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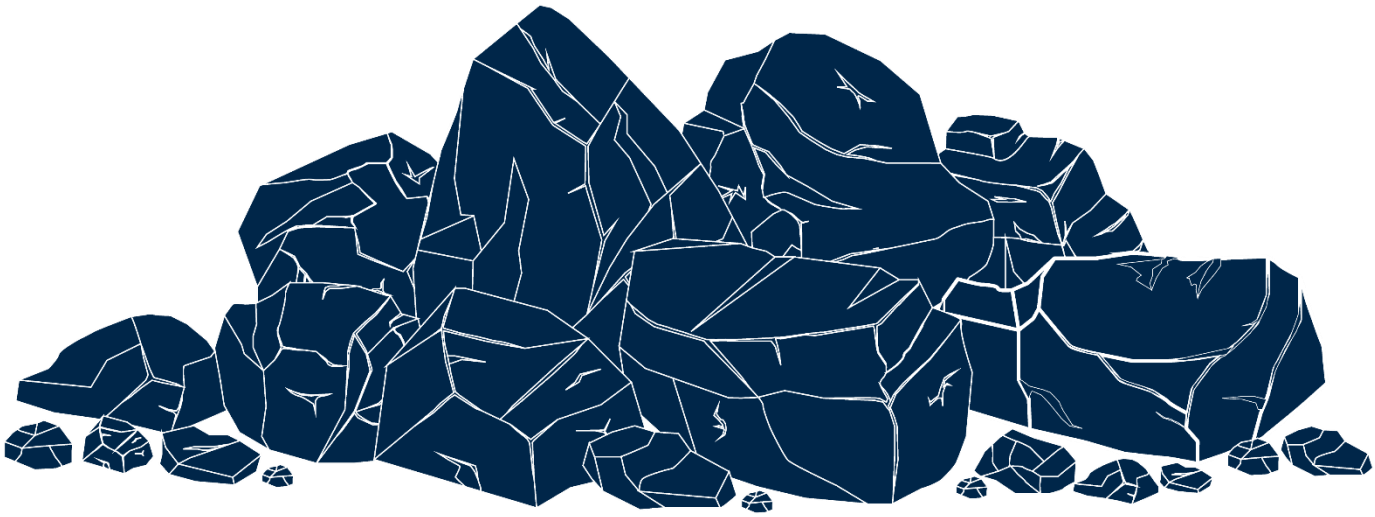
Karuah East Quarry

Environmental Monitoring Report

February 2025



Contents

1.0 Introduction

This report has been completed to meet the requirements of Section 66(6) of the *Protection of the Environment Operations Act 1997* and the NSW Environmental Protection Authority's (EPA) Requirements for Publishing Pollution Monitoring Data (EPA, 2013). This report summarises the required monitoring data under Environmental Protection Licence 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 February 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[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	Coordinates
DDG 1	4	South-West of Karuah East Quarry	54 Mill Hill Close, Karuah NSW 2324	32°38’04’’S 151°59’58’’E
DDG 2	5	South-West of Karuah East Quarry	64 Mill Hill Close, Karuah NSW 2324	32°38’02’’S 152°00’09’’E
DDG 3	6	South-West of Karuah East Quarry	Lot 251 DP1092111, Karuah NSW 2324	32°37’57’’S 151°59’41’’E
DDG 4	7	East of Karuah East Quarry	21 Halloran Road, North Arm Cove NSW 2324	32° 37' 30.87"S 152°01'10.18"E
DDG 5	8	South-West of Karuah East Quarry	Lot 21 DP1024341, Karuah NSW 2324	32° 37' 55.33"S 152°00'2.74"E
HVAS	9	South-West of Karuah East Quarry	64 Mill Hill Close, Karuah NSW 2324	32°38’03’’S 152°00’09’’E

2.1 Deposited Dust Monitoring

Deposited dust results for the 12-months prior-to and including February 2025 are summarised by **Table 7**.

Table 7 Deposited dust monitoring results.

Reporting Period	Start Date	End Date	Days	DDG 1 EPL ID 4	DDG 2 EPL ID 5	DDG 3 EPL ID 6	DDG 4 EPL ID 7	DDG 5 EPL ID 8
Mar-24	26/02/2024	28/03/2024	31	0.8	0.9	1.8	0.6	1.8
Apr-24	28/03/2024	29/04/2024	32	0.9	0.4	0.5	0.8	0.5
May-24	29/04/2024	29/05/2024	30	0.5	0.3	0.2	0.4	0.4
Jun-24	29/05/2024	28/06/2024	30	0.7	0.5	0.5	0.7	0.4
Jul-24	28/06/2024	30/07/2024	32	1.1	0.8	0.6	0.9	0.7
Aug-24	30/07/2024	30/08/2024	31	0.7	0.5	0.7	0.9	0.6
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
Progressive Annual Average				**1.2**	**0.9**	**1.0**	**1.5**	**0.9**

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^2/month.

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

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**.

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

Run Date	Total Suspended Particulates, TSP (µg/m^3)	Particulate Matter < 10 µm, PM10 (µg/m^3)
5/02/2025	50	27
11/02/2025	17	9
17/02/2025	30	11
23/02/2025	16	9
Monthly Average	**28.3**	**14.0**

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

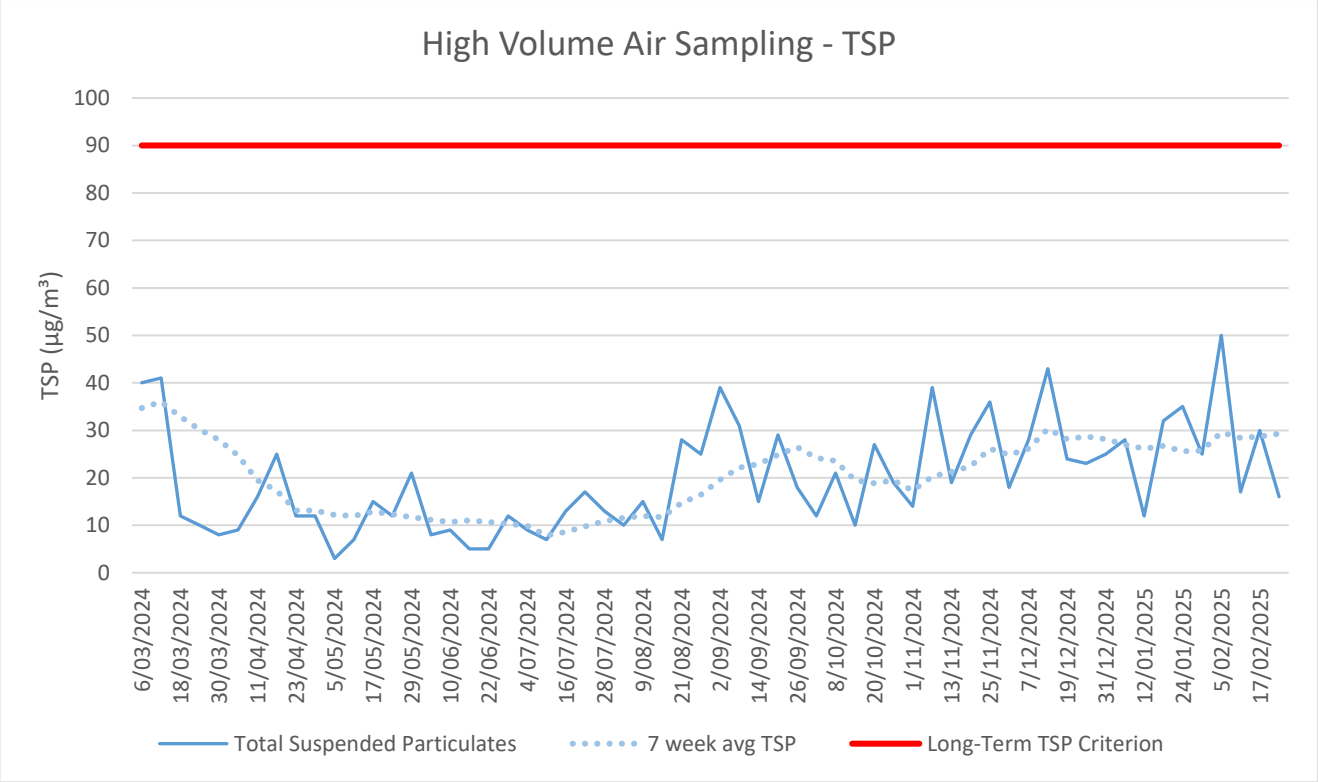


Figure 1 ***Long-term TSP monitoring trends.***

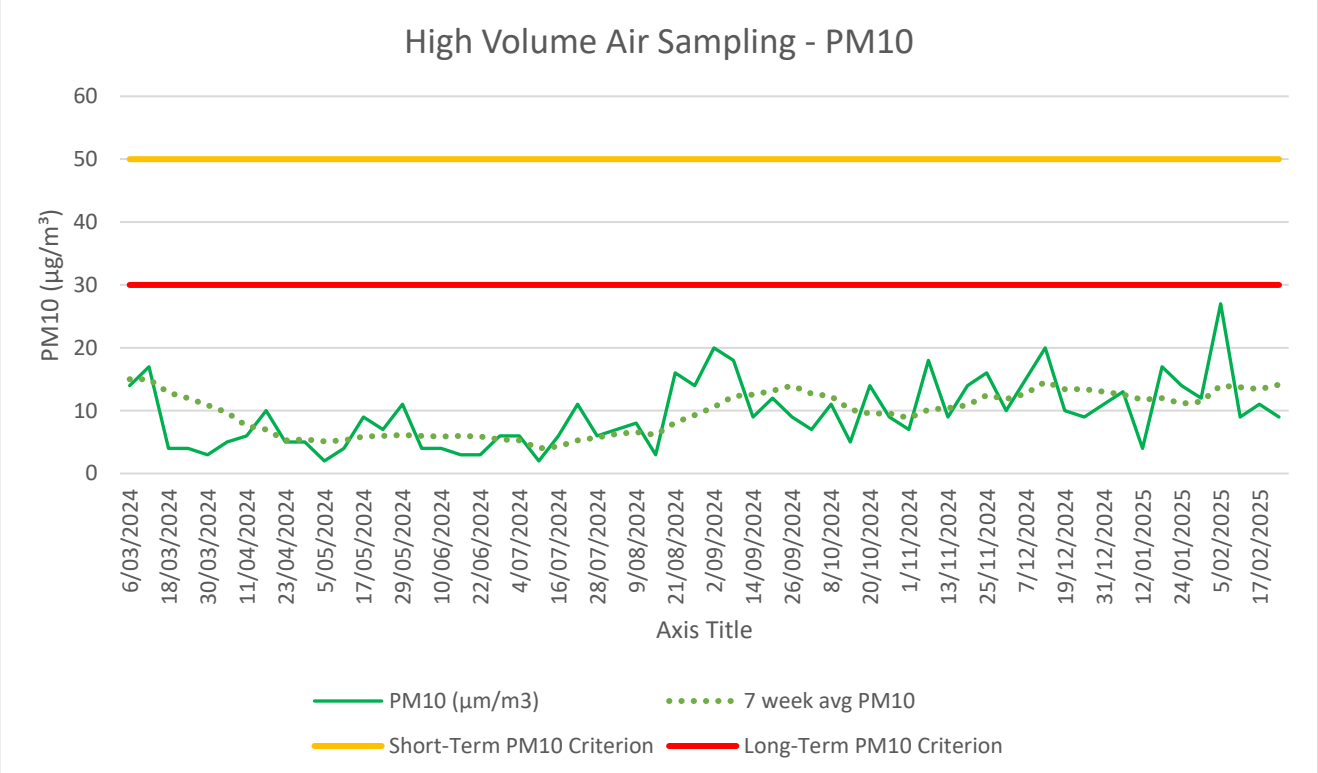


Figure 2 ***Long-term PM10 monitoring trends.***

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 was 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)
03/02/2025	11:04	RL 105	108.7	0.61
14/02/2025	13:41	RL 105	112.9	0.71

***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 completed on Wednesday, 05 February 2025 for the morning shoulder, day and evening period monitoring periods.

Noise levels from the site complied with the relevant limits at all monitoring locations during the Q1 2022 survey.

The results of the monitoring surveys are outlined by the Noise Monitoring Report provided by **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**.

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

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					
10/02/2025	7.1	3	<5	Not Visible	Controlled
24/02/2025	7.1	2	<5	Not Visible	Controlled
LDP 3 – Dam 3					
10/02/2025	7.2	16	9	Not Visible	Controlled
11/02/2025	7.1	24	15	Not Visible	Controlled
12/02/2025	7.1	18	12	Not Visible	Controlled
24/02/2025	7.3	12	7	Not Visible	Controlled
25/02/2025	7.2	10	6	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: **February 2025**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain[2]
		Max[1]	Min[2]	Ave[1]	Max[1]	Min[2]	Ave[1]	Max Gust[1]	Ave Speed[1]	Dir Ave[1]	Max[1]	Ave[1]	
		°C	°C	°C	°C	°C	°C	km/h	km/h	deg	W/m²	W/m²	mm
1	Sat	28.5	19.6	23.2	26.5	20.0	23.0	26.0	4.0	149	1190.7	165.6	1.0
2	Sun	28.3	16.9	21.9	26.0	17.4	21.6	31.9	5.1	158	1113.2	219.1	0.0
3	Mon	29.2	18.6	23.2	26.7	19.0	22.7	31.9	5.3	129	1085.8	267.4	0.0
4	Tue	30.5	20.2	24.4	28.1	20.6	23.9	28.4	5.3	137	1294.2	209.7	0.0
5	Wed	32.5	19.7	25.4	30.6	20.4	25.1	24.9	3.7	209	1220.7	203.9	0.0
6	Thu	35.7	21.3	26.1	33.2	21.5	25.5	37.9	5.1	167	958.3	212.9	0.2
7	Fri	30.2	18.2	23.6	27.9	18.9	23.5	26.0	4.5	153	1119.2	199.5	0.2
8	Sat	32.4	17.6	25.0	30.0	18.1	24.5	27.2	5.3	187	1006.6	278.8	0.0
9	Sun	33.1	19.7	25.4	30.4	19.9	24.8	24.9	4.3	180	1109.2	262.5	0.4
10	Mon	31.1	19.6	25.0	28.2	20.0	24.3	23.7	4.5	153	1128.3	219.1	0.0
11	Tue	27.1	16.5	20.2	25.3	16.7	20.0	28.4	2.8	210	582.4	93.5	11.0
12	Wed	25.3	16.6	20.0	24.4	16.7	19.8	17.8	2.6	209	1015.8	118.3	1.4
13	Thu	29.5	19.7	23.4	27.1	19.9	23.0	21.3	3.9	143	1089.2	171.5	0.0
14	Fri	29.7	20.0	24.9	28.0	20.9	24.6	40.2	7.0	219	1077.5	244.1	0.0
15	Sat	33.6	21.0	25.8	31.1	20.8	25.2	22.5	4.5	182	878.2	186.0	4.2
16	Sun	27.2	16.8	21.8	24.9	17.1	21.3	26.0	5.0	160	1085.0	191.5	0.0
17	Mon	23.6	10.8	16.8	21.3	11.1	16.5	47.3	6.1	168	1134.1	237.1	0.0
18	Tue	25.6	11.1	17.8	22.4	11.9	17.3	30.8	4.8	190	1047.5	262.3	0.0
19	Wed	30.0	14.6	20.8	26.8	15.2	20.4	26.0	4.2	155	924.2	273.3	0.0
20	Thu	28.1	17.0	22.6	25.7	17.7	22.2	33.1	6.3	100	1048.3	249.0	0.0
21	Fri	26.9	18.1	20.6	24.1	18.1	20.3	39.0	7.6	124	907.4	103.7	27.6
22	Sat	25.3	18.3	20.7	23.7	19.0	20.6	16.6	3.2	129	942.5	80.9	0.6
23	Sun	28.4	15.6	21.1	26.5	16.9	21.3	22.5	3.9	181	1167.5	186.0	0.0
24	Mon	32.0	17.3	23.8	30.4	18.2	23.5	23.7	4.5	191	863.2	263.0	0.0
25	Tue	35.8	22.6	26.7	33.2	22.4	25.9	26.0	5.6	157	827.4	234.5	0.0
26	Wed	28.7	20.4	22.8	26.3	20.1	22.2	24.9	4.0	212	981.6	98.1	0.0
27	Thu	30.1	18.3	23.4	27.7	18.7	22.9	26.0	4.5	147	1085.0	200.8	0.0
28	Fri	33.6	18.5	25.1	30.8	19.5	24.7	23.7	4.7	170	909.2	241.3	0.0
Ave or Total		**29.7**	**18.0**	**22.9**	**27.4**	**18.5**	**22.5**	**27.8**	**4.7**	**166.7**	**1028.3**	**202.6**	**46.6**
High		**35.8**	**22.6**	**26.7**	**33.2**	**22.4**	**25.9**	**47.3**	**7.6**		**1294.2**	**278.8**	**27.6**
Low		**23.6**	**10.8**	**16.8**	**21.3**	**11.1**	**16.5**	**16.6**	**2.6**		**582.4**	**80.9**	
												No. rain days >1mm:	**4**

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-25	1,822	54,080
Feb-25	3,048	95,968

8.0 Reporting

8.1 Reportable Environmental Incidents

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

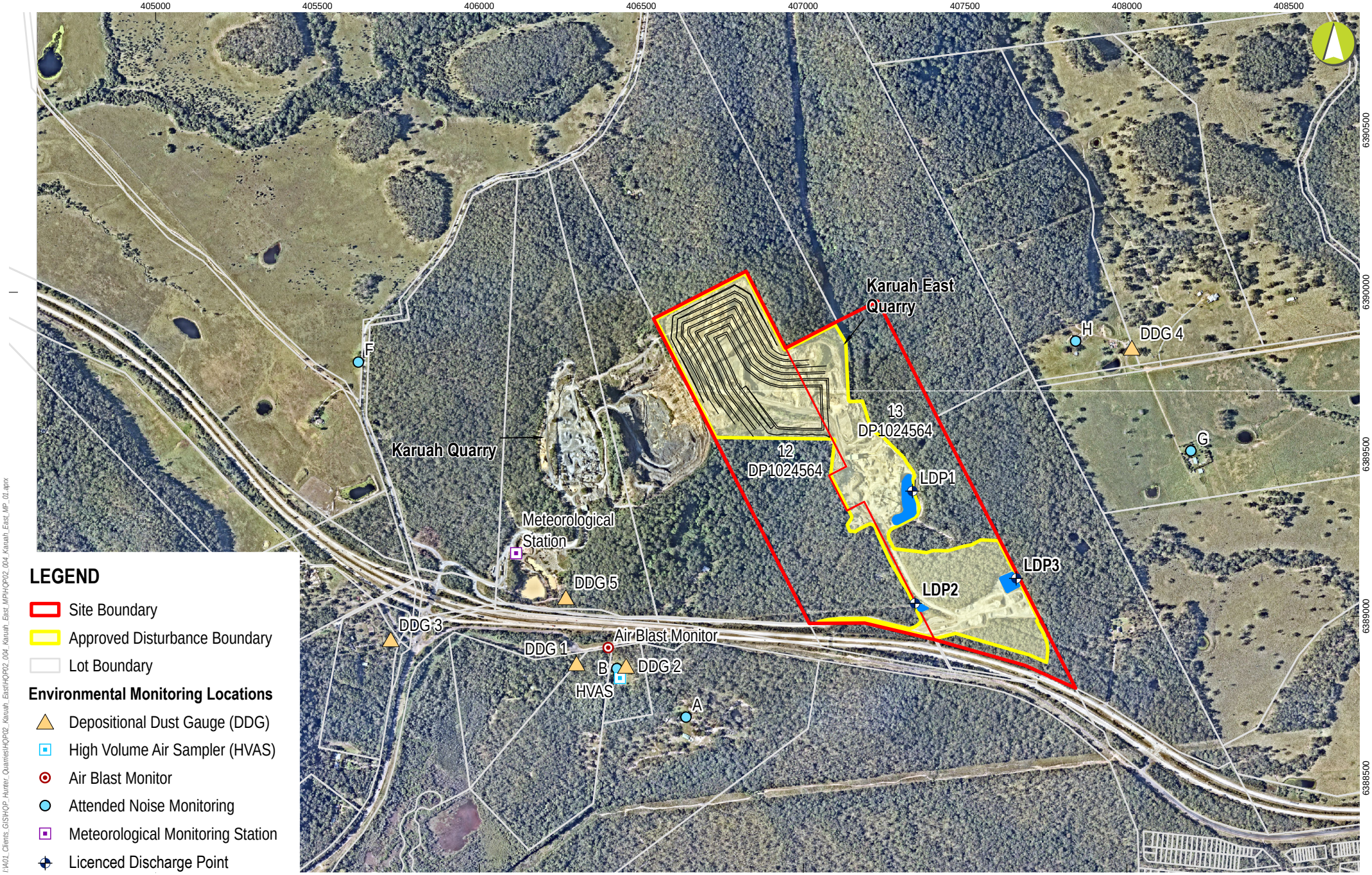
8.2 Reportable Non-Compliances

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

8.3 Community Complaints

During the Reporting Period, no community complaints were received by the Quarry.

Appendix 1 – EPL 20611 Monitoring Locations



LEGEND

- Site Boundary
- Approved Disturbance Boundary
- Lot Boundary

Environmental Monitoring Locations

- Depositional Dust Gauge (DDG)
- High Volume Air Sampler (HVAS)
- Air Blast Monitor
- Attended Noise Monitoring
- Meteorological Monitoring Station
- Licenced Discharge Point

0 110 220 330 440 m

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Sheet Size : A4

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GDA 1994 MGA Zone 56
8/03/2024

Karuah East Quarry

Environmental Monitoring Report

APPENDIX 1 - Environmental Monitoring Locations

Appendix 2 – Q2 2025 Noise Monitoring Report

Karuah East Quarry

Quarterly attended noise monitoring - Q1 2025

Prepared for Karuah East Quarry Pty Limited

February 2025

Karuah East Quarry

Quarterly attended noise monitoring - Q1 2025

Karuah East Quarry Pty Limited

E250042 RP#1

February 2025

Version	Date	Prepared by	Reviewed by	Comments
1	11 February 2025	Kirsten Garlick	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant
11 February 2025

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TABLE OF CONTENTS

Appendices

Tables

Figures

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.

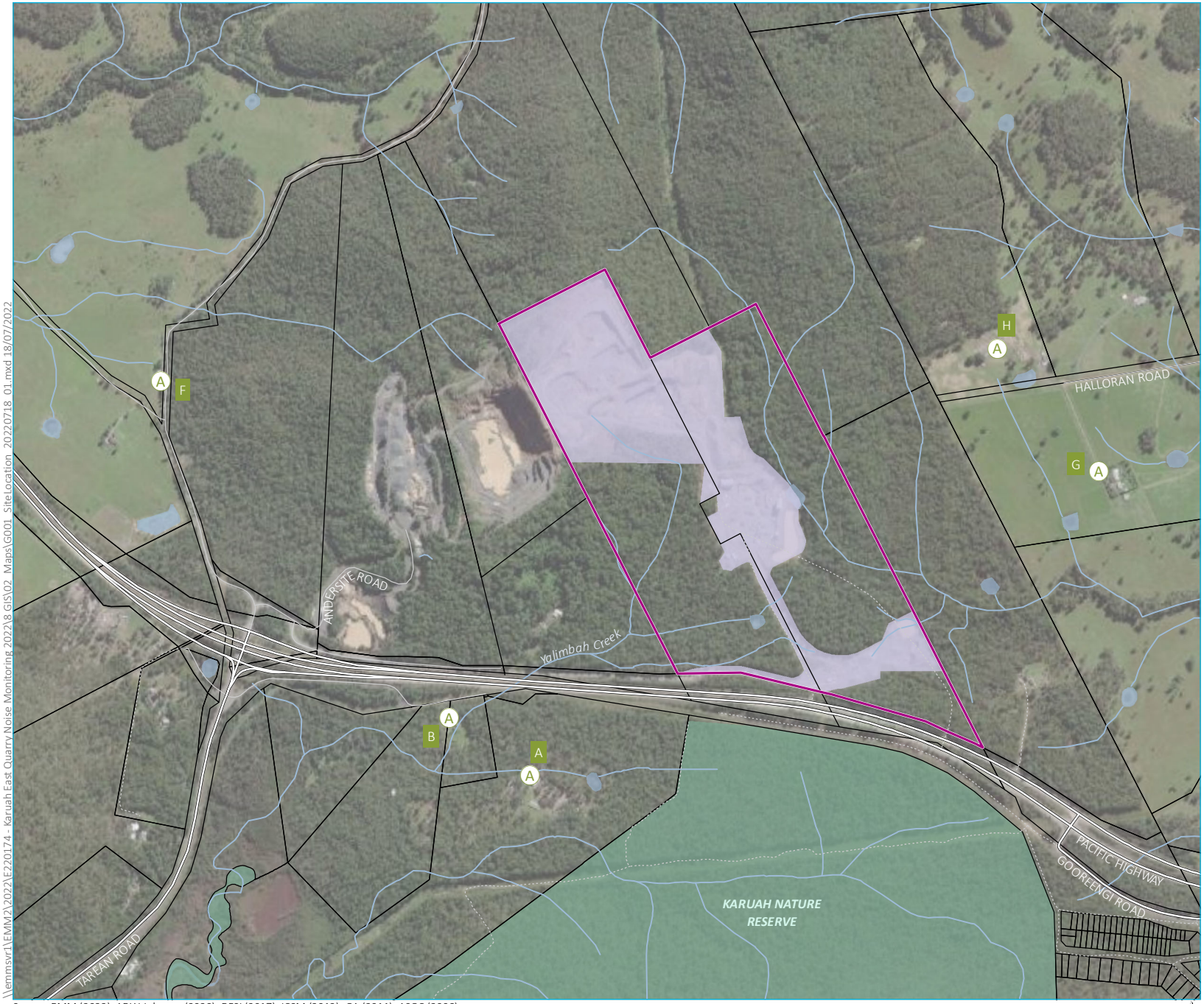
Attended environmental noise monitoring described in this report was done during morning shoulder, day and evening period on Wednesday 5 February 2025 at five monitoring locations.

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



KEY

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

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

0 0.5 1 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM2\2022\E220174 - Karuah East Quarry Noise Monitoring 2022\8 GIS\02 Maps\G001 Site Location 20220718 01.mxd 18/07/2022

Attended noise monitoring locations

Karuah East Quarry
Quarterly attended noise monitoring
Figure 1.1

EMM
creating opportunities

1.3 Terminology and abbreviations

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

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 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 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 $L_{Aeq,15minute}$ 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 Kirsten Garlick. 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 NA-28 sound level meter	01070590	27/5/2026	IEC 61672-1:2002
Pulsar Model 105 calibrator	96080	26/2/2025	IEC 60942:2003

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 2025[1]

Location	Start date and time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
A	05/02/2025 05:00	61	56	54	52	52	49	46
A	05/02/2025 08:31	74	71	66	63	61	57	53
A	05/02/2025 18:00	69	55	51	50	49	46	42
B	05/02/2025 05:21	74	71	67	62	59	51	45
B	05/02/2025 08:11	63	62	61	60	60	51	46
B	05/02/2025 18:19	74	71	65	62	59	54	47
F	05/02/2025 05:43	78	60	52	53	48	46	43
F	05/02/2025 07:47	81	70	49	56	46	43	38
F	05/02/2025 18:41	80	63	51	54	48	44	40
G	05/02/2025 06:09	62	53	46	45	43	42	39
G	05/02/2025 07:20	56	49	45	42	41	39	36
G	05/02/2025 19:07	53	47	44	42	41	39	36
H	05/02/2025 06:30	66	54	52	48	44	41	38
H	05/02/2025 07:00	58	52	51	47	46	40	37
H	05/02/2025 19:26	56	50	48	45	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 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Q1 2025

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	05/02/2025 05:00	23.1	-	-	1
A	05/02/2025 08:31	27.5	-	-	2
A	05/02/2025 18:00	27.0	-	-	8
B	05/02/2025 05:21	22.3	-	-	2
B	05/02/2025 08:11	26.0	-	-	1
B	05/02/2025 18:19	28.0	-	-	8
F	05/02/2025 05:43	22.6	-	-	2
F	05/02/2025 07:47	24.9	-	-	1
F	05/02/2025 18:41	26.0	0.8	180	8
G	05/02/2025 06:09	21.6	-	-	3
G	05/02/2025 07:20	31.4	-	-	1
G	05/02/2025 19:07	25.7	1.0	200	7
H	05/02/2025 06:30	21.8	-	-	3
H	05/02/2025 07:00	26.6	-	-	2
H	05/02/2025 19:26	24.8	0.7	200	7

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 NPfI.

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 2025

Location	Start Date and Time (Period)	Wind		Stability Class	Very enhancing? [1]	Limit, dB		Site level, dB [2]		Exceedance	
		Speed m/s	Direction [4]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
A	05/02/2025 05:00 (MS)	0.2	192	F	No	35	52	IA	IA	Nil	Nil
A	05/02/2025 08:31 (D)	0.9	268	A	No	42	N/A	IA	N/A	Nil	N/A
A	05/02/2025 18:00 (E)	1.2	151	F	No	40	N/A	IA	N/A	Nil	N/A
B	05/02/2025 05:21 (MS)	0.4	206	F	No	35	52	IA	IA	Nil	Nil
B	05/02/2025 08:11 (D)	0.5	165	A	No	40	N/A	IA	N/A	Nil	N/A
B	05/02/2025 18:19 (E)	0.9	200	F	No	40	N/A	IA	N/A	Nil	N/A
F	05/02/2025 05:43 (MS)	0.2	177	F	No	35	52	IA	IA	Nil	Nil
F	05/02/2025 07:47 (D)	0.3	62	A	No	40	N/A	IA	N/A	Nil	N/A
F	05/02/2025 18:41 (E)	1.1	183	F	No	35	N/A	IA	N/A	Nil	N/A
G	05/02/2025 06:09 (MS)	0.2	193	F	No	35	52	<30	42	Nil	Nil
G	05/02/2025 07:20 (D)	0.3	259	A	No	43	N/A	<35	N/A	Nil	N/A
G	05/02/2025 19:07 (E)	0.8	164	F	No	39	N/A	IA	N/A	Nil	N/A
H	05/02/2025 06:30 (MS)	0.4	248	B	No	35	52	<20	30	Nil	Nil
H	05/02/2025 07:00 (D)	0.3	298	F	No	44	N/A	<25	N/A	Nil	N/A

Table 4.3 Site noise levels and limits – Q1 2025

Location	Start Date and Time (Period)	Wind		Stability Class	Very enhancing? [1]	Limit, dB		Site level, dB [2]		Exceedance	
		Speed m/s	Direction [4]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
H	05/02/2025 19:26 (E)	0.8	163	F	No	46	N/A	IA	N/A	Nil	N/A

Notes: 1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.

2. Site-only $L_{Aeq,15minute}$, 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 period on Wednesday 5 February 2025 at five monitoring locations.

Noise levels from the site complied with relevant limits at all monitoring locations during the Q1 2025 survey.

Appendix A
Noise perception and examples

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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

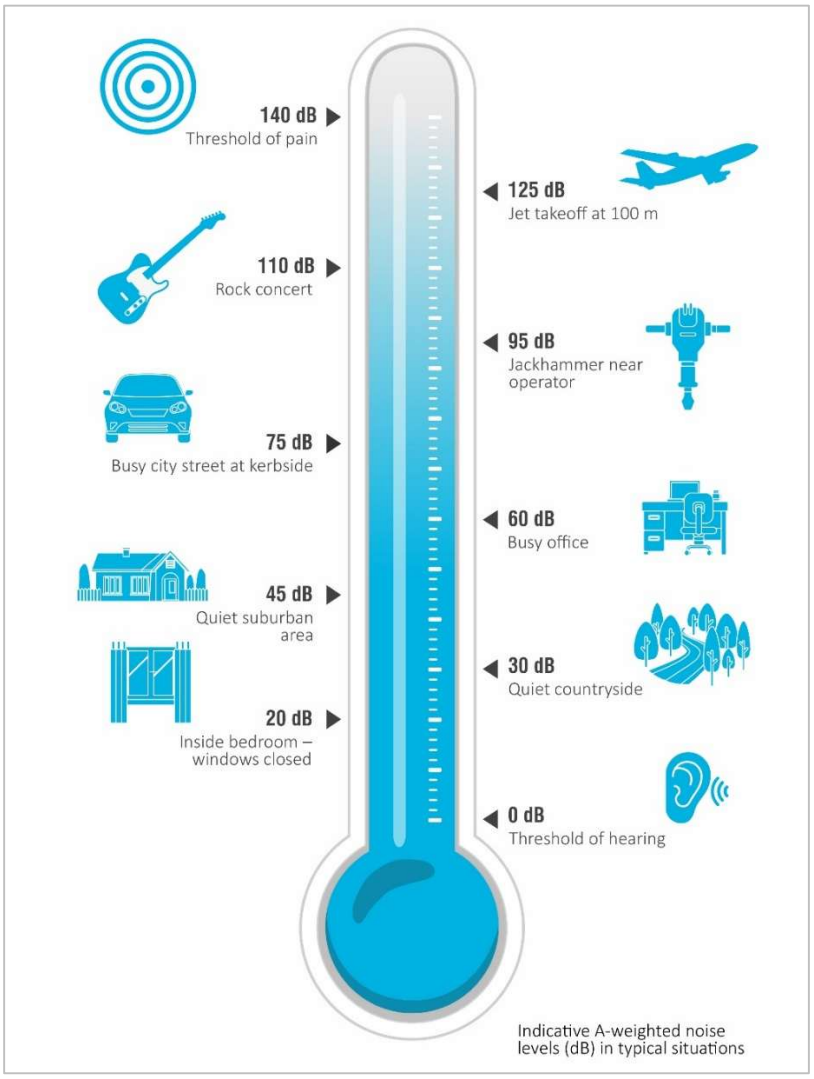

Figure A.1 Common noise levels

Appendix B
Regulator documents

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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 $L_{Aeq\ (15\ min)}$	Morning Shoulder L_{Amax}	Day $L_{Aeq\ (15\ min)}$	Evening $L_{Aeq\ (15\ min)}$
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

[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:
   (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 NPfI);
   (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 NPfI);
   (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

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
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:
a) Wind speed greater than 3 metres/second at 10 metres above ground level; or
b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) 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:
a) 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;
b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises;
c) at the most affected point at a location where there is no dwelling at the location; and
d) 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:
i) at a location other than an area prescribed in part (a) and part (b); and/or
ii) 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.

L5 Blasting

L5.1 Blasting in or on the premises must only be carried out between the hours of 9:00 am and 4:00 pm Monday to Friday. No blasting is permitted on Saturdays, Sundays or public holidays. Blasting outside of the hours specified in this condition can only take place with the written approval of the EPA.

L5.2 Blasting is not permitted simultaneously with adjacent quarry(s).

L5.3 The airblast overpressure level from blasting operations in or on the premises must not exceed:
a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and
b) 120 dB (Lin Peak) at any time,
at monitoring point 11 detailed in Condition P1.4.

L5.4 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:
a) 5 mm/second for more than 5% of the total number of blasts during each reporting period; and
b) 10 mm/second at any time,
at monitoring point 11 detailed in Condition P1.4.

L5.5 Error margins associated with any monitoring equipment used to measure airblast overpressure or peak particle velocity are not to be taken into account in determing whether or not the limit has been exceeded.

L5.6 The airblast overpressure and ground vibration levels in the conditions above do not apply at noise sensitive locations that are owned by the licensee or subject to a private agreement, relating to airblast overpressure and ground vibration levels, between the licensee and land owner.

L5.7 Offensive blast fume must not be emitted from the premises.

Definition:

d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints 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 complaince 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
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after

B.3 Noise management plan

5 Noise limits

5.1 Operational noise

Condition 3 of Schedule 3 of PA 09_0175 provides the operational noise limits for KEQ. These are reproduced in Table 5.1.

Table 5.1 Operational noise criteria (dB) from Table 2 of PA 09_0175

Noise Assessment Location[1]	Morning Shoulder $L_{Aeq(15\ minute)}$	Morning Shoulder L_{Amax}	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$
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 assessment locations are shown in Figure 3.1.

Noise generated by the development must be monitored and measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NPfI (EPA 2017).

The noise limits provided in Table 5.1 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 EPL 20611 and consistent with Condition 3 of Schedule 3 of PA 09_0175 the noise limits provided in Table 5.1 apply under all meteorological conditions except for the following:

- wind speeds greater than 3m/s at 10m above ground level;
- stability category F temperature inversion conditions and wind speeds greater then 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 5.1.

Noise limits do not apply if Karuah East has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and Karuah East has advised the Department in writing of the terms of this agreement.

5.2 Road traffic noise

Condition 4 of Schedule 3 of PA 09_0175 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 5.2 at any residence on privately-owned land.

Appendix C
Calibration certificates

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Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24405

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	01070590
Microphone Serial Number :	08184
Pre-amplifier Serial Number :	52329
Firmware Version :	v2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.4 °C	**Ambient Temperature :**	23.8 °C
Relative Humidity :	45.2 %	**Relative Humidity :**	46.7 %
Barometric Pressure :	101.3 kPa	**Barometric Pressure :**	101.26 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 27 May 2024
Report Issue Date : 3 Jun 2024

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.

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

Uncertainties of Measurement -

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

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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

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

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C24154

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

Equipment Tested/ Model Number : Model 105
Instrument Serial Number : 96080

Atmospheric Conditions

Ambient Temperature : 25.5 °C
Relative Humidity : 52.1 %
Barometric Pressure : 100.4 kPa

Calibration Technician : Peter Elters
Calibration Date : 26 Feb 2024
Secondary Check: Rhys Gravelle
Report Issue Date : 26 Feb 2024

Approved Signatory : Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	93.80	1000.30

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.10 dB*	*Temperature*	*±0.1 °C*
Frequency	*±0.07 %*	*Relative Humidity*	*±1.9 %*
Distortion	*±0.20 %*	*Barometric Pressure*	*±0.11 kPa*

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

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