NARRABRI MINE NOISE MONITORING

Quarter Ending June 2022
Summary Noise Report

Prepared for:

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

SLR Ref: 610.18063-R17
Version No: -v1.0
July 2022

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.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18063-R17-v1.0	14 July 2022	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 N8 19
5.1.4 Operator Attended Noise Survey Results – EPL Monitoring Location N9 22
5.1.5 Operator Attended Noise Survey Results – NMP Monitoring Location N1 25
5.1.6 Operator Attended Noise Survey Results – NMP Monitoring Location N3 26
5.1.7 Operator Attended Noise Survey Results – NMP Monitoring Location N7 27
5.1.8 Operator Attended Noise Survey Results – NMP Monitoring Location $N8_{(NMP)}$ 28
6 CONCLUSION 29

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 – Q2 2022 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

CONTENTS

Table 9 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 2) 17
Table 10 Operator Attended EPL Noise Survey Results – N6 – Newhaven (Day 3) 18
Table 11 Operator Attended EPL Noise Survey Results – N8 – Haylin View (Day 1) 19
Table 12 Operator Attended EPL Noise Survey Results – N8 – Haylin View (Day 2) 20
Table 13 Operator Attended EPL Noise Survey Results – N8 – Haylin View (Day 3) 21
Table 14 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 1) 22
Table 15 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 2) 23
Table 16 Operator Attended EPL Noise Survey Results – N9 – High Range (Day 3) 24
Table 17 Operator Attended NMP Noise Survey Results – N1 – Bow Hills 25
Table 18 Operator Attended NMP Noise Survey Results – N3 – Ardmona 26
Table 19 Operator Attended NMP Noise Survey Results – N7 – Merriman 27
Table 20 Operator Attended NMP Noise Survey Results – N8 – Matilda 28

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 8 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]	21/06/2022	38	32	27	35	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	Y	Y[5]
		22/06/2022	I/A	I/A	I/A	I/A			Y	Y	Y	Y
		23/06/2022	I/A	I/A	I/A	I/A			Y	Y	Y	Y
N6	Newhaven	21/06/2022	I/A	I/A	32	39			Y	Y	N	Y
		22/06/2022	N/M	30	28	41			Y	Y	N	Y
		23/06/2022	N/M	28	29	35			Y	Y	Y	Y
N8	Haylin View[2]	21/06/2022	34	30	29	36			N	Y	Y	Y
		22/06/2022	N/M	I/A	22	24			N	Y	Y	Y
		23/06/2022	22	27	27	35			Y	N	N	Y
N9	High Range[2]	21/06/2022	I/A	I/A	30	35			Y	Y	N	Y
		22/06/2022	29	23	24	28			Y	Y	Y	Y
		23/06/2022	32	I/A	21	25			Y	N	Y	Y
-	Bow Hills[1]	20/06/2022[4]	40	I/A	27	36		Day 15 min Evening 15 min Night 15 min	N	Y	N	Y
-	Ardmona	20/06/2022	I/A	I/A	I/A	I/A			Y	Y	N	Y
-	Merriman[2]	20/06/2022	30	I/A	N/M	N/M			Y	Y	N	Y
-	Matilda[2]	20/06/2022	I/A	I/A	I/A	I/A			Y	Y	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.

Note 4: Evening and Night monitoring conducted on this date, Day monitoring conducted during the following day period on 21/06/2022.

Note 5: The Noise Criteria for EPL Monitoring Location N5 (Oakleigh) does not apply as the property is owned by Narrabri Coal and is therefore not a privately owned residence.

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 20** 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
- N8 Haylin View – 791 Mayfield Road, Baan Baa
- N9 High Range – 92 Davis Road Turrawan

It is noted that the Narrabri Mine own the properties Oakleigh (N5), Haylin View (N8) an High Range (N9).

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, N8 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
N8[1]	EPL	Residence	Haylin View – 791 Mayfield Road Baan Baa	777428	6617316
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 3029485 and s/n 3027586). Attended noise measurements were undertaken by SLR staff Jason Rasquinha and Adam Sirianni.

Figure 1 Attended Noise Monitoring Locations

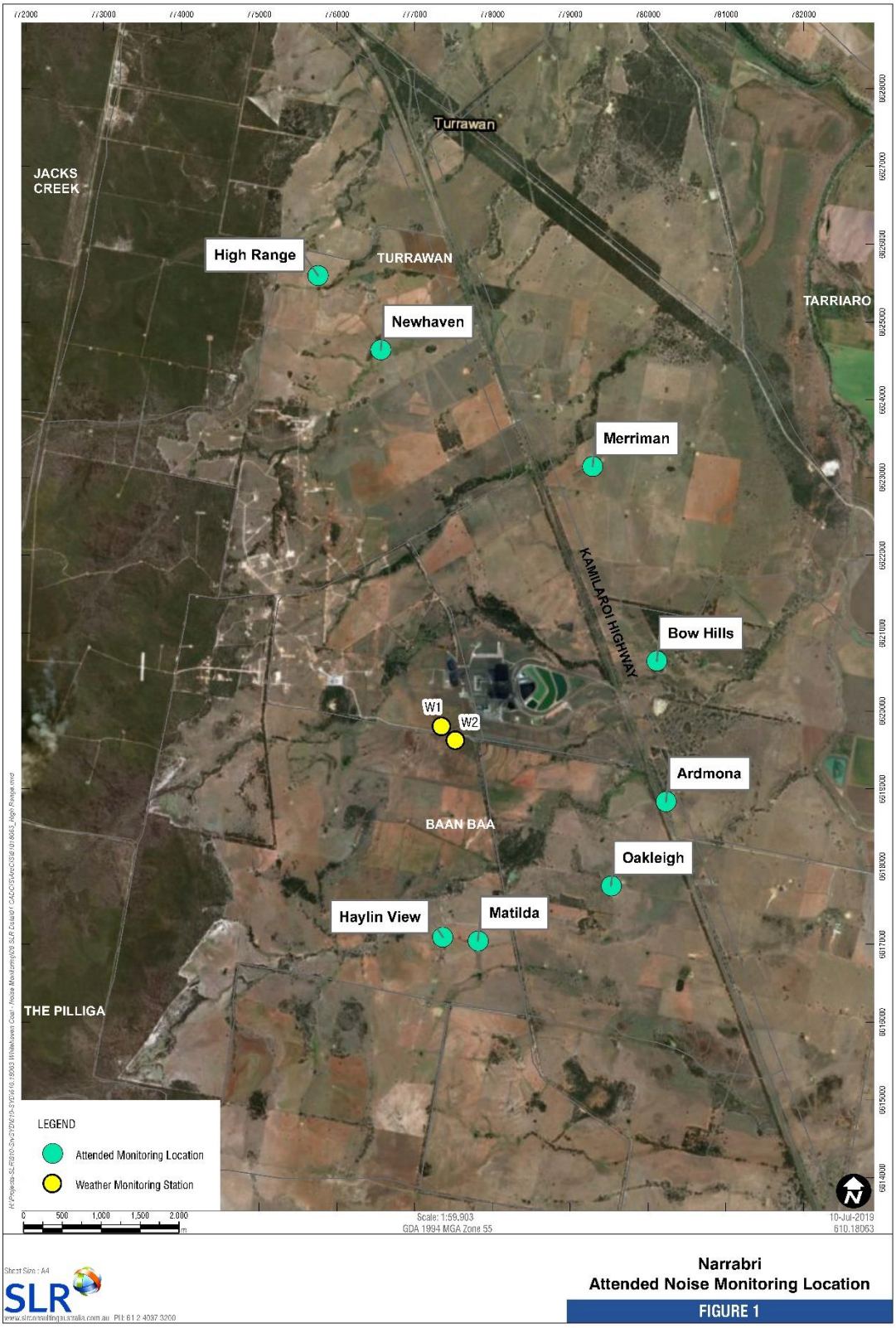


Table 4 presents a summary of which days of the week the quarterly monitoring was conducted, in accordance with condition M7.4 of EPL 12789 and Section 5 of the NMP.

Table 4 Days of the Week Quarterly EPL Monitoring was Conducted – Q2 2022

Period	Day of the Week (Excluding Weekends and Public Holidays)				
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
EPL Monitoring Locations					
Day		21 June 2022	22 June 2022	23 June 2022	
Evening		21 June 2022	22 June 2022	23 June 2022	
Night[1]		21 June 2022	22 June 2022	23 June 2022	
NMP Monitoring Locations					
Day	20 June 2022	21 June 2022			
Evening	20 June 2022				
Night[1]	20 June 2022				

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 20**.

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 21/06/2022 09:19 0.9 – 3.6 m/s SE/NW 11-18°C 3029485	35 dBA LAeq(15minute)	1	D	58	47	44	37	42	34	38 LAeq	**Site Related Noise Events:** Evaporation Fans 28-43 **Other Noise Events:** Birds 50-61 Traffic 30-47 Wind 35-45 Impact 43 Aircraft 40-45
		2	E	43	41	39	36	37	35	35 LAeq	
		3	E	57	46	41	34	38	32	34 LAeq	
		4	D	47	42	38	32	36	30	32 LAeq	
		5	C	61	49	40	32	39	28	30 LAeq	
		6	D	56	46	41	34	38	31	29 LAeq	
Evening 1 21/06/2022 20:44 1.7 – 2.0 m/s WNW 8°C 3029485	35 dBA LAeq(15minute)	1	F	55	48	43	26	39	24	25 LAeq	**Site Related Noise Events:** General surface activity 23-25 Dozer operations 28-35 **Other Noise Events:** Traffic 40-55 Animals 33-36
		2	F	51	47	43	28	38	26	32 LAeq	
Night 1 21/06/2022 22:01 1.1 – 1.5 m/s NW 7-8°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	53	50	45	27	41	25	25 LAeq 33 LA1	**Site Related Noise Events:** General surface activity 23-28 Dozer operations 30-35 **Other Noise Events:** Traffic 40-53 Train 45-59
		2	G	48	44	39	27	35	24	25 LAeq 27 LA1	
		3	G	53	50	43	27	39	25	27 LAeq 35 LA1	
		4	G	59	58	46	29	46	27	25 LAeq 35 LA1	

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 22/06/2022 09:16 1.2 – 3.5 m/s ESE 13-16°C 3029485	35 dBA LAeq(15minute)	1	D	64	54	42	28	42	26	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Birds 44-65 Traffic 30-37 Wind 30-35 Aircraft 40-54
		2	D	59	47	34	28	36	25	I/A	
		3	D	61	48	38	30	39	26	I/A	
		4	D	59	45	37	28	36	24	I/A	
		5	D	61	47	35	26	36	23	I/A	
		6	D	65	55	42	26	42	23	I/A	
Evening 2 22/06/2022 20:09 0 – 1.1 m/s ENE 7-8°C 3029485	35 dBA LAeq(15minute)	1	G	47	44	40	25	36	21	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 37-47 Impact 43 Aircraft 40-43
		2	F	47	44	41	28	37	23	I/A	
Night 2 22/06/2022 23:25 0.5 – 2.0 m/s SSE 3-7°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	51	49	42	21	38	19	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 45-54 Train 47-59 Train horn 46
		2	G	54	51	42	26	39	22	I/A	
		3	G	59	54	47	23	43	20	I/A	
		4	G	52	48	42	21	37	19	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 23/06/2022 07:59 1.7 – 2.8 m/s ESE 6-11°C 3029485	35 dBA LAeq(15minute)	1	F	57	52	49	37	45	31	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 44-53 Birds 51-62 Train 30-35
		2	E	51	49	45	34	42	29	I/A	
		3	D	61	51	45	33	42	29	I/A	
		4	E	62	52	45	35	43	31	I/A	
		5	E	56	49	43	35	40	28	I/A	
		6	D	53	46	40	31	37	29	I/A	
Evening 3 23/06/2022 20:51 0.8 – 0.9 m/s SE 8°C 3029485	35 dBA LAeq(15minute)	1	F	53	49	45	22	41	20	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 38-54 Animals 33-40
		2	G	51	46	41	22	37	20	I/A	
Night 3 23/06/2022 22:01 0 – 1.0 m/s ENE 5-6°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	53	51	43	31	40	27	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Aircraft 39-51 Traffic 41-53 Train 40-53
		2	F	46	44	36	22	33	20	I/A	
		3	F	53	51	45	21	41	19	I/A	
		4	F	51	47	41	24	37	22	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 21/06/2022 09:33 0.9 – 4.2 m/s NW 12-18°C 3027586	35 dBA LAeq(15minute)	1	E	73	60	49	34	48	28	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Birds 41-82 Traffic 30-37 Aircraft 39-49 Animals 40-63
		2	E	66	55	48	35	44	29	I/A	
		3	D	73	52	42	32	44	27	I/A	
		4	C	82	60	49	33	50	29	I/A	
		5	D	79	59	48	33	51	30	I/A	
		6	B	62	57	49	34	45	29	I/A	
Evening 1 21/06/2022 20:12 1.7 – 1.9 m/s WSW 8-9°C 3027586	35 dBA LAeq(15minute)	1	G	51	46	41	24	37	17	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 44-51 Animals 30-40
		2	F	50	48	44	28	40	23	I/A	
Night 1 21/06/2022 23:40 0 – 1.2 m/s NW 8-9°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	G	50	47	43	26	37	23	26 LAeq 30 LA1	**Site Related Noise Events:** Exhaust vent fan 26-39 Dozer operations 35-39 **Other Noise Events:** Traffic 39-53 Animals 35-46 Birds 47-61 Train 45-49
		2	G	47	44	39	27	35	22	29 LAeq 34 LA1	
		3	G	61	49	46	24	41	20	26 LAeq 30 LA1	
		4	G	44	39	36	30	33	26	32 LAeq 39 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 22/06/2022 10:37 0.9 – 4.4 m/s SSE 16-17 °C 3027586	35 dBA LAeq(15minute)	1	D	69	61	50	27	48	24	I/A	**Site Related Noise Events:** Exhaust vent fan faintly audible **Other Noise Events:** Traffic 40-45 Birds 45-69 Aircraft 43-58 Wind 30-36
		2	C	51	42	35	27	33	25	I/A	
		3	B	68	42	36	30	35	27	I/A	
		4	D	56	41	37	32	35	30	I/A	
		5	D	59	47	39	32	37	27	N/M	
		6	D	63	54	37	28	40	24	I/A	
Evening 2 22/06/2022 20:13 0.1 – 1.1 m/s ENE 7-8°C 3027586	35 dBA LAeq(15minute)	1	G	59	47	44	28	39	24	30 LAeq	**Site Related Noise Events:** Exhaust vent fan 25-37 **Other Noise Events:** Traffic 42-51 Impact 59 Train 42-55
		2	F	55	52	50	29	44	26	30 LAeq	
Night 2 22/06/2022 23:47 0.5 - 2 m/s SE 3-6°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	G	48	46	42	29	37	23	28 LAeq 32 LA1	**Site Related Noise Events:** Exhaust vent fan 25-34 Dozer operations 30-41 **Other Noise Events:** Traffic 45-49 Train horn 43 Train 50-54
		2	G	54	50	47	28	42	25	27 LAeq 32 LA1	
		3	G	45	37	32	23	29	22	26 LAeq 41 LA1	
		4	G	50	46	43	28	38	24	28 LAeq 34 LA1	

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 23/06/2022 11:43 1 – 2.5 m/s SE 16-17°C 3027586	35 dBA LAeq(15minute)	1	D	70	50	41	30	40	27	I/A	**Site Related Noise Events:** Exhaust vent fan faintly audible **Other Noise Events:** Traffic 30-47 Birds 46-70 Train 51-58 Wind 32-39
		2	D	47	39	35	27	32	23	N/M	
		3	D	55	45	36	28	34	26	I/A	
		4	D	51	42	34	28	33	25	I/A	
		5	D	49	37	33	27	31	24	I/A	
		6	D	52	42	34	28	32	25	I/A	
Evening 3 23/06/2022 21:25 0 – 0.9 m/s ESE 7-8°C 3027586	35 dBA LAeq(15minute)	1	G	53	51	49	28	43	25	28 LAeq	**Site Related Noise Events:** Exhaust vent fan 25-30 **Other Noise Events:** Traffic 45-51 Train 48-53
		2	F	50	47	42	32	39	28	28 LAeq	
Night 3 23/06/2022 22:06 0 – 1 m/s NE 5-6°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	61	46	41	30	38	26	27 LAeq 30 LA1	**Site Related Noise Events:** Exhaust vent fan 25-35 **Other Noise Events:** Traffic 41-54 Birds 44-61
		2	F	50	46	43	30	39	26	29 LAeq 35 LA1	
		3	F	54	48	43	28	39	24	27 LAeq 35 LA1	
		4	F	50	48	45	30	41	28	28 LAeq 33 LA1	

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

5.1.3 Operator Attended Noise Survey Results – EPL Monitoring Location N8

Results of the operator attended noise surveys at N8 are provided in **Table 11**, **Table 12** and **Table 13**. Monitoring location N8 represents residential receptors located to the southeast of the site in Haylin View.

Table 11 Operator Attended EPL Noise Survey Results – N8 – Haylin View (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 21/06/2022 12:03 3.4 – 4.5 m/s WNW 19-20 °C 3027586	35 dBA LAeq(15minute)	1	B	65	47	42	33	40	29	33 LAeq	**Site Related Noise Events:** Evaporation fans 32-41 Doer operations 25-30 **Other Noise Events:** Birds 40-69 Wind 38-49 Aircraft 43-50
		2	A	56	47	43	34	40	30	34 LAeq	
		3	A	59	47	42	30	39	27	30 LAeq	
		4	D	69	47	43	30	41	27	31 LAeq	
		5	D	62	45	41	31	38	27	31 LAeq	
		6	B	55	47	43	29	39	24	30 LAeq	
Evening 1 21/06/2022 21:16 0.9 – 1.9 m/s W 8°C 3027586	35 dBA LAeq(15minute)	1	F	47	38	34	27	31	25	30 LAeq	**Site Related Noise Events:** Dozer operations 29-37 General surface activity 25-38 **Other Noise Events:** Traffic 34-39 Animals 40-47
		2	G	40	36	33	26	30	24	30 LAeq	
Night 1 21/06/2022 22:00 1.1 – 1.5 m/s NW 8-9°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	39	34	32	26	30	24	29 LAeq 32 LA1	**Site Related Noise Events:** Dozer operations 31-36 General surface activity 25-32 **Other Noise Events:** Traffic 30-39 Impact 45 Animals 36-45
		2	G	45	31	30	27	28	25	27 LAeq 29 LA1	
		3	G	45	33	30	27	29	26	27 LAeq 29 LA1	
		4	G	40	33	30	26	28	24	27 LAeq 36 LA1	

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

Table 12 Operator Attended EPL Noise Survey Results – N8 – Haylin View (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 22/06/2022 12:55 3.6 – 4.9 m/s SE 18°C 3027586	35 dBA LAeq(15minute)	1	C	51	43	40	27	36	23	N/M	**Site Related Noise Events:** Evaporation fans faintly audible **Other Noise Events:** Birds 36-56 Wind 30-51
		2	D	56	44	41	29	38	26	N/M	
		3	E	54	48	41	29	38	25	N/M	
		4	D	48	45	39	27	36	22	N/M	
		5	D	47	41	38	24	34	22	N/M	
		6	D	54	46	37	24	34	21	N/M	
Evening 2 22/06/2022 21:14 1.2 – 1.5 m/s SE 7-8°C 3027586	35 dBA LAeq(15minute)	1	F	48	30	26	18	23	17	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 26-32 Train 39-48 Animals 30-33
		2	F	45	35	32	22	28	19	I/A	
Night 2 22/06/2022 22:01 1.3 – 1.5 m/s SE 7-8°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	52	47	34	24	34	22	I/A	**Site Related Noise Events:** General surface activity 20-24 **Other Noise Events:** Train 30-45 Aircraft 48-56 Traffic 30-33
		2	F	56	31	27	19	25	17	22 LAeq 24 LA1	
		3	F	46	33	29	19	26	18	I/A	
		4	F	46	32	29	19	24	18	20 LAeq 24 LA1	

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

Table 13 Operator Attended EPL Noise Survey Results – N8 – Haylin View (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 23/06/2022 13:51 1.2 – 2.4 m/s ENE 18°C 3027586	35 dBA LAeq(15minute)	1	D	56	45	39	26	35	23	20 LAeq	**Site Related Noise Events:** Evaporation fans 20-25 **Other Noise Events:** Birds 47-62 Wind 30-35 Aircraft 55-62
		2	D	60	43	36	26	34	22	20 LAeq	
		3	D	62	56	42	25	42	22	22 LAeq	
		4	D	56	45	32	23	33	21	22 LAeq	
		5	D	53	45	35	24	33	21	21 LAeq	
		6	D	53	43	32	22	31	21	20 LAeq	
Evening 3 23/06/2022 20:23 0.8 – 1.9 m/s SW 8-9°C 3027586	35 dBA LAeq(15minute)	1	G	52	38	35	25	32	22	27 LAeq	**Site Related Noise Events:** General surface activity 26-32 Onsite impact 36 Dozer operations 28-32 **Other Noise Events:** Traffic 35-41 Animals 38-52
		2	G	43	36	29	22	27	21	25 LAeq	
Night 3 23/06/2022 23:44 0 – 0.8 m/s WSW 20-21°C 3027586	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	G	54	31	27	23	26	20	25 LAeq 34 LA1	**Site Related Noise Events:** General surface activity 22-34 **Other Noise Events:** Birds 33-54 Train 30-39
		2	G	47	37	34	24	30	23	26 LAeq 35 LA1	
		3	G	49	34	30	23	27	22	25 LAeq 29 LA1	
		4	G	53	36	32	26	30	24	27 LAeq 31 LA1	

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

5.1.4 Operator Attended Noise Survey Results – EPL Monitoring Location N9

Results of the operator attended noise surveys at N9 are provided in **Table 14**, **Table 15** and **Table 16**. Monitoring location N9 represents residential receptors located to the northwest of the site in High Range.

Table 14 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 21/06/2022 07:16 1.9 – 2.6 m/s SSE 5-10°C 3029485	35 dBA LAeq(15minute)	1	F	57	52	49	40	45	35	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 44-53 Birds 53-66 Local traffic 61-70 Train 40-64
		2	E	64	57	47	38	45	33	I/A	
		3	E	66	54	50	43	48	38	I/A	
		4	E	70	57	48	37	47	34	I/A	
		5	E	58	48	43	37	41	34	I/A	
		6	D	65	46	40	32	39	28	I/A	
Evening 1 21/06/2022 19:55 1.7 – 1.9 m/s W 8-9°C 3029485	35 dBA LAeq(15minute)	1	F	50	46	43	21	38	18	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 45-50 Aircraft 30-36 Animals 32-35
		2	G	49	42	38	20	34	17	I/A	
Night 1 21/06/2022 23:25 0 – 1.5 m/s NNE 7-9°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	G	42	38	31	22	28	20	23 LAeq 27 LA1	**Site Related Noise Events:** Exhaust vent fan 20-30 Dozer operations 23-35 **Other Noise Events:** Traffic 36-49 Animals 30-65 Train 38-46
		2	G	49	46	38	22	34	20	22 LAeq 35 LA1	
		3	G	42	38	32	22	28	20	24 LAeq 28 LA1	
		4	G	65	49	42	29	41	25	30 LAeq 35 LA1	

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

Table 15 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 22/06/2022 07:25 1.4 - 2 m/s SE 5-11°C 3029485	35 dBA LAeq(15minute)	1	G	69	60	49	38	48	33	N/M	**Site Related Noise Events:** Exhaust vent fan 20-35 **Other Noise Events:** Traffic 41-52 Birds 55-69 Animals 45-50 Local traffic 61
		2	G	68	58	50	38	48	28	N/M	
		3	G	54	49	46	34	42	30	N/M	
		4	F	68	54	47	36	44	32	N/M	
		5	F	62	54	46	34	44	28	N/M	
		6	E	59	49	43	34	40	31	29 LAeq	
Evening 2 22/06/2022 20:59 1.2 – 1.5 m/s SE 7-8°C 3029485	35 dBA LAeq(15minute)	1	F	44	41	38	24	34	22	22 LAeq	**Site Related Noise Events:** Exhaust vent fan 20-25 Dozer operations 23-25 **Other Noise Events:** Traffic 35-42 Animals 34-50 Birds 30-36
		2	F	50	45	37	23	33	21	23 LAeq	
Night 2 22/06/2022 22:01 1.3 – 1.5 m/s SE 7-8°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	55	48	38	22	36	20	20 LAeq 25 LA1	**Site Related Noise Events:** Exhaust vent fan 20-25 Dozer operations 23-28 **Other Noise Events:** Animals 38-50 Traffic 40-52 Aircraft 47-55
		2	F	52	44	38	22	34	21	24 LAeq 28 LA1	
		3	F	58	30	24	20	27	19	20 LAeq 24 LA1	
		4	F	55	50	46	25	41	20	N/M	

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

Table 16 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 23/06/2022 10:01 2.5 – 4.7 m/s SE 12-16°C 3029485	35 dBA LAeq(15minute)	1	D	68	63	39	33	48	31	32 LAeq	**Site Related Noise Events:** Exhaust vent fan 25-35 Dozer operations 23-28 **Other Noise Events:** Birds 60-78 Traffic 40-44 Animals 40-45 Aircraft 40-45 Wind 30-37
		2	D	68	57	45	31	44	28	28 LAeq	
		3	C	78	64	46	33	51	29	N/M	
		4	D	77	62	50	31	50	26	N/M	
		5	D	49	41	36	28	34	24	I/A	
		6	D	64	55	36	27	40	24	I/A	
Evening 3 23/06/2022 20:00 1.2 - 2 m/s SW 8-9°C 3029485	35 dBA LAeq(15minute)	1	G	44	36	31	21	28	19	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 30-43 Birds 40-44
		2	G	43	40	36	24	31	21	I/A	
Night 3 23/06/2022 23:24 0.7 – 0.8 m/s W 3-4°C 3029485	35 dBA LAeq(15minute) 45 dBA LA1(1minute)	1	F	44	29	25	22	24	20	21 LAeq 25 LA1	**Site Related Noise Events:** Exhaust vent fan 20-23 **Other Noise Events:** Animals 40-57 Impact 44 Traffic 39-47 Train 40-45 Train horn 46
		2	F	44	41	39	24	35	22	20 LAeq 23 LA1	
		3	G	57	44	42	27	38	25	N/M	
		4	G	47	43	39	26	35	25	N/M	

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

5.1.5 Operator Attended Noise Survey Results – NMP Monitoring Location N1

Results of the operator attended noise surveys at N1 are provided in **Table 17.** Monitoring location N1 represents residential receptors located to the east of the site in Bow Hills.

Table 17 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 21/06/2022 11:20 4.0 m/s WNW 19°C 3029485	35 dBA LAeq(15minute)	1	C	55	50	47	41	45	38	40 LAeq	**Site Related Noise Events:** Evaporation fans 38-51 **Other Noise Events:** Traffic 49-55 Wind 38-47
Evening 20/06/2022 21:08 1.6 m/s SE 10°C 3027586	35 dBA LAeq(15minute)	1	F	59	55	49	27	44	20	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 46-59
Night 20/06/2022 22:57 2.7 m/s SSE 8°C 3027586	35 dBA LAeq(15minute)	1	G	53	40	30	24	29	22	27 LAeq 36 LA1	**Site Related Noise Events:** General surface activity 24-29 Dozer operations 30-36 **Other Noise Events:** Traffic 43-53

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

5.1.6 Operator Attended Noise Survey Results – NMP Monitoring Location N3

Results of the operator attended noise surveys at N3 are provided in **Table 18.** Monitoring location N3 represents residential receptors located to the southeast of the site in Ardmona.

Table 18 Operator Attended NMP Noise Survey Results – N3 – Ardmona

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 20/06/2022 14:21 1.8 m/s SSE 20°C 3029485	35 dBA LAeq(15minute)	1	D	93	87	76	42	74	33	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 85-95 Birds 59-68
Evening 20/06/2022 19:20 1.9 m/s SSE 12°C 3029485	35 dBA LAeq(15minute)	1	A	90	82	64	36	68	31	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 86-91 Insects 33-35
Night 20/06/2022 23:10 3.0 m/s SSE 8°C 3029485	35 dBA LAeq(15minute)	1	F	88	70	49	25	61	24	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Wind 30-33 Traffic 80-88 Animals 31

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

5.1.7 Operator Attended Noise Survey Results – NMP Monitoring Location N7

Results of the operator attended noise surveys at N7 are provided in **Table 19.** Monitoring location N7 represents residential receptors located to the northeast of the site in Merriman.

Table 19 Operator Attended NMP Noise Survey Results – N7 – Merriman

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 20/06/2022 15:05 2.3 m/s SSE 20°C 3029485	35 dBA LAeq(15minute)	1	D	51	45	40	32	37	29	30 LAeq	**Site Related Noise Events:** Evaporation fans 30-32 **Other Noise Events:** Traffic 40-46 Animals 46-51 Birds 40-43
Evening 20/06/2022 20:37 1.6 m/s SE 10°C 3027586	35 dBA LAeq(15minute)	1	F	55	51	44	27	41	24	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Animals 44-54 Traffic 40-55
Night 20/06/2022 23:28 2.8 m/s SSE 9°C 3027586	35 dBA LAeq(15minute)	1	F	61	52	43	24	40	22	N/M	**Site Related Noise Events:** Surface activity faintly audible **Other Noise Events:** Animals 52-61 Traffic 44-48

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

Note: Due to roadworks restricting access to the property, monitoring was undertaken at the property boundary.

5.1.8 Operator Attended Noise Survey Results – NMP Monitoring Location N8$_{(NMP)}$

Results of the operator attended noise surveys at N8$_{(NMP)}$ are provided in **Table 20**. Monitoring location N8$_{(NMP)}$ represents residential receptors located to the south of the site in Matilda.

Table 20 Operator Attended NMP Noise Survey Results – N8 – Matilda

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 20/06/2022 15:58 2.8 m/s SE 19 °C 3029485	35 dBA LAeq(15minute)	1	D	57	48	40	25	37	23	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 30-36 Birds 43-54 Alarm 57
Evening 20/06/2022 21:43 1.9 m/s SSE 9°C 3027586	35 dBA LAeq(15minute)	1	F	48	39	33	20	29	18	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 40-48
Night 20/06/2022 22:17 2.4 m/s SSE 9°C 3027586	35 dBA LAeq(15minute)	1	F	52	38	34	26	31	24	I/A	**Site Related Noise Events:** Inaudible **Other Noise Events:** Traffic 35-39 Animals 50-52

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 eight locations in order to determine the noise performance of the Narrabri Mine, with compliance achieved at all privately owned receiver locations.

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

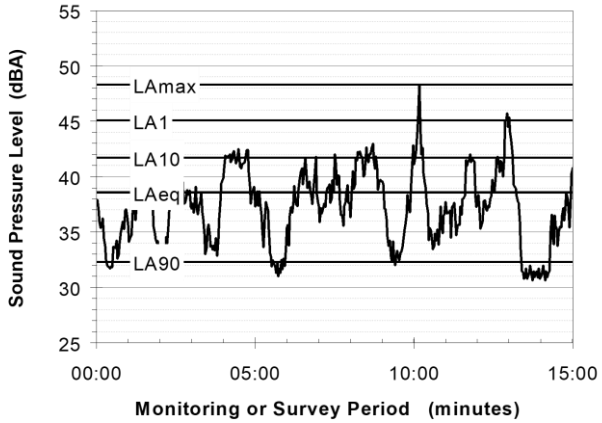
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

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

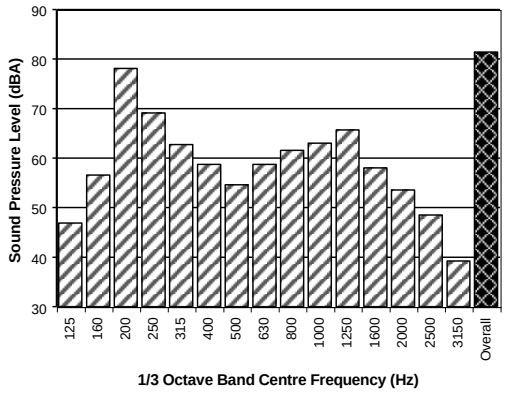
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

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

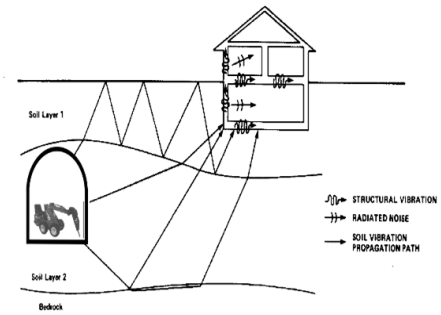
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

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

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM31777

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	B&K		
Type No:	2270	**Serial No:**	3029485
Mic. Type:	4189	**Serial No:**	3260622
Pre-Amp. Type:	ZC0032	**Serial No:**	30123
Filter Type:	1/3 Octave	**Test No:**	F031778

Owner: SLR Consulting Australia Pty Ltd
120 High Street
North Sydney, NSW 2060

Tests Performed: IEC 61672-3:2013 & IEC 61260-3:2016

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1007	hPa ±1 hPa	**Date of Receipt :**	15/02/2022
Temperature	25	°C ±1° C	**Date of Calibration :**	16/02/2022
Relative Humidity	55	% ±5%	**Date of Issue :**	16/02/2022

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Lab No. 9262
Acoustic and Vibration Measurements

Acu-Vib Electronics
CALIBRATIONS SALES RENTALS REPAIRS

Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

Page 1 of 2 Calibration Certificate
AVCERT10.14 Rev.2.0 14/04/2021

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self-Generated Noise	11.1	Observed
Electrical Noise	11.2	Observed
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Not Applicable
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: 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 evidence was not publically 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 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-2013.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 61260-3:2016 and were conducted to test the following performance characteristics:

Tests performed	*Clause*	*Result*
Test of relative attenuation at filter midband frequency	10	N/A
Linear operating range including range control if fitted	11	Pass
Test of lower limit of linear operating range	12	Pass
Measurement of relative attenuation (filter shape)	13	Pass

The filter submitted for testing successfully completed the tests listed above for the environmental conditions under which the tests were performed. If the filter type has successfully completed the pattern-evaluation tests of IEC 61260-2 then it can be stated that the filter set continues to conform to the specifications of IEC 61260-1.

A full technical report is available on request.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM30969

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	B&K		
Type No:	2270	**Serial No:**	3027586
Mic. Type:	4189	**Serial No:**	3232163
Pre-Amp. Type:	ZC0032	**Serial No:**	29527
Filter Type:	1/3 Octave	**Test No:**	F030970

Owner: SLR Consulting Australia Pty Ltd
120 High Street
North Sydney, NSW 2060

Tests Performed: IEC 61672-3:2013 & IEC 61260-3:2016

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	988	hPa ±1 hPa	**Date of Receipt :**	28/10/2021
Temperature	26	°C ±1° C	**Date of Calibration :**	29/10/2021
Relative Humidity	41	% ±5%	**Date of Issue :**	01/11/2021

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ... **AUTHORISED SIGNATURE:** .....
Jack Kiely

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Lab No. 9262
Acoustic and Vibration Measurements

Acu-Vib Electronics
CALIBRATIONS SALES RENTALS REPAIRS

Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

Page 1 of 2 Calibration Certificate
AVCERT10.14 Rev.2.0 14/04/2021

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self-Generated Noise	11.1	Observed
Electrical Noise	11.2	Observed
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Not Applicable
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: 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 evidence was not publically 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 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-2013.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 61260-3:2016 and were conducted to test the following performance characteristics:

Tests performed	*Clause*	*Result*
Test of relative attenuation at filter midband frequency	10	Pass
Linear operating range including range control if fitted	11	Pass
Test of lower limit of linear operating range	12	Pass
Measurement of relative attenuation (filter shape)	13	Pass

The filter submitted for testing successfully completed the tests listed above for the environmental conditions under which the tests were performed. If the filter type has successfully completed the pattern-evaluation tests of IEC 61260-2 then it can be stated that the filter set continues to conform to the specifications of IEC 61260-1.

A full technical report is available on request.

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