

Camden Gas Project.

Camden Community
Consultative Committee

November 2015

Energy in
action.[®]

Since 1837

AGL

Water matters.

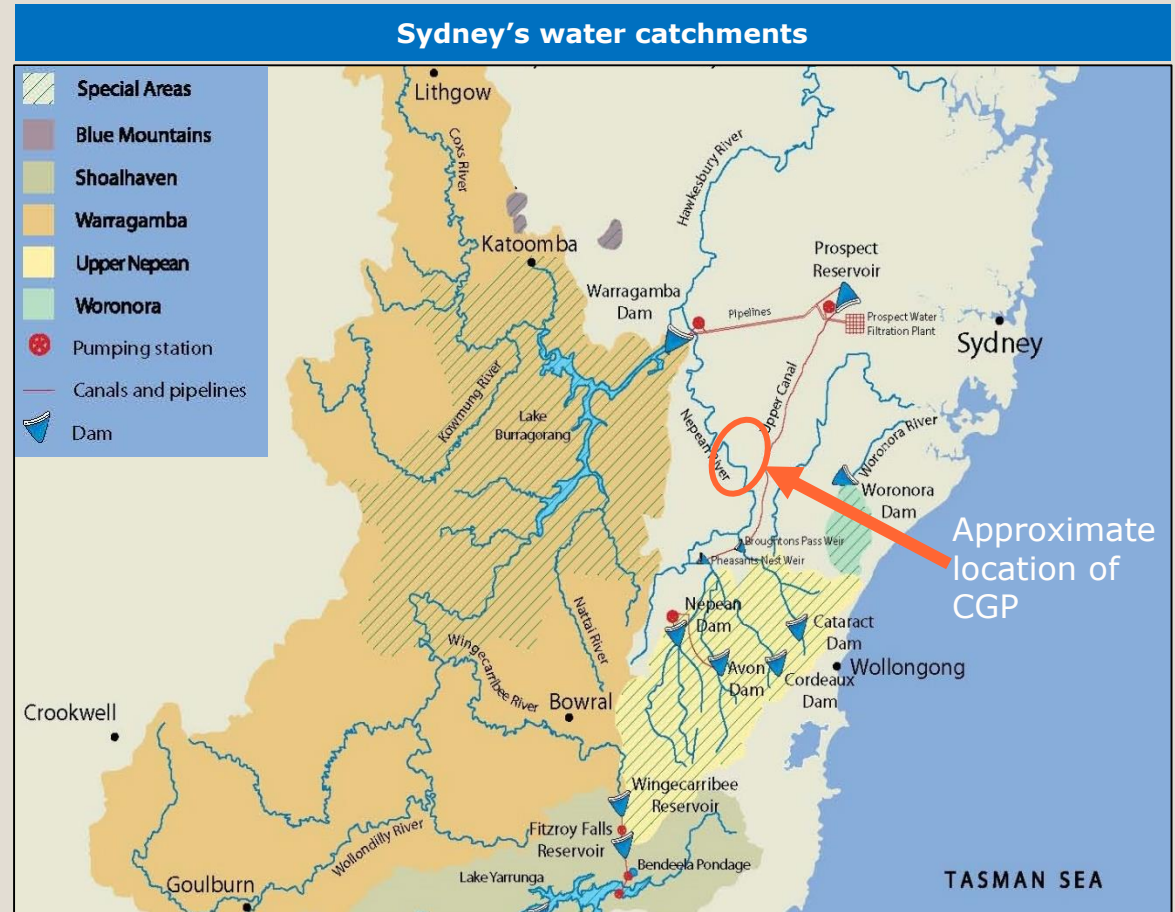
Energy in
action.[®]

Since 1837

 **AGL**

Water resources in Macarthur area.

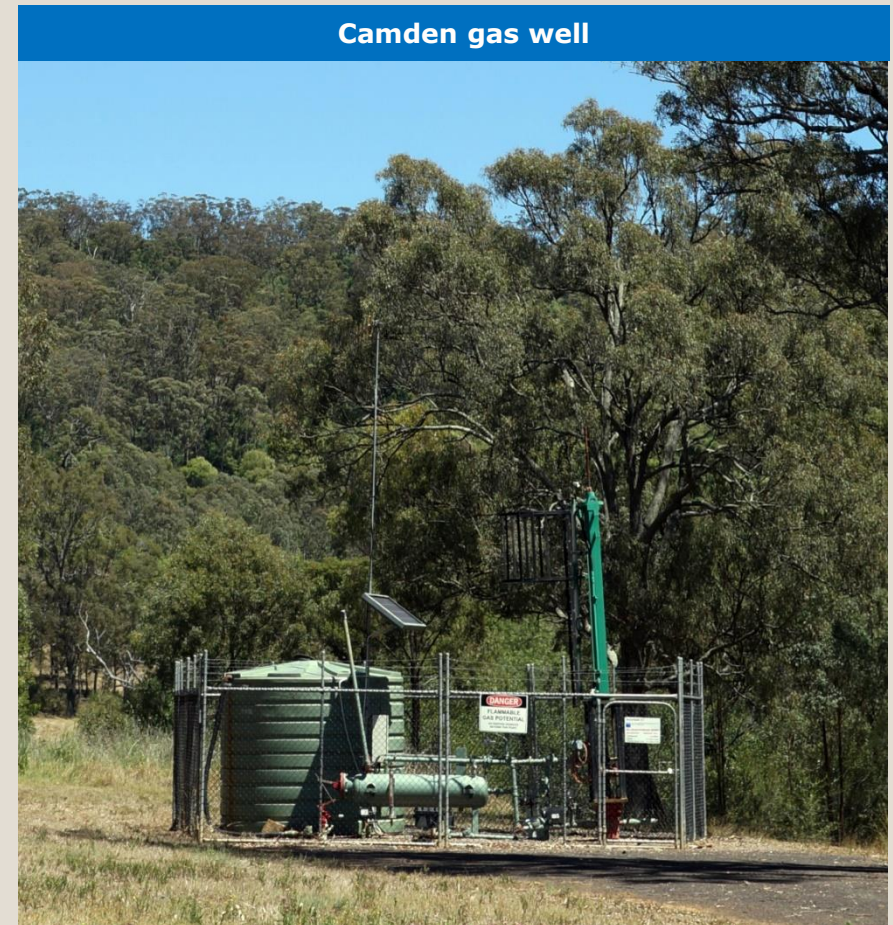
- (Lower Nepean) Georges River catchments
- Downstream of drinking water catchments
- Reticulated supply
- Negligible groundwater use



- > Camden Community Consultative Committee
- > November 2015
- > AGL External

CSG water in the Southern Coalfield.

- Different from QLD coal basins
- Older and deeper (~600 m)
 - Less permeable coal seams = far less water
 - <2.2 ML per year for 95 wells = one individual well in QLD in 1 week
 - All water from coal seams
- Beneficial aquifers:
 - Separated by >400 m of rock including very low permeability layers above coal
 - Water bore yields low
 - Water quality marginal to poor



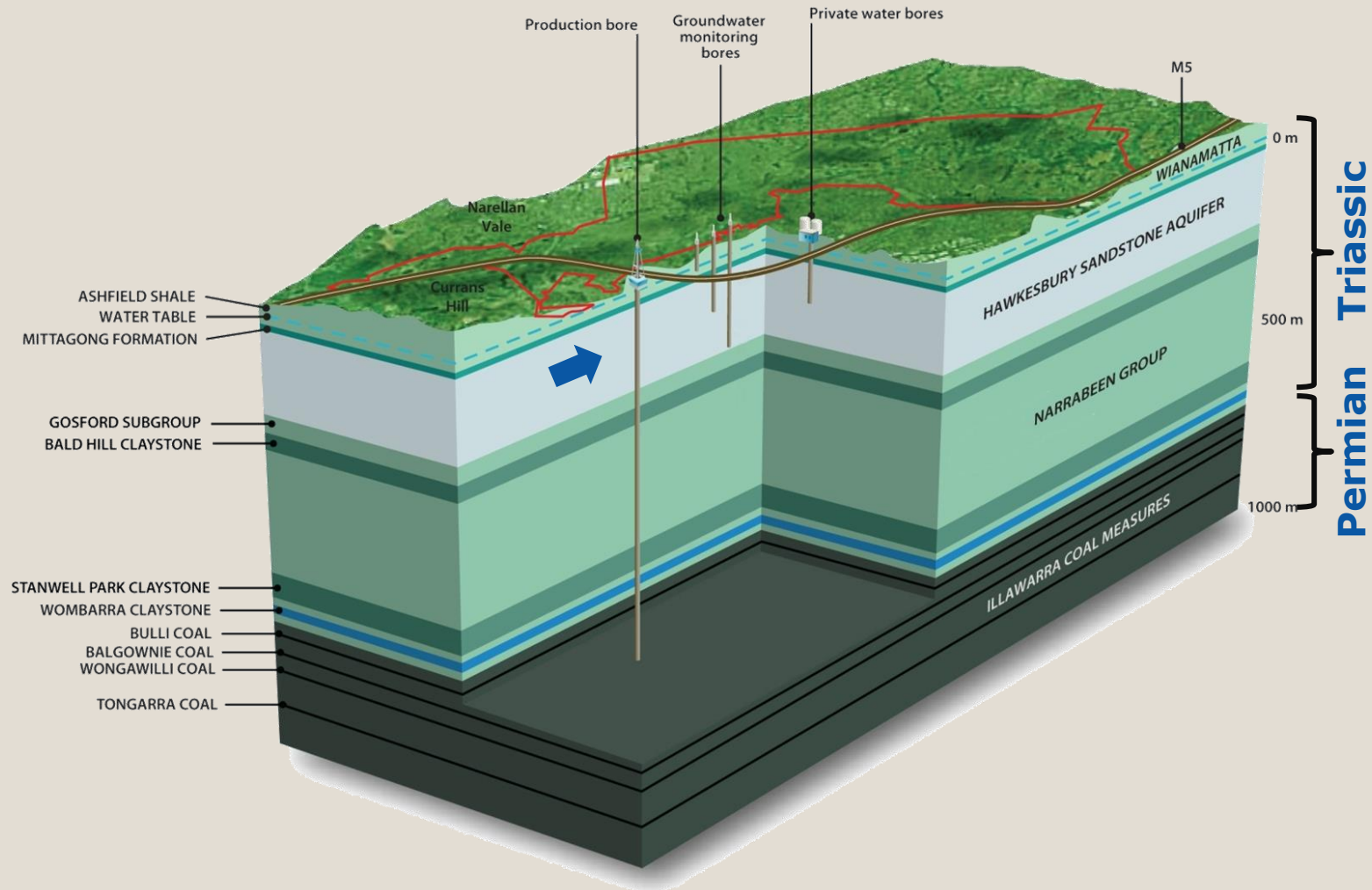
Hawkesbury Sandstone aquifer.

Hawkesbury Sandstone (M1, Newcastle to Sydney)



- Camden area:
 - Quality varies.
 - Low yields.
 - >30,000 years old, slow moving, not being recharged locally, no dependant ecosystems.

Conceptual hydrogeological model.



- > Camden Community Consultative Committee
- > November 2015
- > AGL External

Produced water management.

Lower volumes make for sustainable options.

Produced water process.



Stage 1: Produced water removed from well and temporarily stored at each well site in small farm tank.



Stage 2: Transported by truck to Rosalind Park Gas Plant.



Stage 3: May be filtered at Rosalind Park Gas Plant.



Stage 4: Collected by EPA-licensed third party contractor and taken to EPA-licensed liquid waste treatment facility.



Stage 5: Produced water is treated at EPA-licensed liquid waste treatment facility.



Stage 6: Treated water suitable for discharge.

- > Camden Community Consultative Committee
- > November 2015
- > AGL External

Groundwater monitoring network.

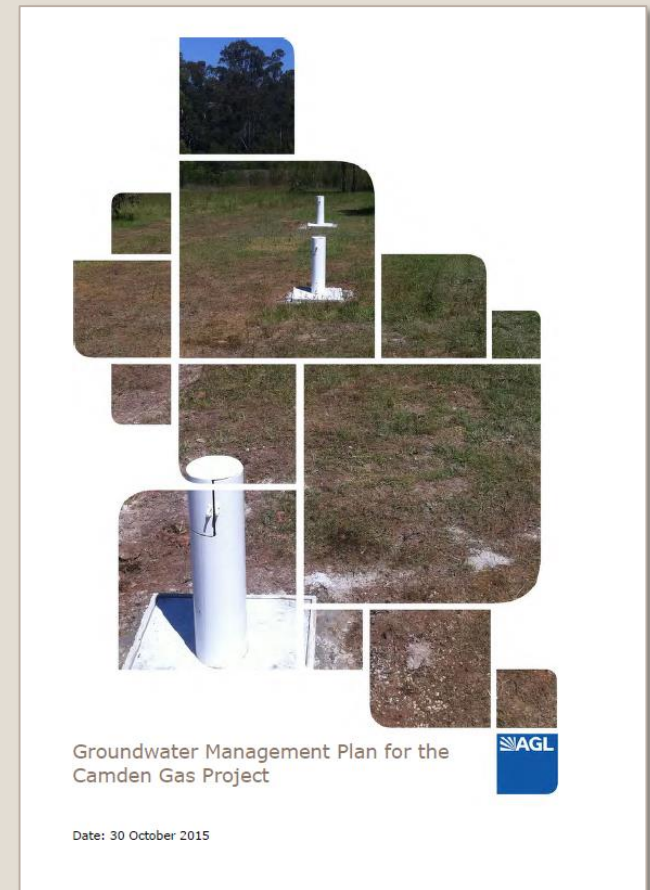
Data variety builds comprehensive understanding.



- > Camden Community Consultative Committee
- > November 2015
- > AGL External

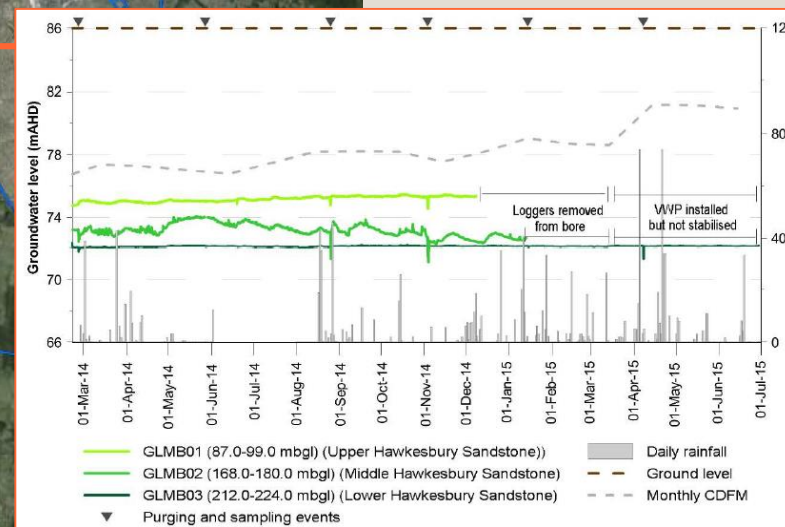
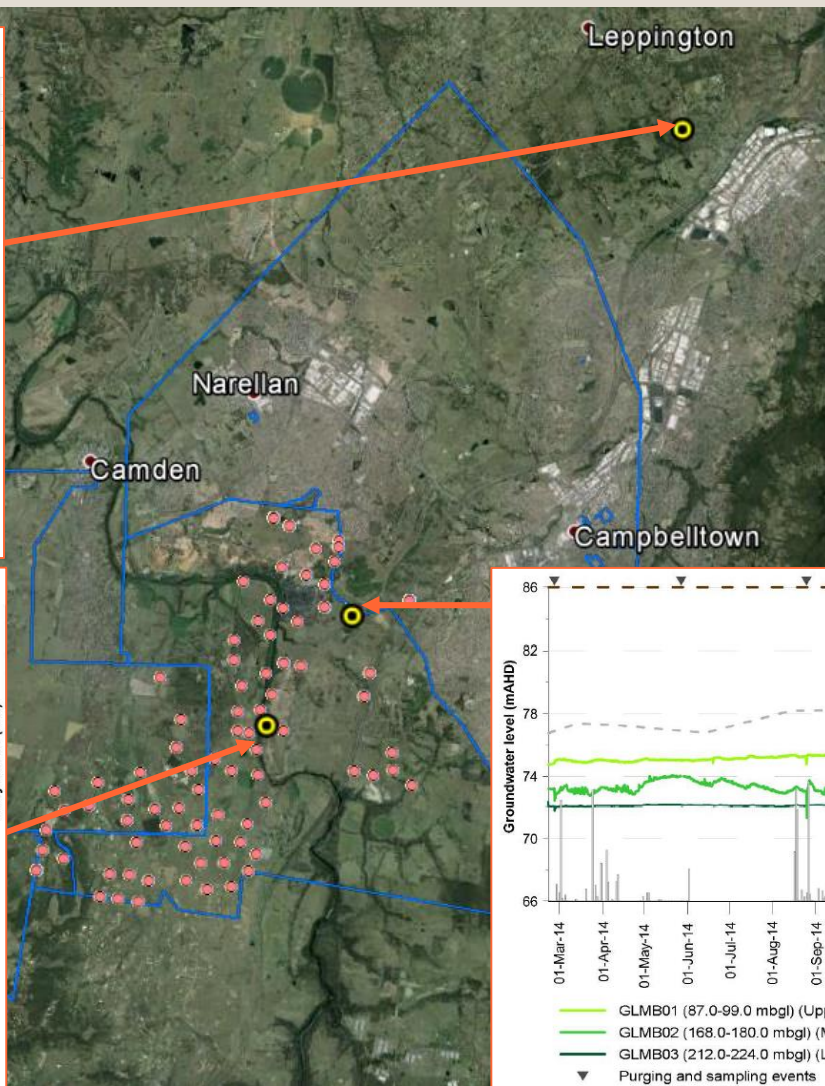
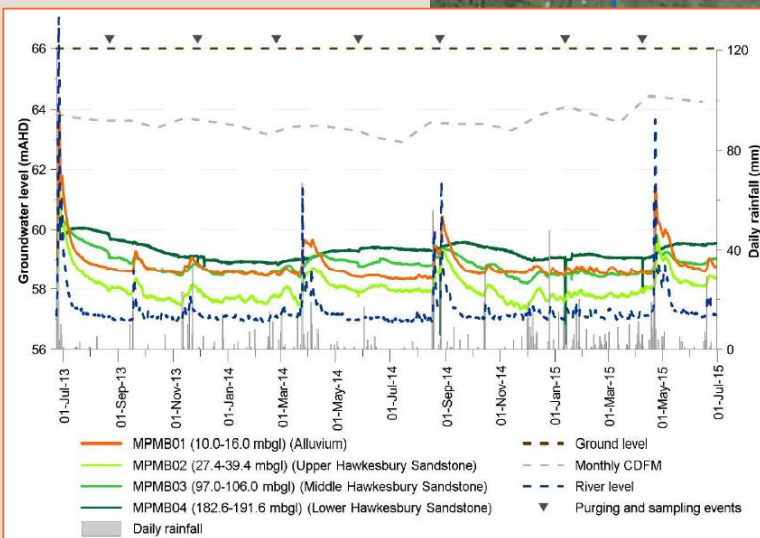
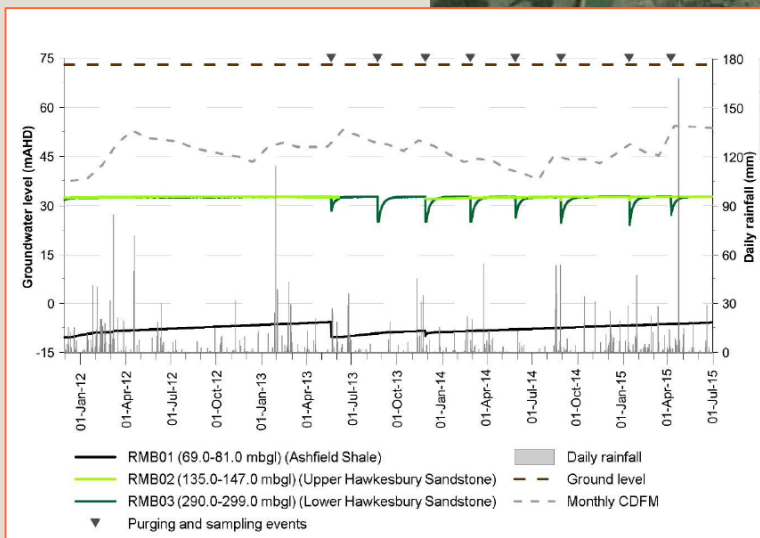
Groundwater Management Plan – 2015.

- Developed in consultation with DPI Water
- Objectives:
 - Describe water level and quality monitoring network
 - Identify water level and quality trends that may suggest connectivity or contamination of aquifers due to CSG activities
 - Provide a monitoring (and an action response) framework for water users and regulators on the groundwater monitoring program at Camden
 - Provide water triggers for an action plan should there be unexpected water level or water quality impacts
 - Outline the reporting and review requirements for the monitoring program.
- 2015 version – updates on network and monitoring frequency, licences, removal of reference to northern expansion



Available at www.agl.com.au/camden

Dedicated monitoring bores.



- > Camden Community Consultative Committee
- > November 2015
- > AGL External

AGL's Water Portal.

- More information and greater access to water data in our NSW CSG project areas
 - **57 water monitoring sites in total** (8 are surface water)
 - 46 in Gloucester (7 surface water)
 - 11 in Camden
 - 21 are LIVE sites
 - Weather stations at Gloucester
 - 360 degree photos at many sites
- Local community and the public can monitor groundwater before, during and after project activities, such as Waukivory Pilot in Gloucester
- Information on recent water levels and water quality.

Choose a Location | [\(change location\)](#) [FAQs](#) | [Glossary](#)

Map Options
Satellite | Map

Gloucester
Camden

Google Imagery ©2015 TerraMetrics 50 km Terms of Use

Live groundwater Live surface water Weather station 360° photos
Groundwater Surface water CSG exploration lease CSG production lease

[About](#) | [Weather](#) | [360° Photos](#) | [Water Data](#)

AGL is exploring for, or producing, natural gas from coal seams at Camden and Gloucester in New South Wales.

We have installed water monitoring bores across the project areas and publish the data on the Water Portal to keep the community informed. Here you can view detailed results from about 65 water monitoring locations, many of which are updated daily. The site also provides hourly updates on local conditions from our local weather stations.

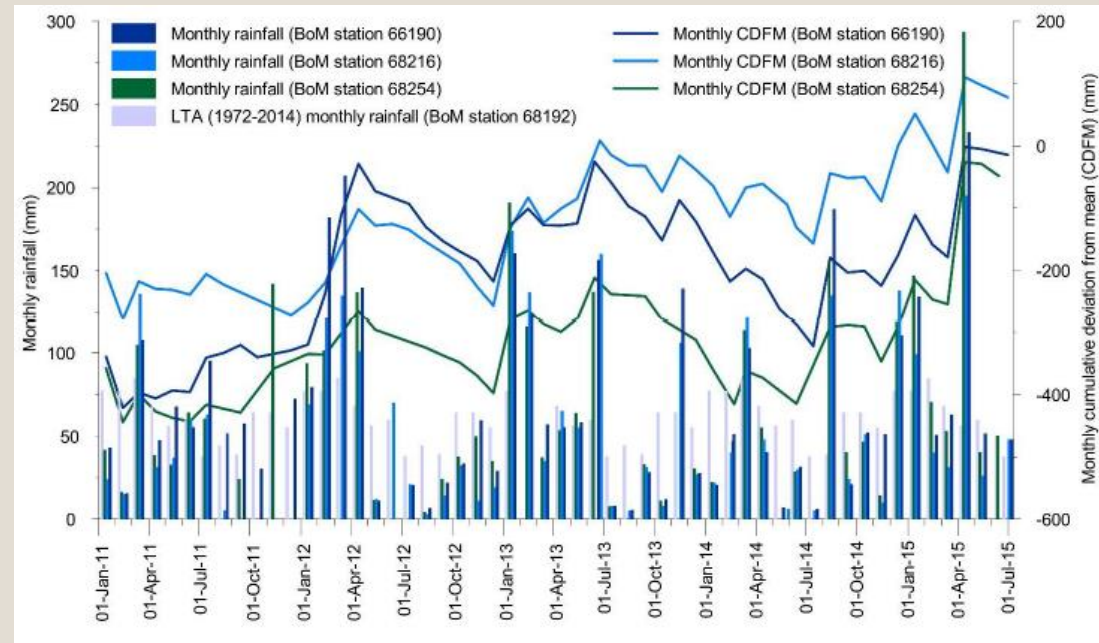
Please note: With AGL's exit from the Hunter Gas Project, the associated water monitoring bores have been decommissioned and are no longer included on the water portal. All water reports for the Hunter Gas Project can be found in the [Hunter document library](#).

To find out more, please read our fact sheet: [The AGL Water Portal](#).

- > Camden Community Consultative Committee
- > November 2015
- > AGL External

2014/15 annual report – water levels.

- Rainfall higher than long-term average
- No apparent response to rainfall events at RMB and GLMB sites, MPMB clear response to rainfall and flooding events
- Alluvium at MPMB may be discharging into Nepean
- No evidence of groundwater dependent ecosystem at RMB
- Data is indicative of natural systems in **long-term equilibrium** with occasional seasonal responses to recharge when there is a connection with surface features (e.g. MPMB)
- “No downward temporal trends have been observed in the groundwater level data at any of the monitored locations and therefore it can be assumed that no depressurisation due to CSG operations (which involve dewatering of the coal seam) is occurring within the monitored zones.”



2014/15 annual report – water quality.

	Nepean	Alluvium	Ashfield shale (Sept 2015)	Hawkesbury Sst
pH	Neutral (~7.8)	~ 5	Neutral (~7)	6 - 10
salinity	fresh	fresh	Moderately saline	Fresh – moderately saline
Dissolved metals	low	low (but higher than Nepean)	low	low
Nutrients	Slightly elevated ammonia (c.f. drinking water)	low	low	low – TOC highest in deepest sites
Hydrocarbons	Minor dissolved methane only	Minor dissolved hydrocarbons (not methane)	Minor detections including dissolved methane	Minor detections including dissolved methane at all sites (inc. RMB)
BTEX	No	No	Benzene, toluene, xylene detected	Toluene (all sites except MPMB02)

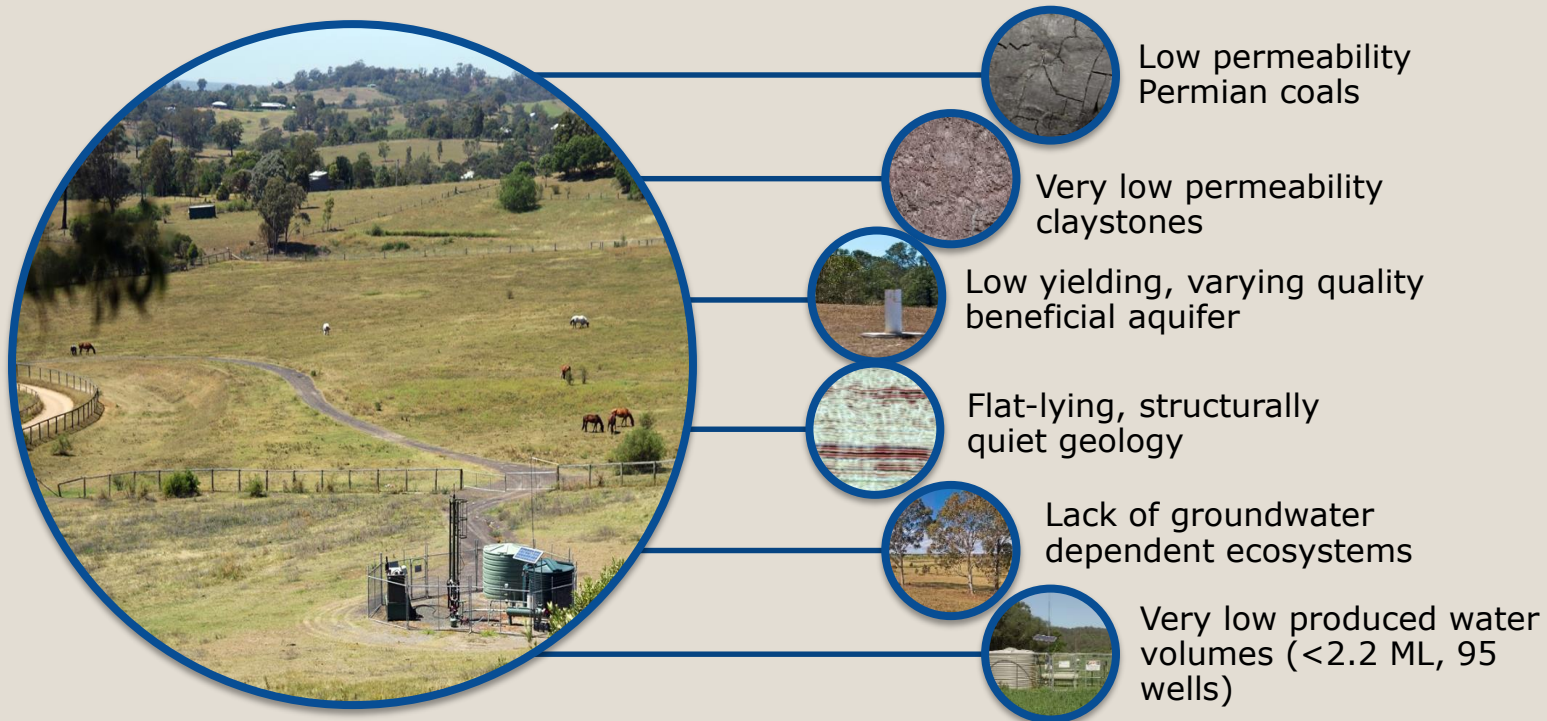
- BTEX is assessed to be **naturally occurring** as detected at all sites, including control site (Denham Court)
- **No significant change** in water quality was detected during the 2014/15 monitoring year compared to the previous monitoring year
- **No adverse water quality impacts** that can be attributed to CSG operations were observed at any of the monitored locations. Water quality results are **not significantly different** between the control site (Denham Court) and the CGP sites

CSG in Macarthur Region.

From a water point of view, a great place for CSG.

"There are no observable impacts to groundwater levels or quality that could be attributable to the CSG operations.

There is also no evidence of connectivity between the shallower monitored zones and the coal seams." (PB, 2015)



- > Camden Community Consultative Committee
- > November 2015
- > AGL External

Operations &
Environment.

Energy in
action.[®]

Since 1837

 **AGL**

Well Summary.

Production Well Status	Number (as of 26/11/15)
Drilled (total wells)	144
Wells under construction	0
Producing and dewatering wells	90
Suspended	38
Plugged and abandoned	16

- > Camden Community Consultative Committee
- > November 2015
- > AGL External

Field operations.

- No well workovers undertaken this quarter. Workover rig planned to return to Camden in December.
- Foot-Onslow Creek pipebridge repairs commenced in October.
- 2012-15 Independent Environmental Audit.
 - Spring Farm, Menangle Park, Razorback and EMAI Stage 2 Project Approvals.
- Leak Detection and Repair Survey completed in October.
 - 2014 and 2015 LDAR Summary Report to be released in December.
- 2014-15 Annual Environmental Performance Report.

Rosalind Park Gas Plant.

- > Noise monitoring
 - » 4th quarterly monitoring scheduled for December.

- > Air emissions monitoring
 - » October and November monthly monitoring results compliant.
 - » 3rd quarterly monitoring results compliant.
 - » 4th quarterly monitoring to be completed on 01 December.
 - » Predictive Emissions Monitoring System (PEMS) Stage 2 trial in progress.

- > Environmental Improvements: Bunding.

- > Mock Emergency Drill for RPGP High Pressure Pipeline Incident.

Land & Approvals.

Energy in
action.[®]

Since 1837

 **AGL**

Land & Approvals.

- Ongoing decommissioning and rehabilitation program of suspended wells.

- Greater Macarthur Land Release
 - Menangle Park and Mt Gilead – Priority Precincts.
 - AGL submission.

Community & Stakeholder Relations.

Energy in
action.[®]

Since 1837

 **AGL**

Community & Stakeholders.

Community & Business support

- Support for Sunflower Cottage, 24 September 2015
- Sponsorship of Christmas In Narellan and involvement on Committee
 - Christmas in Narellan event, 14 November 2015
- White Ribbon Day, Business & Community Breakfast, 3rd December 2015



- > Camden Community Consultative Committee
- > November 2015
- > AGL External