



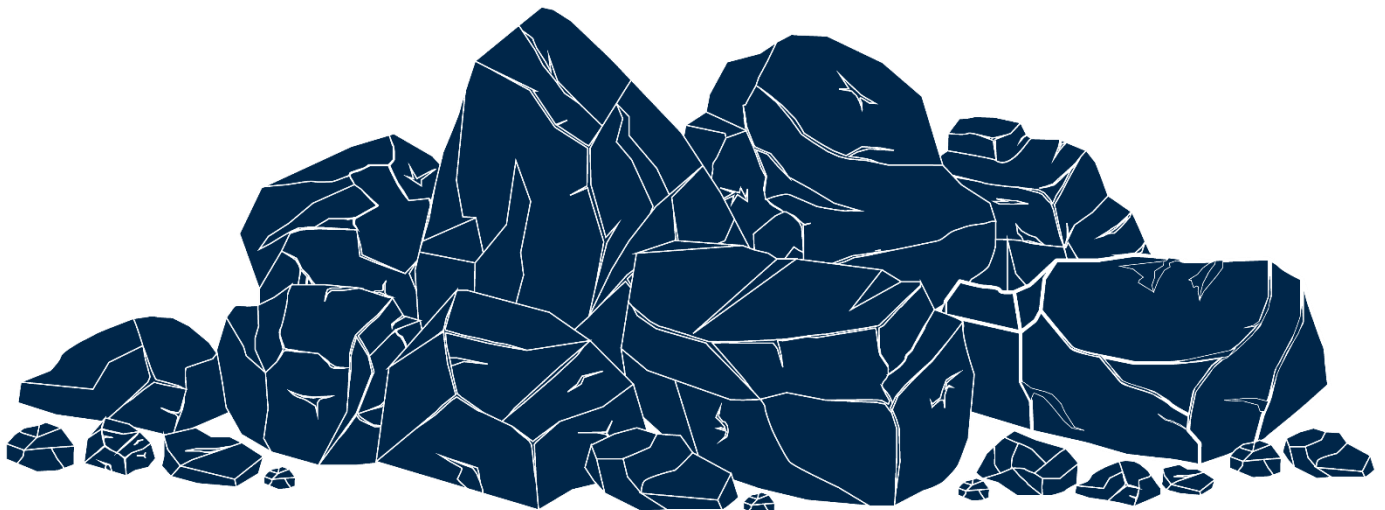
Karuah East Quarry  
ABN: 80 141 505 035  
Karuah East Quarry Pty Limited  
Blue Rock Close, Karuah NSW 2324

W: [www.hunterquarries.com.au](http://www.hunterquarries.com.au)  
E: [admin@hunterquarries.com.au](mailto:admin@hunterquarries.com.au)  
T: 02 4050 0304  
P: PO Box 23, Thornton NSW 2322

Karuah East Quarry

# Environmental Monitoring Report

August 2025



## Contents

<b>Contents .....</b>	<b>2</b>
<b>1.0 Introduction.....</b>	<b>3</b>
<b>2.0 Air Quality Monitoring.....</b>	<b>4</b>
2.1 Deposited Dust Monitoring.....	5
2.2 High Volume Air Sampling.....	6
<b>3.0 Blast Monitoring .....</b>	<b>8</b>
<b>4.0 Noise Monitoring .....</b>	<b>8</b>
<b>5.0 Surface Water Monitoring .....</b>	<b>9</b>
<b>6.0 Weather Station Monitoring .....</b>	<b>11</b>
<b>7.0 Production Data .....</b>	<b>12</b>
<b>8.0 Reporting.....</b>	<b>12</b>
8.1 Reportable Environmental Incidents .....	12
8.2 Reportable Non-Compliances .....	12
8.3 Community Complaints.....	12
<b>Appendix 1 – EPL 20611 Monitoring Locations.....</b>	<b>13</b>

## 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:	<a href="#">EPL 20611</a>

**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:	<a href="#">Project Approval MP09_0175</a>

A summary of the environmental monitoring data for the August 2025 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 <sup>1</sup>	Maximum Total Deposited Dust Level <sup>1</sup>
Deposited Dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

<sup>1</sup> 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 <sup>3</sup>
Particulate Matter < 10 µm (PM10)	Annual	30 µg/m <sup>3</sup>

**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 <sup>3</sup>

**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 August 2025 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/m<sup>2</sup>/month.

**Table 7** *Deposited dust monitoring results.*

Reporting Period	Start Date	End Date	Days	DDG 1 (EPL ID 4) EPL ID 12	DDG 2 (EPL ID 5) EPL ID 13	DDG 3 (EPL ID 6) EPL ID 14	DDG 4 (EPL ID 7) EPL ID 15	DDG 5 (EPL ID 8) EPL ID 16
Sep-24	30/08/2024	30/09/2024	31	(2.2)	(1.2)	(1.3)	(1.2)	(0.9)
Oct-24	30/09/2024	31/10/2024	31	(1.0)	(0.7)	(0.7)	(5.1)*	(0.4)
Nov-24	31/10/2024	29/11/2024	29	(1.4)	(1.1)	(1.1)	(1.7)	(0.9)
Dec-24	29/11/2024	30/12/2024	29	(0.6)	(1.4)	(1.3)	(3.1)	(1.1)
Jan-25	30/12/2024	31/01/2025	32	(3.8)	(1.7)	(1.9)	(1.3)	(1.3)
Feb-25	31/01/2025	03/03/2025	31	(1.2)	(0.9)	(1.1)	(1.2)	(2.1)
Mar-25	03/03/2025	03/04/2025	31	(0.7)	(1.0)	(1.4)		(28.2)^
	04/03/2025	03/04/2025	30				(1.1)	
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*	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	**
Progressive Annual Average				2.3	1.6	0.9	1.5	–

**Notes:**      \* An anomalous exceedance was recorded at DDG1 during the July 2025 Monitoring Period. This event 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.

^ An exceedance was recorded at DDG5 during the March 2025 Monitoring Period, due to an elevated quantity of combustible matter being recorded (27.5 g). This is attributed to the development of a significant algal bloom on the collected rainwater surface within the dust gauge glassware. This event was reported to NSW Planning, the NSW EPA and surrounding landholders in accordance with the relevant conditions of the Consent and EPL.

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

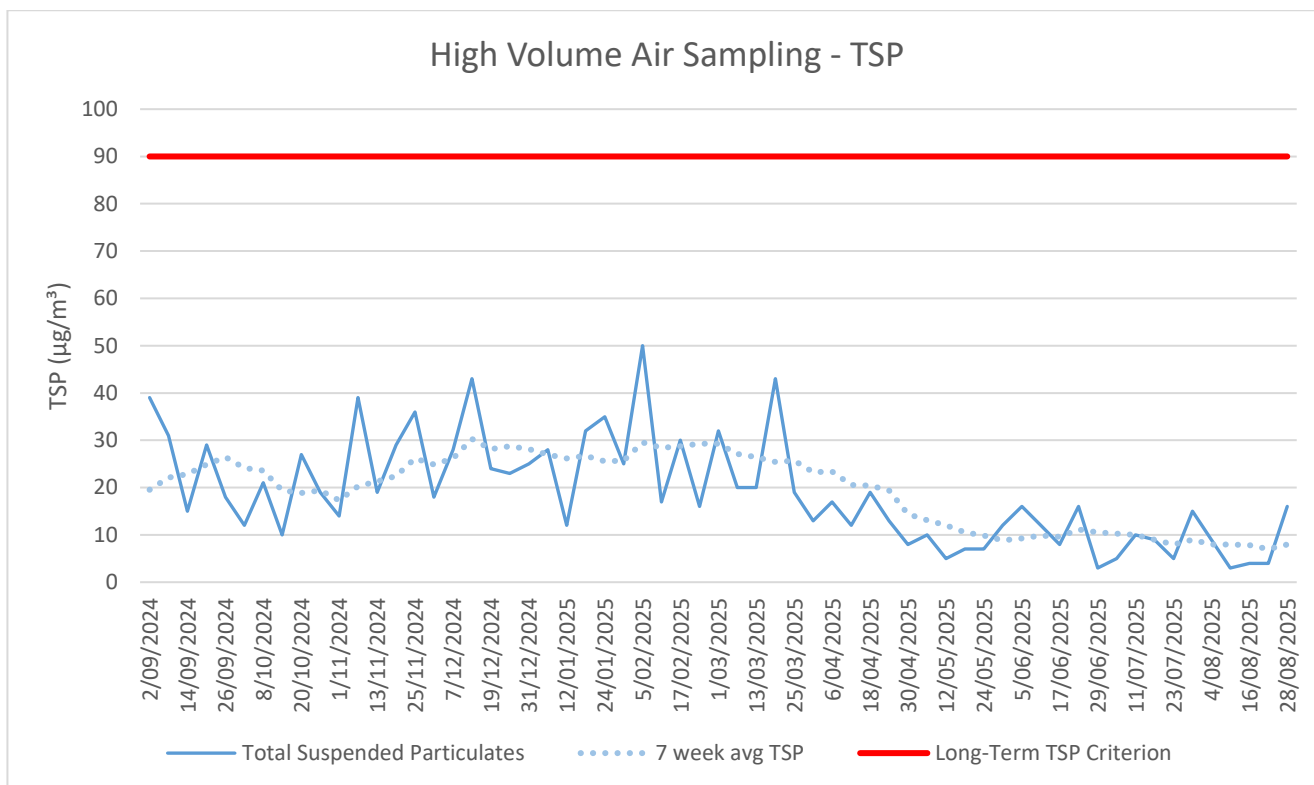
## 2.2 High Volume Air Sampling

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

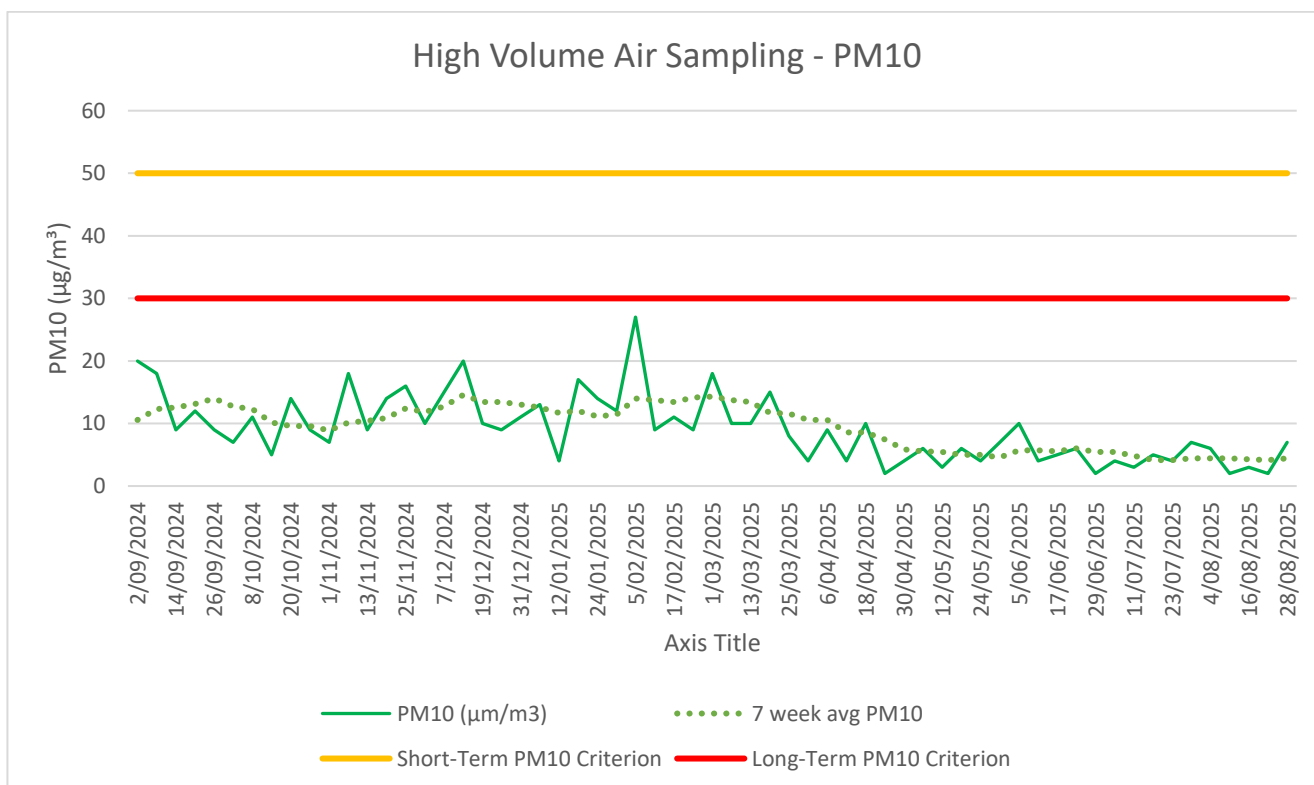
Monitoring results for the five HVAS run days within the Reporting Period were compliant with the long-term limits for TSP and PM10 and short-term limits for PM10.

**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 $\mu\text{m}$ , PM10 ( $\mu\text{g}/\text{m}^3$ )
04/08/2025	9	6
10/08/2025	3	2
16/08/2025	4	3
22/08/2025	4	2
28/08/2025	16	7



**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 was one blast undertaken during the Reporting Period, which was observed to be within compliance limits, as summarised by **Table 10**.

**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)
15/08/2025	13:15	RL105	109.1	0.90

\*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 Wednesday, 27 August 2025 during the morning, day and evening monitoring periods.

The noise monitoring results were within the compliance limits for the Q3 2025 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.

Discharge events that occurred during the Reporting Period are summarised by **Table 11**.

Controlled discharge events were compliant with the limits provided by the Consent and EPL, including Total Suspended Solids (TSS) below 40 mg/L and pH within the range of 6.5 to 8.5.

However, a major rainfall event greater than the design storm event was experienced at the site over five days from 31 July 2025 to 04 August 2025. The quarry received 211.8 mm of rainfall during this event resulting in uncontrolled discharges from all three sediment dams, exceeding the site's TSS limits. During the event the site's Pollution Incident Response Management Plan (PIRMP) was enacted.

**Table 11 Discharge Water Monitoring Results.**

Date	pH	Turbidity (NTU)	Total Suspended Solids, TSS (mg/L)	Oil and Grease	Discharge Type
<b>LDP 1 – Dam 1</b>					
03/08/2025	7.4	>1000	1100	Not Visible	Uncontrolled
04/08/2025	7.3	820	290	Not Visible	Uncontrolled
05/08/2025	7.6	>1000	440	Not Visible	Uncontrolled
<b>LDP 2 – Dam 2</b>					
02/08/2025	7.1	100	90	Not Visible	Controlled*
03/08/2025	7.0	290	140	Not Visible	Uncontrolled
07/08/2025	7.0	45	24	Not Visible	Uncontrolled
14/08/2025	7.0	50	26	Not Visible	Uncontrolled
15/08/2025	6.8	50	32	Not Visible	Controlled
20/08/2025	6.9	25	15	Not Visible	Controlled
21/08/2025	6.6	39	20	Not Visible	Controlled
22/08/2025	6.8	30	14	Not Visible	Controlled
23/08/2025	7.5	45	32	Not Visible	Controlled
<b>LDP 3 – Dam 3</b>					
01/08/2025	7	50	30	Not Visible	Controlled
02/08/2025	6.9	85	43	Not Visible	Controlled
03/08/2025	7.1	160	90	Not Visible	Uncontrolled
04/08/2025	7.1	170	91	Not Visible	Uncontrolled
07/08/2025	6.9	55	37	Not Visible	Controlled
08/08/2025	7.0	50	31	Not Visible	Controlled
12/08/2025	6.7	50	36	Not Visible	Controlled
15/08/2025	6.8	33	24	Not Visible	Controlled
16/08/2025	6.8	25	15	Not Visible	Controlled
17/08/2025	6.9	25	14	Not Visible	Controlled
19/08/2025	6.7	31	24	Not Visible	Controlled
20/08/2025	6.9	20	14	Not Visible	Controlled
21/08/2025	6.5	39	27	Not Visible	Controlled
22/08/2025	6.7	38	32	Not Visible	Controlled
23/08/2025	7.4	45	33	Not Visible	Controlled
24/08/2025	7.2	45	33	Not Visible	Controlled

**Note:**                      *\*Controlled discharge to facilitate improved flocculant residence time ahead of main storm front.*

## 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: **August 2025**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain <sup>2</sup> mm
		Max <sup>1</sup>	Min <sup>2</sup>	Ave <sup>1</sup>	Max <sup>1</sup>	Min <sup>2</sup>	Ave <sup>1</sup>	Max Gust <sup>1</sup>	Ave Speed <sup>1</sup>	Dir Ave <sup>1</sup>	Max <sup>1</sup>	Ave <sup>1</sup>	
		°C	°C	°C	°C	°C	°C	km/h	km/h	deg	W/m <sup>2</sup>	W/m <sup>2</sup>	
1	Fri	13.1	8.8	10.5	12.8	9.1	10.5	31.9	16.6	206	266.7	38.5	28.8
2	Sat	13.5	8.9	10.7	13.2	9.2	10.6	24.9	15.2	196	320.0	41.6	31.6
3	Sun	15.2	11.8	13.3	15.8	12.1	13.8	68.6	44.4	104	90.0	11.5	114.2
4	Mon	19.6	10.2	14.8	18.7	10.8	15.5	43.8	34.3	122	667.5	76.9	2.8
5	Tue	20.3	9.7	14.0	19.0	10.1	13.9	27.2	19.1	210	703.2	98.9	0.6
6	Wed	21.5	6.3	12.3	20.6	7.6	12.9	16.6	10.9	221	485.8	119.8	0.4
7	Thu	19.4	5.0	10.4	17.8	5.7	10.8	23.7	15.2	216	530.8	119.0	1.2
8	Fri	15.2	8.9	11.6	14.9	9.2	11.7	22.5	14.5	223	297.5	47.7	5.6
9	Sat	16.8	11.1	12.9	16.3	11.4	12.9	28.4	18.6	200	383.3	69.3	16.0
10	Sun	19.4	8.7	13.0	17.7	9.4	12.9	24.9	18.7	175	697.5	113.7	5.8
11	Mon	16.7	8.7	12.0	16.2	9.0	11.9	24.9	13.5	218	738.2	84.1	10.2
12	Tue	17.2	4.6	10.0	15.9	5.1	10.2	13.0	9.7	212	768.2	86.8	0.0
13	Wed	18.6	4.7	10.2	17.2	5.6	10.5	16.6	12.5	239	620.8	127.2	0.2
14	Thu	20.2	7.7	11.9	18.6	8.4	12.2	14.2	9.5	212	520.0	116.9	4.2
15	Fri	14.3	8.2	10.9	14.1	9.0	11.3	15.4	11.6	236	431.6	39.0	12.4
16	Sat	19.3	6.8	11.9	18.1	7.6	12.3	13.0	8.1	231	727.5	98.5	0.2
17	Sun	20.6	3.8	11.8	19.6	6.2	12.4	26.0	16.4	256	680.0	100.6	0.0
18	Mon	16.8	2.5	8.3	15.3	3.1	8.6	27.2	18.7	226	545.0	143.9	0.0
19	Tue	17.8	5.3	9.9	15.5	6.0	9.7	33.1	20.1	204	796.7	115.1	11.0
20	Wed	16.8	7.1	10.2	15.3	7.4	10.2	18.9	12.4	214	755.8	81.4	5.2
21	Thu	16.3	10.7	12.8	15.3	10.2	12.9	26.0	17.5	158	541.7	63.0	19.8
22	Fri	15.3	11.2	12.5	15.3	11.5	12.6	28.4	16.9	172	184.1	32.0	19.2
23	Sat	18.3	9.8	12.8	17.3	10.4	13.2	21.3	15.4	237	715.0	82.8	5.4
24	Sun	21.5	8.4	13.9	19.8	9.6	14.4	29.6	18.6	184	769.2	132.7	0.2
25	Mon	20.5	9.5	13.6	18.8	9.8	13.9	26.0	16.8	210	583.3	149.4	0.0
26	Tue	21.9	9.4	14.3	20.1	10.7	14.6	21.3	12.7	196	837.5	123.9	0.0
27	Wed	24.3	10.7	16.8	23.0	11.8	17.1	22.5	14.2	195	599.2	153.2	0.0
28	Thu	26.3	12.9	16.9	24.9	13.2	17.0	47.3	29.7	233	720.0	130.5	0.6
29	Fri	19.7	5.6	13.9	18.9	8.0	14.7	49.7	30.8	235	608.3	164.4	0.0
30	Sat	20.6	7.9	13.7	19.6	9.1	14.2	47.3	30.9	230	688.3	165.0	0.2
31	Sun	18.6	4.0	11.9	17.6	5.7	12.3	49.7	31.5	247	698.3	143.2	0.0
Ave or Total		18.6	8.0	12.4	17.5	8.8	12.6	28.5	18.5	207.0	579.7	99.0	295.8
High		26.3	12.9	16.9	24.9	13.2	17.1	68.6	44.4		837.5	165.0	114.2
Low		13.1	2.5	8.3	12.8	3.1	8.6	13.0	8.1		90.0	11.5	
Notes: 1. Values are for the 24 hour period from 9am to 9am next day.												No. rain days >1mm:	16
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-25	1,822	54,080
Feb-25	3,048	95,968
Mar-25	3,001	95,438
Apr-25	2,044	63,662
May-25	2,174	65,786
Jun-25	3,087	93,552
Jul-25	2,964	88,839
Aug-25	1,773	53,267
<b>Progressive Annual Total</b>	<b>19,913</b>	<b>610,592</b>

## 8.0 Reporting

### 8.1 Reportable Environmental Incidents

During the Reporting Period, one reportable environmental incident occurred at the Quarry.

- Uncontrolled discharge of sediment-laden water to Yalimbah and Bulga Creeks from Saturday 02 August to Tuesday, 05 August 2025 following the receipt of 211.8 mm of rainfall over five days. This rainfall event exceeded the 95th percentile 5x day rainfall depth of 90.6 mm, which the site's sediment dams are designed to withstand in accordance with Landcom's Blue Book (Managing Urban Stormwater: Soils and Construction – Volume 2E, Mines and quarries).

During the event the site's PIRMP was enacted through reporting to relevant authorities, the KEQPL executive and the local community. Formal incident reports were subsequently submitted to NSW Planning and the NSW EPA.

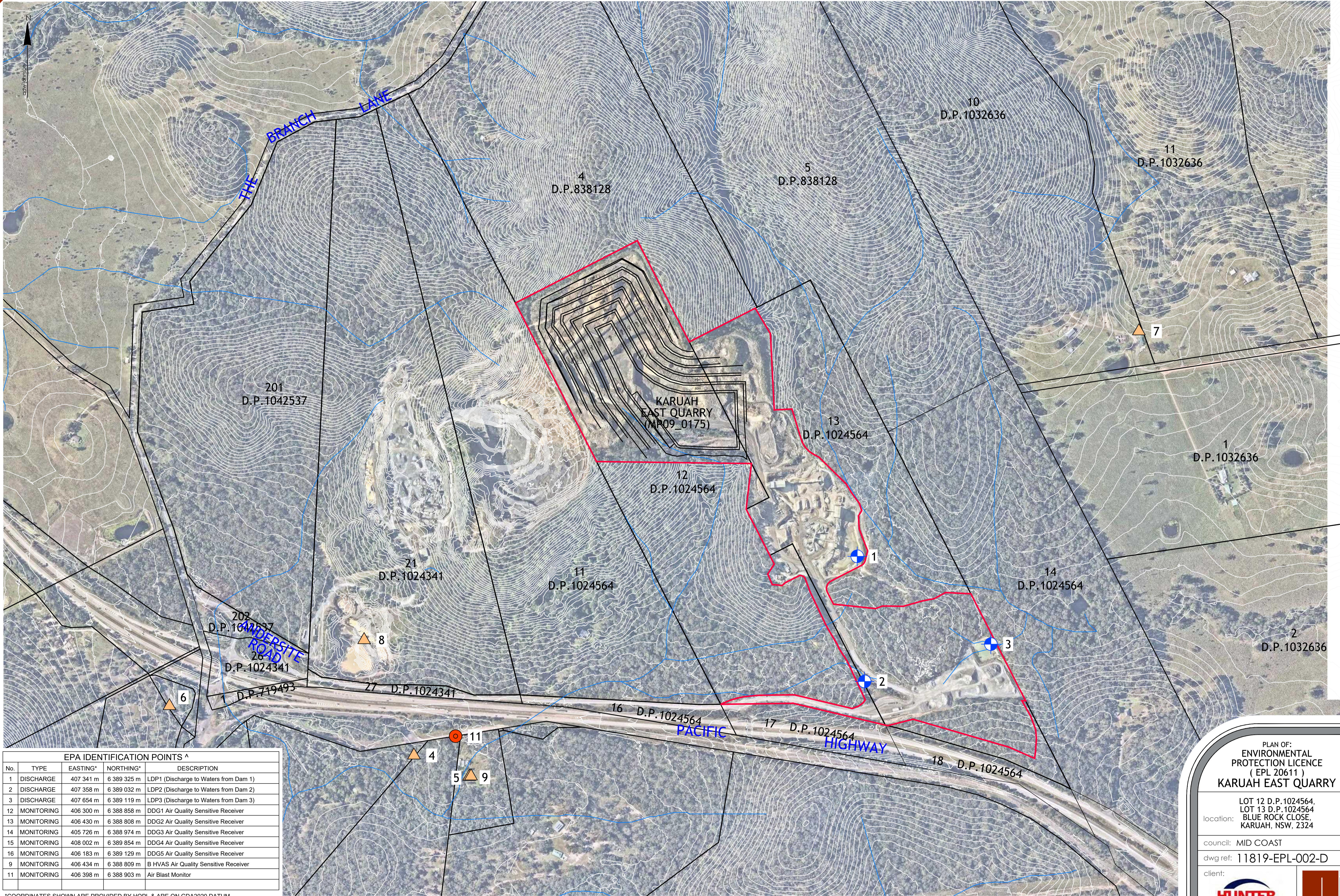
### 8.2 Reportable Non-Compliances

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 received by the Quarry.

## Appendix 1 – EPL 20611 Monitoring Locations



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.				

- project management
- civil engineering
- infrastructure
- superintendency
- economic analysis
- social impact
- town planning
- surveying
- development feasibility
- visualisation
- urban design

^ 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.adwjohnson.com.au

## Appendix 2 – Q3 2025 Noise Monitoring Report

## **Karuah East Quarry**

### **Quarterly attended noise monitoring - Q3 2025**

---

Prepared for Karuah East Quarry Pty Limited

September 2025

# Karuah East Quarry

## Quarterly attended noise monitoring - Q3 2025

Karuah East Quarry Pty Limited

E250042 RP#4

September 2025

Version	Date	Prepared by	Reviewed by	Comments
1	5 September 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

**Signature:**   
**Email:** rkirwan@emmconsulting.com.au

**Robert Kirwan**  
Associate Acoustics Consultant – Team Leader  
5 September 2025

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).

© EMM Consulting Pty Ltd, Level 10, 201 Pacific Highway, St Leonards NSW 2065. 2025.  
ABN: 28 141 736 558

# TABLE OF CONTENTS

---

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Background	1
1.2	Attended monitoring locations	1
1.3	Terminology and abbreviations	3
<b>2</b>	<b>Noise limits</b>	<b>4</b>
2.1	Project approval	4
2.2	Environment protection licence	4
2.3	Noise management plan	4
2.4	Noise limit summary	4
2.5	Meteorological conditions	4
2.6	Additional considerations	5
2.7	Very noise-enhancing meteorological conditions	5
<b>3</b>	<b>Methodology</b>	<b>6</b>
3.1	Overview	6
3.2	Attended noise monitoring	6
3.3	Meteorological data	6
3.4	Modifying factors	7
3.5	Site operations	7
3.6	Instrumentation	7
<b>4</b>	<b>Results</b>	<b>8</b>
4.1	Total measured noise levels and atmospheric conditions	8
4.2	Site only noise levels	9
<b>5</b>	<b>Mitigation and management</b>	<b>12</b>
5.1	Proposed management actions	12
<b>6</b>	<b>Summary</b>	<b>13</b>

## Appendices

Appendix A	Noise perception and examples
Appendix B	Regulator documents
Appendix C	Calibration certificates

Tables

Table 1.1	Attended noise monitoring locations	1
Table 1.2	Terminology and abbreviations	3
Table 2.1	Noise limits, dB	4
Table 3.1	Attended noise monitoring equipment	7
Table 4.1	Total measured noise levels – Q3 2025 <sup>1</sup>	8
Table 4.2	Measured atmospheric conditions – Q3 2025	9
Table 4.3	Site noise levels and limits – Q3 2025	10
Table A.1	Perceived change in noise	

Figures

Figure 1.1	Attended noise monitoring locations	2
Figure A.1	Common noise levels	

# 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 Wednesday 27 August 2025 at five monitoring locations.

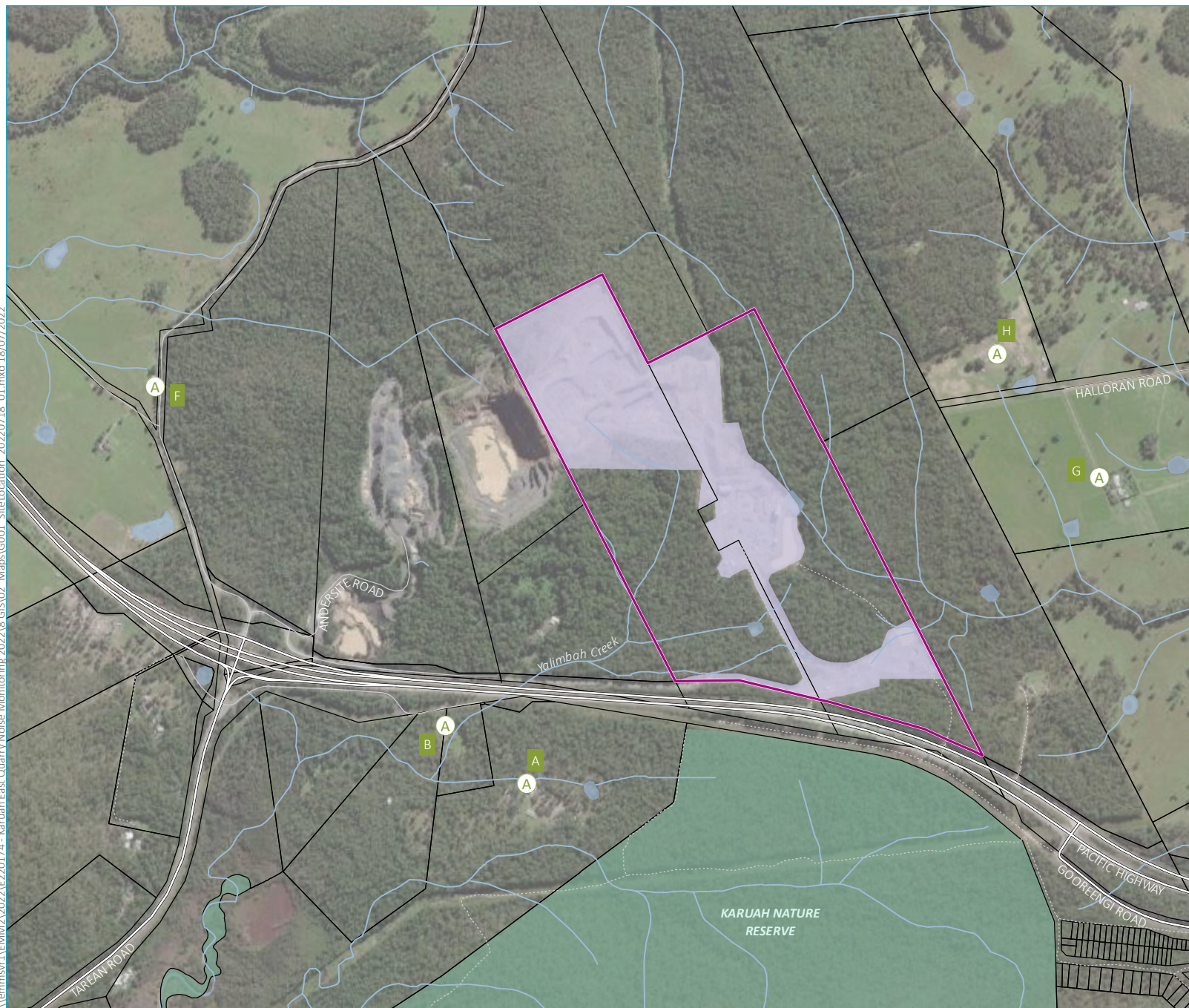
## 1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

**Table 1.1** Attended noise monitoring locations

Location 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\8 GIS\02 Maps\G001\_SiteLocation\_20220718\_01.mxd 18/07/2022



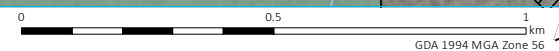
- KEY**
- Site boundary
  - A Attended noise monitoring location
  - Approved disturbance area
  - Major road
  - Minor road
  - Vehicular track
  - Watercourse/drainage line
  - Cadastral boundary
  - Waterbody
  - NPWS reserve
  - State forest

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 <sub>Amax</sub>	The maximum root mean squared A-weighted noise level over a time period.
L <sub>A1</sub>	The A-weighted noise level which is exceeded for 1% of the time.
L <sub>A1,1minute</sub>	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
L <sub>A10</sub>	The A-weighted noise level which is exceeded for 10% of the time.
L <sub>Aeq</sub>	The energy average A-weighted noise level.
L <sub>A50</sub>	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
L <sub>A90</sub>	The A-weighted noise level exceeded for 90% of the time, also referred to as the “background” noise level and commonly used to derive noise limits.
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period.
L <sub>Ceq</sub>	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 (m).
VTG	The vertical temperature gradient in degrees Celsius per 100 m 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: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
Evening	Monday – Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays: 6:00 pm to 10:00 pm.
Morning Shoulder	Monday – Saturday: 5:00 am to 7:00 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 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 NPfI 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 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 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  $L_{Aeq,15\text{minute}}$  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  $L_{A1,1\text{minute}}$ . The EPA accepts sleep disturbance analysis based on either the  $L_{A1,1\text{minute}}$  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 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 Attended noise monitoring equipment**

Item	Serial number	Calibration due date	Relevant standard
Brüel and Kjær2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
SVAN SV-36 acoustic calibrator	75592	09/10/2026	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 – Q3 2025<sup>1</sup>

Location	Start date and time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>Aeq</sub> dB	L <sub>A50</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB
A	27/08/2025 5:06	65	57	54	51	51	47	44
B	27/08/2025 5:24	77	74	68	64	59	51	45
F	27/08/2025 5:46	81	60	53	54	49	45	42
G	27/08/2025 6:12	66	47	41	42	39	38	36
H	27/08/2025 6:30	57	53	47	45	45	42	38
H	27/08/2025 7:00	57	52	48	46	46	44	41
G	27/08/2025 7:18	65	53	50	48	47	44	42
F	27/08/2025 7:43	81	67	55	56	51	48	45
B	27/08/2025 8:03	74	72	68	64	63	57	49
A	27/08/2025 8:21	65	58	53	50	49	47	41
A	27/08/2025 18:00	62	60	58	56	56	54	51
B	27/08/2025 18:17	77	76	72	68	66	59	51
F	27/08/2025 18:36	82	65	58	59	55	51	47
G	27/08/2025 19:01	60	48	46	44	44	42	39
H	27/08/2025 19:21	56	49	46	44	43	41	38

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 – Q3 2025**

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north <sup>1</sup>	Cloud cover 1/8s
A	27/08/2025 5:06	14.3	<0.5	-	0
B	27/08/2025 5:24	14.5	<0.5	-	0
F	27/08/2025 5:46	14.4	<0.5	-	0
G	27/08/2025 6:12	14.9	<0.5	-	0
H	27/08/2025 6:30	15.1	<0.5	-	0
H	27/08/2025 7:00	16.1	<0.5	-	1
G	27/08/2025 7:18	16.4	<0.5	-	1
F	27/08/2025 7:43	18.2	<0.5	-	2
B	27/08/2025 8:03	19.0	<0.5	-	2
A	27/08/2025 8:21	20.1	<0.5	-	2
A	27/08/2025 18:00	16.5	2.7	280	0
B	27/08/2025 18:17	16.2	2.4	270	0
F	27/08/2025 18:36	15.8	2.2	280	0
G	27/08/2025 19:01	15.2	1.7	285	0
H	27/08/2025 19:21	14.8	2.1	270	0

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 – Q3 2025**

Location	Start date and time (period)	Wind		Stability class	Very enhancing? <sup>1</sup>	Limit, dB		Site level, dB <sup>2</sup>		Exceedance	
		Speed (m/s)	Direction <sup>4</sup>			L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>	L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>	L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>
A	27/08/2025 5:06	0.7	254	F	No	35	52	IA	IA	No	No
B	27/08/2025 5:24	0.7	294	F	No	35	52	IA	IA	No	No
F	27/08/2025 5:46	0.5	137	F	No	35	52	IA	IA	No	No
G	27/08/2025 6:12	0.3	57	F	No	35	52	IA	IA	No	No
H	27/08/2025 6:30	0.2	3	F	No	35	52	34	45	No	No
H	27/08/2025 7:00	0.4	248	A	No	44	N/A	42	N/A	No	N/A
G	27/08/2025 7:18	0.2	329	A	No	43	N/A	43	N/A	No	N/A
F	27/08/2025 7:43	0.4	60	A	No	40	N/A	IA	N/A	No	N/A
B	27/08/2025 8:03	0.5	1	A	No	40	N/A	IA	N/A	No	N/A
A	27/08/2025 8:21	0.9	61	A	No	42	N/A	IA	N/A	No	N/A
A	27/08/2025 18:00	3.6	223	D	Yes	40	N/A	IA	N/A	No	N/A
B	27/08/2025 18:17	3.4	224	E	Yes	40	N/A	IA	N/A	No	N/A
F	27/08/2025 18:36	3.6	226	D	Yes	35	N/A	IA	N/A	No	N/A
G	27/08/2025 19:01	1.9	230	F	No	39	N/A	IA	N/A	No	N/A

Location	Start date and time (period)	Wind		Stability class	Very enhancing? <sup>1</sup>	Limit, dB		Site level, dB <sup>2</sup>		Exceedance	
		Speed (m/s)	Direction <sup>4</sup>			L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>	L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>	L <sub>Aeq,15minute</sub>	L <sub>Amax</sub>
H	27/08/2025 19:21	2.1	221	F	Yes	46	N/A	IA	N/A	No	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 L<sub>Aeq,15minute</sub>, includes modifying factor penalties if applicable.
  - 3. Degrees magnetic north, “-” indicates calm conditions.
  - 4. MS = Morning Shoulder period; D = Day period; E = Evening period.

## 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 the morning shoulder, day and evening periods on Wednesday 27 August 2025 at five monitoring locations.

Noise levels from the site complied with relevant limits at all monitoring locations during the Q3 2025 survey.

---

# Appendix A

Noise perception and examples

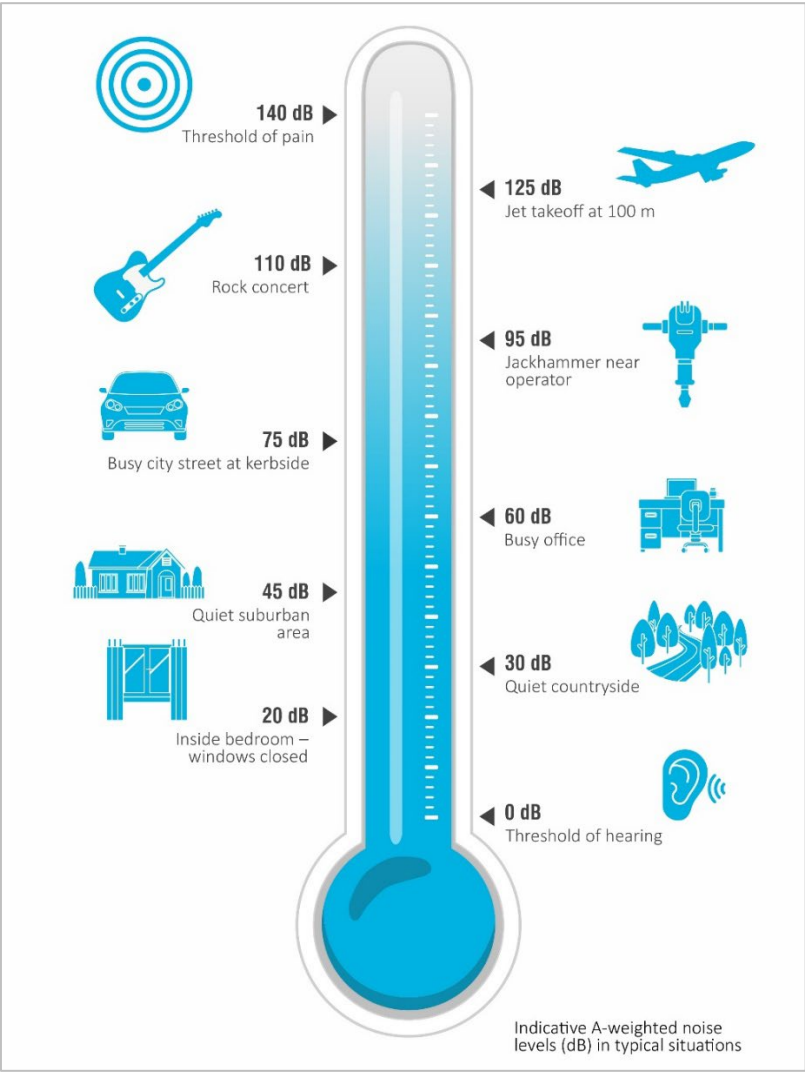
---

# 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<sup>a</sup> on privately-owned land.

*Table 2: Operational noise criteria dB*

Noise Assessment Location <sup>a</sup>	Morning Shoulder <i>L<sub>Aeq</sub> (15 min)</i>	Morning Shoulder <i>L<sub>Amax</sub></i>	Day <i>L<sub>Aeq</sub> (15 min)</i>	Evening <i>L<sub>Aeq</sub> (15 min)</i>
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

<sup>a</sup> 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 <sup>a</sup> )
Pacific Highway	60 dB(A) L <sub>Aeq</sub> (15 hour)
Local roads	55 dB(A) L <sub>Aeq</sub> (1 hour)

<sup>a</sup> 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:
  - (a) take all reasonable steps to minimise noise from construction and operational activities, including low frequency noise and other audible characteristics, associated with the development;
  - (b) implement reasonable and feasible noise attenuation measures on all plant and equipment that will operate in noise sensitive areas;
  - (c) operate a comprehensive noise management system commensurate with the risk of impact;
  - (d) 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);
  - (e) 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
  - (f) 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:
  - (a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;
  - (b) be prepared in consultation with the EPA;
  - (c) describe the measures to be implemented to ensure:
    - (i) compliance with the noise criteria and operating conditions in this consent;
    - (ii) best practice management is being employed;
    - (iii) noise impacts of the development are minimised during noise-enhancing meteorological conditions when the noise criteria in this consent do not apply (see NPfl);
  - (d) describe the noise management system in detail; and
  - (e) include a monitoring program that:
    - (i) is capable of evaluating the performance of the development;
    - (ii) monitors noise at the nearest and/or most affected residences;
    - (iii) adequately supports the noise management system;
    - (iv) includes a protocol for distinguishing noise emissions of the development from any neighbouring developments; and
    - (v) 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 Assesment 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

# Environment Protection Licence

Licence - 20611

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 L <sub>Aeq</sub> (15 min)	Morning Shoulder L <sub>Amax</sub>	Day L <sub>Aeq</sub> (15 min)	Evening L <sub>Aeq</sub> (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 NPfI (EPA 2017).

The noise limits provided in **Table 5** apply under standard and noise-enhancing meteorological conditions (as defined in the NPfI) 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 NPfI, 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 <sub>Aeq</sub> (15 hour)
Local Roads	55 dB L <sub>Aeq</sub> (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
ENV-MP-KEQ008	Version 4C	17/06/2024	17/06/2027	E&D Manager	21 of 37

---

# Appendix C

Calibration certificates

---

## CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

Page 1 of 11

### 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 <b>Environmental conditions</b> 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



## Summary

Preliminary inspection	<b><u>Passed</u></b>
Environmental conditions, Prior to calibration	<b><u>Passed</u></b>
Reference information	<b><u>Passed</u></b>
Indication at the calibration check frequency	<b><u>Passed</u></b>
Acoustical signal tests of a frequency weighting, C weighting	<b><u>Passed</u></b>
Self-generated noise, Microphone installed	<b><u>Passed</u></b>
Self-generated noise, Electrical	<b><u>Passed</u></b>
Electrical signal tests of frequency weightings, A weighting	<b><u>Passed</u></b>
Electrical signal tests of frequency weightings, C weighting	<b><u>Passed</u></b>
Electrical signal tests of frequency weightings, Z weighting	<b><u>Passed</u></b>
Frequency and time weightings at 1 kHz	<b><u>Passed</u></b>
Long-term stability, Reference	<b><u>Passed</u></b>
Level linearity on the reference level range, Upper	<b><u>Passed</u></b>
Level linearity on the reference level range, Lower	<b><u>Passed</u></b>
Toneburst response, Time-weighting Fast	<b><u>Passed</u></b>
Toneburst response, Time-weighting Slow	<b><u>Passed</u></b>
Toneburst response, LAE	<b><u>Passed</u></b>
C-weighted peak sound level, 8 kHz	<b><u>Passed</u></b>
C-weighted peak sound level, 500 Hz	<b><u>Passed</u></b>
Overload indication	<b><u>Passed</u></b>
Long-term stability, 1. relative	<b><u>Passed</u></b>
High-level stability	<b><u>Passed</u></b>
Long-term stability, 2. relative	<b><u>Passed</u></b>
Environmental conditions, Following calibration	<b><u>Passed</u></b>

The sound level meter submitted for testing successfully completed the 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 specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

Instruments

<u>Category:</u>	<u>Type:</u>	<u>Manufacturer:</u>	<u>Serial No.:</u>
Voltmeter	DMM34461A	Keysight / Agilent	MY60055667
Generator	Pulse Generator	Bruel & Kjaer	BK3161-105338
Calibrator	4226	Bruel & Kjaer	3222931
AmplifierDivider	WB-3630 Output Module	Bruel & Kjaer	3330940
Adaptor	WA0302B, 15 pF	Bruel & Kjaer	2747050

## Preliminary inspection

Visually inspect instrument, and operate all relevant controls. (clause 5)

Result

Visual inspection	OK
-------------------	----

## Environmental conditions, Prior to calibration

Actual environmental conditions prior to calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured [Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	22.20
Air pressure	101.30	-21.30	3.70	100.40
Relative humidity	50.00	-25.00	20.00	51.20

## Reference information

Information about reference range, level and channel. (clause 22.h + 22.m)

	Value [dB SPL]
Reference sound pressure level	94
Reference level range	140
Channel number	1

## Indication at the calibration check frequency

Measure and adjust sound level meter using the supplied calibrator. (clause 10 + 22.m)

	Expected [dB SPL / Hz]	Measured [dB SPL / Hz]	Uncertainty [dB]
Calibration check frequency (in-house calibrator)	1000.00	1000.00	1.00
Initial indication (in-house calibrator)	93.93	93.83	0.20
Adjusted indication (in-house calibrator)	93.93	93.86	0.20

## Acoustical signal tests of a frequency weighting, C weighting

Frequency weightings measured acoustically with a calibrated multi-frequency sound calibrator. Averaging time is 10 seconds, and the result is the average of 2 measurements. (clause 12)

	Coupler Pressure Lc [dB SPL]	Mic. Correction C4226 [dB]	Body Influence [dB]	Expected [dB SPL]	Measured [dB SPL]	Accept - Limit [dB]	Accept + Limit [dB]	Deviation [dB]	Uncertainty [dB]
1000Hz, Ref. (1st)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
1000Hz, Ref. (2nd)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
1000Hz, Ref. (Average)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
125.89Hz (1st)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
125.89Hz (2nd)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
125.89Hz (Average)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
7943.3Hz (1st)	93.69	2.80	-0.08	87.97	87.74	-2.5	1.5	-0.23	0.52
7943.3Hz (2nd)	93.69	2.80	-0.08	87.97	87.73	-2.5	1.5	-0.24	0.52
7943.3Hz (Average)	93.69	2.80	-0.08	87.97	87.73	-2.5	1.5	-0.24	0.52

## Self-generated noise, Microphone installed

Self-generated noise measured with microphone submitted for periodic testing. Averaging time is 30 seconds. An anechoic chamber is used to isolate environmental noise.

The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.1)

	Max [dB SPL]	Measured [dB SPL]	Uncertainty [dB]
A weighted	17.70	17.09	0.50

## Self-generated noise, Electrical

Self-generated noise measured in most sensitive range, with electrical substitution for microphone, according to manufactures specifications.

The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.2)

	Max [dB SPL]	Measured [dB SPL]	Uncertainty [dB]
A weighted	13.60	12.67	0.30
C weighted	14.30	12.97	0.30
Z weighted	19.40	18.08	0.30

## Electrical signal tests of frequency weightings, A weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)

Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	1.56	95.00	95.06	0.00	0.07	95.13	-1.0	1.0	0.13	0.12
125.89Hz	-8.54	95.00	95.02	0.00	0.07	95.09	-1.0	1.0	0.09	0.12
251.19Hz	-16.04	95.00	94.97	0.00	0.14	95.11	-1.0	1.0	0.11	0.12
501.19Hz	-21.44	95.00	94.97	0.00	0.29	95.26	-1.0	1.0	0.26	0.12
1995.3Hz	-25.84	95.00	95.01	-0.01	-0.02	94.98	-1.0	1.0	-0.02	0.12
3981.1Hz	-25.64	95.00	94.99	-0.02	-0.02	94.95	-1.0	1.0	-0.05	0.12
7943.3Hz	-23.54	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-18.04	95.00	94.11	0.87	0.18	95.16	-16.0	2.5	0.16	0.12

## Electrical signal tests of frequency weightings, C weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)

Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-23.84	95.00	95.02	0.00	0.07	95.09	-1.0	1.0	0.09	0.12
125.89Hz	-24.44	95.00	95.04	0.00	0.07	95.11	-1.0	1.0	0.11	0.12
251.19Hz	-24.64	95.00	95.00	0.00	0.14	95.14	-1.0	1.0	0.14	0.12
501.19Hz	-24.64	95.00	95.03	0.00	0.29	95.32	-1.0	1.0	0.32	0.12
1995.3Hz	-24.44	95.00	95.04	-0.01	-0.02	95.01	-1.0	1.0	0.01	0.12
3981.1Hz	-23.84	95.00	95.00	-0.02	-0.02	94.96	-1.0	1.0	-0.04	0.12
7943.3Hz	-21.64	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-16.14	95.00	94.08	0.87	0.18	95.13	-16.0	2.5	0.13	0.12

## Electrical signal tests of frequency weightings, Z weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)

Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-24.64	95.00	95.03	0.00	0.07	95.10	-1.0	1.0	0.10	0.12
125.89Hz	-24.64	95.00	95.01	0.00	0.07	95.08	-1.0	1.0	0.08	0.12
251.19Hz	-24.64	95.00	95.00	0.00	0.14	95.14	-1.0	1.0	0.14	0.12
501.19Hz	-24.64	95.00	95.00	0.00	0.29	95.29	-1.0	1.0	0.29	0.12
1995.3Hz	-24.64	95.00	95.01	-0.01	-0.02	94.98	-1.0	1.0	-0.02	0.12
3981.1Hz	-24.64	95.00	95.02	-0.02	-0.02	94.98	-1.0	1.0	-0.02	0.12
7943.3Hz	-24.64	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-24.64	95.00	94.14	0.87	0.18	95.19	-16.0	2.5	0.19	0.12

## Frequency and time weightings at 1 kHz

Frequency and time weighting measured at 1 kHz with electrical signal in reference range. Measured relative to A-weighted and Fast response. (clause 14)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
LAF, Ref.	94.00	94.00	-0.5	0.5	0.00	0.12
LCF	94.00	94.00	-0.2	0.2	0.00	0.12
LZF	94.00	94.00	-0.2	0.2	0.00	0.12
LAS	94.00	93.96	-0.1	0.1	-0.04	0.12
LAeq	94.00	93.99	-0.1	0.1	-0.01	0.12

## Long-term stability, Reference

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)  
Adjusting to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]		[dB]
Reference	94.00	-0.5	0.5	0.00	2023-12-20 13:24:32	0.10

## Level linearity on the reference level range, Upper

Level linearity in reference range, measured at 8 kHz until overload. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
99 dB	99.00	99.00	-0.8	0.8	0.00	0.13
104 dB	104.00	104.00	-0.8	0.8	0.00	0.13
109 dB	109.00	109.00	-0.8	0.8	0.00	0.13
114 dB	114.00	114.02	-0.8	0.8	0.02	0.13
119 dB	119.00	119.02	-0.8	0.8	0.02	0.13
124 dB	124.00	124.02	-0.8	0.8	0.02	0.13
129 dB	129.00	129.02	-0.8	0.8	0.02	0.13
134 dB	134.00	134.02	-0.8	0.8	0.02	0.13
135 dB	135.00	135.02	-0.8	0.8	0.02	0.13
136 dB	136.00	136.02	-0.8	0.8	0.02	0.13
137 dB	137.00	137.02	-0.8	0.8	0.02	0.13
138 dB	138.00	138.02	-0.8	0.8	0.02	0.13
139 dB	139.00	139.02	-0.8	0.8	0.02	0.13
140 dB	140.00	140.01	-0.8	0.8	0.01	0.13

## Level linearity on the reference level range, Lower

Level linearity in reference range, measured at 8 kHz down to lower limit, or until underrange. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
89 dB	89.00	89.00	-0.8	0.8	0.00	0.13
84 dB	84.00	84.00	-0.8	0.8	0.00	0.13
79 dB	79.00	78.99	-0.8	0.8	-0.01	0.13
74 dB	74.00	73.99	-0.8	0.8	-0.01	0.13
69 dB	69.00	69.00	-0.8	0.8	0.00	0.13
64 dB	64.00	63.99	-0.8	0.8	-0.01	0.13
59 dB	59.00	58.99	-0.8	0.8	-0.01	0.13
54 dB	54.00	54.00	-0.8	0.8	0.00	0.13
49 dB	49.00	49.00	-0.8	0.8	0.00	0.13
44 dB	44.00	44.01	-0.8	0.8	0.01	0.13
39 dB	39.00	39.02	-0.8	0.8	0.02	0.24
34 dB	34.00	34.06	-0.8	0.8	0.06	0.24
30 dB	30.00	30.14	-0.8	0.8	0.14	0.24
29 dB	29.00	29.16	-0.8	0.8	0.16	0.24
28 dB	28.00	28.19	-0.8	0.8	0.19	0.24
27 dB	27.00	27.26	-0.8	0.8	0.26	0.24
26 dB	26.00	26.29	-0.8	0.8	0.29	0.24
25 dB	25.00	25.39	-0.8	0.8	0.39	0.24
24 dB	24.00	24.46	-0.8	0.8	0.46	0.24

## Toneburst response, Time-weighting Fast

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	136.00	135.99	-0.5	0.5	-0.01	0.12
2 ms Burst	119.00	118.93	-1.5	1.0	-0.07	0.12
0.25 ms Burst	110.00	109.82	-3.0	1.0	-0.18	0.12

## Toneburst response, Time-weighting Slow

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	129.60	129.63	-0.5	0.5	0.03	0.12
2 ms Burst	110.00	110.02	-3.0	1.0	0.02	0.12

## Toneburst response, LAE

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	130.00	129.99	-0.5	0.5	-0.01	0.12
2 ms Burst	110.00	109.96	-1.5	1.0	-0.04	0.12
0.25 ms Burst	101.00	100.85	-3.0	1.0	-0.15	0.12

## C-weighted peak sound level, 8 kHz

Peak-response to a 8 kHz single-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	132.00	132.00	-0.5	0.5	0.00	0.09
Single Sine	135.40	135.30	-2.0	2.0	-0.10	0.20

## C-weighted peak sound level, 500 Hz

Peak-response to a 500 Hz half-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	135.00	135.00	-0.5	0.5	0.00	0.09
Half-sine, Positive	137.40	137.12	-1.0	1.0	-0.28	0.12
Half-sine, Negative	137.40	137.12	-1.0	1.0	-0.28	0.12

## Overload indication

Overload indication in the least sensitive range determined with a 4 kHz positive/negative half-cycle signal. (clause 20)

	Measured / Input Level	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous	140.00	-0.5	0.5	0.00	0.20
Half-sine, Positive	141.30	-10.0	10.0	1.30	0.20
Half-sine, Negative	141.60	-10.0	10.0	1.60	0.20
Difference	141.60	-1.5	1.5	0.30	0.24

## Long-term stability, 1. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)  
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL / Min]	[dB / Min]	[dB / Min]	[dB / Min]		[dB]
Measurement	94.00	-0.1	0.1	0.00	2023-12-20 13:49:50	0.10
Time passed	25.18	0.0	35.0	25.18		0.00

## High-level stability

High-level stability over 5 minutes, with steady 1kHz signal, 1dB below upper boundary. (clause 21)

	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
High-level, Ref.	139.00	-0.5	0.5	0.00	0.10
High-level, after 5min	139.00	-0.1	0.1	0.00	0.10

## Long-term stability, 2. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)  
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[Min / dB SPL]	[Min / dB]	[Min / dB]	[Min / dB]		[dB]
Wait	31.31	25.0	120.0	31.31		0.00
Measurement	94.00	-0.1	0.1	0.00	2023-12-20 13:56:36	0.10

## Environmental conditions, Following calibration

Actual environmental conditions following calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured
				[Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	23.30
Air pressure	101.30	-21.30	3.70	100.50
Relative humidity	50.00	-25.00	20.00	59.40

## **Australia**

### **SYDNEY**

Level 10 201 Pacific Highway  
St Leonards NSW 2065  
T 02 9493 9500

### **NEWCASTLE**

Level 3 175 Scott Street  
Newcastle NSW 2300  
T 02 4907 4800

### **BRISBANE**

Level 1 87 Wickham Terrace  
Spring Hill QLD 4000  
T 07 3648 1200

### **CANBERRA**

Suite 2.04 Level 2  
15 London Circuit  
Canberra City ACT 2601

### **ADELAIDE**

Level 4 74 Pirie Street  
Adelaide SA 5000  
T 08 8232 2253

### **MELBOURNE**

Suite 9.01 Level 9  
454 Collins Street  
Melbourne VIC 3000  
T 03 9993 1900

### **PERTH**

Suite 3.03  
111 St Georges Terrace  
Perth WA 6000  
T 08 6430 4800

## **Canada**

### **TORONTO**

2345 Yonge Street Suite 300  
Toronto ON M4P 2E5  
T 647 467 1605

### **VANCOUVER**

2015 Main Street  
Vancouver BC V5T 3C2  
T 604 999 8297

### **CALGARY**

700 2nd Street SW Floor 19  
Calgary AB T2P 2W2



[linkedin.com/company/emm-consulting-pty-limited](https://www.linkedin.com/company/emm-consulting-pty-limited)



[emmconsulting.com.au](http://emmconsulting.com.au)