



Waukivory Pilot Project

Review of Environmental Factors

October 2013

AGL Quick Reference Guide

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Waukivory Pilot Project — Review of Environmental Factors

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The purpose of this quick reference guide is to provide a brief overview of the Waukivory Pilot Project, as well as a guide to those parts of the Review of Environmental Factors that have been raised most frequently by interested stakeholders. This quick reference guide does not form part of the REF.

This Review of Environmental Factors (REF) sets out AGL's environmental assessment for a four well natural gas pilot well project known as the Waukivory Pilot Project, located near Gloucester in NSW.

The project will involve the perforation of well casings of four existing coal seams gas (CSG) wells to access coal seams which contain natural gas. The coal seams are located 300 to 1,000 metres below the surface. The Waukivory Pilot Project will not involve drilling, as the four pilot wells were already drilled in late 2012 under a separate approval.

After the well casings are perforated at the target coal seams, each well will be hydraulically fractured using a mixture of water, sand and some chemical additives (known as fracture stimulation fluid) which will be injected into the coal seams at high pressure in order to widen the existing, natural fractures in the coal seams and allow the flow of natural gas from the coal seams. Hydraulic fracture stimulation is required because of the geology in this area.

Prior to natural gas flowing freely, the injected water and chemical additives must first be removed from the coal seams by pumping the water back to the surface (known as flowback water), where it will be captured in above ground storage tanks or a double lined dam for lawful disposal.

Once the flowback water is removed from the coal seams, naturally occurring groundwater from the coal seam must be removed. This is called produced water. This produced water will be directed to lined dams on AGL's properties where the water can be beneficially reused by irrigating a lucerne paddock that AGL has planted on its Tiedmans property at Gloucester, to continue a CSG irrigation trial that AGL commenced in April 2013. The transportation of produced water to the Tiedmans property forms part of this REF. The storage, blending and irrigation works have previously been approved as part of the irrigation trial.

Following community consultation carried out by AGL during 2012 and 2013, this REF contains the information that AGL has been asked to consider at consultation meetings and through written submissions. This REF also complies with the recently published NSW Government Code of Practice for Coal Seam Gas- fracture stimulation activities, which commenced on September 2012, and which sets out new standards required for chemical disclosures, risk assessments, reporting and a range of other stringent measures to ensure that the activity is carried out in accordance with best practice operating practices. The REF and supporting reports, including the Fracture Stimulation Management Plan and Human Health and Environment Risk Assessment, is the most comprehensive assessment of a fracture stimulation activity carried out in NSW.

Set out below is a 'quick reference' guide to the parts of the REF that have been most frequently raised by stakeholders as areas of interest. Overall, the REF concludes that the adverse impacts from the Waukivory Pilot Project will be negligible to low, and that risks can be managed with best practice operating practices.

Approval Process: this REF is lodged with the NSW Government DTIRIS-Office of Coal Seam Gas regulator (DTIRIS-OCSG), who will seek advice prior to approval from several other NSW Government Agencies such as the Environmental Protection Agency (EPA), Office of Water, Department of Planning and Infrastructure (DoPI) and the Department of Primary Industries. The approval process is set out in more detail in section ES4 of the Executive Summary, and Section 2.12 of the REF.

Duration of the Waukivory Pilot Project: the activity is planned to be carried out over a period of about 18 months, and is expected to involve about one month of site preparation, about one week of hydraulic fracture stimulation for each well, about one month of flowback water production, about three months of natural coal seam produced water production and about six months of natural gas production and testing using containerised flares. Approval is sought to carry out this project over a three year period to allow sufficient time to deal with any project contingencies. More detail on the time frame of the Waukivory Pilot Project is set out in section 2.8.3 of the REF.

Water use requirements: this activity will involve the use of about 6 megalitres of water (equivalent to about 2.4 Olympic sized swimming pools) which will be drawn from dams located on AGL's properties or purchased from the market. AGL will not take water from creeks or rivers for this operation, nor draw water from beneficial aquifers in the Gloucester region. More detail on the usage and source of water for the Waukivory Pilot Project is set out in section 2.8.6 of the REF and in the Surface Water and Groundwater Management Plan at Appendix D.

Chemicals and additive used in fracture stimulation: this activity will involve the injection of a mixture of treated water, sand, thickening agents and nine chemical additives into coal seams to allow the flow of natural gas. AGL has selected the simplest, most basic and lowest risk set of chemical additives for this hydraulic fracture stimulation to minimise any harm or risk to the environment or to people. There will no BTEX used in this project. BTEX products are banned from use by CSG projects in NSW. The nature and quantities of the chemicals and additives proposed to be used in this operation are disclosed fully in the Fracture Stimulation Management Plan at Appendix B of the REF. An independent Human Health and Ecological Risk Assessment of these chemicals has been carried by enRisks as set out in Appendix M of the REF. The material safety data sheets and chemical abstract service numbers for all chemicals are attached to the Human Health and Ecological Risk Assessment.

Water use and disposal: all water use and disposal, and waste disposal associated with this project will be managed in accordance with all laws, guidelines and codes of practice for the management of water and waste products. This includes the conditions of the petroleum exploration licence, water licence and environment protection licence. Flowback water will be captured in storage tanks and lawfully disposed of to an offsite facility. Any other solid or liquid waste products will be captured and stored on site and then removed from the site for lawful disposal to licensed waste management facilities. Produced water will be captured on site in tanks or lined dams, and then transferred to lined dams located on AGL's Tiedmans property where it will be blended with fresh water and used for an irrigation trial project to grow lucerne and other crops. The water use and disposal of produced water on AGL's Tiedmans site is regulated under an already existing approval. Further information on the management of water and waste disposal for this project is set out in section 2.8.6 and in the Surface water and Groundwater Management Plan. There will be no water, waste or other discharge from this activity to the ground, into creeks or rivers or catchment areas other than as strictly permitted by law.

Waukivory Pilot Project impacts: Adverse noise, traffic and visual impacts from the Waukivory Pilot Project have been assessed to be negligible to low. While the Project will generate increased truck movements, impacts will be short term, and at the completion of the project the activity footprint will be minimised and rehabilitated. Noise, visual and traffic impacts are discussed and analysed in sections 6.8, 8.3 and 8.7 of the REF.

Health Risk Assessment: The risk to human health from this proposed activity has been assessed as negligible to low. An independent Human Health Risk and Ecological Assessment has been carried out by enRisk which is set out in Appendix M of the REF.

Operational Risk Assessment and Risk Management: AGL has carried out a comprehensive assessment of all risks associated with the activity and how each of the identified risks will be avoided, managed or mitigated by adopting best practice safety and environmental risk management practices. The risk assessment for this activity which identifies potential risks and sets out the measure adopted to mitigate and manage these risks is set out in Appendix L.

Greenhouse Gas Emissions: it has been conservatively estimated that the proposed activity and the flaring of natural gas from the Waukivory Pilot Project will involve the emission of about 65,000 tonnes CO₂e. This will add about 0.0011% to Australia's annual greenhouse gas emissions, which is negligible. A discussion and analysis of the greenhouse gas emissions associated with this project is set out in 6.7.3 of the REF.

Fugitive Emissions: it has been estimated that there will be negligible fugitive methane emissions associated with this activity. A baseline assessment of methane concentration in the vicinity of the Waukivory Pilot Project has been carried out by AGL in July 2013, and further assessment of fugitive emissions will be carried out during and after the activity. A discussion and analysis of fugitive emissions is set out in section 6.7.4 of the REF.

Job creation and local business benefit: it is expected that about 35 people will be employed by AGL on the Waukivory Pilot Project, some of which will come from professional service companies contracted by AGL and some of which will be employed directly either locally in Gloucester or elsewhere in NSW. The local business benefit from this activity has been assessed as being moderately positive as AGL will procure a range of services and supplies from local business people in Gloucester while the pilot project is operating. A discussion and analysis of business benefits is set out in section 8.4 of the REF.

Cumulative impact: this REF has considered the cumulative environmental impacts of the proposed activity. A number of environmental investigations were done as part of this REF. Consideration has been given to the wider area within the environmental assessments prepared as part of this REF and in the environmental investigations prepared as part of the wider PEL 285 area.

The proposed activity is in the Gloucester Basin which supports a variety of extractive industries including coal mining and other proposed pilot testing wells. The closest operating mine is the Stratford coal mine, approximately 5km south of the site. The proposed activity is on a rural property cleared of vegetation and used for agriculture. The proposed activity is short-term, with few offsite impacts. The site will be rehabilitated to pre-existing condition at completion of the activity. The schedule of the development of the Gloucester Gas Project in accordance with the approval is not expected to coincide with the proposed activity. Similarly, the proposed open-cut coal mine (known as Rocky Hill) adjacent to the east of the site is not expected to operate concurrently with the proposed activity as the environmental impact statement for that project has only commenced public exhibition towards the end of August 2013. The environmental impacts of the proposed activity are negligible to low adverse with no significant interactions with these neighbouring operations expected.





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