

# ***COAL SEAM GAS AND THE ENVIRONMENT***

## **GETTING THE BALANCE RIGHT**

Ian Hayllor  
Chair – Basin Sustainability Alliance



Young farmers face uncertain future

# UNCERTAIN FUTURE

## Environmental Impact Statements

Potential Issue	Mitigation	Potential Residual Impact
Loss / deterioration of the <b>ecological value</b> of land and water in the vicinity.	Application of a specific set of Environmental Management Procedures in accordance with decision	Of Concern
Loss / deterioration of the <b>agricultural value</b> of land.		Of Concern
<b>Disturbance of soil</b> and associated siltation in surface runoff or creation of <b>erosion pathways</b> .		Not of Concern
<b>Weed and pathogen</b> ingress due to vehicles and work		Not of Concern

Salt spills



### APPLICATION NOTICE

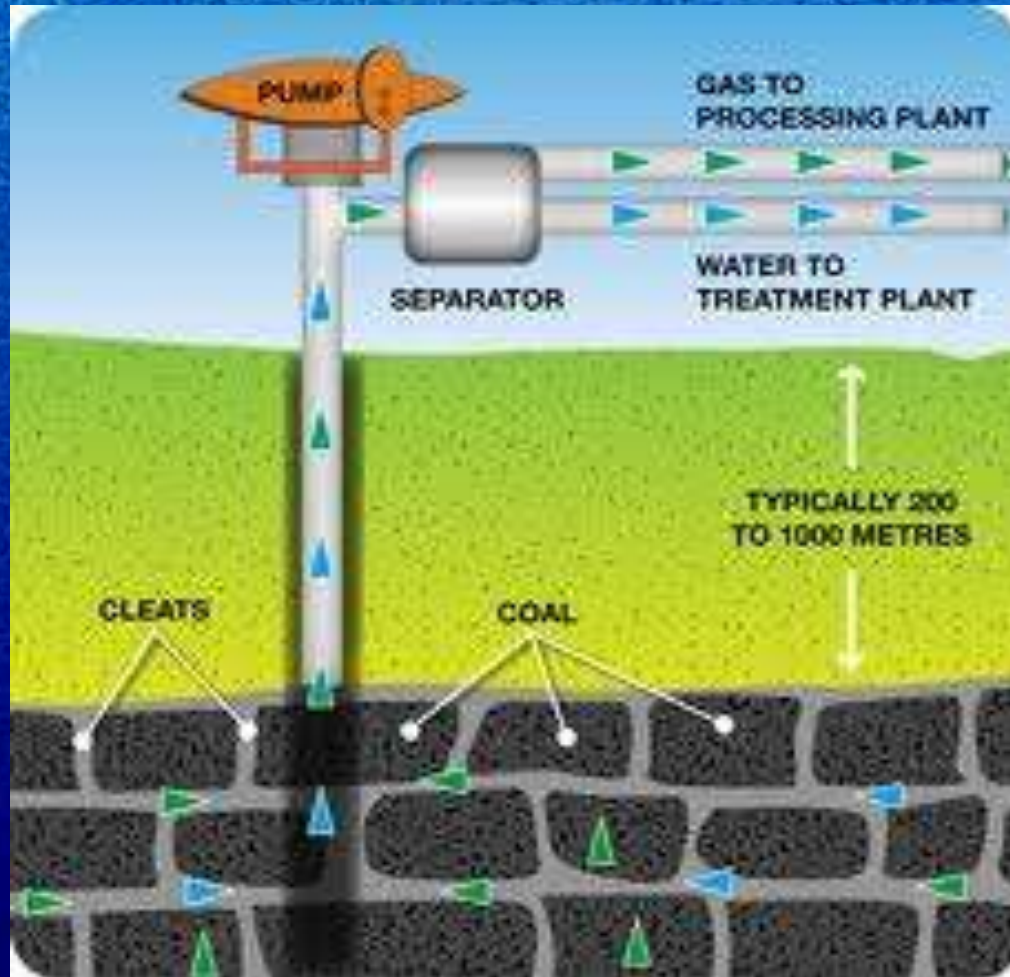
ENVIRONMENTAL PROTECTION ACT 1994 - SECTION 4106 for a or 122 for amendment application>

- (a) It is advised that Arrow Energy Ltd has lodged an application under the *Environment*
- (b) The application is for a project level 1 environment authority in relation to petrol PL198, PL 230, PL238, PL252, PL 258 and PL260 involving a petroleum activity disposal, 15-Fuel Burning, 64-Water treatment, 16-Extractive activities, 14-Electricity generation
- (c) The application relates to the Arrow Energy Dalby Expansion Project in the S
- (d) Any person can view, make copies, take extracts of the application at - Depart Resource Management , Petroleum and Gas Unit, Level 7, 400 George Street
- (e) Any person may make a
- (f) Properly made submission
  - be written and signed
  - state the name and ad
  - be made to the DERM Department of Environ 4000; and
  - be received before the

Gas wells



# COAL SEAM GAS EXTRACTION



(From APLNG website)

# PUSH FOR LNG EXPORT

## Australian government pushes rapid expansion of gas projects

By Frank Gaglioti and Patrick O'Connor  
15 May 2010

The Labor government of Prime Minister Kevin Rudd is overseeing a significant expansion of Australian gas production and export. The energy source is set to develop into a vital source of profits for Australian companies, with the government riding roughshod over environmental concerns and protests against substandard conditions to position Australia as a major player in the burgeoning global market for liquid natural gas (LNG).

The Gorgon gas project announced last September is the most significant new field opened up in the last two years. Located on the Pilbara coast in northern Western Australia, Gorgon is one of the largest natural gas fields in the world. Chevron Australia claims that the field represents 8 percent of current world LNG capacity. US petroleum giant Chevron and ExxonMobil, and Dutch- and British-owned Shell are the joint owners, with an upfront capital investment estimated at about \$200 billion to different Asian countries, including Japan, over two decades. The most significant deal is with the largest oil company PetroChina, which is to pay an estimated 45 million tonnes of LNG.

Last August Minister for Resources and Energy Martin Ferguson said that the expansion of the industry would create 100,000 jobs.

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## Blueprint released for QLD's new LNG industry

AAP | September 17, 2009 11:12AM

**THE Queensland government has released a framework for the liquefied natural gas industry, which has the potential to add more than \$3 billion, or around 0.1 percent, to the gross state product.**

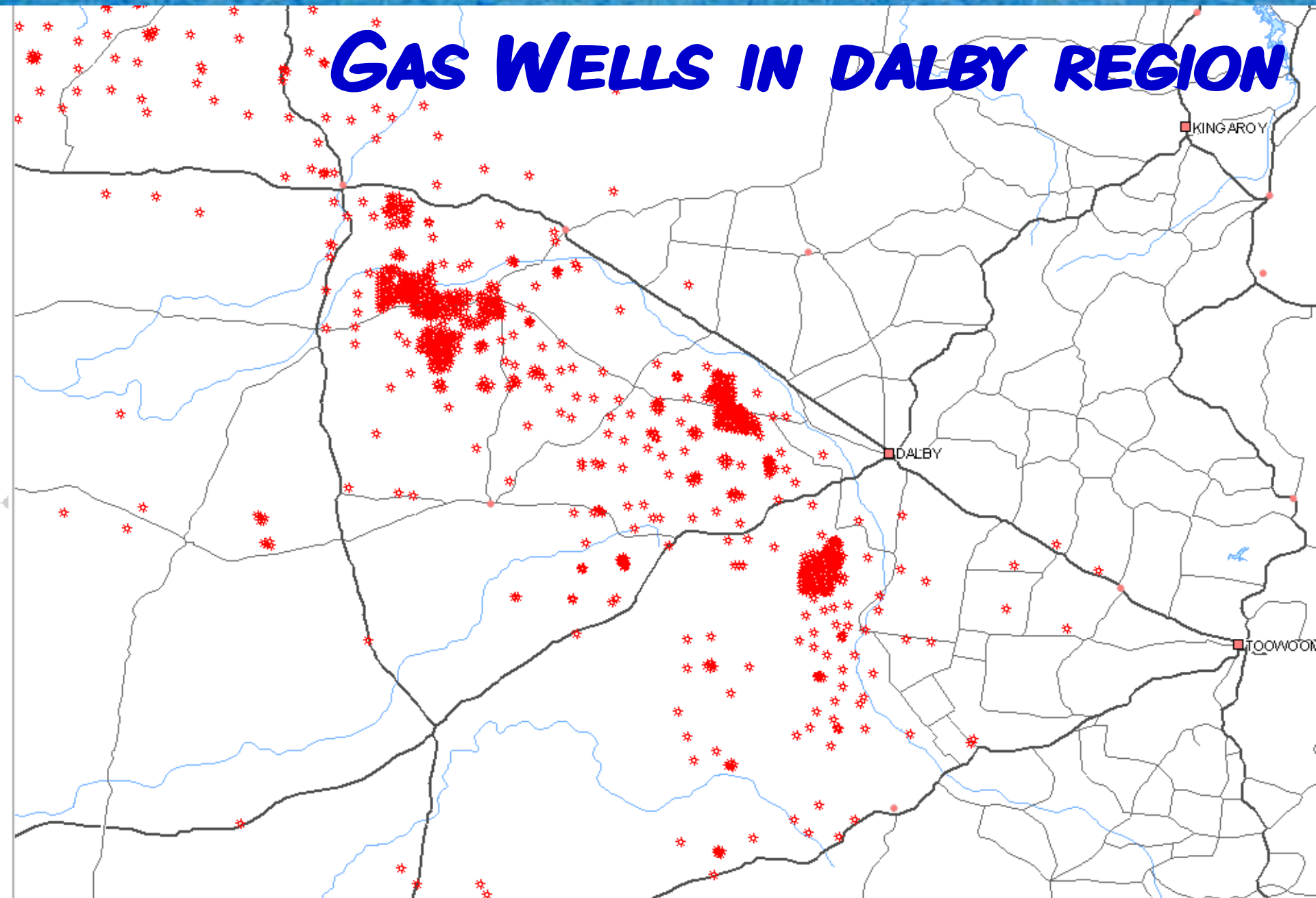
The Blueprint for Queensland's LNG Industry provides industry and the community with a clear understanding of the government's plans to develop the world's first coal seam gas export industry.

Premier Anna Bligh told parliament today that eight projects were vying to start in the state, with a potential worth of \$40 billion, and to create as many as 18,000 direct and indirect jobs.

An LNG industry exporting at 28 million tonnes a year would see the government receive around \$850 million a year in royalties, Ms Bligh said.

"This is a once-in-a-lifetime opportunity," she said.

# ***GAS WELLS IN DALBY REGION***





...representing landholder, community groups, individuals with environmental, health and social concerns about the unrestrained development of the coal seam gas industry across Queensland.



**protect**

**our future for  
growing food  
and fibre**



**preserve**

**water resources  
for our children  
& grandchildren**



**safeguard**

farmlands  
for future  
generations



**achieve**

a sustainable  
future for all  
Queenslanders



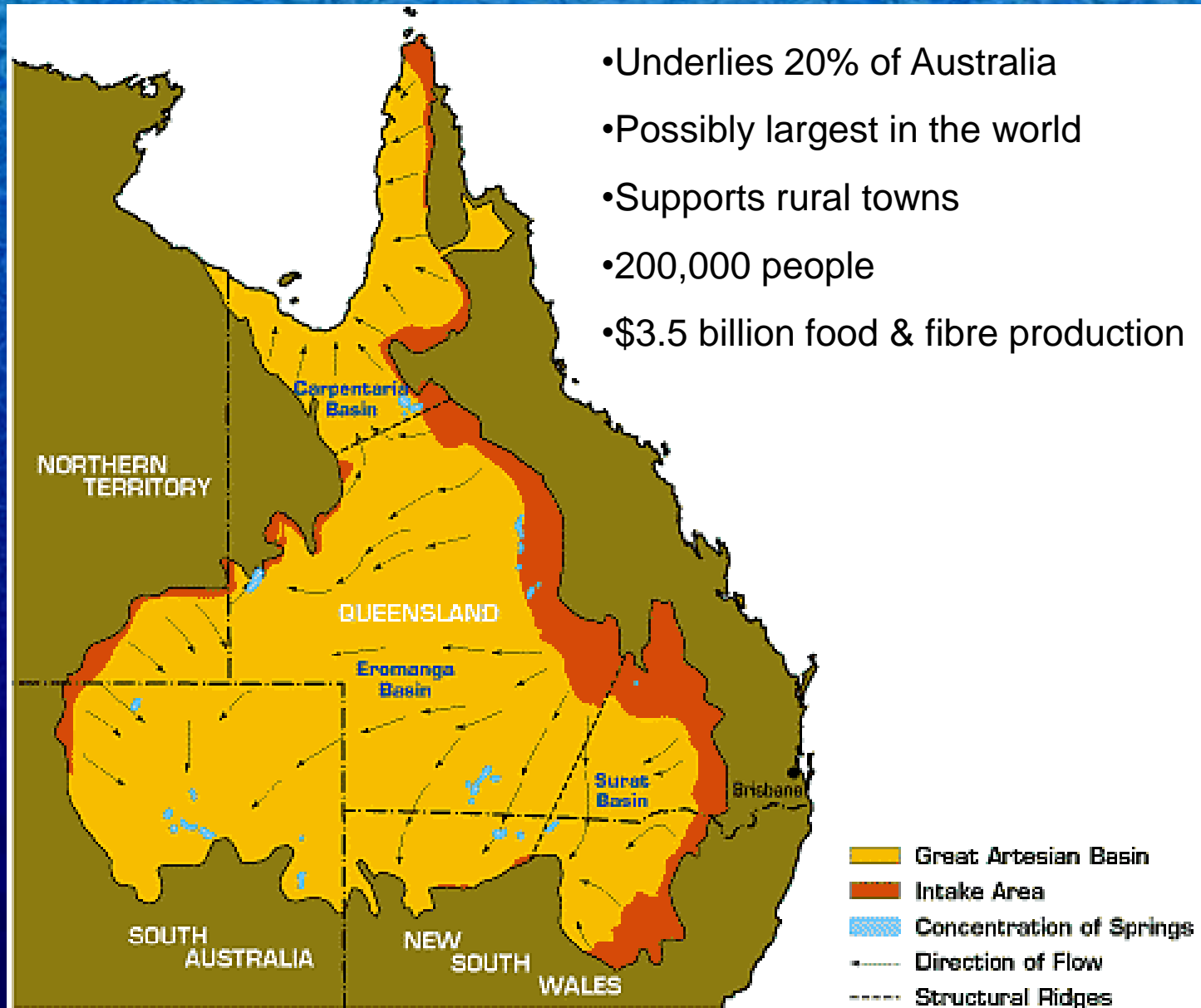
# OUR GOAL



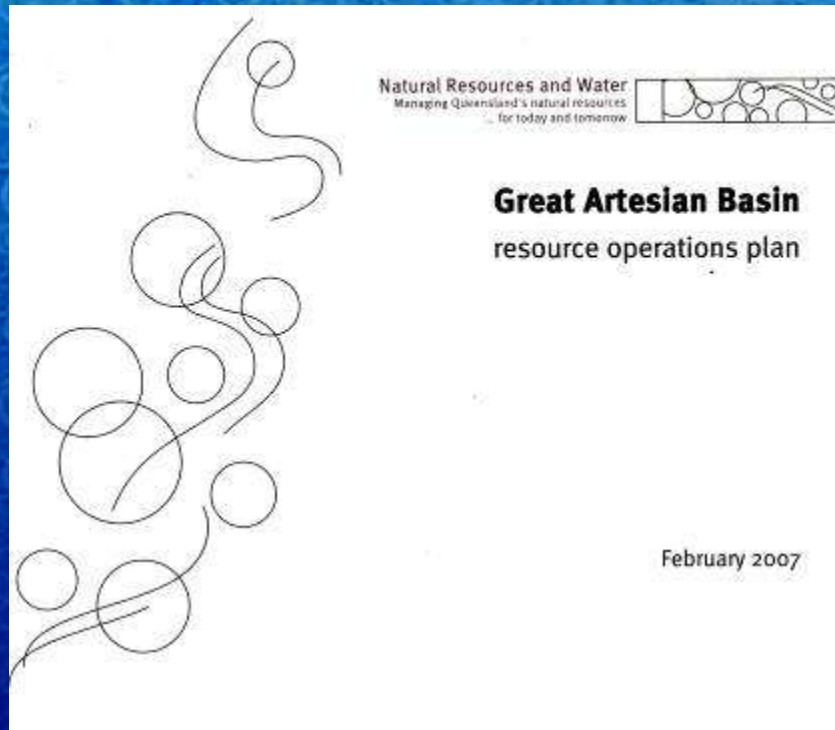
...is to have a coal seam gas industry that has **minimal environmental, economic and social impacts** on landholders and communities throughout the Great Artesian Basin but is still able to provide jobs and wealth to the whole state

# GREAT ARTESIAN BASIN

- Underlies 20% of Australia
- Possibly largest in the world
- Supports rural towns
- 200,000 people
- \$3.5 billion food & fibre production



# RESOURCE OPERATIONS PLAN



- 23,400ml – general reserve
- 10,000ml – projects of state or regional significance

# COAL SEAM GAS INDUSTRY

350,000 ML per year for 25 – 50 years  
from an already fully allocated system



**Why are CSG activities exempt  
from Resource Operation Plan?**

# *WHAT WE'VE LEARNT FROM THE PAST*

## Murray Darling Basin

- over allocated in time of lack of knowledge
- Govt spending billions to buy back allocations



**Economic harm to communities**

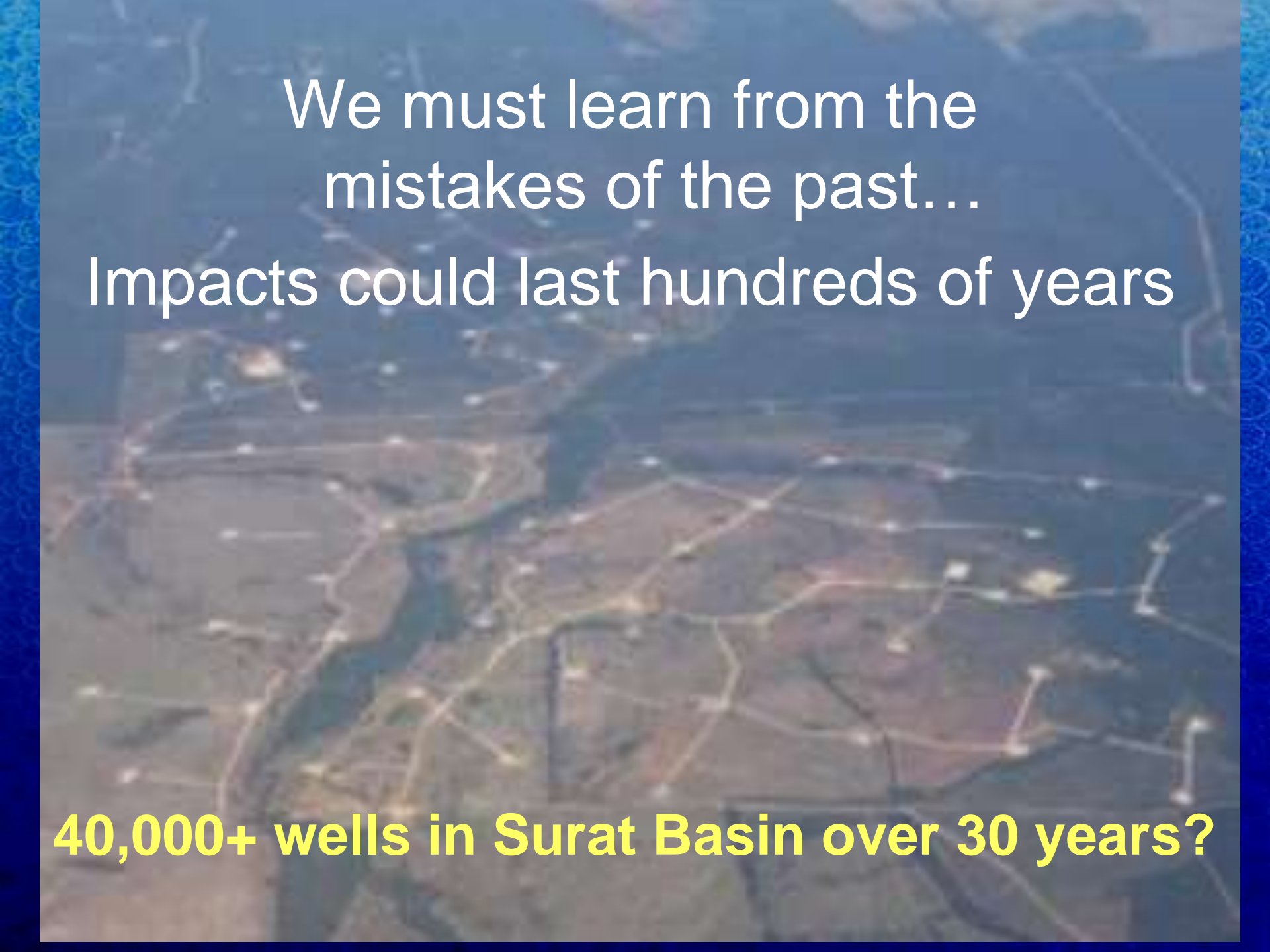
# *WHAT WE'VE LEARNT FROM THE PAST*

## Tree Clearing

- We now know this to be an irresponsible approach



**Severe economic harm**



We must learn from the  
mistakes of the past...

Impacts could last hundreds of years

**40,000+ wells in Surat Basin over 30 years?**

# LONG TERM IMPACTS ON GAB

expected that chemical toilets that require regular pump out will be used. These would normally be organised by the contract driller, but Arrow Energy will stipulate requirements for their management.

Potential issues include:

Potential Issue	Mitigation	Potential Residual Impact
Installation of permanent equipment that will result in the generation of large volumes of <b>associated water</b> to be disposed through beneficial use.	Application of a specific set of	Of Concern
Cross linkage between upper and lower <b>groundwater</b> aquifers through incomplete sealing of wells.	Environmental Management Procedures in accordance with decision trees that form part of the	Not of Concern
Installation of permanent infrastructure that collectively will draw down <b>groundwater</b> on a regional scale and potentially increase the movement of different qualities of groundwater water across confining layers.	Environmental Management	Of Concern
<b>Disturbance of soil</b> and associated siltation in surface runoff.	Process and	Not of Concern
Disturbance of items of <b>cultural heritage</b> value in the		Not of Concern

Direct Quotes from Santos GLNG pages  
(emphasis added)

## Appendix P2: Groundwater

[Section 3.4.2]

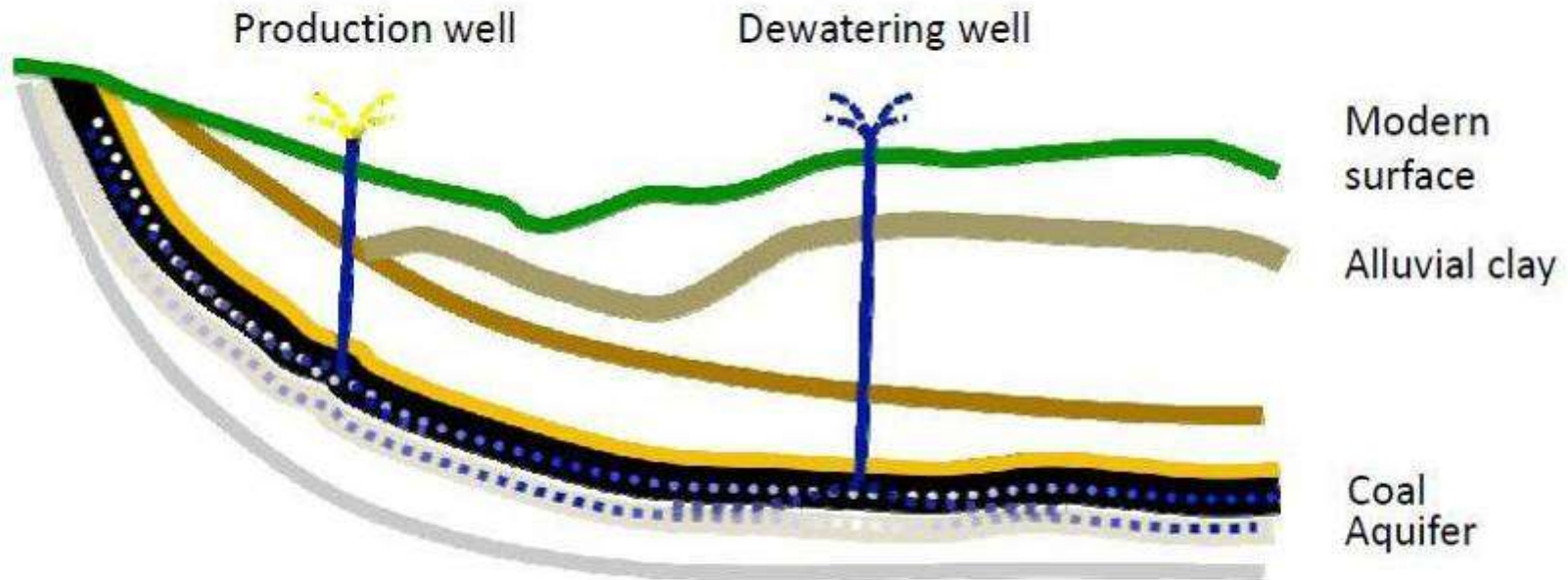
"In all fields there is potential for water to move vertically from aquifers above and below the wellfield into the coal seams as a result of the huge pressure differential caused by the drawdown of groundwater heads."

[Section 3.5.2]

Because the Walloon Coal Measures have been dewatered and the only source of replenishment is the Hutton Sandstone, it is expected that the rate of recovery of water levels in the Walloon Coal Measures will be very slow and **drawdown in the Hutton Sandstone aquifer will continue for many hundreds of years after operations cease.**

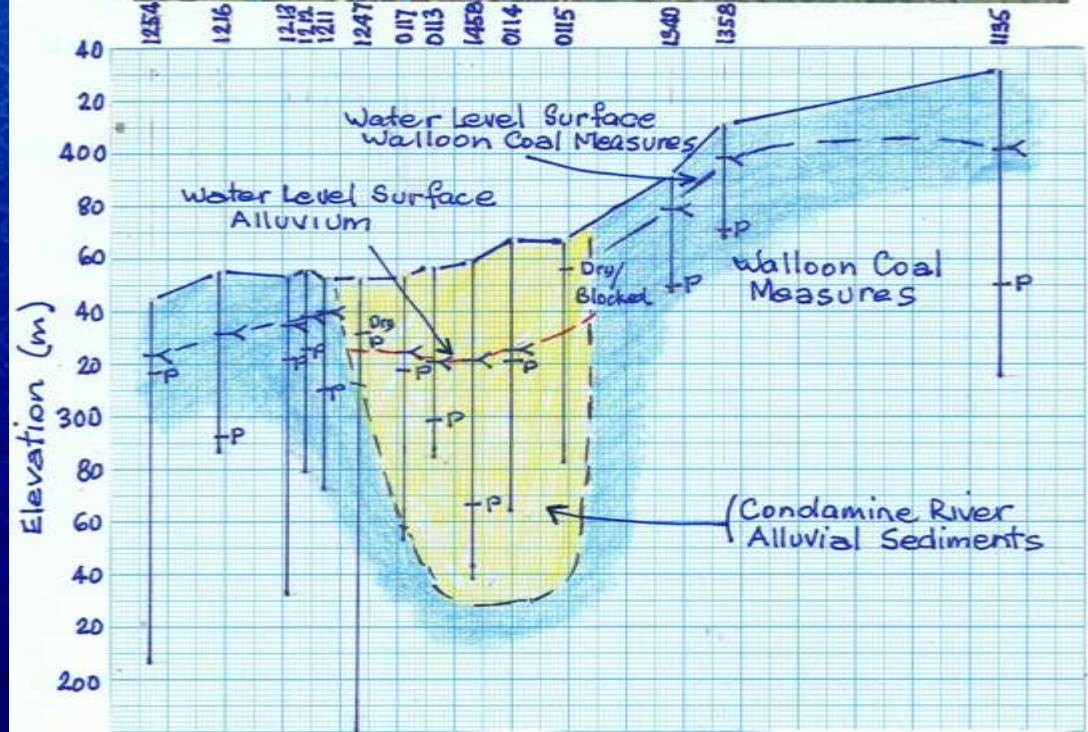
[http://www.glng.com.au/library/EIS/Appendices/P2\\_Groundwater%20%28Deep%29%20FINAL%20PUB LIC.pdf](http://www.glng.com.au/library/EIS/Appendices/P2_Groundwater%20%28Deep%29%20FINAL%20PUB LIC.pdf)

# Risk: Water movement from aquifer below coal into coal responding to dewatering



Water moves in response to head change (left side) and upwards in response to increased capillary "pull" particularly under and around bores

# HILLIER REPORT



# Burke considers groundwater report before decision on gas

ROSANNE BARRETT

TONY Burke is considering a report that warns of the potential for Queensland's coal-seam gas industry to deplete groundwater in the Great Artesian Basin as he prepares to rule on several multi-billion-dollar projects.

The federal Environment Minister remains committed to a deadline of October 22, when he is expected to advise international energy giants Santos and BG Group whether he will grant environmental approvals for their projects converting coal-seam gas to liquefied natural gas, worth an estimated \$22bn to the Queensland economy.

While the projects have been supported by the Queensland government, farmers and green groups have formed an alliance to call for a moratorium.

Their main concern is a poten-

tial depletion of the groundwater, something acknowledged by CSG companies in specific areas.

Irrigators commissioned a report by the former technical adviser to the Great Artesian Basin Co-ordinating Council, John Hillier. It found there was an equilibrium between the Walloon Coal Measures — where CSG exploration is under way — and the Great Artesian Basin.

"There has been movement from the Walloon Coal Measures to the alluvium in the past, and with the decrease in pressure from the Walloons, this reversal of gradient must have an effect," the report said.

Mr Burke said the department was "aware of the report by Dr Hillier and (has) considered that report in its advice to me. Water is one of many important issues considered in the assessment of these proposals."

Santos and BG Group have

acknowledged that their projects — which will extract 270 megalitres a day from the coal seam at their peak in 2014 — will have an impact on groundwater levels.

The Precipice Sandstone aquifer could drop as much as 15m, the Hutton Sandstone water table 3m and the Springbok Sands up to 5m, environmental impact statements acknowledge.

The companies will offer "make-good measures" to farmers when the water table drops, including lowering water pumps, compensation and providing bulk water. But landholders have warned that Mr Burke faces a "permanent state of unrest" if he approves the projects.

"If this is approved, there is going to be civil disobedience and non-violent protest," said Michael Bretherick, spokesman for the Western Downs Alliance.

The Australian – 11 October 2010

# CONCERN ABOUT MAKE GOOD PROVISIONS

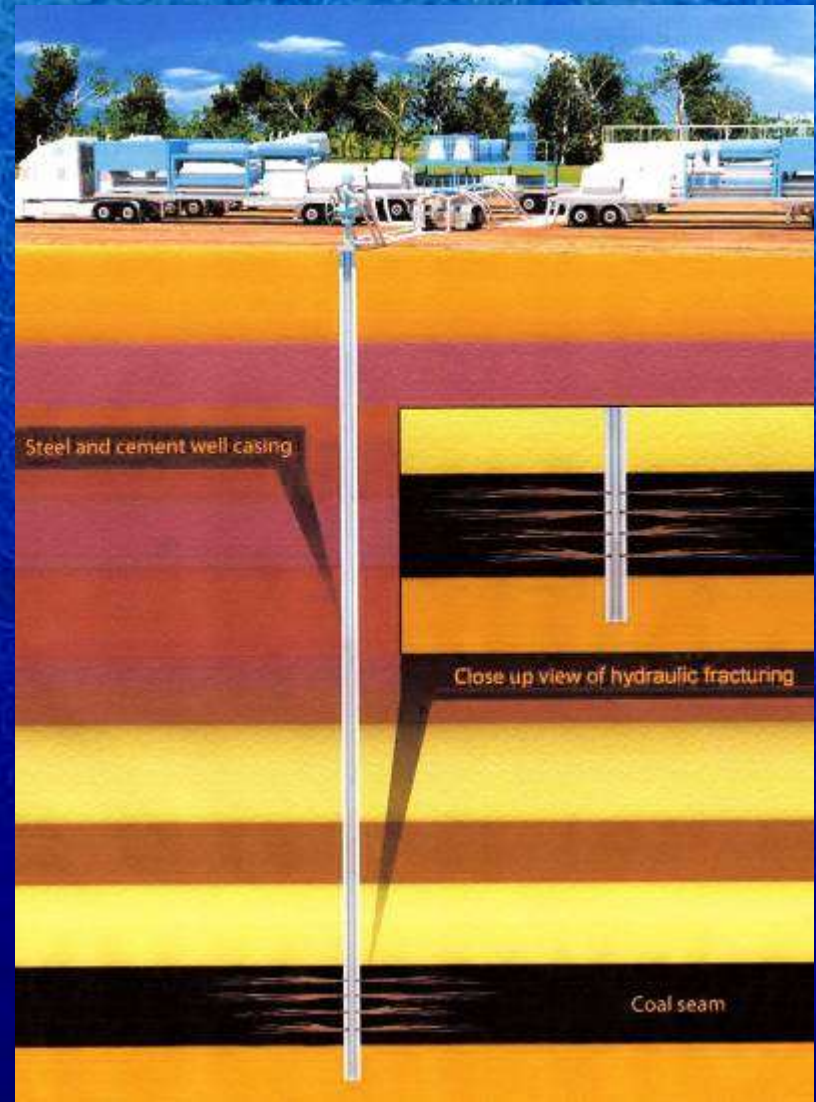
## Coal Seam Gas Field Environmental Values and Management of Impacts

Table 6.6.2 Potential Groundwater (Deep) Impacts and Mitigation Measures

Potential Impact	Mitigation Measures	Objective
of groundwater head levels in GAB aquifers.	<ul style="list-style-type: none"> <li>Monitor any groundwater users within the coal seam aquifers, determine trigger levels and implement water replacement plans</li> </ul>	Reduce the impact of dewater any groundwater users with bore screened in affected aquifers.
of groundwater head levels in underlying and underlying	<ul style="list-style-type: none"> <li>Monitor groundwater levels in selected GAB units, optimum injection to reduce drawdown extent, quarterly water level measurements, biannual hydrochemical monitoring.</li> </ul>	Reduce the extent of dewater within the GAB aquifers.
of landholder bore yields (surrounding CSG fields over groundwater heads) landholder extracts water from impacted aquifers.	<ul style="list-style-type: none"> <li>Conduct water level measurements biannually, undertake bore census within 30 km radius of the CSG field boundaries, submit annual comparison of monitored water level data to predicted water levels, determine trigger levels and implement water supply restoration measures as necessary. These measures include:               <ul style="list-style-type: none"> <li>Lower pump inlet in affected bore</li> <li>Drill new bore outside zone of influence</li> <li>Provide alternative supplies</li> <li>Compare to trigger values and if required implement water replacement plan and possible compensation</li> </ul> </li> </ul>	Reduce the impact of dewater surrounding groundwater use
of groundwater quality	<ul style="list-style-type: none"> <li>Develop and implement a program to monitor aquifer quality bi-annually.</li> </ul>	Verify no deterioration in groundwater quality

# ENVIRONMENTAL SAFETY

- Fracking
- Inter-aquifer connectivity
- Chemicals



# Robertson moves to ban toxic chemicals

Petrina Berry  
October 5, 2010

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## AAP

Proposed new laws to ban toxic chemicals from use in coal seam gas (CSG) operations were introduced to Queensland parliament on Tuesday.

Natural Resources Minister Stephen Robertson introduced the bill, which bans the CSG industry from using BTEX in fracking - a process where fluid is pumped at high pressure into a coal seam to fracture the seam and allow gas to flow readily into gas wells.

BTEX is an acronym for the toxic group of petroleum chemicals benzene, toluene, ethylbenzene, and xylenes.

The proposed new laws come after Cougar Energy's pilot underground coal gasification plant near Kingaroy was shut down in July after traces of benzene and toluene were found in nearby bores.

However, a spokesman for Mr Robertson told AAP the Cougar Energy water contamination scare did not trigger the bill.

He said Mr Robertson was fulfilling a promise he made in August to ban BTEX.

# TOXIC CHEMICALS BANNED

# LAND SURFACE IMPACTS

- Salt treatment and storage

👉 Poor storage



And you may get this—SALT blowing off an unrehabilitated 30+ year old petroleum

👉 Reverse osmosis







# ***THE WAY FORWARD***

- ✓ Positive meetings with government
- ✓ Move away from THEM & US approach
- ✓ Look for WIN-WIN

# ***THE WAY FORWARD***

- ✓ Reinjection
- ✓ Collaborative research

# *THE WAY FORWARD*

- Cumulative modelling
- Economic analysis
- Independent monitoring, reporting and assessment of CSG impacts

**A moratorium on further CSG development in Queensland until an independent scientific study determines the potential Impacts of wide-scale CSG development on groundwater, land and the environment.**

“We are stewards of this water for future generations – for our children and grandchildren”  
Colin Hazel Groundwater Engineer



[www.basinsustainabilityalliance.org](http://www.basinsustainabilityalliance.org)