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Galilee Gas Project AgForce Meeting

Andrew Falkner – Nicola Fry | 13 June 2013 | AGL External

Galilee Gas Project

CSG exploration JV between AGL and Galilee Energy.

- > AGL (ASX: AGK):
 - » Operator with 175 years of energy experience
 - » Among Australia's leading integrated energy companies, with 3.5m customer accounts and a significant power generation portfolio
 - » Employs about 3000 people mostly in Sydney, Melbourne and Brisbane

- > Galilee Energy Ltd (ASX:GLL):
 - » Brisbane-based emerging energy company
 - » The Galilee Project Team consists of geologists, hydrogeologists, engineers (drilling, operations, reservoir), environmental scientists, and specialists from land and approvals, community, commercial



AGL Upstream Gas assets

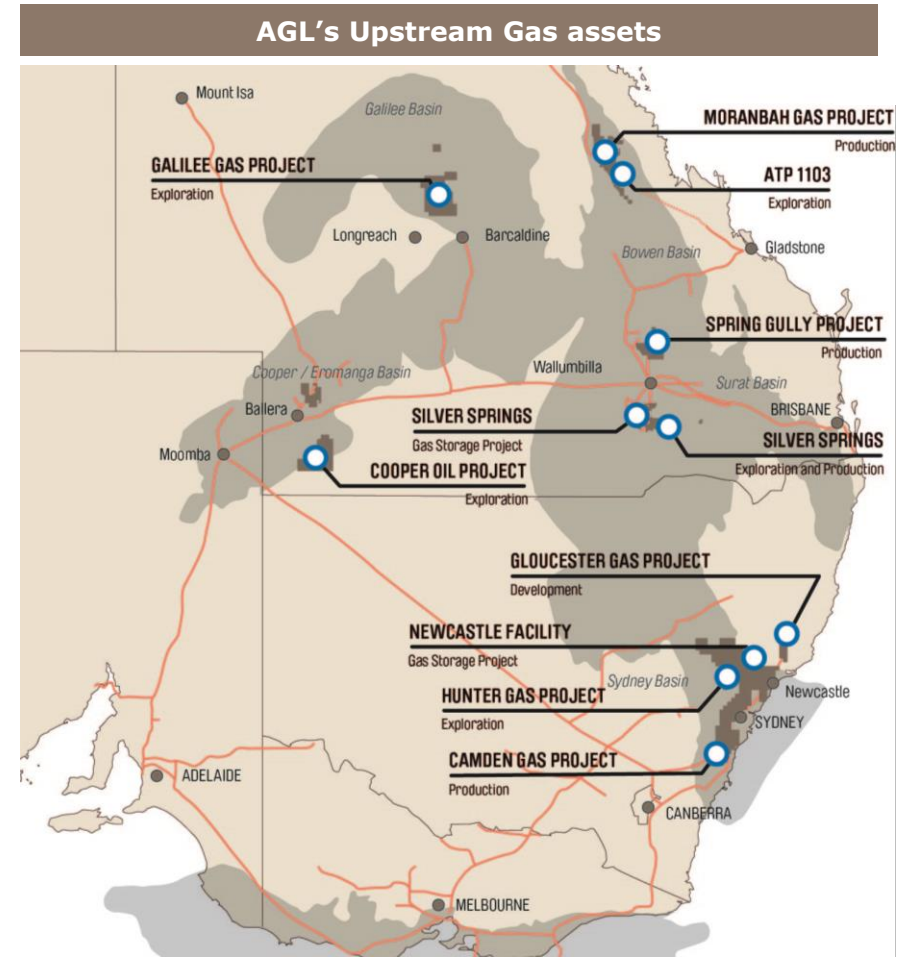
Majority of assets in exploration phase.

> Operating assets:

- » Production: Camden Gas Project, Silver Springs Production, Spring Gully Project
- » Moving to development: Gloucester Gas Project
- » Exploration: Hunter Gas Project, Galilee Gas Project, Cooper Oil Project
- » Storage: Silver Spring Gas Project, Newcastle Gas Storage Project

> Non-operating assets (JVs):

- » Production: Moranbah Gas Project
- » Exploration: ATP 1103



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Exploration

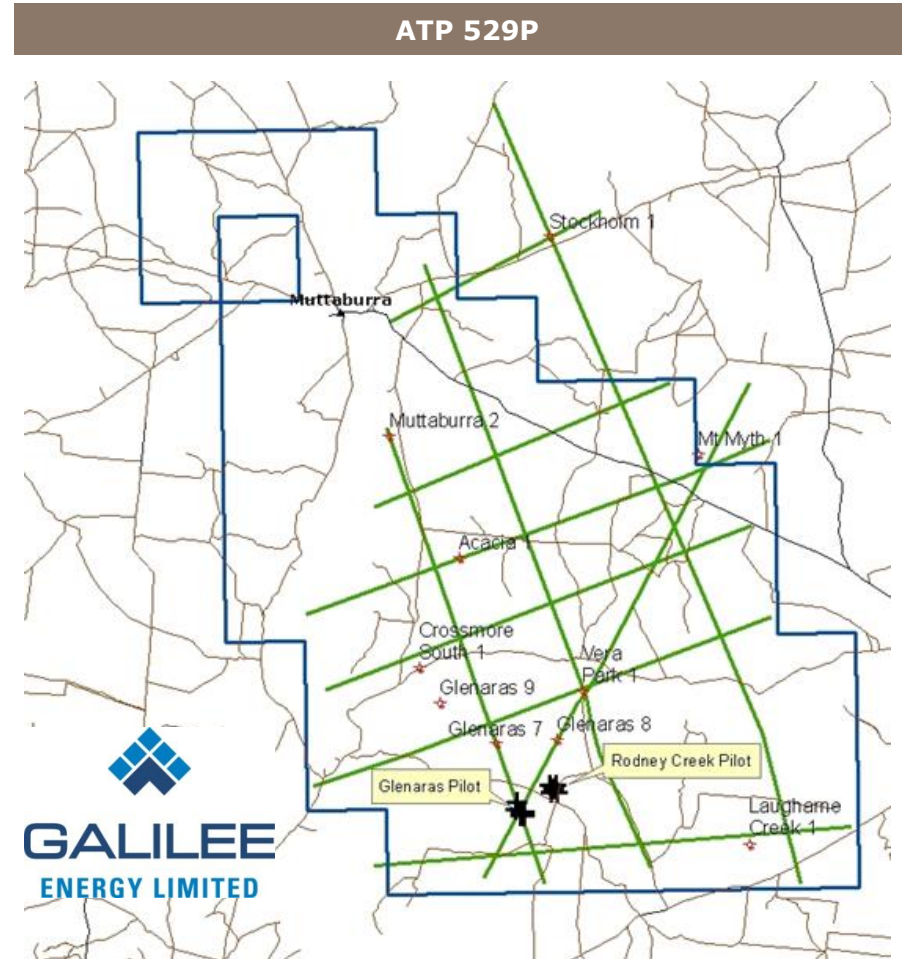
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ATP 529P: permit area for CSG exploration

Natural gas that could help meet Australians' energy needs.

- › Granted in 1992 under the Petroleum Act 1923
- › \$50+ million investment
- › 259 PJ of 2C resources
- › To date:
 - » 7 core holes
 - » 3 further test wells
 - » 5-well production pilot
 - » 300ML holding pond
 - » Aquifer monitoring bores
 - » Camp
 - » 540km 2D seismic



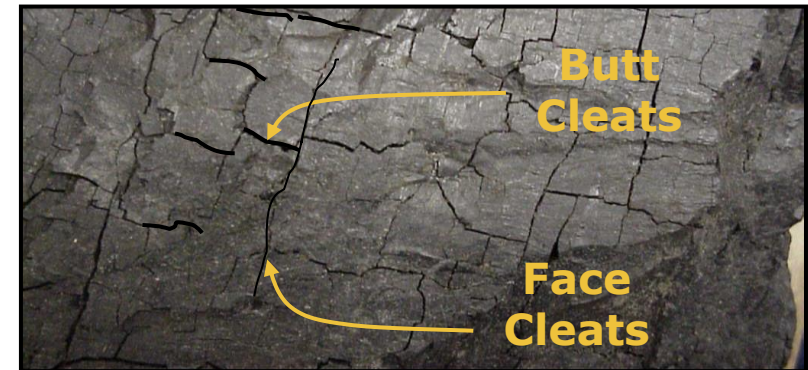
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What is CSG?

Naturally occurring gas trapped in coal seams.

- › Mainly methane (CH₄)
- › Produced from ancient organic matter & trapped in coal seams
- › About a third of eastern Australia's natural gas is sourced from CSG
- › Held in place by water that saturates coal seam
- › Extracted from coal seam by removing the water to depressurise and allow gas flow
- › The removed water, which is old and slightly salty, is produced water

Typical coal cleats



Glenaras holding pond



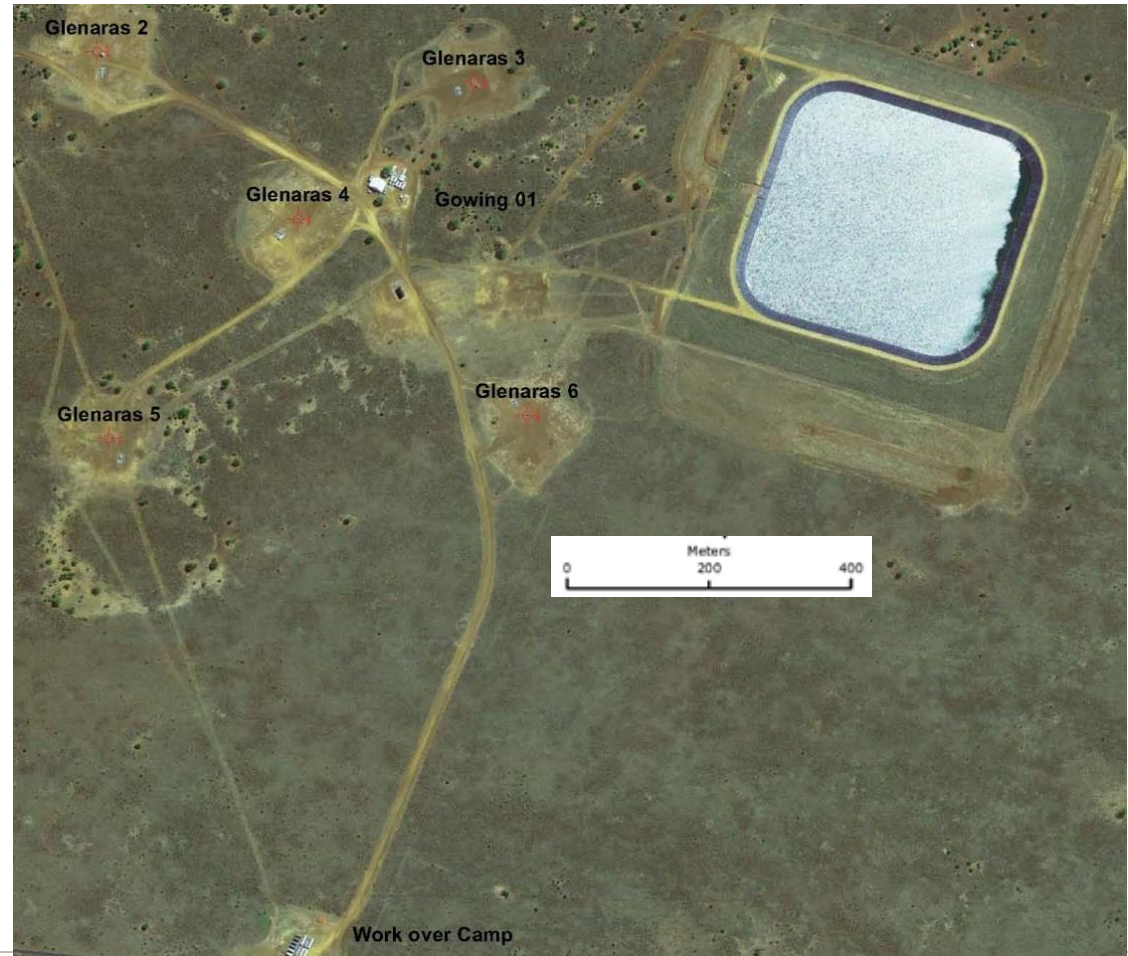
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Glenaras production test pilot

Investigating the area's potential gas.

- > The pilot included:
 - » 5 close spaced production wells
 - » 3 fraced wells
 - » 2 barefoot completions
 - » Aquifer monitoring bores
 - » Camp
 - » Holding pond

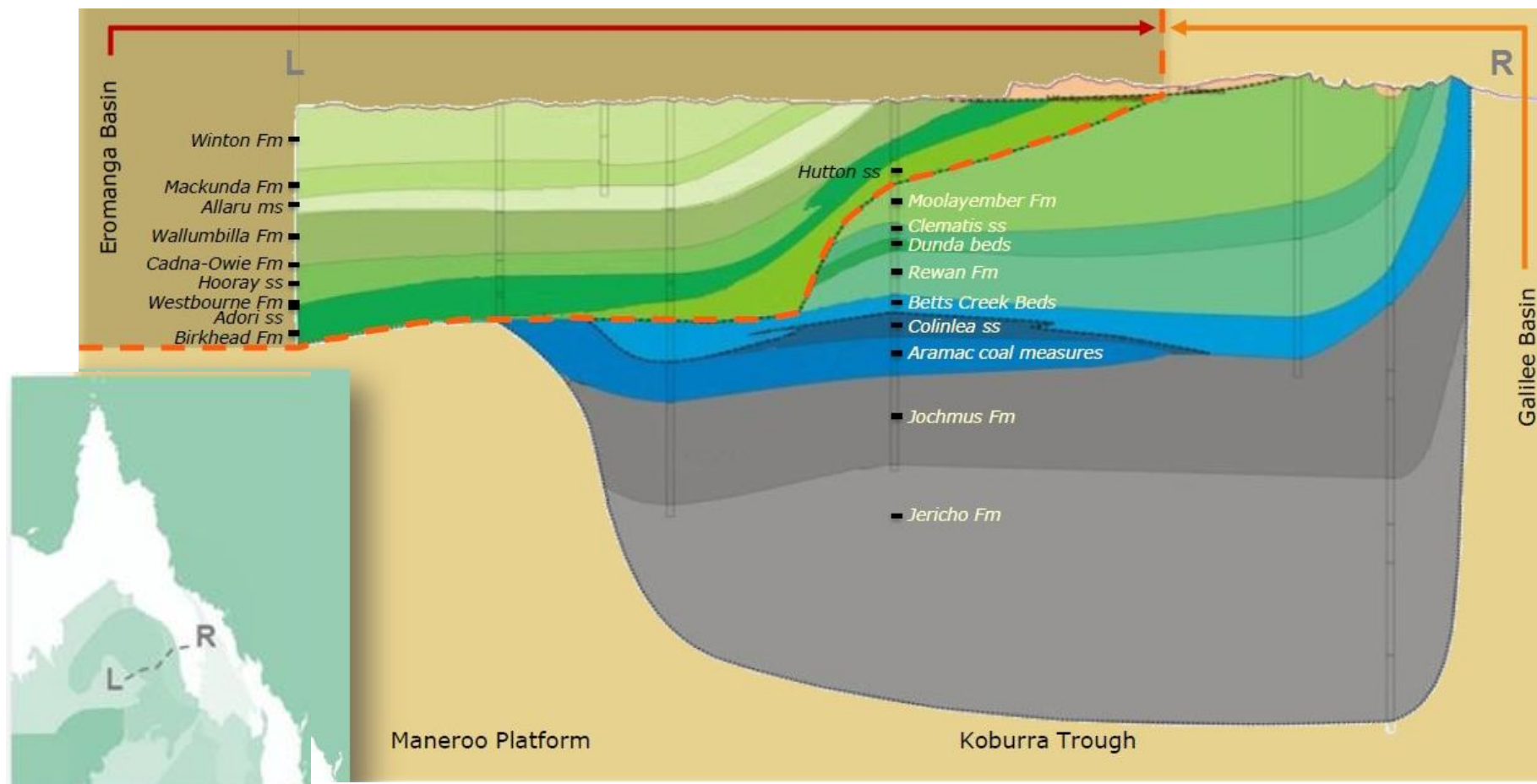
Aerial view of the Glenaras production test pilot wells and holding pond



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Galilee Basin Geology

Far from flat and boring.



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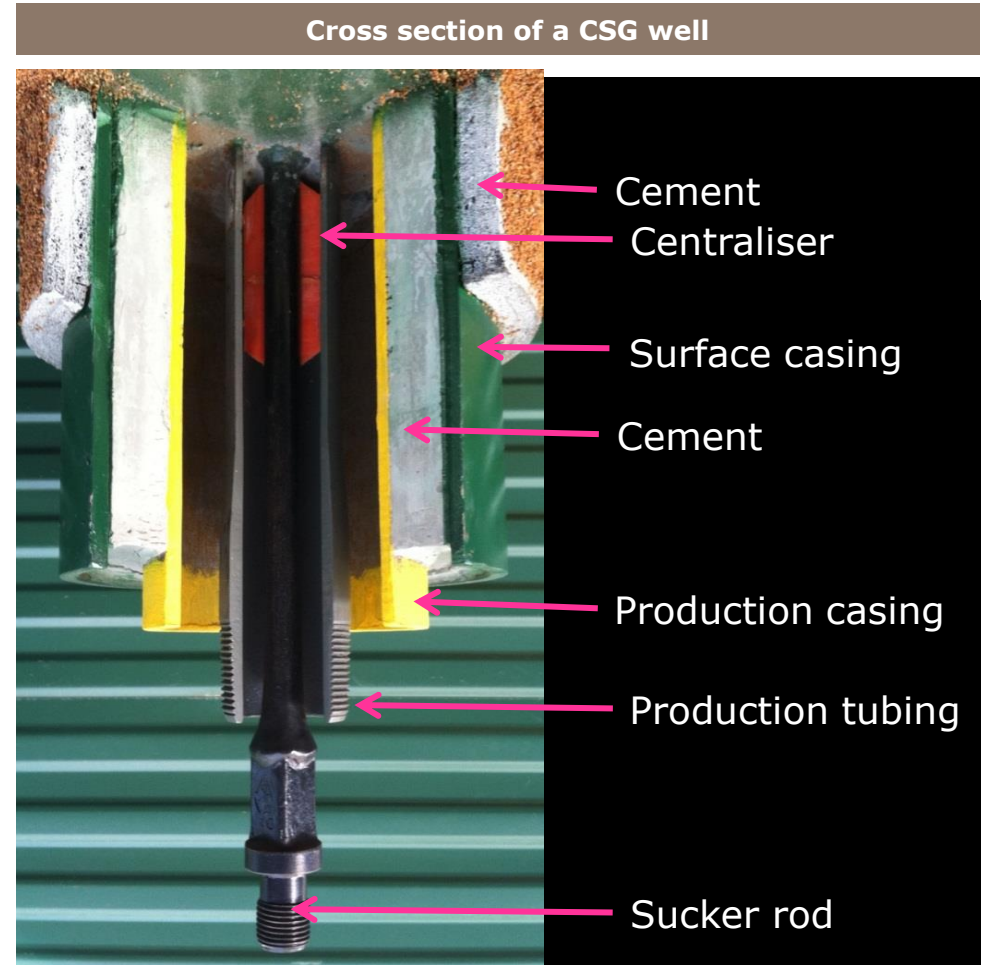
Operations



Well integrity and design

Well sealed with steel and concrete; coal seams don't connect to aquifer.

- › AGL follows Oil & Gas Standards using API¹ casing & wellheads
- › 4 barriers of protection down to 120m below the surface
- › Wells are pressure cemented to prevent leaks
- › Cement is brought back to surface on surface & production casing
- › Cement bond logs to confirm zonal isolation & cement quality
- › Ensures geological layers are isolated



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¹ American Petroleum Institute

Fracturing CSG wells stimulates flow

A controlled and measurable process to create a path for CSG.

> Process:

- » Fluid pumped into a formation pushes open natural cleats
- » Sand is pumped in to hold the 'fracture' open
- » Operation takes about 2 days

> Frac fluid:

- » Typically 98.5% sand & water
- » Chemicals, if used, are highly diluted, controlled and regulated
- » No BTEX chemicals used in fracturing fluids

CSG fracturing in Gloucester



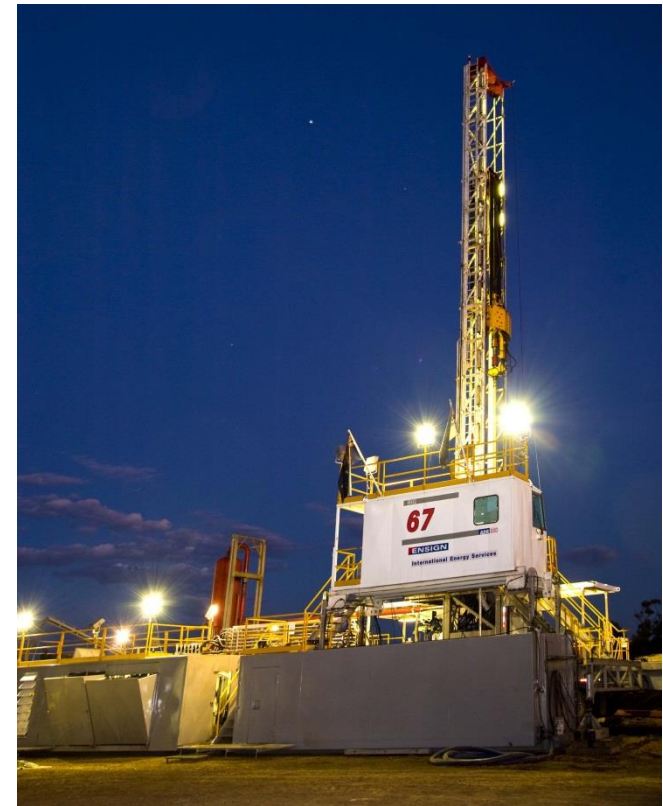
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What next?

Geology and hydrogeology investigations and exploration to continue.

- > If the Glenaras Pilot is successful, further pilots will be required to add reserves.
- > More information will be collected to understand the reservoir.
- > A commercial decision is 5-7 years off with a domestic market most likely
- > AGL will continue to update and inform the community and key stakeholders about our operations

State-of-the-art Ensign 67 Rig in Galilee



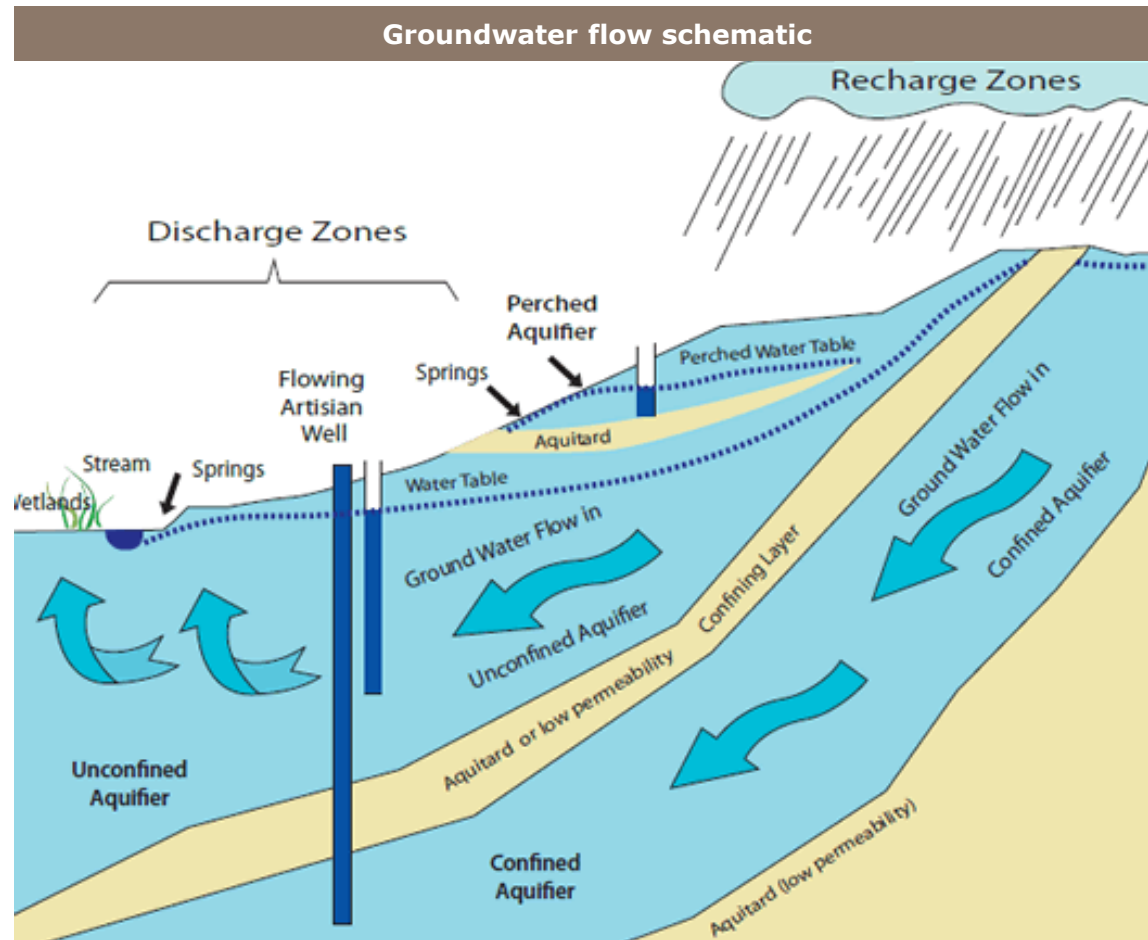
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Water matters



Conceptual groundwater occurrence and flow.

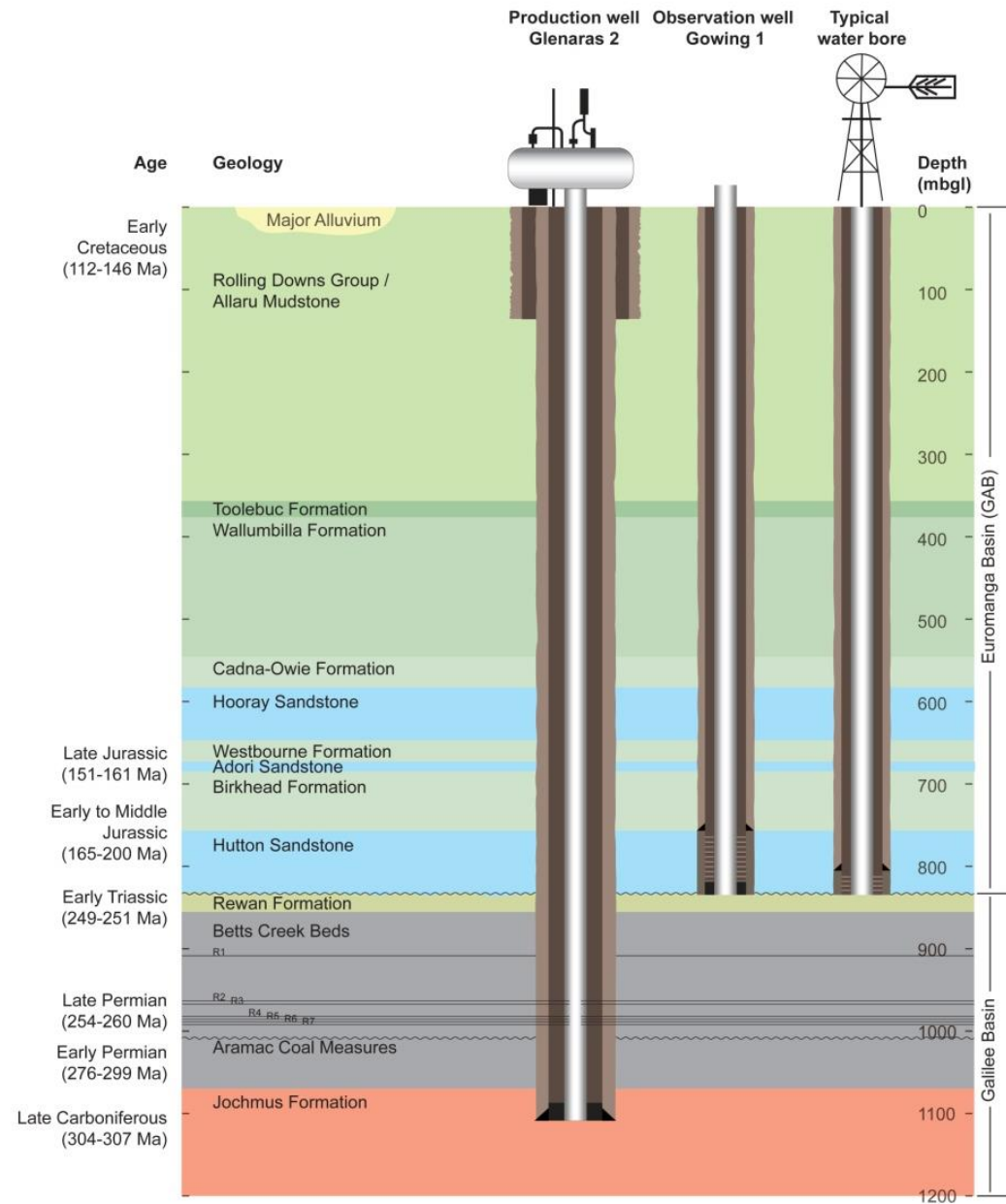
Hydrogeology model promotes understanding.



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Hydrogeology

- > Alluvium (Tertiary – Quaternary)
 - » Older deposits – remnant mesas in the landscape
 - » Younger deposits – sediments beneath floodplains of present day rivers and creeks
- > Eromanga Basin (part of GAB) (Jurassic – Cretaceous)
 - » Hooray Sandstone
 - » Adori Sandstone
 - » Hutton Sandstone
 - » Rewan Formation
- > Galilee Basin (Permian)
 - » No beneficial aquifers



This is a diagrammatic representation only and is not to scale.

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Underground Water Impact Report

Pilot hasn't impacted shallow sandstone aquifers of the GAB.

- > Requirement of QLD Government
- > Describes
 - » All aquifers and their interaction
 - » Quantity of water extracted and predicted
 - » Data from CSG pilot and nearby water bores
 - » Predicts changes of water levels within the coal seams, and local aquifers (GAB) – no impact >5m threshold
 - » Numerical model and description
 - » Water monitoring strategy
 - » Reporting/review process
- > Report available on: agl.com.au/galilee

Nearby private water bore where data was collected



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Produced water management

Reuse solutions to promote sustainable operations.

- > Investigating irrigation trial of saltbush as a beneficial use of the water
- > Studies completed to date
 - » Water Treatment Concept Design
 - » Water treatment requirements
 - » Soil investigation
 - » Suitable irrigation application rates for soil types
- > Trial irrigation area will be between 25ha to 50ha

Sheep grazing alongside AGL's exploration activities



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