



Wongawilli Colliery

Noise Compliance Monitoring Q4 2018

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Noise Compliance Monitoring Q4 2018

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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 site are identified in the NMP than outlined in the Project Approval, these sites are related to rail noise.

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

This document describes the results of quarterly compliance noise measurements carried out on 19th December 2018.

Rail noise monitoring undertaken between 10th and 12th of January 2019 is also described in this document.

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

	Day	Evening	Night	Sleep Disturbance
Receiver Number	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 Spur 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

The rail noise monitoring location are indicated in Figure 5.2. Monitoring was undertaken at 50 Huxley Drive, Horsley.

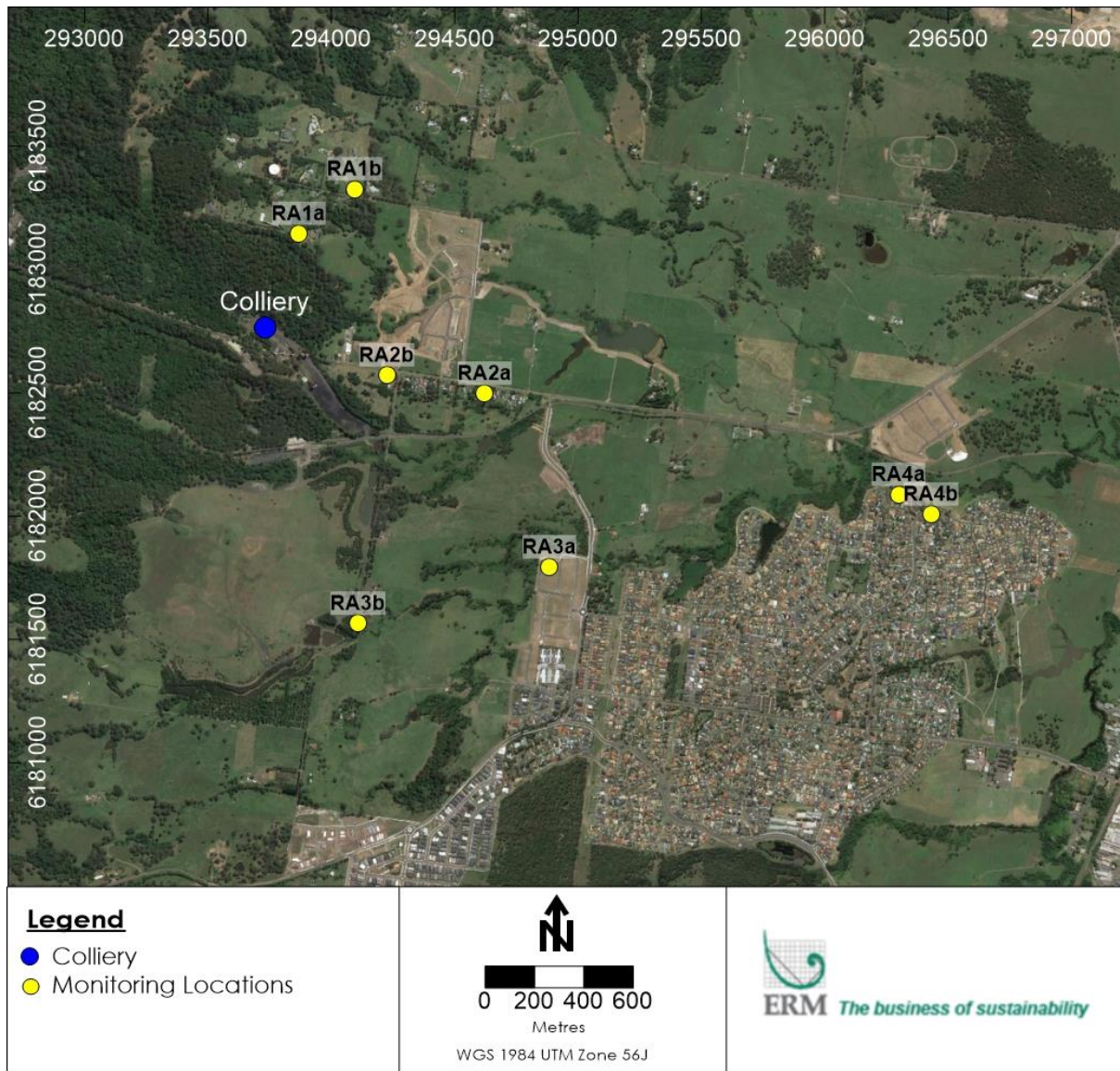


Figure 5.1 – NMP Monitoring Locations

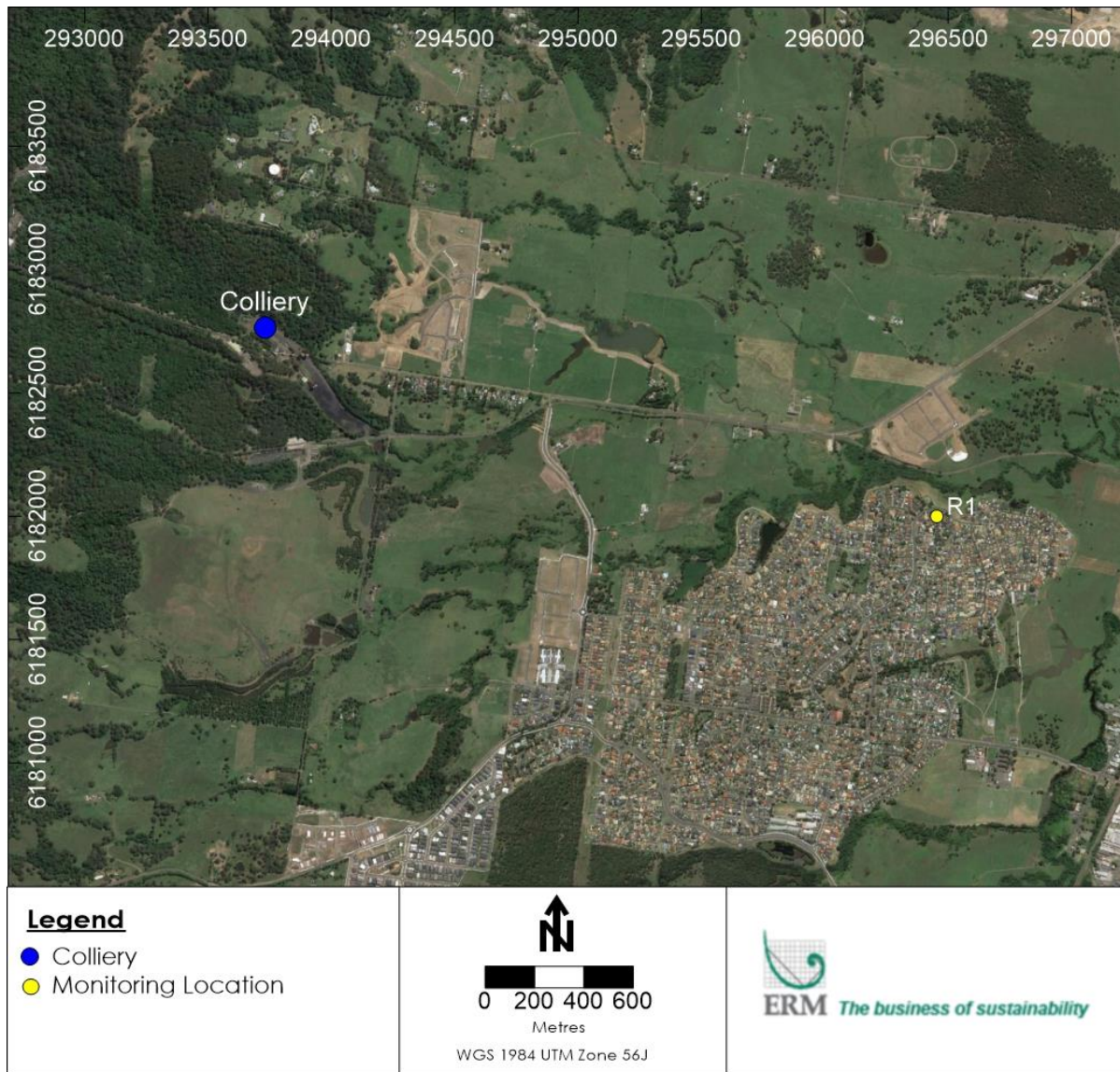


Figure 5.2 – Rail Noise Monitoring Location

6. PROJECT OPERATIONS

ERM were advised operations during the measurement period included underground operations and product load out. Fixed mechanical plant operating included continuous operation of:

- Syntron in the Transfer House at Pit Top,
- Screen and sizer building operation,
- Conveyor and conveyor drive head operation.

During the day time period loading of coal into trains also occurred. Mobile plant was operating in the stockpile area.

7. MEASUREMENT METHODOLOGY

Attended noise compliance measurements were carried out with reference to the NSW INP (EPA, 2000) and Australian Standard AS 1055:1997. Rail noise measurements were completed with consideration to Australian Standard AS 2377:2002 and the NSW EPA Rail Infrastructure Noise Guideline (2013).

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 the 19th December 2018 utilising two NTi Audio XL2 type 1 Sound Level Meters (serial numbers A2A-06883-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 carried out between 10th and 12th January 2019, utilising an NTi Audio XL2 Sound Level Meter. Continuous sound pressure level data was collected over the monitoring interval.

The logger was located in the front garden of 50 Huxley Drive, Horsley approximately 80m from the rail line.

Train passby events were identified in the collected data, then post processed to calculate passby sound exposure levels (SEL) for each event. Period noise levels were calculated from the event SELs.

Where identified in the collected audio data, extraneous noise was removed from the passby event.

The meteorological conditions observed during the unattended noise monitoring were generally satisfactory for noise monitoring.

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). Data heavily affected by insect noise has been filtered.

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

Receiver	Date/ Time	Period	Criteria L _{Aeq,15min} dB(A)	Weather	Measured Noise Level L _{An,15min} dB(A)			Estimated Contribution from project	Complies	Notes
					L _{Aeq}	L _{A10}	L _{A90} ¹	L _{Aeq,15min} dB(A)		
RA1a	19/12/18 15:24	Day	43	Calm, 21°C Wind: 0-0.5 m/s	47	47	41	41	Yes	Cicadas/distant construction – 42-44 dBA (constant), Car pass by – 60-66 dBA, Mine hum – 40-43 dBA
RA1b	19/12/18 14:35	Day	43	Calm, 21°C Wind: 1 m/s	52	50	41	41	Yes	Car pass by – 56 dBA, Insects/birds – 56 dBA, Construction noise/cars – 52 dBA
RA2a	19/12/18 14:06	Day	44	Cloudy, 22°C Wind: 1-2 m/s	64	67	51	<45	Yes	Traffic – 69 dBA, Construction – 68 dBA
RA2b	19/12/18 14:57	Day	44	Cloudy, 22°C Wind: 1-2 m/s	54	51	43	<44	Yes	Mine noise (load dumping) – 48-50 dBA, Motorbike pass by – 65-70 dBA, Distant traffic noise – 49-55 dBA, Mine hum – 45-46 (Constant), Cicadas/birds – 50-55 dBA
RA3a	19/12/18 14:26	Day	40	Cloudy, 24°C Wind: 1-2 m/s	52 (43)	54	48 (45)	N/A – cicada noise dominant	Yes	Cicadas – 47-52 dBA (constant), Construction/traffic noise – 48-50 dBA (constant), Distant traffic – 45-47 dBA, Birds – 56-58 dBA
RA3b	19/12/18 15:47	Day	40	Cloudy, 25°C Wind: 0-1 m/s	50 (48)	53	45 (44)	<42	Yes	Mine hum (barely audible) – 40 dBA, Cicadas – 42- 44 dBA (constant), Car pass by – 60-66 dBA
RA1a	19/12/18 20:01	Eve	43	Cloudy, 18°C	49 (44)	51	46 (41)	41	Yes	Mine hum (clearly audible) – 45 dBA (constant), Cicadas – 45-48 dBA (constant), Mine truck movement 45-48 dBA, Dog barks – 55-60 dBA,

				Wind: 0-1 m/s						Machinery switched on (extra low end noise) – 52-54 dBA
RA1b	19/12/18 20:48	Eve	43	Cloudy, 18°C Wind: 0-1 m/s	48 (42)	49	45 (39)	<40	Yes	Insects/dog barking – 51 dBA, Mining noise – 48 dBA
RA2a	19/12/18 19:10	Eve	43	Drizzling, 20°C Wind: 0-1 m/s	60	61	40	<40	Yes	Mine hum – 40-42 dBA (constant), Car pass by – 70-84 dBA, Distant hammering – 45-50 dBA, Rock dumping (mine) – 43 dBA, Dog bark – 70-75 dBA
RA2b	19/12/18 20:24	Eve	43	Cloudy, 19°C Wind: 0-1 m/s	53 (50)	54	51 (48)	<45	Yes	Cicadas/mine noise – 50-54 dBA, Traffic – 55-60 dBA, Birds – 50-55 dBA
RA3a	19/12/18 19:55	Eve	40	Cloudy, 21°C, Wind: 0-1 m/s	53	49	39 (38)	<40	Yes	Birds – 47-40 dBA, Dog barking – 40-43 dBA, Cicadas – 42-45 dBA, Cars – 54-56 dBA
RA3b	19/12/18 19:38	Eve	40	Cloudy, 20°C, Wind: 0-1 m/s	67 (51)	68	65 (41)	41	Yes	Cicadas – 58-62 dBA (constant), Car pass by – 65-70
RA1a	19/12/18 22:06	Night	43	Cloudy, 21°C, Wind: 0-1 m/s	47 (41)	48	44 (39)	<40	Yes	Cicadas/distant construction – 42-44 dBA (constant), Car pass by – 60-66 dBA, Mine hum – 40-43 dBA
RA1b	19/12/18 22:52	Night	43	Drizzling, 23°C Wind: 0-1 m/s	45 (41)	47	42 (39)	<40	Yes	Cicadas – 43-45 dBA, Airplane – 44-48 dBA, Dogs barking – 46-49 dBA

RA2a	19/12/18 21:14	Night	43	Cloudy, 20°C Wind: 0-1 m/s	57	53	36	<40	Yes	Mine hum (clearly audible) – 38-40 dBA (constant), Car pass by – 65-75 dBA, Cicadas – 38-40 dBA (constant)
RA2b	19/12/18 22:29	Night	43	Cloudy, 21°C Wind: 0-1 m/s	50 (49)	49	46	<45	Yes	Mine – 44-46 dBA, Cicadas – 46-48 dBA, Cars – 50 dBA, Airplane – 51 dBA
RA3a	19/12/18 22:01	Night	38	Cloudy, 20°C Wind: 0-1 m/s	58 (42)	59	57 (40)	<40	Yes	Cicadas – 57-58 dBA, Truck – 60 dBA
RA3b	19/12/18 21:43	Day	38	Cloudy, 20°C Wind: 0-1 m/s	42 (40)	43	41 (37)	<38	Yes	Mine hum and cicadas – 40-42 dBA (constant)

Notes: All noise levels are rounded to the nearest whole decibel.

1 values exceeding the adopted criteria are indicated in bold font.

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	49	<40	Yes	Site audible @ 45 dB(A).
RA1b	59	49	<40	Yes	Site audible @ 36-38 dB(A).
RA2a	60	78	<40	Yes	Consistent noise from site 40-44 dB(A). Measurement influenced by vehicle passby.
RA2b	60	48	<40	Yes	Consistent noise from site @ 41-42 dB(A)
RA3a	48	58	<40	Yes	Site noise consistent @ 42-43 dB(A). Measurement influenced by vehicle passby.
RA3b	48	46	<40	Yes	Consistent noise from site 35-36 dB(A).

Notes: All noise levels are rounded to the nearest whole decibel.

8.2 Rail Spur Noise

The results of the rail noise measurements at rail receiver location R1 are presented in Table 8.1 for $L_{Aeq,period}$ criteria. All values are in dB(A).

Rail operations during monitoring included 7 locomotive pass by events

Table 8.3 – Rail Noise events (L_{Aeq} Noise Levels)

Location	Date	Time (hh:mm) (AEDST)	Duration	LAE ¹	Rail Noise Level L_{Aeq} period	Criteria	Complies
R1	10.01.2019	15:08	02:30	78	33 $L_{Aeq,15hr}$	65	Y
R1	11.01.2019	10:42	05:00	68	42 $L_{Aeq,15hr}$	65	Y
R1	11.01.2019	13:57	05:00	78			
R1	11.01.2019	15:50	04:00	86			
R1	12.01.2019	06:45	03:00	84	42 $L_{Aeq,9hr}$	60	Y
R1	12.01.2019	09:53	03:00	86	42 $L_{Aeq,15hr}$	65	Y
R1	12.01.2019	11:57	03:00	76			

Notes: Rail noise levels are corrected to a façade level (+2.5 dB) All results are rounded to 1 dB.

1: LAE is sound exposure level for each individual passby event is the measured free field noise level.

9. DISCUSSION

9.1 Operational Colliery Noise

The Project was barely audible or inaudible during the daytime and mostly audible during evening and night time periods at all locations.

Site noise levels during the night time periods were found to be below the relevant sleep disturbance limits for all locations, where identified.

During the night time period, no short duration high noise level events were identified. No annoying characteristics were observed during measures which would trigger the application of modifying factors as defined in Chapter 4 of the INP.

9.2 Rail Spur

Measured rail noise levels at 50 Huxley Drive, Horsely were below the day time noise limit of 65 dB(A) for monitoring undertaken on 27th September 2018.

10. STATEMENT OF COMPLIANCE

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

Project operations were barely audible or inaudible at all locations during the daytime and mostly audible during evening and night time periods at all locations.

Maximum site noise levels during the night time periods were not identifiable, therefore remaining below the relevant sleep disturbance limits for all locations.

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

Rail noise levels at 50 Huxley Drive, Horsley were within the day time rail noise limit of LAeq 65 dB(A) (7am to 10pm) and night time rail noise limit of LAeq 60 dB(A) (10pm to 7am).

11. CONCLUSION

ERM conducted operational compliance noise monitoring at Wongawilli Colliery on 19th December 2018 during typical operations. This involved the completion of attended noise measurements at six (6) locations during the day, evening and night periods as required by the Project Approval.

The assessment was conducted according to current guidelines, standards and assessment methods.

The compliance monitoring found that the Project is operating within its required noise limits. Project operations were barely audible or inaudible at all locations during the daytime and mostly audible during evening and night time periods at all locations.

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

Maximum site noise levels during the night time periods were found to be below the relevant sleep disturbance limits for all locations, where identified.

Unattended rail noise measurements were carried out on 10th – 12th January 2019 at 50 Huxley Drive, Horsley.

Measured rail noise levels at 50 Huxley Drive, Horsley were below the day time noise limit of 65 dB(A) and night time noise limit of 60 dB(A).

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.