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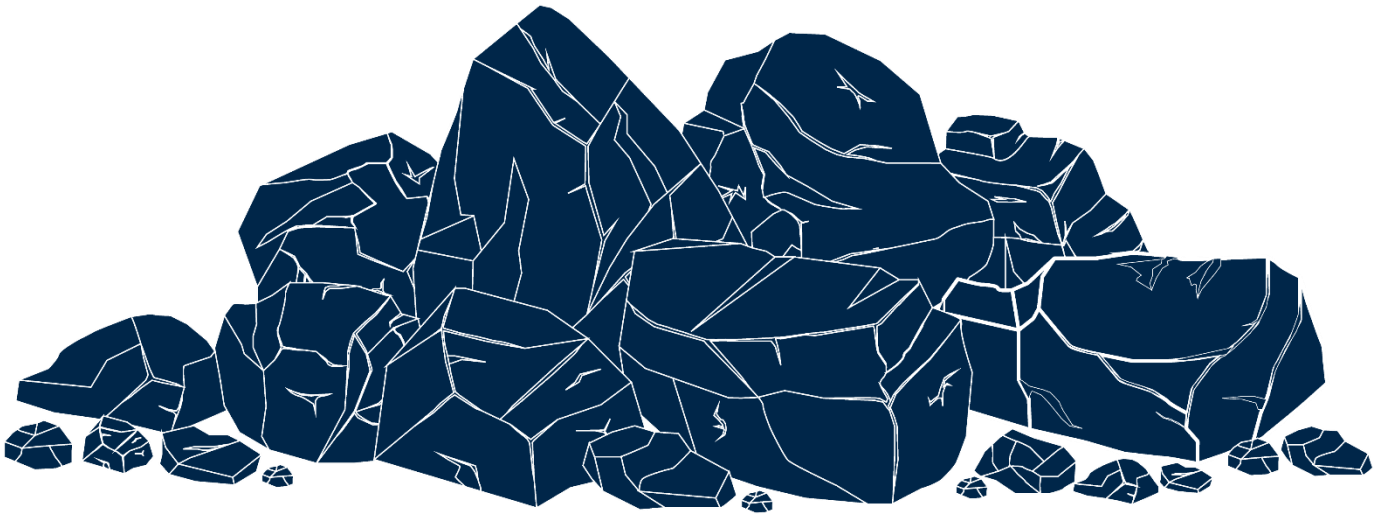
Karuah Hard Rock Quarry

Environmental Monitoring Report

November 2024



Contents

1.0 Introduction

This report has been completed to meet the requirements of Section 66(6) of the *Protection of the Environment Operations Act 1997* and the NSW Environmental Protection Authority's (EPA) Requirements for Publishing Pollution Monitoring Data (EPA, 2013). This report summarises the required monitoring data under Environmental Protection Licence 11569 (the EPL) and Development Consent for the Karuah Hard Rock Quarry (the Quarry) as summarised by **Table 1** and **Table 2** respectively.

Table 1 Summary of Environment Protection Licence, EPL 11569

EPL Number:	EPL 11569
Licensee's Name:	Hunter Quarries Pty Ltd
Licensee's Address:	Karuah Hard Rock Quarry PO Box 3284, Thornton NSW 2322 Corner of Andesite Road and The Branch Lane, Karuah NSW 2324.
Link to Full Licence on the EPA website:	EPL 11569

Table 2 Summary of Project Approval, DA 265-10-2004

Project Approval:	DA 265-10-2004
Applicant:	Hunter Quarries Pty Ltd
Consent Authority:	Minister for Infrastructure, Planning and Natural Resources
Link to Full Project Approval on the NSW Planning website:	Development Consent DA 265-10-2004

A summary of the environmental monitoring data for the November 2024 reporting period (the Reporting Period) is covered in this report. Tables throughout this report provide key monitoring information from the EPL and the Consent, including:

- location of monitoring;
- pollutant;
- unit of measurement; and
- monitoring frequency required.

Monitoring locations are illustrated by the site plan provided by **Appendix 1**.

2.0 Air Quality Monitoring

Dust emissions generated by the Quarry operation must not cause additional exceedances of ambient air quality criterion outlined in Schedule 3, Condition 13 of the Consent and summarised by **Table 3**, **Table 4** and **Table 5**.

Deposited dust monitoring is undertaken at the locations listed in **Table 6**, in accordance with the Approved Methods of Sampling and Analysis of Air Pollutants in NSW (EPA, 2022).

Table 3 Long-term Assessment Criteria for Deposited Dust (DA 265-10-2004).

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level[1]	Maximum Total Deposited Dust Level[1]
Deposited Dust	Annual	2 g/m^2/month	4 g/m^2/month

[1] Deposited dust is assessed as insoluble solids as defined by AS 3580.10.1-2003.

Table 4 Long-term Assessment Criteria for Particulate Matter (DA 265-10-2004).

Pollutant	Averaging Period	Criterion
Total Suspended Particulates	Annual	90 µg/m^3
Particulate Matter < 10 µm (PM10)	Annual	30 µg/m^3

Table 5 Short-term Assessment Criteria for Particulate Matter (DA 265-10-2004).

Pollutant	Averaging Period	Criterion
Particulate Matter < 10 µm (PM10)	24-hour	50 µg/m^3

Table 6 Air Quality Monitoring Locations (EPL 11569).

Site Monitoring Point ID	EPL Monitoring Point ID	Location	Address	Coordinates
DDG 1	2	South-West of Karuah Hard Rock Quarry	54 Mill Hill Close, Karuah NSW 2324	32°38’04’’S 151°59’58’’E
DDG 2	3	South-West of Karuah Hard Rock Quarry	64 Mill Hill Close, Karuah NSW 2324	32°38’02’’S 152°00’09’’E
DDG 3	4	South-West of Karuah Hard Rock Quarry	Lot 251 DP1092111, Karuah NSW 2324	32°37’57’’S 151°59’41’’E
DDG 4	5	East of Karuah Hard Rock Quarry	21 Halloran Road, North Arm Cove NSW 2324	32° 37' 30.87"S 152°01'10.18"E

Deposited dust results for the 12-months prior-to and including November 2024 are summarised by **Table 7**.

Table 7 Deposited dust monitoring results.

Reporting Period	Start Date	End Date	Days	DDG 1 EPL ID 2	DDG 2 EPL ID 3	DDG 3 EPL ID 4	DDG 4 EPL ID 5
Dec-23	30/11/2023	28/12/2023	28	1.1	1.0	1.3	1.3
Jan-24	28/12/2024	25/01/2024	28	1.4	1.2	1.0	1.2
Feb-24	25/01/2024	26/02/2024	32	1.1	0.8	1.3	1.3
Mar-24	26/02/2024	28/03/2024	31	0.8	0.9	1.8	0.6
Apr-24	28/03/2024	29/04/2024	32	0.9	0.4	0.5	0.8
May-24	29/04/2024	29/05/2024	30	0.5	0.3	0.2	0.4
Jun-24	29/05/2024	28/06/2024	30	0.7	0.5	0.5	0.7
Jul-24	28/06/2024	30/07/2024	32	1.1	0.8	0.6	0.9
Aug-24	30/07/2024	30/08/2024	31	0.7	0.5	0.7	0.9
Sep-24	30/08/2024	30/09/2024	31	2.2	1.2	1.3	1.2
Oct-24	30/09/2024	31/10/2024	31	1.0	0.7	0.7	5.1*
Nov-24	31/10/2024	29/11/2024	29	1.4	1.1	1.1	1.7
Progressive Annual Average				**1.1**	**0.8**	**0.9**	**1.3**

Monitoring results for the Reporting Period at the four DDG monitoring sites are within the long-term annual deposited dust limit of 4 g/m^2/month.

**Note:* *an anomalous exceedance was recorded at DDG4 during the October 2024 Reporting Period which was subsequently reported to the NSW Department of Planning, Housing & Infrastructure (NSW Planning), the NSW EPA and surrounding landholders in accordance with the relevant conditions of the Consent and EPL.*

3.0 Blast Monitoring

Blast monitoring is undertaken for all blasts at the Quarry at the nearest residential location to ensure that air blast overpressure and ground vibration remain within the compliance limits, as summarised by **Table 8**; with the monitoring results summarised by **Table 9**.

There were no blasts undertaken during the Reporting Period.

Table 8 Blasting Airblast Overpressure and Ground Vibration Criteria (DA 265-10-2004 & EPL 11569).

Location	Airblast Overpressure (dB(L))	Ground Vibration (mm/s)	Allowable Exceedance
Private Residence B	120	10	0%
	115	5	5% over 12-month reporting period.

Table 9 Blasting Monitoring Results.

Date	Time	Location	Airblast Overpressure (dB(L))	Ground Vibration (mm/s)
–	–	–	–	–

***Not triggered = n/t**
Ground Vibration < 0.5 mm/s
Overpressure < 108 dB(L)

4.0 Noise Monitoring

Noise monitoring is undertaken in accordance with the EPL and NSW Planning approved Environmental Monitoring Program, which requires attended and unattended noise monitoring to be conducted on a 6-monthly basis.

During the Reporting Period, attended noise monitoring was completed on Monday, 25 November 2024 at the two monitoring locations during the daytime monitoring period; whilst unattended monitoring occurred from Tuesday, 19 November 2024 to Monday, 25 November 2024.

The noise monitoring results were within compliance limits for the H2 2024 monitoring round as outlined by the Noise Monitoring Report provided in **Appendix 2**.

5.0 Surface Water Monitoring

Water monitoring is undertaken in accordance with the EPL and NSW Planning approved Site Water Management Plan, with daily monitoring of surface water being discharged from the Quarry via the licenced discharge point in accordance with Condition L2 and M2 of the EPL.

No discharge events occurred during the Reporting Period, as summarised by **Table 10**.

Table 10 Discharge Water Monitoring Results.

Date	Oil and Grease	pH	Total Suspended Solids, TSS (mg/L)	Nitrogen (total) (mg/L)	Phosphorus (total) (mg/L)	Discharge Type
LDP 1 – Sediment Dam 2						
-	-	-	-	-	-	-

6.0 Weather Station Monitoring

The Quarry operates and maintains a permanent meteorological monitoring station to record weather parameters including temperature, wind speed and direction, solar radiation and rainfall. **Figure 1** below outlines the weather records for the Reporting Period.

Monthly Weather Summary

Site: **Karuah Quarry Complex**
Month: **November 2024**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain[2]
		Max[1] °C	Min[2] °C	Ave[1] °C	Max[1] °C	Min[2] °C	Ave[1] °C	Max Gust[1] km/h	Ave Speed[1] km/h	Dir Ave[1] deg	Max[1] W/m²	Ave[1] W/m²	mm
1	Fri	31.8	16.3	22.7	29.2	16.5	22.0	39.0	5.4	136.0	1090.0	255.8	0.0
2	Sat	24.5	13.7	18.4	21.7	14.6	18.1	31.9	5.6	119.9	1126.6	160.1	0.4
3	Sun	26.2	15.1	20.3	23.4	16.2	19.9	30.8	6.2	190.8	1198.2	230.2	0.4
4	Mon	32.6	20.5	25.0	31.4	21.5	25.1	21.3	3.7	182.9	887.5	196.4	0.0
5	Tue	28.3	18.8	21.6	27.7	19.0	21.2	29.6	4.9	132.5	737.5	101.0	0.8
6	Wed	23.1	17.4	20.1	21.5	17.9	19.6	29.6	5.6	127.1	560.8	120.3	0.0
7	Thu	33.4	19.6	24.3	31.5	20.5	24.0	43.8	4.2	169.8	1099.2	242.5	0.0
8	Fri	39.3	16.6	24.4	37.1	16.8	23.9	49.7	4.6	209.6	1016.7	215.2	16.8
9	Sat	30.3	13.8	21.2	29.3	14.5	20.9	28.4	4.7	179.3	1032.4	295.3	0.0
10	Sun	28.0	16.6	22.2	25.4	17.2	21.6	27.2	5.3	169.2	1069.9	240.6	0.0
11	Mon	29.1	18.0	21.6	25.6	18.0	20.9	33.1	6.1	140.3	1156.7	192.5	1.8
12	Tue	24.6	17.9	19.8	22.6	17.5	19.4	21.3	2.8	150.9	1019.9	93.9	13.8
13	Wed	22.8	17.0	18.8	21.5	17.0	18.5	17.8	2.3	166.0	576.6	101.3	2.2
14	Thu	26.6	13.9	19.1	24.1	14.6	18.8	26.0	3.6	191.2	1216.7	157.9	4.2
15	Fri	25.7	18.0	21.1	23.1	18.0	20.4	27.2	6.9	107.9	1231.5	187.9	0.0
16	Sat	21.8	17.9	19.7	21.1	18.1	19.5	18.9	4.1	127.9	507.4	68.2	5.8
17	Sun	25.5	17.7	21.5	24.3	18.6	21.3	27.2	5.3	176.1	1141.6	189.5	1.2
18	Mon	30.6	18.3	23.9	29.1	18.6	23.6	50.9	5.1	213.3	1049.2	215.9	3.8
19	Tue	24.2	15.6	18.8	22.2	16.1	18.6	16.6	2.9	138.3	970.8	115.9	3.4
20	Wed	24.2	13.4	18.7	21.7	14.1	18.3	31.9	5.0	111.3	1269.2	227.5	0.0
21	Thu	25.7	12.0	18.8	22.9	12.7	18.4	31.9	5.1	136.7	1269.0	267.6	0.0
22	Fri	25.6	12.6	19.0	23.1	13.5	18.6	35.5	4.9	138.0	1137.4	250.5	0.0
23	Sat	28.7	13.5	21.8	26.6	14.6	21.3	29.6	5.6	148.0	1100.0	293.6	0.0
24	Sun	31.7	13.9	22.4	28.6	14.7	21.8	26.0	5.1	146.9	955.0	312.1	0.0
25	Mon	33.6	17.2	24.2	31.0	17.9	23.4	28.4	6.2	184.5	961.6	296.7	0.0
26	Tue	32.4	18.5	24.5	29.6	19.1	23.7	28.4	5.9	176.5	1004.1	296.6	0.0
27	Wed	35.8	19.7	27.1	33.2	20.4	26.3	29.6	5.4	152.9	923.3	301.7	0.0
28	Thu	37.2	21.6	27.8	34.1	22.2	27.4	28.4	4.4	155.0	1037.5	237.1	0.0
29	Fri	28.7	20.5	23.7	27.3	20.9	23.5	13.0	2.2	147.5	399.9	71.7	0.2
30	Sat	26.3	20.8	22.3	24.1	20.8	21.9	16.6	3.3	122.8	645.8	83.6	1.6
Ave or Total		**28.6**	**16.9**	**21.8**	**26.5**	**17.4**	**21.4**	**29.0**	**4.7**	**155.0**	**979.7**	**200.6**	**56.4**
High		**39.3**	**21.6**	**27.8**	**37.1**	**22.2**	**27.4**	**50.9**	**6.9**		**1269.2**	**312.1**	**16.8**
Low		**21.8**	**12.0**	**18.4**	**21.1**	**12.7**	**18.1**	**13.0**	**2.2**		**399.9**	**68.2**	
												No. rain days >1mm:	**10**

Notes: 1. Values are for the 24 hour period from 9am to 9am next day.
2. Values are for the 24 hours to 9am.

Figure 1 Weather Records Summary.

7.0 Production Data

Monthly monitoring of sales and truck movements are summarised by **Table 11**.

Table 11 Quarry Production Data.

Month	Truck Movements	Quarry Product Sales (t)
Jan-24	1,537	50,963
Feb-24	2,247	73,874
Mar-24	1,419	46,529
Apr-24	1,076	35,168
May-24	419	13,584
Jun-24	511	17,217
Jul-24	629	19,502
Aug-24	497	14,401
Sep-24	504	16,140
Oct-24	494	16,648
Nov-24	413	12,490

8.0 Reporting

8.1 Reportable Environmental Incidents

During the Reporting Period, no reportable environmental incidents occurred at the Quarry.

8.2 Reportable Non-Compliances

During the Reporting Period, no reportable non-compliances were identified at the Quarry.

8.3 Community Complaints

During the Reporting Period, no community complaints were reported to the Quarry.

Appendix 1 – EPL 11569 Monitoring Locations

Karuah Hard Rock Quarry

Environmental Monitoring Report

APPENDIX 1 - Environmental Monitoring Locations

Appendix 2 – H2 2024 Noise Monitoring Report

Karuah Quarry

Biannual Attended Noise Monitoring - Semester 2 2024

Prepared for Hunter Quarries Pty Limited

November 2024

Karuah Quarry

Biannual Attended Noise Monitoring - Semester 2 2024

Hunter Quarries Pty Limited

E240073 RP6

November 2024

Version	Date	Prepared by	Reviewed by	Comments
1	29 November 2024	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant
29 November 2024

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Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at Karuah Quarry (KQ, the site) located at Blue Rock Close, Karuah 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 day period on Monday 25 November 2024 at two monitoring locations, required by the environmental monitoring program (EMP). It is of note that the site currently operates during the day period only and as such, noise monitoring during the evening and nigh-time periods is not required.

1.2 Attended monitoring locations

The 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 descriptor/ID	Description/address near-by	Coordinates (MGA56)	
		Easting	Northing
NM1	Private Residence - 74 Mill Hill Close, Karuah	406623	6388704
NM2	Private Residence - 64 Mill Hill Close, Karuah	406405	6388859

KEY

- Site boundary
- A Noise monitoring location
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Waterbody
- NPWS reserve
- State forest

Source: EMM (2021); ADW Johnson (2020); DFSI (2017); ICSM (2012); GA (2011); ASGC (2006)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Noise monitoring locations

Karuah Quarry
Bi-annual noise monitoring
Figure 3.1

EMM
creating opportunities

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 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent 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 Development consent

Karuah Quarry noise limits are detailed in Condition 1 of Schedule 3 of Development Consent (DC) DA 265-10-2004. Relevant sections of DA 265-10-2004 are reproduced in Appendix B.

2.2 Environment protection licence

There are no noise limits detailed in the site's Environment Protection Licence (EPL) 11569.

2.3 Environmental monitoring program

The approved EMP adopts two attended noise monitoring locations that are representative of residences outlined in DA 265-10-2004. Relevant sections of the EMP are reproduced in Appendix B.2.

2.4 Noise limits

Noise impact limits based on the development consent are provided in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	All other times $L_{Aeq,15minute}$
NM1	48	47	46
NM2	48	47	46

Notes: 1. Day: 7:00 am–6:00 pm Monday to Saturday; 8:00 am–6:00 pm Sundays and public holidays; Evening: 6:00 pm–10:00 pm; Night: All other times: 10:00 pm–7:00 am Monday to Saturday; 10:00 pm–8:00 am Sundays and public holidays.

2.5 Meteorological conditions

PA 09_0175 specifies that noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017.

The EPA requirements in Condition L4.3 of EPL 20611 state that noise limits do not apply under the following meteorological conditions:

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

2.6 Additional requirements

Monitoring and reporting have been done in accordance with the NSW EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

2.7 Very noise-enhancing meteorological conditions

In accordance with the approved methods, noise monitoring for the site is scheduled to occur during forecasted meteorological conditions where noise limits in Table 2.1 will be applicable. However, in cases where actual meteorological conditions do not align with forecasts and noise limits are subsequently not directly applicable, it is the expectation of regulators that noise impact still be managed.

The NPfI states that:

> Noise limits derived for consents and licences will apply under the meteorological conditions used in the environmental assessment process, that is, standard or noise-enhancing meteorological conditions. For 'very noise-enhancing meteorological conditions' … a limit is set based on the limit derived under standard or noise-enhancing conditions (whichever is adopted in the assessment) plus 5 dB. In this way a development is subject to noise limits under all meteorological conditions.

Therefore, if monthly noise monitoring occurs during meteorological conditions outside of those specified in Section 2.5, site limits will be adjusted based on Table 2.1 plus 5 dB.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done as guided by Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data 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 day period 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 $L_{Aeq,15minute}$ were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

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

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 NM in this report were due to one or more of the following:

- Site noise levels were extremely low and unlikely, in many cases, to be noticed
- Site noise levels were masked by other more dominant noise 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.

3.3 Unattended noise monitoring

The unattended noise monitoring was carried out using two Acoustic Research Labs (ARL) Ngara unattended noise loggers. These environmental noise loggers were in place from Tuesday 19 to Monday 25 November 2024.

Calibration of instrumentation was checked prior to and following measurements. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates (refer Appendix C).

Data affected by adverse meteorological conditions and by spurious or uncharacteristic events has been excluded from the results in accordance with methodologies provided in the NPfI.

3.4 Meteorological data

Meteorological data for the monitoring period was sourced from the Karuah Quarry on-site meteorological station to determine applicability of criteria in accordance with the DC.

3.5 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} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels 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.

3.6 Instrumentation

Attended noise monitoring was conducted by Lucas Adamson. Qualifications, experience, and/or demonstration of competence is in accordance with the Approved methods and supportive documentation is available upon request.

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

Table 3.1 Noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær 2250 sound level meter	2759405	20/12/2024	IEC 61672-1:2013
Svantek SV-36 calibrator	79952	9/10/2025	IEC 60942:2017
ARL EL316 unattended noise logger	16207005	11/04/2025	IEC 61672-3:2013
ARL Ngara unattended noise logger	878125	3/11/2025	IEC 61672-3:2013

4 Results

4.1 Attended noise monitoring

4.1.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the noise sources responsible for these measured levels is provided in Section 5.1 of this report.

Table 4.1 Total measured 15-minute noise levels (attended) – Semester 2 2024[1]

Location	Start date and time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
NM2	25/11/2024 8:02	75	73	70	69	68	67	64
NM1	25/11/2024 8:23	64	56	53	51	51	48	46

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 – Semester 2 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north [1]	Cloud cover 1/8s
NM2	25/11/2024 8:02	21.1	<0.5	-	1
NM1	25/11/2024 8:23	22.3	<0.5	-	1

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

4.1.2 Site only noise levels

i Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

ii 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. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – Semester 2 2024

Location	Start Date and Time	Wind		Stability Class	Standard limits apply? [1]	Limits, dB	Site levels, dB	Exceedances, dB [1]
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	$L_{Aeq,15minute}$ [2]	$L_{Aeq,15minute}$
NM2	25/11/2024 8:02	1.8	311	A	Y	48	IA	Nil
NM1	25/11/2024 8:23	1.2	321	A	Y	48	IA	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. NA in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4.2 Unattended noise monitoring

Overall noise levels measured at each location during unattended measurements are provided in Table 4.4. Discussion as to the noise sources responsible for these measured levels is provided in Section 5.2 of this report.

Table 4.4 Total measured noise levels (unattended) – Semester 2 2024[1]

Location	Period	Measured noise levels, dB	
		RBL	$L_{Aeq,period}$
NM1 19-25 November 2024	Day	48	55
	Evening	49	54
	Night	45	53
NM2 19-25 November 2024	Day	58	72
	Evening	51	64
	Night	43	62

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

5 Discussion

5.1 Attended noise monitoring

5.1.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for each location and provided in this section. Statistical 1/3 octave-band analysis of environmental noise was undertaken and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs, insects and birds are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

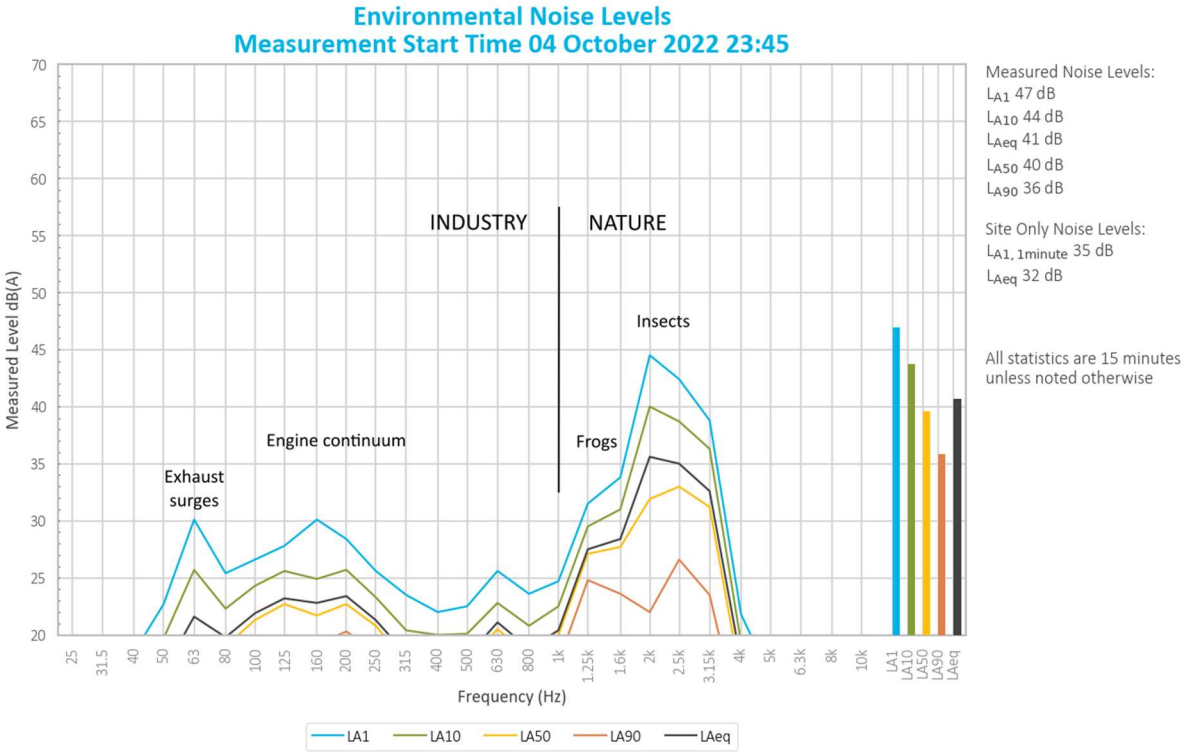

Figure 5.1 Example graph

5.1.2 NM1

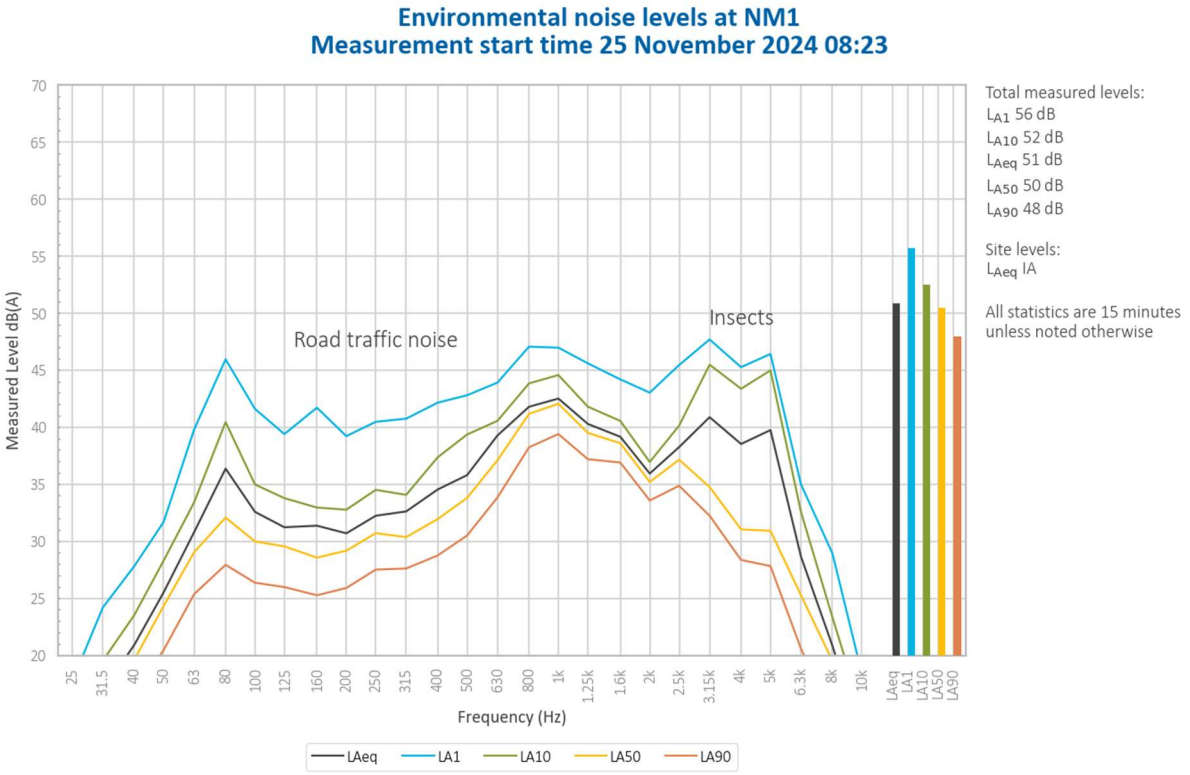

Figure 5.2 Environmental Noise Levels – NM1

Karuah Quarry operations were inaudible during the entire measurement.

Insects and road traffic noise dominated total measured noise levels.

Noise from birds was also noted.

5.1.3 NM2

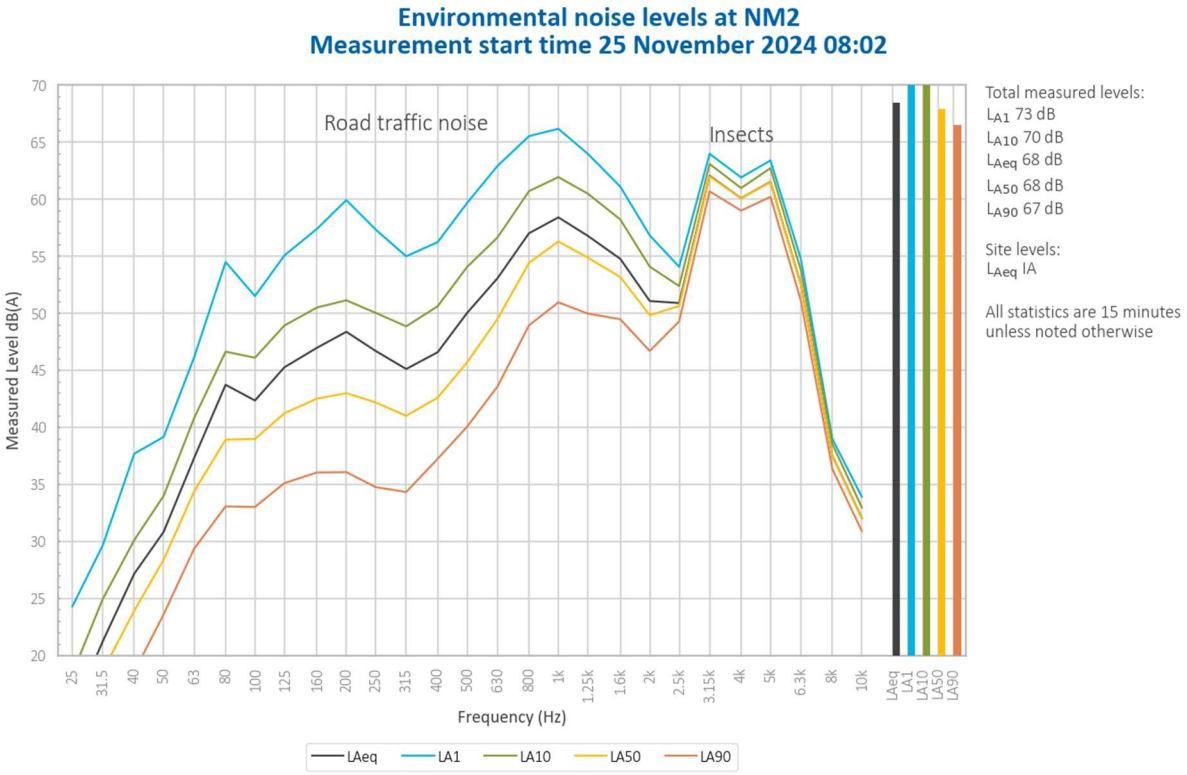

Figure 5.3 Environmental Noise Levels – NM2

Karuah Quarry operations were inaudible during the entire measurement.

Insects and road traffic noise dominated total measured noise levels.

Noise from birds was also noted.

5.2 Unattended noise monitoring

Observations during the operator attended measurements indicate that the dominant source of noise at both unattended noise monitoring locations is road traffic noise from the Pacific Highway (particularly during peak traffic periods), with insects, birds and dogs barking also noted to be audible.

Notwithstanding, a review of the unattended noise monitoring data has found no correlation between recorded noise levels and events associated with Karuah Quarry operations. Without an operator present to discern the noise sources contributing to the measured noise levels, it is difficult to establish any meaningful conclusions or trends from the unattended noise monitoring data.

6 Summary

EMM was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at the site surrounds. 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 day period on Monday 25 November 2024 at two monitoring locations, as required by the EMP.

Noise levels from site complied with relevant limits at all monitoring locations during the Semester 2 2024 survey.

A review of the unattended noise monitoring data found that no meaningful conclusions, events or trends could be associated with Karuah Quarry operations.

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

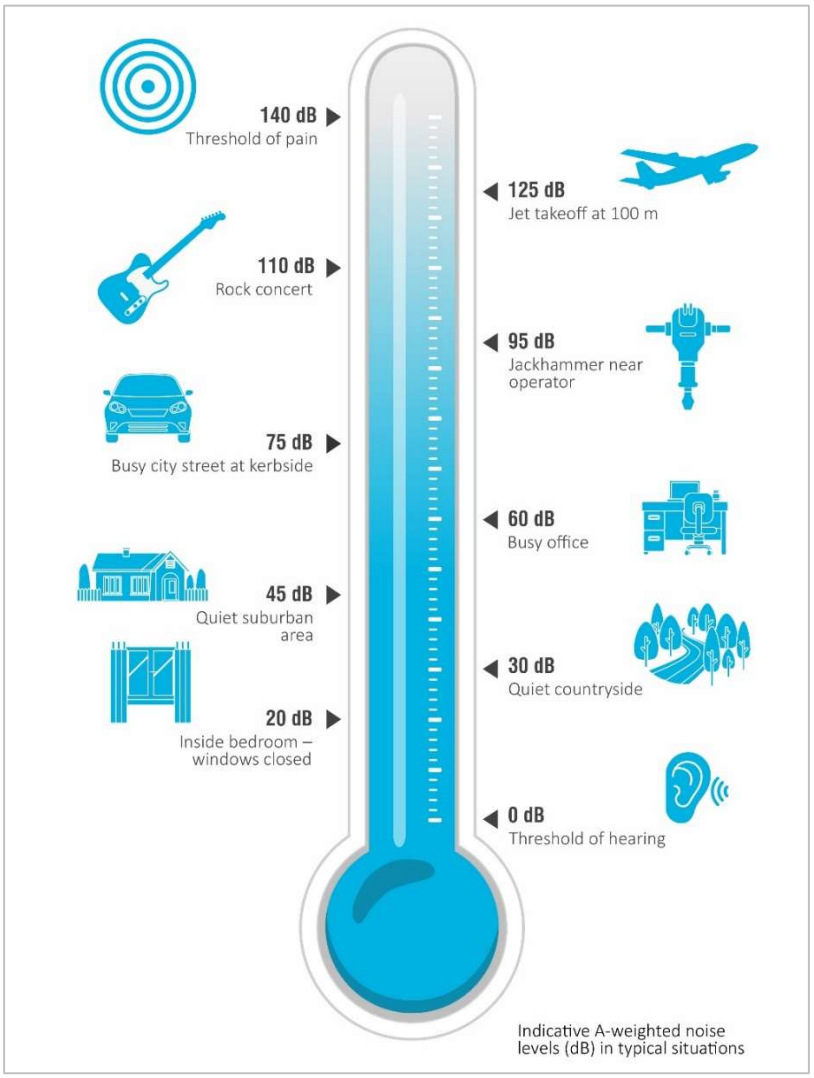

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development Consent

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

[1]NOISE

Noise Impact Assessment Criteria

1. The Applicant shall ensure that the noise generated by the development does not exceed the criteria specified in Table 2 at any residence or noise sensitive receptor on privately owned land.

Time Period	Noise Limits dB(A)
	$L_{Aeq\ (15minute)}$
Day (7am to 6pm) Monday to Friday and 7am to 1pm Saturday	48
Evening (6pm to 10pm) Monday to Friday	47
At all other times	46

Table 2: Noise Impact Assessment Criteria for the Development

Notes:

- *Noise from the site is to be measured within thirty meters of any residence or other noise sensitive areas to determine compliance with the noise criteria set out in Table 2.*
- *$LA_{eq(15\ minute)}$ is the equivalent continuous noise level - the level of noise equivalent to the energy average of noise levels occurring over a measurement period.*
- *For the purpose of noise measures required for this condition, the LA_{eq} noise level must be measured or computed at the point defined in this condition over a period of 15 minutes using "FAST" response on the sound level meter.*
- *For the purpose of the noise criteria for this condition, 5dBA must be added to the measured level if the noise is substantially tonal or impulsive in character. The location or point of impact can be different for each development, for example, at the closest residential receiver or at the closest boundary of the development. Measurement locations can be:*
  - *a) 1 meter from the facade of the residence for night time assessment;*
  - *b) at the residential boundary;*
  - *c) 30 meters from the residence (rural situations) where boundary is more than 30 meters from residence.*
- *The noise emission limits identified in this condition apply for prevailing meteorological conditions (winds up to 3m/s), except under conditions of temperature inversions. Noise impacts that may be enhanced by temperature inversions must be addressed by:*
  - *a) documenting noise complaints received to identify any higher level of impacts or patterns of temperature inversions;*
  - *b) where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts under temperature inversions conditions should be developed and implemented.*

Operating Hours

2. The Applicant shall comply with the operating hours in Table 1:

Activity	Days of the Week	Time
• Construction	Monday – Friday	7am to 6pm
• Extraction and processing	Saturday	7am to 1pm
• Internal and off-site transportation of product	Sunday and public holidays	No work at any time
Minor maintenance works on plant and machinery	7 days a week and public holidays	7am to 6pm

Table 1: Operating Hours for the Development

Note: Delivery of material outside of the hours of operation permitted by condition 2 is only allowed, where that delivery is required by the police or other authorities for safety reasons; and/or where the operation or personnel or equipment are endangered. In such circumstances, prior notification should be provided to the DEC and affected residents as soon as possible, or within a reasonable period in the case of emergency.

Noise Monitoring

3. Within 6 months of the date of this consent, the Applicant shall prepare and implement a Noise Monitoring Program for the development to evaluate compliance with the noise impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.

[1] Incorporates DEC GTAs

B.2 Environmental monitoring program

area will be used to calculate the volume of water discharged. Samples will be taken during the discharge of water from the site.

The results of the water quality monitoring program for the quarry shall be reported as per **Section 6.0** of this *Environmental Monitoring Program*.

5.4 Noise and Blast Monitoring

5.4.1 Operational Noise

Schedule 2 Condition 1 of the Development Consent requires HQPL to ensure noise generated by the development does not exceed the criteria specified in **Table 6** below at any residence, or any noise sensitive receptor on privately owned land.

Table 6: Noise Impact Assessment Criteria for the Development

Time Period	Noise Limits dB(A) $L_{Aeq\ (15\ min)}$
Day (7am to 6pm) Mon to Fri and 7am to 1pm Saturday	48
Evening (6pm to 10pm) Monday to Friday	47
At all other times	46

In order to measure the possible impact of noise resulting from quarry operations, the following monitoring will be undertaken at the two (2) nearest residences downwind and/or in line-of sight from the quarry and not owned or under agreement with HQPL:

- An unattended (continuous 24hr) noise monitor will be placed in the field to measure noise for at least four (4) full days of monitoring each six months;
- An attended survey (15-minutes meeting EPA standards) will be undertaken at the two nearest residences on a six monthly basis. This survey will be undertaken in conjunction with the unattended survey described above;
- A suitably qualified noise consultant will be engaged to undertake 15-minute attended noise surveys to investigate any complaints received by HQPL; and
- Onsite logged climatic data (particularly winds) will be utilised to assist with a timely management response to any noise issue that may arise. This is further discussed in Section 5.5.

During attended surveys, where the noise from operations is measured to be greater than approved criteria, a review of operational activities causing exceedances shall be undertaken and, where considered appropriate, the offending activity will cease until such times as the meteorological conditions improve (i.e. inversion lift) or other appropriate controls can be employed. In addition, the frequency of noise monitoring may be increased as appropriate, or until such time that it can be demonstrated that noise levels are well below required limits. Noise monitoring is completed by a trained external environmental consultancy.

5.4.2 Monitoring of Operational Blasting (Vibration and Overpressure)

In accordance with the Development Consent, blasts will only occur between 9am and 3pm Monday to Friday inclusive, once a week or at other times as approved by the OEH. In addition, blasting will only be undertaken in favourable weather conditions and by accredited specialist blasting contractors. Data from the site weather station will be checked prior to blasting. HQPL usually schedules blasts at 12:00pm on the day of blasting.

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C51438

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 79952
Class: 1
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
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 :**	02/10/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	09/10/2024
Relative Humidity	42	% ±5%	**Date of Issue :**	09/10/2024

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

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%.

Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
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www.acu-vib.com.au

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

Sydney Calibration Laboratory
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

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

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
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) and test procedure 2250-4189.

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:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil

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www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23804

Client Details	EMM Consulting Ground Floor, Suite 01, 20 Chandos Street St Leonards NSW 2065
Equipment Tested/ Model Number :	ARL Ngara
Instrument Serial Number :	878125
Microphone Serial Number :	320652
Pre-amplifier Serial Number :	28213
Firmware Version :	12.6

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	25 °C	**Ambient Temperature :**	25.1 °C
Relative Humidity :	42.1 %	**Relative Humidity :**	42.1 %
Barometric Pressure :	100.56 kPa	**Barometric Pressure :**	100.53 kPa

Calibration Technician : Shaheen Boaz
Secondary Check: Dhanush Bonu
Calibration Date : 3 Nov 2023
Report Issue Date : 6 Nov 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	*N/A*
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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

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*	*±0.11 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.

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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
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Sound Level Meter
AS 1259-1:1990 - AS 1259-2:1990
Calibration Certificate

Calibration Number C23153

Client Details EMM Consulting
Ground Floor, Suite 01, 20 Chandos Street
St Leonards NSW 2065

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-207-005
Microphone Serial Number : 322776
Pre-amplifier Serial Number : 28435

Atmospheric Conditions
Ambient Temperature : 25.1°C
Relative Humidity : 43.1%
Barometric Pressure : 99.97kPa

Calibration Technician : Shaheen Boaz
Secondary Check: Rhys Gravelle
Calibration Date : 11 Apr 2023
Report Issue Date : 13 Apr 2023

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	*Pass*	10.3.4: Inherent system noise level	*Pass*
10.2.3: Frequency weighting	*Pass*	10.4.2: Time weighting characteristic F and S	*Pass*
10.3.2: Overload indications	*Pass*	10.4.3: Time weighting characteristic I	*Pass*
10.3.3: Accuracy of level range control	*Pass*	10.4.5: R.M.S performance	*Pass*
8.9: Detector-indicator linearity	*Pass*	9.3.2: Time averaging	*Pass*
8.10: Differential level linearity	*Pass*	9.3.5: Overload indication	*Pass*

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.14dB*	*Temperature*	*±0.1°C*
12.5kHz	*±0.17dB*	*Relative Humidity*	*±1.9%*
16kHz	*±0.25dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.1dB*		

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

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.

NATA WORLD RECOGNISED ACCREDITATION

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.

Australia

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Newcastle NSW 2300
T 02 4907 4800

BRISBANE
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Spring Hill QLD 4000
T 07 3648 1200

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Canberra City ACT 2601

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