NARRABRI MINE NOISE MONITORING

Quarter Ending March 2021
Summary Noise Report

Prepared for:

Narrabri Coal Operations Pty Ltd
10 Kurrajong Creek Road
Baan Baa NSW 2390

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PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@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 Narrabri Coal Operations Pty Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18063-R12-v1.0	11 March 2021	Adam Sirianni	Martin Davenport	Martin Davenport

CONTENTS

1 INTRODUCTION 5
2 PERFORMANCE ASSESSMENT AND DISCUSSION 5
3 NOISE CRITERIA 7
3.1 Project Approval, EPL and NMP 7
3.2 Non-compliances & Exemptions 7
3.3 Attended Monitoring 8
EPL Monitoring Locations 8
NMP Monitoring Locations 8
EPL Monitoring Requirements 8
NMP Monitoring Requirements 9
4 OPERATIONAL NOISE MONITORING METHODOLOGY 9
4.1 General Requirements 9
4.2 Methodology - Operator Attended Noise Monitoring 9
5 RESULTS AND DISCUSSION 12
5.1 Results of Operator Attended Monitoring 12
5.1.1 Operator Attended Noise Survey Results – EPL Monitoring Location N5 13
5.1.2 Operator Attended Noise Survey Results – EPL Monitoring Location N6 16
5.1.3 Operator Attended Noise Survey Results – EPL Monitoring Location N9 20
5.1.4 Operator Attended Noise Survey Results – NMP Monitoring Location N1 23
5.1.5 Operator Attended Noise Survey Results – NMP Monitoring Location N3 24
5.1.6 Operator Attended Noise Survey Results – NMP Monitoring Location N7 25
5.1.7 Operator Attended Noise Survey Results – NMP Monitoring Location $N8_{(NMP)}$ 26
6 CONCLUSION 27

DOCUMENT REFERENCES

TABLES

Table 1 Performance Assessment – Operations 6
Table 2 Project Approval and EPL Noise Criteria 7
Table 3 Noise Monitoring Locations 10
Table 4 Days of the Week Quarterly EPL Monitoring was Conducted – Q1 2021 12
Table 5 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 1) 13
Table 6 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 2) 14
Table 7 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 3) 15
Table 8 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 1) 16
Table 9 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 2) 18

CONTENTS

Table 10 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 3) 19
Table 11 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 1) 20
Table 12 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 2) 21
Table 13 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 3) 22
Table 14 Operator Attended NMP Noise Survey Results – N1 – Bow Hills 23
Table 15 Operator Attended NMP Noise Survey Results – N3 – Ardmona 24
Table 16 Operator Attended NMP Noise Survey Results – N7 – Merriman 25
Table 17 Operator Attended NMP Noise Survey Results – N8 – Matilda 26

FIGURES

Figure 1 Attended Noise Monitoring Locations 11

APPENDICES

Appendix A Acoustic Terminology
Appendix B Calibration Certificates

1 Introduction

Narrabri Coal Operations Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct operational noise monitoring for the Narrabri Mine located near Narrabri, New South Wales (NSW) in accordance with the approved Noise Management Plan (NMP) dated June 2018, the Narrabri Mine Project Approval (PA) 08_0144 and the Environment Protection Licence 12789 (EPL 12789).

The objectives of the noise monitoring programme for this operating period were as follows:

- Conduct operator attended noise surveys at 7 locations (as listed in **Section 3.3**) surrounding the mine during the day, evening and night-time periods.
- Quantify all sources of noise within each of the attended noise surveys, including their measured and/or estimated contribution and maximum level of individual noise sources.
- Assess the noise emissions of Narrabri Mine and determine compliance with respect to the limits contained in Section 2 of the NMP and the relevant approvals.

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

2 PERFORMANCE ASSESSMENT AND DISCUSSION

The following provides a summary of the attended noise measurements undertaken at each monitoring location. Further details are provided for each location in **Section 5** of this report.

Table 1 Performance Assessment – Operations

EPL ID	Location	Date	Narrabri Mine Contribution dBA				Noise Criteria[1]	Measurement Periods	Standard Weather [3]			Compliant
			LAeq 15 min Day	LAeq 15 min Evening	LAeq 15 min Night	LA1 (1 min) Night			Day	Evening	Night	
N5	Oakleigh[2]	22/02/2021	I/A	I/A	I/A	I/A	Day, Evening and Night – LAeq(15minute) 35 dBA Night LA1(1minute) – 45 dBA	Day - 1.5 hrs Evening - 0.5 hrs Night – 1hrs	Y	Y	N	Y
		23/02/2021	I/A	I/A	N/M	N/M			Y	N	N	Y
		24/02/2021	N/M	I/A	I/A	I/A			N	N	N	Y
N6	Newhaven	22/02/2021	N/M	32	29	30			N	N	N	Y
		23/02/2021	<28	N/M	I/A	I/A			Y	N	N	Y
		24/02/2021	I/A	I/A	I/A	I/A			Y	N	N	Y
N9	High Range[2]	22/02/2021	N/M	N/M	27	30			Y	N	N	Y
		23/02/2021	<25	I/A	I/A	I/A			Y	N	N	Y
		24/02/2021	N/M	I/A	I/A	I/A			N	N	N	Y
-	Bow Hills[1]	22/02/2021	33	34	34	37		Day 15 min Evening 15 min Night 15 min	Y	N	N	Y
-	Ardmona	22/02/2021	I/A	N/M	<25	27			Y	N	N	Y
-	Merriman[2]	22/02/2021	I/A	32	35	38			N	N	N	Y
-	Matilda[2]	22/02/2021	I/A	I/A	I/A	I/A			Y	N	N	Y

I/A = Inaudible, N/M = Not Measurable

Note 1: A private agreement between NCOPL and the residents of N1 Bow Hills of 50 dBA LAeq(15minute) is in place. This new level of 50 dBA LAeq(15minute) replaces the levels identified in Conditions 1-3, Schedule 4 of PA 08_0144 Mod 2 and the identical limits contained in condition L3 of Environment Protection Licence No 12789

Note 2: Property is owned by Narrabri Coal Operations

Note 3: Noise levels presented are the highest measured noise level under standard weather conditions over the monitoring period.

3 Noise Criteria

3.1 Project Approval, EPL and NMP

Noise monitoring at the Narrabri Mine was conducted in accordance with EPL 12789, the PA requirements and the NMP. The site specific EPL and PA noise limits are summarised in Section 2 of the NMP and are reproduced in **Table 2**. These criteria do not apply where the mine has an agreement with the relevant owner/s of the residence to generate higher noise levels.

Table 2 Project Approval and EPL Noise Criteria

Location	Day	Emergency Day	Night	
	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{A1(1minute)}$
All Privately owned Residences	35	35	35	45

3.2 Non-compliances & Exemptions

In accordance with Section 11.1.3 of the NSW Industrial Noise Policy (INP) a development is deemed to be in non-compliance with a 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. This may occur for two reasons:

- The noise from the Narrabri Mine is excessive, in which case Narrabri Mine will be not complying with its consent or licence condition.
- The noise was increased by extreme, non-standard weather effects—in which case the Narrabri Mine is not considered to be in noncompliance with its consent or licence condition.

In this latter case, further monitoring at a later date is required to determine compliance under "normal" meteorological conditions.

The INP states in Section 9.2 that *"it is not practicable to meet the noise limit under all inversion events; hence exceedances under extreme temperature inversions are not considered to be a non-compliance with consent or licence conditions."*

Non-standard weather effects include:

- Wind speeds greater than 3 m/s at 10m above ground level; or
- Stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 metres above ground level; or
- Stability category G temperature inversion conditions

As stated in EPL 12789 *"Data recorded by the meteorological station identified as EPA Identification Point(s) W1 must be used to determine meteorological conditions and temperature inversion conditions (stability category) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 of Appendix E of the "New South Wales Industrial Noise Policy" dated January 2000 ISBN 0 7313 2715 2."*

Weather and Temperature inversion monitoring is undertaken continuously in accordance with EPL 12789 with monitoring locations displayed in **Figure 1**. Monitoring Location W1 records wind speed and direction at 10m above ground level. Temperature inversion monitoring is undertaken continuously by directly measuring temperature at two elevations 50m apart (10m & 60m from ground level) at monitoring location W2. All weather data reported in **Table 5** to **Table 17** have been recorded at these monitoring locations.

3.3 Attended Monitoring

Attended Noise monitoring is to be undertaken on a quarterly basis at residential areas. The attended monitoring will take place at the following locations:

EPL Monitoring Locations

- N5 Oakleigh – 16293 Kamilaroi Highway Baan Baa
- N6 Newhaven – 184 Greylands Road Turrawan
- N9 High Range – 92 Davis Road Turrawan

EPL also requires monitoring at N8 Haylin View to be conducted quarterly when surface activities approach the eastern end of the southern longwall panels. No works are currently being undertaken over the eastern end of the southern longwall panels; therefore monitoring has been ceased until required.

It is noted that the Narrabri Mine own the properties Oakleigh (N5) and Haylin View (N8) and has a private agreement with the landholders of High Range (N9) for increased noise limits.

NMP Monitoring Locations

- N1 Bow Hills – 16652 Kamilaroi Highway Baan Baa
- N3 Ardmona – 16462 Kamilaroi Highway Baan Baa
- N7 Merriman – 16896 Kamilaroi Highway Baan Baa
- $N8_{(NMP)}$ Matilda – 773 Mayfield Road Baan Baa

It is noted that the Narrabri Mine owns the properties Merriman (N7) and Matilda ($N8_{(NMP)}$) and has a private agreement with the landholder of Bow Hills (N1) for increased noise limits.

The following details the requirements of the monitoring:

EPL Monitoring Requirements

- At each one of the monitoring locations N5, N6, and N9;
- Occur quarterly in a reporting period;
- Occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:

  i) 1.5 hours during the day;

  ii) 30 minutes during the evening; and

  iii) 1 hour during the night.
- Occur for three consecutive operating days.

NMP Monitoring Requirements

- At each one of the monitoring locations N1, N3, N7 and $N8_{(NMP)}$
- Occur quarterly in a reporting period; and
- Occur during a day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum 15 minutes.

4 Operational Noise Monitoring Methodology

4.1 General Requirements

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA. Calibration certificates for all instruments employed during the monitoring campaign are presented in **Appendix B.**

4.2 Methodology - Operator Attended Noise Monitoring

Operator attended noise measurements were conducted during the day, evening and night-time periods for a minimum of 1.5 hours during the day; 30 minutes during the evening and 1 hour during the night at the three EPL nominated noise monitoring locations and for 15 minutes during the day, evening and night at each of the NMP nominated noise monitoring location representing the most affected receiver locations, listed in **Table 3** and shown in **Figure 1**. During the operator attended noise measurements, the character and relative contribution of ambient noise sources and mine contributions were determined.

Table 3 Noise Monitoring Locations

Monitoring Location	Monitoring Requirements	Receiver Type	Address	Monitoring Location - MGA Zone 55	
				Easting (m)	Northing (m)
N5[1,2]	EPL	Residence	Oakleigh – 16293 Kamilaroi Highway Baan Baa	779526	6617751
N6[1,2]	EPL	Residence	Newhaven – 184 Greylands Road Turrawan	776564	6624643
N9[1]	EPL	Residence	High Range – 92 Davis Road Turrawan	775879	6625895
N1	NMP	Residence	Bow Hills – 16652 Kamilaroi Highway Baan Baa	780114	6620641
N3[2]	NMP	Residence	Ardmona – 16462 Kamilaroi Highway Baan Baa	780233	6618836
N7[2]	NMP	Residence	Merriman – 16896 Kamilaroi Highway Baan Baa	779290	6623143
$N8_{(NMP)}$[2]	NMP	Residence	Matilda – 773 Mayfield Road Baan Baa	777815	6617045

Note: 1. EPL monitoring locations
2. NMP monitoring locations

The objective of the operator attended noise monitoring was to measure the $L_{A1(1minute)}$ and the $L_{Aeq(15minute)}$ noise level contribution from the Narrabri Mine at the nearest potentially affected receptors in order to determine the noise contribution of operational activities associated with Narrabri Mine over each 15 minute measurement period. In addition, the operator quantifies and characterises the overall levels of ambient noise in the area (i.e. L_{Amax}, L_{A1}, L_{A10}, L_{A90}, and L_{Aeq}) over the 15 minute measurement interval.

Operator attended noise measurements were conducted using one-third octave integrating Brüel & Kjær Type 2270 sound level meters (s/n 308204 and s/n 3029485 respectively). Attended noise measurements were undertaken by SLR staff Adam Sirianni and Jordan Murray.

Figure 1 Attended Noise Monitoring Locations

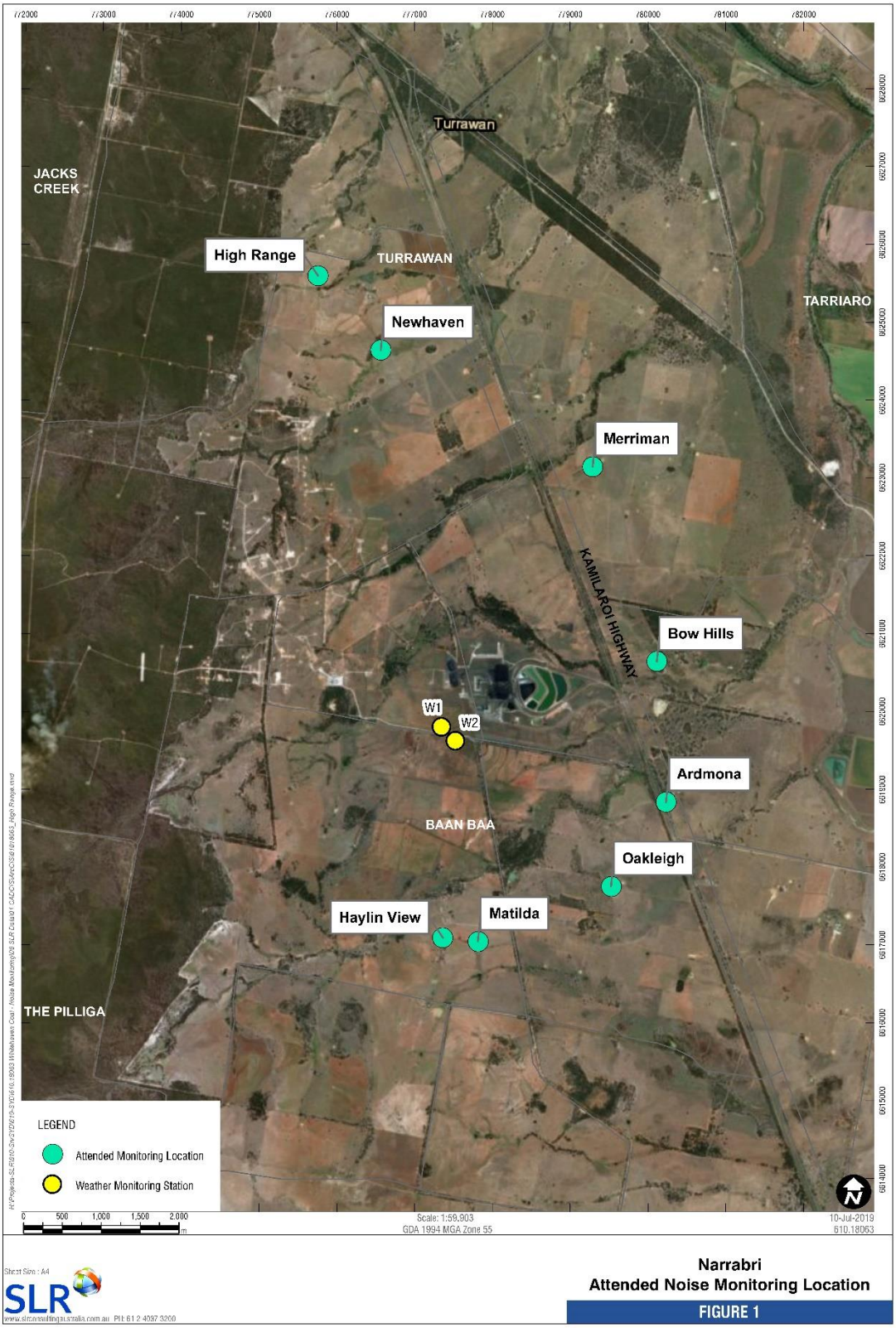


Table 4 presents a summary of which days of the week the quarterly monitoring was conducted, in accordance with condition M7.4 of EPL 12789 and Section 5 of the NMP.

Table 4 Days of the Week Quarterly EPL Monitoring was Conducted – Q1 2021

Period	Day of the Week (Excluding Weekends and Public Holidays)				
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Day	22/02/2021	23/02/2021	24/02/2021		
Evening	22/02/2021	23/02/2021	24/02/2021		
Night[1]	22/02/2021	23/02/2021	24/02/2021		

Note 1: Taken to mean the night-time period from 10:00 pm on the stated day to 7:00 am the following day.

5 Results and Discussion

5.1 Results of Operator Attended Monitoring

Results of the operator attended noise surveys at N5, N6, N9, N1, N3, N7 and $N8_{(NMP)}$ are provided **Table 5** to **Table 17**.

Ambient noise levels presented include all noise sources such as transport (roads, rail and aircraft), fauna (insects, frogs, birds and bats), the natural environment (wind in trees), domestic noises, other industrial operations as well as Narrabri Mine noise emissions.

Weather data during the monitoring period has been obtained from the weather station located on the Narrabri Mine site and observed conditions.

The tables also provide the following information:

- Date and start time, operator and equipment details.
- Monitoring location.
- Wind velocity (m/s) and temperature (°C) at weather station W1, as detailed in **Section 3.2**.
- Typical maximum (L_{Amax}) and contributed $L_{Aeq(15minute)}$ noise levels.

5.1.1 Operator Attended Noise Survey Results – EPL Monitoring Location N5

Results of the operator attended noise surveys at N5 are provided in **Table 5**, **Table 6** and **Table 7**. Monitoring location N5 represents residential receptors located to the southeast of the site in Oakleigh.

Table 5 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 1)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 1 22/02/2021 12:37 2.2 – 4.2 m/s S/SSW 34-35 °C 3008204	35 dBA LAeq(15minute)	1	A	52	46	40	26	36	23	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Birds 48-64 Wind 30-35 Traffic 30-33 Aircraft 38-44
		2	B	53	48	42	26	38	22	I/A	
		3	A	53	47	42	25	37	22	I/A	
		4	B	56	48	43	27	39	22	I/A	
		5	B	63	49	43	26	40	22	I/A	
		6	B	64	48	43	25	39	21	I/A	
Evening 1 22/02/2021 20:20 3 – 3.6 m/s S 31 °C 3008204	35 dBA LAeq(15minute)	1	E	52	45	41	29	36	27	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Insects 35-49 Impacts 48-52
		2	E	52	50	49	45	47	43	I/A	
Night 1 22/02/2021 22:00 3.1 – 3.6 m/s S 27-28 °C 3008204	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	50	47	46	43	45	39	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Insects 46-50 Traffic 35-40 Birds 53-58
		2	F	51	45	44	41	42	38	I/A	
		3	F	58	47	46	40	44	36	I/A	
		4	F	53	47	46	42	44	37	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

Table 6 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 2)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 2 23/02/2021 09:19 2.3 – 3.4 m/s SE 25-28 °C 3008204	35 dBA LAeq(15minute)	1	B	54	46	40	28	36	25	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 30-37 Birds 40-58 Wind 35-39
		2	A	50	40	34	27	32	24	I/A	
		3	A	51	39	33	26	31	24	I/A	
		4	B	58	44	37	26	34	23	I/A	
		5	A	55	44	38	26	34	23	I/A	
		6	A	54	41	35	25	32	23	I/A	
Evening 2 23/02/2021 19:19 5.7 – 7.1 m/s ESE 27-30 °C 3008204	35 dBA LAeq(15minute)	1	E	66	55	51	43	48	39	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 46-55 Birds 66 Traffic 40-46
		2	D	60	53	49	41	46	37	I/A	
Night 2 23/02/2021 23:02 6.7 – 7.3 m/s SE 19-20 °C 3008204	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	D	55	46	43	36	40	33	N/M	**Site Related Noise Events:** Mine faintly audible **Other Noise Events:** Wind 40-59 Traffic 40-45 Aircraft 30-35
		2	E	56	46	42	37	40	35	N/M	
		3	D	59	51	47	40	44	38	I/A	
		4	D	59	51	46	40	44	37	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

Table 7 Operator Attended EPL Noise Survey Results – N5 – Oakleigh (Day 3)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 3 24/02/2021 08:54 3.9 – 4.9 m/s SE 20-24 °C 3008204	35 dBA LAeq(15minute)	1	E	47	40	37	31	34	28	I/A	**Site Related Noise Events:** General surface activity faintly audible **Other Noise Events:** Wind 30-40 Traffic 34-37 Birds 47-70 Aircraft 45-50 Roadworks audible at times
		2	D	60	41	36	31	35	29	N/M	
		3	D	58	41	36	31	35	29	N/M	
		4	E	53	45	38	31	36	28	N/M	
		5	D	70	49	40	32	40	29	N/M	
		6	D	65	42	36	31	35	29	I/A	
Evening 3 24/02/2021 20:22 4.0 – 5.0 m/s E 20 °C 3008204	35 dBA LAeq(15minute)	1	E	53	47	42	35	40	33	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 42-51 Traffic 30-53
		2	E	53	45	41	35	39	33	I/A	
Night 3 24/02/2021 22:18 3.5 – 4.9 m/s SE/ESE 20-21 °C 3008204	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	E	59	47	43	38	41	36	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 38-53 Insects 38-42 Aircraft 40-47 Wind 35
		2	E	53	43	40	36	38	34	I/A	
		3	E	53	47	42	37	40	35	I/A	
		4	E	55	48	44	38	42	35	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

5.1.2 Operator Attended Noise Survey Results – EPL Monitoring Location N6

Results of the operator attended noise surveys at N6 are provided in **Table 8**, **Table 9** and **Table 10**. Monitoring location N6 represents residential receptors located to the northwest of the site in Newhaven.

Table 8 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 1)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 1 22/02/2021 15:46 4.6 – 5.5 m/s S 35-37 °C 3029485	35 dBA LAeq(15minute)	1	D	62	47	43	34	40	30	N/M	**Site Related Noise Events:** Not Measurable **Other Noise Events:** Cattle 48-61 Birds 52-64 Wind 33-37
		2	A	64	45	41	30	38	26	N/M	
		3	D	58	50	45	30	41	27	N/M	
		4	D	57	50	45	32	41	28	N/M	
		5	E	67	48	45	33	42	28	N/M	
		6	A	54	48	42	29	38	26	N/M	
Evening 1 22/02/2021 19:18 43 – 5.5 m/s S/SSE 32-34 °C 3029485	35 dBA LAeq(15minute)	1	E	53	48	43	33	40	31	31 LAeq	**Site Related Noise Events:** Main exhaust vent 28-33 **Other Noise Events:** Residential noise 38-53 Insects 28-31
		2	E	51	44	37	34	36	33	32 LAeq	

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Night 1 22/02/2021 22:00 3.1 – 3.6 m/s S 27-28 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	49	45	43	39	42	31	28 LAeq 29 LA1	**Site Related Noise Events:** Main exhaust vent 26-30 **Other Noise Events:** Insects 38-41 Road traffic noise 48-56
		2	F	47	45	43	40	42	39	28 LAeq 29 LA1	
		3	F	56	45	44	42	43	41	29 LAeq 30 LA1	
		4	F	50	46	45	44	44	42	27 LAeq 29 LA1	

Note: N/M = Not Measurable, I/A = Inaudible

Table 9 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 2)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 2 23/02/2021 10:11 2.0 - 3.2 m/s SE 26-30 °C 3029485	35 dBA LAeq(15minute)	1	B	72	54	43	33	43	31	I/A	**Site Related Noise Events:** Faint ventilation fans <28 **Other Noise Events:** Train 46-58 Birds 59-72 Road traffic 35-44
		2	A	63	55	41	34	42	31	N/M	
		3	A	64	55	43	34	42	32	N/M	
		4	B	72	58	50	34	47	32	<28 LAeq	
		5	B	57	52	46	34	43	32	N/M	
		6	A	63	55	48	33	44	31	I/A	
Evening 2 23/02/2021 20:24 6.4 – 7.0 m/s SE/ESE 23-24 °C 3029485	35 dBA LAeq(15minute)	1	D	54	50	48	41	45	39	N/M	**Site Related Noise Events:** Not Measurable **Other Noise Events:** Wind 39-54 Insects 41-43
		2	E	53	47	45	40	43	38	N/M	
Night 2 23/02/2021 23:15 6.7 – 7.3 m/s SE 19-20 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	E	60	49	48	43	46	42	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Insects 38-40 Wind 43-60
		2	D	56	51	49	45	47	42	I/A	
		3	D	55	51	48	44	46	43	I/A	
		4	D	54	51	49	45	47	43	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

Table 10 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 3)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 3 24/02/2021 10:08 1.8 – 4.7 m/s SE 23-28 °C 3029485	35 dBA LAeq(15minute)	1	D	61	47	42	37	41	34	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Road traffic 42-49 Birds/insects 34-61 Wind 38-44
		2	D	54	43	40	35	38	32	I/A	
		3	D	59	50	40	33	39	31	I/A	
		4	B	54	47	38	32	37	30	I/A	
		5	C	55	47	39	32	37	30	I/A	
		6	C	59	49	36	33	37	31	I/A	
Evening 3 24/02/2021 20:52 4.0 - 4.5 m/s E 20 °C 3029485	35 dBA LAeq(15minute)	1	E	54	49	45	40	42	38	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 43-54 Insects 38-40 Train 41-49
		2	E	47	44	41	39	40	38	I/A	
Night 3 24/02/2021 22:03 3.5 – 4.9 m/s ESE 20-21 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	E	55	46	44	42	43	43	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 45-60 Insects 38-41
		2	E	60	47	44	42	42	43	I/A	
		3	E	54	46	44	41	41	42	I/A	
		4	E	43	46	43	39	39	41	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

5.1.3 Operator Attended Noise Survey Results – EPL Monitoring Location N9

Results of the operator attended noise surveys at N9 are provided in **Table 11**, **Table 12** and **Table 13**. Monitoring location N9 represents residential receptors located to the northwest of the site in High Range.

Table 11 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 1)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 1 22/02/2021 10:26 0.2 – 2.8 m/s ESE/S 29-33 °C 3008204	35 dBA LAeq(15minute)	1	A	54	49	39	34	38	31	N/M	**Site Related Noise Events:** Main exhaust vent faintly audible **Other Noise Events:** Birds 38-63 Aircraft 47-54 Local traffic 53-70 Animals 52
		2	A	66	50	37	32	41	30	N/M	
		3	A	51	37	35	31	33	28	N/M	
		4	B	60	50	34	30	37	28	N/M	
		5	C	52	41	35	29	33	26	N/M	
		6	C	49	41	35	27	32	25	I/A	
Evening 1 22/02/2021 19:15 4.3 – 5.5 m/s S/SSE 32-34 °C 3008204	35 dBA LAeq(15minute)	1	E	64	40	34	29	34	27	N/M	**Site Related Noise Events:** Main exhaust vent faintly audible **Other Noise Events:** Birds 51-65 Wind 37-41
		2	E	65	39	33	29	34	28	N/M	
Night 1 22/02/2021 23:39 2.7 – 3.6 m/s S/SSE 25-27 °C 3008204	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	54	51	49	46	48	43	N/M	**Site Related Noise Events:** Main exhaust vent 25-29 Dozer operations 26-30 **Other Noise Events:** Traffic 30-46 Insects 46-49 Animals 40-54
		2	F	51	50	49	46	47	43	N/M	
		3	F	51	50	49	46	47	44	25 LAeq 27 LA1	
		4	E	49	48	47	44	46	42	27 LAeq 30 LA1	

Note: N/M = Not Measurable, I/A = Inaudible

Table 12 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 2)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 2 23/02/2021 07:25 2.9 - 4.1 m/s SE 20-23 °C 3008204	35 dBA LAeq(15minute)	1	D	61	46	41	31	38	27	<25 LAeq	**Site Related Noise Events:** Main exhaust vent 20-25 **Other Noise Events:** Traffic 35-46 Birds 40-63 Animals 40-50
		2	E	53	42	38	30	35	26	N/M	
		3	E	58	44	39	30	36	27	N/M	
		4	D	55	42	36	30	34	27	N/M	
		5	D	51	40	34	28	32	26	I/A	
		6	B	62	40	34	28	33	26	I/A	
Evening 2 23/02/2021 21:05 6.6 – 7.2 m/s ESE/SE 22-23 °C 3029485	35 dBA LAeq(15minute)	1	D	62	49	47	38	44	36	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 41-32 Insects 37-40 Road traffic 41-50 Dogs 38-43
		2	E	51	48	46	38	42	36	I/A	
Night 2 23/02/2021 22:00 6.7 – 7.3 m/s SE 20-21 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	D	66	45	42	38	40	36	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 39-66
		2	E	59	46	43	38	41	37	I/A	
		3	D	61	44	41	38	40	37	I/A	
		4	D	61	45	41	38	40	37	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

Table 13 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 3)

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 3 24/02/2021 07:01 4.6 – 5.2 m/s SE 18-19 °C 3008204	35 dBA LAeq(15minute)	1	D	59	49	38	31	38	29	N/M	**Site Related Noise Events:** Main exhaust vent faintly audible **Other Noise Events:** Wind 30-41 Birds 42-60 Traffic 30-40 Aircraft 40-52 Horn 52
		2	E	49	42	38	32	35	28	N/M	
		3	D	46	41	37	32	35	29	N/M	
		4	D	54	45	39	32	37	29	N/M	
		5	E	50	39	35	30	34	28	I/A	
		6	D	60	44	35	31	35	29	I/A	
Evening 3 24/02/2021 20:25 4.0 – 4.5 m/s E 20 °C 3029485	35 dBA LAeq(15minute)	1	E	58	49	46	39	43	36	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 43-58
		2	E	58	50	49	45	48	40	I/A	
Night 3 24/02/2021 23:18 4.5 – 5.0 m/s SE/ESE 20-21 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	E	52	47	45	42	44	37	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 43-54 Cows 42-46 Road traffic 39-45
		2	E	49	47	46	43	45	37	I/A	
		3	E	54	51	48	43	45	37	I/A	
		4	E	49	58	47	43	45	40	I/A	

Note: N/M = Not Measurable, I/A = Inaudible

5.1.4 Operator Attended Noise Survey Results – NMP Monitoring Location N1

Results of the operator attended noise surveys at N1 are provided in **Table 14.** Monitoring location N1 represents residential receptors located to the east of the site in Bow Hills.

Table 14 Operator Attended NMP Noise Survey Results – N1 – Bow Hills

Period Date/Start Time Weather SLM Details	Criteria[1]	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 22/02/2021 15:04 1.8 m/s NE 31 °C 3029485	35 dBA LAeq(15minute)	1	E	66	50	43	37	41	34	33 LAeq	**Site Related Noise Events:** Dozer operations 35-41 General surface activity 30-37 **Other Noise Events:** Offsite construction activity 40-50 Traffic 42-45 Birds 38-66
Evening 22-02-2021 20:32 3.5 m/s S 31 °C 3029485	35 dBA LAeq(15minute)	1	E	58	53	47	37	44	32	34 LAeq	**Site Related Noise Events:** Dozer operations 29-37 **Other Noise Events**: Road traffic noise 44-58 Insects 34-38
Night 22-02-2021 23:55 2.7 m/s SSE 26 °C 3029485	35 dBA LAeq(15minute)	1	F	65	54	50	35	45	32	34 LAeq 37 LA1	**Site Related Noise Events:** Dozer operations 32-38 **Other Noise Events:** Train 37-65 Insects 34-37 Road traffic 41-50

Note: N/M = Not Measurable, I/A = Inaudible

Note 1: A private agreement between NCOPL and the residents of N1 Bow Hills of 50 dBA LAeq(15minute) is in place. This new level of 50 dBA LAeq(15minute) replaces the levels identified in Conditions 1-3, Schedule 4 of PA 08_0144 Mod 2 and the identical limits contained in condition L3 of Environment Protection Licence No 1278

5.1.5 Operator Attended Noise Survey Results – NMP Monitoring Location N3

Results of the operator attended noise surveys at N3 are provided in **Table 15.** Monitoring location N3 represents residential receptors located to the southeast of the site in Ardmona.

Table 15 Operator Attended NMP Noise Survey Results – N3 – Ardmona

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 22/02/2021 14:39 2.2 m/s E 31 °C 3008204	35 dBA LAeq(15minute)	1	F	92	87	74	40	72	34	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 83-92 Thunder 53 Birds 48-64
Evening 22/02/2021 19:57 4.3 m/s S 32 °C 3008204	35 dBA LAeq(15minute)	1	E	92	80	61	34	67	30	N/M	**Site Related Noise Events:** General activity faintly audible **Other Noise Events**: Traffic 88-92 Insects 45-47 Animals 45-48
Night 22/02/2021 23:13 3.7 m/s S 27 °C 3008204	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	90	74	56	40	64	37	<25 LAeq 27 LA1	**Site Related Noise Events:** Dozer operations 25-27 General surface activity 25-26 **Other Noise Events:** Traffic 76-90 Insects 44-46 Aircraft 40-45

Note: N/M = Not Measurable, I/A = Inaudible

5.1.6 Operator Attended Noise Survey Results – NMP Monitoring Location N7

Results of the operator attended noise surveys at N7 are provided in **Table 16.** Monitoring location N7 represents residential receptors located to the northeast of the site in Merriman.

Table 16 Operator Attended NMP Noise Survey Results – N7 – Merriman

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 23/02/2021 09:32 3.3 m/s ESE 25 °C 3029485	35 dBA LAeq(15minute)	1	B	65	48	41	30	39	27	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Road traffic 42-51 Wind 33-38 Birds 39-65
Evening 22/02/2021 20:04 3.7 m/s S 32 °C 3029485	35 dBA LAeq(15minute)	1	E	59	54	48	33	44	30	32 LAeq	**Site Related Noise Events:** Dozer briefly audible 31-37 **Other Noise Events**: Road traffic noise 42-58 Insects 31-33 Wind 27-34
Night 22/02/2021 23:30 3.6 m/s S 27 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	56	51	43	38	42	36	35 LAeq 38 LA1	**Site Related Noise Events:** General dozer operations 32-39 **Other Noise Events:** Insects 37-41 Bats 51-56

Note: N/M = Not Measurable, I/A = Inaudible

5.1.7 Operator Attended Noise Survey Results – NMP Monitoring Location N8(NMP)

Results of the operator attended noise surveys at N8(NMP) are provided in **Table 17**. Monitoring location N8(NMP) represents residential receptors located to the south of the site in Matilda.

Table 17 Operator Attended NMP Noise Survey Results – N8 – Matilda

Period Date/Start Time Weather SLM Details	Criteria	Measurement Number	Stability Category	Primary Noise Descriptor						Narrabri Mine Contribution, (dB)	Description
				LAmax (dB)	LA1 (dB)	LA10 (dB)	LA90 (dB)	LAeq (dB)	LAmin (dB)		
Day 23/02/2021 09:00 3.0 m/s ESE 24 °C 3029485	35 dBA LAeq(15minute)	1	D	52	47	45	42	44	39	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Farm operations 40-52 Wind 39-44
Evening 22/02/2021 21:11 2.9 m/s S 30 °C 3029485	35 dBA LAeq(15minute)	1	F	57	51	51	48	50	44	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events**: Wind related noise 42-57 Insects 44-49
Night 23/02/2021 00:31 3.2 m/s S 25 °C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	52	47	45	42	44	39	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Insects 41-43 Wind related noise 38-53 Dog bark 49-52

Note: N/M = Not Measurable, I/A = Inaudible

6 Conclusion

SLR was engaged by Narrabri Coal Operations Pty Ltd to conduct attended noise monitoring for the Narrabri Mine in accordance with the Narrabri Mines' Noise Management Plan, Environment Protection Licence and Project Approval.

Operator attended noise monitoring was conducted at seven locations in order to determine the noise performance of the Narrabri Mine, with compliance achieved at all locations during all time periods.

APPENDIX A

Acoustic Terminology

Sound Level or Noise Level

The terms “sound” and “noise” are almost interchangeable, except that in common usage “noise” is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is 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 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA 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	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	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

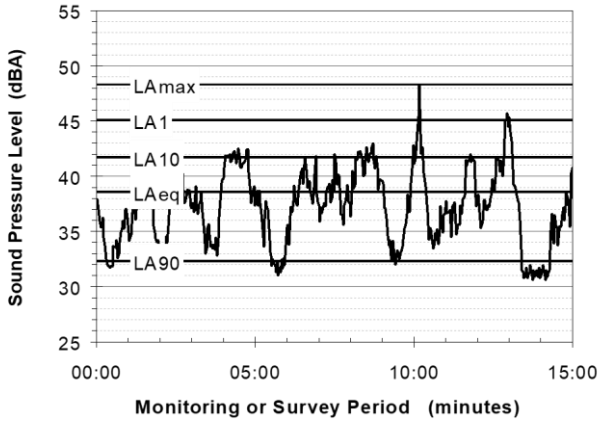
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to 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 exceed 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.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the “repeatable minimum” LA90 noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or “average” levels representative of the other descriptors (LAeq, LA10, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than “broad band” noise. 7. Impulsiveness

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

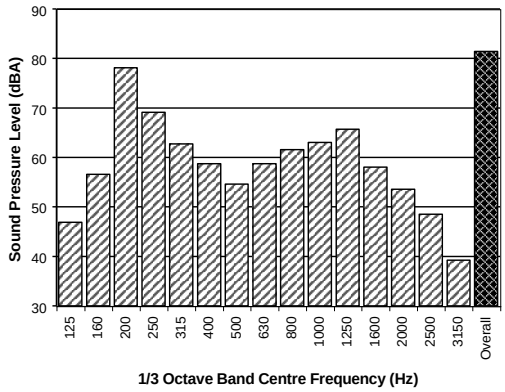
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

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 (3 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.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-pressure

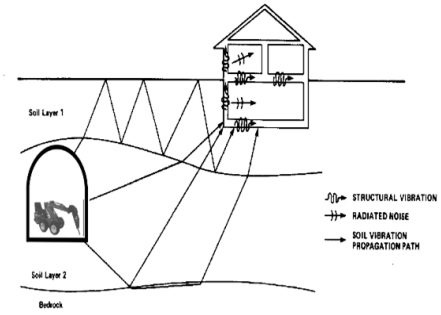
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "structure-borne noise", "ground-borne noise" or "regenerated noise". This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise

APPENDIX B

Calibration Certificates

HBK HOTTINGER BRÜEL & KJÆR

The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark

ilac-MRA DANAK CAL Reg.No. 307 Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2007175 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2270	No: 3029485	Id: -
Microphone:	Brüel & Kjær Type 4189	No: 3260622	
PreAmplifier:	Brüel & Kjær Type ZC-0032	No: 30123	
Supplied Calibrator:	None		
Software version:	BZ7222 Version 4.7.6	Pattern Approval:	-
Instruction manual:	BE1712-22		

CUSTOMER

SLR Consulting Australia Pty Ltd
Sub Base Platypus
Tenancy 201 / 120 High Street
2060 North Sydney
New South Wales, Australia

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2270 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 8.2 - DB: 8.20) by using procedure B&K proc 2270, 4189 (IEC 61672:2013).

RESULTS

Calibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 2020-10-30

Date of issue: 2020-10-30

Susanne Jørgensen
Calibration Technician

Erik Bruus
Approved Signatory

1. Calibration Note

n/a

2. Summary

4.1. Preliminary inspection	Passed
4.2. Environmental conditions, Prior to calibration	Passed
4.3. Reference information	Passed
4.4. Indication at the calibration check frequency	Passed
4.5. Acoustical signal tests of a frequency weighting, C weighting	Passed
4.6. Self-generated noise, Microphone installed	Passed
4.7. Self-generated noise, Electrical	Passed
4.8. Electrical signal tests of frequency weightings, A weighting	Passed
4.9. Electrical signal tests of frequency weightings, C weighting	Passed
4.10. Electrical signal tests of frequency weightings, Z weighting	Passed
4.11. Frequency and time weightings at 1 kHz	Passed
4.12. Long-term stability, Reference	Passed
4.13. Level linearity on the reference level range, Upper	Passed
4.14. Level linearity on the reference level range, Lower	Passed
4.15. Toneburst response, Time-weighting Fast	Passed
4.16. Toneburst response, Time-weighting Slow	Passed
4.17. Toneburst response, LAE	Passed
4.18. C-weighted peak sound level, 8 kHz	Passed
4.19. C-weighted peak sound level, 500 Hz	Passed
4.20. Overload indication	Passed
4.21. Long-term stability, 1. relative	Passed
4.22. High-level stability	Passed
4.23. Long-term stability, 2. relative	Passed
4.24. Environmental conditions, Following calibration	Passed

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.
However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Brüel & Kjær

Australian Calibration Laboratory
Suite 2, 6-10 Talavera Road, North Ryde NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

NATA
WORLD RECOGNISED ACCREDITATION

CERTIFICATE OF CALIBRATION

Certificate No: CAU2000352 Page 1 of 12

CALIBRATION OF:

Sound Level Meter:	Bruel & Kjaer	2270	No: 3008204
Microphone:	Bruel & Kjaer	4189	No: 2983643
Preamplifier:	Bruel & Kjaer	ZC-0032	No: 29477
Supplied Calibrator:	Bruel & Kjaer	None	No: N/A
Software version:	BZ7224 Version 4.7.5	Pattern Approval:	PTB
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

SLR Consulting Australia Pty Ltd
Tenancy 202 Submarine School
120 High Street
North Sydney NSW 2060

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 °C
Environment conditions: *see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.0 - DB: 8.00) and test procedure 2270-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
	Calibration without repair/adjustment	X	Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 11/05/2020

Sajeeb Tharayil
Calibration Technician

Certificate issued: 11/05/2020

Craig Patrick
Approved signatory

Summary

Preliminary inspection	Passed
Environmental conditions, Prior to calibration	Passed
Reference information	Passed
Indication at the calibration check frequency	Passed
Acoustical signal tests of a frequency weighting, C weighting	Passed
Self-generated noise, Microphone installed	Passed
Self-generated noise, Electrical	Passed
Electrical signal tests of frequency weightings, A weighting	Passed
Electrical signal tests of frequency weightings, C weighting	Passed
Electrical signal tests of frequency weightings, Z weighting	Passed
Frequency and time weightings at 1 kHz	Passed
Long-term stability, Reference	Passed
Level linearity on the reference level range, Upper	Passed
Level linearity on the reference level range, Lower	Passed
Toneburst response, Time-weighting Fast	Passed
Toneburst response, Time-weighting Slow	Passed
Toneburst response, LAE	Passed
C-weighted peak sound level, 8 kHz	Passed
C-weighted peak sound level, 500 Hz	Passed
Overload indication	Passed
Long-term stability, 1. relative	Passed
High-level stability	Passed
Long-term stability, 2. relative	Passed
Environmental conditions, Following calibration	Passed

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organization responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

ASIA PACIFIC OFFICES

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
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

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

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

SYDNEY
2 Lincoln Street
Lane Cove NSW 2066
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
Level 1, 514 Sturt Street
Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

TOWNSVILLE SOUTH
12 Cannan Street
Townsville South QLD 4810
Australia
T: +61 7 4772 6500

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 404 939 922

AUCKLAND
68 Beach Road
Auckland 1010
New Zealand
T: +64 27 441 7849

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