7 March 2018

WM Project Number: 06159-WM
Our Ref: AGL070318RH
Email: aclifton@agl.com.au

Aaron Clifton
AGL Upstream Investments Pty Ltd
Lot 35, Medhurst Road
MENANGLE NSW 2568

Dear Aaron

Re: Operational Noise Monitoring of Well Sites SF17 and SF20

Introduction

Wilkinson Murray was commissioned to conduct operational noise monitoring of well sites Spring Farm 17 (SF17) and Spring Farm 20 (SF20). Measurements were conducted at the potentially most affected residential receivers in different directions to assess compliance. This letter report summarises the results of measurements conducted on Wednesday, 7 and Thursday, 15 February 2018.

Both well sites were free flowing during the measurements. At SF17, all three (3) wells (SF01, SF02 and SF03) were producing. At SF20, four wells (SF05, SF07, SF08 and SF09) were producing.

It is important to note that civil works associated with the construction of Liz Kernohan Drive and Spring Farm Eastern Village residential estate to the south-east of Austen Boulevard was taking place during daytime hours (before 6.00pm).

Measurement Locations

Measurements conducted at the potentially most affected residential receivers surrounding the well sites are described as follows:

- R1 Along residential road loop directly north of Holland Drive (representing recently constructed houses located along road loop and directly south-west of the SF20 well site)
- R2 On south-west corner of Liz Kernohan Drive and Nicholson Parade intersection (representing recently constructed houses located directly south of the SF20 well site)
- R3 At northern end of Austen Boulevard (representing recently constructed houses located directly south-west of the SF17 well site)
- R4 At northern end of Jennings Circuit (representing future dwellings to be constructed as part of the Spring Farm residential estate and located directly south of the SF17 well site)
- R5 15 Jane Court (representing existing house located to the north of both well sites)

Figure 1 shows the measurement locations and both well sites.

Figure 1 Measurement Locations & Well Sites

Operational Noise Criteria

The Minister's Conditions of Approval (PA06_0291) for the Project state Project-specific operational noise criteria as shown in Table 1.

Table 1 Project-Specific Operational Noise Criteria

Well Site	$L_{Aeq,15min}$ (dBA)		
	Day (7.00am – 6.00pm)	Evening (6.00pm – 10.00pm)	Night (10.00pm – 7.00am)
SF17 & SF20	43	41	36

Monitoring Procedure

Noise monitoring was conducted during the three (3) time periods defined in Table 1 in order to assess compliance for the day, evening and night time periods.

Daytime measurements were carried out on Wednesday, 7 February 2018. Evening and night measurements were carried out on Thursday, 15 February 2018.

The measurements were made using a B&K Type 2236 Sound Level Meter. The sound level meter holds a current NATA calibration certificate (Calibration Certificate valid for 2 years is attached to this letter).

The reported measurements were conducted in suitable meteorological conditions (wind speeds below 5m/s at microphone height and no rain). Wind speed and direction was determined using a hand-held digital anemometer Digitech QM1642. Cloud cover was observed to be around 0% during the day, evening and night time measurements.

It should be noted that noise emission limits identified in the Minister's Conditions of Approval (PA06_0291) only apply under meteorological conditions of wind speeds of up to 3 meters per second (m/s).

Local meteorological data sourced from the Campbelltown (Mount Annan) Bureau of Meteorology weather station indicates that wind speeds at 10m height were no greater than 3 m/s. Therefore, it is considered the noise limits are applicable to all measurement results.

Results of Attended Noise Measurements

Table 2 summarises the measurement results.

Table 2 Measurement Results

Period	Measurement Start Time	Location	Comments	Estimated $L_{Aeq,15min}$ due to Well Sites (dBA)	$L_{Aeq,15min}$ Noise Criteria (dBA)		
					Day	Eve	Night
Day	9.45am	R1	Distant traffic hum, 40-44dBA. Liz Kernohan Drive traffic 50-77dBA. SF20 well site inaudible at all times.	Inaudible	43	-	-
	10.02am	R2	Distant traffic hum, 40-45dBA. Liz Kernohan Drive traffic 50-84dBA. SF20 well site inaudible at all times.	Inaudible	43	-	-
	10.25am	R4	Measurement dominated by civil works, 43-56dBA. SF17 well site inaudible at all times.	Inaudible	43	-	-
	10.45am	R3	Measurement dominated by civil works, 51-64dBA. SF17 well site inaudible at all times.	Inaudible	43	-	-

Period	Measurement Start Time	Location	Comments	Estimated $L_{Aeq,15min}$ due to Well Sites (dBA)	$L_{Aeq,15min}$ Noise Criteria (dBA)		
					Day	Eve	Night
	11.12am	R5	Distant traffic, 35-36dBA, and insect noise, 38-45dBA. Well sites inaudible at all times.	Inaudible	43	-	-
Evening	8.03pm	R5	Distant traffic, 38-40dBA. Insect noise, 34-38dBA. Well sites inaudible at all times.	Inaudible	-	41	-
	8.32pm	R4	Distant traffic hum, 35-40dBA. Industrial noise from southern direction, 37-39dBA. SF17 well site inaudible at all times.	Inaudible	-	41	-
	8.49pm	R3	Distant traffic hum, 35-41dBA. Industrial noise from southern direction, 34-35dBA. SF17 well site inaudible at all times.	Inaudible	-	41	-
	9.10pm	R1	Distant traffic hum, 39-44dBA. Liz Kernohan Drive traffic 50-58dBA. SF20 well site inaudible at all times.	Inaudible	-	41	-
	9.27pm	R2	Distant traffic hum, 39-44dBA. Liz Kernohan Drive traffic 50-68dBA. SF20 well site just audible at times, estimated 32dBA.	32	-	41	-
Night	10.00pm	R5	Measurement dominated by distant traffic, 38-40dBA. Well sites inaudible at all times.	Inaudible	-	-	36
	10.25pm	R4	Distant traffic hum, 35-38dBA. Industrial noise from southern direction, 37-39dBA. SF17 well site inaudible at all times.	Inaudible	-	-	36
	10.42pm	R3	Distant traffic hum, 35-38dBA. Industrial noise from southern direction, 34-35dBA. SF17 well site inaudible at all times.	Inaudible	-	-	36
	11.01pm	R1	Distant traffic hum, 39-42dBA. Liz Kernohan Drive traffic 50-54dBA. SF20- well site just audible at times, estimated 31-32dBA.	32	-	-	36
	11.17pm	R2	Distant traffic hum, 39-43dBA. Liz Kernohan Drive traffic 50-55dBA. SF20 well site just audible at times, estimated 32dBA.	32	-	-	36

Conclusion

On the basis of the attended measurements conducted at the potentially most affected existing and future residential receivers in different directions, noise levels generated by well sites SF17 and SF20 are found to comply with the relevant operational noise criteria during the day, evening and night time periods.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY

Roman Haverkamp
Senior Engineer

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C16688

Client Details Wilkinson Murray (Sydney) Pty Ltd
Level 4, 272 Pacific Highway
Crows Nest, NSW, 2065

Equipment Tested/ Model Number : B&K 2236
Instrument Serial Number : 2173783
Microphone Serial Number : 2157590
Pre-amplifier Serial Number : N/A

Atmospheric Conditions
Ambient Temperature : 22°C
Relative Humidity : 53.6%
Barometric Pressure : 99.45kPa

Calibration Technician : Vicky Jaiswal **Secondary Check:** Nick Williams
Calibration Date : 07/12/2016 **Report Issue Date :** 09/12/2016
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	*Pass*	10.3.4: Inherent system noise level	*Pass*
10.2.3: Frequency weighting	*Pass*	10.4.2: Time weighting characteristic F and S	*Pass*
10.3.2: Overload indications	*Pass*	10.4.3: Time weighting characteristic I	*Pass*
10.3.3: Accuracy of level range control	*Pass*	10.4.5: R.M.S performance	*Pass*
8.9: Detector-indicator linearity	*Pass*	9.3.2: Time averaging	*Pass*
8.10: Differential level linearity	*Pass*	9.3.5: Overload indication	*Pass*

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017Pa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.

This calibration certificate is to be read in conjunction with the calibration test report.

Accoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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