

Hunter Power Project

Environmental Noise Monitoring

Prepared for Snowy Hydro

December 2024

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Snowy Hydro

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December 2024

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Snowy Hydro to conduct a monthly noise survey of construction noise 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 18 December 2024 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 Rd, Loxford NSW 2326	356579	6370464
NM2	10 Dawes Ave, Loxford NSW 2326	358109	6370268
NM3	22 Bowditch Ave, Loxford NSW 2326	359228	6370812
NM4	464 Cessnock Rd, Gillieston Heights NSW 2321	361930	6372907
NM5	59 Sawyers Gully Rd, Sawyers Gully NSW 2326	356117	6370129

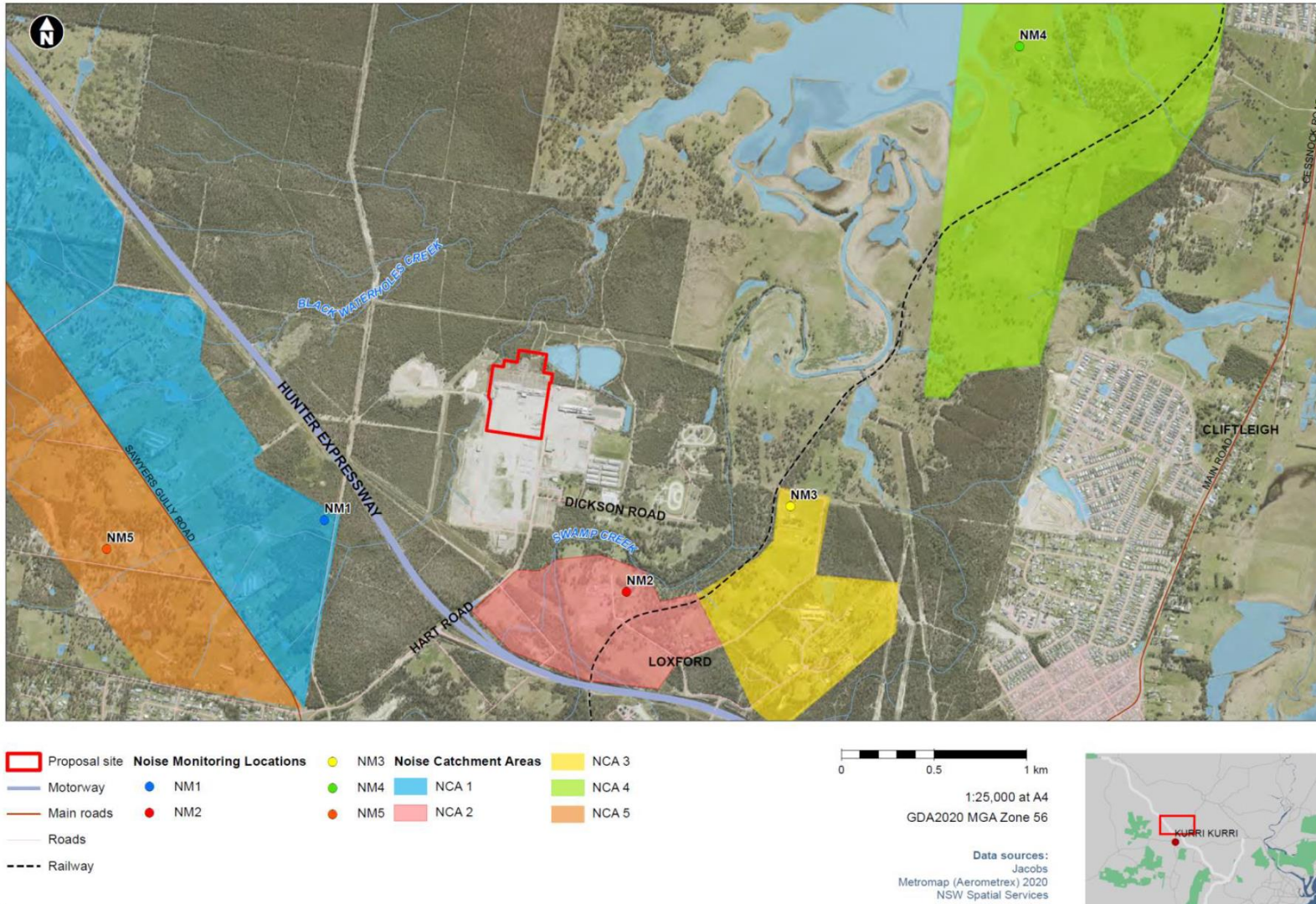


Figure 1.1 Attended noise monitoring locations

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.
LA1,1minute	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
LA10	The A-weighted noise level which is exceeded for 10% of the time.
LAeq	The energy average A-weighted noise level.
LA50	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
LA90	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.
LCeq	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 Environment Protection Authority (EPA) and most recently revised on 27 September 2024. 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

Construction noise limits based on the project approval, licence and CNVMP are provided in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day (standard hours) ¹ L _{Aeq,15minute}	Day (outside standard hours) ¹ L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute}	Night L _{Amax}
NM1	55	50	50	41	52
NM2	50	45	45	43	53
NM3	48	43	43	42	52
NM4	45	40	35	35	52
NM5	47	42	42	40	52

Notes: 1. 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. Day (Outside Standard Hours) means any period from 7:00 am–6:00 pm that are not included in inside standard hours. Evening means the period from 6:00 pm–10:00 pm. Night means the period from 10:00 pm–7:00 am.

2.5 Additional requirements

Monitoring and reporting have been done 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 done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW requirements. Due to the site meteorological station not working, meteorological data for this survey was obtained from the Cessnock airport 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 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 Cessnock AWS which allowed correlation of atmospheric parameters with measured noise levels. This data was obtained in 5-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	12 July 2025	IEC 61672-1:2002
Svantek SV36 calibrator	154613	05 June 2025	IEC 60942:2003

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 – December 2024 ¹

Location	Start date and time	L _{Amax}	L _{A1}	L _{A10}	L _{Aeq}	L _{A50}	L _{A90}	L _{Amin}
NM1	18/12/2024 21:23	56	44	42	40	40	38	36
NM2	18/12/2024 20:53	61	50	46	44	43	41	39
NM3	18/12/2024 20:31	64	56	46	44	40	39	37
NM4	18/12/2024 20:00	76	70	66	63	60	52	44
NM5	18/12/2024 21:44	77	70	59	57	51	42	39
NM1	18/12/2024 22:20	54	47	42	41	40	38	36
NM2	18/12/2024 22:47	57	49	45	43	42	40	36
NM3	18/12/2024 23:09	61	45	42	40	39	36	34
NM4	18/12/2024 23:41	73	66	59	55	44	34	30
NM5	18/12/2024 22:01	69	60	55	51	48	41	39

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 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – December 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic North ¹	Cloud cover 1/8s
NM1	18/12/2024 21:23	21	1.2	181	6
NM2	18/12/2024 20:53	19	<0.5	-	1
NM3	18/12/2024 20:31	20	1.3	185	1
NM4	18/12/2024 20:00	19	1.1	141	2
NM5	18/12/2024 21:44	19	0.5	153	4
NM1	18/12/2024 22:20	18	1.1	203	0
NM2	18/12/2024 22:47	19	<0.5	-	2
NM3	18/12/2024 23:09	18	<0.5	-	8

Table 4.2 **Measured atmospheric conditions – December 2024**

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic North ¹	Cloud cover 1/8s
NM4	18/12/2024 23:41	18	0.8	178	8
NM5	18/12/2024 22:01	19	0.5	211	0

Notes: 1. “-” indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Monitoring results

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

Table 4.3 Monitoring results – December 2024

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	18/12/2024 21:23	1.5	165	50	NA	IA	IA	Nil	NA
NM2	18/12/2024 20:53	2.6	171	45	NA	IA	IA	Nil	NA
NM3	18/12/2024 20:31	3.6	162	43	NA	IA	IA	Nil	NA
NM4	18/12/2024 20:00	4.6	162	35	NA	IA	IA	Nil	NA
NM5	18/12/2024 21:44	1.5	173	42	NA	IA	IA	Nil	NA
NM1	18/12/2024 22:20	1.5	166	41	52	IA	IA	Nil	Nil
NM2	18/12/2024 22:47	1.5	227	43	53	IA	IA	Nil	Nil
NM3	18/12/2024 23:09	0.0	-	42	52	IA	IA	Nil	Nil
NM4	18/12/2024 23:41	1.0	186	35	52	IA	IA	Nil	Nil
NM5	18/12/2024 22:01	1.5	179	40	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 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 18 December 2024 at five monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the December 2024 survey.

Appendix A

Noise perception and examples

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

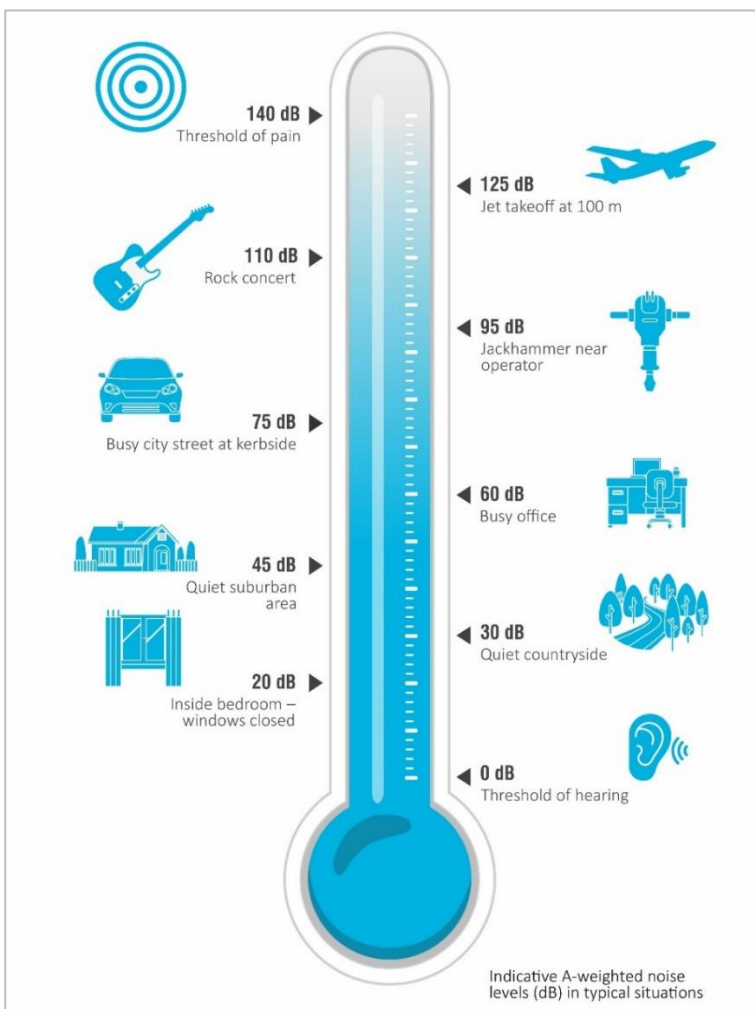


Figure A.1 Common noise levels

Appendix B

Regulator documents

B.1 Project approval

Hours of Construction

B30. All construction work at the premises must be conducted between 7 am and 6 pm Monday to Friday and between 8 am and 1 pm Saturdays and at no time on Sundays and public holidays.

Exceptions to Construction Hours

B31. The following activities may be carried out outside the recommended construction hours:

- (a) construction that causes $L_{Aeq}(15\text{minute})$ noise levels that are:
 - (i) no more than 5 dB above Rating Background Level at any residence in accordance with the *Interim Construction Noise Guideline* (DECC, 2009); and
 - (ii) no more than the Noise Management Levels specified in Table 3 of the *Interim Construction Noise Guideline* (DECC, 2009) at other sensitive land uses; or
- (b) for the delivery of materials required by the police or other authorities for safety reasons; or
- (c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or
- (d) as approved through the process outlined in condition B32 of this approval.

Variation of Construction Hours

B32. The hours of construction activities specified under condition B30 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction shall be:

- (a) considered on a case-by-case or activity-specific basis;
- (b) accompanied by details of the nature and justification for activities to be conducted during the varied construction hours;
- (c) accompanied by written evidence that appropriate consultation with potentially affected sensitive receivers and notification of relevant Council(s) (and other relevant agencies) has been and will be undertaken;
- (d) all feasible and reasonable noise mitigation measures have been put in place; and
- (e) accompanied by a noise impact assessment consistent with the requirements of the *Interim Construction Noise Guideline* (DECCW, 2009), or latest version.

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:
- Day means the period from 7am to 6pm Monday to Saturday, and the period from 8am to 6pm Sundays and Public Holidays;
 - Evening means the period from 6pm to 10pm; and
 - 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:
- The noise limits set out in licence condition L4.1 apply under the meteorological conditions in the following table.
 - 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:
- The meteorological conditions are to be determined from meteorological data obtained from the licensed Point 4.
 - Stability category shall be determined using the following method from Fact Sheet D of the *Noise Policy for Industry* (NSW EPA, 2017):
 - Use of sigma-theta data (section D1.4).
- L4.5 To assess compliance:
- with the $L_{Aeq(15\text{ minutes})}$ or the L_{Amax} noise limits in licence condition L4.1 and L4.3, the noise measurement equipment must be located:
 - 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,
 - in an area within 30 metres of a residence façade, but not closer than 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 $L_{Aeq(15\text{ minutes})}$ 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:
- L_{Aeq} (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*).
- L_{Amax} , 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) L_{Aeq} (15min)	Day (Outside Standard Hours) L_{Aeq} (15min)	Evening L_{Aeq} (15min)	Night L_{Aeq} (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 $L_{eq,15min}$ 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

C.1 Calibration certificates



Sound Level Meter
IEC 61672-3:2013
Calibration Certificate
Calibration Number C23471

Client Details	EMM Consulting Ground Floor Suite 01, 20 Chandos Street	
Equipment Tested/ Model Number :	Type 2250	
Instrument Serial Number :	3008201	
Microphone Serial Number :	2888134	
Pre-amplifier Serial Number :	16037	
Firmware Version :	N/A	
Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions	
Ambient Temperature : 23.1 °C	Ambient Temperature : 24.3 °C	
Relative Humidity : 44 %	Relative Humidity : 44.1 %	
Barometric Pressure : 101.6 kPa	Barometric Pressure : 101.3 kPa	
Calibration Technician : Max Moore	Secondary Check: Rhys Gravelle	
Calibration Date : 12 Jul 2023	Report Issue Date : 17 Jul 2023	
Approved Signatory :	Ken Williams	

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.014 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172. Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: **C50057**

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV36 **Serial No:** 154613
Class: 1
Owner: EMM Consulting
Level 4, 20 Chandos Street
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1004 hPa ±1 hPa	Date of Receipt :	05/06/2024
Temperature	23 °C ±1° C	Date of Calibration :	05/06/2024
Relative Humidity	44 % ±5%	Date of Issue :	05/06/2024

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

CHECKED BY:

AUTHORISED SIGNATURE:



Wain Sze

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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