



Wongawilli Colliery

Noise Compliance Monitoring Q2 2019

6 November 2019

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Noise Compliance Monitoring Q2 2019

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1. INTRODUCTION

Wollongong Coal Limited (Wollongong Coal) (formerly Gujarat NRE FCGL Pty Ltd) mining operations at NRE Wongawilli Colliery – Nebo Area Project (the Project) are subject to the conditions of the Project Approval, application number 09_0161 (The Project Approval). Tables 3 and 4 in Schedule 4 of the Project Approval set out the applicable noise limits.

Section 8 of the Project Approval requires a Noise Management Plan to be prepared. This management plan was prepared by Wollongong Coal in July 2016 (reference WWC EC PLN 007).

Section 5.1 of the Noise Management Plan (NMP) states that WCL proposes to undertake quarterly attended monitoring to determine compliance with the criteria. It is noted that two additional monitoring sites have been identified in the NMP which has been outlined in the Project Approval. The two additional sites are related to rail noise emissions from the Project.

Attended measurements are to be conducted over a 15-minute period using Type-1 Sound Level Meters with consideration to the NSW Industrial Noise Policy (INP) (EPA, 2000) and the Australian Standard AS 1055 Acoustics – Description and Measurement of Environmental Noise.

This document describes the results of quarterly compliance noise measurements carried out on 27th June 2019.

Rail noise monitoring was not undertaken as there were no rail movements during the monitoring period.

2. OBJECTIVES

The objective of the compliance noise monitoring was to assess compliance of Wongawilli Colliery (the Project) with the relevant noise limit conditions of the Project Approval.

3. REFERENCE DOCUMENTS

The following documents have been considered as part of the compliance noise monitoring:

- NRE Wongawilli Colliery Project Approval No. 09_0161;
- NRE Wongawilli Colliery Environmental Protection Licences No. 1087 and 12442;
- NRE Wongawilli Colliery Nebo Area Environmental Assessment (ERM Report 0097271s);
- NRE Wongawilli Colliery Noise Management Plan (WWC EC PLN 007, July 2016);
- NSW Environmental Protection Agency – Noise Policy for Industry (NPI) (EPA 2017);
- NSW Environmental Protection Agency – Rail Infrastructure Noise Guideline (EPA 2013);
- Australian Standard AS 1055:1997 –Acoustics – Description and Measurement of Environmental Noise; and
- Australian Standard AS 2377:2002 –Acoustics – Methods for the measurement of Railbound Vehicle Noise.

4. NOISE CRITERIA

4.1 Colliery Noise

The relevant noise criteria are contained within Tables 3 and 4 of the Project Approval. These tables are reproduced in **Table 4.1** and **Table 4.2**. The locations of the nominated receiver locations are presented in **Table 4.3**.

The Project Approval states both intrusive and amenity criteria, which are respectively assessed over a 15 minute period for the day, evening and night time assessment periods.

It is considered that the intrusive criteria, being both lower and assessed over a shorter time period, are more stringent and therefore the limiting criteria to determine compliance for the Project.

Table 4.1 – Noise Criteria dB(A) - Intrusive noise limits

Receiver Number	Day	Evening	Night	Sleep Disturbance
	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{A1} (1min)
RA1	43	43	43	59
RA2	44	43	43	60
RA3	40	40	38	48
All other existing residential receivers	40	40	38	48

Day is defined as 7.00am to 6.00pm, evening as 6.00pm to 10.00pm and night as 10.00pm to 7.00am.

To interpret the locations, see Appendix 4 of the Project Approval.

Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions) of the INP.

Table 4.2 – Noise Criteria dB(A) – Amenity Noise Limits

Receiver Area	Day	Evening	Night
	L _{Aeq} (11hr)	L _{Aeq} (4hr)	L _{Aeq} (9hr)
All privately-owned land	60	50	45

To interpret the locations, see Appendix 4 of the Project Approval.

Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions) of the INP.

Further to these conditions, the Project Approval outlines a range of noise goals to be considered with the objective of reducing future noise levels from the Project. These noise goals are presented in **Table 4.3**.

Table 4.3 – Noise Criteria dB(A) – Intrusive noise goals

Receiver Number	Day	Evening	Night	Sleep Disturbance
	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{A1} (1min)
RA1	40	40	38	51
RA2	40	40	38	51
RA3	40	40	38	48
All other existing residential receivers	40	40	38	48

To interpret the locations, see Appendix 4 of the Project Approval.

Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions) of the INP.

The noise goals in Table 4.3 may be varied by way of direction to the Proponent by the Secretary, following consideration of the results of the noise audit required under condition 7 of the Project Approval.

4.2 Rail Noise

The relevant noise criteria are contained within Table 6 of the Project Approval, and reproduced in **Table 4.4**.

Table 4.4 – Noise Criteria dB(A) – Rail Noise Limits

Receiver Area	Day (7am – 10pm)	Night (10pm – 7am)
	L _{Aeq} (15hr)	L _{Aeq} (period)
All existing residential receivers	65	60

The Project Approval notes that these noise criteria do not apply if the Proponent has an agreement with the relevant owner/s of the residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Furthermore, by the end of July 2013, or other timing as may be agreed by the Secretary, the Proponent shall use its best endeavours to ensure that its rail spur is only accessed by:

- Locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208); and
- Trains comprising no less than 30 wagons.

In addition, the Proponent shall restrict train speeds on the Wongawilli rail spur to a maximum of 20 km/h.

5. NOISE MONITORING LOCATIONS

With consideration to the requirements of the Project Approval and the NMP, noise monitoring locations are summarised in summarised in **Table 5.1** and **Figure 5.1**.

Table 5.1 – Noise Monitoring Locations

Receiver Area Number	Description	Coordinates (MGA zone 56H)	
		Easting	Northing
RA1a	30 Vista Parkway	293868	6183146
RA1b	111 Smiths Lane	294095	6183327
RA2a	18 Wongawilli Rd	294622	6182498
RA2b	1 Wongawilli Rd	294225	6182572
RA3a	80 Shone Ave	294884	6181794
RA3b	Jersey Farm	294108	6181565
RA4a	66 Ritchie Crescent (rail noise)	296299	6182088
RA4b	61 Huxley Drive (rail noise)	296430	6182008

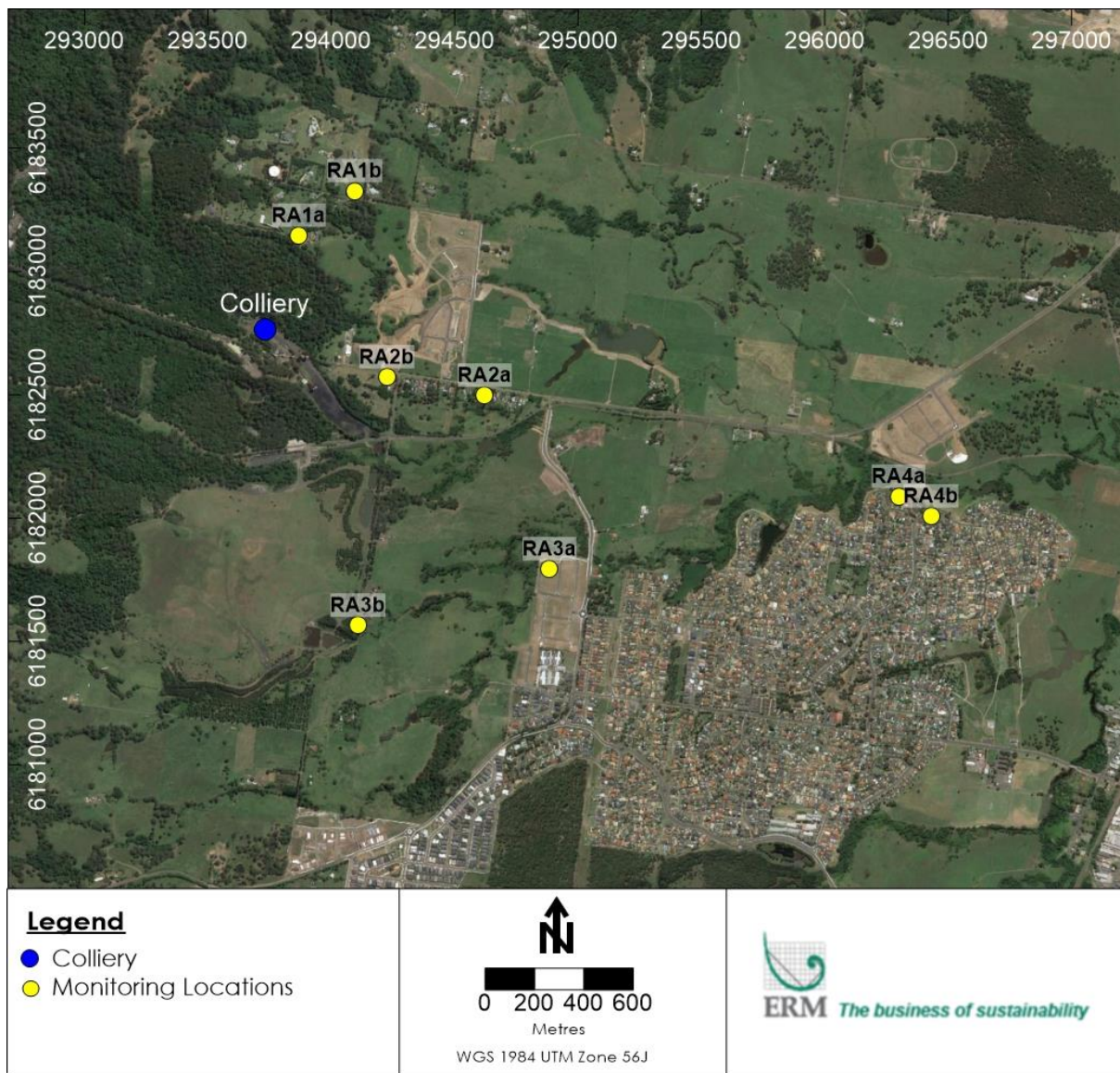


Figure 5.1 – NMP Monitoring Locations

6. PROJECT OPERATIONS

During the measurement period, only the fans associated with the mine were in operation. All other plant and equipment, as well as mining activities were not operating during the noise measurements.

7. MEASUREMENT METHODOLOGY

Attended noise compliance measurements were carried out with reference to the NSW INP (EPA, 2000) and Australian Standard AS 1055:1997.

7.1 Operational Noise

15-minute operator attended measurements were carried out at the 6 receiver locations nominated in the Project Approval and shown in **Table 4.1** during the day, evening and night periods.

The meteorological conditions were observed during attended noise monitoring. Monitoring data collected at the project's automatic weather station (AWS) was also reviewed to confirm observations. Wind conditions were estimated onsite using an anemometer. The potential for temperature inversions to be present was estimated using the sigma-theta method (Appendix E4 of the INP) using data from the on-site AWS. Stability classes of F or G are considered to be indicative that strong temperature inversions are present.

Measurements were carried out on 27th June 2019 utilising two NTi Audio XL2 type 1 Sound Level Meters (serial numbers A2A-06986-E0 and A2A-06981-E0). Calibration was checked before and after measurements using a Pulsar Instruments Model 105 acoustic calibrator (serial number 55095). No significant drift (± 0.5 dB) was noted.

The weather conditions were observed to be generally suitable for noise monitoring and in accordance with those specified in the Project Approval.

Operator attended measurements quantified the contribution from the Project using a combination of measured levels, onsite observations and third octave frequency analysis, where appropriate.

All reported site noise level contributions (Leq, 15 minute) have considered the NPI, 2017 annoying noise characteristics modifying factor (penalty) e.g. for tonality or low-frequency content, prior to compliance being assessed. The application of the NPI, 2017 for annoying noise characteristics modifying factor is in accordance with Point 8 of the NSW EPA's "*Implementation and transitional arrangements for the Noise Policy for Industry (2017)*". Point 8 of the document states the following:

"The NSW Industrial Noise Policy (2000) will continue to apply where it is referenced in existing statutory instruments (such as consents and licences), except for the NSW Industrial Noise Policy Section 4 modifying factors, which will be transitioned to Noise Policy for Industry (2017) Fact Sheet C through a NSW Industrial Noise Policy application note. This approach has been taken because the Noise Policy for Industry (2017) modification factor approach reflects a more recent understanding of the impact of tonal and low-frequency noise on the community."

For the determination of compliance, Section 11.1.3 of the NSW INP states the following:

A development will be deemed to be in non-compliance with noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition.

Therefore, non-compliance will be reported where the noise level from the Project is determined to be at least 2 dB above the nominated criteria.

7.2 Rail Noise

Unattended measurements were not carried out in this quarter, as there were no scheduled train movements during the monitoring period.

8. MONITORING RESULTS

8.1 Colliery Operational Noise

The results of the operator attended measurements are presented in **Table 8.1** for LAeq, 15min criteria and **Table 8.2** for LA1, 1min criteria. All values are in dB(A).

Table 8.1 – Attended Measurement Results (L_{Aeq} Noise Levels)

Receiver	Date	Time	Period	Criteria L _{Aeq,15min} dB(A)	Temp (°C)	Wind			Measured Noise Level L _{An,15min} dB(A)			Estimated Contribution from project L _{Aeq,15min} dB(A)	Complies	Observations - dB(A)
						Dir	Avg (m/s)	Max (m/s)	L _{Aeq}	L _{A10}	L _{A90} ¹			
RA1A	27/06/2019	13:57	Day	43	21	E	0.3	1.7	42	44	34	<34	Yes	Site inaudible, Construction machinery – 40-50, Car music – 40, Birds – 40
RA1B	27/06/2019	13:56	Day	43	21	E	0.3	1.7	59	60	44	<44 ²	Yes	Site inaudible, Construction – 58-62, Birds – 46-80, Traffic – 50-75
RA2A	27/06/2019	13:08	Day	44	19	E	0.3	0.8	63	63	47	<47 ²	Yes	Site inaudible, Construction machinery/trucks – 45-60, Traffic – 60-75, Birds – 45, Dogs – 50-55
RA2B	27/06/2019	13:33	Day	44	19	E	0.3	1.0	57	56	37	<37	Yes	Site inaudible, Birds – 38-47, Traffic – 40-75,, Train – 40-43
RA3A	27/06/2019	13:05	Day	40	19	ENE	0.3	0.8	46	45	33	<33	Yes	Faint hum from site, Birds – 46-54, Traffic – 35-45,, Dogs – 45-47
RA3B	27/06/2019	13:35	Day	40	19	E	0.3	1.0	45	46	33	<33	Yes	Faint hum from site Birds – 35-40, Traffic/trucks – 38-65, Aircraft – 40-45

Receiver	Date	Time	Period	Criteria L _{Aeq,15min} dB(A)	Temp (°C)	Wind			Measured Noise Level L _{An,15min} dB(A)			Estimated Contribution from project L _{Aeq,15min} dB(A)	Complies	Observations - dB(A)
						Dir	Avg (m/s)	Max (m/s)	L _{Aeq}	L _{A10}	L _{A90} ¹			
RA1A	27/06/2019	21:12	Evening	43	12	W	0	0.6	45	39	33	<33	Yes	Site inaudible Firework – 65, Crickets – 35, Traffic – 35-55
RA1B	27/06/2019	21:11	Evening	43	12	WNW	0	0.6	50	45	36	<36	Yes	Faint hum from site Firework – 62, Traffic – 40-68, Birds – 50, Insects – 37-38, Train - 37
RA2A	27/06/2019	20:29	Evening	43	10	W	0	0.6	62	56	41	<41	Yes	Site inaudible, Traffic – 40-65, Crickets – 42, Barking – 40-45
RA2B	27/06/2019	20:48	Evening	43	10	WNW	0	0.6	45	44	35	<35	Yes	Faint hum from site Traffic – 39-60, Insects – 33-35,, Birds – 45-60, Dogs – 35-40
RA3A	27/06/2019	20:19	Evening	40	10	W	0	0.3	44	46	39	<39	Yes	Site inaudible Animals – 43-45, Traffic – 39-44, Train – 42, Insects - 39
RA3B	27/06/2019	20:18	Evening	40	10	W	0	0.3	38	40	35	<35	Yes	Faint hum from site, Crickets – 35-40, Dogs – 35, Distant traffic – 37-42, Birds – 40
RA1A	27/06/2019	22:47	Night	43	9	NW	1.7	3.7	46	42	37	<37	Yes	Site inaudible Wind-blown vegetation – 38-40, Aircraft – 40-45,

Receiver	Date	Time	Period	Criteria L _{Aeq,15min} dB(A)	Temp (°C)	Wind			Measured Noise Level L _{An,15min} dB(A)			Estimated Contribution from project L _{Aeq,15min} dB(A)	Complies	Observations - dB(A)
						Dir	Avg (m/s)	Max (m/s)	L _{Aeq}	L _{A10}	L _{A90} ¹			
														Crickets – 36-38, Traffic – 35
RA1B	27/06/2019	22:32	Night	43	9	NW	0.2	1.0	48	45	36	<36	Yes	Site inaudible Traffic – 35-55, Crickets – 35
RA2A	27/06/2019	22:03	Night	43	9	NNW	0	0.5	59	56	37	<37	Yes	Site inaudible Traffic – 40-43, Crickets – 43, Traffic – 40-50
RA2B	27/06/2019	22:01	Night	43	9	NW	1.7	3.7	47	43	31	<31	Yes	Faint hum from site Traffic – 33-71, Aircraft – 38-44, Insects – 32-42, Dogs – 39, Traffic – 59-71
RA3A	27/06/2019	22:21	Night	38	9	NNW	0.0	0.5	48	46	35	<35	Yes	Site inaudible Distant traffic – 40-50, Dogs – 40-66, Insects – 34
RA3B	27/06/2019	22:28	Night	38	9	NW	0.2	1.0	42	40	35	<35	Yes	Site inaudible Traffic – 36-40, Insects – 35-36, Train – 37

1. All noise levels are rounded to the nearest whole decibel

2. Existing background ambient noise levels exceed criteria. As the site was inaudible, it is expected that noise levels from the site will be under the background level and therefore comply with relevant criteria

Table 8.2 – Attended Measurement Results (Sleep Disturbance)

Receiver	Criteria $L_{A1,1min}$ dB(A)	Measured Levels $L_{A1,1min}$ dB(A)	Estimated Contribution from Project $L_{A1,1min}$	Complies	Notes
RA1a	59	56	<37	Yes	Site inaudible Wind-blown vegetation – 38-40, Aircraft – 40-45, Crickets – 36-38, Traffic – 35
RA1b	59	45	<36	Yes	Site inaudible Traffic – 35-55, Crickets – 35
RA2a	60	73	<37	Yes	Site inaudible Traffic – 40-43, Crickets – 43, Traffic – 40-50
RA2b	60	47	<31	Yes	Faint hum from site Traffic – 33-71, Aircraft – 38-44, Insects – 32-42, Dogs – 39, Traffic – 59-71
RA3a	48	53	<35	Yes	Site inaudible Distant traffic – 40-50, Dogs – 40-66, Insects – 34
RA3b	48	40	<35	Yes	Site inaudible Traffic – 36-40, Insects – 35-36, Train – 37

1. All noise levels are rounded to the nearest whole decibel

2. Estimated contributions expected to be less than measured background L_{A90}

9. DISCUSSION

The Project was inaudible or barely audible at all times during the monitoring period, as there were no operational activities taking place or no noise intensive plant and equipment operating. No exceedances of the noise criteria were observed from the Project.

10. STATEMENT OF COMPLIANCE AND CONCLUSION

ERM has completed operational noise compliance monitoring for Wongawilli Colliery on 27th June 2019. Measurements were completed at six (6) locations representative of nearby residential areas (RA1 to RA3), and demonstrated that measured noise levels are below relevant noise limits for daytime, evening and night periods.

Project operations were inaudible or barely audible at all locations during the daytime, evening and night time periods at all locations as there were no operational activities taking place during the monitoring.

Peak event site noise levels during the night time periods were not identifiable, therefore the Project's L1 noise contributions are assumed to be below the relevant sleep disturbance limits for all receiver locations.

No annoying impulsive, low frequency or tonal characteristics were observed from the Project.

Therefore, compliance has been demonstrated at all monitoring locations for all periods.

APPENDIX A GLOSSARY OF TERMS

Glossary of Terms

Term	Description
Adverse weather	Weather conditions that affect noise measurements (wind, rain and temperature inversions) that occur at a particular site for a significant period of time. The maximum wind speed allowed during acoustics measurements are in process is 5m/s. No rain is allowed.
Ambient noise	The all-encompassing noise environment at a given location, made up of many sources in the near and far field.
Assessment period	The period in a day over which assessments are made.
A-weighting	Adjustment made to a noise level based on international standards. Approximates a human's hearing response to frequency at lower sound levels.
Background noise	Background noise is the term used to describe the underlying level of noise present in an area, measured in the absence of any extraneous noise. Typically when measured with a sound level meter is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period ($L_{A90,T}$).
dB	Decibel, the logarithmic ratio of a given sound pressure to a reference pressure.
dB(A)	A-weighted decibels.
Free-field	A sound field where the effects of reflection are negligible throughout the region of interest.
Frequency	The number of cycles per unit of time. It is measured with cycles per second (cps) or the interchangeable Hertz (Hz). Frequency can be associated as a synonymous to pitch.
Intermittent noise	Level that drops to the background noise level several times during the period of observation.
Heavy vehicle	A truck or other vehicle with either two or three axles, two groups or three or more axles, more than two groups.
Light vehicle	Passenger vehicles (cars, vans, utilities, motorcycles etc.).
$L_{A1,T}$	The noise level exceeded for 1% of the time period, T.
$L_{A10,T}$	The noise level exceeded for 10% of the time period, T.
$L_{A90,T}$	The noise level exceeded for 90% of the time period, T. Commonly referred to as the background noise level.
$L_{Aeq,T}$	The equivalent average noise level of the time period, T. It represents in a single number, the energy of the actual fluctuating noise level over the period.
$L_{Amax,T}$	The maximum noise level measured during the period, T.
RBL	Rating Background Level. The background noise level as defined by the NSW Industrial Noise Policy (EPA, 2000). It is calculated by the taking the median value of the lowest 10th percentile L_{A90} measurements in any day, evening or night period.
Sound Pressure Level (SPL)	Is the difference between the pressure produced by a sound wave and the barometric (ambient) pressure at the same point in space. Typically expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Levels (L_w)	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. Typically associated with noise sources.