Hunter Power Project

Environmental Noise Monitoring

Prepared for Snowy Hydro Limited

August 2025

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Environmental Noise Monitoring

Snowy Hydro Limited

E241185 RP#1

August 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	19/08/2025	Ingrid Smith	Robert Kirwan	Draft
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Approved by

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22 August 2025

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Snowy Hydro Limited to conduct noise surveys during commissioning and operation of the gas-fired power plant at the Hunter Power Project (HPP, the site) located near Loxford, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the evening and night periods of 31 July, 4 August, and 6 August 2025 at five monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1.

It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location ID	Address	Coordinates (MGA56)	
		Easting	Northing
NM1	103 Bishops Bridge Road, Loxford NSW 2326	356579	6370464
NM2	10 Dawes Avenue, Loxford NSW 2326	358109	6370268
NM3	22 Bowditch Avenue, Loxford NSW 2326	359228	6370812
NM4	464 Cessnock Road, Gillieston Heights NSW 2321	361930	6372907
NM5	59 Sawyers Gully Road, Sawyers Gully NSW 2326	356117	6370129

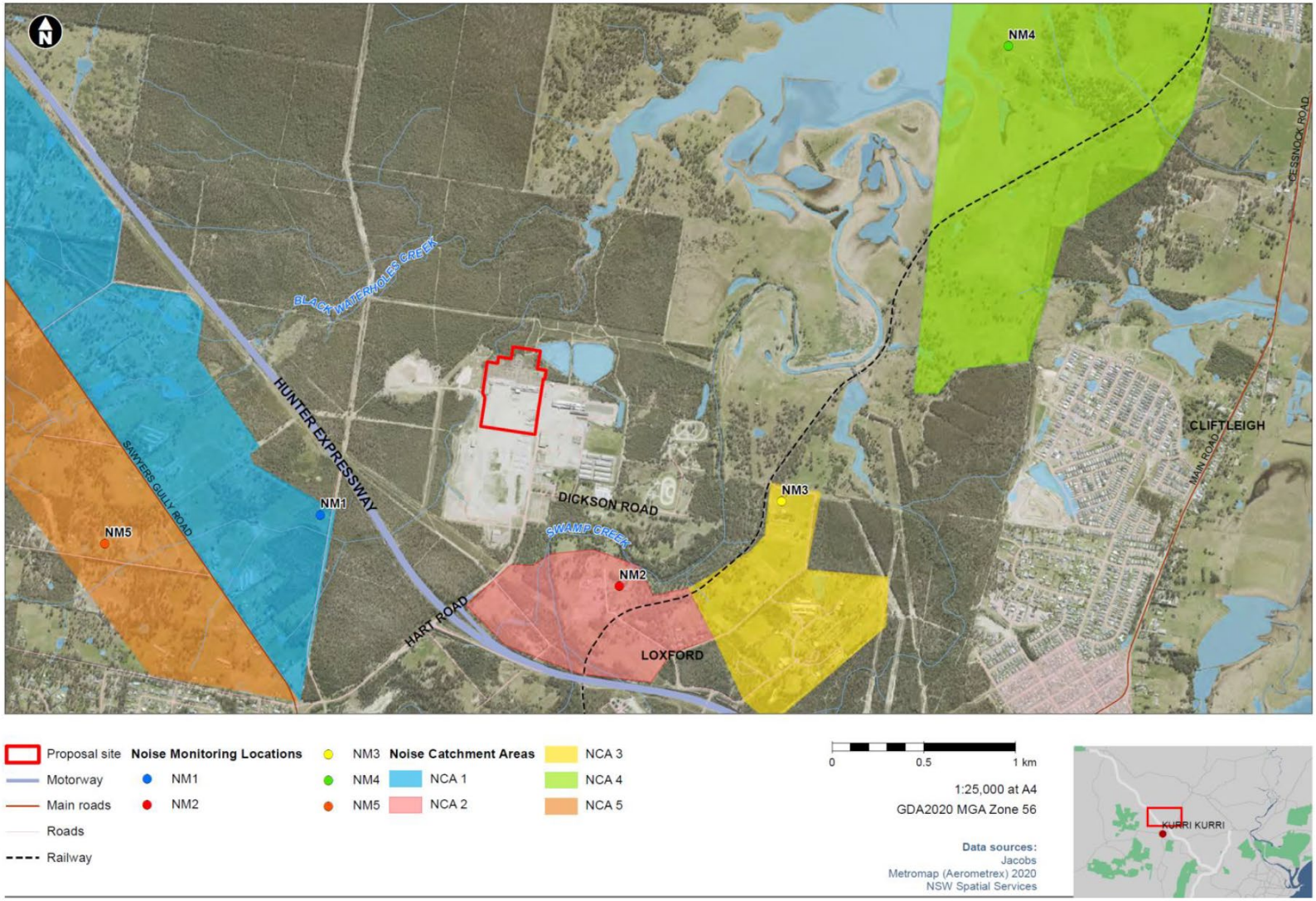

Figure 1.1 **Attended noise monitoring locations**

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Project approval

The current project approval for HPP is 12590060 (MOD 2, November 2023). Relevant sections of the project approval are reproduced in Appendix B.1.

2.2 Environment protection licence

HPP holds Environment Protection Licence (EPL) No. 21627 issued by the NSW Environment Protection Authority (EPA) and most recently revised on 13 June 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Construction noise management plan

The current Construction Noise and Vibration Management Plan (CNVMP) is version 5, approved on 10 May 2023. Relevant sections of the CNVMP are reproduced in Appendix B.3.

2.4 Noise limits

Operational noise limits based on the project approval and EPL are provided in Table 2.1.

Table 2.1 Operational noise limits

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night L_{Amax}
NM1	50	48	41	52
NM2	45	45	43	53
NM3	43	43	38	52
NM4	40	35	35	52
NM5	42	42	38	52

2.5 Additional requirements

Monitoring and reporting have been carried out in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was carried out in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW requirements. Meteorological data for this survey was obtained from the site automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the evening and night periods at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement and particular attention was paid to the extent of site's contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 decibels (dB) below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate of site noise may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

Meteorological data was obtained from the site AWS which allowed correlation of atmospheric parameters with measured noise levels. This data was obtained in 1-minute intervals. Atmospheric parameters include wind speed, wind direction and rainfall. When meteorological data is provided in less than 15-minute intervals, analysis must be conducted to determine the meteorological conditions present for most of each measurement period.

3.4 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Measurement equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær Type 2250 sound level meter	3008201	15 August 2025	IEC 61672-1:2013
Svantek SV36 calibrator	154613	16 June 2026	IEC 60942:2017
Rion NA28 sound level meter	30131882	06 February 2027	IEC 61672-1:2002
Svantek SV36 calibrator	138014	07 August 2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Total noise levels measured during each 15-minute attended measurement are provided in Table 4.1.

Table 4.1 Total measured noise levels, dB[1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
NM1	31/07/2025 20:11	52	44	41	40	39	37	35
NM1	31/07/2025 23:18	64	42	39	40	35	33	31
NM1	04/08/2025 20:56	57	53	49	47	45	44	41
NM1	04/08/2025 22:00	56	54	52	48	45	43	41
NM1	06/08/2025 19:50	62	60	57	54	53	50	46
NM1	06/08/2025 23:18	57	49	45	43	42	41	39
NM2	31/07/2025 20:39	57	54	51	48	48	45	43
NM2	31/07/2025 22:51	55	50	47	45	44	42	40
NM2	04/08/2025 20:07	62	53	51	48	48	46	44
NM2	04/08/2025 22:49	54	50	47	45	44	43	41
NM2	06/08/2025 20:34	58	55	52	50	50	48	46
NM2	06/08/2025 22:51	55	51	48	47	46	44	43
NM3	31/07/2025 21:00	50	46	44	43	43	41	39
NM3	31/07/2025 22:30	56	47	45	43	42	41	39
NM3	04/08/2025 19:44	55	49	44	42	42	40	38
NM3	04/08/2025 23:12	52	47	46	45	44	43	42
NM3	06/08/2025 20:55	53	50	48	46	45	44	42
NM3	06/08/2025 22:30	53	49	48	46	45	44	42
NM4	31/07/2025 21:44	74	67	61	57	49	43	36
NM4	31/07/2025 22:00	72	66	61	57	50	43	37
NM4	04/08/2025 19:12	91	79	75	70	64	54	41
NM4	04/08/2025 23:43	82	75	61	61	39	31	28
NM4	06/08/2025 21:25	73	69	60	57	51	48	47
NM4	06/08/2025 22:00	73	61	57	52	47	44	42
NM5	31/07/2025 19:50	82	69	61	60	55	50	44
NM5	31/07/2025 23:38	71	64	51	51	41	35	31
NM5	04/08/2025 20:34	76	67	53	55	46	43	40
NM5	04/08/2025 22:22	74	68	52	54	44	39	36

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
NM5	06/08/2025 20:10	78	65	59	57	54	51	46
NM5	06/08/2025 23:37	79	66	55	55	48	44	42

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 metres per second (m/s) at microphone height.

Table 4.2 Measured atmospheric conditions

Location	Start date and time	Temperature °C	Wind speed m/s	Wind Direction ° Magnetic North [1]	Cloud cover 1/8s
NM1	31/07/2025 20:11	13	<0.5	-	3
NM1	31/07/2025 23:18	13	<0.5	-	8
NM1	04/08/2025 20:56	16	<0.5	-	7
NM1	04/08/2025 22:00	16	<0.5	-	3
NM1	06/08/2025 19:50	14	<0.5	-	0
NM1	06/08/2025 23:18	10	<0.5	-	0
NM2	31/07/2025 20:39	11	<0.5	-	3
NM2	31/07/2025 22:51	12	<0.5	-	8
NM2	04/08/2025 20:07	17	<0.5	-	6
NM2	04/08/2025 22:49	13	<0.5	-	3
NM2	06/08/2025 20:34	8	<0.5	-	0
NM2	06/08/2025 22:51	11	<0.5	-	0
NM3	31/07/2025 21:00	11	1.1	211	3
NM3	31/07/2025 22:30	10	<0.5	-	7
NM3	04/08/2025 19:44	19	<0.5	-	6
NM3	04/08/2025 23:12	12	0.6	150	2
NM3	06/08/2025 20:55	9	<0.5	-	0
NM3	06/08/2025 22:30	11	<0.5	-	0
NM4	31/07/2025 21:44	11	<0.5	-	3
NM4	31/07/2025 22:00	11	0.7	276	5
NM4	04/08/2025 19:12	16	1.1	120	4
NM4	04/08/2025 23:43	15	<0.5	-	2
NM4	06/08/2025 21:25	13	0.7	239	1

Location	Start date and time	Temperature °C	Wind speed m/s	Wind Direction °Magnetic North [1]	Cloud cover 1/8s
NM4	06/08/2025 22:00	10	1	239	1
NM5	31/07/2025 19:50	12	0.8	194	3
NM5	31/07/2025 23:38	14	<0.5	-	8
NM5	04/08/2025 20:34	16	0.5	170	6
NM5	04/08/2025 22:22	14	<0.5	-	3
NM5	06/08/2025 20:10	12	<0.5	-	0
NM5	06/08/2025 23:37	11	<0.5	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq}.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

There were no modifying factors applicable during the surveys.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS.

Table 4.3 Monitoring results

Location	Start date and time	Wind [1]		Limits, dB[2]		Site levels, dB		Exceedances, dB[2]	
		Speed m/s	Direction	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	31/07/2025 20:11	2.9	233	48	NA	<25	<25	Nil	NA
NM1	31/07/2025 23:18	1.5	249	41	52	<25	<25	Nil	Nil
NM1	04/08/2025 20:56	0.8	232	48	NA	IA	IA	Nil	NA
NM1	04/08/2025 22:00	0.6	232	41	52	IA	IA	Nil	Nil
NM1	06/08/2025 19:50	0.8	240	48	NA	<25	35	Nil	NA
NM1	06/08/2025 23:18	2	251	41	52	<25	<25	Nil	Nil
NM2	31/07/2025 20:39	3.8	225	45	NA	<25	<25	Nil	NA
NM2	31/07/2025 22:51	2.4	251	43	53	<25	<25	Nil	Nil
NM2	04/08/2025 20:07	1.7	312	45	NA	IA	IA	Nil	NA
NM2	04/08/2025 22:49	0.8	277	43	53	<25	<25	Nil	Nil
NM2	06/08/2025 20:34	1	230	45	NA	34	38	Nil	NA
NM2	06/08/2025 22:51	0.9	261	43	53	31	35	Nil	Nil
NM3	31/07/2025 21:00	3	235	43	NA	<25	33	Nil	NA
NM3	31/07/2025 22:30	2	251	38	52	26	31	Nil	Nil
NM3	04/08/2025 19:44	0.9	231	43	NA	IA	IA	Nil	NA
NM3	04/08/2025 23:12	0.8	238	38	52	<20	<20	Nil	Nil
NM3	06/08/2025 20:55	0.8	271	43	NA	32	38	Nil	NA
NM3	06/08/2025 22:30	0.7	260	38	52	32	37	Nil	Nil

Location	Start date and time	Wind [1]		Limits, dB[2]		Site levels, dB		Exceedances, dB[2]	
		Speed m/s	Direction	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM4	31/07/2025 21:44	2.8	241	35	NA	IA	IA	Nil	NA
NM4	31/07/2025 22:00	2.3	251	35	52	IA	IA	Nil	Nil
NM4	04/08/2025 19:12	0.6	234	35	NA	IA	IA	Nil	NA
NM4	04/08/2025 23:43	0.9	237	35	52	IA	IA	Nil	Nil
NM4	06/08/2025 21:25	0.5	244	35	NA	IA	IA	Nil	NA
NM4	06/08/2025 22:00	1	221	35	52	IA	IA	Nil	Nil
NM5	31/07/2025 19:50	2.3	233	42	NA	IA	IA	Nil	NA
NM5	31/07/2025 23:38	1.1	252	38	52	IA	IA	Nil	Nil
NM5	04/08/2025 20:34	1.6	307	42	NA	IA	IA	Nil	NA
NM5	04/08/2025 22:22	0.6	231	38	52	IA	IA	Nil	Nil
NM5	06/08/2025 20:10	1	229	42	NA	IA	IA	Nil	NA
NM5	06/08/2025 23:37	2.2	245	38	52	IA	IA	Nil	Nil

Notes: 1. Degrees magnetic north, "-" indicates calm conditions.

2. "NA" denotes noise limit not applicable during this period.

5 Summary

EMM was engaged by Snowy Hydro Limited to conduct a monthly noise survey of construction noise at HPP. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the evening and night periods of 31 July, 4 August, and 6 August 2025 at five monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the July and August surveys.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
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

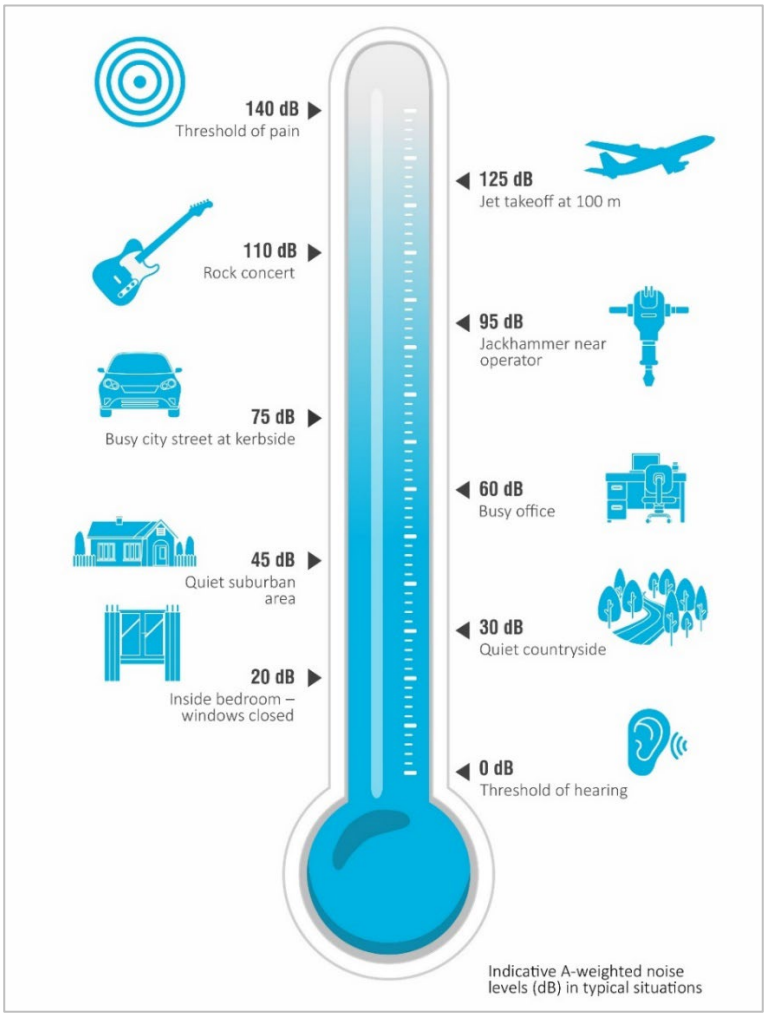

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Project approval

NOISE

Noise Limit Conditions

B21. Operational noise generated at the premises must not exceed the noise limits at the times and locations in Table 5 below (or alternative limits as permitted by the applicable EPL).

Table 5: *Noise Limits*

Location	Noise Limits in dB(A)			
	Day	Evening	Night	Night
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	L_{AFmax}
103 Bishops Bridge Rd, Sawyers Gully	50	48	41	52
10 Dawes Ave, Loxford	45	45	43	53
20 Bowditch Ave, Loxford	43	43	38	52
464 Cessnock Rd, Gillieston Heights	40	35	35	52
59 Sawyers Gully Rd, Sawyers Gully	42	42	38	52

B22. The noise limits set out in condition B21 apply under the meteorological conditions described in Table 6.

Table 6: *Meteorological Conditions*

Assessment Period	Meteorological Conditions
Day	Stability Categories A, B, C and D with wind speeds up to and including 3 m/s at 10 m above ground level.
Evening	Stability Categories A, B, C and D with wind speeds up to and including 3 m/s at 10 m above ground level.
Night	Stability Categories A, B, C and D with wind speeds up to and including 3 m/s at 10 m above ground level; or Stability category E and F with wind speeds up to and including 2 m/s at 10 m above ground level.

B23. For those meteorological conditions not referred to in condition B22, the noise limits that apply are the noise limits in condition B21 plus 5 dB(A).

B24. For the purposes of condition B22, the meteorological conditions are to be determined from meteorological data obtained from the meteorological weather station (point to be established) and the stability category shall be determined using the sigma-theta data method (section D1.4) from Fact Sheet D of the *Noise Policy for Industry* (NSW EPA, 2017), or latest version.

B25. For the purpose of determining the noise generated from the premises, the modifying factor corrections in Table C1 in Fact Sheet C of the *Noise Policy for Industry* (NSW EPA, 2017), or latest version, must be applied, if appropriate, to the noise measurements by the noise monitoring equipment.

Meteorological Monitoring

B26. Prior to the commencement of the installation of the gas turbines, unless otherwise agreed by the Secretary, the Proponent must ensure there is a suitable meteorological weather station operating located on the premises or at a location approved by the EPA that:

(a) complies with the NSW EPA's *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* (or latest version);
(b) is capable of continuous real-time measurement of wind speed, wind direction, sigma theta, air temperature, rainfall and relative humidity; and
(c) is capable of measuring meteorological conditions in accordance with the *Noise Policy for Industry* (EPA 2017 or latest version).

Noise Monitoring

B27. Within six months of full operation post commissioning attended noise validation monitoring must be undertaken during a period of full load and must:

(a) occur at each receiver location listed in condition B21;
(b) occur annually in a reporting period;
(c) occur during day, evening and night period as defined in the *Noise Policy for Industry* (or latest version) over two 15- minute compliance measurements during each period;
(d) occur for three consecutive operating days.

B28. On completion of post commissioning attended noise validation monitoring required in condition B27, that shows compliance with conditions B21 and B23, ongoing attended noise monitoring must be undertaken to the satisfaction of the EPA.

Noise Monitoring Report

B29. A noise compliance assessment report must be submitted to the EPA and the Secretary within 30 days (or an alternative timeframe agreed by the Secretary) of the completion of the post commissioning validation monitoring and any annual monitoring. The assessment must be prepared by a qualified person and include:

(a) an assessment of compliance with noise limits presented in conditions B21 and B23; and

(b) an outline of any management actions taken within the monitoring period to address any exceedances of the limits contained in conditions B21 and B23.

B.2 Environmental protection licence

L4 Noise limits

L4.1 Operational noise generated at the premises must not exceed the noise limits (expressed in dB) at the times and locations in the table below.

Location	Day LAeq (15min)	Evening LAeq (15min)	Night LAeq (15min)	Night LAFmax
103 Bishops Bridge Rd, Sawyers Gully	50	48	41	52
10 Dawes Ave, Loxford	45	45	43	53
20 Bowditch Ave, Loxford	43	43	38	52
464 Cessnock Rd, Gillieston Heights	40	35	35	52
59 Sawyers Gully Rd, Sawyers Gully	42	42	38	52

L4.2 For the purposes of Condition L4.1:
a) Day means the period from 7am to 6pm Monday to Saturday, and the period from 8am to 6pm Sundays and Public Holidays;
b) Evening means the period from 6pm to 10pm; and
c) Night means the period from 10pm to 7am Monday to Saturday, and the period from 10pm to 8am Sundays and Public Holidays.

L4.3 Noise-enhancing meteorological conditions:
a) The noise limits set out in licence condition L4.1 apply under the meteorological conditions in the following table.
b) For those meteorological conditions not referred to in the table below, the noise limits that apply are the noise limits in licence condition L4.1 plus 5dB.

Assessment Period	Meteorological Condition
Day	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.
Evening	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.
Night	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level; or Stability category E and F with wind speeds up to and including 2m/s at 10m above ground level.

L4.4 For the purposes of licence condition L4.3:
a) The meteorological conditions are to be determined from meteorological data obtained from the licensed Point 4.
b) Stability category shall be determined using the following method from Fact Sheet D of the *Noise Policy for Industry* (NSW EPA, 2017):
i) Use of sigma-theta data (section D1.4).

L4.5 To assess compliance:
a) with the $L_{Aeq(15\ minutes)}$ or the L_{Amax} noise limits in licence condition L4.1 and L4.3, the noise measurement equipment must be located:
(i) approximately on the property boundary, where any residence is situated 30 metres or less from the property boundary closest to the premises; or where applicable,
(ii) in an area within 30 metres of a residence façade, but not closer that 3 metres where any residence on the property is situated more than 30 metres from the property boundary closest to the premises; or where

applicable,
(iii) in an area within 50 metres of the boundary of a National Park or Nature Reserve,
(iv) at any other location identified in licence condition L4.1.

b) with the $L_{Aeq(15\ minutes)}$ or the L_{Amax} noise limits in licence condition L4.1 and L4.3, the noise measurement equipment must be located:
(i) at the reasonably most affect point at a location where there is no residence at the location; or
(ii) at the reasonably most affected point within at area at a location prescribed by licence condition L4.5(a).

L4.6 A non-compliance of licence conditions L4.1 and L4.3 will still occur where noise generated from the premises is measured in excess of the noise limit at a point other than the reasonably most affected point at locations referred to in licence condition L4.5(a) or L4.5(b).

L4.7 For the purposes for licence conditions L4.5 and L4.6, the reasonably most affected point is a point at a location or within an area at a location experiencing or expected to experience the highest sound pressure level from the premises.

L4.8 For the purpose of determining the noise generated from the premises, the modifying factor corrections in Table C1 in Fact Sheet C of the *Noise Policy for Industry* (NSW EPA, 2017) may be applied, if appropriate, to the noise measurement by the noise monitoring equipment.

L4.9 Noise measurements must not be undertaken where rain or wind speed at microphone level will affect the acquisition of valid measurements.

L4.10 For the purposes of the licence:

- Noise Policy for Industry means the document entitled "*Noise Policy for Industry*" published by the NSW Environment Protection Authority in October 2017.
- Noise – 'sound pressure levels' for the purposes of conditions L4.1 to L4.8 includes:
- LAeq (15 minute), meaning the value of the A-weighted sound pressure level of a continuous steady sound that, over a 15 minute time interval, has the same mean square sound pressure level as a sound under consideration with a level that varies with time (Australian Standard AS 1055:2018 *Acoustics: description and measurement of environmental noise*).
- LAFmax, meaning the maximum sound pressure level of an event measured with a sound level meter satisfying Australian Standard AS IEC 61672.1-2013 *Electroacoustics - Sound level meters - Part 1: Specifications* set to 'A' frequency weighting and fast time weighting.

L4.11 Construction noise generated at the premises must not exceed the noise limits (expressed in dB) at the times and locations in the table below.

Location	Day (Inside Standard Hours) LAeq (15min)	Day (Outside Standard Hours) LAeq (15min)	Evening LAeq (15min)	Night LAeq (15min)
103 Bishops Bridge Rd, Sawyers Gully	55	50	50	41
10 Dawes Ave, Loxford	50	45	45	43
20 Bowditch Ave, Loxford	48	43	43	42
464 Cessnock Rd, Gillieston Heights	45	40	35	35
59 Sawyers Gully Rd, Sawyers Gully	47	42	42	40

L4.12 For the purpose of Condition L4.11:
a) Day (Inside Standard Hours) means the period from 7:00 am - 6:00 pm Monday to Friday, the period from 8:00 am - 1:00 pm Saturday, and does not include any period on Sunday or public holidays;
b) Day (Outside Standard Hours) means any period from 7:00 am - 6:00 pm that are not included in part a;
c) Evening means the period from 6:00 pm - 10:00 pm; and
d) Night means the period from 10:00 pm - 7:00 am.

B.3 Noise management plan

4.3 Construction noise objectives

4.3.1 Noise management levels

The ICNG provides guidance for assessing noise from construction activities in NSW. It establishes NMLs for recommended standard construction hours and for outside of the recommended standard hours. Construction is considered to have the potential to cause a noise impact if the predicted noise exceeds the applicable noise management level. Table 4-3 lists ICNG guidance for establishing construction NMLs at residential receivers.

Table 4-3 ICNG guidance for establishing construction NMLs at residential receivers

Time of day	Management level $L_{Aeq(15min)}$	How to apply
Recommended standard hours (SH): Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected: Rating Background Level (RBL) + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15\ min)}$ is greater than the noise affected level, Snowy Hydro (Proponent) should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected: 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours (OOH) - All other times including public holidays	Noise affected: RBL + 5 dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Considering the adopted Rating Background Levels (RBLs) presented in the Revised Noise Impact Assessment in Appendix G of the *Hunter Power Project Response to Submissions Report* (Jacobs, 2021b), and reproduced in Section 2, the Noise Management Levels (NMLs) for the identified surrounding residential receivers grouped into NCAs are presented in Table 4-4.

Table 4-4 Construction noise management levels (residential receivers)

NCA	NML $L_{eq\ 15\ min}$ dB(A)			
	Day (during standard hours) 7:00 am – 6:00 pm Weekdays, 8:00 am – 1:00 pm Saturdays	Day (outside standard hours) 7:00 am – 6:00 pm Outside of Standard Hours	Evening 6:00pm-10:00pm	Night 10:00pm-7:00am
NCA 1	55	50	50	41
NCA 2	50	45	45*	43
NCA 3	48	43	43*	42
NCA 4	45**	40**	35**	35**
NCA 5	47	42	42*	40

Criteria reduced so Evening criteria is not higher than Day OoH criteria.

4.3.2 Sleep disturbance

For projects where night construction (and operations) occur, the potential for noise levels to lead to sleep disturbance should be considered. Section 4.3 of the ICNG discusses the method for assessing and managing sleep disturbance. This guidance references further information in the Road Noise Policy that discusses criteria for the assessment of sleep disturbance.

Refer to Section 6.5 which outlines the Out of Hours Work Protocol for assessing noise impacts, and may be required if night works are required.

Where noise levels from a construction (or industrial) source at a residential receptor at night exceeds the following, a maximum noise level event assessment should be undertaken:

- $L_{Aeq,15min}$ 40 dB(A) or the RBL + 5 dB(A), whichever is greater, and/or
- L_{AMax} 52 dB(A) or the RBL +15 dB(A), whichever is greater.

Based on this guidance, Table 4-6 and Table 4-7 present the sleep disturbance screening criterion for the noise catchment areas surrounding the Project.

Table 4-6 $L_{Aeq,15min}$ Sleep disturbance criterion

Noise Catchment Area	Night RBL (L_{A90} dB(A))	RBL + 5 dB(A)	Indicative $L_{Aeq,15min}$ Sleep disturbance criterion	Selected $L_{Aeq,15min}$ Sleep disturbance criterion
NCA 1	36	41	40	41
NCA 2	38	43		43
NCA 3	37	42		42
NCA 4	30	35		40
NCA 5	35	40		40

Table 4-7 L_{AMax} Sleep disturbance criterion

Noise Catchment Area	Night RBL (L_{A90} dB(A))	RBL + 15 dB(A)	Indicative L_{AMax} Sleep disturbance criterion	Selected L_{AMax} Sleep disturbance criterion
NCA 1	36	51	52	52
NCA 2	38	53		53
NCA 3	37	52		52
NCA 4	30	45		52
NCA 5	35	50		52

Appendix C
Calibration certificates

EMM
creating opportunities

C.1 Calibration certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

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

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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%.

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Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
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www.acu-vib.com.au

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

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C54254

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model:	Svantek SV 36	**Serial No:**	154613
Class:	1		
Owner:	EMM Consulting The Forum, Level 10/201 Pacific Hwy St Leonards NSW 2065		
Tests Performed:	Measured Output Pressure level, Frequency & Distortion		
Comments:	See Details and Class Tolerance overleaf.		

CONDITION OF TEST:

Ambient Pressure	1011	hPa ±1 hPa	**Date of Receipt :**	13/06/2025
Temperature	21	°C ±1° C	**Date of Calibration :**	16/06/2025
Relative Humidity	41	% ±5%	**Date of Issue :**	16/06/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: A. Nowosadzka **AUTHORISED SIGNATURE:** H. Soe

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Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C50817

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 138014
Class: 1
Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	05/08/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	07/08/2024
Relative Humidity	41	% ±5%	**Date of Issue :**	07/08/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

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

Hein Soe

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NATA

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300512

CALIBRATION OF:

Filter:	Bruel & Kjaer	2250	No: 3008201
Preamplifier:	Bruel & Kjaer	ZC-0032	No: 16037
Software version:	BZ7223	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting
Suite 01, 20 Chandos Street
St Leonards NSW 1590

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C		
Environment conditions:	Air temperature:	23.6 °C	± 3°C
	Air pressure:	100.4 kPa	± 3 kPa
	Relative Humidity:	44.9 %RH	± 20 %RH

SPECIFICATIONS:

The Filter Bruel & Kjaer 2250 has been calibrated in accordance with the requirements as specified in IEC 61260-1:2014 class 1. Procedures from IEC 61260-3:2016 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) by using procedure 2250-REAR 1/1 Octave (IEC61260:2016)

RESULTS:

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

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

Date of Calibration: 14/08/2023

Sajeeb Tharayil
Calibration Technician

Certificate issued: 15/08/2023

Craig Robert Patrick
Approved signatory

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