



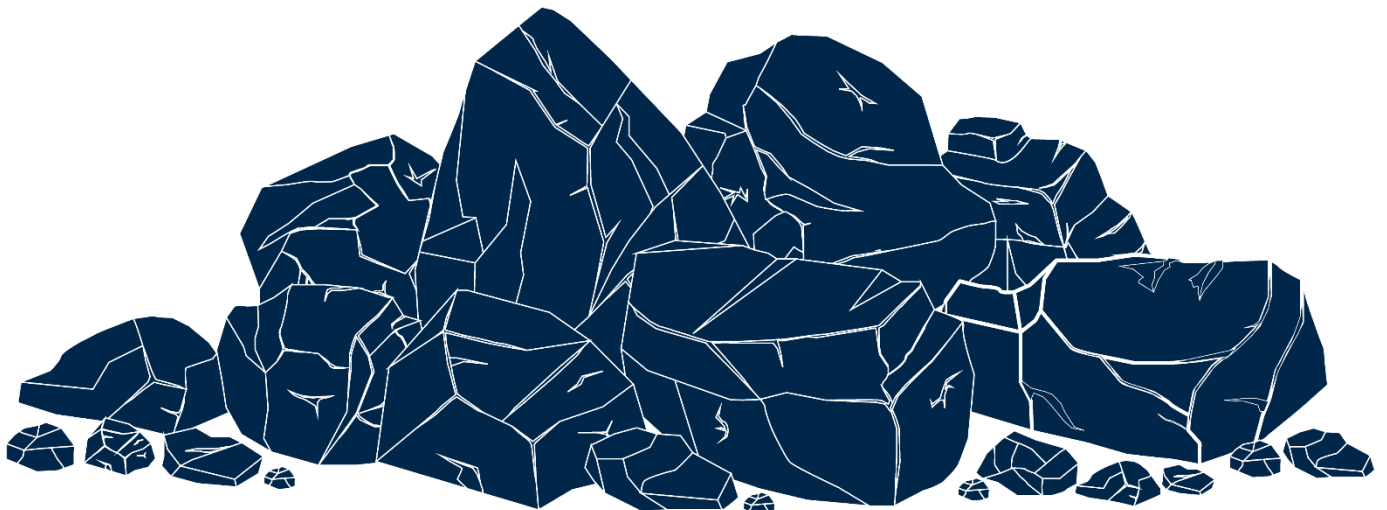
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Karuah East Quarry

Environmental Monitoring Report

March 2026



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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 20611 (the EPL) and Project Approval MP09_0175 (the Consent) for the Karuah East Quarry (the Quarry) as summarised by **Table 1** and **Table 2** respectively.

Table 1 Summary of Environment Protection Licence, EPL 20611

EPL Number:	EPL 20611
Licensee’s Name:	Karuah East Quarry Pty Limited
Licensee’s Address:	Karuah East Quarry PO Box 3284, Thornton NSW 2322 Blue Rock Close, Karuah NSW 2324
Link to Full Licence on the EPA website:	EPL 20611

Table 2 Summary of Project Approval, MP09_0175

Project Approval:	MP09_0175
Applicant:	Karuah East Quarry Pty Limited
Consent Authority:	NSW Planning Assessment Commission
Link to Full Project Approval on the NSW Planning website:	Project Approval MP09_0175

A summary of the environmental monitoring data for the March 2026 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 and TSP/PM10 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 (MP09-0175).

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 (MP09-0175).

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 (MP09-0175).

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

Table 6 Air Quality Monitoring Locations (EPL 20611).

Site Monitoring Point ID	EPL Monitoring Point ID	Location	Address
DDG 1	12	South-West of Karuah East Quarry	54 Mill Hill Close, Karuah NSW 2324
DDG 2	13	South-West of Karuah East Quarry	64 Mill Hill Close, Karuah NSW 2324
DDG 3	14	South-West of Karuah East Quarry	Lot 251 DP1092111, Karuah NSW 2324
DDG 4	15	East of Karuah East Quarry	21 Halloran Road, North Arm Cove NSW 2324
DDG 5*	16	South-West of Karuah East Quarry	Lot 21 DP1024341, Karuah NSW 2324
HVAS	9	South-West of Karuah East Quarry	64 Mill Hill Close, Karuah NSW 2324

NOTE: * DDG 5 discontinued monitoring from August 2025 due to deletion from the EPL following acquisition of Lot 11 DP1024564 from Wedgerock Pty Ltd.

2.1 Deposited Dust Monitoring

Deposited dust results for the 12-months prior-to and including March 2026 are summarised by **Table 7**. Monitoring results for the Reporting Period at all five DDG monitoring sites are within the long-term annual deposited dust limit of 4 g/m²/month.

Table 7 *Deposited dust monitoring results.*

Reporting Period	Start Date	End Date	Days	DDG 1 EPL ID 12	DDG 2 EPL ID 13	DDG 3 EPL ID 14	DDG 4 (EPL ID 7) EPL ID 15	DDG 5 ¹ (EPL ID 8) EPL ID 16
Apr-25	03/04/2025	05/05/2025	32	1.2	3.2	0.4	(1.0)	1.1
May-25	05/05/2025	03/06/2025	29	2.0	3.9	0.2	(0.3)	0.6
Jun-25	03/06/2025	01/07/2025	28	2.9	1.0	0.6	0.4	2.1
Jul-25	01/07/2025	01/08/2025	31	10.1 ²	0.5	0.4	0.2	0.9
Aug-25	01/08/2025	01/09/2025	31	0.9	2.3	0.5	0.8	–
Sep-25	01/09/2025	01/10/2025	30	1.7	1.3	1.0	0.7	–
Oct-25	01/10/2025	31/10/2025	30	1.1	1.7	1.7	1.2	–
Nov-25	31/10/2025	02/12/2025	32	1.0	2.5	2.1	1.1	–
Dec-25	02/12/2025	02/01/2026	31	1.8	1.6	1.3	1.5	–
Jan-26	02/01/2026	30/01/2026	28	1.1	1.2	0.9	0.5	–
Feb-26	30/01/2026	27/02/2026	28	0.8	1.2	1.1	1.4	–
Mar-26	27/02/2026	31/03/2026	32	1.2	7.7 ³	0.8	4.6 ³	–
Progressive Annual Average				2.1	1.4	1.0	0.9	–

Notes:

1. *DDG 5 discontinued monitoring from August 2025 due to deletion from the EPL following acquisition of Lot 11 DP1024564 from Wedgerock Pty Ltd.*
2. *Recorded anomalous exceedance at DDG 1 in July 2025 which was 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. *Recorded exceedances at DDG 1 and DDG 4 in March 2026 which was reported to NSW Planning, the NSW EPA and surrounding landholders in accordance with relevant conditions of the Consent and EPL. The exceedances are considered unlikely to be directly attributable to quarry operations given strong easterly winds during the monitoring period placed DDG 4 upwind of the site, whilst the result at DDG 1 was not repeated at the two neighbouring monitoring locations indicating a localised dust source.*

2.2 High Volume Air Sampling

TSP and PM10 results for the Reporting Period are summarised by **Table 8** and illustrated respectively by **Figure 1** and **Figure 2**.

Monitoring results for the five HVAS run days within the Reporting Period were compliant with the long-term criteria for TSP and PM10, and short-term criteria for PM10.

Table 8 *HVAS TSP and PM10 monitoring results for the Reporting Period.*

Run Date	Total Suspended Particulates, TSP ($\mu\text{g}/\text{m}^3$)	Particulate Matter < 10 μm , PM10 ($\mu\text{g}/\text{m}^3$)
02/03/2026	50	18
08/03/2026	15	10
14/03/2026	20	10
20/03/2026	18	12
26/03/2026	25	14

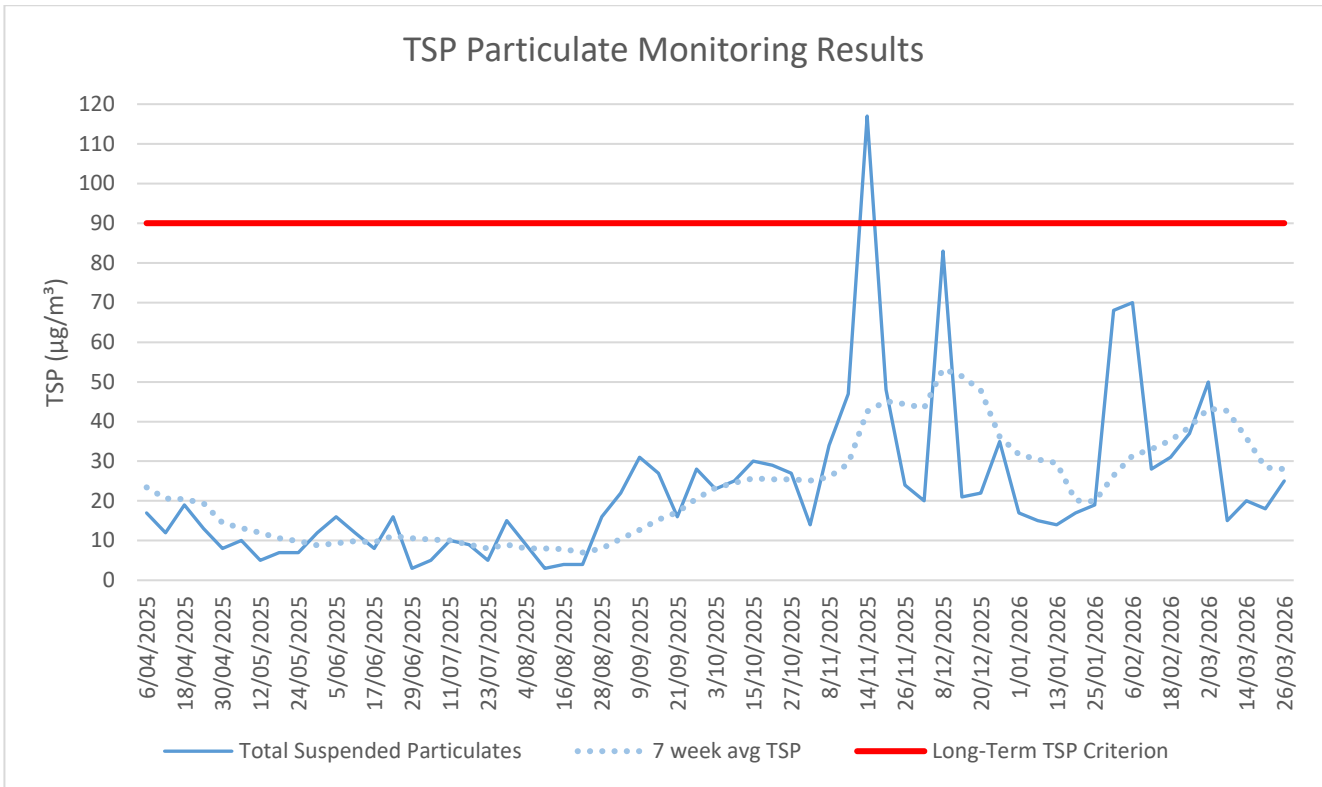


Figure 1 Long-term TSP monitoring trends.

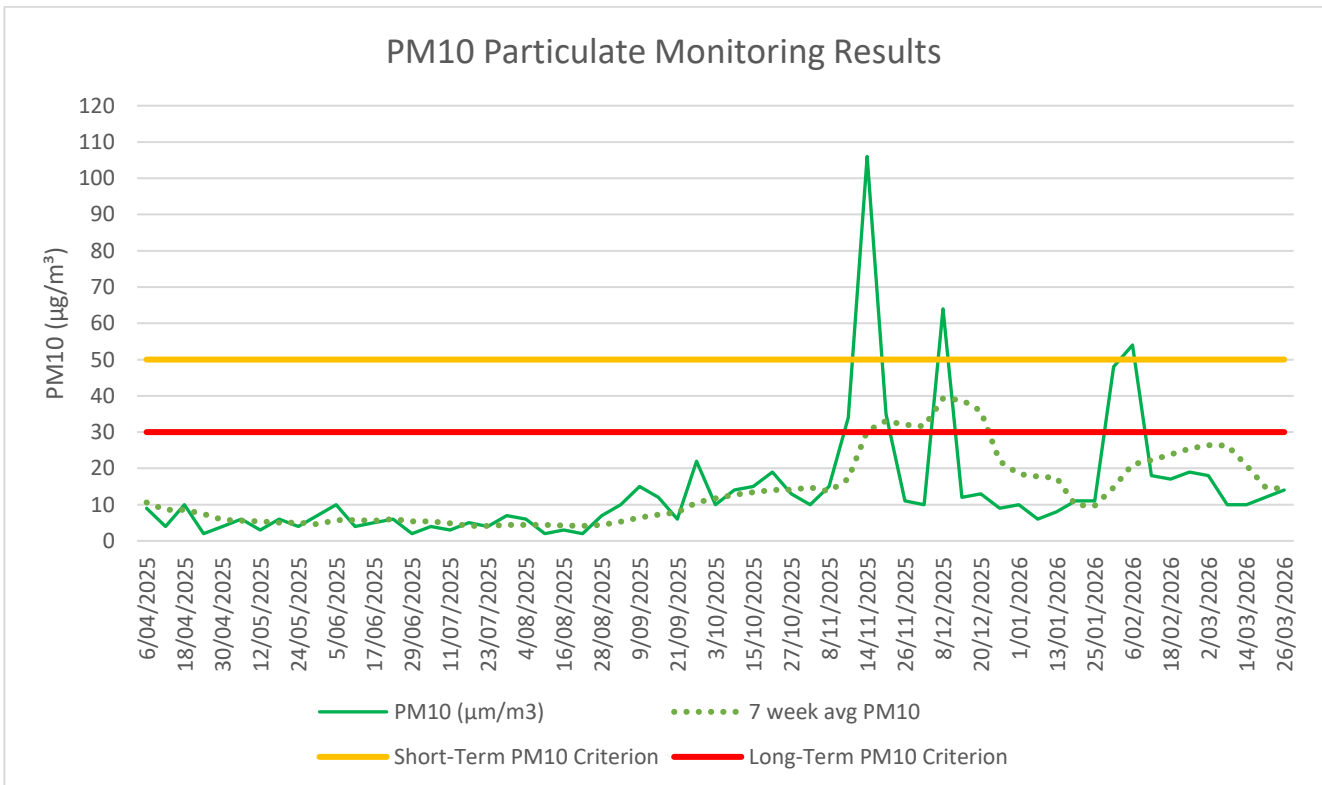


Figure 2 Long-term PM10 monitoring trends.

3.0 Blast Monitoring

Blast monitoring is undertaken for all blasts at the Quarry at the nearest residential location (EPL Monitoring Point 11) to ensure that air blast overpressure and ground vibration remain within the compliance limits, as summarised by **Table 9**; with the monitoring results summarised by **Table 10**.

There were two blasts undertaken during the Reporting Period, which were observed to be within compliance limits.

Table 9 Blasting Airblast Overpressure and Ground Vibration Criteria (MP09-0175 & EPL 20611).

Location	Airblast Overpressure (dB(L))	Ground Vibration (mm/s)	Allowable Exceedance
Private Residence B	120	10	0%
EPL Monitoring Point ID 11	115	5	5% over 12-month reporting period.

Table 10 Blasting Monitoring Results.

Date	Time	Location	Airblast Overpressure (dB(L))	Ground Vibration (mm/s)
9/03/2026	11:35	RL 90	n/t	n/t
24/03/2026	12:34	RL 120 + 128	n/t	n/t

*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 Noise Management Plan, which requires attended noise monitoring to be conducted on a quarterly basis.

During the Reporting Period, attended noise monitoring was conducted at the five monitoring locations on Thursday, 05 March 2026 during the morning, day and evening monitoring periods.

The noise monitoring results were within the compliance limits for the Q1 2026 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 Water Management Plan, with daily monitoring of surface water being discharged from the Quarry via the licenced discharge points in accordance with Condition L2 and M2 of the EPL.

There were three discharge events spread across seven days during the Reporting Period are summarised by **Table 11**.

Table 11 Discharge Water Monitoring Results.

Date	pH	Turbidity (NTU)	Total Suspended Solids, TSS (mg/L)	Oil and Grease	Discharge Type
LDP 1 – Dam 1					
-	-	-	-	-	-
LDP 2 – Dam 2					
02/03/2026	7.5	34	23	Not Visible	Controlled
20/03/2026	6.7	50	14	Not Visible	Controlled
21/03/2026	7.3	16	13	Not Visible	Controlled
23/03/2026	7.3	16	12	Not Visible	Controlled
LDP 3 – Dam 3					
10/03/2026	7.3	5.8	8	Not Visible	Controlled
19/03/2026	7.4	7.3	10	Not Visible	Controlled
21/03/2026	7.1	11	6	Not Visible	Controlled
22/03/2026	7.3	3.2	<5	Not Visible	Controlled
23/03/2026	7.3	3.2	<5	Not Visible	Controlled

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 3** below outlines the weather records for the Reporting Period.



Monthly Weather Summary

Site: **Karuah Quarry Complex**
 Month: **March 2026**

Date	Day	Temperature @ 2m			Temperature @ 10m			Wind Speed			Solar Radiation		Rain ² mm
		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/m ²	Ave ¹ W/m ²	
1	Sun	27.9	19.6	22.9	26.1	19.5	22.3	22.1	6.5	147	1013.3	189.7	6.8
2	Mon	26.9	20.2	22.5	25.3	20.5	22.5	15.1	4.0	119	1099.9	112.0	2.6
3	Tue	32.1	19.2	24.8	30.3	19.2	24.4	17.6	7.5	214	1151.7	184.8	2.2
4	Wed	28.8	19.6	24.3	27.7	19.5	24.1	13.3	4.3	141	1054.1	108.3	0.4
5	Thu	30.8	19.6	24.5	29.3	20.0	24.3	13.1	4.0	197	855.8	125.6	0.6
6	Fri	33.1	19.3	25.7	30.8	19.8	25.2	18.9	4.4	150	788.3	224.4	0.2
7	Sat	35.5	21.4	27.0	33.3	22.0	26.4	21.4	5.8	134	790.7	233.3	0.0
8	Sun	33.9	20.6	25.1	31.1	20.4	24.5	15.6	4.5	155	1044.1	152.4	3.8
9	Mon	23.7	20.0	21.2	22.8	19.9	21.1	19.6	5.5	120	711.6	77.9	32.4
10	Tue	26.3	20.0	22.0	24.7	20.0	21.6	17.4	3.5	141	1102.4	122.0	9.2
11	Wed	29.3	17.3	22.4	26.7	17.9	22.1	17.7	4.4	161	914.2	207.8	0.2
12	Thu	34.2	18.5	25.2	33.0	20.2	25.4	17.2	3.7	201	780.8	229.8	0.0
13	Fri	30.0	20.5	24.0	27.0	20.6	23.3	21.5	7.8	110	881.7	189.2	0.0
14	Sat	24.2	13.3	19.3	22.4	14.3	19.4	25.2	6.3	130	1090.7	60.8	1.8
15	Sun	26.4	11.9	18.4	24.0	12.4	18.3	17.3	3.2	163	999.2	157.1	0.0
16	Mon	29.2	13.7	21.0	27.3	14.7	21.0	17.9	4.3	182	872.4	223.0	0.0
17	Tue	32.0	18.1	23.9	29.7	18.7	23.4	15.7	4.2	181	819.9	200.7	0.0
18	Wed	35.6	21.3	26.1	33.6	21.7	25.7	15.7	3.9	167	1033.2	154.8	0.0
19	Thu	28.9	20.1	23.6	26.2	19.9	22.9	20.4	4.4	145	969.9	148.9	25.0
20	Fri	22.8	18.0	19.9	22.6	18.2	19.8	8.9	1.6	229	335.0	51.9	18.2
21	Sat	28.3	15.9	20.8	26.0	16.0	20.5	18.3	3.7	191	1105.0	182.6	0.2
22	Sun	29.0	15.8	21.1	26.6	16.0	20.8	16.7	3.3	179	881.7	178.4	0.0
23	Mon	28.5	18.5	22.1	25.8	18.7	21.5	18.9	4.1	180	909.9	184.9	0.0
24	Tue	28.0	15.1	21.1	26.3	15.6	21.0	20.0	3.4	159	919.1	156.6	0.2
25	Wed	28.2	14.8	20.6	25.8	15.4	20.4	19.2	4.0	173	925.7	173.1	0.0
26	Thu	29.5	15.2	21.2	27.1	15.7	20.8	14.7	3.2	194	840.8	194.9	0.0
27	Fri	33.6	15.2	22.9	32.1	15.5	22.7	25.0	6.7	218	883.2	156.3	4.0
28	Sat	18.9	15.6	16.7	17.6	15.5	16.4	29.9	12.4	239	918.3	143.3	0.0
29	Sun	21.8	10.9	15.5	20.4	11.5	15.7	18.6	3.9	199	812.5	108.6	0.0
30	Mon	25.4	12.0	17.9	23.1	12.6	17.6	21.2	4.2	187	1047.4	166.7	0.0
31	Tue	26.2	11.4	17.5	23.5	12.0	17.3	19.1	3.7	172	905.8	175.0	0.0
Ave or Total		28.7	17.2	22.0	26.7	17.5	21.7	18.5	4.7	170.2	918.0	160.5	107.8
High		35.6	21.4	27.0	33.6	22.0	26.4	29.9	12.4		1151.7	233.3	32.4
Low		18.9	10.9	15.5	17.6	11.5	15.7	8.9	1.6		335.0	51.9	
												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 3 Weather Records Summary during the Reporting Period.

7.0 Production Data

Monthly monitoring of sales and truck movements are summarised by **Table 12**.

Table 12 Quarry Production Data.

Month	Truck Movements	Quarry Product Sales (t)
Jan-26	1,669	53,474
Feb-26	2,453	76,092
Mar-26	2,684	82,141
Progressive Annual Total	6,806	211,707

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

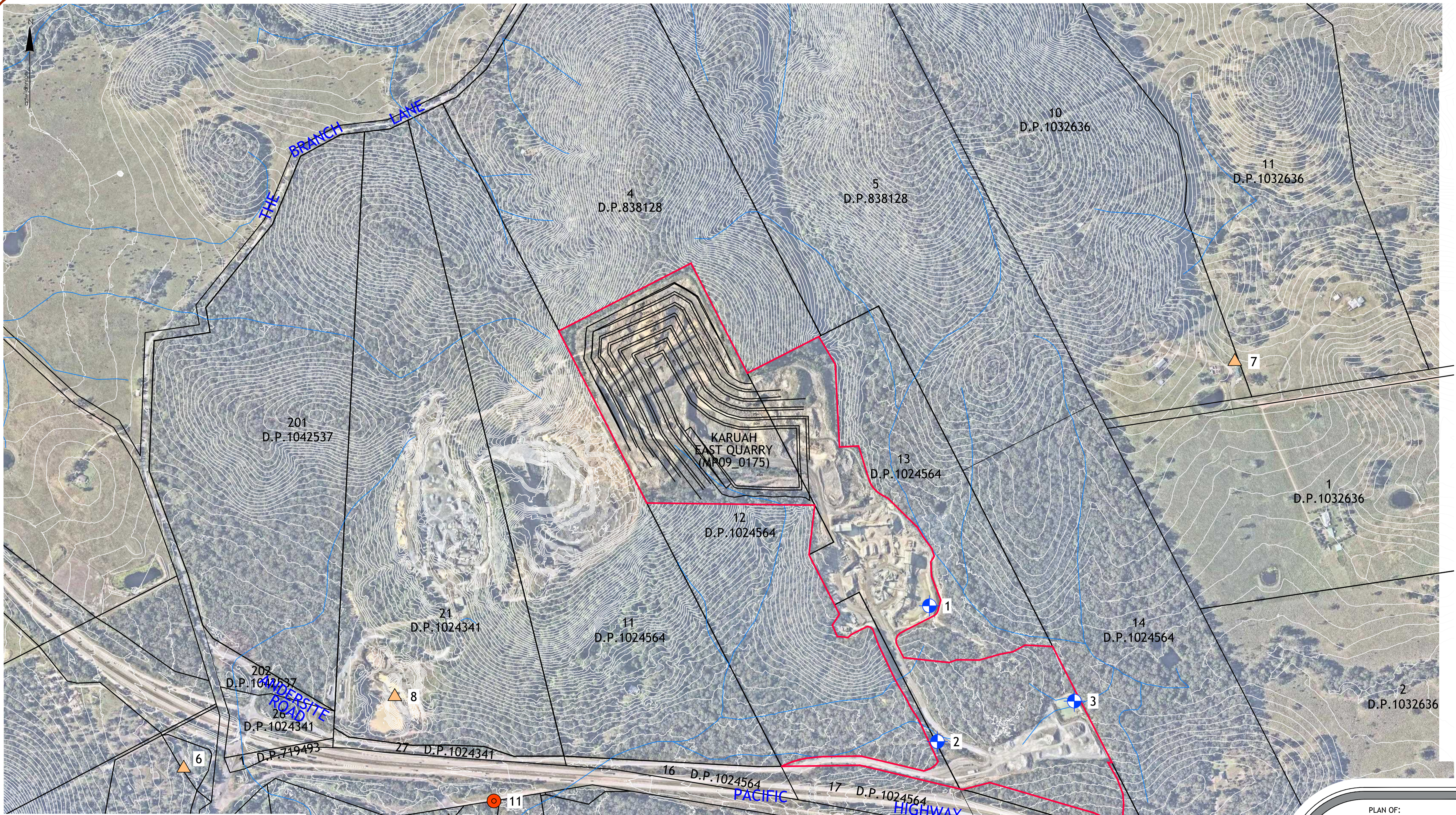
During the Reporting Period, the Quarry had one reportable non-compliance in relation to air quality:

- Exceedance of performance criteria at two Depositional Dust Gauges.

8.3 Community Complaints

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

Appendix 1 – EPL 20611 Monitoring Locations



Plotted By: Tachyon Jarvis Plot Date: 20/05/24 8:22:45PM Cad File: N:\11819\DWG\11819-EPL-002-D.DWG
 This plan includes coloured information. If you have a black and white copy you do not have all of the information, this note is coloured RED.

EPA IDENTIFICATION POINTS ^				
No.	TYPE	EASTING*	NORTHING*	DESCRIPTION
1	DISCHARGE	407 341 m	6 389 325 m	LDP1 (Discharge to Waters from Dam 1)
2	DISCHARGE	407 358 m	6 389 032 m	LDP2 (Discharge to Waters from Dam 2)
3	DISCHARGE	407 654 m	6 389 119 m	LDP3 (Discharge to Waters from Dam 3)
12	MONITORING	406 300 m	6 388 858 m	DDG1 Air Quality Sensitive Receiver
13	MONITORING	406 430 m	6 388 808 m	DDG2 Air Quality Sensitive Receiver
14	MONITORING	405 726 m	6 388 974 m	DDG3 Air Quality Sensitive Receiver
15	MONITORING	408 002 m	6 389 854 m	DDG4 Air Quality Sensitive Receiver
16	MONITORING	406 183 m	6 389 129 m	DDG5 Air Quality Sensitive Receiver
9	MONITORING	406 434 m	6 388 809 m	B HVAS Air Quality Sensitive Receiver
11	MONITORING	406 398 m	6 388 903 m	Air Blast Monitor

*COORDINATES SHOWN ARE PROVIDED BY HQPL & ARE ON GDA2020 DATUM

ver.	date	comment	surveyed	drawn	checked	pm	co-ordinate information	level information	scale (A1 original size)	page
A	11.06.2020	INITIAL EPL PLAN	--	Z.J.	M.R.	M.R.	CO-ORDINATE SYSTEM: M.G.A. ZONE 56	DATUM: A.H.D.	0 100 200m	1 OF 1
B	24.07.2023	UPDATED EPL BOUNDARY	--	Z.J.	M.R.	M.R.	FOR PLAN CONTENT GDA94	CONTOUR INTERVAL: 2.0 m	SCALE: 1:4000 (FULL)	
C	17.05.2024	UPDATED MONITORING LOCATIONS	HQPL	Z.J.	M.R.	M.R.	ORIGIN OF CO-ORDINATES: P.M.			
D	20.05.2024	UPDATED LDP NAMING & POINTS	HQPL	Z.J.	M.R.	M.R.				

^ MONITORING POINTS HAVE BEEN PROVIDED BY HUNTER QUARRIES PTY LTD. REFER TO PLAN 'KARUAH HARD ROCK QUARRY ENVIRONMENTAL MONITORING LOCATIONS - FIGURE 1' BY SLR CONSULTING AUSTRALIA - REFERENCE: 633.HQP00.0030 DATED 23/06/2014.

PLAN OF:
ENVIRONMENTAL PROTECTION LICENCE (EPL 20611)
KARUAH EAST QUARRY

location: LOT 12 D.P.1024564
 LOT 13 D.P.1024564
 BLUE ROCK CLOSE,
 KARUAH, NSW, 2324

council: MID COAST

dwg ref: 11819-EPL-002-D

client:



central coast office ph: (02) 4305 4300
 hunter office ph: (02) 4978 5100
 sydney office ph: (02) 8046 7411

www.adwjohanson.com.au

working beyond expectations

Appendix 2 – Q1 2026 Noise Monitoring Report

Karuah East Quarry

Quarterly attended noise monitoring - Q1 2026

Prepared for Karuah East Quarry Pty Limited

March 2026

Karuah East Quarry

Quarterly attended noise monitoring - Q1 2026

Karuah East Quarry Pty Limited

E260146 RP1

March 2026

Version	Date	Prepared by	Reviewed by	Comments
1	9 March 2026	Will Moore	Robert Kirwan	Final

Approved by



Robert Kirwan

Senior Associate – Team Leader

10 March 2026

Level 3 175 Scott Street

Newcastle NSW 2300

ABN: 28 141 736 558

This report has been prepared in accordance with the brief provided by Karuah East Quarry Pty Limited and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. This report is to only be used for the purpose for which it has been provided. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Karuah East Quarry Pty Limited (and subject to the terms of EMM's agreement with Karuah East Quarry Pty Limited).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Karuah East Quarry Pty Limited to conduct a quarterly noise survey of operations at Karuah East Quarry (KEQ, 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 morning shoulder, day and evening periods on 5 March 2026 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 descriptor/ID	Description/address	Coordinates (MGA56)	
		Easting	Northing
A	Private residence - 74 Mill Hill Close, Karuah	406623	6388704
B	Private residence - 64 Mill Hill Close, Karuah	406405	6388859
F	Private residence - 1714 The Branch Lane, Karuah	405639	6389782
G	Private residence - 2 Halloran Road, North Arm Cove	405629	6389766
H	Private residence - 21 Halloran Road, North Arm Cove	407795	6389868

\\lemmsvr1\EMM2\2022\E220174 - Karuah East Quarry Noise Monitoring 2022\18 GIS\02 Maps\G001_SiteLocation_20220718_01.mxd 18/07/2022

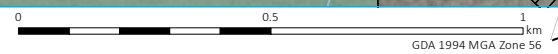


- KEY**
- Site boundary
 - A Attended noise monitoring location
 - Approved disturbance area
 - Major road
 - Minor road
 - Vehicular track
 - Watercourse/drainage line
 - Cadastral boundary
 - Waterbody
 - NPWS reserve
 - State forest

Attended noise monitoring locations

Karuah East Quarry
Quarterly attended noise monitoring
Figure 1.1

Source: EMM (2022); ADW Johnson (2020); DFSI (2017); ICSM (2012); GA (2011); ASGC (2006)



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 per cent 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 per cent 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	The 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.
Morning Shoulder	Monday – Saturday: 5 am to 7 am.

Appendix A provides further information that indicates how an average person perceives changes in noise levels and examples of common noise levels.

2 Noise limits

2.1 Project approval

Karuah East Quarry noise limits are detailed in Condition 3 of Project Approval (PA) 09_0175. Relevant sections of PA 09_0175 are reproduced in Appendix B.1

2.2 Environment protection licence

Karuah East Quarry noise limits are detailed in Condition L4.1 of Environment Protection Licence (EPL) 20611. Relevant sections of EPL 20611 are reproduced in Appendix B.2.

2.3 Noise management plan

The approved Noise Management Plan (NMP) adopts five attended noise monitoring locations that are representative of residences outlined in PA 09_0175 and EPL 20611. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limit summary

Noise limits based on PA 09_0175 and EPL 20611 are as shown in Table 2.1.

Table 2.1 Noise limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Morning Shoulder $L_{Aeq,15minute}$	Morning Shoulder $L_{A1,1minute}$
A	42	40	35	52
B	40	40	35	52
F	40	35	35	52
G	43	39	35	52
H	44	46	35	52

Notes: 1. Morning shoulder period is from 5:00 am to 7:00 am Monday to Saturday as defined in Condition L4.2 of EPL 20611.

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 metres per second (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 considerations

Monitoring and reporting have been done in accordance with the NPfl and 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 NPfl 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 in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements.

Meteorological data was obtained from the KEQ on-site meteorological station which allowed correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the morning shoulder, day and evening periods at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location using a handheld device.

Measured sound levels from various sources were noted during each measurement, and particular attention was given to the extent of the 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 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 for the monitoring period was sourced from the Karuah East Quarry on-site meteorological station (the site AWS) to determine the applicability of criteria in accordance with the EPL and PA.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken 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.

3.5 Site operations

As required by Condition R4.3(a) of the EPL, the operations occurring at the time of monitoring are summarised per period below:

- Day
 - Routine quarry operations in the quarry pit
 - Routine plant processing operations
 - Routine material transport from the quarry pit to the processing plant and product stockpile areas
 - Routine product loading and dispatch to road trucks
- Evening
 - Routine material transport from the processing plant to product stockpile areas
 - Routine maintenance activities of plant and equipment
- Morning shoulder
 - Routine maintenance activities of plant and equipment
 - Routine product loading and dispatch to road trucks

3.6 Instrumentation

Attended noise monitoring was conducted by Will Moore. 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 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	00701424	22/05/2027	IEC 61672-1:2013
SVAN SV-36 acoustic calibrator	138017	16/09/2027	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels – Q1 2026¹

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
A	5/03/2026 05:00	59	55	53	50	49	43	39
B	5/03/2026 05:19	72	70	66	61	58	48	43
F	5/03/2026 05:39	59	55	53	50	50	46	43
G	5/03/2026 06:04	58	57	56	55	55	54	50
H	5/03/2026 06:26	64	55	49	47	46	45	43
H	5/03/2026 07:00	68	56	47	46	42	40	37
G	5/03/2026 07:20	62	55	48	46	44	42	40
F	5/03/2026 07:45	63	56	52	49	48	45	39
B	5/03/2026 08:05	74	71	66	63	61	55	47
A	5/03/2026 08:25	71	70	69	66	65	57	53
A	5/03/2026 18:00	62	61	59	56	56	51	45
B	5/03/2026 18:18	74	72	67	64	61	55	48
F	5/03/2026 18:38	54	48	43	41	40	38	35
G	5/03/2026 19:02	55	51	48	46	45	43	38
H	5/03/2026 19:23	56	50	45	43	41	39	35

Notes: 1. Levels in this table are not necessarily the result of activity at the 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 m 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 – Q1 2026

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north ¹	Cloud cover 1/8s
A	5/03/2026 05:00	23	<0.5	-	0
B	5/03/2026 05:19	24	<0.5	-	0
F	5/03/2026 05:39	23	<0.5	-	1
G	5/03/2026 06:04	21	<0.5	-	2
H	5/03/2026 06:26	23	<0.5	-	4
H	5/03/2026 07:00	23	<0.5	-	4
G	5/03/2026 07:20	25	<0.5	-	3
F	5/03/2026 07:45	25	<0.5	-	3
B	5/03/2026 08:05	26	<0.5	-	3
A	5/03/2026 08:25	27	<0.5	-	2
A	5/03/2026 18:00	32	<0.5	-	1
B	5/03/2026 18:18	31	0.8	60	2
F	5/03/2026 18:38	31	<0.5	-	1
G	5/03/2026 19:02	30	<0.5	-	1
H	5/03/2026 19:23	27	1.2	60	1

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

4.2 Site only noise levels

4.2.1 Modifying factors

No modifying factors were applicable during the survey, as defined in the NPfl.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data obtained 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 – Q1 2026

Location	Start Date and Time (Period)	Wind		Stability Class	Very enhancing? ¹	Limit, dB		Site level, dB ²		Exceedance	
		Speed (m/s)	Direction ³			L _{Aeq,15minute}	L _{Amax}	L _{Aeq,15minute}	L _{Amax}	L _{Aeq,15minute}	L _{Amax}
A	5/03/2026 05:00 (MS)	1.0	85	F	No	35	52	IA	IA	Nil	Nil
B	5/03/2026 05:19 (MS)	1.6	56	F	No	35	52	IA	IA	Nil	Nil
F	5/03/2026 05:39 (MS)	1.5	192	F	No	35	52	IA	IA	Nil	Nil
G	5/03/2026 06:04 (MS)	0.8	126	A	No	35	52	IA	IA	Nil	Nil
H	5/03/2026 06:26 (MS)	0.3	251	A	No	35	52	<20	<20	Nil	Nil
H	5/03/2026 07:00 (D)	0.6	147	A	No	44	N/A	28	38	Nil	N/A
G	5/03/2026 07:20 (D)	0.3	219	A	No	43	N/A	<25	<25	Nil	N/A
F	5/03/2026 07:45 (D)	1.1	308	A	No	40	N/A	IA	IA	Nil	N/A
B	5/03/2026 08:05 (D)	1.7	256	A	No	40	N/A	IA	IA	Nil	N/A
A	5/03/2026 08:25 (D)	1.4	150	A	No	42	N/A	IA	IA	Nil	N/A
A	5/03/2026 18:00 (E)	6.5	267	D	Yes	45 ¹	N/A	IA	IA	Nil	N/A
B	5/03/2026 18:18 (E)	5.4	189	D	Yes	45 ¹	N/A	IA	IA	Nil	N/A
F	5/03/2026 18:38 (E)	4.3	290	D	Yes	40 ¹	N/A	IA	IA	Nil	N/A
G	5/03/2026 19:02 (E)	4.5	247	D	Yes	44 ¹	N/A	IA	IA	Nil	N/A
H	5/03/2026 19:23 (E)	5.9	156	D	Yes	51 ¹	N/A	IA	IA	Nil	N/A

- Notes:
1. Noise limits are adjusted by +5 dB during ‘very noise-enhancing meteorological conditions’ in accordance with the NPfl.
 2. Site-only LAeq,15minute, includes modifying factor penalties if applicable.
 3. Degrees magnetic north, “-” indicates calm conditions.
 4. ‘N/A’ = Not Applicable.

5 Mitigation and management

5.1 Proposed management actions

EPL Condition 4.3(c) requires details of any management actions taken within the monitoring period to address any exceedances of the limits. As there were no exceedances, no management actions were required.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Karuah East Quarry Pty Limited to conduct a quarterly noise survey of operations at the site. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified PA and EPL noise limits.

Attended environmental noise monitoring described in this report was done during morning shoulder, day and evening periods on 5 March 2026 at five monitoring locations.

Noise levels from the site complied with relevant limits at all monitoring locations during the Q1 2026 survey.

Appendix A

Noise perception and examples

A.1 Noise levels

Table A.1 indicates 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 a quarter) as loud

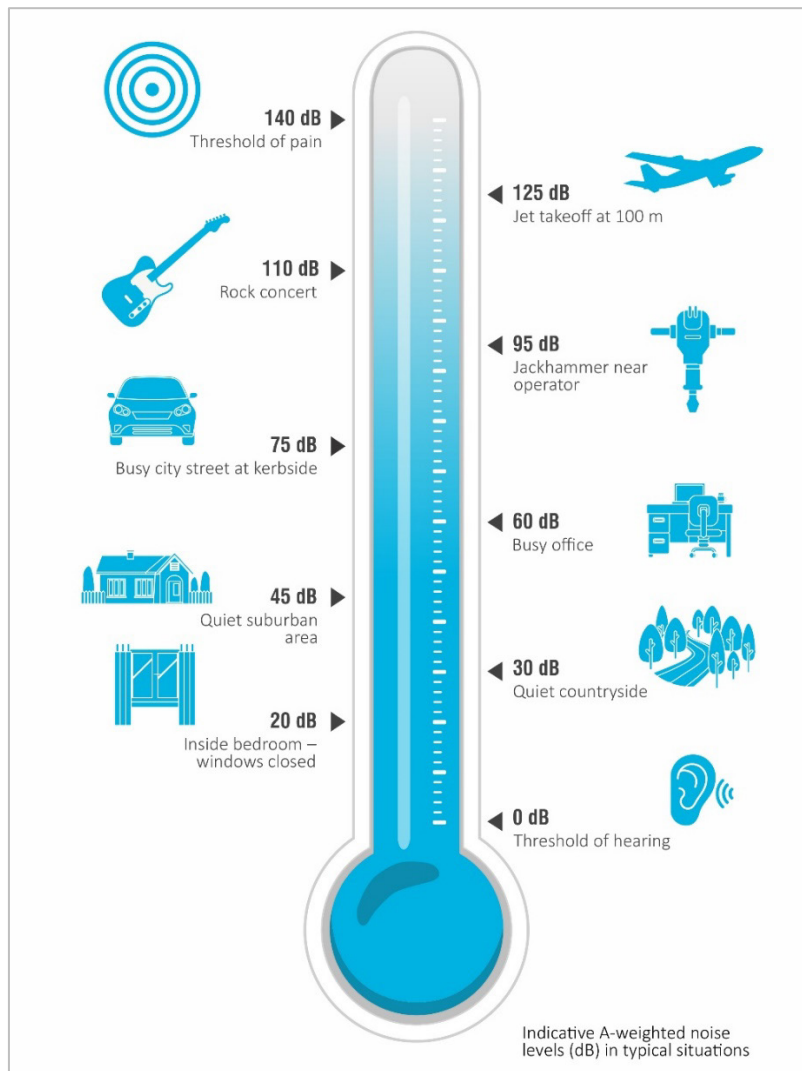


Figure A.1 Common noise levels

Appendix B

Regulator documents

B.1 Project approval

SCHEDULE 3 ENVIRONMENTAL PERFORMANCE CONDITIONS

IDENTIFICATION OF APPROVED LIMITS OF EXTRACTION

1. The Applicant shall, prior to carrying out quarrying operations on the site:
 - (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the Extraction Area; and
 - (b) submit a survey plan of the extraction boundaries, to the satisfaction of the Planning Secretary.
2. The Applicant must ensure that the extraction boundaries are clearly marked at all times while quarrying operations are being carried out, in a manner that allows the limits of extraction to be clearly identified.

NOISE

Operational Noise Criteria

3. Except for the carrying out of construction works, the Applicant must ensure that the operational noise generated by the development does not exceed the criteria in Table 2 at any residence^a on privately-owned land.

Table 2: Operational noise criteria dB

Noise Assessment Location ^a	Morning Shoulder <i>L_{Aeq}</i> (15 min)	Morning Shoulder <i>L_{Amax}</i>	Day <i>L_{Aeq}</i> (15 min)	Evening <i>L_{Aeq}</i> (15 min)
A	35	52	42	40
B	35	52	40	40
G	35	52	43	39
H	35	52	44	46
I	35	52	40	37
All other residences	35	52	40	35

^a Noise Assessment Locations referred to in Table 2 are shown in Appendix 2.

Noise generated by the development must be monitored and measured in accordance with the relevant procedures and modifications (including certain meteorological conditions) of the NPfI.

- 3A. The noise criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Road Traffic Noise Criteria

4. The Applicant must take all reasonable and feasible measures to ensure that the traffic noise generated by the development does not cause additional exceedances of the criteria in Table 3 at any residence on privately-owned land.

Table 3: Road traffic noise criteria

Road	Criteria (Day^a)
Pacific Highway	60 dB(A) L _{Aeq} (15 hour)
Local roads	55 dB(A) L _{Aeq} (1 hour)

^a Day is the period from 7 am to 10 pm every day in accordance with the EPA's NSW Road Noise Policy (2011).

5. Deleted

Noise Operating Conditions

6. The Applicant must:
- take all reasonable steps to minimise noise from construction and operational activities, including low frequency noise and other audible characteristics, associated with the development;
 - implement reasonable and feasible noise attenuation measures on all plant and equipment that will operate in noise sensitive areas;
 - operate a comprehensive noise management system commensurate with the risk of impact;
 - take all reasonable steps to minimise the noise impacts of the development during noise-enhancing meteorological conditions when the noise criteria in this consent do not apply (see NPfl);
 - carry out quarterly attended noise monitoring (unless otherwise agreed by the Planning Secretary) to determine whether the development is complying with the relevant conditions of this consent; and
 - regularly assess the noise monitoring data and modify or stop operations on the site to ensure compliance with the relevant conditions of this consent.

Noise Management Plan

7. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
- be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;
 - be prepared in consultation with the EPA;
 - describe the measures to be implemented to ensure:
 - compliance with the noise criteria and operating conditions in this consent;
 - best practice management is being employed;
 - noise impacts of the development are minimised during noise-enhancing meteorological conditions when the noise criteria in this consent do not apply (see NPfl);
 - describe the noise management system in detail; and
 - include a monitoring program that:
 - is capable of evaluating the performance of the development;
 - monitors noise at the nearest and/or most affected residences;
 - adequately supports the noise management system;
 - includes a protocol for distinguishing noise emissions of the development from any neighbouring developments; and
 - includes a protocol for identifying any noise-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of any such event.

7A. The Applicant must implement the plan as approved by the Planning Secretary.

BLASTING

Blasting Criteria

8. The Applicant must ensure that blasting on the site does not cause exceedances of the criteria in Table 5.

B.2 Environmental protection licence

Environment Protection Licence

Licence - 20611

concentration limits specified for that pollutant in the table.

- L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.
- L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table/s.
- L2.4 Water and/or Land Concentration Limits

POINT 1,2,3

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				5 &/or none visible
pH	pH				6.5 - 8.5
Total suspended solids	milligrams per litre				40

L3 Waste

- L3.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L4 Noise limits

- L4.1 Noise generated at the premises must not exceed the noise limits in the table below. The locations referred to in the table below are indicated in Table 2: Operational Noise Criteria, and Figure 1 of the document titled Project Approval 09_0175 Modification 9 (MOD 9) Department of Planning, Industry & Environment - which has been filed on EPA file Doc22/715570-1.

Noise Assessment Location	Morning Shoulder LAeq(15 min)	Morning shoulder LAmax	Day LAeq (15 min)	Evening LAeq (15 min)
A (74 Mill Hill Close, Karuah, Lot 100 DP 1028885)	35	52	42	40

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B (64 Mill Hill Close, Karuah, Lot 3 DP785172)	35	52	40	40
G (2 Halloran Road, North Arm Cove Lot 1 DP1032636)	35	52	43	39
H (21 Halloran Road, North Arm Cove Lot 10 DP1032636)	35	52	44	46
All other residences	35	52	40	35

- L4.2 Noise limit definitions - For the purpose of the table at L4.1, the following definitions apply:
 Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays;
 Morning Shoulder is defined as the period from 5:00am to 7:00am Monday to Saturday;
 Evening is defined as the period from 6:00pm to 10:00pm Monday to Saturday.
- L4.3 The noise limits set out in this licence apply under all meteorological conditions except for the following:
- Wind speed greater than 3 metres/second at 10 metres above ground level; or
 - Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
 - Stability category G temperature inversion conditions.
- L4.4 **Determining Compliance**
- To determine compliance with the noise limits set out in the table above, the licensee must locate monitoring equipment:
- within 30 metres of a dwelling façade (but not closer than 3 metres) where any dwelling on the property is situated more than 30 metres from the property boundary that is closest to the premises;
 - approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises;
 - at the most affected point at a location where there is no dwelling at the location; and
 - within approximately 50 metres of the boundary of a national park or nature reserve.
- Note: A non-compliance of the Noise Limits table will still occur where noise generated from the premises in excess of the appropriate limit is measured:
- at a location other than an area prescribed in part (a) and part (b); and/or
 - at a point other than the most affected point at a location.
- L4.5 For the purposes of determining the noise generated at the premises the modification factors in Fact Sheet C of the EPA's "Noise Policy for Industry" must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

Environment Protection Licence

Licence - 20611

line so that the impacted community knows how to make a complaint.

M6.3 The preceding two conditions do not apply until 1 month after the date of the issue of this licence.

M7 Blasting

M7.1 To determine compliance with Blast Limit conditions of this licence:

- a) Airblast overpressure and ground vibration levels must be measured and electronically recorded for monitoring point 11 for the parameters specified in Column 1 of the table below; and
- b) The licensee must use the units of measure, sampling method, and sample at the frequency specified opposite in the other columns.

Parameter	Units of Measure	Frequency	Sampling Method
Airblast Overpressure	Decibels (Linear Peak	All blasts	Australian Standard AS 2187.2-2006
Ground Vibration Peak Particle Velocity	millimetres/second	All blasts	Australian Standard AS 2187.2-2006

M8 Noise monitoring

M8.1 To assess compliance with the noise limits for this premises attended noise monitoring must be undertaken in accordance with all noise conditions and:

- a) during a period of normal quarry operations;
- b) at each one of the locations listed in the noise limits table of this licence;
- c) occur quarterly in the reporting period;
- d) occur during each day period as defined in the NSW Noise Policy for Industry.

Note: Quarterly attended noise monitoring must be completed (unless otherwise agreed by the Planning Secretary) to determine whether the development is complying with the relevant conditions of this consent. The frequency of noise monitoring will be reviewed, upon request.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and

B.3 Noise management plan

4.3 Operational Noise Criteria

Schedule 3, Condition 3 of the Project Approval provides operational noise limits for all noise-sensitive receivers surrounding the site, as summarised by **Table 5**.

Table 5 *Noise Impact Criteria.*

Noise Assessment Location	Morning Shoulder	Morning Shoulder	Day	Evening
	L _{Aeq} (15 min)	L _{Amax}	L _{Aeq} (15 min)	L _{Aeq} (15 min)
A	35	52	42	40
B	35	52	40	40
G	35	52	43	39
H	35	52	44	46
I	35	52	40	37
All other residences	35	52	40	35

Noise generated by the development must be monitored and measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions as well as corrections to account for characteristics of a noise source) of the NPfl (EPA 2017).

The noise limits provided in **Table 5** apply under standard and noise-enhancing meteorological conditions (as defined in the NPfl) determined by monitoring at the relevant weather station. In accordance with Condition L4.3 of the EPL and the Project Approval, the noise limits provided in **Table 5** apply under all meteorological conditions except for the following:

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

In accordance with Fact Sheet D of the NPfl, for ‘very noise enhancing meteorological conditions’ the applicable noise limit is set at 5dB above those provided in **Table 5**.

Noise limits do not apply if KEQ has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and KEQ has advised the Department in writing of the terms of this agreement. No agreements have been required or implemented to-date.

4.4 Road Traffic Noise

Schedule 3, Condition 4 of the Project Approval states that all reasonable and feasible measures must be taken to ensure that the traffic generated by KEQ does not cause additional exceedances of the criteria provided in **Table 6** at any residence on privately-owned land.

Table 6 *Road traffic noise criteria.*

Road	Criteria (Day)
Pacific Highway	60 dB L _{Aeq} (15 hour)
Local Roads	55 dB L _{Aeq} (1 hour)

Based on the annual production limit, the following summarises the average daily traffic generation:

- a total of 432 vehicle movements per day (216 despatched loads per day); and
- a maximum hourly traffic flow of 44 vehicle movements (22 despatched loads during that hour).

Document Number	Version Number	Version Date	Revision Date	Document Owner	Page
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Appendix C

Calibration certificates



Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C25320-V1

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW, 2300		
-----------------------	--	--	--

Equipment Tested :	<i>Manufacturer</i>	<i>Model</i>	<i>Serial</i>
Instrument :	Rion	NA-28	00701424
Microphone :	Rion	UC-59	01916
Pre-amplifier :	Rion	NH-23	01463
Firmware Version :	2.0		

Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
Ambient Temperature : 20 °C	Ambient Temperature : 21 °C
Relative Humidity : 62.1 %	Relative Humidity : 60.2 %
Barometric Pressure : 101.61 kPa	Barometric Pressure : 101.62 kPa

Calibration Technician : Emanuel Eid	Secondary Check: Cooper Sallway
Calibration Date : 21-May-2025	Report Issue Date : 22-May-2025

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	Pass
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.

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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.1 °C
125Hz	±0.13 dB	Relative Humidity	±1.9 %
1kHz	±0.13 dB	Barometric Pressure	±0.11 kPa
8kHz	±0.14 dB		
Electrical Tests	±0.13 dB		

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



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.



Sound Level Meter IEC 61672-3:2013 Calibration Test Report

Calibration Number C25320-V1

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW, 2300
-----------------------	--

Equipment Tested :	Manufacturer	Model	Serial
Instrument Serial Number :	Rion	NA-28	00701424
Microphone Serial Number :	Rion	UC-59	01916
Pre-amplifier Serial Number :	Rion	NH-23	01463
Firmware Version :	2.0		

Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
Ambient Temperature : 20 °C	Ambient Temperature : 21 °C
Relative Humidity : 62.1 %	Relative Humidity : 60.2 %
Barometric Pressure : 101.61 kPa	Barometric Pressure : 101.62 kPa

Calibration Technician : Emanuel Eid	Secondary Check: Cooper Sallway
Calibration Date : 21-May-2025	Report Issue Date : 22-May-2025

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
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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.

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 report applies only to the item tested and shall only be reproduced in full, unless approved in writing by Acoustic Research Labs.

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.

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1. REVISION HISTORY

Revision	Date	Description
1	22-May-2025	Original Issue

2. OVERVIEW

This report presents the calibration test results of a NA-28 Sound Level Meter, and associated equipment. Calibration is carried out in accordance with IEC 61672-3:2013, *Electroacoustics - Sound Level Meters - Part 3: Periodic Tests*.

Relevant clauses from this standard have been used for periodic testing in conjunction with Acoustic Research Labs internal test methods described in Section 1 of the calibration work instruction manual.

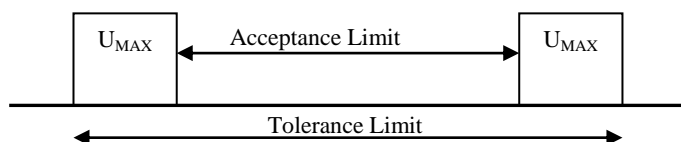
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Where required, reference is made to manual version 50860 as provided by the manufacturer.

2.1 UNCERTAINTIES

For each test performed, the associated measurement uncertainties are derived at the 95% confidence level and are given with a coverage factor of 2.

The uncertainty applies at the time of measurement only, and takes no account of any drift or other effects that may apply afterwards. When estimating uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.



Where deviations from the design goals are provided to determine conformance to performance specifications, each measurement is reported with:

The measured deviation from the design goal

Associated acceptance limits for the test

Maximum allowable uncertainty of measurement for the test

Actual expanded uncertainty for each measurement

2.2 DOCUMENT CONVENTIONS

Test results which highlight non-conformances relative to the standard, and the sound level meter type specified by the manufacturer have been marked with an **F** in the respective tests.

Any tests that are not required, due to sound level meter configuration, are marked N/A.

3. GENERAL

3.1 DEVICE UNDER TEST

Equipment Tested :	<i>Manufacturer</i>	<i>Model</i>	<i>Serial</i>
Instrument :	Rion	NA-28	00701424
Microphone :	Rion	UC-59	01916
Pre-amplifier :	Rion	NH-23	01463

All results within this report correspond to Channel 1 of the device tested.

Instrument received in fair condition..

3.2 ENVIRONMENTAL CONDITIONS DURING TEST

No corrections have been applied to any results obtained to compensate for the environmental conditions.

3.3 CALIBRATION TESTS

Where applicable the following tests were performed in accordance with the requirements of *IEC 61672-3:2013*. These clauses are used to define the periodic testing of Sound Level Meters.

- Clause 10 Indication at the Calibration Check Frequency
- Clause 11 Self Generated Noise
- Clause 12 Acoustical Signal Tests of Frequency Weighting
- Clause 13 Electrical Signal Tests of Frequency Weightings
- Clause 14 Frequency and Time Weightings at 1kHz
- Clause 15 Long Term Stability
- Clause 16 Level Linearity on the Reference Level Range
- Clause 17 Level Linearity including the level range control
- Clause 18 Toneburst Response
- Clause 19 Peak C Sound Level
- Clause 20 Overload Indication
- Clause 21 High Level Stability

3.4 TEST EQUIPMENT USED

All test equipment used during periodic testing are calibrated every 12months by an accredited laboratory, traceable to SI units.

The performance of all equipment during these calibrations and the effects of instrument stability are used to determine the measurement uncertainty of each reported result.

3.4.1 Multi-function Acoustic Calibrator

A Bruel & Kjaer 4226 Multi-function calibrator (S/N – 2985012) was used for frequency response testing of the entire instrument (including microphone). This instrument was used as a reference calibrator and for frequency response verification.

The acoustic signal was applied by the 4226 Multi-function calibrator using a 1/2 inch microphone input.

3.4.2 Microphone Electrical Equivalent Circuit

Calibration of most instrument parameters is carried out using electrical signals fed to the unit via a two-port electrical equivalent circuit of the microphone.

These signals were applied via the instrument's microphone input.

Where possible, a 13 pF capacitance dummy microphone was used during testing.

3.4.3 Adjustable Attenuator

A means for varying the attenuation of electrical signals via the dummy microphone was provided by a JFW Industries dual rotary attenuator (S/N – 792819 2132). The attenuator is switchable in 1dB steps between 0dB and 60dB.

3.4.4 Arbitrary Function Generator

A Keysight 33511B (S/N – MY62000827) was used to generate the required electrical signals.

3.4.5 Environmental Monitoring

A MHB-382SD (S/N – AG44204) was used for measuring environmental conditions during device calibration. It is capable of providing temperature, relative humidity and pressure measurements.

4. CALIBRATION TEST RESULTS

4.1 INDICATION AT THE CALIBRATION CHECK FREQUENCY

The indication of the sound level meter at the calibration check frequency was checked by application of an acoustic signal at the reference sound pressure level and frequency.

Stated reference conditions as found in manual are

Reference Level : 94.0 dB

Reference Frequency : 1000.0 Hz

Indications before and after adjustments were recorded and are shown in Table 1 (all measurements in dB) -

Table 1 - Check Frequency Calibration Results

Frequency Weighting	Initial Response	B&K 4226 Corrected	FreeField Corrected	Final Corrected Response
A	94.30	94.10	94.10	94.02
C	94.20	94.10	94.10	94.02
Z	94.20	94.10	94.10	94.02

Free field adjustment data as provided by the manufacturer. Windscreen correction factors applied.

4.2 SELF GENERATED NOISE

4.2.1 Microphone Installed

Self generated noise was measured with the microphone installed on the sound level meter, in the configuration submitted for periodic testing. The sound level meter was set to the most-sensitive level range and with frequency weighting A selected.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

15.10	15.10	15.10	15.10	15.10
15.10	15.10	15.10	15.10	15.10

Acoustic Noise Floor : 15.1 dB(A)

4.2.2 Electrical Input Signal Device

With the microphone replaced by the electrical input signal device and terminated as specified, the sound level meter was set to the most-sensitive level range and with frequency weightings Z, C and A selected as provided.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

12.00	11.10	11.10	11.10	11.10
11.10	11.10	9.80	9.80	9.80

Random Readings dB(C)

14.10	14.60	15.50	13.50	14.10
14.60	14.10	14.10	14.10	14.60

Random Readings dB(Z)

20.2	22.2	20.0	20.0	19.8
21.7	21.4	22.0	23.2	23.3

Electric Noise Floor :

dB(A)	dB(C)	dB(Z)
10.8	14.3	21.4

4.3 ACOUSTICAL SIGNAL TESTS OF A FREQUENCY WEIGHTING

The sound level meter was set to measure frequency weighting C with a FAST response. The test was carried out using a multi-function acoustic calibrator set to pressure mode.

Three (3) readings were made at each test frequency. The average of the readings was then corrected to the multi-function acoustic calibrator.

Table 2 - Frequency Weighting C Response

Freq Hz	Reading 1	Reading 2	Reading 3	Uncertainty (dB)
125	94.0	94.0	94.0	0.13
1 000	94.1	94.1	94.1	0.13
8 000	88.6	88.6	88.6	0.14

Actual Freq Hz	B&K 4226 Corrections	Corrected Response dB(C)		Uncertainty (dB)
		Actual	re 1kHz	
125.90	-0.06	93.94	-0.08	0.13
1005.10	-0.08	94.02	0.00	0.13
7915.10	0.07	88.67	-5.35	0.14

Adjustments were then applied to correct for free field and sound level meter body effects with data supplied by the manufacturer as per Table 3. Windscreen correction factors applied.

Table 3 - Correction Data

Actual Freq (Hz)	Pressure to Freefield (dB)	Uncertainty (dB)	Body Effects (dB)		WS Effects (dB)	
			Body Effects (dB)	Uncertainty (dB)	WS Effects (dB)	Uncertainty (dB)
125.90	0.00	0.25	0.00	0.25	0.00	0.20
1005.10	0.00	0.25	0.00	0.25	-0.10	0.20
7915.10	3.00	0.35	-0.10	0.35	-0.40	0.30

Finally, the corrected responses are normalised to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

Table 4 - Acoustic C Response

Actual Freq (Hz)	Corrected Response dB(C)		Expected Response dB(C)		Deviation (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Actual	re 1kHz	re 1kHz	Tolerance Limit				
125.90	93.94	0.02	-0.2	±1.0	0.22	P	0.43	0.60
1005.10	93.92	0.00	0.0	±0.7	0.00	P	0.43	0.60
7915.10	91.17	-2.75	-3.0	+1.5 / -2.5	0.25	P	0.60	0.70

4.4 ELECTRICAL SIGNAL TESTS OF FREQUENCY WEIGHTINGS

Frequency weighting responses for Z, C and A were determined relative to the response at 1kHz using steady sinusoidal electrical input signals.

On the reference level range, and for each frequency weighting under test, the level of a 1kHz input signal was adjusted to yield 75dB. At test frequencies other than 1kHz, the input signal level was adjusted to compensate for the design goal attenuations as specified in Table 2 of IEC 61672.1-2013.

Table 5 - Measured Electrical Frequency Response

Freq (Hz)	A Weighting (dB)	C Weighting (dB)	Z Weighting (dB)	Uncertainty (dB)
63	75.0	75.0	75.0	0.13
125	75.0	75.0	75.0	0.11
250	75.0	75.0	75.0	0.10
500	75.0	75.0	75.0	0.10
1 000	75.0	75.0	75.0	0.10
2 000	75.1	75.1	75.0	0.10
4 000	75.1	75.0	75.0	0.10
8 000	75.1	75.1	75.0	0.10
15 850	74.6	74.6	75.0	0.13

Adjustments were then applied to correct for a uniform free field response and sound level meter body effects with data supplied by the manufacturer as per Table 6. Windscreen correction factors applied.

Table 6 - Correction Data

Freq (Hz)	Ufreq (dB)	Uncertainty (dB)	Body Effects (dB)	Uncertainty (dB)	WS Effects (dB)	Uncertainty (dB)
63	0.10	0.25	0.00	0.25	0.00	0.20
125	0.10	0.25	0.00	0.25	0.00	0.20
250	0.10	0.25	0.00	0.25	0.00	0.20
500	0.00	0.25	-0.20	0.25	0.00	0.20
1 000	0.00	0.25	0.00	0.25	-0.10	0.20
2 000	0.00	0.25	-0.10	0.25	-0.30	0.20
4 000	0.10	0.25	-0.30	0.25	-0.40	0.20
8 000	0.00	0.35	-0.10	0.35	-0.40	0.30
15 850	-0.10	0.45	-0.40	0.35	1.00	0.30

Finally, the corrected responses were referenced to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

Table 7 - A Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	75.10	0.20	±1.0	P	0.43	0.60
125	75.10	0.20	±1.0	P	0.42	0.60
250	75.10	0.20	±1.0	P	0.42	0.60
500	74.80	-0.10	±1.0	P	0.42	0.60
1 000	74.90	0.00	±0.7	P	0.42	0.60
2 000	74.70	-0.20	±1.0	P	0.42	0.60
4 000	74.50	-0.40	±1.0	P	0.42	0.60
8 000	74.60	-0.30	+1.5 / -2.5	P	0.59	0.70
15 850	75.10	0.20	+2.5 / -16	P	0.66	1.00

Table 8 - C Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	75.10	0.20	±1.0	P	0.43	0.60
125	75.10	0.20	±1.0	P	0.42	0.60
250	75.10	0.20	±1.0	P	0.42	0.60
500	74.80	-0.10	±1.0	P	0.42	0.60
1 000	74.90	0.00	±0.7	P	0.42	0.60
2 000	74.70	-0.20	±1.0	P	0.42	0.60
4 000	74.40	-0.50	±1.0	P	0.42	0.60
8 000	74.60	-0.30	+1.5 / -2.5	P	0.59	0.70
15 850	75.10	0.20	+2.5 / -16	P	0.66	1.00

Table 9 - Z Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	75.10	0.20	±1.0	P	0.43	0.60
125	75.10	0.20	±1.0	P	0.42	0.60
250	75.10	0.20	±1.0	P	0.42	0.60
500	74.80	-0.10	±1.0	P	0.42	0.60
1 000	74.90	0.00	±0.7	P	0.42	0.60
2 000	74.60	-0.30	±1.0	P	0.42	0.60
4 000	74.40	-0.50	±1.0	P	0.42	0.60
8 000	74.50	-0.40	+1.5 / -2.5	P	0.59	0.70
15 850	75.50	0.60	+2.5 / -16	P	0.66	1.00

4.5 FREQUENCY AND TIME WEIGHTINGS AT 1KHZ

A steady sinusoidal electrical input signal of 1kHz at the reference sound pressure level was applied to the reference level range.

The deviations of the indicated level of C and Z frequency weightings were recorded, along with the deviations of the indication of A weighted time averaged, and SLOW weighted response.

Table 10 - Frequency and Time Weighting Results

Frequency Weighting	Time Weighting	Response (dB)	Deviation (dB)	P/F	Tolerance Limit (dB)	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
A	Fast	94.0	0.0	P	±0.2	0.10	0.20
	Leq	94.0	0.0	P	±0.2	0.10	0.20
	Slow	94.0	0.0	P	±0.2	0.10	0.20
C	Fast	94.0	0.0	P	±0.2	0.10	0.20
Z	Fast	94.0	0.0	P	±0.2	0.10	0.20

4.6 LONG-TERM STABILITY

Long-term stability was tested by comparing a steady sinusoidal electrical signal applied at the start, and at the end of testing. The applied signal level was set to the reference level and frequency and was maintained constant. The difference between the indicated levels was recorded.

Table 11 - Frequency and Time Weighting Results

Signal Level (mV)	Initial Response (dB)	Final Response (dB)	Deviation (dB)	P/F	Tolerance Limit (dB)	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
63.1	94	94.0	0.0	P	±0.1	0.10	0.10

4.7 LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE

Level linearity was tested with a steady sinusoidal electrical signal at a frequency of 8kHz, with the meter set to display frequency weighted A, FAST response.

The starting point for level linearity testing was set to 94.0dB as stated in the instruction manual.

Level linearity was measured in 5dB steps of increasing input signal level from the starting point up to within 5dB of the stated upper limit, then at 1dB steps up to (but not including) the first indication of overload.

Table 12 - Level Linearity - Increasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
94.0	94.0	0.0	±0.8	P	0.1	0.3
99.0	99.0	0.0	±0.8	P	0.1	0.3
104.0	104.0	0.0	±0.8	P	0.1	0.3
109.0	109.0	0.0	±0.8	P	0.1	0.3
114.0	114.0	0.0	±0.8	P	0.1	0.3
119.0	119.0	0.0	±0.8	P	0.1	0.3
123.0	123.0	0.0	±0.8	P	0.1	0.3
124.0	124.0	0.0	±0.8	P	0.1	0.3
125.0	125.0	0.0	±0.8	P	0.1	0.3
126.0	126.0	0.0	±0.8	P	0.1	0.3
127.0	127.0	0.0	±0.8	P	0.1	0.3
128.0	128.0	0.0	±0.8	P	0.1	0.3
129.0	129.0	0.0	±0.8	P	0.1	0.3

Overload indication at 130.0dB.

Level linearity test was the continued in 5dB steps of decreasing input signal level from the starting point up to within 5dB of the stated lower limit, then at 1dB steps up to (but not including) the first indication of under range.

Table 13 - Level Linearity - Decreasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
94.0	94.0	0.0	±0.8	P	0.1	0.3
89.0	89.0	0.0	±0.8	P	0.1	0.3
84.0	84.0	0.0	±0.8	P	0.1	0.3
79.0	79.0	0.0	±0.8	P	0.1	0.3
74.0	74.0	0.0	±0.8	P	0.1	0.3
69.0	69.0	0.0	±0.8	P	0.1	0.3
64.0	64.0	0.0	±0.8	P	0.1	0.3
59.0	59.0	0.0	±0.8	P	0.1	0.3
54.0	54.0	0.0	±0.8	P	0.1	0.3
49.0	49.0	0.0	±0.8	P	0.1	0.3
44.0	43.9	-0.1	±0.8	P	0.1	0.3
39.0	38.9	-0.1	±0.8	P	0.1	0.3
34.0	33.9	-0.1	±0.8	P	0.1	0.3
30.0	29.9	-0.1	±0.8	P	0.1	0.3
29.0	28.9	-0.1	±0.8	P	0.1	0.3
28.0	27.9	-0.1	±0.8	P	0.1	0.3
27.0	26.9	-0.1	±0.8	P	0.1	0.3
26.0	25.9	-0.1	±0.8	P	0.1	0.3

Under range indication at 25.0dB.

4.8 LEVEL LINEARITY INCLUDING LEVEL RANGE CONTROL

As the sound level meter had more than one level range, tests of level linearity errors including errors introduced by the level range control were performed with steady sinusoidal input signals at a frequency of 1kHz, with the sound level meter set to display A weighted, FAST response.

The level of the signal was adjusted to yield an indication of the reference sound pressure level on the reference level range, and with the signal kept constant, the indicated signal level was recorded for all level ranges.

For all level ranges, the signal level was decreased to a level that was 5dB above the stated lower limit of each range, the indicated levels were recorded and compared to the expected values.

Table 14 - Response to Reference Level

Range	Signal Level dB(A)	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
1	94.0	94.0	0.0	±0.8	P	0.1	0.3
2	94.0	94.0	0.0	±0.8	P	0.1	0.3
3	94.0	94.0	0.0	±0.8	P	0.1	0.3
4	94.0	93.9	-0.1	±0.8	P	0.1	0.3
5	94.0	Out of Range	N/A	±0.8	N/A	0.1	0.3
6	94.0	Out of Range	N/A	±0.8	N/A	0.1	0.3

Table 15 - Response to Low Level Signal

Range	Signal Level dB(A)	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
1	35.0	35.1	0.1	±0.8	P	0.1	0.3
2	25.0	25.0	0.0	±0.8	P	0.1	0.3

4.9 TONEBURST RESPONSE

The response of the sound level meter to short-duration signals was tested on the reference range with 4kHz tone bursts.

The tone bursts were generated from a steady sinusoidal signal at a level of 117.0dB.

Table 16 - FAST Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	116.0	0.0	±0.5	P	0.1	0.3
2ms	99.0	0.0	+1.0 / -1.5	P	0.1	0.3
0.25ms	89.9	-0.1	+1.0 / -3	P	0.1	0.3

Table 17 - SLOW Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	109.6	0.0	±0.5	P	0.1	0.3
2ms	90.0	0.0	+1.0 / -3	P	0.1	0.3

Table 18 - Sound Exposure Level Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	110.0	0.0	±0.5	P	0.1	0.3
2ms	90.0	0.0	+1.0 / -1.5	P	0.1	0.3
0.25ms	80.9	-0.1	+1.0 / -3	P	0.1	0.3

4.10 PEAK C RESPONSE

Indication of Peak C sound level was tested on the least sensitive level range. Test signals used were -

A single complete cycle of an 8kHz sinusoid, starting and stopping at zero crossings

Positive and negative half cycles of a 500Hz sinusoid, starting and stopping at zero crossings.

The level of the steady 8kHz sinusoid was adjusted to display 135.0dB(C).

Table 19 - Single Cycle Response

Response Peak C	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Overload Peak C	Maximum Permitted Uncertainty (dB)
138.3	-0.1	±2.0	P	0.22	N	0.35

Table 20 - Half Cycle Response

Signal Orientation	Response Peak C (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
Positive	136.9	-0.5	±1.0	P	0.1	0.35
Negative	136.9	-0.5	±1.0	P	0.1	0.35

No overload was noted during Peak C testing.

4.11 OVERLOAD INDICATION

The overload indication was tested on the least sensitive level range, with the sound level meter set to display frequency weighted A, time averaged values.

Positive and negative half cycle sinusoidal electrical signals at 4kHz were used. The test began at an indicated time averaged level of 129.0dB(A).

Using the positive half cycle signal, the signal level was increased in steps of 0.5dB up to, but not including, the first indication of overload. The level of the input signal was then increased in steps of 0.1dB until the first indication of overload. These steps were repeated using the negative half cycle signal.

Table 21 - Overload Indication

Signal Orientation	Overload Response (dB)	Difference (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
Positive		N/A	±1.5	N/A	0.10	0.25
Negative						

Overload indication could not be verified due to insufficient output of the waveform generator.

Overload latch indication could not be verified due to insufficient output of the waveform generator.

4.12 HIGH LEVEL STABILITY

High level stability was tested by measuring the response of the meter to high signal levels. The result was evaluated as the difference between the A-Weighted indicated levels in response to a steady 1kHz signal applied over 5 minutes.

Table 22 - FAST Weighted Response

Time Weighting	Initial Response (dB)	Final Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
Fast	129.0	129.0	0.0	±0.1	P	0.10	0.10
Slow	N/A	N/A	N/A	±0.1	N/A	0.10	0.10
Leq	129.0	129.0	0.0	±0.1	P	0.10	0.10

CERTIFICATE OF CALIBRATION

CERTIFICATE No: **C55448**

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model: Svantek SV 36 **Serial No:** 138017

Class: 1

Owner: EMM Consulting
Level 3, 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 997 hPa ± 1 hPa

Temperature 24 $^{\circ}\text{C} \pm 1^{\circ}\text{C}$

Relative Humidity 41 % $\pm 5\%$


Date of Receipt : 08/09/2025

Date of Calibration : 16/09/2025

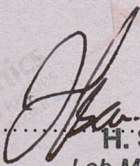
Date of Issue : 29/09/2025

Acu-Vib Test AVP02 (Calibrators)

Procedure: Test Method: AS IEC 60942 - 2017

CHECKED BY: 
L. Gail

**AUTHORISED
SIGNATURE:**


H. Soe
Lab Manager

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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No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE No: C55448

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.

The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	93.96 dB	1000.02 Hz	0.28 %
Level2:	NA	N	114.03 dB	999.99 Hz	0.20 %
Uncertainty			±0.11 dB	±0.05%	±0.40 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
	250 Hz	1 kHz	250 Hz	1 kHz
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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.

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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