

# Chain Valley Colliery

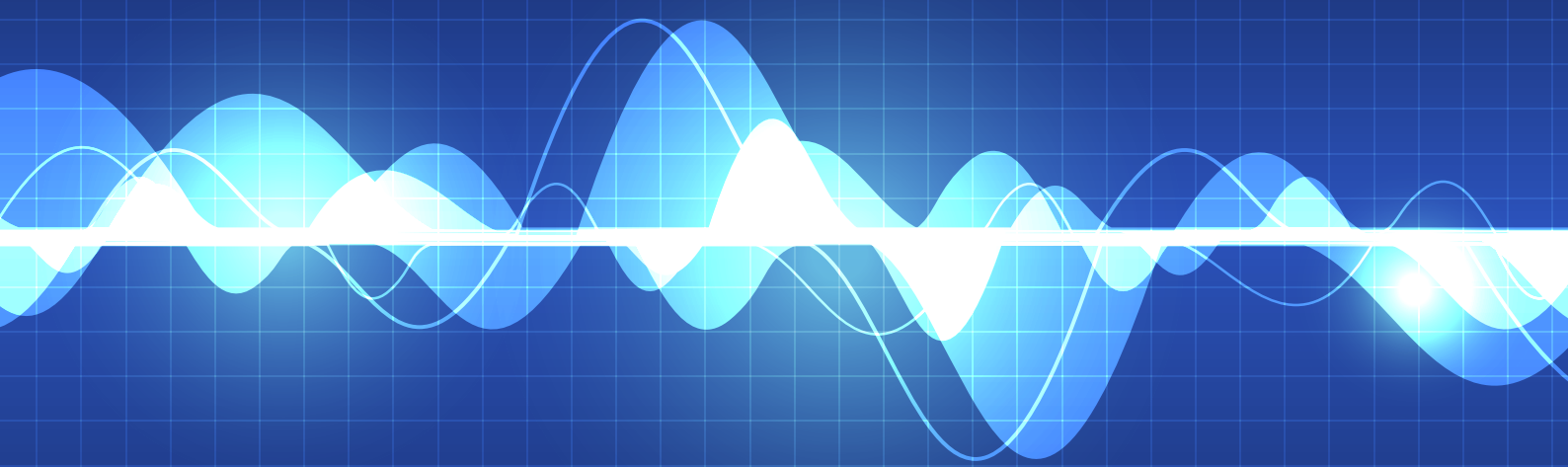
Quarterly attended noise monitoring

Quarter 1 - 2019

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Prepared for Great Southern Energy Pty Ltd (trading as DeltaCoal)

U 2019





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# Chain Valley Colliery

Quarterly attended noise monitoring - Quarter 1 2019

Prepared for Great Southern Energy Pty Ltd (trading as DeltaCoal)  
May 2019

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# Chain Valley Colliery

Quarterly attended noise monitoring - Quarter 1 2019

**Report Number**

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H180389 RP2

**Client**

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Great Southern Energy Pty Ltd (trading as DeltaCoal)

**Date**

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16 May 2019

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**Prepared by****Approved by**

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16 May 2019

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16 May 2019

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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# 1 Introduction

EMM Consulting Pty Limited (EMM) was engaged to undertake operator attended noise surveys on behalf of DeltaCoal Pty Limited (DeltaCoal).

The purpose of the monitoring was to address requirements of the Chain Valley Colliery Noise Management Plan (NMP), prepared to satisfy the requirements of the Development Consent SSD-5465 (DC) and Environment Protection License (EPL) 1770.

The approved Chain Valley Colliery Noise Management Plan (NMP) requires monitoring to occur on a quarterly basis. This report presents the results and findings of attended noise monitoring conducted during the first quarter of 2019, on 26 March 2019.

The following material was referenced as part of this assessment:

- Department of Planning and Environment (DPE), Development Consent SSD-5465, as modified on 16 December 2015 (current as of 26 March 2019);
- Environment Protection Authority (EPA), Environment Protection License (EPL) 1770, as varied on 8 June 2016 (current as of 26 March 2019);
- Chain Valley Colliery Noise Management Plan, approved by DPE on 12 March 2014;
- NSW EPA, Industrial Noise Policy (INP), 2000;
- NSW EPA, Industrial Noise Policy Application notes, 2017; and
- NSW EPA, Noise Policy for Industry (NPfi), 2017.

## 2 Noise limits

### 2.1 Operational and sleep disturbance noise limits

Chain Valley Colliery noise limits are provided in Table 1, Condition 7 of Schedule 3 of the DC and L5.1 of the EPL. Extracts of the relevant sections of the DC and EPL pertaining to noise are provided in Appendix A and B, respectively. The approved NMP adopts seven attended noise monitoring locations that are representative of residences outlined in the DC. One additional location, assessment location R13, has also been included. The noise monitoring locations and relevant criteria are summarised in Table 3.1.

**Table 2.1 Noise impact assessment criteria**

Monitoring location (refer Fig 3.1)	Assessment location	Day	Evening	Night	Night
		$L_{Aeq,15\text{ minute}}, \text{ dB}$	$L_{Aeq,15\text{ minute}}, \text{ dB}$	$L_{Aeq,15\text{ minute}}, \text{ dB}$	$L_{A1,1\text{ minute}}, \text{ dB}$
ATN001	R9	35	35	35	45
ATN002	R11	49	49	49	54
R12	R12	49	49	49	53
R13	R13	43	43	43	49
ATN003	R15	36	36	36	45
ATN004	R14	35	35	35	45
ATN005	R17	35	35	35	45
ATN006	R19	37	37	37	45
ATN007	R22	46	46	46	46

The DC specifies the following meteorological conditions under which noise limits do not apply:

- wind speeds greater than 3 m/s at 10 metres above ground level; or
- stability category F or G temperature inversion conditions.

The EPL specifies the following meteorological conditions under which noise limits do not apply:

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

If noise limits are satisfied adopting the EPL weather exclusion rules, then the DC limits will also be met. For this assessment, the recorded  $L_{Amax}$  has been used as a conservative estimate of the  $L_{A1,1\text{ minute}}$ . The INP application notes state that the EPA accepts sleep disturbance analysis based on either the  $L_{A1,1\text{ minute}}$  or  $L_{Amax}$  metrics (EPA 2013), with  $L_{Amax}$  resulting in a more conservative assessment.

The DC and EPL state that modification factor corrections in the application notes to the INP (2017) shall be applied to the measured mine noise levels where applicable. The application notes to the INP state that Fact Sheet C of the NPfl (EPA 2017) now applies regarding the application of modifying factors.

## 2.2 Low frequency noise criteria

Appendix 8 Condition 5 of the DC and L5.9 of the EPL states that noise generated by Chain Valley Colliery is to be measured in accordance with the relevant requirements of the INP. The INP application notes state that Section 4 of the INP has been withdrawn and the modifying factor adjustments outlined in Fact Sheet C of the NPfl are to be used when assessing the characteristics of a noise source.

Fact sheet C of the NPfl (EPA 2017) provides guidelines for applying modifying factor corrections to account for low frequency noise emissions. The NPfl specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values in Table C2 of the NPfl (EPA 2017), which has been reproduced in Table 2.2 below.

**Table 2.2 One-third octave low-frequency noise thresholds**

One-third octave $L_{Zeq,15\text{ minute}}$ threshold level													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more and:

- where any of the one-third octave noise levels in Table 3.2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or
- where any of the one-third octave noise levels in Table 3.2 are exceeded by more than 5 dB and cannot be mitigated, a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period.

Hence, where possible throughout each survey the operator has estimated the difference between site 'C-weighted' and site 'A-weighted' noise emission levels by matching audible sounds with the response of the analyser ( $L_{Ceq}-L_{Aeq}$ ). Where this was deemed to be 15 dB or greater, the measured one-third octave frequencies have been compared to the values in Table 2.2 to identify the relevant modifying factor correction (if applicable). This method has been applied to this assessment as presented in Section 5.

It is of note that the NPfl (EPA 2017) states that low-frequency noise corrections only apply under the standard or noise-enhancing (i.e. applicable) meteorological conditions.



# 3 Assessment methodology

## 3.1 Attended noise monitoring

To quantify noise emissions from Chain Valley Colliery, 15-minute attended noise monitoring surveys were completed at representative locations, in accordance with the approved NMP.

Noise monitoring locations required as per the NMP, as well as one additional location, and their coordinates are listed in Table 3.1 and are shown in Figure 3.1.

**Table 3.1** Attended noise monitoring locations

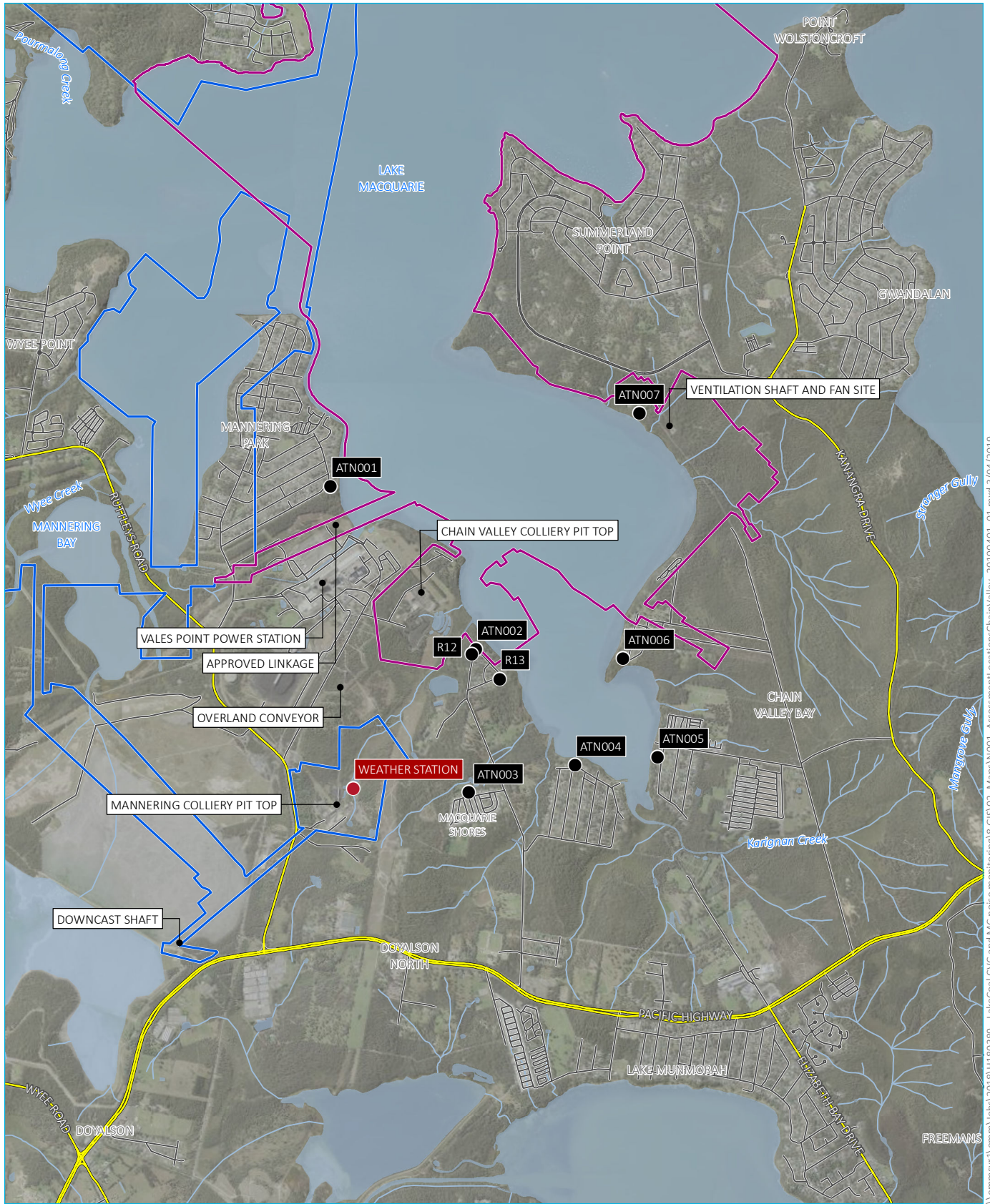
Monitoring location	Description	MGA56	
		Easting	Northing
ATN001	Griffith Street, Mannering Park	364140	6330594
ATN002	Lakeshore Avenue, Kingfisher Shores	365218	6329388
ATN003	Short Street, Macquarie Shores	365165	6328323
ATN004	Lloyd Avenue, Chain Valley Bay	365949	6328530
ATN005	Teragalin Drive, Chain Valley Bay	366560	6328590
ATN006	Sunset Parade, Chain Valley Bay	366305	6329321
ATN007 <sup>1</sup>	Cams Boulevard, Chain Valley Bay	366425	6331135
R12 <sup>2</sup>	Lakeshore Avenue, Kingfisher Shores	365185	6329352
R13	Karoola Avenue, Kingfisher Shores	365391	6329169

Notes: 1. Due to access issues, noise monitoring for ATN007 was conducted at an intermediate location with site contributions calculated back to ATN007.  
2. Noise monitoring at R12 is conducted in conjunction with ATN002, as monitoring location is representative of both ATN002 and R12.

## 3.2 Instrumentation

Brüel & Kjær 2250 Type 1 and Svantek 979 Type 1 sound analysers (s/n 2759405 and 21095, respectively) were used to conduct 15-minute attended measurements and record 1/3 octave frequency and statistical noise indices. The sound analysers were calibrated before and on completion of the survey using a Brüel & Kjær Type 4230 calibrator (s/n 1276091). The instrumentation’s calibration certificates are provided in Appendix C.

Where possible throughout each survey, the operator has quantified the contribution of each significant noise source. This was done by matching audible sounds with the response of the analyser (where applicable) and/or via post-analysis of data (e.g. low pass filtering).



Source: EMM (2019); DFSI (2017); GA (2011)

**KEY**

- Chain Valley Colliery development consent boundary
- Manning Colliery project approval boundary
- Noise monitoring location
- Weather station
- Main road
- Local road
- Watercourse/drainage line
- Waterbody

Site boundary and noise monitoring locations

Chain Valley Colliery noise monitoring  
Figure 3.1

\\emmsvr1\emm\jobs\2018\180389 - LakeCoal CVC and MC noise monitoring\GIS\02\_Maps\W001\_AssessmentLocationsChainValley\_20190401\_01.mxd 3/04/2019

### 3.3 Determination of stability category

As required by the DC, EPL and NMP, this assessment determined the stability categories throughout the attended monitoring period using the sigma-theta (ST) method as per Appendix E of the INP (EPA 2000). The ST data was obtained from Chain Valley Colliery meteorological station located to the north of the site.

Table E1 of the INP (EPA 2000) is reproduced in Table 4.2 and presents the stability categories and associated ranges in temperature lapse rates.

**Table 3.2 Stability categories and temperature lapse rates**

Stability category	Temperature lapse rate ( $\Delta T$ ) ( $^{\circ}\text{C}/100\text{ m}$ )
A	$\Delta T < -1.9$
B	$-1.9 \leq \Delta T < -1.7$
C	$-1.7 \leq \Delta T < -1.5$
D	$-1.5 \leq \Delta T < -0.5$
E	$-0.5 \leq \Delta T < 1.5$
F	$1.5 \leq \Delta T < 4.0$
G	$\Delta T \geq 4.0$

Source: INP (EPA 2000).

# 4 Review of data and discussion

## 4.1 Summary

Results of attended noise measurements are summarised in Table 4.1. Chain Valley Colliery contribution and total mine noise were determined for each survey using in-field observations and post-analysis of data as required (e.g. removing higher frequencies that are not mine related i.e. above 630 Hz). Attended monitoring was completed on 26 March 2019.

The meteorological data for the monitoring period was sourced from Mannering Colliery's weather station to determine applicability of criteria in accordance with the DC and EPL. In accordance with the DC, noise limits were not applicable during 13 of the 24 measurements due the presence of wind speeds greater than 3 m/s or an F atmospheric stability category. In accordance with the EPL, noise limits were not applicable during 11 of the 24 measurements due the presence of wind speeds greater than 3 m/s or an F atmospheric stability category in combination with wind speeds greater than 2 m/s.

Low frequency noise was conservatively assessed by comparison of the total measured one-third octave  $L_{Aeq}$  noise levels to the NPfI one-third octave low-frequency noise thresholds. Measured noise levels exceed the relevant LFN thresholds during the three measurements at ATN007. Therefore, in accordance with the NPfI, a 2 dB positive adjustment was found to be relevant and was applied to estimated site noise levels for these measurements.

Monitoring identified that site noise was inaudible during 21 of the 24 measurements. Typically, when a particular source is not audible above local ambient noise levels, the likely contribution of that source is generally at least 10 dB below the measured background ( $L_{A90}$ ) level. Therefore, site  $L_{Aeq}$  noise contributions were below the relevant limits at these locations.

At the one location where site noise was audible (i.e. vent fan emissions at ATN007), Chain Valley Colliery noise contributions were below (i.e. complied with) the noise limits, where applicable.

**Table 4.1 Chain Valley Colliery attended noise monitoring results – Q1 2019**

Location	Date	Start time	Total noise levels, dB							Site contributions, dB			Noise limits, dB		Meteorological conditions <sup>3</sup> limits apply (DC/EPL) (Y/N)	Exceedance, dB (DC/EPL)	Comments
			L <sub>Amin</sub>	L <sub>A90</sub>	L <sub>Aeq</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>	L <sub>Ceq</sub>	LFN mod. factor <sup>1</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>			
ATN1	26/3	15:35 (Day)	44	46	53	50	67	74	70	Nil	IA	N/A	35	N/A	2.4 m/s @ 169 B class stability Y/Y	Nil/Nil	<b>Site noise inaudible.</b> Vales Point Power Station (VPPS) noise and bird noise consistent. Wind in trees, resident noise, car passbys and distant traffic occasional.
ATN1	26/3	18:32 (Eve.)	46	48	52	52	59	78	70	Nil	IA	N/A	35	N/A	3.8 m/s @ 165 B class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> VPPS noise consistent. Bird noise frequent. Wind in trees, resident noise, car passbys and distant traffic occasional.
ATN1	26/3	23:14 (Night)	45	47	49	50	53	59	67	Nil	IA	IA	35	35	2.1 m/s @ 148 F class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> VPPS noise and insects consistent. Wind in trees, local traffic and dogs barking occasional.
ATN2	26/3	16:06 (Day)	35	38	43	45	51	60	58	Nil	IA	N/A	49	N/A	2.0 m/s @ 158 A class stability Y/Y	Nil/Nil	<b>Site noise inaudible.</b> Bird noise consistent. Wind in trees and VPPS noise frequent. Resident noise, local traffic and boat noise occasional.
ATN2	26/3	19:15 (Eve.)	35	38	44	44	55	67	58	Nil	IA	N/A	49	N/A	2.1 m/s @ 165 A class stability Y/Y	Nil/Nil	<b>Site noise inaudible.</b> Insects and VPPS noise consistent. Distant and local traffic frequent. Wind in trees and distant dogs barking occasional.
ATN2	26/3	23:39 (Night)	31	33	36	38	40	51	57	Nil	IA	IA	49	54	0.9 m/s @ 155 F class stability N/Y	'N/A' / Nil	<b>Site noise inaudible.</b> Insects, bird noise and VPPS noise consistent. Wind in trees frequent. Distant traffic occasional.
ATN3	26/3	15:45 (Day)	36	38	44	45	55	63	60	Nil	IA	N/A	36	N/A	3.6 m/s @ 161 B class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects and bird noise consistent. Wind in trees, distant traffic and resident noise frequent. Aircraft noise and dogs barking occasional.

**Table 4.1 Chain Valley Colliery attended noise monitoring results – Q1 2019**

Location	Date	Start time	Total noise levels, dB							Site contributions, dB			Noise limits, dB		Meteorological conditions <sup>3</sup> limits apply (DC/EPL) (Y/N)	Exceedance, dB (DC/EPL)	Comments
			L <sub>Amin</sub>	L <sub>A90</sub>	L <sub>Aeq</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>	L <sub>Ceq</sub>	LFN mod. factor <sup>1</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>			
ATN3	26/3	18:53 (Eve.)	35	37	40	42	45	62	58	Nil	IA	N/A	36	N/A	2.2 m/s @ 152 B class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Insects and bird noise consistent. Wind in trees, resident noise, distant and local traffic frequent. Aircraft noise occasional.
ATN3	26/3	23:18 (Night)	34	37	39	41	42	49	50	Nil	IA	IA	36	45	2.1 m/s @ 161 F class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects, bird noise and idling noise from NE (unrelated to CVC) consistent. Distant traffic frequent.
ATN4	26/3	16:20 (Day)	36	40	53	53	64	74	67	Nil	IA	N/A	35	N/A	2.5 m/s @ 125 A class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Insects consistent. Bird noise frequent. Car passbys, wind in trees, distant traffic, distant dogs barking, resident noise and nearby sign occasional.
ATN4	26/3	18:01 (Eve.)	40	43	53	56	63	77	57	Nil	IA	N/A	35	N/A	2.3 m/s @ 177 B class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Insects consistent. Bird noise frequent. Car passbys, wind in trees, distant traffic, distant dogs barking, resident noise and nearby sign occasional.
ATN4	26/3	22:47 (Night)	36	38	41	43	49	57	46	Nil	IA	IA	35	45	2.4 m/s @ 171 F class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects consistent. Resident noise, distant dogs barking, wind in trees and distant traffic occasional.
ATN5	26/3	16:46 (Day)	34	36	44	43	54	69	59	Nil	IA	N/A	35	N/A	1.9 m/s @ 143 A class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Insects and nearby music consistent. Bird noise frequent. Distant traffic, VPPS noise, distant dogs barking and nearby dogs occasional.
ATN5	26/3	19:19 (Eve.)	35	37	42	43	52	56	55	Nil	IA	N/A	35	N/A	3.1 m/s @ 159 B class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects consistent. Bird noise, distant traffic, distant dogs barking, wind in trees, aircraft noise and resident noise occasional.

**Table 4.1 Chain Valley Colliery attended noise monitoring results – Q1 2019**

Location	Date	Start time	Total noise levels, dB							Site contributions, dB			Noise limits, dB		Meteorological conditions <sup>3</sup> limits apply (DC/EPL) (Y/N)	Exceedance, dB (DC/EPL)	Comments
			L <sub>Amin</sub>	L <sub>A90</sub>	L <sub>Aeq</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>	L <sub>Ceq</sub>	LFN mod. factor <sup>1</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>			
ATN5	26/3	22:22 (Night)	30	32	37	39	44	51	54	Nil	IA	IA	35	45	2.7 m/s @ 156 F class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects consistent. VPPS noise, distant traffic, wind in trees, distant dogs barking and nearby car occasional.
ATN6	26/3	17:10 (Day)	36	38	49	49	61	72	58	Nil	IA	N/A	37	N/A	2.0 m/s @ 143 A class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Lapping water consistent. Bird noise frequent. Distant traffic, VPPS noise, wind in trees and resident noise occasional.
ATN6	26/3	19:41 (Eve.)	35	38	42	45	48	63	54	Nil	IA	N/A	37	N/A	3.3 m/s @ 144 B class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects and VPPS noise consistent. Wind in trees frequent. Resident noise, bird noise, distant traffic, dogs barking and boat noise occasional.
ATN6	26/3	22:01 (Night)	33	36	41	44	48	57	50	Nil	IA	IA	37	45	2.1 m/s @ 163 F class stability N/N	'N/A' / 'N/A'	<b>Site noise inaudible.</b> Insects and wind in trees consistent. VPPS noise and bat noise occasional.
ATN7 <sup>6</sup>	26/3	17:39 (Day)	52	53	54	54	58	62	73	2 dB	43 (41+2)	N/A	46	N/A	3.5 m/s @ 167 B class stability N/N	'N/A' / 'N/A'	<b>CVC vent fan noise consistent and dominant.</b> Bird noise frequent. Wind in trees and aircraft noise occasional.
ATN7 <sup>6</sup>	26/3	18:05 (Eve.)	51	53	53	54	55	60	73	2 dB	43 (41+2)	N/A	46	N/A	2.3 m/s @ 177 B class stability Y/Y	Nil / Nil	<b>CVC vent fan noise consistent and dominant.</b> Bird noise consistent. Wind in trees occasional.
ATN7 <sup>6</sup>	26/3	22:02 (Night)	53	54	55	55	56	57	74	2 dB	44 (42+2)	43	46	46	2.1 m/s @ 163 F class stability N/N	'N/A' / 'N/A'	<b>CVC vent fan noise consistent and dominant.</b> Insects and bird noise consistent. Distant traffic occasional.
R13	26/3	16:28 (Day)	33	36	56	56	69	76	69	Nil	IA	N/A	43	N/A	1.6 m/s @ 140 A class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Bird noise consistent. VPPS noise and local traffic frequent. Wind in trees and dogs barking occasional.

**Table 4.1 Chain Valley Colliery attended noise monitoring results – Q1 2019**

Location	Date	Start time	Total noise levels, dB							Site contributions, dB			Noise limits, dB		Meteorological conditions <sup>3</sup> limits apply (DC/EPL) (Y/N)	Exceedance, dB (DC/EPL)	Comments
			L <sub>Amin</sub>	L <sub>A90</sub>	L <sub>Aeq</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>	L <sub>Ceq</sub>	LFN mod. factor <sup>1</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>	L <sub>Aeq</sub>	L <sub>Amax</sub> <sup>2</sup>			
R13	26/3	19:33 (Eve.)	33	36	46	46	58	71	53	Nil	IA	N/A	43	N/A	1.9 m/s @ 150 B class stability Y/Y	Nil / Nil	<b>Site noise inaudible.</b> Insects consistent. VPPS noise, distant and local traffic frequent. Resident noise and dogs barking occasional.
R13	26/3	23:58 (Night)	28	32	41	45	47	66	49	Nil	IA	IA	43	49	1.3 m/s @ 160 F class stability N/Y	'N/A' / Nil	<b>Site noise inaudible.</b> Insects and VPPS noise consistent. Bird noise, and wind in trees occasional.

- Notes:
1. Modifying factor correction for low frequency noise in accordance with fact sheet C of the NPfl (refer Section 2.2).
  2. For assessment purposes the L<sub>Amax</sub> and the L<sub>A1,1 minute</sub> are interchangeable.
  3. Meteorological data were taken as an average over 15 minutes from Chain Valley Colliery weather station (Refer to Section 5.1).
  4. IA = inaudible.
  5. N/A = not applicable.
  6. Due to access issues, noise monitoring for ATN007 was conducted at an intermediate location with site contributions calculated back to ATN007



## 5 Conclusion

EMM has completed a review of mine noise from Chain Valley Colliery within the surrounding community based on attended measurements conducted on 26 March 2019.

The applicability of noise limits was assessed with reference to Mannering Colliery's meteorological station located to the south of the site. In accordance with the DC, noise limits were not applicable during 13 of the 24 measurements due the presence of wind speeds greater than 3 m/s or an F atmospheric stability category. In accordance with the EPL, noise limits were not applicable during 11 of the 24 measurements due the presence of wind speeds greater than 3 m/s or an F atmospheric stability category in combination with wind speeds greater than 2 m/s.

The assessment of noise contributions from site included consideration of modifying factors for noise characteristics where relevant and in accordance with the INP.

Chain Valley Colliery noise contributions were below (satisfied) the noise limits, where applicable, at all monitoring locations for this round of noise monitoring.

# References

Chain Valley Colliery Noise Management Plan, 2014.

NSW Department of Planning and Environment, Development Consent SSD5465, 2015.

NSW Environment Protection Authority, Environment Protection License 1770.

NSW Environment Protection Authority, Industrial Noise Policy, 2000.

NSW Environment Protection Authority, Industrial Noise Policy Application notes, 2017.

NSW Environment Protection Authority, Noise Policy for Industry, 2017.

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Appendix A

# Glossary of acoustic terms

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Several technical terms are discussed in this report. These are explained in Table A.1 **Error! Reference source not found.**

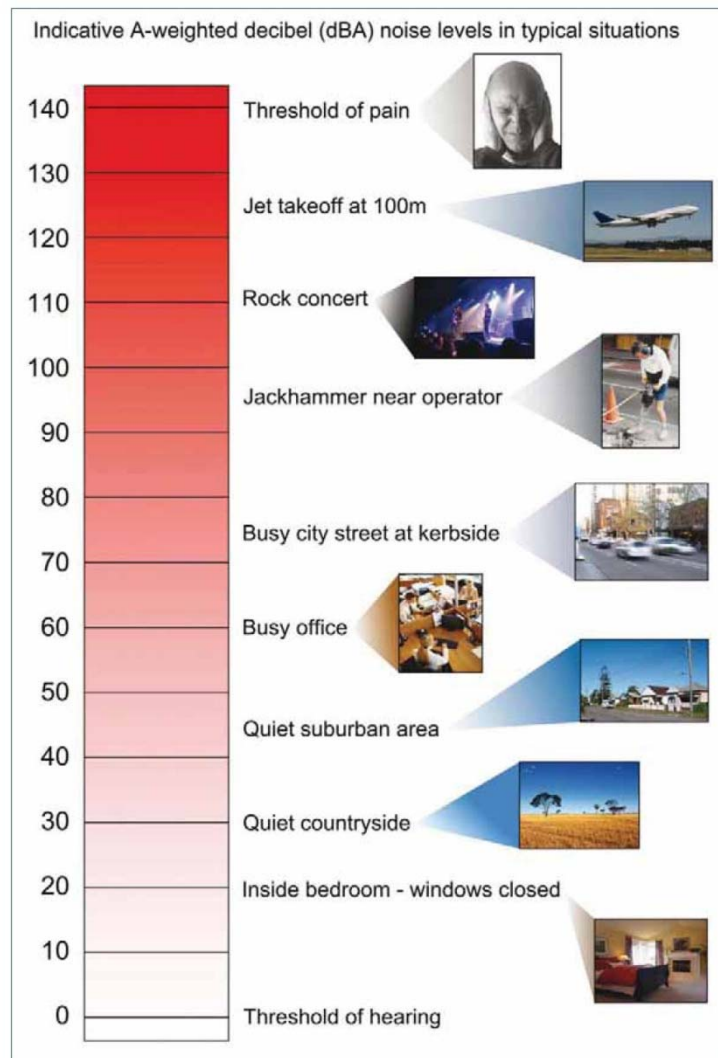
**Table A.1** Glossary of acoustic terms

Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L <sub>A1</sub>	The 'A-weighted' noise level which is exceeded 1% of the time.
L <sub>A1,1 minute</sub>	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L <sub>A10</sub>	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L <sub>A90</sub>	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L <sub>Aeq</sub>	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The L <sub>Aeq,15 minute</sub> descriptor refers to an L <sub>Aeq</sub> noise level measured over a 15-minute period.
L <sub>Amin</sub>	The minimum 'A-weighted' noise level received during a measuring interval.
L <sub>Amax</sub>	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L <sub>Ceq</sub>	The equivalent continuous 'C-weighted' sound pressure level over a given period. The L <sub>Ceq,15 minute</sub> descriptor refers to an L <sub>Ceq</sub> noise level measured over a 15 minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table A.2 **Error! Reference source not found.** gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure A.1.

**Table A.2 Perceived change in noise**

Change in sound pressure level (dB)	Perceived change in noise in surrounding environment
up to 2	not perceptible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud



Source: Road Noise Policy (Department of Environment, Climate Change and Water 2011)

**Figure A.1 Common noise levels**

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Appendix B

# Project approval extract

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4. Prior to 31 March 2014, and every 12 months thereafter, unless the **Secretary** directs otherwise, the Applicant shall commission a suitably qualified person, whose appointment has been approved by the **Secretary**, to conduct an Independent Traffic Audit of the development. This audit must:
  - (a) be undertaken without prior notice to the Applicant, and in consultation with RMS, NCC, WSC and the CCC;
  - (b) assess the impact of the development on the performance and safety of the road network, including a review of:
    - haulage records;
    - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
    - community complaints register; and
  - (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.
5. Within 1 month of receiving the audit report, or as otherwise agreed by the **Secretary**, the Applicant shall submit a copy of the report to the **Secretary**, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

A summary of the audit report must be included in the Annual Review.

### Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the **Applicant** shall prepare and submit to the **Secretary** for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development. The assessment must include:
  - (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
  - (b) quantified social and environmental impacts associated with road and rail transport.

### NOISE

#### Noise Impact Assessment Criteria

7. The Applicant shall ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15 \text{ min})$	$L_{Aeq}(15 \text{ min})$	$L_{Aeq}(15 \text{ min})$	$L_{A1}(1 \text{ min})$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:

- To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and
- Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

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

### Operating Conditions

8. The Applicant shall:
  - (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;

- (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
  - (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
  - (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
  - (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
  - (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
- to the satisfaction of the **Secretary**.

Table 2: Long-term Noise Goals dB(A)

Location	Day	Evening	Night
	$L_{Aeq}(15\text{ min})$	$L_{Aeq}(15\text{ min})$	$L_{Aeq}(15\text{ min})$
R11 – R13	41	41	41
R22	40	40	40

Notes:

- To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and
- Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

### Noise Management Plan

9. The Applicant shall prepare a Noise Management Plan for the development to the satisfaction of the **Secretary**. This plan must:
- (a) be prepared in consultation with the EPA and submitted to the **Secretary** for approval within 4 months of the date of this consent, unless otherwise agreed by the **Secretary**;
  - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
  - (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
  - (d) include a monitoring program that:
    - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
    - evaluates and reports on:
      - the effectiveness of the on-site noise management system; and
      - compliance against the noise operating conditions; and
    - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant shall implement the approved management plan as approved from time to time by the **Secretary**.

### AIR QUALITY

#### Odour

10. The Applicant shall ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

#### Air Quality Criteria

11. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedance of the criteria listed in Tables 3, 4 and 5 at any residence on privately-owned land.

Table 3: Long-term criteria for particulate matter

Pollutant	Averaging period	<sup>d</sup> Criterion
Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 $\mu\text{g}/\text{m}^3$
Particulate matter < 10 $\mu\text{m}$ (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 $\mu\text{g}/\text{m}^3$



## APPENDIX 8 NOISE COMPLIANCE ASSESSMENT

### Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
  - (a) during periods of rain or hail;
  - (b) average wind speed at microphone height exceeds 5 m/s;
  - (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
  - (d) temperature inversion conditions greater than 3°C/100 m.

### Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station described in condition 15 of schedule 3.

### Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the **Secretary** directs otherwise.
5. Unless otherwise agreed with the **Secretary**, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
  - (a) monitoring locations for the collection of representative noise data;
  - (b) meteorological conditions during which collection of noise data is not appropriate;
  - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
  - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

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Appendix C

## EPL extract

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# Environment Protection Licence

Licence - 1770



## L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Waste	Any other waste received on the premises for storage, treatment, processing, sorting or disposal and which receipt is not a scheduled activity under Schedule 1 of the POEO Act, as in force from time to time.	-	
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

## L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

### POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

# Environment Protection Licence

Licence - 1770



## POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

## POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

## POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

## POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37
Night	Night-LA1 (1 minute)	-	45

# Environment Protection Licence



Licence - 1770

## POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

## POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

- a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
- b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:

- (a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
- (b) Evening is defined as the period 6pm to 10pm, and
- (c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meteorological conditions except for any one of the following:

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

# Environment Protection Licence

Licence - 1770



L5.5 For the purpose of condition L5.4:

(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.

(b) Stability category temperature inversion conditions are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the *NSW industrial Noise Policy* (EPA 2000)

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the  $L_{Aeq(15\text{ min})}$  noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more than 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the  $LA1(1\text{ minute})$  noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;

a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or

b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

## 4 Operating Conditions

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Appendix D

# Calibration certificates

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# CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 22926 & FILT 4696**

**Equipment Description:** Sound & Vibration Analyzer

**Manufacturer:** Svantek

**Model No:** Svan-979      **Serial No:** 21095

**Microphone Type:** 40AE      **Serial No:** 120711

**Preamplifier Type:** SV17      **Serial No:** 25110

**Filter Type:** 1/3 Octave      **Serial No:** 21095

**Comments:** All tests passed for class 1.  
(See over for details)

**Owner:** EMGA Mitchell McLennan  
Ground Floor, Suite 01, 20 Chandos St  
St Leonards NSW 2065

**Ambient Pressure:** 999 hPa  $\pm 1.5$  hPa

**Temperature:** 23 °C  $\pm 2^\circ$  C      **Relative Humidity:** 35%  $\pm 5\%$

**Date of Calibration:** 14/06/2018      **Issue Date:** 15/06/2018

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

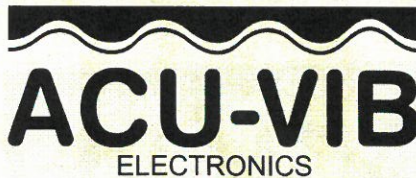
**CHECKED BY:** *[Signature]*

**AUTHORISED SIGNATURE:** *[Signature]*  
*Jack Kieft*

Accredited for compliance with ISO/IEC 17025 - Calibration  
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262  
Acoustic and Vibration  
Measurements



**HEAD OFFICE**  
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154  
Tel: (02) 96808133      Fax: (02) 96808233  
Mobile: 0413 809806  
web site: www.acu-vib.com.au



# CERTIFICATE OF CALIBRATION

CERTIFICATE No: 24152

**EQUIPMENT TESTED:** Sound Level Calibrator

**Manufacturer:** B & K  
**Type No:** 4230                      **Serial No:** 1276091  
**Owner:** EMM Consulting  
Level 1, 146 Hunter Street  
Newcastle, NSW 2300

**Tests Performed:** Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	93.81	989.84	1.58
Level 2:	NA	N	NA	NA	NA
<b>Uncertainty:</b>			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.i.) k=2					

**CONDITION OF TEST:**

**Ambient Pressure:** 1004 hPa ±1.5 hPa    **Relative Humidity:** 47% ±5%

**Temperature:** 20 °C ±2° C

**Date of Calibration:** 14/02/2019                      **Issue Date:** 15/02/2019

**Acu-Vib Test Procedure:** AVP02 (Calibrators)

**Test Method:** AS IEC 60942 - 2017

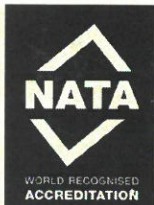
**CHECKED BY:** *[Signature]*    **AUTHORISED SIGNATURE:** *[Signature]*

*Jack Kieft*

.Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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%.



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# CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 22129 & FILT 4384**

**Equipment Description:** Sound Level Meter

**Manufacturer:** B & K

**Model No:** 2250                      **Serial No:** 2759405

**Microphone Type:** 4189                      **Serial No:** 2888134

**Filter Type:** 1/3 Octave                      **Serial No:** 2759405

**Comments:** All tests passed for class 1.  
(See over for details)

**Owner:** EMGA Mitchell McLennan  
Ground Floor, Suite 01, 20 Chandos St  
St Leonards NSW 2065

**Ambient Pressure:** 1008 hPa  $\pm$ 1.5 hPa

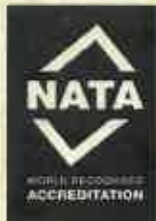
**Temperature:** 25 °C  $\pm$ 2° C    **Relative Humidity:** 48%  $\pm$ 5%

**Date of Calibration:** 07/02/2018                      **Issue Date:** 09/02/2018

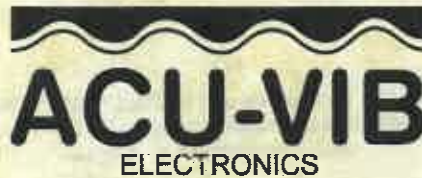
**Acu-Vib Test Procedure:** AVP10 (SLM) & AVP06 (Filters)

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

Accredited for compliance with ISO/IEC 17025 - Calibration  
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



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