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The Gloucester Gas Project.

Supplying the NSW natural gas network.

The Gloucester Gas Project (the Project) will deliver gas from New South Wales (NSW) for NSW households, communities and businesses. It is located about 100 kilometres north of Newcastle near Stratford, and is wholly owned and operated by AGL Energy Limited (AGL).

AGL has State and Commonwealth Government approvals to develop the Project, which includes:

- > Stage 1 gas field development area of up to 110 gas wells and associated infrastructure;

- > A central processing facility to treat gas and water;
- > A 15 megawatt gas-fired power station; and
- > A gas transmission pipeline to transport gas between the central processing facility and the existing Sydney – Newcastle trunk pipeline.

Gas from the Project will be for domestic supply within NSW and has the potential to meet the annual gas demand of more than a million homes. The first gas from the Project is planned to be available to NSW homes and businesses from late 2016.

What is the Waukivory Pilot?

The Waukivory Pilot is a group of four natural gas wells, drilled in 2012 at two properties near Forbesdale. The wells were drilled into the deep coal seams hundreds of metres below the surface, and fully sealed off from all surrounding rock and beneficial aquifers.

As part of its ongoing exploration program, AGL has lodged its *Review of Environmental Factors* (REF) application with the NSW Office of Coal Seam Gas to hydraulically fracture stimulate and conduct a production test from these wells.

The Waukivory Pilot trial program will gather data from the wells to monitor how much water is produced from the coal seams, assess the natural gas potential of the wells and to gain an understanding of the impact (if any) on overlying groundwater systems.

What is the Review of Environmental Factors?

The REF is a detailed submission of the proposed activities during the Waukivory Pilot. It was developed in line with the NSW Government's Codes of Practice for Coal Seam Gas announced in 2012 and includes an independent environmental assessment and a comprehensive evaluation of hydraulic fracturing. The REF has been submitted to the NSW Government's Office of Coal Seam Gas for review and determination.

AGL will carry out the Waukivory Pilot in accordance with best practice environmental health and safety standards. The REF concludes that if the pilot project is implemented under current environmental standards and guidelines, and follows the recommendations and plans as set out in the REF, AGL's environmental management plan, fracture stimulation management plan and water management plan; then adverse impacts are expected to be negligible or low.



The *Review of Environmental Factors* includes a comprehensive evaluation of hydraulic fracturing.



- > Coal seam gas is natural gas we use every day.
- > It is a safe and reliable energy source that is used in homes, schools, hospitals and businesses.
- > 1.1 million NSW consumers rely on natural gas every day for cooking, warming their houses, and running hot baths and showers.

What are AGL's plans for the wells?

The Waukivory Pilot has four stages:

1. Site preparation: Well site preparation will take three to four days and includes a small amount of ground levelling and maintenance on the existing well pads.
2. Fracture stimulation: A further three to four days will be required to set up the fracture stimulation activities, followed by a similar number of days to hydraulically fracture each of the wells.
3. Flow testing: After each well is fracture stimulated, well completion equipment will be installed so that gas can flow from the well. Data is collected throughout this process to better understand the underground gas reservoir.

Under an exploration licence, produced gas must be flared. AGL will flare the gas that flows within an enclosed structure to minimise the visual gas flame. This takes place over 12 – 18 months and occurs 24 hours a day, seven days a week.

4. Water monitoring: The groundwater monitoring network will determine if flow testing causes any changes in beneficial aquifers (water sources used for livestock and limited domestic purposes) and deeper groundwater.

What is hydraulic fracturing?

Hydraulic fracturing is used to widen existing, naturally-occurring coal seam fractures (cleats) to allow gas to flow more easily out of the coal seams and into the well casing. AGL has a strong track record of safely using hydraulic fracture stimulation, and has used the technique on 126 wells in NSW (mostly at Camden and the remainder in Gloucester and the Hunter). The hydraulic fracture stimulation process is carefully managed so that there is minimal impact on the rock layers above and below the coal seam.

During hydraulic fracture stimulation, a fluid consisting mainly of sand and water with a small amount of additives is pumped at high pressure down the well and into the coal seam's existing fractures. The pressurised fluid widens the existing pathways in the coal seam. This fluid then flows back out of the well leaving the sand in place in the fractures. The use of sand ensures these pathways don't close, and allows water to flow out of the coal seam followed by the gas. Typically for AGL's operations, fractures are millimetres wide and extend for tens of metres into the coal seam.

The complete list of additives used in the fracture stimulation fluid is available at www.agl.com.au/gloucester.

Produced water is released from the coal seam, along with natural gas, and the quantity of water decreases once the gas begins to flow from the coal seam.

On completion of activities, all equipment used for pilot testing will be removed from the site and rehabilitation, contouring, and re-vegetation will occur.

Managing community impacts.


During the initial construction of the Waukivory Pilot there will be additional truck movements and increased noise associated with some activities. AGL will try to minimise any disturbance to people, land and the environment.

Activities associated with the hydraulic fracture stimulation of the wells will only be performed Monday to Friday 7am to 6pm and Saturday 8am to 1pm.

Find out more.

Community information sessions will be held on 20 and 21 November. The sessions will be held in the conference room at the Gloucester Country Club, Bucketts Way, from 2pm until 4pm and 6pm until 8pm both days.

More information on the Waukivory Pilot can also be found at www.agl.com.au/gloucester



AGL will carry out the Waukivory Pilot in accordance with best practice environmental health and safety standards.

New water scientist to work with community.

Gloucester Shire Council and AGL recently announced a new cooperation agreement. The agreement will facilitate key water studies in the region, fund an independent expert water scientist and provide more information to the community about water in the Gloucester Basin.

What are the outcomes of the cooperation agreement?

The agreement will see the delivery of free water sampling reports for landowners, accelerated basin-wide water studies and funding for an independent water scientist employed by Gloucester Shire Council. The studies are expected to take 18 months.

What specific work will take place?

- > A new surface and groundwater survey of private properties in the Gloucester Gas Project and buffer areas;
- > Providing landowners with free water sample testing of their bores, springs, dams, river/creek pump locations and rainwater tanks;
- > A flood study of the Avon and Gloucester rivers – providing invaluable information on local water conditions;
- > An independent assessment of the available options for handling, disposal and reuse of produced water; and
- > An independent expert review of AGL's water studies.

Expansion of the water monitoring network.

AGL is continuing to expand the water monitoring network in the Gloucester Basin. Additional water monitoring bores have been drilled at the northern end of the basin, off the Bucketts Way, just east of Gloucester. Another four monitoring bores are planned for the south of the basin and at the completion of this round of water bore drilling, the number of monitoring bores will increase to 45.

Data is collected from AGL's monitoring bores quarterly and the information from the ongoing water monitoring program can be found on the Gloucester Gas Project website.



Irrigation trial.

AGL's irrigation trial, where produced water from coal seams is being mixed with fresh water to irrigate crops at Gloucester, continues to prosper with the second harvest now completed.

The trial, which began in April this year, has produced lucerne and triticale, allowing us to test both perennial and annual crops. The crops are made into silage bales and used locally as cattle feed.

At the end of September, the area previously sown with triticale was replanted with sorghum. The trial is approved by the NSW Division of Resources and Energy, and is subject to ongoing monitoring and reporting processes.

More information about the trial is available on the Gloucester Gas Project website www.agl.com.au/gloucester.

Your Say AGL

AGL has launched a new online engagement website – YourSayAGL.com.au

Your Say AGL will initially focus on providing information about our projects and the wider industry, with further engagement activities planned for coming months.

Join AGL's online community – YourSayAGL.com.au

For more information call our Project Information Line on 1300 886 170, visit agl.com.au/gloucester or join AGL's online community YourSayAGL.com.au

About us.

Formed in 1837, AGL Energy Ltd is one of Australia's leading integrated renewable energy companies, selling gas, electricity and energy related services to more than 3.5 million customers across NSW, SA, VIC and QLD.

AGL is committed to creating a sustainable energy future for our customers, investors and communities. The company is Australia's largest private owner, operator and developer of renewable generation assets. AGL is expanding its gas exploration and production to facilitate long term supplies for its domestic customers.

AGL Energy Limited
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