

RIX'S CREEK MINE

Monthly Compliance Monitoring November 2021

Prepared for:

Bloomfield Collieries
Four Mile Creek Road
Ashtonfield NSW 2323

SLR Ref: 630.12841-R29
Version No: -v1.0
January 2022



PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
10 Kings Road
New Lambton NSW 2305 Australia
(PO Box 447 New Lambton NSW 2305)
T: +61 2 4037 3200
E: newcastleau@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Bloomfield Collieries (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.12841-R29-v1.0	20 January 2022	Shannon Harvey	Martin Davenport	Martin Davenport

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1 Introduction

1.1 Background

Bloomfield Collieries Pty Ltd (Bloomfield) has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct night-time compliance noise monitoring of Rix's Creek Mine (the Mine).

The Mine is an open cut coal mine located approximately 5km north-west of Singleton in the Hunter Valley Coalfields of NSW. The Mine comprises the original Rix's Creek Mine and the former Vale Integra Open Cut Mine. The Mine operates under EPL 3391 but as the two previously mentioned mines operate under separate development approvals it is necessary to refer to the two parts of the Mine separately. In this compliance report the original Rix's Creek Mine is referred to as Rix's Creek South (RCS) and the former Vale Integra Open Cut Mine is referred to as Rix's Creek North (RCN).

Compliance noise monitoring of the Mine is guided by the relevant requirements of;

- Environment Protection Licence 3391 dated 15th December 2020 (EPL 3391)
- Rix's Creek Mine Noise Management Plan dated 9th December 2020 (NMP)
- Rix's Creek North Project Approval PA 08_0102 MOD 9 dated February 2021(PA 08_0102)
- SSD 6300 Rix's Creek Continuation Project

This report presents the results and findings from the operator-attended noise survey conducted on Monday 30 November 2021.

1.2 Objectives of this Report

The objectives of the noise monitoring survey for this month were:

- Conduct Attended Noise Compliance Monitoring in accordance with the Rix's Creek Mine NMP, the NSW Industrial Noise Policy (2000) and requirements as noted in the "Implementation and transitional arrangements for the Noise Policy for Industry (2017).
- Measure the ambient noise levels of at least six (6) noise sensitive locations surrounding the Mine during the night-period (10:00 pm to 7:00 am) for a minimum of 15 minutes at each location.
- Quantify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of the individual noise sources.
- Assess the noise emissions of the mine and determine compliance with respect to the relevant conditions.

1.3 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 Rix's Creek Noise Criteria

RCS operations are subject to the conditions contained in SSD 6300 and EPL 3391.

RCN operations are subject to the conditions contained in Schedule 3 of PA 08_0102 and EPL3391.

RCM operations are subject to the conditions contained in EPL3391.

The Rix's Creek Mine NMP encompasses the noise management and relevant criteria for RCS and RCN operations, coal handling, preparation and processing and rail loading across the entire site. The Rix's Creek Mine NMP consolidates all requirements and provides (Section 5 of the NMP) procedures to ensure monthly attended noise compliance monitoring is carried out effectively.

2.1 EPL Noise Limits – Rix's Creek Mine Operations

The figures presented in **Figure 1** are extracts from the EPL 3391.

Figure 1 Relevant EPL Noise Criteria

L3 Noise limits

L3.1 Noise generated at the premises must not exceed the noise limits in the Table below.

Location	Day/Evening/Night LAeq (15 minute)	Night LA1 (1 minute)
EPA 29 and NMG1	40	47
EPA 30 and NMG3	40	45
EPA 31 and NMG4	37	47
EPA 32 and NMG5	41	47
EPA 33 and NMG6	42	47
EPA 34 and NMG7	40	47
EPA 35 and NMG8	40	47
EPA 36 and NMG10	40	47
EPA 37 and NMG11	40	47
EPA 38 and NMG12	40	47

L3.2 For the purpose of condition L3.1:

- a) EPA (number) refers to EPA identification point numbers as referenced in condition P1.4; and
- b) NMG (number) refers to all privately owned residential receivers on land within noise monitoring groups identified by Figure 1.

L3.3 For the purpose of condition L3.1:

- a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- b) Evening is defined as the period from 6pm to 10pm; and
- c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

L3.4 The noise limits set out in condition L3.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres/second at 10 metres above the ground level;
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Stability category G temperature inversion conditions.

L3.5 For the purposes of condition L3.4:

- a) Data recorded by a meteorological station installed on the premises at EPA Identification Point 41 must be used to determine meteorological conditions; and
- b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

L3.6 A non-compliance of condition L3.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:

- at any privately owned residential receiver within the Noise Monitoring Groups defined in Condition L3.1.

L3.7 For the purposes of compliance monitoring and determining the noise generated at the premises the modification factors in Fact Sheet C of the Noise Policy for Industry (2017) must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

Definitions:

- *Noise refers to 'sound pressure levels' for the purpose of conditions L3.1 to L3.7.*

M9 Noise monitoring

M9.1 To assess compliance with condition L3.1, attended noise monitoring must be undertaken in accordance with conditions L3.2 to L3.7 and:

- a) at a minimum of 6 locations from those listed condition P1.4 shown to be experiencing noise enhancing meteorological conditions;
- b) occur every calendar month in a reporting period; and
- c) occur during one night-time period as defined in the *Noise Policy Industry 2017* for a minimum of 15 minutes at each location from a) during the night.

Rix's Creek North Project Approval

The noise limits specified for RCN can be found within the reproduced figures of relevant conditions from the Project Approval PA 08_0102 (MOD 9) in **Appendix B**.

2.3 Rix's Creek South Development Consent

The noise limits specified for RCS can be found within the reproduced extracts from the Development Consent SSD 6300 in **Appendix C**.

2.4 Noise Limits at the Nominated Noise Monitoring Locations

The relevant conditions for RCS and RCN are presented in **Table 1**.

Table 1 Compliance Criteria

NMP ID	EA Ref. (RCN/RCS) ¹	Rix's Creek North		Rix's Creek South		Rix's Creek Mine Combined	
		LAeq(15minute) dB	LA1(1minute) dB	LAeq(15minute) dB	LA1(1minute) dB	LAeq(15minute) dB	LA1(1minute) dB
NM01	132/171	38	48	40	47	40	47
NM03	63/NA	35	45	40	47	40	45
NM04	19/12	36	48	42	47	37	47
NM05	11/8	41	47	42	47	41	47
NM06	150/23	36	48	42	47	42	47
NM07	NA/61	35 ¹	45 ¹	40	47	40	47
NM08	NA/152	35 ¹	45 ¹	40	47	40	47
NM10	NA/126	35 ¹	45 ¹	40	47	40	47
NM11	NA/160	35 ¹	45 ¹	40	47	40	47
NM12	NA/168	35 ¹	45 ¹	40	47	40	47

Notes:

1. Criterion set as for "All other privately owned residences".

3 Noise Monitoring Methodology

3.1 General Requirements

The night-time Attended Noise Compliance Monitoring was conducted in accordance with Rix's Creek Mine NMP, the NSW Industrial Noise Policy (2000) and requirements as noted in the "Implementation and transitional arrangements for the Noise Policy for Industry (2017)".

3.2 Modifying Factors

The implementation and transitional arrangements for the NSW Noise Policy for Industry (NPfI) notes 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 the 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 more recent understanding of the impact of tonal and low-frequency noise on the community.

As such appropriate modifying factors such as low frequency noise have been assessed against NPfI requirements.

Relevant modifying factors are assessed by analysis of the measured RCM L_{Aeq} spectrum where applicable.

3.3 Rix's Creek Mine Noise Monitoring Locations

Residences surrounding the Mine have been grouped generally according to the locality and local acoustic environment. These groupings are referenced in the relevant EAs as Noise Assessment Groups (NAG). Monitoring locations, including the receptor reference numbers from the relevant EAs and the NAG each represents are listed below.

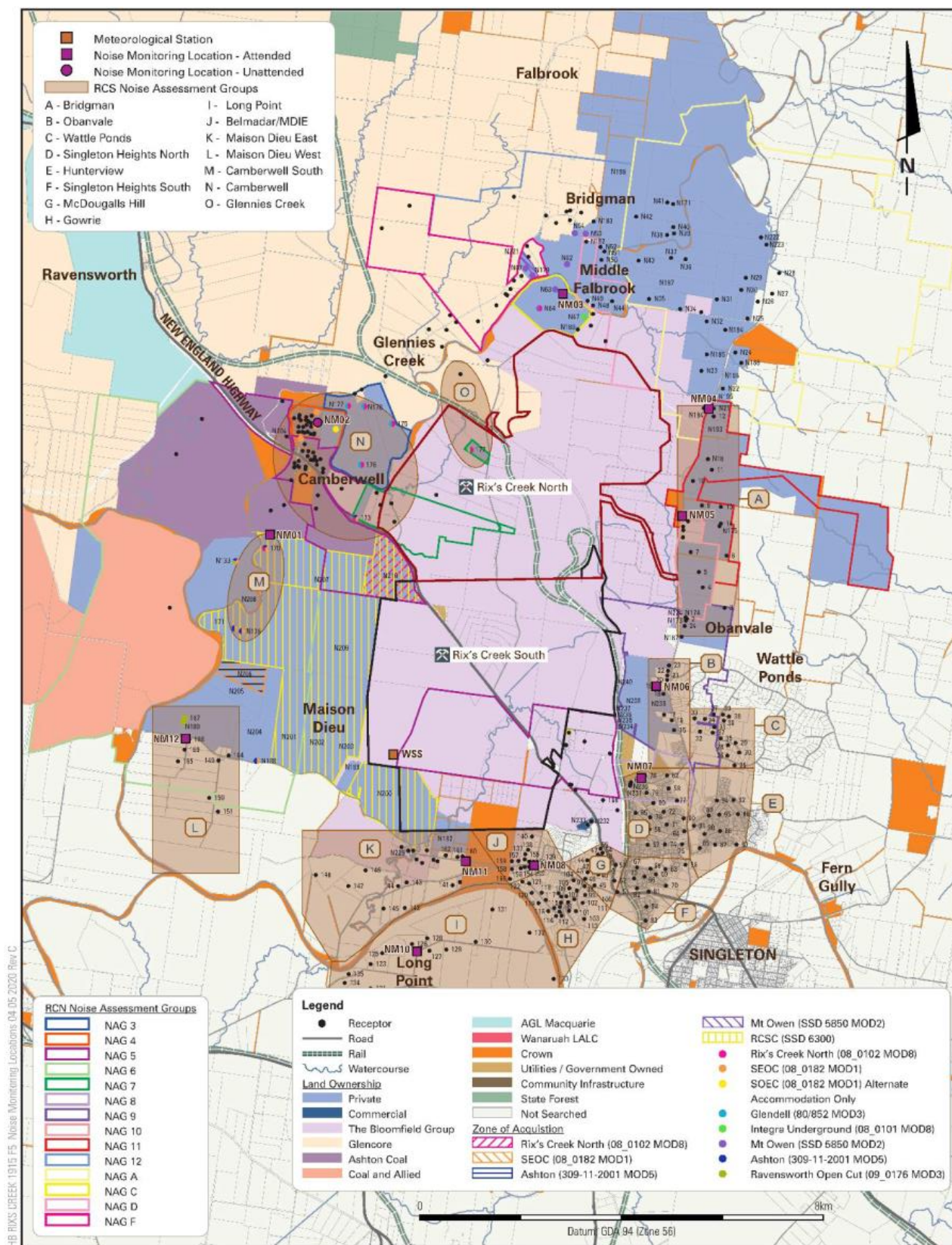
Table 2 Noise Attended Monitoring Locations

NMP ID	EA Ref. (ICO/RCM) ¹	Owner or Area	NAG ²
NM01	132/171	Bowman	6 (RCN)/M (RCS)
NM03	63/NA	Cherry	B, C, F, 1, 6 and 12 (RCN)
NM04	19/12	Andrews	11 and A (RCN)/A (RCS)
NM05	11/8	Ferraro	10 and 11 (RCN)/A (RCS)
NM06	150/23	Bridgman Road	9 (RCN)/B and C (RCS)
NM07	NA/61	Gardiner Circuit	8 (RCN)/D and E (RCS)
NM08	NA/152	Belmadar Way	NA/J, G and F (RCS)
NM10	NA/126	Long Point	NA/K and I (RCS)
NM11	NA/160	320 Maison Dieu Road	NA/K (RCS)
NM12	NA/168	Corner of Maison Dieu Road and Shearers Lane	NA/L (RCS)

Notes: 1. NA indicates location was not included in the EA for that project; and
2. Indicates the NAG reference the location represents from the relevant EAs

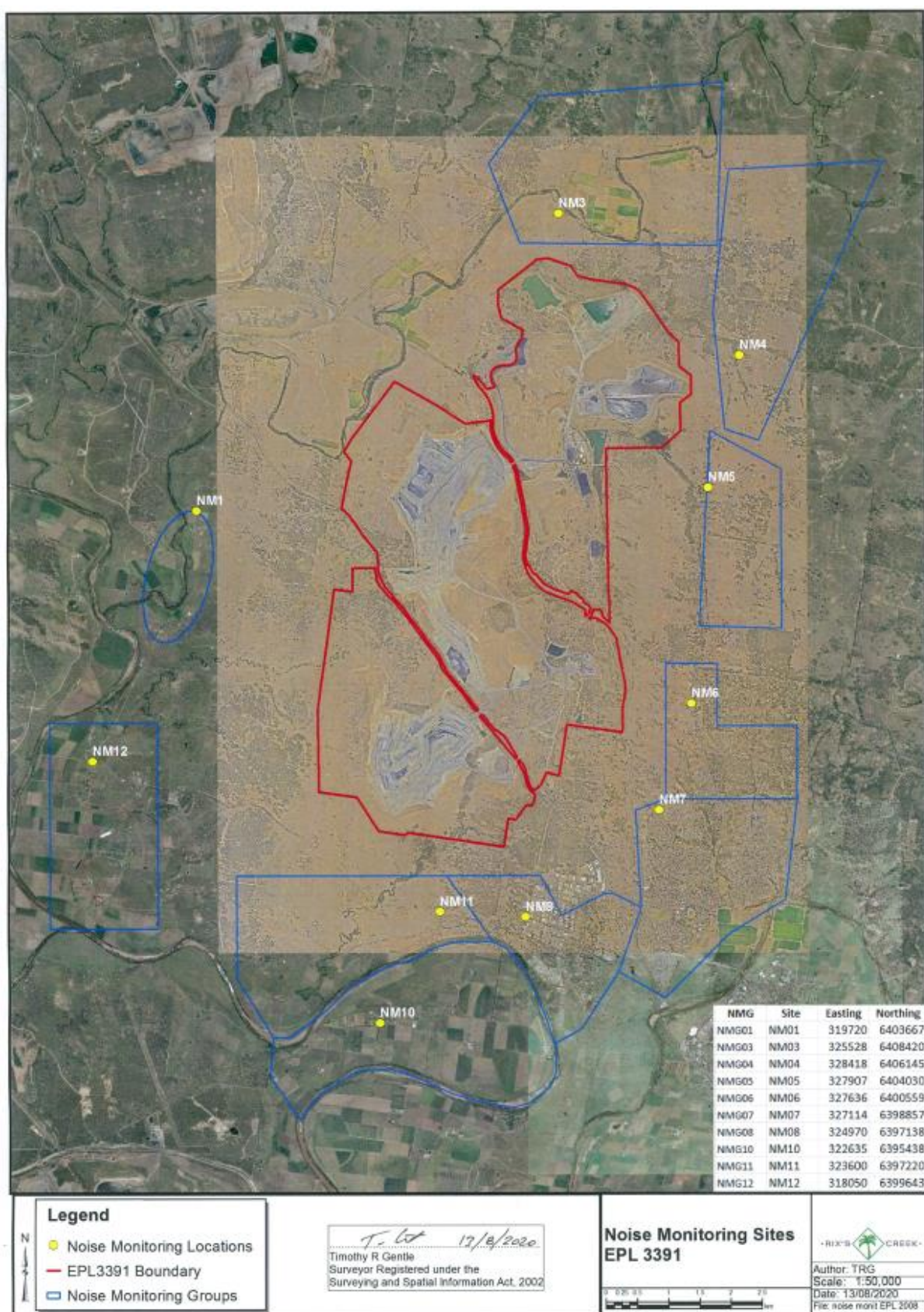
A site map sourced from the NMP and EPL 3391 identifying the assessment and noise monitoring locations are presented in **Figure 2** and **Figure 3**.

Figure 2 RCM Noise Monitoring Locations



Source: Rix's Creek Mine NMP - Figure 5

Figure 3 Attended Noise Compliance Monitoring Sites



3.4 Noise Monitoring Location Selection

As per the NMP, the procedure stated below was used to select appropriate noise monitoring locations:

Compliance monitoring is targeted to locations where operational noise is likely to be in the zone of meteorological enhancement as indicated by the predictive noise model. The procedure for determining which locations to monitor is as follows:

1. *The acoustic consultant undertaking the monitoring will access the predictive model website for the site for the upcoming night shift. The model results will indicate graphically the predicted zone of the meteorological enhancement;*
2. *A monitoring plan will be developed by the consultant for the upcoming night period. Locations are to include:*
 - a. *If a clear zone of meteorological enhancement is indicated, one location in the opposite direction to the zone of predicted enhancement, and, all locations located within the predicted zone of enhancement; or*
 - b. *If relatively neutral conditions are predicted with no clear zone of meteorological enhancement, the eight locations nearest RCM will be monitored. NM01 and NM10 will be excluded, non-compliance at those locations in the absence of meteorological enhancement is unlikely due to distance from the RCM.*

3.5 Nominated Monitoring Locations

Night time attended noise compliance monitoring during November 2021 was conducted at six (6) locations. The details of the monitoring locations are given in **Table 3**.

Table 3 Attended Noise Monitoring Locations

Noise Monitoring Locations	EA Ref. (RCN/RCS)	Owner or Area
NM01	132/171	Bowman
NM03	63/NA	Cherry
NM04	19/12	Andrews
NM05	11/8	Ferraro
NM06	150/23	Bridgman Road
NM07	NA/61	Gardiner Circuit

4 Operator Attended Noise Monitoring

Operator attended noise surveys were conducted at each of the six (6) nominated noise monitoring locations during the night-time period from 10:00 pm to identify and quantify sources of noise that contributed to the overall ambient noise level. A 15 minute measurement was conducted at each site using an integrating sound level meter to observe condition M9.1 of EPL 3391 which requires a minimum of 15 minutes at each location.

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise compliance monitoring commenced at 22:02 on Monday 29 November 2021 and the final noise survey commenced at 00:06 Tuesday 30 November 2021. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2250L (S/N 3003389).

Weather data during the monitoring period has been obtained from the weather station located on the Rix's Mine Creek Mine Weather Station site (EPL 3391 ID #11).

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date and start time.
- Wind velocity (m/s) and Temperature (°C) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from Rix's Creek Mine and are stated only when a contribution could be quantified.

4.1.1 Operator-attended Noise Survey Results – NM01 'Bowman'

Results of the operator-attended noise surveys at NM01 are provided in **Table 5**. Monitoring location NM01 represents residential receptors located to the east of the site.

Table 4 Location NM01

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
	LAmix	LA1	LA10	LA90	LAeq		
29/11/2021 22:02 16°C 3 m/s SE	59	55	55	49	52	N/A	Road traffic 35-59 Frogs/insects 51-58 Rix's Creek Audible in lulls General pit operations <30 Rock dump 34
	Estimated Rix's Creek Mine North Noise Contribution		Estimated Rix's Creek Mine South Noise Contribution				
WS>3.0 m/s? No	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)			
	Criteria Limit: 38	Criteria Limit: 48	Criteria Limit: 40	Criteria Limit: 47			
	<30	34	Inaudible	Inaudible			
	Estimated Rix's Creek Mine EPL Combined Noise Contribution						
	LAeq(15minute)		LA1(1minute				
	Criteria Limit: 40		Criteria Limit:47				
<30		34					

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.1.1 Operator Attended Noise Survey Summary – NM01

RCS operations were inaudible during the night-time noise monitoring survey at this location.

RCN and RCM operations were audible during the night-time noise monitoring survey at this location. RCS and RCM L_{Aeq}(15minute) and L_{A1}(1minute) was estimated to be <30 dBA and 34 dBA.

Road traffic noise as well as noise from frogs and insects also contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.1.2 Operator-attended Noise Survey Results – NM03 'Cherry'

Results of the operator-attended noise surveys at NM03 are provided in **Table 5**. Monitoring location NM03 represents residential receptors located to the north of the site.

Table 5 Location NM03

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
	LAmix	LA1	LA10	LA90	LAeq		
29/11/2021 22:36 16°C 2.8 m/s SSE	57	41	39	36	38	N/A	Road traffic 29-39 Frogs 37-41 Aeroplane 28-30 Operator 46-57 Rix’s Creek Audible Engine noise 26-29
	Estimated Rix’s Creek Mine North Noise Contribution		Estimated Rix’s Creek Mine South Noise Contribution				
LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)				
Criteria Limit: 35	Criteria Limit: 45	Criteria Limit: 40	Criteria Limit: 47				
27	29	Inaudible	Inaudible				
Estimated Rix’s Creek Mine EPL Combined Noise Contribution							
LAeq(15minute)		LA1(1minute					
Criteria Limit: 40		Criteria Limit:45					
27		29					

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.2.1 Operator Attended Noise Survey Summary – NM03

RCS operations were inaudible during the night-time noise monitoring survey at this location.

RCN and RCM operations were audible during the night-time noise monitoring survey at this location. RCS and RCM L_{Aeq}(15minute) and L_{A1}(1minute) was estimated to be 27 dBA and 29 dBA.

Road traffic noise as well as noise from frogs also contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.1.3 Operator-attended Noise Survey Results – NM04 'Andrews'

Results of the operator-attended noise surveys at NM04 are provided in **Table 6**. Monitoring location NM04 represents residential receptors located to the east of the site.

Table 6 Location NM04

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
	LAmix	LA1	LA10	LA90	LAeq		
29/11/2021 22:59 16°C 3.3 m/s SSE	79	62	60	56	59	N/A	Road traffic 36-79 Frogs 60-62 Rix’s Creek General mining operations 26-32
	Estimated Rix’s Creek Mine North Noise Contribution		Estimated Rix’s Creek Mine South Noise Contribution				
WS>3.0 m/s? Yes	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)			
	Criteria Limit: 36	Criteria Limit: 48	Criteria Limit: 42	Criteria Limit: 47			
	30	32	Inaudible	Inaudible			
	Estimated Rix’s Creek Mine EPL Combined Noise Contribution						
	LAeq(15minute)		LA1(1minute)				
	Criteria Limit: 37		Criteria Limit: 47				
	30		32				

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.3.1 Operator Attended Noise Survey Summary – NM04

RCS operations were inaudible during the night-time noise monitoring survey at this location.

RCN and RCM operations were audible during the night-time noise monitoring survey at this location. RCS and RCM L_{Aeq}(15minute) and L_{A1}(1minute) was estimated to be 30 dBA and 32 dBA.

Road traffic noise and noise from frogs also contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.1.4 Operator-attended Noise Survey Results – NM05 'Ferraro'

Results of the operator-attended noise surveys at NM05 are provided in **Table 7**. Monitoring location NM05 represents residential receptors located to the east of the site.

Table 7 Location NM05

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
	LAmix	LA1	LA10	LA90	LAeq		
29/11/2021 23:22 16°C 3.8 m/s SSE	81	57	52	50	50	N/A	Road traffic 35-81 Frogs/insects 51-54 Train 33-34 Rix's Creek Audible General mining operations 29-34
	Estimated Rix's Creek Mine North Noise Contribution		Estimated Rix's Creek Mine South Noise Contribution				
LAeq(15minute)		LA1(1minute)	LAeq(15minute)		LA1(1minute)		
Criteria Limit: 41		Criteria Limit: 47	Criteria Limit: 42		Criteria Limit: 47		
32		33	Inaudible		Inaudible		
Estimated Rix's Creek Mine Noise Combined Contribution							
LAeq(15minute)			LA1(1minute)				
Criteria Limit: 41			Criteria Limit: 47				
32			34				
WS>3.0 m/s? Yes							

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.4.1 Operator Attended Noise Survey Summary – NM05

RCS operations were inaudible during the night-time noise monitoring survey at this location.

RCN and RCM operations were audible during the night-time noise monitoring survey at this location. RCS and RCM L_{Aeq}(15minute) and L_{A1}(1minute) was estimated to be 32 dBA and 34 dBA.

Road and rail traffic noise and noise from frogs also contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.1.5 Operator-attended Noise Survey Results – NM06 'Bridgeman Road'

Results of the operator-attended noise surveys at NM06 are provided in **Table 8**. Monitoring location NM06 represents residential receptors located to the east of the site.

Table 8 Location NM06

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
	L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}		
29/11/2021 23:44 17°C 3.3 m/s SE	79	69	53	43	55	N/A	Road traffic 38-79 Train passby 43-46 Frogs/insects 44-52 Rix's Creek Barely Audible General mining operations <30
	Estimated Rix's Creek Mine North Noise Contribution		Estimated Rix's Creek Mine South Noise Contribution				
	L _{Aeq} (15minute)	L _{A1} (1minute)	L _{Aeq} (15minute)	L _{A1} (1minute)			
	Criteria Limit: 36	Criteria Limit: 48	Criteria Limit: 42	Criteria Limit: 47			
	Inaudible	Inaudible	<30	<30			
	Estimated Rix's Creek Mine North EPL Combined Noise Contribution						
	L _{Aeq} (15minute)		L _{A1} (1minute)				
	Criteria Limit: 42		Criteria Limit: 47				
	<30		<30				
WS>3.0 m/s? Yes							

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.5.1 Operator Attended Noise Survey Summary – NM06

RCN operations were inaudible during the night-time noise monitoring survey at this location.

RCS and RCM operations were audible during the night-time noise monitoring survey at this location. RCS and RCM L_{Aeq}(15minute) and L_{A1}(1minute) was estimated to be <30 dBA and <30 dBA.

Road and rail traffic noise and noise from frogs also contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.1.6 Operator-attended Noise Survey Results – NM07 ‘Gardiner Circuit’

Results of the operator-attended noise surveys at NM07 are provided in **Table 9**. Monitoring location NM07 represents residential receptors located to the south-east of the site.

Table 9 Location NM07

Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Modifying Factors Applicable	Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
	L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}		
30/11/2021 00:06 17°C 3.5 m/s SE	68	65	55	36	51	N/A	Road traffic 38-53 Trains 41-67 Birds 39-49 Frogs/insects 37-42 Rix's Creek Inaudible
	Estimated Rix's Creek Mine North Noise Contribution		Estimated Rix's Creek Mine South Noise Contribution				
WS>3.0 m/s? Yes	L _{Aeq} (15minute)	L _{A1} (1minute)	L _{Aeq} (15minute)	L _{A1} (1minute)			
	Criteria Limit: 35	Criteria Limit: 45	Criteria Limit: 40	Criteria Limit: 47			
	Inaudible	Inaudible	Inaudible	Inaudible			
	Estimated Rix's Creek Mine EPL Combined Noise Contribution						
	L _{Aeq} (15minute)		L _{A1} (1minute)				
	Criteria Limit: 40		Criteria Limit: 47				
	Inaudible		Inaudible				

Note 1: N/A = Not Applicable due to non-compliant weather conditions and/or RCM being inaudible or significantly below the noise criteria.

4.1.6.1 Operator Attended Noise Survey Summary – NM07

RCN, RCS and RCM operations were inaudible during the night-time noise monitoring survey at this location.

Road traffic noise and rail traffic noise as well as noise from frogs, insects and birds contributed to the overall ambient noise environment during the night-time operator attended noise survey at this location.

4.2 Compliance Assessment and Discussion of Results

4.2.1 Rix's Creek Mine Noise Compliance

Results of the operational noise compliance assessment are given in **Table 10** and **Table 11**.

Table 10 Rix's Creek North Compliance Noise Assessment – Operations

Location	Estimated RCN Contribution		Criteria		Compliance	
	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)
NM01 Bowman	<30	34	38	48	Y	Y
NM03 Cherry	27	29	35	45	Y	Y
NM04 Andrews	30	32	36	48	Y	Y
NM05 Ferraro	32	34	41	47	Y	Y
NM06 Bridgeman Road	I/A	I/A	36	48	Y	Y
NM07 Gardiner Circuit	I/A	I/A	35	45	Y	Y

Note 1. I/A – Inaudible

Note 2. N/M – Not measurable

Table 11 Rix's Creek South Compliance Noise Assessment – Operations

Location	Estimated RCN Contribution		Criteria		Compliance	
	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)
NM01 Bowman	I/A	I/A	40	47	Y	Y
NM03 Cherry	I/A	I/A	40	47	Y	Y
NM04 Andrews	I/A	I/A	42	47	Y	Y
NM05 Ferraro	I/A	I/A	42	47	Y	Y
NM06 Bridgeman Road	<30	<30	42	47	Y	Y
NM07 Gardiner Circuit	I/A	I/A	40	47	Y	Y

Note 1. I/A – Inaudible

Note 2. N/M – Not measurable

Table 12 Rix's Creek Mine Combined Compliance Noise Assessment - Operations

Location	Estimated RCN Contribution		Criteria		Compliance	
	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)	LAeq(15minute)	LA1(1minute)
NM01 Bowman	<30	34	40	47	Y	Y
NM03 Cherry	27	29	40	45	Y	Y
NM04 Andrews	30	32	37	47	Y	Y
NM05 Ferraro	32	34	41	47	Y	Y
NM06 Bridgeman Road	<30	<30	42	47	Y	Y
NM07 Gardiner Circuit	I/A	I/A	40	47	Y	Y

Note 1. I/A – Inaudible

Note 2. N/M – Not measurable

4.2.2 Discussion of Results

Results presented in **Table 10**, **Table 11** and **Table 12** indicates that noise levels from RCM complied with relevant criteria at all monitoring locations during the November 2021 monitoring survey.

5 Conclusion

SLR was engaged by Bloomfield Colliery Pty Limited to conduct monthly night time noise monitoring for the Rix's Creek Mine operations guided by the requirements of the Environment Protection License 3391, Rix's Creek Mine Noise Management Plan, Rix's Creek North Project Approval PA 08_0102 and Rix's Creek South Development Consent SSD 6300.

Operator-attended noise monitoring was conducted at six residential receiver locations on Monday 29 November 2021 and concluded Tuesday 30 November 2021 in order to determine the noise of the Rix's Creek Mine operations against the EPL 3391 and relevant Development Consent conditions.

Based on the measured Rix's Creek Mine noise contribution, compliance with the relevant noise limits were achieved at all noise monitoring locations for Rix's Creek North and Rix's Creek South under applicable weather conditions.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	
90	Construction site with pneumatic hammering	Very noisy
80	Kerbside of busy street	
70	Loud radio or television	
60	Department store	Loud
50	General Office	
40	Inside private office	
30	Inside bedroom	Moderate to quiet
20	Recording studio	
		Quiet to very quiet
		Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

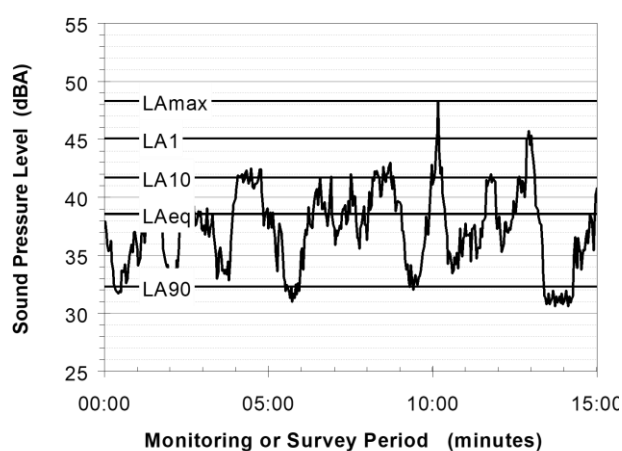
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

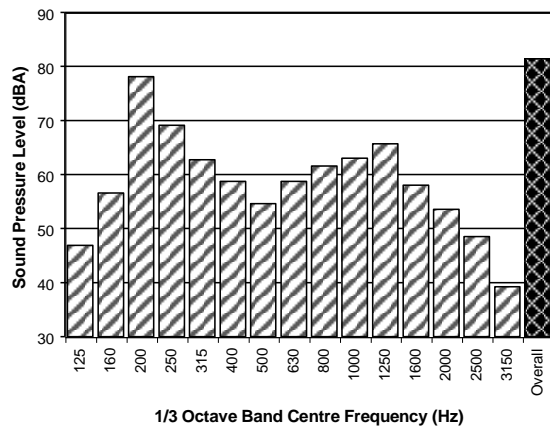
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

APPENDIX B

Rix's Creek North – PA 08_0102 – Schedule 3

NOISE

Noise Criteria

2. Except for the land referred to in Table 1 for which the acquisition basis is noise, the **Applicant** must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 2: Noise criteria dB(A)

Location		Day	Evening	Night	
		$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{A1}(1min)$
NAG 3	All privately-owned land	40	40	39	49
NAG 4	99, 100	39	39	39	47
	88, 91, 95	40	40	40	47
	105, 161	41	41	41	47
	All other privately-owned land	42	42	37	47
NAG 5	104	35	35	35	52
	139	36	36	36	52
	103	37	37	37	52
	121	40	40	40	52
	All other privately-owned land	50	46	42	52

Location		Day	Evening	Night	
		<i>L_{Aeq(15min)}</i>	<i>L_{Aeq(15min)}</i>	<i>L_{Aeq(15min)}</i>	<i>L_{A1(1min)}</i>
NAG 6	137	35	35	35	48
	133	37	37	37	48
	132	38	38	38	48
	All other privately-owned land	41	41	38	48
NAG 7	All privately-owned land	45	42	39	49
NAG 8	142	35	35	35	45
	All other privately-owned land	42	42	35	45
NAG 9	146, 148, 149	35	35	35	48
	143, 144, 145, 147, 150, 151, 152	36	36	36	48
	2	37	37	37	48
	3, 4	39	39	39	48
	All other privately-owned land	40	40	38	48
NAG 10	5	40	40	40	47
	6	41	41	41	47
	8	42	42	42	47
	All other privately-owned land	39	39	37	47
NAG 11	18	35	35	35	49
	20, 21	37	37	36	49
	19	37	37	37	49
	17	38	38	38	49
	7	39	39	39	49
	12, 15	40	40	40	49
	14, 16	42	42	42	49
	All other privately-owned land	41	41	39	49
NAG 12	52	35	35	35	45
	51	37	37	37	45
	53	38	38	38	45
	50, 54	39	39	39	45
	62	40	40	40	45
	All other privately-owned land	38	38	35	45
NAG A	24, 25, 26, 27, 28, 29, 30, 36, 37, 38, 39, 40, 41	35	35	35	46
	31	36	36	35	46
	42, 43	36	36	36	46
	32	37	37	35	46
	22, 23	37	37	37	46
	34	39	39	36	46
	35	39	39	35	46
	All other privately-owned land	39	39	36	46
NAG C	All other privately-owned land	37	37	35	45
NAG D	44, 48	36	36	36	48
	49	39	39	39	48
	All other privately-owned land	40	40	38	48
NAG F	67	40	40	40	50
	All other privately-owned land	40	40	40	50
All other privately-owned land		35	35	35	45

Notes:

- All land located within NAG 1, NAG 2, NAG B and NAG G is now mine-owned.

However, these criteria do not apply if the Applicant, or another mining company, has acquired the land or if the Applicant has a written agreement with the relevant landowner to exceed the criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Noise generated by the project is to be measured in accordance with the relevant requirements of the INP. Appendix 5 sets out the requirements for evaluating compliance with these criteria.

Note: To interpret the locations referred to in Table 2, see the applicable figures in Appendix 4.

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Table 3: Deleted

Cumulative Noise Criteria

4. The Applicant must implement all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other mines in the vicinity does not exceed the criteria in Table 4 at any residence on privately-owned land or on more than 25 percent of any privately-owned land (except for the residential receivers in Table 1 for which the acquisition basis is noise). The Applicant must share the costs associated with implementing these measures on an equitable basis as possible with the relevant mines.

Table 4: Cumulative noise criteria dB(A) L_{Aeq} (period)

Location	Day	Evening	Night
NAGs 4, 5, 8 and 9	55	45	40
All other privately-owned land	50	45	40

Cumulative noise is to be measured in accordance with the relevant requirements of the INP. Appendix 5 sets out the requirements for evaluating compliance with these criteria.

For the purposes of this condition, 'reasonable and feasible avoidance and mitigation measures' includes, but is not limited to, the requirements in conditions 9 and 10 to develop and implement a real-time noise management system that ensures effective operational response to the risk of exceedance of the criteria.

Note: To identify the locations referred to in Table 4, see the figures in Appendix 4.

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Table 5: Deleted

5. Deleted

Table 5: Deleted

Additional Noise Mitigation Measures

6. Upon receiving a written request from the owner of any residence:
- on the land listed in Table 1 for which the acquisition basis is noise; or
 - on land listed in Table 6,
- the Applicant must implement additional noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner.

If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Table 6: Land where additional noise mitigation measures are available on request

5 – D P Cox	6 – W G Cox
-------------	-------------

8 – DK Geelan	16 – A Lambkin
14 – M Hoggan	31 – C Craven
20 – Mr Garvie	48 – G Cheetham
32 – M Langdon	50 – D & M Bridge
53 – K & J Badior	54 – G Holmes
62 – D Moran	95 – J & T Clarke
91 – T & D Olofsson	161 – V Lopes
105 – J & G McInerney	363 – D & L Bynon

Notes:

- To interpret the locations referred to in Table 6, see the applicable figures in Appendix 4.

Table 7: Deleted

7. Deleted

Table 8: Deleted

Rail Noise

8. The Applicant must seek 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 ARTC's EPL (No. 3142) or a Pollution Control Approval issued under the former *Pollution Control Act 1970*.

Operating Conditions

9. The Applicant must:
- implement best practice noise management, including all reasonable and feasible noise mitigation measures, to minimise the operational, low frequency, and rail noise generated by the project at all times, including during temperature inversions;
 - operate a comprehensive noise management system that uses a combination of predicted meteorological forecasting and real-time noise monitoring data to guide the day-to-day planning of mining operations and the implementation of both proactive and reactive mitigation measures to ensure compliance with the relevant conditions of [this consent](#);
 - maintain or improve the effectiveness of noise suppression equipment on plant at all times and ensure defective plant is not used operationally until fully repaired;
 - ensure that noise attenuated plant is deployed preferentially in locations relevant to sensitive receivers;
 - minimise the noise impacts of the project during meteorological conditions under which data is to be excluded for the purposes of assessing compliance with these conditions (see Appendix 5); and
 - co-ordinate the noise management on site with noise management at nearby mines (including Integra Underground, Ashton, [Rix's Creek South](#) and the Mount Owen Complex) to minimise cumulative noise impacts,
- to the satisfaction of the Secretary.

Noise Management Plan

10. The **Applicant** must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with the EPA, and then submitted to the Secretary for approval;
 - (b) describe the measures that would be implemented to ensure:
 - compliance with the noise criteria and operating conditions of **this consent**; and
 - best management practice is being employed;
 - (c) describe the noise management system in detail;
 - (d) include a noise monitoring program that:
 - uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the project;
 - includes a protocol for determining exceedances of the relevant conditions in **this consent**;
 - evaluates and reports on the effectiveness of the noise management system and the best practice noise management measures; and
 - (e) includes a protocol that has been prepared in consultation with the owners of nearby mines (including Integra Underground, Ashton, **Rix's Creek South** and the Mount Owen Complex) to minimise the cumulative noise impacts of the mines.

APPENDIX C

Rix's Creek South – SSD 6300 – Schedule 2 Part B

PART B SPECIFIC ENVIRONMENTAL CONDITIONS

NOISE

Operational Noise Criteria

- B1. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence^a on privately-owned land, excluding the noise-affected land referred to in Table 7.

Table 1: Operational noise criteria dB(A)

NAG	Day/Evening/Night	Night
	<i>L_{Aeq} (15 min)</i>	<i>L_{A1} (1 min)</i>
A – C	42	47
D – O	40	47
All other privately-owned residences	35	45

^a The NAGs referred to in Table 1 are shown in Appendix 3.

- B2. Noise generated by the development must be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Industrial Noise Policy* (EPA, 2000). **Error! Reference source not found.** sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.
- B3. The noise criteria in Table 1 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

APPENDIX 4 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in condition B1 are to apply under all meteorological conditions except the following:
 - (a) where 3°C/100 metres (m) lapse rates have been assessed, then:
 - (i) wind speeds greater than 3 metres/second (m/s) measured at 10m above ground level;
 - (ii) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2m/s measured at 10m above ground level; or
 - (iii) temperature inversion conditions greater than 3°C/100m.
 - (b) where Pasquill Stability Classes have been assessed, then:
 - (i) wind speeds greater than 3m/s at 10m above ground level;
 - (ii) stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
 - (iii) stability category G temperature inversion conditions.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station required under condition B28.

Compliance Monitoring

3. Unless otherwise agreed by the Planning Secretary, the attended compliance monitoring must be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (EPA, 2000), in particular the requirements relating to:
 - (a) monitoring locations for the collection of representative noise data;
 - (b) meteorological conditions during which collection of noise data is not appropriate;
 - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
 - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration,
 with the exception of applying appropriate modifying factors for low frequency noise during compliance testing. This should be undertaken in accordance with Fact Sheet C of the *NSW Noise Policy for Industry* (EPA, 2017).

ASIA PACIFIC OFFICES

ADELAIDE

60 Halifax Street
Adelaide SA 5000
Australia
T: +61 431 516 449

BRISBANE

Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA

GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN

Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST

Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY

21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE

Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE CBD

Suite 2B, 125 Bull Street
Newcastle West NSW 2302
Australia
T: +61 2 4940 0442

NEWCASTLE

10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH

Grd Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY

Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE

12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG

Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 2 4249 1000

AUCKLAND

Level 4, 12 O'Connell Street
Auckland 1010
New Zealand
T: 0800 757 695

NELSON

6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

WELLINGTON

12A & B Waterloo Quay
Wellington 6011
New Zealand
T: +64 2181 7186

SINGAPORE

39b Craig Road
Singapore 089677
T: +65 6822 2203