



# Coal Seam Gas water issues under the National Water Initiative

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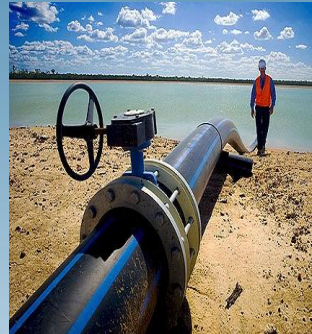
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12 June 2012



# Presentation Overview

- Overview of National Water Commission
  - National Water Initiative
  - Australia's Groundwater resources
  - Water planning, mining and coal seam gas
- Coal seam gas water management
  - NWC position
  - Managing risks
  - Recommendations and principles
- Conclusion



# Australia's National Water Initiative:

## An enduring blueprint for reform ...

### Objective

To achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes.

### 8 interrelated elements of water management

Water access entitlements and planning

Water resource accounting

Best practice water pricing

Urban water reform

Water markets and trading

Knowledge and capacity building

Integrated management of environmental water

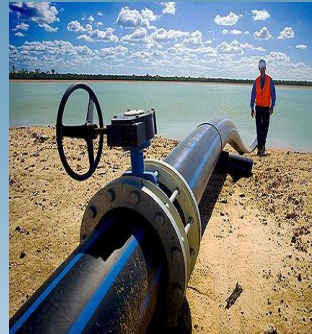
Community partnership and adjustment



# The NWI and Groundwater

The NWI emphasises a “whole of water cycle” approach, including the following actions:

- improve our knowledge of groundwater-surface water connectivity, with significantly connected systems to be managed as one integrated resource;
- complete the return of all currently over-allocated or overused systems to environmentally-sustainable levels of extraction;
- improve understanding of sustainable extraction rates and regimes, and develop common approaches to achieving sustainability;
- develop better understanding of the relationship between groundwater resources and groundwater-dependent ecosystems.





# Australia's Groundwater Challenge

- Out of sight, out of mind
  - poorly understood compared with surface water
  - historical underinvestment in science, planning and management of groundwater, but
  - High security supply through drought periods
- Groundwater importance (AWR 2005) –
  - 17% of available water (recharge plus runoff),
  - 32% of Australia's consumptive water use
  - Only source of water in large parts of country
- Increased utilisation since mid 1990s, especially since MDB cap on surface water
- Problems with over-allocation and double counting of groundwater & surface water
- Extractions exceed recharge in many locations







# Australia's significant groundwater areas

|                               |                  |
|-------------------------------|------------------|
| • <b>Great Artesian Basin</b> | <b>549 GL/yr</b> |
| • Burdekin                    | 350 GL/yr        |
| • Gnangara mound (Perth)*     | 339 GL/yr        |
| • Murrumbidgee catchment      | 340 GL/yr        |
| • Lower limestone coast       | 280 GL/yr        |
| • Sydney water supply area*   | 211 GL/yr        |
| • Lachlan catchment           | 191 GL/yr        |
| • Namoi catchment             | 171 GL/yr        |
| • Condamine Balonne           | 141 GL/yr        |
| • Murray catchment            | 100 GL/yr        |
| • South West Yarragadee       | 70 GL/yr         |
| • Goulburn Catchment          | 57 GL/yr         |
| • Adelaide water supply area* | 53 GL/yr         |

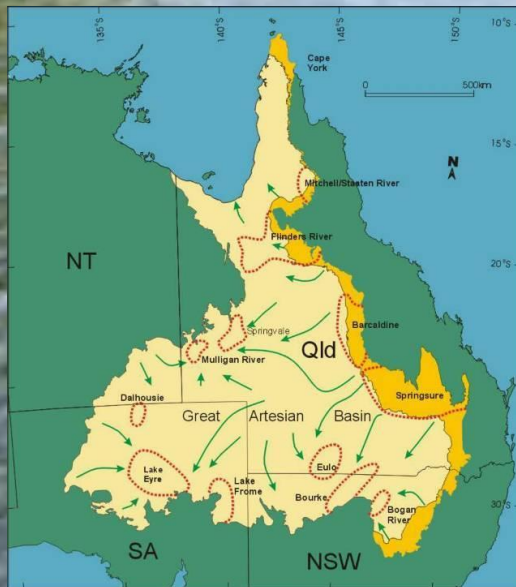


Sources – 2004/05 extractions - CSIRO Sustainable Yields, Australian Water Resources 2005



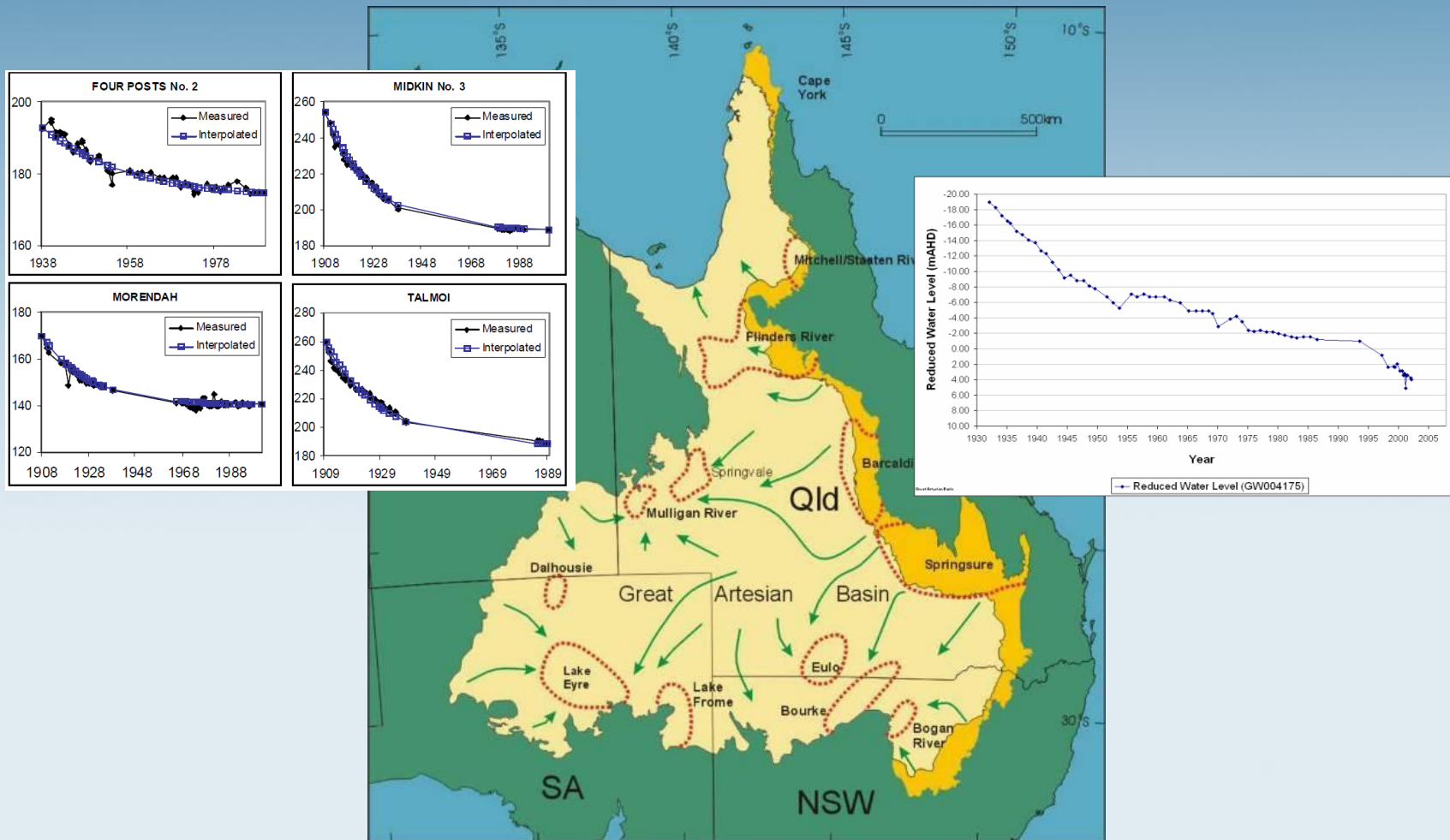
# Great Artesian Basin

- **Extraction 540 GL per annum**
- **History of over - extraction**
- **30% bores have ceased to flow**
- **Major investments in Cap & Pipe**





# Great Artesian Basin Water Levels



Representative bore hydrograph for the Great Artesian Basin, Source: AWR 2005





# Great Artesian Basin:— groundwater dependent ecosystems



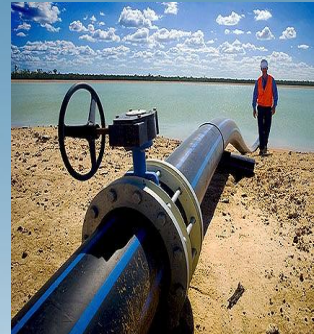
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*GAB spring, Northern Territory.  
Photo: Australian Natural Resources Atlas*



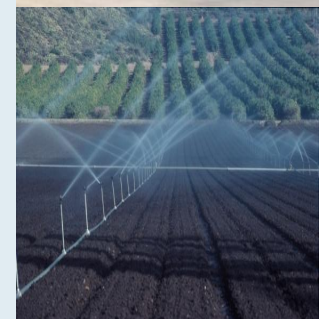
*GAB spring, South Australia.  
Photo: GABCC*





# Commission interest in Mining & CSG

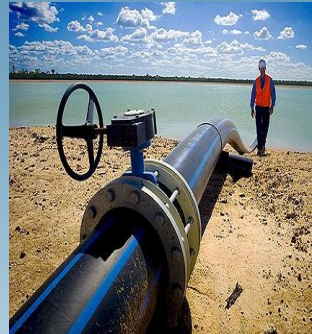
- Mining water use
  - Small but growing water user
  - Not well integrated with water planning
  - Increasing community concerns in some areas
- Coal seam gas
  - Rapid growth in Qld, Surat Basin
  - Large volumes of waste water, often saline
  - Potential effects on Great Artesian Basin
- NWC activities
  - Project - Cumulative impacts of mining on groundwater
  - Project – Incorporating mining into water planning
  - Waterlines – Coal seam gas and water discussion paper
  - Great Artesian Basin water resource assessment
  - Position statements on Mining and Coal Seam Gas





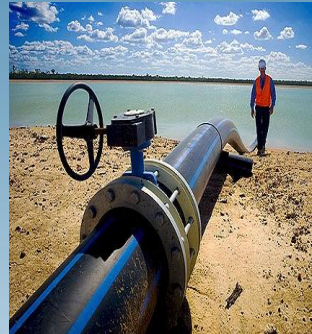
# Commission view on Coal Seam Gas

- National Water Initiative Clause 34
  - *“special circumstances facing the mineral and petroleum sectors might require specific management arrangements outside its scope.”*
- NWC 2009 & 2011 biennial assessments
  - *“In 5 years little progress had been made since to spell out those special circumstances.*
  - *As a consequence, there has been little integration of mining industries with broader water markets and water planning processes, despite the potential for considerable benefits in many cases.”*
- Commission position
  - Position paper on mining and water in May 2010,
  - Position paper on CSG and water in December 2010.
  - Outline water management challenges:
    - lack of integration of mine planning and operations in regional water planning
    - increasing community concerns about the cumulative impacts of mining on water resources.



# Commission position - CSG water use

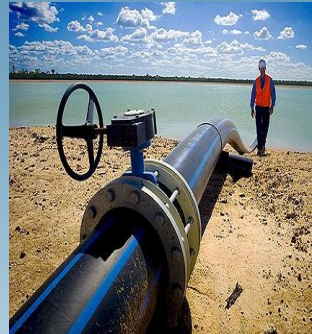
- Substantial economic and other benefits
- If not adequately managed and regulated, risks significant long term and adverse impacts on adjacent surface and groundwater
- Current projections of water use
  - Significant uncertainty in water use estimates
  - Surat & Bowen Basins
    - Industry estimate 75 GL/yr
    - Qld Water Commission 95 GL/yr, 125 GL/yr over next 3 years
  - Important to improve water accounting and reporting





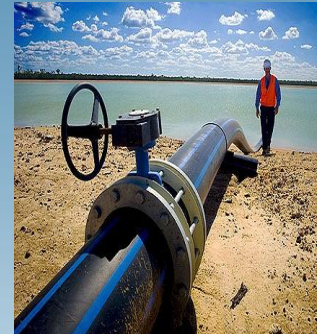
# Commission position - CSG water risks

- Impact on connected surface and groundwater
  - Incl. Great Artesian Basin and Murray-Darling Basin
  - Reduced pressures in adjacent aquifers
  - Reduced flows in connected surface water
  - Potential for land subsidence
- Releases of treated wastewater to surface water
  - Altered natural flow patterns
  - Risks to water quality, river & wetland health
  - Risks of clean water pollution in turbid systems
- Hydraulic fracturing (fracking)
  - Potential cross connection and cross contamination
  - Potential impacts on groundwater quality



# Commission position - CSG water management

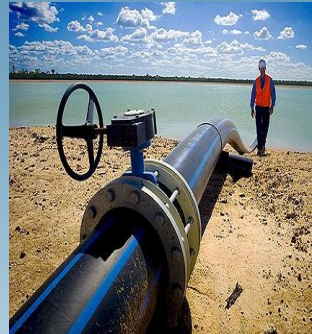
- Roles
  - Regulation primarily State Government responsibility
  - Commonwealth role in certain circumstances EPBC
  - NWC interest in full implementation of NWI
- Co-produced water management is a base for profitable CSM production. Significant, long-term and adverse impacts can be avoided or mitigated **if managed appropriately.**
- In view of the uncertain impacts of coal seam gas developments — especially their long-term nature and the cumulative effects of multiple projects— the Commission recommends an **adaptive and precautionary approach** to managing these developments.
- Such an approach will be essential to make sure that as we develop our understanding of the industry's impacts, this new knowledge will actually be taken up and **progressively applied through improved regulation and management practices.**





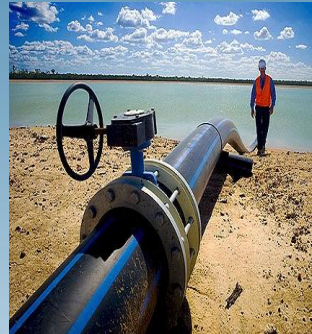
# CSG Water Management Principles

1. The interception of water by Coal Seam Gas extraction should be licensed to ensure it is integrated into water sharing processes from their inception...
2. Project approvals should be transparent, including ... predicted environmental, social and economic risks along with conditions to manage the risks.
3. Adequate monitoring, including baseline assessment of surface and groundwater systems,
4. States and territories should work to achieve consistent approaches to managing the cumulative impacts of CSG extraction... and account for the impacts in water budgets,



# CSG Water Management Principles

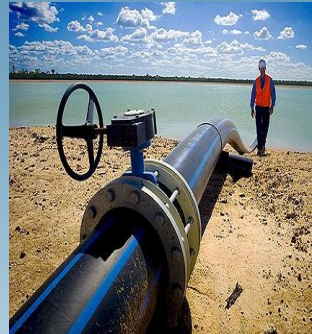
5. Potential options to minimise the cumulative impacts of extraction on the water balance should be pursued as a first priority...aquifer reinjection and groundwater trading or direct substitution
6. If discharges to surface waters are unavoidable, they should be conditioned so that environmental values and water quality objectives...are protected.
7. States and territories should undertake water and land-use change planning and management processes in an integrated way ...
8. Clear accountabilities should be identified for any short- or long-term cumulative impacts from Coal Seam Gas processes,





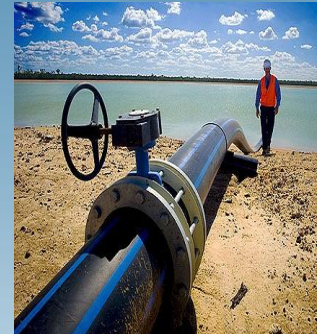
# CSG Water Management Principles

9. The full costs, including externalities, of any environmental, social and economic water impacts and their management should be borne by the Coal Seam Gas companies...
10. A precautionary and adaptive approach to managing and planning for CSG activities is essential ...
11. Water produced as a by-product of CSG extraction, ... should be included in water planning and management processes that are compliant with the National Water Initiative.



# Recent developments

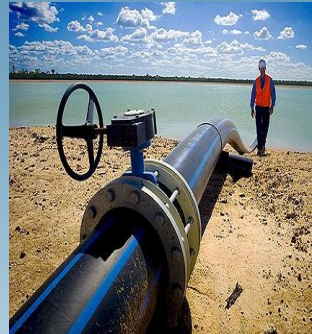
- CSG development and regulatory responses progressing rapidly
- Substantial legislative, regulatory and organisational reforms occurring in Queensland and NSW.
- Federal developments
  - Senate Rural Affairs and Transport References Committee report on CSG impacts on the MDB,
  - Standing Council on Energy and Resources (SCER) agreed to the development of a national harmonised regulatory framework for the CSG industry,
- Australian Government \$200m reform package
  - \$150m for bioregional risk assessments & research, \$50m for States to implement COAG reforms
  - Interim Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining
  - build scientific evidence and understanding of the impacts on water resources of extractive industry activities
  - Undertake bio-regional risk assessments and research to improve the standards of regulation of these industries.





# Conclusions

- Substantial economic and other benefits
- If not adequately managed and regulated, **risks significant long term and adverse impacts** on adjacent surface and groundwater
- The Commission recommends an **adaptive and precautionary approach** to managing long term and cumulative effects



[www.nwc.gov.au](http://www.nwc.gov.au)



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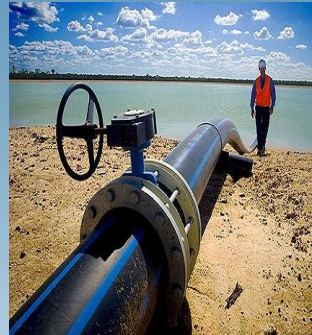
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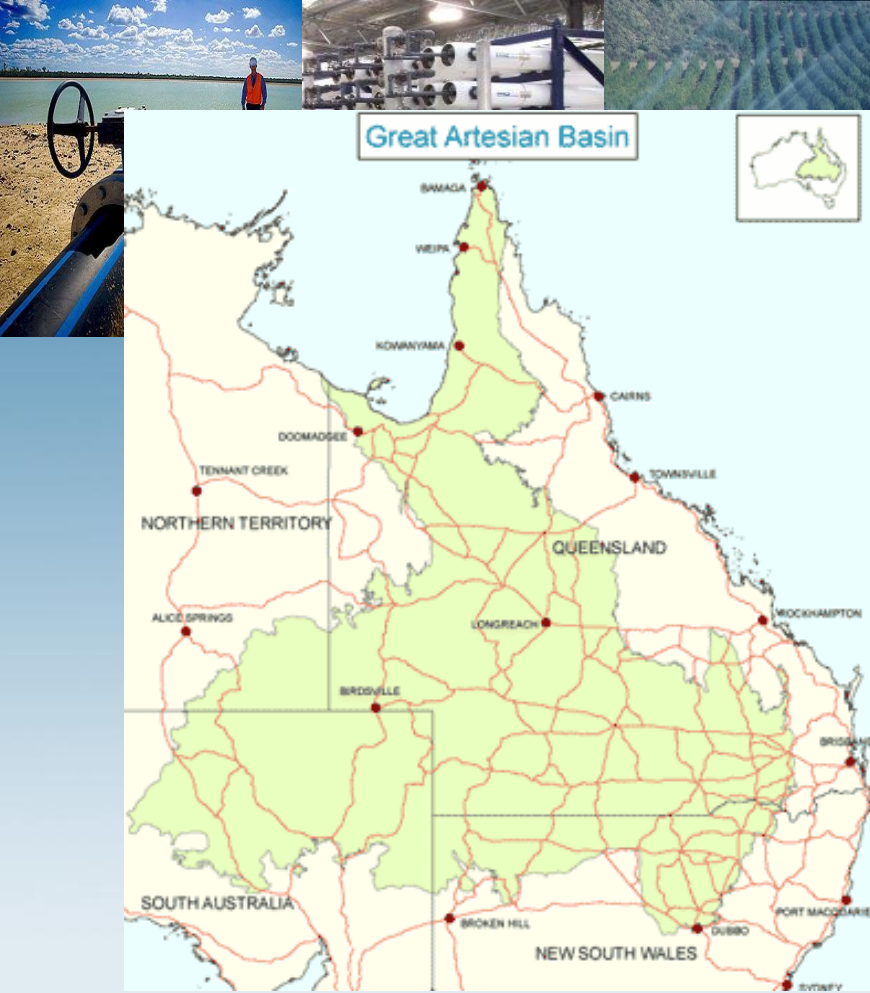


Artesian Bore, Cunnamulla  
Source: Cambridge University Library Fisher  
Collection, Y30850

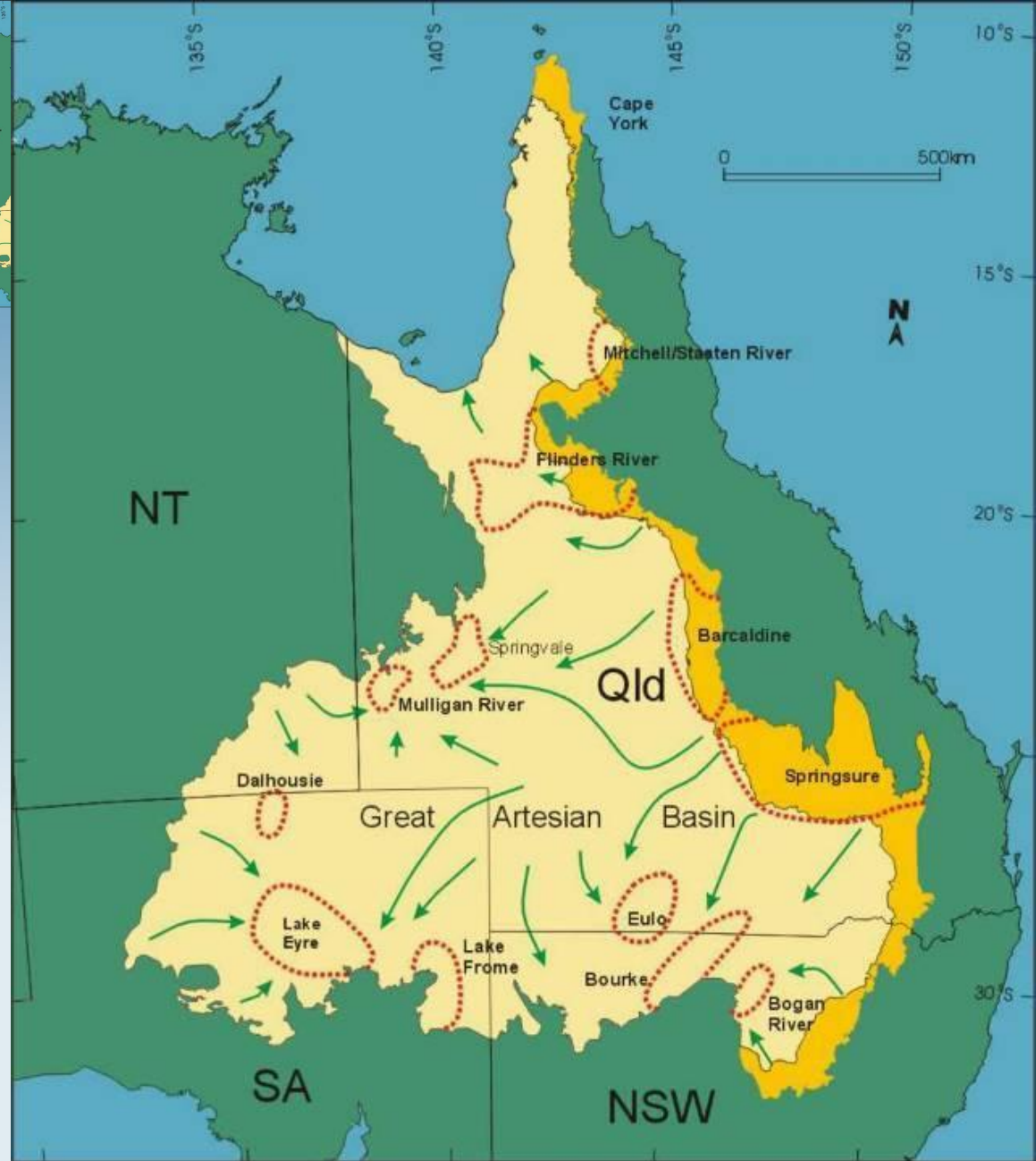


Artesian Bore Barcaldine district Qld c1894  
Source: John Oxley Library 109159





*The GAB*  
Source: SEWPaC



*The GAB*  
Source: GABCC







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*CSG evaporation basin  
Photo: Glenn Hunt. Brisbane times*

*CSG evaporation basin  
Photo: RPS Pty Ltd (NWC Waterlines)*







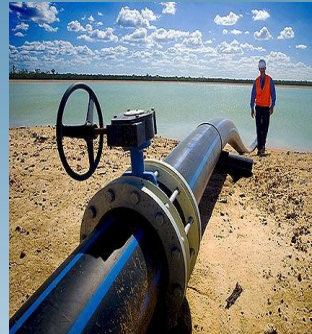
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*Desalination Plant.  
Photo: University of Sydney*

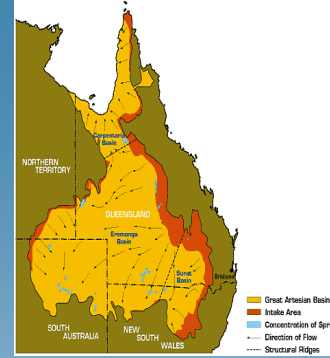


*Salt disposal basin, South Australia.  
Photo: Murray-Darling Basin Authority*

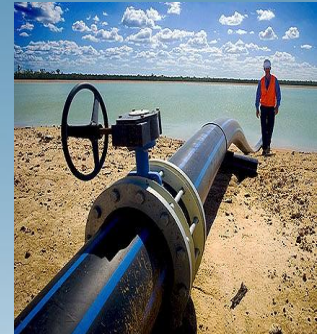




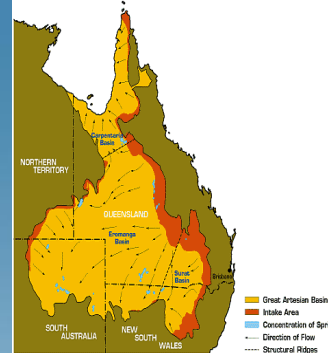
# GAB Water Resource Assessment



- The Great Artesian Basin (GAB) covers one-fifth of the Australian continent, or 1.7 million square km, and is one of the world's largest confined groundwater systems.
- Parts of the GAB water resource have been dated with ages of millions of years.
- The Great Artesian Basin Water Resource Assessment (GAB WRA) has been commissioned to improve understanding of available groundwater resources in the Basin's aquifers.
  - will help water managers meet National Water Initiative commitments
  - will play an important role in synthesising the available information about the hydrological status of the basin's water resources and future water availability
  - funding of \$6.25 million by Australian Government, to be delivered by CSIRO and Geoscience Australia
- The assessment complements several projects already funded by the NWC



# GAB Water Resource Assessment



## GAB WRA products with relevance to the CSG industry

### By December 2011

- Final technical report on review of models and methodologies

### By December 2012

- Four final region reports providing detailed assessment of water resource, climate and development scenarios
- Final technical report on hydrostratigraphy, hydrogeology and system conceptualisation of the GAB
- Final technical report on environment
- Final 3D visualisation
- More information is available at: <http://www.csiro.au/science/Great-Artesian-Basin-water.html>

