connell also suggests that water produced by CSG extraction could have potential uses in some instances. It is very site specific and depends on ground water quality. For regions with good ground water quality, it can be a benefit to have an additional water source. There have been regulations developed regarding produced water and Queensland has done a lot of work looking at the management of produced water.

However if saline water is produced there is potential for that water to have detrimental impacts. Disposal basins, water treatment and reverse osmosis can all be used, however the cost of treating the water can be high depending on its quality, and how much energy is required to treat it.

Environmental Defenders Office
The EDO suggests the main environmental concerns of CSG extraction are:

- Potential contamination of groundwater from drilling fluids and fracking chemicals.
- Disposal of produced water including salt, naturally occurring heavy metals, and drilling and fracking chemicals.
- Potential changes to aquifer water quality and quantity through creating new inter-connections, pressure changes, subsidence.

- Effects of floods on evaporation ponds.
- Greenhouse impacts and air pollution through release of methane.

The EDO recommends that:

- Any development is required to meet the precautionary principle.
- Cumulative impacts should be understood and taken into account when granting licenses.
- Baseline assessment and ongoing monitoring of surface and groundwater systems.
- Licenses for water extraction be required (as for other developments that use water).
- Strict water quality requirements be applied.

US EPA Study into Coal Gas Mining

The US EPA suggests there are many concerns about hydraulic fracturing, and most centre on potential risks to drinking water resources, although other issues have been raised. Potential risks to surface and underground sources of drinking water might occur at various points in the hydraulic fracturing process.

In response to public concern, the EPA will conduct research to examine the relationship between hydraulic fracturing and drinking water resources and determine the likelihood of those risks. Contaminants of concern to drinking water include fracturing fluid chemicals and degradation products and naturally occurring materials in the geologic formation (e.g. metals, radionuclide's) that are mobilized and brought to the surface during the hydraulic fracturing process.

The specific questions to be answered are listed in Figure 4 which highlights the complexity of the systems and factors that need to be considered in determining the extent of impacts. The research will require a broad range of expertise, including petroleum engineering, fate and transport modelling, ground water hydrology, and toxicology. Interim report expected in 2012, with final report in 2014.

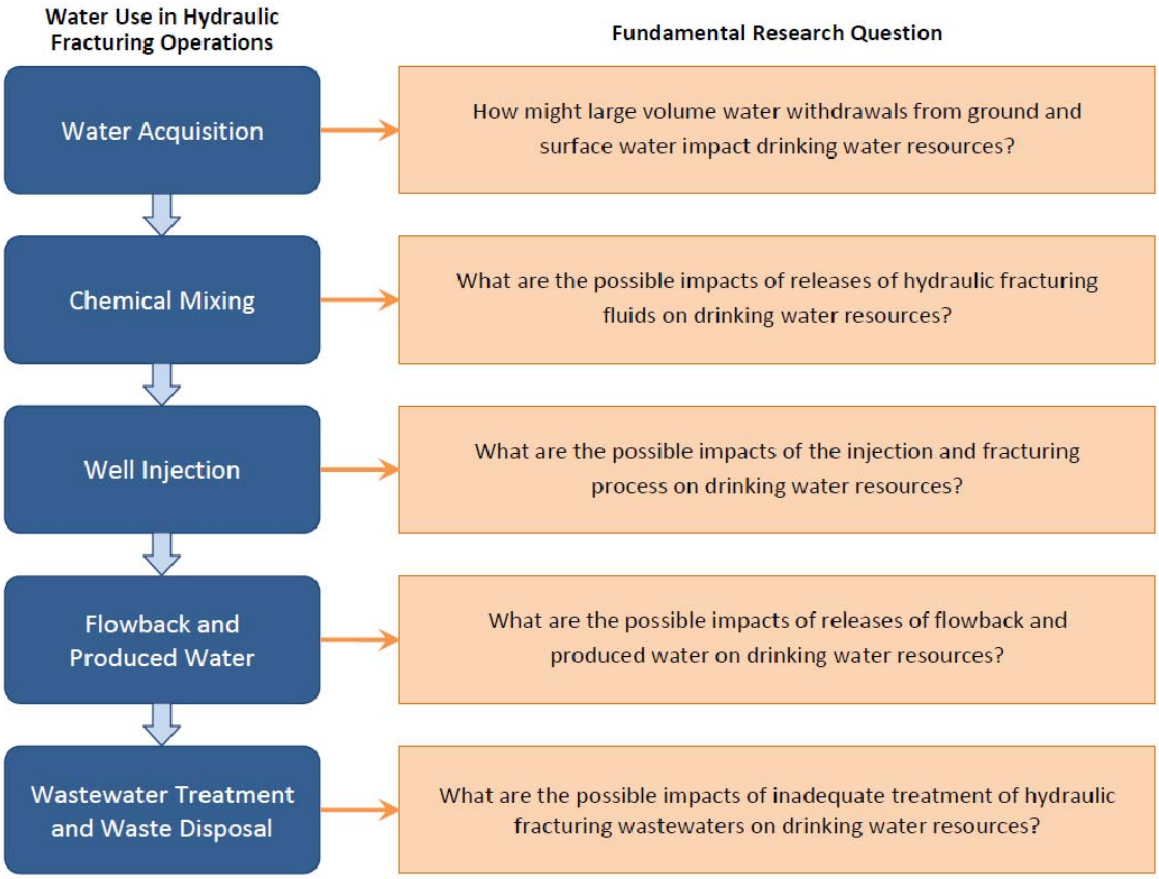

Fig 4: Research questions posed by US EPA Draft Plan to Study the Impacts of Hydraulic Fracturing on Drinking Water Resource (February 2011)

Gasland - US documentary film

The film highlights significant groundwater issues that it attributes to CSG production. Spectacular scenes of water set on fire at the tap are attributed to groundwater sources contaminated from methane that has entered the aquifer during CSG production. It is unclear from the film what particular circumstances resulted in this unusual phenomenon.

The film also alleges livestock and animals have been adversely affected by drinking water that had been contaminated by CSG production activities, particularly fracking.

Further information can be found at www.gasland.com.au.

LEGAL/RESOURCE/FINANCIAL IMPLICATIONS:

Nil.

POLICY IMPLICATIONS:

Nil.

UNDER SEPARATE COVER/FURTHER INFORMATION:

*To view any **"non confidential"** attachments listed below, access the meetings link on Council's website www.tweed.nsw.gov.au (from 8.00pm Wednesday the week before the meeting) or visit Council's offices at Tweed Heads or Murwillumbah (from 8.00am Thursday the week before the meeting) or Council's libraries (from 10.00am Thursday the week of the meeting).*

1. Combined supporting information (ECM 31755367)
   - US EPA brochure on Hydraulic Fracturing Research Study, June 2010
   - Civil Engineers Australia, April 2011
   - NSW Farmers factsheet 1
   - NSW Farmers factsheet 2
   - Letter from NOROC
   - Australian Government National Water Commission - Media Release
   - News Release from Premier of NSW
   - Submission by Tyalgum District Community Association
   - Letter to USA President Obama from the Council of Scientific Council Presidents