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**AGL ENERGY LIMITED**

**WAUKIVORY PILOT PROJECT**

**CONSTRUCTION NOISE COMPLIANCE SURVEY**

**REPORT J0215-01-R3**

**6 NOVEMBER 2014**

Prepared for:  
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## 1. INTRODUCTION

This report presents results from a construction noise compliance survey at various residences in the vicinity of the Waukivory Pilot Project (the project) which is part of the Gloucester Coal Seam Gas Project being developed by AGL Energy Limited. The project includes construction of the following infrastructure:

- Gas collection equipment fitted to four existing gas wells known as WK11, WK12, WK13 and WK14 located approximately 2 km south of Gloucester, NSW;
- Trenching and installation of gas collection pipelines (gathering lines) between the four wells;
- Trenching and installation of a water transfer pipeline between the southern well (WK13) to two surface dams located approximately 1 km and 2.5 km south of the wells;
- Directional drilling to install gathering lines and the water transfer pipeline under the Avon River, Waukivory Creek and Fairbairns Road;
- Gravel hardstand areas around each well, security fences and other ancillary infrastructure; and
- Fracture stimulation of the coal seam around each well to increase gas flow.

The project is subject to Environment Protection Licence (EPL) 20358 issued by the Environment Protection Authority (EPA).

AGL Energy Limited commissioned the *Waukivory Pilot Project Construction Noise Management Plan* (CNMP) (EMGA Mitchell McLennan, 6 August 2014) in response to Condition G2.2 of the EPL. Section 4.2.3 of the CNMP recommends noise monitoring during activities predicted to generate maximum noise impacts during the construction program, while Section 5.1 of the CNMP recommends a number of responses to noise related complaints including noise monitoring at potentially affected receivers to assess construction noise levels against relevant criteria.

This report has been commissioned by AGL Energy Limited in response to Sections 4.2.3 and 5.1 of the CNMP. Noise measurements were taken during a site visit on Friday 31 October 2014.

### 1.1. Glossary

The following acoustical terms are used in this report:

Sound Pressure	Small air pressure variations above and below normal atmospheric pressure that are perceived by human ears as sound.
Frequency	The rate of sound pressure fluctuations per second, expressed as cycles per second or hertz (Hz). Human ears in good condition can typically detect sound in the frequency range 20 Hz to 20,000 Hz (20 kHz), depending on sound level.
Decibels, dB	A noise level unit based on a logarithmic scale of pascals of sound pressure above and below atmospheric pressure. Expressing a sound pressure level in decibels implies root-mean-squared (RMS) sound pressure unless explicitly stated otherwise. Human ears in good condition can typically detect sound pressures from the threshold of perception at 0 dB (20 uPa) to the threshold of pain at 140 dB (200 Pa), depending on frequency. An increase of 10 dB is perceived as an approximate doubling of sound level by a human ear.
dBL	Linear decibels, the same as dB but used to explicitly define a decibel scale in the absence of any frequency weighting.
dBA	A-weighted decibels, where the A weighting means frequencies below 500Hz and above 10kHz are artificially reduced to approximate the frequency response of an average human ear. Most sound monitoring instruments include an A-weighting option, enabling direct measurement of noise levels in dBA.

- LA90            The A-weighted noise level exceeded 90% of the time (which can be thought of as the quietest 10% of the time) over a defined measurement period, usually 15 minutes or one hour, and widely accepted as the background noise level.
- LA90,15min    Same as LA90 with the measurement period specifically stated.
- LAeq            The A-weighted equivalent continuous, or logarithmic average, noise level over a defined time period either measured or predicted at a specific location.
- LAeq,15min    Same as LAeq with the measurement period specifically stated.
- Background Level    see LA90.

## 2. RECEIVERS

The CNMP identified 10 residential receivers with the potential to receive significant construction noise. Table 1.2 in the CNMP presents the address and location of each receiver and is reproduced in Table 1.

**Table 1: Identified Residential Receivers (from Table 1.2 in the CNMP).**

Location	Address	Coordinates (MGA Zone 56)
R1	20 Grantham Road, Forbesdale	402023, 6453041
R2	Intersection of Fairbairns Lane and North Coast Railway	401824, 6452610
R3	176 Fairbairns Road, Forbesdale	402095, 6452080
R4 <sup>1</sup>	237 Fairbairns Road, Forbesdale	402510, 6451653
R5 <sup>1</sup>	197 Fairbairns Road, Forbesdale	403184, 6452184
R6	114 Maslens Lane, Gloucester	402747, 6453425
R7	304 Fairbairns Road, Forbesdale	402282, 6451332
R8	305 Fairbairns Road, Forbesdale	402822, 6450969
R9	Lot 881 Fairbairns Road, Forbesdale	402942, 6450475
R10	384 Fairbairns Road, Forbesdale	403012, 6450236

<sup>1</sup> Receivers R4 and R5 are owned by a neighbouring mining company.

A plan of the area showing the location of each receiver is attached as Appendix A.

## 3. NOISE CRITERIA

Construction activity associated with the project is subject to noise criteria recommended in the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change NSW, July 2009). The ICNG recommends two noise assessment levels during standard construction hours, which are 7 am to 6 pm Monday to Friday and 8 am to 1 pm Monday to Saturday excluding public holidays:

- A ‘noise affected’ level set 10 dBA above the background noise level represents the point above which there may be some community reaction to noise and all feasible and reasonable mitigation measures should be implemented; and
- A ‘highly noise affected’ level of 75 dBA above the background noise level represents the point above which there may be a strong community reaction to noise and additional mitigation measures such as respite periods may be appropriate.

Section 2.2 of the CNMP reports a measured background noise level at or below 30 LA90,15min at all receivers which leads to a ‘noise affected’ level of 40 LAeq,15min during normal construction hours at all receivers.

## 4. METHOD OF ASSESSMENT

Noise measurements were taken on Friday 31 October 2014 in the vicinity of closest potentially affected receivers using a Svan 912AE Type 1 sound level analyser which was programmed to measure and store 1/2-second Leq noise levels in 1/3 octave bands from 1 Hz to 20 kHz for each measurement period. The analyser was fitted with a 12.7mm condenser microphone and a windshield and mounted on a tripod with the microphone located approximately 1.2m above the ground. Noise measurements were taken at each location for a representative period of 15 minutes.

Instrument calibration was checked at the beginning and end of the noise survey using an 01dB Cal-01 acoustic calibrator which produces 94 dB at 1kHz. Copies of current calibration certificates for these instruments, from a NATA-accredited laboratory, have not been attached to this report but are available upon request.

The measured 1/2-second data were subsequently processed to produce 1-second results from 20 Hz to 20 kHz then further processed to exclude noise produced by extraneous sources to enable the separate noise contribution from construction activity alone to be determined, based on detailed notes taken during each measurement period. Charts showing the total measured noise level and the separate noise contribution from construction activity are attached to this report in Appendix B.

The noise survey complies with the recommendations in Section 5.1 of the CNMP, particularly Section 5.1.1 which discusses noise monitoring equipment and Section 5.1.2 which discusses an appropriate noise survey methodology.

## 5. RESULTS

Total measured noise levels at each location, and noise levels produced by construction activity alone, are presented for each assessed receiver in the order in which the noise measurements were taken.

Weather conditions were acceptable for noise monitoring with generally calm conditions and either no wind or light winds up to 1 m/s from the north west. An air temperature of approximately 30 °C was accompanied by cloudless skies, however the atmosphere was a little hazy with what appeared to be smoke from a distant bushfire.

### 5.1. Receiver R3

Noise measurements were taken at Receiver R3, at a location approximately 30 m east of the residence adjacent to the driveway, from 8:15 am on Friday 31 October 2014. Construction activity included fracture stimulation of the closest Well 13 including associated pumps and other equipment in the vicinity of the well. Extraneous noise sources that were audible during the measurement period included passing traffic, birds and wind.

A total noise level of 52 LAeq,15min was measured at R3, primarily due to construction activity. A construction noise level of approximately 51 LAeq,15min has been determined in the absence of extraneous sources, although some uncertainty remains due to the difficulty of separating construction noise from extraneous sources when both are audible simultaneously.

Modifying factors defined in the NSW Industrial Noise Policy, such as a low frequency correction or a tonal correction, were not triggered and were therefore not required. Construction noise at Receiver R3 is considered acceptable given the very short term nature of this construction activity at each well.

## 5.2. Receiver R2

Noise measurements were taken at Receiver R2, at a location approximately 20 m south of the residence on the side of Fairbairns Road, from 8:40 am on Friday 31 October 2014. Construction activity included fracture stimulation of the closest Well 13 including associated pumps and other equipment in the vicinity of the well. Extraneous noise sources that were audible during the measurement period included passing traffic, birds and wind.

A total noise level of 52 LAeq,15min was measured at R2, primarily due to passing traffic. A construction noise level of approximately 41 LAeq,15min has been determined in the absence of extraneous sources, although some uncertainty remains due to the difficulty of separating construction noise from extraneous sources when both are audible simultaneously.

Modifying factors defined in the NSW Industrial Noise Policy, such as a low frequency correction or a tonal correction, were assessed for this time period. A low frequency penalty of 5 dBA is technically required with construction-related noise levels displaying a difference of 15 dB between dBC and dBA noise levels, which is just on the relevant trigger level. No other modifying factors were triggered or required. Construction noise at Receiver R2 is considered acceptable given the very short term nature of this construction activity at each well.

## 5.3. Receiver R1

Noise measurements were taken at Receiver R1, at a location approximately 30 m south west of the residence adjacent to the driveway, from 9:00 am on Friday 31 October 2014. Construction activity included fracture stimulation of Well 13 including associated pumps and other equipment in the vicinity of the well. Extraneous noise sources that were audible during the measurement period included distant traffic, birds and wind and a helicopter travelling past the site a few kilometres to the east.

A total noise level of 41 LAeq,15min was measured at R2, primarily due to a combination of construction activity and a rural pump operating in a nearby field. A construction noise level of approximately 37 LAeq,15min has been determined in the absence of extraneous sources, although some uncertainty remains due to the difficulty of separating construction noise from extraneous sources when both are audible simultaneously.

Modifying factors defined in the NSW Industrial Noise Policy, such as a low frequency correction or a tonal correction, were assessed for this time period. A low frequency penalty of 5 dBA is technically required with construction-related noise levels displaying a difference of 15 dB between dBC and dBA noise levels, which is just on the relevant trigger level. No other modifying factors were triggered or required. Construction noise at Receiver R1 is considered acceptable given the very short term nature of this construction activity at each well.

## 5.4. Receiver R3

A second noise measurement was taken at Receiver R3 as it is the closest receiver to the construction noise sources, at a location approximately 30 m east of the residence adjacent to the driveway from 9:50 am on Friday 31 October 2014. Construction activity included fracture stimulation of the closest Well 13 including associated pumps and other equipment in the vicinity of the well. Extraneous noise sources that were audible during the measurement period included passing traffic, birds and wind.

Representatives from the EPA were present for this noise measurement and obtained similar results using their own noise survey instruments, although the measurement times did not exactly coincide therefore minor differences between the EPA's results and the noise levels in this report can be expected.

A total noise level of 53 LAeq,15min was measured at R3, primarily due to construction activity. A construction noise level of approximately 51 LAeq,15min has been determined in the absence of extraneous

sources, although some uncertainty remains due to the difficulty of separating construction noise from extraneous sources when both are audible simultaneously.

Modifying factors defined in the NSW Industrial Noise Policy, such as a low frequency correction or a tonal correction, were not triggered and were therefore not required. Construction noise at Receiver R3 is considered acceptable given the very short term nature of this construction activity at each well.

## 5.5. Results Summary

Table 2 presents a summary of measured noise levels and estimated or calculated construction noise levels at each monitoring location, including a low frequency penalty of 5 dBA where noted.

**Table 2: Measured Total Noise Levels and Construction Noise Levels, 11 September 2014, dBA.**

Noise Survey Location	Total Measured Noise Level					Calculated or Estimated Construction Noise Level	
	Lmax	LA1	LA10	LAeq	LA90	LAmix	LAeq
R1	55.6	50.6	42.6	40.5	36.2	43	37 <sup>1</sup>
R2	72.2	64.3	50.2	51.8	39.4	47	41 <sup>1</sup>
R3	58.0	56.8	54.8	51.8	46.7	57	51
	62.6	61.0	55.6	53.2	48.2	56	51

1 The reported construction noise level technically requires a 5 dBA low frequency correction factor as recommended in the INP, with a dBC - dBA difference of exactly 15 dB.

## 6. CONCLUSION

This assessment of noise levels produced by construction work associated with the Waukivory Pilot Project at closest residential receivers indicates construction noise levels were below the recommended guideline value of 40 LAeq,15min in the CNMP and relevant EPA policy at Receptor R1 and above the recommended level at Receptors R2 and R3.

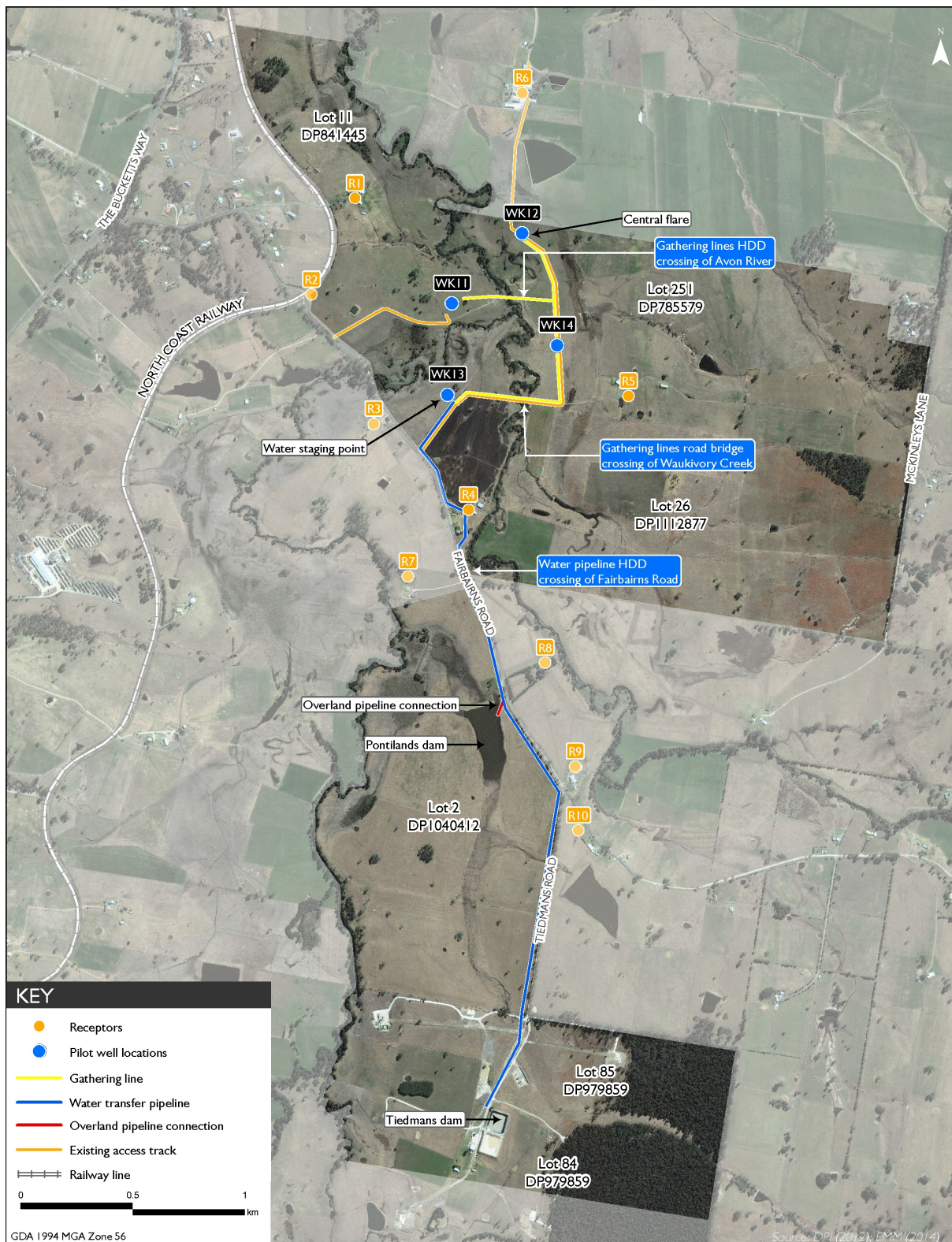
A construction noise level above the recommended guideline value does not mean a non-compliance with the development consent conditions has occurred. According to the Interim Construction Noise Guideline which is the relevant EPA policy, a construction noise levels above the guideline value triggers a requirement to implement all reasonable and feasible noise mitigation measures to result in the lowest practical noise level at receiver properties.

As potential exceedances of the guideline value were anticipated in the CNMP a significant noise barrier in the form of a concrete panel wall was installed around the construction site to reduce construction noise levels at all receivers. No additional noise mitigation measures are considered appropriate given the very short term nature of this construction activity.

Based on the results of this assessment, no additional construction noise mitigation measures are recommended and no significant long term noise impacts are occurring at any receiver in relation to construction work for the project.



## APPENDIX A – SITE AND AREA PLAN



Proposed work areas  
 Construction Noise and Vibration Management Plan  
 Waukivory Pilot Project

Figure 1.1

This plan has been reproduced from the plan on page 3 of the CNMP prepared by EMGA Mitchell McLennan.

## APPENDIX B – MEASURED NOISE LEVELS

Charts on the following pages show measured noise levels and construction noise levels where construction noise was audible.

Two charts are shown for each noise measurement. The first chart shows a ‘noise level trace’ for the duration of the noise measurement in one second intervals in dBA. The red trace shows measured noise levels, while the blue trace shows periods of noise attributed to construction activities where construction noise was audible. If construction noise was not audible then the blue trace representing construction noise is not included in the chart and the noise measurement was typically shortened to five minutes.

Gaps in the blue trace indicate periods of extraneous noise with no significant construction noise at those times, while a difference between the red and blue traces indicates construction noise sources contributed only part of the total noise levels measured at those times.

The second chart for each receiver location shows the measured average ( $L_{eq}$ ) noise level in 1/3 octave bands from 20 Hz to 20 kHz and total  $L_{Aeq}$ ,  $L_{Ceq}$  and  $L_{eq}$  noise levels. The red bars indicate total measured noise levels while the blue bars indicate the noise level attributed to construction sources.



