ANNUAL REVIEW

KARUAH EAST QUARRY

KARUAH, NSW

Review Period: 1 January 2022 – 31 December 2022

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ABBREVIATIONS

CCC	Community Consultative Committee
DA	Development Application
DDG	Dust Deposition Gauge
DPE	Department of Planning and Environment (Formerly DPIE)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EPA	NSW Environmental Protection Authority
EPL	Environment Protection Licence
Ha	Hectare
km	Kilometre
L	Litre
LDP	Licenced Discharge Point
POEO Act	*Protection of the Environment Operations Act 1997*
NPWS	NSW National Parks and Wildlife Service, now part of Environment, Energy and Science
RFS	NSW Rural Fire Service
SWMP	Site Water Management Plan
tpa	tonnes per annum

i PURPOSE OF THE REPORT

Karuah East Quarry Pty Ltd (Karuah East Quarry) has prepared this report which fulfils the Annual Review requirement of the Project Approval PA 09_0175 (Schedule 5, Condition 4).

This Annual Review covers the reporting period from the **1 January 2022** to **31 December 2022**.

This report provides specific detail on the project including a summary of environmental monitoring data and environmental performance during the reporting period.

Name of Operation	Karuah East Quarry Pty Ltd
Name of Operator	Karuah East Quarry Pty Ltd
Development Consent / Project Approval #	PA 09_0175
Name of holder of Development Consent / Project Approval	Karuah East Quarry Pty Ltd
Mining Lease #	None
Water Licences	None
Annual Review start date	1 January 2022
Annual Review end date	31 December 2022

I, Shane Burton, certify that this audit report is a true and accurate record of the compliance status of Karuah East Hardrock Quarry for the period 1 January 2022 to 31 December 2022 and that I am authorised to make this statement on behalf of Karuah East Quarry Pty Ltd.

Note.

The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Shane Burton
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	29/03/2023

1.0 STATEMENT OF COMPLIANCE

Table 1, Table 2, and Table 3 outline the compliance status of the quarry operations at the end of the 2022 reporting period in accordance with relevant approval conditions.

Table 1 - Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Project Approval (PA 09_0175)	NO
Environment Protection Licence (No. 20611)	NO

Table 2 - DPE Compliance Status Key

Risk level	Colour code	Description
High	Non – compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non – compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non – compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Admin NC	Non – compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 3 - Non-Compliances

Relevant Approval	Condition #	Condition Description (Summary)	Compliance Status	Site Comment	Where Addressed in Annual Review
PA 09_0175	Schedule 3 Condition 19	Surface Water Discharges	Non-compliance relating to exceedance of concentration limits	Exceedances in TSS during an uncontrolled discharge through March till July 2022. Refer to **Section 6.8** for further detail.	Section 6.8 and Section 10
PA 09_0175	Schedule 5 Condition 4	Annual Review	Non –Compliance due to the late submission of 2021 Annual Review	2021 Annual Review was submitted beyond the approved time as mentioned in the Project Approval.	Section 10
EPL 20611	Condition L1 and 2	Surface Water Discharges	Non-compliance relating to exceedance of concentration limits	There was a total of 29 discharges from site exceeding TSS criteria as per Schedule 3 Condition 19. Refer to **Section 6.8** for further detail.	Section 6.8 and Section 10

2.0 INTRODUCTION

This Annual Review covers the reporting period from the **1 January 2022** to **31 December 2022** for the Karuah East Quarry. **Figure 1** presents the Karuah East Quarry site plan and layout.

2.1 Project Overview

Karuah East Quarry is a hard rock quarry which contributes materials to construction industries in the Hunter, New England, and Sydney Regions. The site is located on Blue Rock Close, off the Pacific Highway, approximately 3 km north-east of Karuah, NSW. The Karuah East Quarry site covers approximately 33 hectares within Lots 12 and 13 of DP 1024564.The approved development includes the following key elements:

- staged extraction of approximately 29 million tonnes of andesite over a 20 year timeframe;
- extraction of up to 1.5 million tonnes of andesite material per year;
- removal and stockpiling of an estimated 380,000 m^3 of overburden (approximately 750,000 tonnes) from the quarry extraction area. Removal of overburden is not included in the proposed annual extraction rate of 1.5 million tonnes of andesite;
- haulage of up to 1.5 million tonnes of andesite per year from the site to market by 12 to 38 tonne haul trucks via the Pacific Highway;
- implementation of erosion and sediment, and water management control works to ensure no loss of sediment, minimise dust generation and control discharges from the site to ensure that all discharges are within acceptable volumetric and water quality criteria;
- roadworks to secure access to the site including upgrade and extension of Blue Rock Lane, realignment of Andesite Road and Blue Rock Lane intersection, and adjust road markings at Branch Lane and Andesite Road intersection;
- employment of up to 28 onsite staff;
- construction of a new haul road and access through adjoining Roads and Maritime Services (RMS) land;
- staged clearing;
- drilling and blasting activities;
- loading and hauling of extracted material;
- crushing and screening of extracted material;
- stockpiling of material onsite; and
- location of plant on Lot 13 comprised of office buildings, workshops, parking areas, crushing plant, wash plant, weigh bridge and product storage areas.

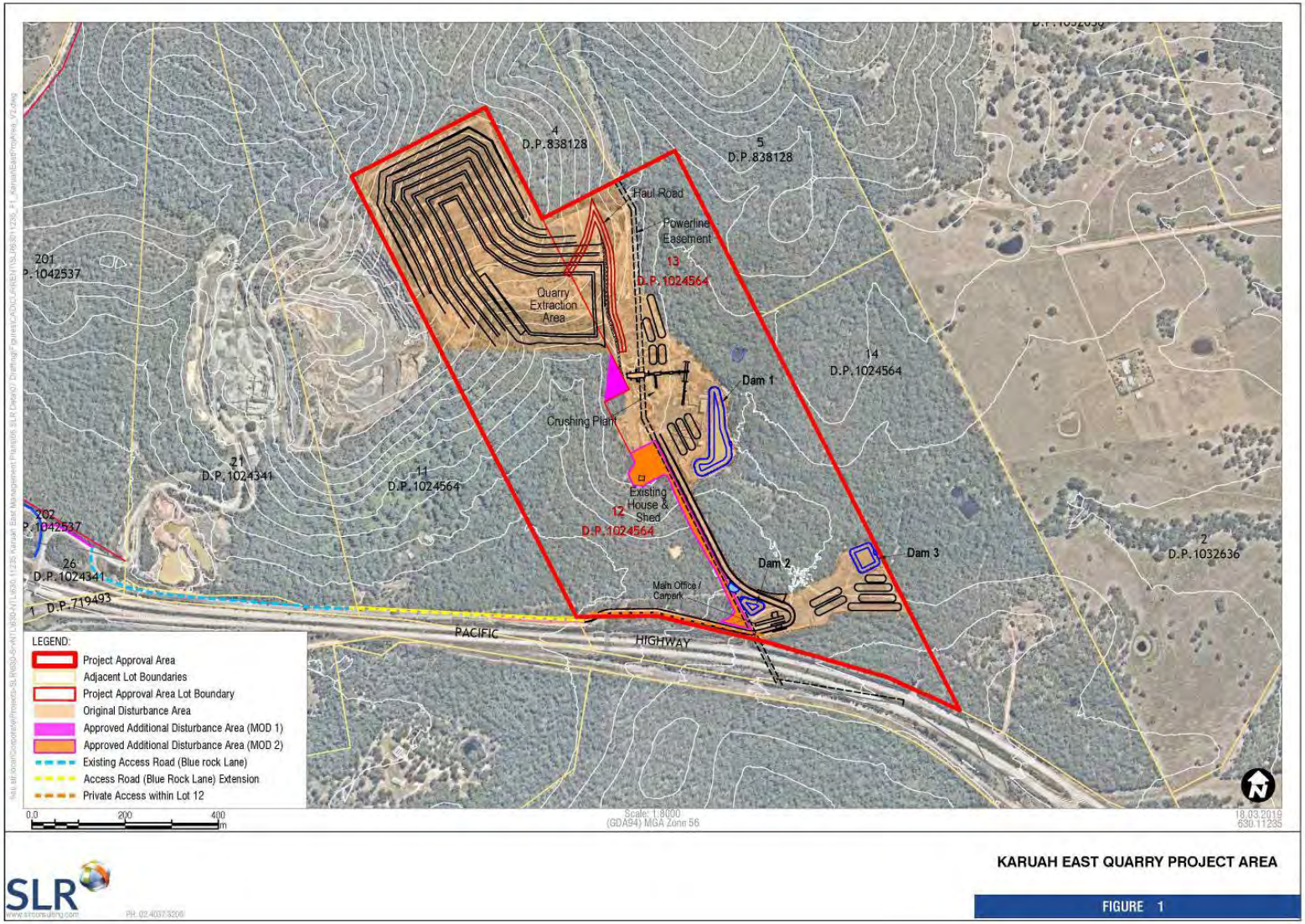


Figure 1 - Karuah East Quarry – Site Plan

3.0 APPROVALS

The Karuah East Quarry is required to hold relevant approvals for the quarrying operations. These approvals are summarised in **Table 4.**

Table 4 - Current Consents and Licences

Instrument	Date of Issue	Date of Expiration	Comments
Project Approval (PA 09_0175)	17 June 2014	31 December 2034	This is the main statutory document for the site
Federal Approval (EPBC 2014/7278)	20 March 2015	30 March 2045	Federal approval relating to the *Environment Protection Biodiversity Conservation* (EPBC) *Act 1999*
Environment Protection Licence (No. 20611)	26 August 2015	-	The EPL is a requirement of *the Protection of the Environment Operations Act* (POEO Act) *1997*

3.1 PA 09_0175

PA 09_0175 has been modified four times, Modification 1, Modification 2, Modification 8 and Modification 9. A copy of the consolidated consent is attached as **Appendix 1**. Note that Modifications 3 to 7 were not progressed and have been withdrawn. In June 2022, an application for Modification 10 was submitted, and is under review to increase the disturbance area within the PA 09_0175 project area.

3.1.1 Modification 1

Modification 1 (MOD 1) was approved by the DPE on the 27 April 2018 and amends the existing Project Approval to nominally expand the area of disturbance of the Karuah East Quarry.

MOD 1 was minor in nature and it increased the area of disturbance (31.88ha) by an additional 2,500m² as shown in **Figure 1**.

3.1.2 Modification 2

Modification 2 (MOD 2) was approved by the DPE on the 19 December 2018 and amends the existing Project Approval to expand the area of disturbance of the approved Karuah East Quarry. MOD 2 was minor in nature and it increased the area of disturbance (31.88ha) by an additional 1.133ha as shown on **Figure 1.**

3.1.3 Modification 8

Following the commencement of quarrying activity in 2018, it was identified that improved targeted acoustic mitigation measures were necessary and would be beneficial to all stakeholders. Modification 8 (MOD 8) was submitted to DPE on 20 June 2019 to implement improved acoustic mitigation measures and to modify the operational noise criteria of the Project Approval (Condition 3 of Schedule 3) in accordance with the NSW Noise Policy for Industry (2017).

Approval for MOD 8 was received on 22 December 2020. Further details around the changes to noise criteria and additional acoustic measures are included in **Section 6.2**. There was no change to surface disturbance as part of this modification.

3.1.4 Modification 9

Modification 9 (MOD 9) was submitted to DPE on 26 April 2021 with the aim of more efficiently supplying product to local customers by aligning operational hours with those local building and infrastructure projects. Under MOD 9, the defined activity "Product loading and dispatch" was added under the hours of operation outlined in Condition 7 of Schedule 2 of the Project Approval. Additionally, operating hours under Quarrying Operations were extended on weekdays and Saturdays.

MOD 9 was approved 2 December 2021. For this 2022 Annual Review period, Karuah East Quarry operated under the hours of operation defined under MOD 9. Karuah East Quarry began to operate as per the hours of operation outlined in MOD 9 from December 2021. There was no change to surface disturbance as part of this modification.

3.2 EPBC 2014/7278

Federal Approval (EPBC 2014/7282) for the Karuah East Quarry was granted on 20 March 2015. A copy of this approval is attached in **Appendix 1**.

An Annual Compliance Report for EPBC Approval 2014/7282 is prepared each year and is available on the Hunter Quarries website https://hunterquarries.com.au/

3.3 EPL 20611

The Karuah East Quarry Environment Protection Licence (EPL 20611) covers all activities at the Quarry. **Table 5** outlines the licensing limits for production and material handling.

Table 5 - EPL Fee-Based Activity

EPL Fee-Based Activity	Current Scale (tpa)
Crushing, Grinding or Separating	> 500,000 t – 2,000,000 t processed
Land-based extractive activity	> 500,000 t – 2,000,000 t obtained

In 2022, Karuah East applied to the EPA for a variation of the EPL based on the changes from MOD 8 and 9. A copy of the EPL is attached in **Appendix 2**.

3.4 Management Plans

The site operates under a series of approved environmental management plans, which are listed in **Table 6**.

Table 6 – Karuah East Quarry Management Plan Status

Management Plan	Status
Environmental Management Strategy	Originally approved in 2015. Updated in 2019 for MOD 2. Reviewed in 2020 and 2021 following recent approvals of MOD 8 and MOD 9. Revision will continue into 2023 to ensure suitable expert consultation.
Air Quality and Greenhouse Gas Management Plan	Originally approved in 2015. Updated in 2019 for MOD 2.

Management Plan	Status
Biodiversity Offset Management Plan	Originally approved in March 2016. Update in December 2022.
Blast Management Plan	Originally approved in 2015. Updated in 2019 for MOD 2.
Heritage Management Plan	Originally approved in 2015.
Landscape and Rehabilitation Management Plan	Originally approved in 2015. Approved in March 2020.
Noise Management Plan	Originally approved in 2015. Updated in 2019 for MOD 2. Updated for MOD 8 and MOD 9 (EMM, April 2022).
Traffic Management Plan	Originally approved in 2015.
Waste Management Plan	Original dated 2017. Updated in 2019 for MOD 2.
Water Management Plan	Originally approved in 2015. Updated in 2019 for MOD 2.
Tetratheca juncea Translocation Plan	Originally approved in 2015. Revised in 2019 for MOD 2.

3.5 Consent Conditions for Reporting in the Annual Review

The preparation of an Annual Review is required by Schedule 5, Condition 4 of PA 09_0175. This Annual Review has been prepared in accordance with the former Department of Planning and Environment's (DPE) *Annual Review Guidelines* (2015).

Table 7 details the requirements of Condition 4 of Schedule 5 of PA 09_0175 and the respective section(s) in this document where these consent conditions are addressed.

Table 7 - Checklist for Annual Review Reporting

Condition Number	Condition Requirement for Annual Review	Document Section
Schedule 5, Condition 4(a)	*By the end of March each year, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:* *(a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;*	This document. Annual Review

Condition Number	Condition Requirement for Annual Review	Document Section
Schedule 5, Condition 4(b)	*(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against:* • *the relevant statutory requirements, limits or performance measures/criteria;* • *the monitoring results of previous years; and* • *the relevant predictions in the documents referred to in condition 2(d) of Schedule 2 of this consent;*	Section 6
Schedule 5, Condition 4(c)	*(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*	Section 1, 10 and 11
Schedule 5, Condition 4(d)	*(d) identify any trends in the monitoring data over the life of the development;*	Section 6
Schedule 5, Condition 4(e)	*(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*	Section 6
Schedule 5, Condition 4(f)	*(f) describe the measures that would be implemented over the current calendar year to improve the environmental performance of the development.*	Section 11

4.0 OPERATIONS SUMMARY

The following section briefly describes the general operation and environmental performance of Karuah East Quarry during this 2022 reporting period.

4.1 Land Preparation

During the reporting period there was approximately 0.89 ha land clearing. Further minor land clearing within the quarry footprint is scheduled for 2023.

4.2 Construction Activities

No construction activities were completed at Karuah East Quarry during the 2022 reporting period.

4.3 Quarry Operations

Operations during 2022 involved progressive drilling and blasting, followed by crushing and screening to produce the required materials.

The monthly production summary during the reporting period is included in **Table 8**.

Table 8 - Monthly Production Summary (tonnes)

Month	Monthly total (tonnes)
January	44,206.00
February	69,606.00
March	71,822.00
April	57,195.00
May	83,023.00
June	83,015.00
July	74,336.00
August	102,096.00
September	85,709.00
October	75,167.80
November	100,598.00
December	91,453.00
Total:	**938,277**
Forecast 2023:	1,200,000

Project Approval 09_0175 permits the extraction of up to 1.5 million tonnes per annum from Karuah East Quarry. The annual production was consistent with the 2022 production total.

4.4 Operating Hours

From 1 January 2022 to 31 December 2022 and in accordance with Schedule 2, Condition 7 of MOD 9, Karuah East Quarry operated during the approved operating hours listed in **Table 9**:

Table 9 Approved Operating Hours

Activity	Operating Hours
Quarrying Operations	7.00 am to 9.00 pm, Monday to Friday; 7:00 am to 10:00 pm Monday to Friday on 50 calendar days per year; and 7:00 am to 6:00 pm, Saturday. No drilling 6:00 pm to 10:00 pm Monday to Friday or 1:00 pm to 6:00 pm Saturday No quarrying operations on Sundays or Public Holidays
Product loading and dispatch	5:00 am to 9:00 pm Monday to Friday 5:00 am to 10:00 pm Monday to Friday on 50 calendar days per year 6:00 am to 6:00 pm Saturday No product loading and dispatch on Sundays or Public Holidays
Construction activities	7.00 am to 6.00 pm, Monday to Friday; and 8.00 am to 1.00 pm, Saturdays. Unless noise from the activities does not exceed 40 dB(A)LAeq(15minute) at any privately-owned residence.
Maintenance activities	24 hours a day, 7 days per week, providing maintenance activities are inaudible at any privately-owned residence.

4.5 Operating Equipment

When operational during the 2022 reporting period the following equipment was used:

- Excavator x 3;
- Bulldozer x 1;
- Mobile crusher (screening and crushing equipment);
- Pugmill (cementious blender) x 1;
- Trommel x 1;
- Front end loader x 6;
- 25,000 L water tanker; x 1 and
- Onsite Haul trucks x 6.

4.6 Next Reporting Period

Table 10 outlines forecast operations for the next reporting period.

Table 10 - Forecast Operations for Next Reporting Period

Aspect	Forecast for Next Reporting Period
Construction	Potential Construction and/or Installation of new Amenities Buildings
Quarrying	Continuation of quarrying during 2023.

5.0 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The actions required as an outcome of the previous Annual Review are provided in **Table 11**.

Table 11 - Actions Required from Previous Annual Review

Action Required from Previous Annual Review	Action taken by Operator	Where Discussed in Annual Review
Karuah East Commitments from 2021 Annual Review		
Update of multiple Management Plans to incorporate MOD 9.	KEQ has commenced updates of multiple management plans and approval is expected to occur in 2023 and into 2024.	Section 6.2
Continue environmental monitoring in accordance with management plans and approval requirements	KEQ continued to conduct environmental monitoring. Instances of equipment error caused unavoidable monitoring frequency non-compliances.	Section 1.0, Section 3.4 and Section 6.0
Continue CCC and community support	KEQ continued to facilitate CCC meetings in 2022	Section 8.0
Continue to update the website with monitoring data and key environment and community information	Monthly monitoring data uploaded to the Hunter Quarries environmental reporting page during 2022.	Results discussed in Section 6.0.
Continue to undertake pest and weed management as required	Pest and weed monitoring and management continued.	Section 6.5

KEQ have not yet received feedback from DPE in response to the submission of the 2021 Annual Review.

6.0 ENVIRONMENTAL PERFORMANCE

Appendix 3 includes a number of Figures that identify the location of the environmental monitoring sites discussed in the following sections.

6.1 Meteorological Monitoring

Schedule 3, Condition 17 of PA 09_0175 requires:

> *For the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline.*

A meteorological station was installed in August 2016 which is used by both the Karuah Quarry and Karuah East Quarry. The location of the station is shown in **Appendix 3**.

Table 12 presents a summary of the meteorological data collected by the meteorological station during the Annual Review reporting period.

Table 12 - Annual Review Meteorological Data

Month	Temp (ºC)			Rainfall			Wind
	Average (ºC)	Min Temp (ºC)	Max Temp (ºC)	Total (mm)	Max Daily (mm)	No rain days < 1 mm	Max Wind Gust (km/h)
Jan-22	23.5	14.3	37.1	77	19.4	7	43.8
Feb-22	22	13.1	38.3	141.8	32.4	15	67.4
Mar-22	20.2	12.3	30.4	342.8	77	21	52.1
Apr-22	17.9	8.9	30.2	211.8	58.6	10	42.6
May-22	14.5	4.3	28.1	117.2	26.2	11	67.4
Jun-22	10.4	2.4	21.5	38.6	9.8	6	58
Jul-22	11.3	3	22.4	272.4	75	15	56
Aug-22	12.4	2.8	23.8	94.6	33.6	8	42.6
Sep-22	14.6	5.3	25.2	149	37.6	15	56.1
Oct-22	17.4	5.6	31.9	147.8	39.2	10	48.5
Nov-22	18.6	5.5	34.5	43.8	22	6	61.5
Dec-22	20.4	8.1	34.6	30	17.2	6	49.7

Average monthly temperatures during the reporting period ranged from 10.4 degrees Celsius (ºC) to 23.5ºC, with a maximum temperature 38.3ºC recorded in February 2022. Total monthly rainfall ranged from 30 mm (December) to 342.8 mm (March) per month, with the maximum daily rainfall recorded at 77 mm in March 2022. The maximum wind gusts were recorded in July and October 2021 with a result of 61.5 km per hour.

The total rainfall for 2022 was 1666.8 mm which can be compared to 1993.4 mm in 2021.

6.2 Noise

6.2.1 EIS / Preferred Project Report Predictions

The *Noise and Blasting Impact Assessment (SLR, 2012)* was developed for the initial project approval. predicted noise levels were below the project specific noise criteria.

For MOD 8, a Noise Impact Assessment was undertaken by Thearle Acoustics (Thearle,2019) in accordance with the NSW Noise Policy for industry (2017). This report found operational noise levels of the Karuah East Quarry were predicted to meet project specific noise target at all nearest, non-project related residential locations surrounding the site with the exception of Lot 10 DP 1032636. The predicted noise levels from the 2019 report are presented in the table belo..

Table 13 – MOD 8 EIS Predicted Noise Levels – Daytime

Location	Period	Project specific Noise Criteria LAeq (15 minute)	
		Predicted Noise Impact	Predicted Intrusiveness Criteria
A	Day	42 dBA	49 dBA
B	Day	36 dBA	49 dBA
C	Day	37 dBA	49 dBA
D	Day	34 dBA	49 dBA
E	Day	39 dBA	49 dBA
F	Day	26 dBA	40 dBA
G	Day	43 dBA	44 dBA
H	Day	45 dBA	43 dBA
I	Day	40 dBA	40 dBA
J	Day	<35 dBA	40 dBA

6.2.2 Noise Criteria

PA 09_0175

Operational noise criteria are outlined in Schedule 3, Condition 3 of PA 09_0175 and state:

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 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

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.

EPL Condition L4

The noise limits set out in Condition L4.1 of the EPL 20611 are reproduced in **Table 14** are generally consistent with the criteria detailed in PA 09_0175.

Table 14 - EPL Noise Limits (dBA $L_{Aeq(15minute)}$)

Location	Noise Limit dBA - Day LAeq(15minute)
Residence A on Lot 100 DP 1028885	42
Residence B on Lot 3 DP 785172	40
Residence G on Lot 1 DP 1032636	43
Residence H on Lot 10 DP 1032636	44
Any approved residence on Lot 11 DP 1024564	40

EPL 20611 was varied in 2022 to reflect the changes to noise criteria as a result of the approval of MOD 9. The criteria in **Table 14** continue to apply for the 2023 reporting period.

Operational Noise Limits on Lot 11.

It is noted that the noise limits detailed in EPL 20611 for Lot 11 are for *"any approved residence on Lot 11 DP 1024564"*.

As outlined in Section 1.1 of the *Noise Management Plan*, the DPE agree that criteria only applies to 'Residence on Lot 11' if there is a Council approved residence within Lot 11. At this point in time, there is not a Council approved residence on Lot 11. Karuah East Quarry is committed to undertaking noise monitoring to determine compliance at 'approved residences' only. Should a residence be approved by Council on Lot 11, the *Noise Management Plan* will be updated to include noise monitoring at this location.

6.2.3 Key Environmental Performance or Management Issues

Attended noise monitoring was conducted at the nearest residential receivers to the quarry during Q1, Q2, Q3 and Q4 of the 2022 reporting period by EMM Consulting. A summary of the results are provided in **Table 15, Table 17, Table 18** and **Table 19**, with copies of the noise monitoring reports also in **Appendix 4**.

The approved *Noise Management Plan* includes a noise monitoring program as required by Schedule 3, Condition 7 of PA 09_0175.

6.2.3.1 Attended Noise Monitoring

March 2022 Operational Noise Monitoring

Table 15 - Operator Attended Noise Survey Results (16 March 2022)

Date/Start Time Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
	LAmax	LA1	LA10	LA90	LAeq	
Location A 16/03/2022 10:38 AM Slight Breeze	59	55	54	47	51	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway and insects consistently audible. Nearby excavator (unrelated to KEQ) frequently audible.
Location B 16/03/2022 10:55 AM Slight Breeze	71	67	65	57	62	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway and insects consistently audible. Bird noise occasionally audible.
Location F 16/03/2022 10:13 AM Calm	78	56	49	42	51	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and bird noise consistently audible. Aircraft noise and car passbys occasionally audible.
Location G 16/03/2022 11:21 AM Slight Breeze	57	51	42	34	40	**Karuah East Quarry briefly audible on two occasions** Distant traffic on the Pacific Highway and insects consistently audible. Site Noise : L_{Aeq} <20 dBA

While the LAeq noise levels were above the PA/EPL requirements, the source of this noise was not as a result of Karuah East Quarry. Primary source of noise that was recorded during the March sampling period was from the nearby traffic on the Pacific Highway, insects, and birds. Karuah East Quarry was briefly audible on two occasions and Location G.

Karuah East operational activities were found to be inaudible at Location A, B, and F. Karuah East Quarry noise contributions were below (satisfied) the noise limits al all monitoring locations for this round of monitoring.

Table 16 - Operator Attended Noise Survey Results (June 2022)

Date/Start Time Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
	LAmax	LA1	LA10	LA90	LAeq	
Location A 16/06/2022 07:47 AM Calm	69	58	56	51	54	**Karuah East Quarry Inaudible** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible.
Location B 16/06/2022 08:38 AM Calm	71	69	66	59	63	**Karuah East Quarry Inaudible** Traffic on the Pacific Highway consistently audible. Bird noise and resident noise occasionally audible.
Location F 16/06/2022 07:47 AM Calm	66	62	58	58	55	**Karuah East Quarry Inaudible** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible.
Location G 16/06/2022 07:00 AM Calm	55	50	47	42	45	**Karuah East Quarry processing plant and engine revs consistently audible** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible. **Site noise:** L_{Aeq} 38 dBA
Location H 16/06/2022 07:21 AM Calm	66	61	59	44	52	**Karuah East Quarry processing plant and engine revs consistently audible.** Distant traffic on the Pacific Highway consistently audible. Bird noise and dogs barking frequently audible. **Site Noise contribution:** L_{Aeq} 44

While the LAeq noise levels were above the PA/EPL requirements, the source of this noise was not as a result of Karuah East Quarry. Primary source of noise that was recorded during the June sampling period was from the nearby traffic on the Pacific Highway, and birds. Karuah East Quarry was audible at Location G and H where the processing plant and engines where constantly audible, however site noise was below the noise criteria.

Karuah East operational activities were found to be inaudible at Location A, B, and F. Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

August 2022 Operational Noise Monitoring

Table 17 - Operator Attended Noise Survey Results (August 2022)

Date/Start Time Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
	LAmax	LA1	LA10	LA90	LAeq	
Location A 18/08/2022 04:01 PM Calm	73	61	57	51	55	**Karuah East Quarry inaudible**. Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise frequently audible.
Location B 18/08/2022 04:20 PM Calm	73	71	68	59	65	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible**.**
Location F 18/08/2022 04:39 PM Calm	81	66	53	45	56	**Karuah East Quarry inaudible.** Insects, frogs, and traffic on the Pacific Highway consistently audible. Bird noise frequently audible
Location G 18/08/2022 05:20 PM Calm	67	62	51	50	51	**Karuah East Quarry engine revs constantly audible**. Insects, frogs and traffic on the Pacific Highway consistently audible. **Site Noise L_{Aeq} 30**
Location H 18/08/2022 05:22 PM Calm	64	46	39	33	38	**Karuah East Quarry engine revs consistently audible.** Traffic on the Pacific Highway consistently audible. Bird noise frequently audible. **Site Noise L_{Aeq} 30**

While the LAeq noise levels were above the PA/EPL requirements, the source of this noise was not as a result of Karuah East Quarry. Primary source of noise that was recorded during the August sampling period was from the frogs, insects, birds and the nearby Pacific Highway. Karuah East Quarry was audible at Location G and H where the engines where constantly audible, however site noise was below the noise criteria.

Karuah East operational activities were found to be inaudible at Location A, B and F. Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

November 2022 Operational Noise Monitoring

Table 18 - Operator Attended Noise Survey Results (November 2022)

Date/Start Time Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
	LAmax	LA1	LA10	LA90	LAeq	
Location A 23/11/2022 07:07 AM Calm	62	59	57	50	54	**Karuah East Quarry inaudible**. Insects, birds and traffic on the Pacific Highway consistently audible.
Location B 23/11/2022 07:50 AM Calm	78	72	67	57	64	**Karuah East Quarry inaudible**. Insects, birds and traffic on the Pacific Highway consistently audible.
Location F 23/11/2022 08:25 AM Light Breeze	83	64	55	50	57	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway consistently audible. Wind in foliage frequently audible.
Location G 23/11/202 08:49 AM Light Breeze	64	51	48	43	46	**Karuah East Quarry processing plant consistently audible.** Insects and traffic on the Pacific Highway consistently audible. Wind in foliage frequently audible.**.** **Site noise : L_{Aeq} 43**
Location H 23/11/2022 9:06 AM Slight Breeze	62	51	47	43	46	**Karuah East Quarry processing plant consistently audible.** Insects and traffic on the Pacific Highway consistently audible. Wind in foliage frequently audible.**.** **Site noise : L_{Aeq} 43**

While the LAeq noise levels were above the PA/EPL requirements, the source of this noise was not as a result of Karuah East Quarry. Primary source of noise that was recorded during the November sampling period was from the nearby Pacific Highway, insects, and birds. Karuah East Quarry was audible at Location G and H where the processing plant was constantly audible, however site noise was below the noise criteria.

Karuah East operational activities were found to be inaudible at Location A, B and F. Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

6.2.3.2 Noise Summary 2022

Attended noise levels were within the consent condition criteria outlined in **Table 15** at all locations during the 2022 monitoring period.

6.2.4 Management Measures

The *Noise Management Plan* was updated in 2021 and was submitted in April 2022 to reflect the approval of MOD 8 and MOD 9.

The following best practice noise control measures were implemented in 2022:

- adherence to operating hours;
- noise monitoring will be undertaken on site and within the community;
- keep plant and equipment well maintained;
- regular inspection and maintenance of equipment to ensure it is in good working order and operating at the lowest feasible noise level;
- equipment is not to be operated until it is maintained or repaired;
- regular training for staff and contractors (i.e. toolbox talks) for the use of equipment in ways to minimise noise;
- operate mobile plant in a quiet, efficient manner;
- switching off vehicles and plant when not in use;
- a speed limit of 40 km/hour or less will be applied and enforced for all construction related vehicles onsite;
- incorporate clear signage at the site including relevant contact numbers for community enquiries; and
- prompt response to any community concerns.

6.2.5 Proposed Improvements to Management Measures

No proposed improvements are expected to be made to the newly approved *Noise Management Plan.*

6.3 Blasting

6.3.1 EIS Predictions

The Noise Impact Assessment (NIA) (SLR, 2012) prepared as part of the EIS, developed blasting site laws for Karuah East Quarry based on blast monitoring results from the existing Karuah Quarry. The site laws were utilised to determine limiting factors to blast design for the site in order to achieve the criteria described in **Section 6.3.2**. Based on the predicted blast results the blast emission criteria are predicted to be met without imposing any significant constraints on blast design throughout the life of the quarry. Subsequent modifications have not resulted to changes in blasting practices.

6.3.2 Approved Criteria

Blasting criteria for the site are provided in Schedule 3, Condition 8 of PA 09_0175 and are summarised in **Table 19.**

Table 19 - Project Approval Blasting Criteria

Location	Air blast overpressure (dB (Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance
Any residence on privately-owned land, or any public infrastructure	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

Conditions L5.1 to 5.7 of EPL 20611 detail the blast limits for the project. The blast limits contained in the EPL are consistent with those presented in PA 09_0175.

6.3.3 Key Environmental Performance or Management Issues

There have been 26 blasts during the reporting period at Karuah East Quarry. The results of the blast monitoring undertaken are contained in **Table 20**.

Table 20 - Blast Results 2022

Date	Location		Time	Overpressure dB(L)	Vibration
Tuesday, 11 January 2022	32° 37' 33.13" S 152° 0' 18.54" E	Top of Quarry	12:25:00 PM	n/t	n/t
Friday, 21 January 2022	32° 37' 32.46492" S 152° 0' 23.14705" E	R.L 120	12:30 PM	n/t	n/t
Wednesday, 2 February 2022	32° 37' 34.19906" S 152° 0' 26.43956" E	R.L 105	12:00 PM	n/t	n/t
Monday, 14 February 2022	32.6244° " S 152.005043° E	Top of Quarry	1:00 PM	n/t	n/t
Monday, 28 February 2022	32° 37' 30.45164" S 152° 0' 24.38573" E	R.L 120	11:46 AM	n/t	n/t
Wednesday, 30 March 2022	32° 37' 30.34" S 152° 0' 23.5" E	R.L 128/135	12:01 PM	n/t	n/t
Thursday,7 April 2022	32°37'31.23"S 152° 0'27.96"E	R.L 120	01:38 PM	n/t	n/t
Thursday, 14 April 2022	32° 37' 30.97" S 152° 0' 24.49" E	R.L 105	11:29 AM	n/t	n/t
Friday, 29 April 2022	32° 37' 30.02" S 152° 0' 24.71" E	R.L 105	12:29 PM	112.3	0.73
Friday, 6 May 2022	32° 37' 30.69" S 152° 0' 21.95" E	R.L 120	12:27 PM	112	0.99
Wednesday, 25 May 2022	32°37'29.25"S 152° 0'17.33"E	Top of Quarry	12:23 PM	n/t	n/t
Wednesday, 8 June 2022	32° 37' 32.70" S 152° 0' 25.39" E	R.L 105	12:01 PM	103.3	1.14
Thursday, 23 June 2022	32° 37' 33.79" S 152° 0' 20.04" E	R.L 120	10:58 AM	106.1	1.12

Date	Location		Time	Overpressure dB(L)	Vibration
Tuesday, 12 July 2022	32° 37' 33.44" S 152° 0' 20.08" E	R.L 120	11:36 AM	108.7	1.02
Friday, 22 July 2022	32°37'32.42"S, 152° 0'27.39"E	Top of Quarry	1.04 PM	n/t	n/t
Wednesday, 27 July 2022	32° 37' 31.8889" S 152° 0' 25.1687" E	R.L 105	11:32 AM	n/t	n/t
Monday, 15 August 2022	32.6258° S 152.00738° E	Top of Quarry	1:23 PM	n/t	n/t
Friday, 26 August 2022	32.625818° S 152.007382°E	RL 105	11:02 AM	103.9	0.57
Monday, 9 September 2022	32.625759° S 152.008167°E	RL 120	12:28 PM	111	0.91
Monday, 19 September 2022	32.62423° S 152.0056687°E	RL 145-135	1:13 PM	n/t	n/t
Friday, 30 September 2022	32.625866605° S 152.005821207°E	RL 120-105	12.29 PM	n/t	n/t
Monday, 17 October2022	32.623874296° S 152.005971143°E	RL 145	2:30 PM	n/t	n/t
Wednesday, 2 November 2022	32.625421693°S 152.005453049°E	R.L 128	1:45 PM	110.1	0.94
Monday, 21 November 2022	32.625069889° S 152.006044054° E	RL 128	1:45 PM	110.4	1.03
Monday, 5 December 2022	32.625278724° S 152.005316806° E	RL 128	1:32 PM	n/t	n/t
Monday, 19 December 2022	32.625926778° S 152.005673975° E	RL 120	12.32PM	106.1	1.19

n/t = Not triggered

During the 2022 Annual Review reporting period:

- no blasts exceeded 120 dBL;
- 16 blasts were below detectable limits at the nearest residential dwelling or privately-owned land, and were therefore well below the criteria; and
- 16 blasts were below the detectable limits for vibration, and were therefore well below the criteria of <5 mm/s.
- all blasts were below the EPL/PA Limits.

6.3.4 Management Measures

Section 6 of the *Blast Management Plan* outlines the proposed blasting controls on site. In summary these include:

- s

Additionally, all blasting activities at Karuah East Quarry are monitored by a licensed blasting contractor.

6.3.5 Proposed Improvements to Management Measures

Karuah East Quarry will continue to monitor all blasts at Location B as per the approved *Blast Management Plan*. Blast design and management will be completed in accordance with the approved *Blast Management Plan*.

6.4 Air Quality

6.4.1 EIS Predictions

The revised Air Quality Impact Assessment (AQIA) (updated for the Preferred Project Report) indicates that Karuah East Quarry may operate without significant impact on the surrounding environment. In particular, the updated AQIA has confirmed that potential cumulative impacts of Karuah East Quarry and existing Karuah Quarry are well below acceptable criteria levels and will not impose adverse impacts. Overall, it has been demonstrated that the AQIA for Karuah East Quarry is acceptable in terms of air quality considerations for both the construction and operational phases.

6.4.2 Approved Criteria

AQIA criteria relevant to the Project are provided in Schedule 3, Condition 13 and Tables 7 to 9 of PA 09_0175 and have been reproduced in **Table 22, and Table 23, and Table 24**. The criteria are prescribed by the NSW Environment Protection Authority (EPA) in their document, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2022)* (Approved Methods).

All reasonable and feasible avoidance and mitigation measures are to be employed so that particulate matter emissions generated by the development do not exceed the criteria in **Table 21** to **Table 23** at any residence on privately owned land.

Table 21 - Long-term impact assessment criteria for particulate matter

Pollutant	Averaging Period	[d] Criterion
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 22 - Short-term impact assessment criteria for particulate matter

Pollutant	Averaging Period	[d] Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 23 - Long-term impact assessment criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Table 22 to Table 24 above:

a) Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).

b) Incremental impacts (i.e. incremental increase in concentrations due to the development on its own).

c) Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

d) Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Planning Secretary in consultation with EPA.

No specific limit conditions are specified for air quality emissions in EPL 20611.

6.4.3 Key Environmental Performance or Management Issues

The main source of air pollution at the quarry is in the form of airborne dust, which arises from activities such as construction, quarrying, vehicle movements and crushing. Air quality monitoring has been performed to meet the *Approved Methods of Sampling and Analysis of Air Pollutants in NSW*.

Depositional Dust

Depositional dust results are outlined within **Table 24.** The location of the depositional dust gauges is shown in **Appendix 3**.

Table 24 - Depositional Dust Monitoring Summary 2022 (g/m^2/month)

Date	DDG1	DDG2	DDG3	DDG4	DDG5
January	0.9	0.7	0.3	0.4	0.8
February	1.4	0.8	1.2	0.1	0.9
March	0.8	3.6	0.8	0.4	0.9
April	0.1	0.3	0.1	0.2	0.2
May	0.4	0.6	0.4	0.3	0.3
June	0.3	0.2	0.2	0.2	0.3
July	0.3	0.3	0.4	0.7	0.4
August	0.9	0.9	0.6	1.0	0.9
September	0.5	0.2	0.6	0.3	0.8
October	0.2	0.5	0.5	0.3	0.3
November	0.8	0.8	0.7	1.2	2
December	0.7	0.7	0.3	0.6	0.1
Annual Average	0.6	0.8	0.5	0.5	0.7
Minimum	0.3	0.2	0.1	0.1	0.1
Maximum	1.4	3.6	1.2	1.2	2.0

The 2022 monitoring results indicated that the maximum deposited dust levels measured at DDG 1 to DDG 5 were all less than the long-term impact assessment criteria for depositional dust (maximum deposited dust level of 4 g/m^2/month) over the reporting period.

High Volume Air Sampler

EPL 20611 Condition M2.2 and the *Air Quality Management Plan* (required by PA 09_0175 Schedule 3 Condition 16) requires monitoring of TSP and PM_{10} every 6 days. **Table 25** outlines the High Volume Air Sampler (HVAS) results during the 2022 reporting period.

Table 25 - High Volume Air Sampler Results (µg/m³)

Date	TSP (µg/m³)	PM_{10} (µg/m³)	Compliance Status/Comments
4 January 2022	14	7	Compliant with 24-hour criteria.
10 January 2022	33	18	Compliant with 24-hour criteria.
16 January 2022	30	21	Compliant with 24-hour criteria.
22 January 2022	12	10	Compliant with 24-hour criteria.
28 January 2022	27	12	Compliant with 24-hour criteria.
3 February 2022	24	14	Compliant with 24-hour criteria.
9 February 2022	21	12	Compliant with 24-hour criteria.
15 February 2022	32	20	Compliant with 24-hour criteria.
21 February 2022	20	13	Compliant with 24-hour criteria.
27 February 2022	11	10	Compliant with 24-hour criteria.
5 March 2022	17	12	Compliant with 24-hour criteria.
11 March 2022	16	12	Compliant with 24-hour criteria.
17 March 2022	23	15	Compliant with 24-hour criteria.
23 March 2022	4	12	Compliant with 24-hour criteria.
29 March 2022	15	11	Compliant with 24-hour criteria.
4 April 2022	13	10	Compliant with 24-hour criteria.
10 April 2022	12	9	Compliant with 24-hour criteria.
16 April 2022	12	8	Compliant with 24-hour criteria.
22 April 2022	13	9	Compliant with 24-hour criteria.
28 April 2022	26	9	Compliant with 24-hour criteria.
4 May 2022	16	11	Compliant with 24-hour criteria.
10 May 2022	5	3	Compliant with 24-hour criteria.
16 May 2022	23	13	Compliant with 24-hour criteria.
22 May 2022	5	2	Compliant with 24-hour criteria.
28 May 2022	6	3	Compliant with 24-hour criteria.
3 June 2022	10	6	Compliant with 24-hour criteria.
9 June 2022	10	3	Compliant with 24-hour criteria.
15 June 2022	13	7	Compliant with 24-hour criteria.
21 June 2022	26	12	Compliant with 24-hour criteria.
27 June 2022	14	6	Compliant with 24-hour criteria.
3 July 2022	8	6	Compliant with 24-hour criteria.
9 July 2022	23	12	Compliant with 24-hour criteria.
15 July 2022	5	4	Compliant with 24-hour criteria.
21 July 2022	6	3	Compliant with 24-hour criteria.
27 July 2022	11	5	Compliant with 24-hour criteria.
2 August 2022	16	7	Compliant with 24-hour criteria.
8 August 2022	10	4	Compliant with 24-hour criteria.
14 August 2022	3	1	Compliant with 24-hour criteria.
20 August 2022	12	6	Compliant with 24-hour criteria.

Date	TSP (µg/m³)	PM_{10} (µg/m³)	Compliance Status/Comments
26 August 2022	8	4	Compliant with 24-hour criteria.
1 September 2022	18	9	Compliant with 24-hour criteria.
7 September 2022	11	5	Compliant with 24-hour criteria.
13 September 2022	11	7	Compliant with 24-hour criteria.
19 September 2022	22	12	Compliant with 24-hour criteria.
25 September 2022	14	6	Compliant with 24-hour criteria.
1 October 2022	16	9	Compliant with 24-hour criteria.
7 October 2022	15	9	Compliant with 24-hour criteria.
13 October 2022	44	18	Compliant with 24-hour criteria.
19 October 2022	16	7	Compliant with 24-hour criteria.
25 October 2022	27	12	Compliant with 24-hour criteria.
31 October 2022	16	9	Compliant with 24-hour criteria.
6 November 2022	10	7	Compliant with 24-hour criteria.
12 November 2022	42	18	Compliant with 24-hour criteria.
18 November 2022	16	7	Compliant with 24-hour criteria.
24 November 2022	21	12	Compliant with 24-hour criteria.
30 November 2022	25	13	Compliant with 24-hour criteria.
6 December 2022	20	11	Compliant with 24-hour criteria.
12 December 2022	50	16	Compliant with 24-hour criteria.
18 December 2022	14	9	Compliant with 24-hour criteria.
24 December 2022	14	10	Compliant with 24-hour criteria.
30 December 2022	21	13	Compliant with 24-hour criteria.
Annual Average	**17**	**10**	**Compliant**
Minimum	**3.0**	**1.0**	
Maximum	**50**	**18**	**Compliant**

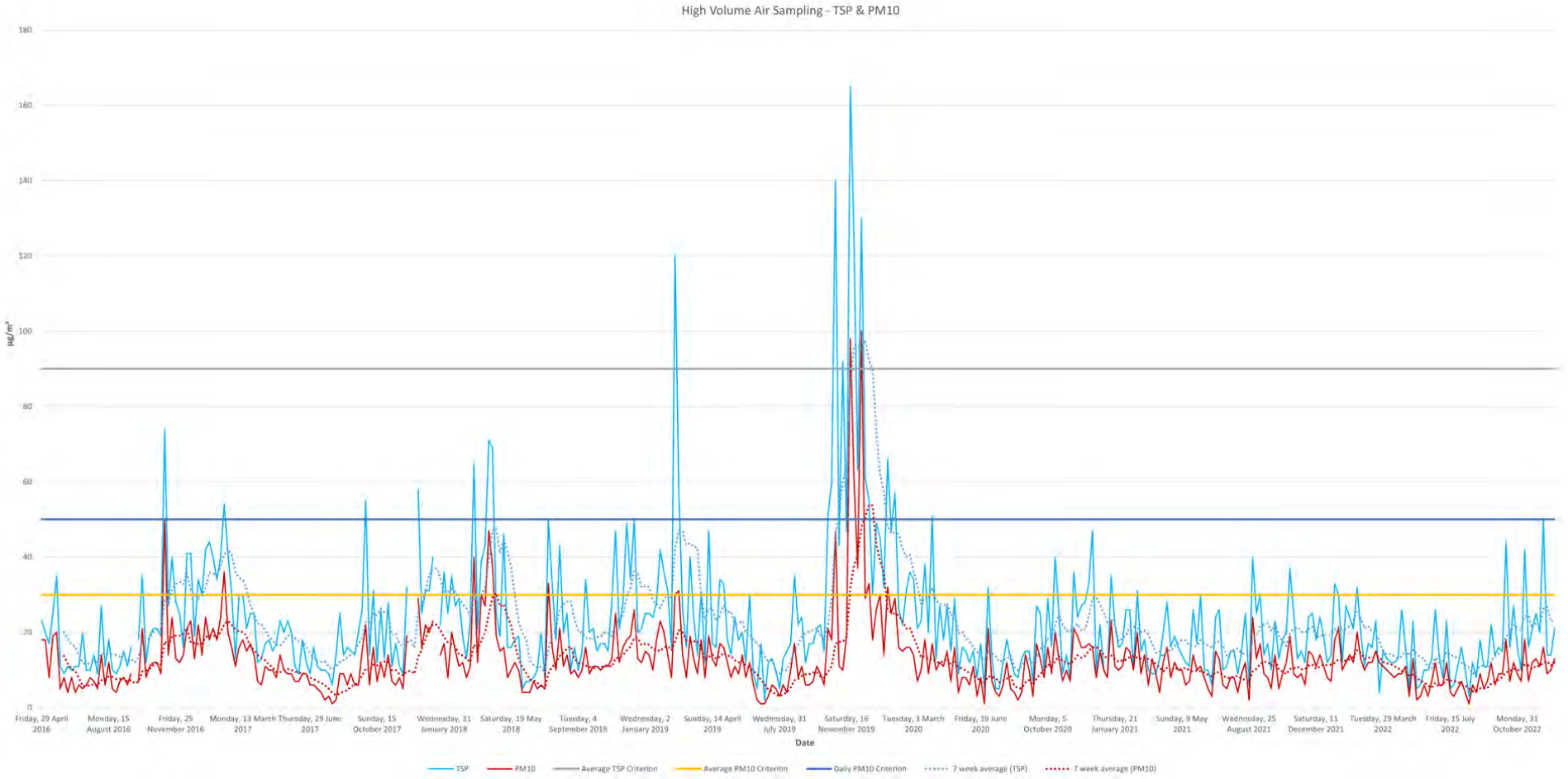
Notes: 1= Maximum criteria as specified in PA 09_0175

The TSP annual average for 2022 was 17 µg/m³, which is below the annual average criteria of 90 µg/m³. There was a decrease in the TSP annual average from 2021 (18.0 µg/m³) to 2022 (17.0 µg/m³). The site is still well below the annual average for TSP. The highest short-term TSP result for the reporting period was 50 µg/m³ which occurred in the 12 December 2022 sample. The highest TSP reading increased in 2022 from a maximum reading of 40 µg/m³ in August 2021.

The annual average for PM_{10} was 10 µg/m³, below the long-term impact assessment criteria of 30 µg/m³. This was a slight decrease from the average PM_{10} result of 10.5 µg/m³ in 2020. The maximum PM_{10} result recorded during 2022 was 18 µg/m³ slightly less than the 24 µg/m³ recorded during 2021.

The short-term impact assessment criteria of 50 µg/m³ was not exceeded during 2022. Long term trends are shown on **Figure 2**. The elevated results for PM_{10} and TSP seen in late 2019 resulted from the 2019 NSW bushfires which was classified as an extraordinary event. Exceedances experienced in early 2019 were attributed to a dust storm, and similarly higher results seen in 2016 were the result of bushfire.

Figure 2 - High Volume Air Sampling – Long-term Trends



6.4.4 Management Measures

The following best practice air quality control measures continued to be implemented in 2022:

- Disturb only the minimum area necessary for onsite activities;
- Exposed areas are rehabilitated as soon as practicable with inert material and vegetation;
- Perform regular inspections of weather conditions to identify conditions which would be unfavourable in terms of dust levels at nearest sensitive locations blowing in the direction of sensitive receptors and implement remedial measures where required;
- All trafficable areas and vehicle manoeuvring areas in or on the premises will be maintained in a condition that will minimise the emission of dust to the air, or emission from the premises of wind-blown or traffic generated dust;
- Trucks entering and leaving the premises that are carrying loads of dust generating materials will have their loads covered at all times, except during loading and unloading.
- All plant and equipment to be installed at the site to be maintained and operated in a proper and efficient condition, in accordance with manufacturer's instructions and POEO Act and Regulation.

6.4.5 Proposed Improvements to Management Measures

The Karuah East Quarry will continue to monitor air quality in accordance with the conditions of PA 09_0175 and will also review measures for improving dust management on site.

6.5 Biodiversity

6.5.1 EIS Predictions

No Endangered Ecological Communities or Critically Endangered Ecological Communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and EPBC Act were recorded within the Project Approval Area.

6.5.2 Approved Criteria

There are no specific criteria associated with biodiversity management for the Karuah East Quarry. Activities are completed in accordance with the Preferred Project Report, Federal Approval, *Biodiversity Offset Area Management Plan* (BOAMP) and *Land and Rehabilitation Management Plan* (LRMP).

6.5.3 Key Environmental Performance or Management Issues

Biodiversity Offset Area and Lot 12

The Biodiversity Offset Area (BOA) for the Karuah East Quarry is a 130.36 ha consolidated land parcel comprised of three lots:

- Lot 13 DP 1024564 (part);
- Lot 14 DP 1024564; and
- Lot 5 DP 838128.

Ecological monitoring for the Karuah East Quarry was completed by Wedgetail Project Consulting in November and December 2022. A copy of the Biodiversity Offset Area Monitoring Report (Wedgetail, 2023) is attached as **Appendix 5**.

A total of 18 vegetation monitoring sites were established and surveyed within the BOA and Lot 12 in October 2015. These permanent monitoring sites have been surveyed annually in October since 2016, using the same methods as the baseline survey (see **Appendix 5**). A series of criteria have been developed as part of the overall ecological monitoring program, including:

- Fencing, gates and signage;
- Access tracks;
- Erosion, sedimentation and soil management;
- Existing dwellings;
- Revegetation and regeneration;
- Habitat augmentation;
- Threatened flora translocation;
- Weed control;
- Vertebrate pest management; and
- Fire management.

The results from the 2022 monitoring indicate that vegetation condition across monitoring sites remain relatively stable since the previous monitoring event in 2021, with almost all monitoring sites recording signs of regeneration across both canopy and mid-storey species.

Nest box monitoring undertaken in 2022 for boxes 1-319. As per the approved *Flora and Fauna Management Plan*, the next round of nest box monitoring is required in 2024.

Key results from the 2022 monitoring programme include:

- *Asperula asthenes*, *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* populations have decreased during the 2022 monitoring period. The decrease in abundances for these species across the majority of the monitoring sites continues a pattern of fluctuation abundances since 2015. There is no discernible pattern to suggest impacts from quarry operations are related to these fluctuations.
- No areas of major active erosion were identified within the BOA during the 2022. Minor sedimentation due to overtopping of a small number of sediment fences was observed.
- Weed coverage across the KEQ BOA and Lot 12 has increased – management is required to reduce Lantana cover, especially within the northern portion of the site, adjacent to the powerline easement.
- No feral pigs, or evidence thereof, were observed during the 2022 monitoring event, however this species was identified near the powerline easement in 2020. Despite not having been identified, it is likely this species persists within the BOA and therefore continued control programmes be carried out; and

- A total of 377 nest boxes have been installed to date across the KEQ BOA. Monitoring of nest boxes have been carried out in 2018, 2020 and 2022. No further nest boxes need to be installed until further clearing of hollow bearing trees occurs.

6.5.4 Management Measures

During 2022, the following management measures were undertaken:

- Repair of erosion and sediment controls as required;
- Fence repair (as required);
- Monitoring of nest boxes;
- Installation and maintenance of fauna crossing as required; and
- Weed and pest control, in particular Lantana as well as invasive wildlife.

As committed to in the previous Annual Review, KEQ commenced a review of the BOAMP as per the recommendations of the Karuah East 2020 IEA.

As recommended by Kleinfelder (2022), KEQ will continue to undertake biodiversity monitoring, biennial pest management, and, in particular, weed control activities.

Long Term Security of the Conservation Offset Area

Condition 29 of Project Approval 09_0175 requires long term security of the Biodiversity Offset Area. The offset area (comprised of part Lot 13 DP 1024564, Lot 14 DP 1024564 and Lot 5 DP 838128) is managed as a Biodiversity Offset Area in line with the approved Biodiversity Offset Area Management Plan (BOAMP).

Karuah East Quarry Pty Ltd previously provided a draft Conservation Agreement to the NSW Biodiversity Conservation Trust (BCT). Comments were received from the BCT requesting that the Conservation Agreement to be split into two separate agreements (to cover the differing land ownerships of Lot 13 DP 1024564 and Lot 5 DP 838128/ Lot 14 DP 1024564 (same ownership). Meetings have been held with the NSW BCT (November 2020) and NSW DPE (February 2021) and the status of the KEQ Biodiversity Offset Area was discussed. The following is noted:

- Both agencies note that the offset land is managed in line with the BOAMP; and
- BCT staff noted that as new offsets will be required as a result of the proposed MOD 10 application to modify the Project Approval (proposed increase to disturbance area primarily to facilitate additional stockpiling area), these additional offset lands will need to be integrated into Conservation Agreements relevant to individual land ownerships. It is BCT's strong preference that the long term arrangements are finalised after MOD 10 has been determined. DPE confirmed support of this approach. MOD 10 was lodged in July 2021 and is currently under assessment by the NSW DPE.

6.5.5 Proposed Improvements to Management Measures

The Karuah East Quarry has conducted the requirements outlined in the TJMP by completing monitoring of *T. juncea* individuals at Site 2 in October 2022. The 2022 monitoring was the final monitoring event for the translocated individuals and will complete the approved *T. juncea* monitoring program.

The Karuah East Quarry will continue to implement the BOAMP and LRMP during 2023.

6.6 Heritage (Aboriginal and Non-Aboriginal)

6.6.1 EIS Predictions

An Aboriginal Heritage Impact Assessment was completed as part of the EIS specialist report prepared by RPS (2012). A search of the Aboriginal Heritage Information Management System (AHIMS) database revealed no listed sites inside the project area and the pedestrian survey revealed no Aboriginal cultural heritage items. No evidence of Aboriginal cultural heritage was found during the survey and no impacts were predicted.

A Due Diligence Report was completed by RPS on 17 August 2018 as part of MOD 2. The inspection confirmed the MOD 2 Project Area contains low archaeological sensitivity. Recommendations from the report are contained in **Section 6.6.4.**

6.6.2 Approved Criteria

There are no specific Project Approval criteria associated with heritage relating to the project. Heritage is managed in accordance with the approved *Heritage Management Plan* (RPS, 2015).

The process for managing any unexpected heritage items is outlined in **Section 6.6.4**.

6.6.3 Key Environmental Performance or Management Issues

There were no issues or additional measures taken relating to Aboriginal cultural heritage during the reporting period.

6.6.4 Management Measures

The process for managing unexpected Aboriginal objects/items is outlined in the *Heritage Management Plan* (RPS, 2015).

In accordance with Condition 36(c) of Project Approval 09_0175 for the Karuah East Quarry and the approved HMP (RPS 2015), RAPs must be provided the option to monitor initial surface disturbance within the Project Area for the identification of unrecorded Aboriginal objects. RAPs must be notified 14 days in advance of work.

Should unexpected Aboriginal objects/features be encountered, work must stop immediately, and the area cordoned off with a high visibility barrier. The Quarry Manager is to then contact a heritage consultant and Registered Aboriginal Parties (RAPs). The heritage consultant, in consultation with the RAPs, is to conduct a field survey to assess the Aboriginal objects/features identified. The heritage consultant, in consultation with the RAPs, will then recommend appropriate mitigation measures.

The Quarry Manager is to implement the mitigation measures that are recommended by the heritage consultant and agreed to by the RAPs and in accordance with the Heritage NSW regulations. If additional visual inspection and salvage is recommended, the Quarry Manager is to arrange for the heritage consultant and RAPs to undertake those works.

If human remains are identified, work must cease immediately within that area and the area cordoned off. The Karuah East Quarry Manager must contact the NSW Police. The NSW Police will assess if the remains are part of a crime scene or possible Aboriginal remains. If determined to be Aboriginal remains, the NSW Police will contact Heritage NSW and Heritage NSW will confirm the determination in writing. If determined to be a NSW Police matter, NSW Police instructions must be followed. Clearance to recommence work bust be sought from the NSW Police. If Heritage NSW confirms the remains are Aboriginal, Heritage NSW in

consultation with RAPs will develop a management plan. The Karuah East Quarry Manager will document the implementation of the plan.

Provided that these heritage contingency protocols have been followed, works within the project area may proceed.

6.6.5 Proposed Improvements to Management Measures

There are no further proposed management responses other than those outlined in the *Heritage Management Plan (RPS).*

6.7 General Waste Management

6.7.1 Environmental Management

Karuah East Quarry uses a licensed contractor for waste removal at the site.

Typical waste generation at the quarry now the site is operational has consisted of non-hazardous and general wastes, metals as well as oily wastes. The general and non-hazardous wastes were placed in a skip bin and removed from site. Metals are placed in an identified metal recycling skip-bin for intermittent pick up and recycling at metal recycling facilities. Yellow bins are utilised for recycling materials such as paper and cardboard.

6.7.2 Environmental Performance

A licensed waste contractor removes waste from a 3 m^3 waste bin at the site. Over the 2022 reporting period, approximately 57 cubic metres of waste (including construction waste) was removed from the site.

6.7.3 Proposed Improvements to Management Measures

The Karuah East Quarry will continue to implement a waste management strategy similar to the adjacent Karuah Quarry.

6.8 Water Management

Summary of Water Management at Site

Surface water at Karuah East Quarry is managed in accordance with the *Water Management Plan (WMP).* The primary objective of water management is to remain compliant with EPL 20611 and ensure there is no uncontrolled discharge of water from the site. The goal for any water that leaves the site from a controlled or uncontrolled discharge is that this water meets the required EPL criteria. This objective is intrinsic to erosion and sedimentation designs and controls for the quarry. As such, the following specific objectives of this WMP have been established as part of the construction and operational phases:

- Conducting best practice land clearing procedures for all proposed disturbance areas;
- Implementation of erosion and sediment controls during construction and operation as per the Blue Book and WMP;
- Separating undisturbed runoff from disturbed runoff where possible to minimise and isolate the amount of disturbed or dirty water runoff;
- Directing sediment-laden runoff into designated sediment control dams;

- Diverting clean runoff from areas upstream of the operation into natural depressions and creeks;
- Allowing sediments to settle in sediment control dams so that the water can be re-used for onsite dust suppression, thereby maintaining dam capacities for subsequent rainfall events;
- Maintaining sediment control structures to ensure that the designed capacities are maintained for optimum settling of sediments; and
- Implementing an effective revegetation and maintenance program for the site.

Water Storage and Use

The Karuah East Quarry has three sediment dams, including:

- Dam 1 - Catchment (crushing plant and product stockpiles);
- Dam 2 - Catchment (product stockpiles and office infrastructure area); and
- Dam 3 - Catchment (product stockpiles area).

The current water management system and location of dams are shown in **Figure 3**.

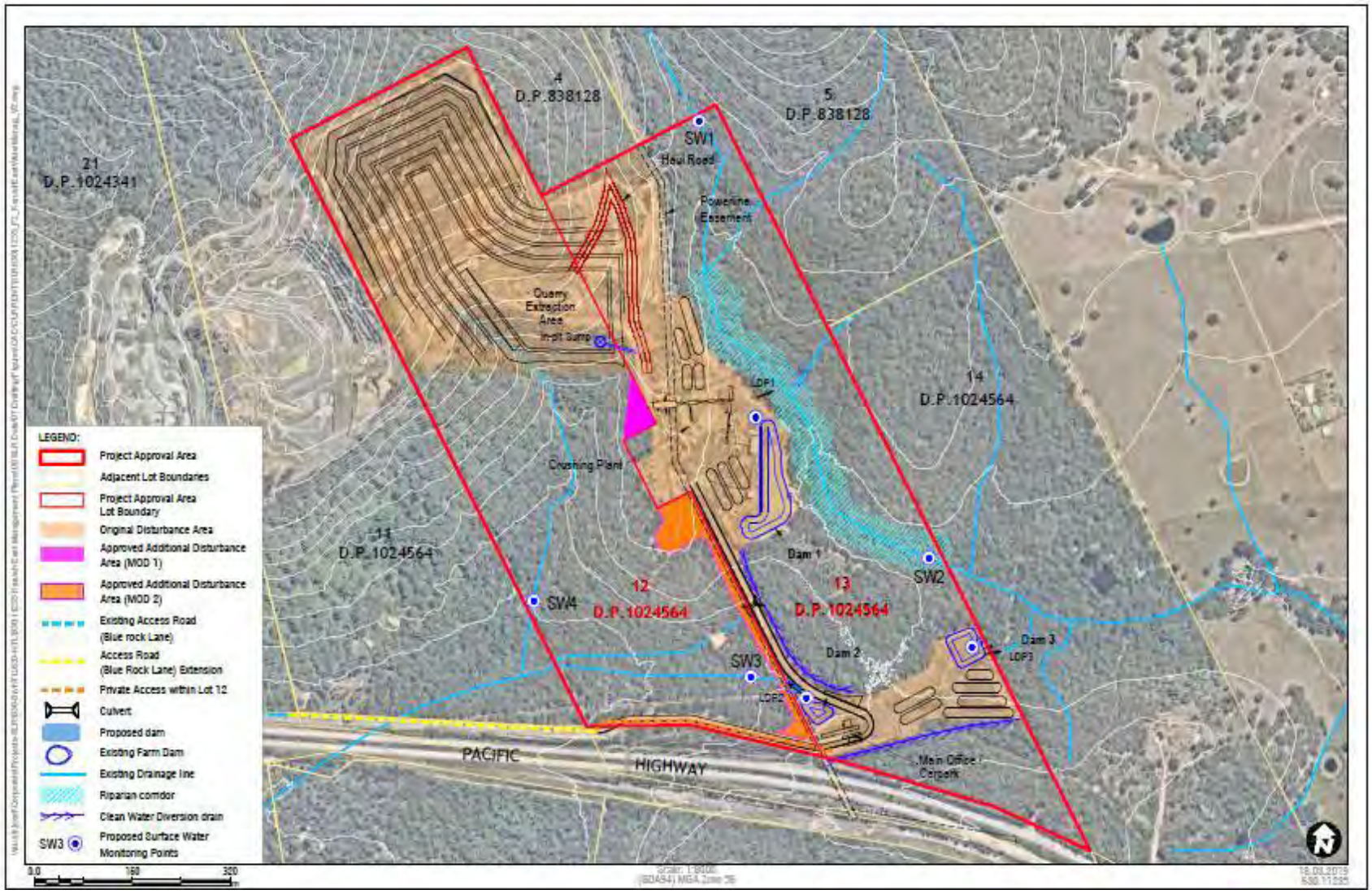


Figure 3 - Current Water Management System (Prepared by SLR)

6.8.1 EIS/Preferred Project Report Predictions

Surface water was assessed for the Karuah East Quarry EIS and then updated for the Preferred Project Report (2013).

The only direct disturbance to occur to the local drainage system will be in the upper reaches of the northern most drainage line in Lot 12. The length of the channel which will be disturbed as a result of excavation in the upper reaches of the catchment with no clearly defined bed or banks. Therefore, the impact on the wider catchment as a result of disturbance to the upper reaches of this drainage line is not anticipated to be significant.

With regards to offsite discharges, a water balance model has been developed to predict the frequency and volume of discharges from the project. The water balance predicts that uncontrolled discharges will be minimal, averaging only one discharge day per year in Stage 2 (which represents approximately half of the total disturbance area) and two days in Stage 5 (at full disturbance).

6.8.2 Surface Water Monitoring

6.8.2.1 Approved Criteria

Discharge criteria for the Karuah East Quarry is provided in Condition L2.4 of EPL 20611 and outlined in **Table 26**. These pollutants will be tested during discharge events from LDP001, LDP002 and LDP003. Discharge events are discussed in **Section 7.3.3**.

Table 26 - Discharge Surface Water Criteria (LDP001, LDP002, LDP003)

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 and/or none visible
pH	pH	-	-	-	6.5 - 8.5
Total Suspended Solids	Milligrams per litre	-	-	-	40

As detailed in Section 8.1.3 of the WMP, surface water monitoring is undertaken at the following locations:

- Dam 1, Dam 2, and Dam 3;
- SW 1 and SW 2 - Existing second order drainage line (within Lot 13 flowing along the eastern boundary of the PA Area); both upstream and downstream of the quarry;
- SW 3 - Existing drainage line downstream of Dam 2; and
- SW 4 - Existing drainage line downstream of the quarry extraction area.

As per Section 8.1.3 of the WMP, SW 1 - 4 will be tested biannually (when flowing) during operations to determine ongoing compliance with the water quality performance criteria. SW2 and SW3 will be tested within 24 hours any discharge as per Section 3 of the Statement of Commitments.

Karuah East Quarry began revising and updating the WMP in 2022. Karuah East Quarry will submit the updated WMP for approval and publish the approved version on the website.

6.8.2.2 Discharge Results

Controlled and uncontrolled discharges from each licenced discharge point are listed in **Table 27.**

Table 27 - Discharge Monitoring Results 2022

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Discharging	Comment
EPL Criteria	**6.5 - 8.5**	**-**	**-**	**40**	**5**		
LDP1							
Monday, 17 January 2022	7.6	895	63	20	NV	Yes	Controlled discharge
Tuesday, 18 January 2022	7.6	906	59	24	NV	Yes	Controlled discharge
Wednesday, 19 January 2022	7.5	863	67	29	NV	Yes	Controlled discharge
Friday, 4 March 2022	7.1	398	2,500	1,600	<5	Yes	No
Saturday, 5 March 2022	7.1	506	1,800	1,800	NV	Yes	No
Sunday, 6 March 2022	7.2	526	1,600	1,500	NV	Yes	No
Monday, 7 March 2022	7.07	546	1,360	984	<5	Yes	No
Tuesday, 8 March 2022	7.3	698	990	750	NV	Yes	No
Wednesday, 9 March 2022	7.2	526	2,000	870	NV	Yes	No
Thursday, 10 March 2022	7.1	556	1,700	1,100	NV	Yes	No
Thursday, 31 March 2022	7.2	297	5,000	3,200	NV	Yes	No
Friday, 1 April 2022	7.1	284	3,100	2,500	NV	Yes	No
Saturday, 2 April 2022	7.1	323	2,400	2,300	NV	Yes	No
Sunday, 3 April 2022	7.1	349	2,100	1,700	NV	Yes	No
Monday, 4 April 2022	7.1	393	2,000	1,100	NV	Yes	No
Wednesday, 6 July 2022	7.2	293	2,200	1,700	NV	Yes	No
Thursday, 7 July 2022	7.2	202	1,800	1,300	NV	Yes	No
Friday, 8 July 2022	7.2	310	2,100	1,100	NV	Yes	No

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Discharging	Comment
EPL Criteria	**6.5 - 8.5**	**-**	**-**	**40**	**5**		
Saturday, 9 July 2022	7	563	230	110	NV	Yes	No
Sunday, 10 July 2022	7	503	1,100	700	NV	Yes	No
Monday, 11 July 2022	7.1	415	820	750	NV	Yes	No
Tuesday, 12 July 2022	7	396	1,500	840	NV	Yes	No
Wednesday, 13 July 2022	7.1	435	1,600	980	NV	Yes	No
Thursday, 1 September 2022	7.6	648	65	25	NV	Yes	Controlled discharge
Friday, 2 September 2022	7.8	599	50	20	NV	Yes	Controlled discharge
Monday, 26 September 2022	8.5	621	65	26	<5	Yes	Controlled discharge
Monday, 17 October 2022	8	700	40	14	NV	Yes	Controlled discharge
Tuesday, 18 October 2022	7.8	657	50	28	NV	Yes	Controlled discharge
Wednesday, 19 October 2022	8	730	55	26	NV	Yes	Controlled discharge
Thursday, 20 October 2022	7.7	664	50	21	NV	Yes	Controlled discharge
Friday, 4 November 2022	7.6	620	100	38	NV	Yes	Controlled discharge
Monday, 7 November 2022	7.5	670	65	33	NV	Yes	Controlled discharge
Tuesday, 8 November 2022	7.3	757	90	39	NV	Yes	Controlled discharge
LDP2							
Monday, 17 January 2022	7	476	40	20	NV	Yes	Controlled discharge
Thursday, 10 February 2022	7.2	578	25	10	NV	Yes	Controlled discharge
Monday, 14 March 2022	6.9	629	15	5	NV	Yes	Controlled discharge
Thursday, 31 March 2022	6.7	102	1,600	1,300	NV	Yes	No
Friday, 1 April 2022	6.8	279	910	490	NV	Yes	No

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Discharging	Comment
EPL Criteria	**6.5 - 8.5**	**-**	**-**	**40**	**5**		
Tuesday, 19 April 2022	7.2	484	15	<5	NV	Yes	Controlled discharge
Tuesday, 26 April 2022	6.9	445	30	8	NV	Yes	Controlled discharge
Thursday, 12 May 2022	6.8	543	39	13	NV	Yes	Controlled discharge
Tuesday, 7 June 2022	7.3	473	60	22	NV	Yes	Controlled discharge
Wednesday, 6 July 2022	7	194	700	510	NV	Yes	Noi
Thursday, 7 July 2022	7	130	530	210	NV	Yes	No
Monday, 18 July 2022	7	501	15	<5	NV	Yes	Controlled discharge
Tuesday, 19 July 2022	7	516	16	<5	NV	Yes	Controlled discharge
Thursday, 11 August 2022	6.6	732	18	6	NV	Yes	Controlled discharge
Friday, 12 August 2022	7	673	39	34	NV	Yes	Controlled discharge
Monday, 29 August 2022	7.1	573	25	9	NV	Yes	Controlled discharge
Thursday, 8 September 2022	7	583	5.9	<5	NV	Yes	Controlled discharge
Monday, 26 September 2022	7.4	717	17	8	NV	Yes	Controlled discharge
Monday, 24 October 2022	7.1	827	14	9	NV	Yes	Controlled discharge
Tuesday, 25 October 2022	7	757	22	10	NV	Yes	Controlled discharge
LDP 3							
Wednesday, 16 March 2022	7.7	554	94	40	NV	Yes	Controlled discharge
Thursday, 17 March 2022	7.7	535	85	33	NV	Yes	Controlled discharge
Friday, 18 March 2022	7.7	551	77	32	NV	Yes	Controlled discharge
Thursday, 31 March 2022	7.3	444	170	120	NV	Yes	No
Friday, 1 April 2022	7.1	329	850	500	NV	Yes	No

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Discharging	Comment
EPL Criteria	**6.5 - 8.5**	**-**	**-**	**40**	**5**		
Tuesday, 19 April 2022	7.4	520	42	15	NV	Yes	Controlled discharge
Wednesday, 20 April 2022	7.4	525	42	16	NV	Yes	Controlled discharge
Thursday, 21 April 2022	7.3	530	40	17	NV	Yes	Controlled discharge
Tuesday, 26 April 2022	7.4	504	62	39	NV	Yes	Controlled discharge
Wednesday, 27 April 2022	7.4	517	65	26	NV	Yes	Controlled discharge
Thursday, 28 April 2022	7.4	521	67	30	NV	Yes	Controlled discharge
Wednesday, 4 May 2022	7.5	628	25	10	NV	Yes	Controlled discharge
Thursday, 5 May 2022	7.5	629	15	6	NV	Yes	Controlled discharge
Friday, 6 May 2022	7.5	654	30	14	NV	Yes	Controlled discharge
Thursday, 12 May 2022	7.6	546	55	26	NV	Yes	Controlled discharge
Friday, 13 May 2022	7.6	539	55	22	NV	Yes	Controlled discharge
Wednesday, 6 July 2022	7.2	239	200	100	NV	Yes	No
Thursday, 7 July 2022	7	174	320	200	NV	Yes	No
Friday, 8 July 2022	7	225	560	330	NV	Yes	No
Wednesday, 27 July 2022	7.2	491	45	17	NV	Yes	Controlled discharge
Thursday, 28 July 2022	7.2	520	40	14	NV	Yes	Controlled discharge
Friday, 29 July 2022	7.2	551	35	9	NV	Yes	Controlled discharge
Thursday, 11 August 2022	7.3	622	60	29	NV	Yes	Controlled discharge
Friday, 12 August 2022	7.4	620	36	14	NV	Yes	Controlled discharge
Monday, 29 August 2022	7.9	641	19	6	NV	Yes	Controlled discharge
Tuesday, 30 August 2022	7.9	637	14	5	NV	Yes	Controlled discharge

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Discharging	Comment
EPL Criteria	**6.5 - 8.5**	**-**	**-**	**40**	**5**		
Wednesday, 31 August 2022	7.3	667	13	6	NV	Yes	Controlled discharge
Thursday, 1 September 2022	7.3	647	25	13	NV	Yes	Controlled discharge
Friday, 2 September 2022	7	624	21	10	NV	Yes	Controlled discharge
Monday, 26 September 2022	8	546	35	24	NV	Yes	Controlled discharge
Tuesday, 27 September 2022	8.1	557	27	19	NV	Yes	Controlled discharge
Wednesday, 28 September 2022	8.3	561	21	16	NV	Yes	Controlled discharge
Thursday, 29 September 2022	8.4	583	26	19	NV	Yes	Controlled discharge
Friday, 30 September 2022	8.1	549	31	20	NV	Yes	Controlled discharge
Monday, 24 October 2022	7.5	500	70	36	NV	Yes	Controlled discharge
Wednesday, 26 October 2022	7.2	559	60	35	NV	Yes	Controlled discharge

Summary of LDP1 Discharges

- There was a total of 33 discharges from LDP1 during the 2022 reporting period;
- All discharges where within guidelines for pH and Oil and Grease
- 20 discharges where uncontrolled; and
- TSS results exceeded criteria during the 20 uncontrolled discharges dates from 04 March 2022 to 13 July 2022.

Summary of LDP2 Discharges

- There was a total of 20 discharges from LDP2 during the 2022 reporting period
- All discharges where within guidelines for pH and Oil and Grease;
- Four uncontrolled discharges; and
- TSS results exceeded criteria during the four uncontrolled discharges dates March, April and July 2022

Summary of LDP3 Discharges

- There was a total of 30 discharges from LDP3 during the 2022 reporting period;
- All discharges where within guidelines for pH and Oil and Grease
- Five discharges where uncontrolled; and
- TSS results exceeded criteria during the five uncontrolled discharges dates in March, April and July 2022

In total, there was 88 discharges, with 29 of these being uncontrolled and exceeding TSS criteria. All 29 TSS exceedances occurred during the uncontrolled discharges from March 2022 to July 2022 with the largest exceedance recording 3200 mg/L on the 31 March 2022 from LDP001. The uncontrolled discharges related to a period of extreme rainfall in the Karuah region, recording over 970mm of rainfall during this time, which resulted in submerged roads and damaged access tracks.

These uncontrolled discharges were reported as an incident to appropriate regulatory authorities (including the NSW EPA and DPE) in accordance with the *Pollution Incident Response Management Plan* as outlined below:

- Uncontrolled discharge incident commencing Friday, 4 March 2022 -
    - Incident notification 4 March 2022.
    - Incident Report 18 March 2022.
- Uncontrolled discharge incident commencing Thursday, 31 March 2022 -
    - Incident notification 31 March 2022.
    - Incident Report 7 April 2022.

- Uncontrolled discharge incident commencing Monday, 6 July 2022 -
    - Incident notification 6 July 2022.
    - Incident Report 13 July 2022.

Further details of this incident can be found in **Section 10**.

Compared to 2021, there was a greater number of discharges in 2022 with a higher number of TSS exceedances (18 in 2021 compared to 29 in 2022). In 2020. There were zero pH exceedances in 2022. The TSS ranged <5 to 3200 mg/L in 2022, and <5 to 1260 mg/L in 2021.

6.8.3 Groundwater Monitoring Results

There are no criteria applicable to groundwater monitoring in Project Approval 09_0175 or EPL 20611.

In accordance with the approved WMP, groundwater levels are monitored on a quarterly basis to identify any adverse impacts arising from the operation of the quarry in the future, and to identify long-term groundwater level trends. Groundwater samples will be collected for laboratory analysis on a 6-monthly basis. The groundwater quality results will be laboratory analysed for the parameters below and compared to background water quality results:

- pH, EC, Total Dissolved Solids (TDS); Alkalinity;
- Total nitrogen, total phosphorus;
- Major ions, calcium, magnesium, sodium, potassium, chloride, sulphate, carbonate, bicarbonate;
- Total Petroleum Hydrocarbon (TPH); and
- BTEX (benzene, toluene, ethyl benzene, exylene). Additional Analysis – 12 monthly (every second sample only):
- Nutrient suite: total nitrogen, nitrate, total Kjeldahl nitrogen, total phosphorus, phosphate;
- Metals (arsenic, cadmium, chromium, copper, lead, zinc, nickel, manganese, mercury, total iron, filterable iron);
- Polycyclic Aromatic Hydrocarbon (PAH); and
- Organophosphorus pesticides, phenoxy acid herbicides.

The existing monitoring bores at BH205, BH207, BH208 and BH303 are used for monitoring groundwater of the quarry area. BH207 was relocated in September 2016 and BH205 was relocated on 11 March 2017. Both of these piezometers were relocated within 30m to their original locations to allow construction to progress.

New monitoring bores will be installed if any existing monitoring bores are destroyed during the quarry operations or are subject to general failure. The locations of new bores will be added to the *Water Management Plan* and provided to DPE and DoI Water.

Groundwater Level

Table 28 shows a comparison of groundwater levels since 2017. All groundwater locations were monitored four times during 2021 with a requirement for quarterly monitoring of groundwater levels as per the WMP. As evident, water levels have remained relatively consistent at BH208 and BH303, with BH205 showing a consistent increase in water level in recent years. Water levels at BH207 were relatively consistent and saw a slight increase in 2021. These increases may be attributed to the higher-than-average rainfall received at site in 2020 and 2021.

Table 28 - Groundwater Level since 2017

Date	Groundwater level (metres below ground level)			
	BH205	BH207	BH208	BH303
April 2017	25.3	9.4	20.0	30.7
October 2017	22.9	8.9	19.9	30.6
January 2018	21.9	9.1	20.3	30.7
April 2018	21.7	9.2	20.5	30.8
July 2018	20.5	8.9	20.5	30.9
October 2018	20.4	9.3	19.9	30.8
January 2019	20.1	9.2	20.4	31.0
April 2019	20.3	9.2	20.5	30.6
July 2019	19.7	9.1	20.6	31.1
October 2019	18.6	8.2	20.6	30.7
January 2020	19.95	9.3	20.7	31.2
April 2020	18.4	8.3	20.6	30.4
July 2020	18.2	8.3	20.8	31.2
October 2020	16.7	7.7	20.7	30.8
January 2021	18.1	8.5	20.8	31.4
April 2021	17.5	7.4	20.7	30.9
June 2021	18.2	8.3	20.7	31.2
October 2021	16.7	7.4	20.5	30.7
January 2022	17.44	7.86	20.71	31.07
April 2022	17.2	7.65		31.0
July 2022	16.75	7.38		30.67
October 2022	15.8	6.89		30.2

Groundwater Quality

Sampling of groundwater monitoring locations occurred on 18 April 2022 and 20 October 2022 in accordance with the six-monthly requirement to monitor groundwater quality data as per the WMP. Note: BH 208 was unable to be sampled in 2022 second, third and fourth quarters due to insufficient water levels during monitoring events. Results have been compared against data sampled from 2010 (pre-Karuah East Quarry) in **Table 29.**

Table 29 - Average Groundwater Quality Results for Key Parameters

Monitoring Location	pH	TDS (mg/L)	EC (µS/cm)	Number of Samples
Average Results 2017				
BH 205	8.7	1200	2230	2
BH 207	7.2	1800	3600	2
BH 208	6.6	1900	3500	2
BH 303	6.9	1175	2350	2
Average Results 2018				
BH 205	8.8	1150	2500	2
BH 207	7.2	1020	1940	2
BH 208	7.10	3000	3000	1
BH 303	7.5	1250	2550	2
Average Results 2019				
BH 205	8.3	1734	2432	2
BH 207	6.9	1579	2527	2
BH 208	6.9	*	2505	1
BH 303	6.2	1557	2404	2
Average Results 2020				
BH 205	7.1	1460	2735	2
BH 207	7.0	1548	2865	2
BH 208	*	*	*	0
BH 303	5.9	1625	2985	2
Average Results 2021				
BH 205	6.76	1869	3350	2
BH 207	6.45	1663	3070	2
BH 208	*	*	*	0
BH 303	5.82	1674	2910	2
Average Results 2022				
BH 205	6.25	2740	5020	2
BH 207	6.61	1889	3465	2
BH 208	*	*	*	0
BH 303	5.98	1518	2745	2

* No data recorded due to insufficient water levels.

2022 results are comparable to results from previous years and pre-Karuah East averages. The pH at BH 205, BH 303 and BH 207 in 2021 is more alkaline than 2022 results but consistent with levels recorded. TDS levels continued to be highly variable across the years. Average EC across the three monitoring locations was higher than the 2021 average EC levels.

Karuah East Quarry will continue to monitor groundwater quality during 2023.

6.8.4 Water Take

There is no Water Take at the Karuah East Quarry, with the site having no groundwater extraction licences.

6.8.5 Salinity Trading Scheme Credit Use

Not applicable to Karuah East Quarry.

6.8.6 Compensatory Water to Other Users

Not applicable to Karuah East Quarry.

6.9 Summary of Environmental Performance

Table 30 provides a summary of the environmental performance at the site for the reporting period.

Table 30 - Summary of Environmental Performance

Aspect	Approval Criteria/EIS Prediction	Performance During the Operating Period	Trend/Key Management Implications	Implemented / Proposed Management Actions
Noise	See Section 6.2.1	Compliant	Within criteria.	Continued monitoring
Blasting	See Section 6.3.1	Compliant	Within criteria.	Continued monitoring
Air Quality	See Section 6.4.1	Compliant.	Within criteria.	Continued monitoring
Biodiversity	See Section 6.5.1	Compliant.	Within criteria for BOAMP and LRMP.	Continued monitoring.
Heritage	See Section 6.6.1	Compliant	No specific criteria.	Continued monitoring
Waste	No predictions	Compliant	Minimal change over successive years.	Continued monitoring
Water	See Section 6.8.1	Non-Compliant due to discharge and TSS exceedances.	Discharge criteria non-compliances have been reported to EPA and DPE. 29 uncontrolled discharges at LP001, LP002, and LP003 occurred from March through July 2022.	Continued monitoring

7.0 REHABILITATION

There have been no opportunities to establish rehabilitation at the quarry site in its current form. Future rehabilitation activities will be undertaken in accordance with the approved LRMP.

7.1 Rehabilitation Performance During Reporting Period

A summary of rehabilitation at Karuah East Quarry is outlined in **Table 31**.

Table 31 - Summary of Rehabilitation Performance During Reporting Period

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	No Rehabilitation.
Agreed post- rehabilitation land use	Final landuse is outlined within the LRMP. The vegetation at closure will be native woodland consistent with the surrounding bushland.
Key rehabilitation performance indicators	No Rehabilitation.
Renovation or removal of buildings	No Rehabilitation.
Any other Rehabilitation Taken including: • Exploration activities; • Infrastructure; • Dams; and • The installation or maintenance of fences, bunds and any other works.	No Rehabilitation. Clearance of approximately 0.89 ha within the quarry footprint undertaken during May 2022
Variations to activities undertaken to those proposed (including why there were variations and whether the Resources Regulator was notified)	No Rehabilitation.
Outcomes of trials, research projects and other initiatives	No Rehabilitation.
Key issues that may affect successful rehabilitation	No Rehabilitation.

Table 32 - Disturbance and Rehabilitation Status

Quarry Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
Total Quarry Footprint (including access road in)	28.46	29.35	31.5
Total Active Disturbance	28.46	29.35	31.5
Land Being Prepared for Rehabilitation	0	0	0
Land Under Active Rehabilitation	0	0	0
Completed Rehabilitation	0	0	0

7.2 Actions for the next Reporting Period

The DPE (2015) *Annual Review Guidelines* requires an outline of the rehabilitation actions proposed during the next reporting period. These actions are detailed in **Table 33**.

Table 33 - Actions for the Next Reporting Period

Action	Site Comment
Describe the steps to be undertaken to progress agreement during next reporting period, where final rehabilitation outcomes have not yet been agreed between stakeholders.	There is no planned additional rehabilitation at the site in the next Annual Review period.
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period.	There are no additional rehabilitation trials during the next Annual Review period.
Summary of rehabilitation activities proposed for next report period.	There is no planned additional rehabilitation at the site in the next Annual Review period. Karuah East Quarry continues to assess opportunities for progressive rehabilitation throughout quarry planning.

8.0 COMMUNITY

8.1 Community Engagement Activities

A Community Consultative Committee (CCC) was formed for the Karuah East Quarry in accordance with Schedule 5, Condition 6 of PA 09_0175, which states:

> *The Applicant must establish and operate a Community Consultative Committee (CCC) for the development. The CCC must:*
>
> *(a) be established and operated in general accordance with the Community Consultative Committees Guidelines for State Significant Projects (Department of Planning and Environment, 2016); and*
>
> *(b) be established prior to the commencement of construction activities, to the satisfaction of the Planning Secretary.*

Meetings were held on the following dates:

- 14 March 2022
- 19 September 2022

The CCC comprises of an independent chairperson, up to seven community and stakeholder representatives, a representative from Mid Coast Council, and up to three company representatives. Other attendees may include any guest community members at the approval of the independent chairperson. Meeting minutes are found on the website http:hunterquarries.com.au

Key aspects discussed include:

- Site inspection;
- Discussion about MOD 10 (stockpiling space, parking and administration office) in the 14 March 2022 meeting;
- Monitoring and environmental performance, including non-compliances; and
- Community complaints and response to complaints.

8.2 Community Contributions

The Karuah East Quarry feels strongly about supporting the local community and has a history of community contributions. Community contributions are being made through Hunter Quarries Pty Limited.

8.3 Complaint Management

If a complaint is received, it is logged and investigated by the Quarry Manager. Feedback is then provided to the complainant and government agencies, as required. This process forms a part of the Karuah East Environmental Management Strategy (EMS).

A telephone number has been established for the purpose of receiving complaints and enquiries from the community and this number is available on the Karuah East Quarry website (www.hunterquarries.com.au)

and is provided on a sign at the entrance to the quarry. The community can contact the quarry on (02) 4997 5966 as well as through the Karuah East Quarry website.

8.3.1 Complaints

In 2022 there was one complaint received.

Karuah East Quarry received a complaint by email from DPE, who was notified by a community member on 14 January 2022 regarding air quality and water pollution. An investigation was undertaken immediately after the complaint was received, however site personnel could not find evidence of air quality and water pollution exceedances leaving site. Karuah East Quarry provided monitoring data to DPE. There were no further actions required.

Table 34 summarises the number of complaints made to Karuah East Quarry since operations at the site commenced.

Table 34 – Comparison of Complaints for Karuah East Quarry

Year	Complaint Type					
	Noise	Air Quality	Blasting	Traffic	Water	Other
2016	0	0	0	1	0	0
2017	1	0	0	0	1	1 (combined noise and dust complaint)
2018	1	0	1	0	0	0
2019	0	0	0	0	0	2 (access and vibration)
2020	0	0	0	0	0	1 (vibration)
2021	1	0	0	0	0	0
2022	0	1	0	0	1	0

9.0 INDEPENDENT ENVIRONMENTAL AUDIT

An Independent Environmental Audit is required for at Karuah East Quarry in accordance with Schedule 5 Condition 9 of PA 09_0175. This is to be completed "within 12 months of the commencement of development on the site, and every 3 years thereafter". The first Independent Environmental Audit was completed in July 2017 by EMM Consulting.

In October 2020, Hansen Bailey completed the second Independent Environmental Audit of Karuah East Quarry. A copy of the Independent Environmental Audit is available on the website https://hunterquarries.com.au/.

The following key documents reviewed during the audit included:

- PA 09_0175 and Statement of Commitments (as modified);
- EPL 20611; and
- Karuah East Quarry environmental management plans and procedures.

The non-compliances identified in the 2020 Independent Environmental Audit were generally minor in nature, however there were some additional controls recommended by Hansen Bailey to ensure that the environmental management plans approved under PA 09_0175 are consistently implemented.

The Audit Action Plan and current progress against the recommendations is contained in **Appendix 7**.

10.0 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

10.1 Summary of Incidents and Non - Compliances

Uncontrolled Discharge

With an active La Niña influencing climate along the east coast of Australian since September 2020, KEQ has experienced greater than average rainfall. During March 2022 a rainfall event was experienced resulting in 342.5mm received over the whole month. Successively, KEQ has received 141.8mm in February, 211.8mm in April, and 117.2mm in May 2022.

As a result of this active La Nina, Karuah East Quarry experienced 29 uncontrolled discharges from site, with the highest TSS exceedance recorded being 3200mg/L on the 31 March.

All three of the KEQ dams eventually reached storage capacity and uncontrolled discharge commenced from 31 March 2022 and 6 July 2022, with rainfall evens during this time reaching up to 77mm with a 24-hor period. KEQ enacted the PIRMP to minimise risks of pollution and notified the EPA and DPE. KEQ also provided an incident report and non-compliance notification to the EPA and DPE following the event. Water quality monitoring was undertaken (see **Section 6.8** for the results).

In addition to the EPA Hotline being contacted to self-report the incident, a DPE Compliance Officer was contacted and provided a summary of the extreme weather event and environmental incident that had occurred. A communication strategy was prepared in consultation with the DPE and implemented as soon as practically possible, to notify nearby residents.

At the morning toolbox talk, all site workers and contractors were briefed that the PIRMP had been enacted and were advised to notify their supervisor if they noticed anything that may cause environmental concern.

Late Submission of 2021 Annual Review

Due to unexpected actions during the 2021 reporting period, the 2021 Annual Review was unable to be submitted within the approve timeframe as stated in the project approval.

Schedule 5, Condition 4 states that:

Annual Review
By the end of March each year, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:

(a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;
(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against:

- *the relevant statutory requirements, limits or performance measures/criteria;*
- *the monitoring results of previous years; and*
- *the relevant predictions in the documents referred to in condition 2(d) of Schedule 2 of this consent;*

(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
(d) identify any trends in the monitoring data over the life of the development;
(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(f) describe the measures that would be implemented over the current calendar year to improve the environmental performance of the development.

Karuah East Quarry have committed to submitting the 2022 Annual Review within the Project Approval timeframe.

10.2 Environmental Training

Training of Karuah East Quarry employees and contractors was undertaken monthly through the year with a focus on environmental awareness and incidents. This training includes PIRMP testing at least once a year. Other training includes environmental awareness for the following areas:

- Biodiversity conservation;
- Air quality;
- Fuel and spill containment and control;
- Noise and vibration;
- Pest vertebrate management; and
- Waste management.

11.0 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Table 35 outlines the proposed actions in the next reporting period.

Table 35 - Proposed Actions in the Next Reporting Period

Proposed Action	Timeline	Management Plan Requires Revision
Update of multiple Management Plans to incorporate MOD 9 and MOD 10	Revision and approval process is expected to occur in 2023 and into 2024.	Yes
Continue environmental monitoring in accordance with management plans and approval requirements	On-going	No.
Continue CCC and community support	On-going	No
Continue to update the website with monitoring data and key environment and community information	On-going	No
Continue to undertake pest and weed management as required	Ongoing	No

12.0 REFERENCES

The following documents and reports have been used to assist in writing this Annual Review:

Management Plans

- Air Quality and Greenhouse Gas Management Plan (SLR 2019);
- Biodiversity Offset Area Management Plan (Kleinfelder 2022);
- Blast Management Plan (SLR 2019);
- Environmental Management Strategy (SLR 2019);
- Heritage Management Plan (RPS 2019);
- Landscape and Rehabilitation Management Plan (Kleinfelder and SLR 2019);
- Noise Management Plan (EMM 2022);
- *Tetratheca juncea* Translocation Program (Firebird 2019);
- Traffic Management Plan (Streetwise 2015); and
- Water Management Plan (SLR 2019).

Monitoring Reports

- 2022 Biennial Ecological Monitoring Report (Wedgetail Project Consulting, 2023)
- Karuah East Quarry Independent Environmental Audit (Hansen Bailey 2020);
- Groundwater Monitoring Summary Report 2022 (RCA, 2022)
- Karuah East Quarry-Quarterly Noise Monitoring Reports (EMM 2022a, 2022bn 2022c, and 2022d); and
- *Tetratheca Juncea* Monitoring Report for The Karuah East Quarry Site (Firebird ecoSultants 2021).

Statutory Documents

- Section2.55 (1A) Modification Report – Proposed Modification to Operational Noise Criteria and Implementation of Improved Acoustic Mitigation Measures, PA 09_0175 (ADW Johnson 2019);
- Section 75W Application (MOD 1) to amend Part 3A Project Approval 09_0175 Minor Increase to Approved Disturbance Area (ADW Johnson 2018a);
- Section 75W Application (MOD 2) to amend Part 3A Project Approval 09_0175 Minor Increase to Approved Disturbance Area (ADW Johnson 2018b);
- Environmental Assessment Report – Proposed Karuah East Quarry (ADW Johnson 2013);

- Environment Protection Licence (No. 20611);
- Preferred Project Report - Proposed Karuah East Quarry (ADW Johnson July 2013);
- Project Approval (PA 09_0175); and
- Federal Approval (EPBC 2014/7278).

APPENDIX 1 – Project Approval and Federal Approval

Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, the Planning Assessment Commission approves the project application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:
- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

Alan Coutts
Member of the Commission

David Johnson
Member of the Commission

Sydney 17 June 2014

SCHEDULE 1

Application Number:	09_0175
Proponent:	Karuah East Quarry Pty Limited
Approval Authority:	Minister for Planning
Land:	Lot 12 DP 1024564 Lot 13 DP 1024564 Lot 202 DP 1042537 Lot 26 DP 1024341 Lot 27 DP 1024341 Lot 16 DP 1024564 Lot 17 DP 1024564
Project:	Karuah East Quarry Project

Green text represents Mod 1 (Increased disturbance area) – April 2018
Red text represents Mod 2 (Increased disturbance area) – December 2018
Note: *Modifications 3 – 7 – withdrawn*
Purple text represents Mod 8 (Operational noise criteria) – December 2020
Blue text represents Mod 9 (Extended operating hours) – November 2021

TABLE OF CONTENTS

DEFINITIONS

Aboriginal object / place	Has the same meaning as the definition of the term in section 5 of the NP&W Act.
Annual review	The review required under condition 4 of Schedule 5
Applicant	Karuah East Quarry Pty Limited or any other person or company who rely on this consent to carry out the development that is the subject of this consent
BCA	Building Code of Australia
BCD	Biodiversity and Conservation Division within the Department
Biodiversity offset strategy	The conservation and enhancement strategy described in the EA, and depicted conceptually in the figure in Appendix 4
Calendar year	A period of 12 months from 1 January to 31 December
CCC	Community Consultative Committee
Conditions of this consent	Conditions contained in Schedules 2 to 5 inclusive
Council	MidCoast Council
CPI	Australian Bureau of Statistics Consumer Price Index
Day	The period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays.
Department	Department of Planning, Industry and Environment
DPIE Water	Water Group within the Department
Development	The development as described in the document/s listed in condition 2(d) of Schedule 2, as modified by this consent
Development layout	The layout of the development as shown in the figures in Appendix 1
EA	Environmental Assessment titled *Environmental Assessment Report, Proposed Karuah East Hard Rock Quarry*, prepared by ADW Johnson Pty Limited and dated 31 January 2013, including the response to submissions prepared by ADW Johnson Pty Limited and dated 31 May 2013 and the Preferred Project Report titled *Preferred Project Report Proposed Karuah East Quarry*, prepared by ADW Johnson Pty Limited and dated 30 July 2013
EA (MOD 1)	Environmental Assessment titled *Karuah East Quarry Section 75W Application (MOD 1) Minor Increase to Approved Disturbance Area* prepared by ADW Johnson Pty Limited and dated 18 January 2018; including the response to submissions prepared by ADW Johnson Pty Limited and dated 9 March 2018
EA (MOD 2)	Environmental Assessment titled *Karuah East Quarry Section 75W Application (MOD 2) Minor Increase to Approved Disturbance Area* prepared by ADW Johnson Pty Limited and dated 30 August 2018, including the response to submissions prepared by ADW Johnson Pty Limited and dated 25 October 2018
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence under the POEO Act
Extraction Area	Extraction Area shown in Figure 1 in Appendix 1
Feasible	Feasible relates to engineering considerations and what is practical to build

Heritage item	An Aboriginal object, an Aboriginal place, or a place, building, work, relic, moveable object, tree, or precinct of heritage significance, that is listed under any of the following: • the State Heritage Register under the *Heritage Act 1977;* • a state agency heritage and conservation register under section 170 of the *Heritage Act 1977*; • a Local Environmental Plan under the EP&A Act; • the World Heritage List; • the National Heritage List or Commonwealth Heritage List under the EPBC Act; or • anything identified as a heritage item under the conditions of this consent.
Incident	The occurrence of a set of circumstances that causes or threatens to cause material harm which may or may not be or cause a non-compliance
Land	Has the same meaning as the definition of the term in in section 1.4 of the EP&A Act, except where the term is used in the noise and air quality conditions in Schedules 3 and 4 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at NSW Land Registry Services at the date of this consent
Material harm	Is harm to the environment that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or • results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment).
MEG	Regional NSW – Mining, Exploration & Geoscience
Minister	The Minister for Planning and Public Spaces, or delegate
Minor	Not very large, important or serious.
Mitigation	Activities associated with reducing the impacts of the development
Modification 1	Modification 1 to the development, as described in EA (MOD 1)
Modification 2	Modification 2 to the development, as described in EA (MOD 2)
Modification 8	Modification 8 to the development, as described in SEE (MOD 8)
Modification 9	Modification 9 to the development, as described in MR (MOD 9)
MR (MOD 9)	The Modification Report titled *S4.55(1A) Modification Report Proposed Modification to Extend Hours of Operation Project Approval 09_0175, dated April 2021 prepared by ADW Johnson* and the letter titled *Karuah East Quarry Project Mod 9 (MP09_0175 – Mod 9) Proposed Extended Hours of Operation Response to NSW EPA Request for Additional Information Dated 7 September 2021*, dated 30 September 2021 prepared by ADW Johnson
NP&W Act	*National Parks and Wildlife Act 1974*
NPfI	NSW *Noise Policy for Industry 2017*
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by a public agency, Karuah East Quarry Pty Limited (or its subsidiary) or another quarry operator (or its subsidiary).
Product loading and dispatch	Empty haulage trucks entering the site and being loaded with stockpiled material before exiting the site via the weighbridge
Public infrastructure	Linear and other infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc.

Quarrying operations	Includes the removal of overburden and extraction, processing, handling, storage and movement of quarry products on the site
Quarry products	Extractive material which is extracted from and transported from the site
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Registered Aboriginal Parties	As described in the *National Parks and Wildlife Regulation 2009*
Rehabilitation	The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting
Residence	Existing or approved dwelling at the date of approval of Modification 1
RFS	NSW Rural Fire Service
SEE (MOD 8)	The Statement of Environmental Effects titled *Karuah East Quarry S4.55 (1A) Modification Report Proposed Modification to Operational Noise Criteria and Implementation of Improved Acoustic Measures* prepared by ADW Johnson Pty Limited and dated 20 June 2019.
Site	The development land shown in Figure 1 of Appendix 1, with land Lot and DP numbers identified in Schedule 1.
Statement of commitments	The Applicant's commitments in Appendix 6
TfNSW	Transport for NSW
Waste	Has the same meaning as the definition of the term in the Dictionary to the POEO Act

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.

TERMS OF APPROVAL

2. The Applicant must carry out the development:
   (a) in compliance with the conditions of this consent;
   (b) in accordance with the statement of commitments in Appendix 6;
   (c) in accordance with all written directions of the Planning Secretary; and
   (d) generally in accordance with the EA, EA (MOD1), EA (MOD 2), SEE (MOD 8) and MR (MOD 9).

3. Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to:
   (a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and
   (b) the implementation of any actions or measures contained in any such document referred to in condition 3(a).

4. The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document/s listed in condition 2(d). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition 2(d), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.

LIMITS ON APPROVAL

Quarrying Operations

5. The Applicant may carry out quarrying operations on the site until 31 December 2034.

   Note: Under this consent, the Applicant is required to rehabilitate the site and carry out additional undertakings to the satisfaction of the Planning Secretary. Consequently, this consent will continue to apply in all other respects other than the right to conduct quarrying operations until the rehabilitation of the site and those undertakings have been carried out to a satisfactory standard.

Production Limit

6. The Applicant must not extract, process and transport more than 1.5 million tonnes of quarry products from the site in any calendar year.

Hours of Operation

7. The Applicant must comply with the operating hours in Table 1.

Table 1: Operating hours

Activity	*Operating Hours*
Quarrying Operations	7:00 am to 9:00 pm, Monday to Friday 7:00 am to 10:00 pm Monday to Friday on 50 calendar days per year; and 7:00 am to 6:00 pm, Saturday. No drilling 6:00 pm to 10:00 pm Monday to Friday or 1:00 pm to 6:00 pm Saturday

Activity	Operating Hours
	No quarrying operations on Sundays or Public Holidays.
Product loading and dispatch	5:00 am to 9:00 pm Monday to Friday 5:00 am to 10:00 pm Monday to Friday on 50 calendar days per year 6:00 am to 6:00 pm Saturday No product loading and dispatch on Sundays or Public Holidays
Construction activities	7.00 am to 6.00 pm, Monday to Friday; and 8.00 am to 1.00 pm, Saturdays, unless noise from these activities does not exceed 40 dB(A) $L_{Aeq(15\ min)}$ at any privately-owned residence.
Maintenance activities	24 hours a day, 7 days per week, providing maintenance activities are inaudible at any privately-owned residence

Note: This condition does not apply in the event of a direction from police or other relevant authority for safety or emergency reasons regarding works which may need to be undertaken to avoid loss of life, property loss and/or to prevent environmental harm.

STRUCTURAL ADEQUACY

8. The Applicant must ensure that any new buildings and structures, and any alterations, or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

Notes:
- *Under Part 6 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for any proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*

DEMOLITION

9. The Applicant must ensure that all demolition work on site is carried out in accordance with *AS 2601-2001: The Demolition of Structures*, or its latest version.

PROTECTION OF PUBLIC INFRASTRUCTURE

10. The Applicant must:
    (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
    (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

DEVELOPER CONTRIBUTIONS

11. The Applicant must pay Council, in accordance with Council's *Great Lakes Wide Development Contributions Plan (November 2007) – Amended*:
    (a) a one-off Headquarters Building contribution of $1.00 per $1,000.00 of capital value of the development; and
    (b) annual road maintenance contributions of $.037 per tonne per km, for every tonne of quarry products transported from the site on local roads in accordance with Council's *Great Lakes Wide Development Contributions Plan (November 2007) – Amended.* Each payment must be: (i) paid to Council at the end of each calendar year;
        i based on weighbridge records of the quantity of quarry products transported from the site; and
        ii increased annually over the life of the development in accordance with the CPI.

Note: If the parties are not able to agree on any aspect of the road maintenance contributions, either party may refer the matter to the Planning Secretary for resolution.

OPERATION OF PLANT AND EQUIPMENT

12. All plant and equipment used on site, or to monitor the performance of the development, must be:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

STAGED SUBMISSION OF ANY STRATEGY, PLAN OR PROGRAM

13. With the approval of the Planning Secretary, the Applicant may submit any strategy, plan or program required by this consent on a progressive basis.

    Notes:
    - *While any strategy, plan or program may be submitted on a progressive basis, the Applicant will need to ensure that the existing operations on site are covered by suitable strategies, plans or programs at all times; and*
    - *If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.*

PRODUCTION DATA

14. The Applicant must:
    (a) provide annual quarry production data to MEG using the standard form for that purpose; and
    (b) report this data in the Annual Review (see condition 4 of Schedule 5).

COMPLIANCE

15. The Applicant must ensure that all employees, contractors and sub-contractors are made aware of, and instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.

APPLICABILITY OF GUIDELINES

16. References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, standards or policies in the form they are in as at the date of this consent.

    However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, when issuing directions under this consent in respect of ongoing monitoring and management obligations, require compliance with an updated or revised version of such a guideline, protocol, standard or policy, or a replacement of them.

EVIDENCE OF CONSULTATION

17. Where conditions of this consent require consultation with an identified party, the Applicant must:
    (a) consult with the relevant party prior to submitting the subject document;
    (b) provide details of the consultation undertaken including:
        (i) the outcome of that consultation, matters resolved and unresolved; and
        (ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

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.

Table 4: Blasting criteria

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

However, the blasting criteria in Table 5 do not apply if the Applicant has a written agreement with the relevant landowner or infrastructure provider/owner, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting Hours

9. The Applicant must ensure that blasting on site is only carried out during the hours in Table 6.

Table 6: Blasting hours

Day	Blasting hours
Monday – Friday	9.00 am to 4.00 pm
Saturdays, Sundays and Public Holidays	No blasting

Blasting Frequency

10. The Applicant must not carry out more than 2 blasts a week on the site, unless an additional blast is required following a blast misfire.

Note: A blast may involve a number of explosions within a short period, typically less than two minutes.

Operating Conditions

11. The Applicant must:
    (a) implement best blast management practice to:
        - protect the safety of people and livestock in the surrounding area;
        - protect public or private infrastructure/property in the surrounding area from any damage; and
        - minimise the dust and fume emissions of any blast;
    (b) schedule blasts to avoid the blasting schedule of any nearby quarrying operation;
    (c) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on the site, and
    (d) not undertake blasting within 500 metres of:
        (i) any public road without the approval of the relevant road authority; or
        (ii) any land outside the site not owned by the Applicant, unless:
            - the Applicant has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Applicant has advised the Department in writing of the terms of this agreement, or
            - the Applicant has:
                - demonstrated to the satisfaction of the Planning Secretary that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and
                - updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land,

    to the satisfaction of the Planning Secretary.

Blast Management Plan

12. The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
    (a) be prepared by a suitably qualified expert whose appointment has been approved by the Planning Secretary;
    (b) be prepared in consultation with Council and EPA, and submitted to the Planning Secretary for approval prior to the commencement of construction activities;
    (c) describe the measures that would be implemented to ensure:
        - best management practice is being employed; and
        - compliance with the relevant conditions of this consent;
    (d) include a road closure protocol if blasting occurs within 500 metres of a public road;
    (e) include a specific blast fume management protocol, to demonstrate how emissions will be minimised including risk management strategies if blast fumes are generated; and
    (f) include a monitoring program for evaluating the performance of the development including:
        - compliance with the applicable criteria; and
        - minimising fume emissions from the site.

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

AIR QUALITY

Air Quality Criteria

13. The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not exceed the criteria in Tables 7 to 9 at any residence on privately-owned land.

Table 7: Long-term impact assessment criteria for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Total suspended particulates (TSP)	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 8: Short-term impact assessment criteria for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 9: Long-term Impact Assessment Criteria for Deposited Dust

Pollutant	***Averaging period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
[c] Deposited dust	Annual	[b] 2 g/m^2 /month	[a] 4 g/m^2 /month

Notes to Tables 7-9:

- *[a] Total impact (ie incremental increase in concentrations due to the development plus background concentrations due to all other sources);*
- *[b] Incremental impact (ie incremental increase in concentrations due to the development on its own);*
- *[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*
- *[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Planning Secretary in consultation with EPA.*

Greenhouse Gas Emissions

14. The Applicant must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.

Operating Conditions

15. The Applicant must:
    (a) implement best management practice to minimise dust emissions by the development;
    (b) regularly assess air quality monitoring data and relocate, modify, and/or stop operations on site as may be required to ensure compliance with the air quality criteria in this consent;
    (c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Tables 7-9); and
    (d) minimise surface disturbance of the site, other than as permitted under this consent.

Air Quality Management Plan

16. The Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
    (a) be prepared by a suitably qualified expert whose appointment has been approved by the Planning Secretary;
    (b) be prepared in consultation with Council and EPA, and submitted for approval to the Planning Secretary prior to the commencement of construction activities;
    (c) describe the measures that would be implemented to ensure:
        - compliance with the relevant air quality conditions of this consent;
        - best management practice is employed; and
        - the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events;
    (d) describe the proposed air quality management system; and (e) include a monitoring program that:
        - is capable of evaluating the performance of the development;
        - includes a protocol for determining any exceedances of the relevant conditions of consent;
        - effectively supports the air quality management system; and
        - evaluates and reports on the adequacy of the air quality management system.

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

METEOROLOGICAL MONITORING

17. For the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

SOIL & WATER

Water Supply

18. The Applicant must ensure it has sufficient water during all stages of the development, and if necessary, adjust the scale of quarrying operations on site to match its available supply.

Surface Water Discharges

19. The Applicant must comply with the discharge limits in any EPL, or with Section 120 of the POEO Act.

Effluent Management

20. The Applicant must:
    (a) not irrigate, discharge or dispose of sewage or bathroom effluent from the site; and
    (b) operate and maintain a suitable effluent storage facility, to the satisfaction of Council and EPA.

Water Management Plan

21. The Applicant must prepare a Water Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
    (a) be prepared in consultation with the EPA and DPIE Water by suitably qualified and experienced person/s whose appointment has been approved by the Planning Secretary;
    (b) be submitted to the Planning Secretary for approval prior to the commencement of construction activities;
    (c) include:
        (i) a Site Water Balance that includes details of:
            - sources and security of water supply, including contingency planning;
            - water use on site; and
            - measures that would be implemented to minimise use of clean water and maximise recycling of dirty water on the site;
        (ii) a Surface Water Management Plan, that includes:
            - baseline data on surface water flows and quality in the watercourses that could be affected by the development;
            - a detailed description of the surface water management system on the site, including the design objectives and performance criteria for the:
                - clean water diversions;
                - erosion and sediment controls;
                - water storages (including Maximum Harvestable Rights requirements); and
                - control of water pollution from areas of the site that have been rehabilitated;
            - surface water impact assessment criteria, to be developed following analysis of baseline data, including trigger levels for investigating any potentially adverse surface water quality impacts;
            - a program to monitor:
                - any surface water discharges;
                - the effectiveness of the water management system;
                - surface water flows and quality in local watercourses; and
                - ecosystem health of local watercourses; and
            - an assessment of appropriate options to improve storage and retention times in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom);
        (iii) a Groundwater Monitoring Program that includes:
            - baseline data of groundwater levels surrounding the site;
            - groundwater impact assessment criteria, to be developed following analysis of baseline data, including trigger levels for investigating any potentially adverse groundwater impacts; and
            - a program to monitor and/or validate the impacts of the development on groundwater resources; and
        (iv) a Surface and Ground Water Response Plan that describes the measures and/or procedures that would be implemented to:
            - respond to any exceedances of the surface water impact assessment criteria and groundwater impact assessment criteria; and
            - mitigate and/or offset any adverse impacts on surface water and groundwater resources located within and adjacent to the site.

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

TRANSPORT

Roadworks

22. The Applicant must, at its own cost, complete the following roadworks shown conceptually in Figure 2 of Appendix 1, prior to transporting quarry products from the site:
    (a) extending Blue Rock Close, with tar seal and appropriate pavement, road markings and advance warning signage, to the satisfaction of Council and TfNSW;

(b) realigning and upgrading the Blue Rock Close/Andersite Road intersection with appropriate road markings, pavement thickening and advance warning signage, to the satisfaction of Council;
(c) upgrading the Branch Lane/Andersite Road intersection with appropriate road markings and advance warning signage, to the satisfaction of Council;
(d) constructing the site access road on Lots 12 and 13 DP 1024564 with appropriate pavement and advance warning signage, to the satisfaction of Council; and (e) installing a wheel-wash facility on the site.

Monitoring of Product Transport

23. The Applicant must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months and in the Annual Review.

Parking

24. The Applicant must provide sufficient parking on-site for all development-related traffic, in accordance with Council's parking codes, to the satisfaction of the Planning Secretary.

Operating Conditions

25. The Applicant must ensure that all development-related heavy vehicles:
(a) enter and exit the site in a forward direction; and
(b) exit the site with loads covered.

Transport Management Plan

26. The Applicant must prepare a Transport Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
(a) be prepared by a suitably qualified traffic consultant whose appointment has been approved by the Planning Secretary;
(b) be prepared in consultation with TfNSW and Council, and submitted to the Planning Secretary for approval prior to the commencement of construction activities;
(c) include a Driver Code of Conduct;
(d) describe the measures that would be implemented to ensure:
- compliance with the relevant conditions of this consent;
- that drivers of development-related heavy vehicles are aware of potential safety issues along the haulage routes; and
- that drivers of development-related heavy vehicles comply with the Driver Code of Conduct; and

(e) include a program to monitor the effectiveness of these measures.

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

LANDSCAPE

***Tetratheca Juncea* Translocation**

27. The Applicant must develop a translocation program for *Tetratheca juncea* to the satisfaction of the Planning Secretary. This program must:
(a) be prepared in consultation with BCD, by a suitably qualified and experienced ecologist whose appointment has been approved by the Planning Secretary;
(b) be submitted to the Planning Secretary for approval prior to the commencement of construction activities that involve clearing of or potential harm to *Tetratheca juncea*;
(c) include measures for the translocation of all *Tetratheca juncea* stems in the area of disturbance to nearby areas with similar physical and biological habitat features;
(d) include a monitoring program to study the *Tetratheca juncea* stems before and after translocation;
(e) include short and long-term goals and performance criteria to measure the effectiveness of the program; and

(f) provide for the transfer of information obtained as a result of implementing the program to BCD and the Department.

Biodiversity Offset Strategy

28. The Applicant must, prior to the commencement of vegetation clearing activities, finalise the Biodiversity Offset Strategy, as described in documents listed in condition 2 of Schedule 2, summarised in Table 10 and shown conceptually in Figure 1 of Appendix 4, in consultation with BCD and Council, and to the satisfaction of the Planning Secretary.

Table 10: Biodiversity Offset Strategy

Area	***Offset Type***	***Minimum Size (ha)***
Offset Area	Existing vegetation to be managed and enhanced	130.36 ha

Note: The Biodiversity Offset Strategy must direct that the land proposed as the Biodiversity Offset must be free of any dwelling-houses and associated sheds, bushfire asset protection zones and other related utilities or structures so as to preserve the integrity and function of that offset area. The Biodiversity Offset Strategy must also provide details of the revegetation of any parts of the offset area that are cleared of native vegetation or are in an otherwise substantially modified state, other than required management trails and boundary fencing buffer distances.

The Applicant must implement the strategy as approved by the Planning Secretary.

Long Term Security of Offsets

29. The Applicant must, within 12 months of the finalisation of the Biodiversity Offset Strategy, make suitable arrangements to provide appropriate long-term security for the offset area, in consultation with BCD and Council, and to the satisfaction of the Planning Secretary.

Note: In order of preference, mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy include transfer to the National Park Estate, Biobanking Agreement, Voluntary Conservation Agreement, or restrictive covenant on land titles.

Rehabilitation Objectives

30. The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must:
    (a) be consistent with the rehabilitation strategy as described in the EA and shown conceptually in Figure 1 in Appendix 5; and
    (b) comply with the objectives in Table 11.

Table 11: Rehabilitation Objectives

Feature	***Objective***
Site (as a whole)	Safe, stable & non-polluting.
Surface Infrastructure	To be decommissioned and removed, unless the Planning Secretary agrees otherwise.
Quarry Wall Benches	Landscaped and revegetated utilising native tree and understorey species, ensuring that the tree canopy is restored and integrated with the surrounding tree canopy.
Quarry Pit Floor	Landscaped and revegetated with wetland vegetation.
Other land affected by the development	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: • native endemic species; and • a landform consistent with the surrounding environment.
Community	Ensure public safety. Minimise the adverse socio-economic effects associated with quarry closure.

Progressive Rehabilitation

31. The Applicant must:
    (a) rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance;
    (b) take all reasonable and feasible measures to minimise the total area of the site exposed at any time; and
    (c) implement interim rehabilitation strategies where areas prone to dust generation cannot yet be permanently rehabilitated.

Landscape and Rehabilitation Management Plan

32. Within 6 months of the date of approval of Modification 1, the Applicant must prepare a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Planning Secretary. This Plan would relate to the area of the quarry and all perimeter lands. This plan must:
    (a) be prepared by a suitably qualified expert whose appointment has been approved by the Planning Secretary;
    (b) be prepared in consultation with BCD and Council, and submitted to the Planning Secretary for approval prior to the commencement of construction activities;
    (c) describe how the implementation of the Tetratheca juncea Translocation Program would be integrated with the overall rehabilitation of the site;
    (d) describe the short, medium and long-term measures that would be implemented to:
        - manage remnant vegetation and habitat on the site; and
        - ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations of this consent.
    (e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, including triggers for any remedial action;
    (f) include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial preparation of the plan), including the procedures to be implemented for:
        - ensuring compliance with the rehabilitation objectives and progressive rehabilitation obligations of this consent;
        - enhancing the quality of remnant vegetation and fauna habitat;

- restoring native endemic vegetation and fauna habitat within the rehabilitation area, including details of the target revegetation communities of the rehabilitated landform;
- coordinating the relocation of native fauna to protected habitats associated with pre-clearing fauna surveys;
- maximising the salvage of environmental resources within the approved disturbance area - including tree hollows, vegetative and soil resources - for beneficial reuse in the enhancement of the rehabilitation area;
- collecting and propagating seed;
- ensuring minimal environmental consequences for threatened species, populations and habitats;
- minimising the impacts on native fauna on site, including the details and implementation of appropriate pre-clearance surveys;
- minimising the impacts on fauna movement between undisturbed areas of the site and nearby vegetation (including potential fauna crossings);
- controlling weeds and feral pests;
- controlling erosion;
- controlling access and providing for management trails; and
- bushfire management and implementation of ecologically appropriate bushfire intervals.

(g) include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;

(h) identify the potential risks to successful implementation of the Tetratheca juncea Translocation Program and rehabilitation of the site, and include a description of the contingency measures that would be implemented to mitigate these risks;

(i) include details as to how the rehabilitated land would be permanently conserved and managed as part of the broader Biodiversity Offset Area approved in these conditions;

(j) include details of who would be responsible for monitoring, reviewing, and implementing the plan; and

(k) include details as to the timing of actions set-out in the plan

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

Biodiversity Offset Area Management Plan

33. The Applicant must prepare a Biodiversity Offset Area Management Plan for the development to the satisfaction of the Planning Secretary. This Plan would relate to the area of the Biodiversity Offset Area required in these conditions. This plan must:

(a) be prepared by a suitably qualified expert whose appointment has been approved by the Planning Secretary;

(b) be prepared in consultation with BCD and Council;

(c) describe how the implementation of the *Tetratheca juncea* Translocation Program would be integrated with the Biodiversity Offset Area management;

(d) describe the short, medium and long-term measures that would be implemented to manage remnant vegetation and habitat on the Biodiversity Offset Area;

(e) include detailed performance and completion criteria for evaluating the performance of the conservation, restoration and management of the Biodiversity Offset Area, including triggers for any remedial action;

(f) providing for the transfer of environmental resources from the approved disturbance area - including tree hollows, vegetative and soil resources - for beneficial reuse in the enhancement of the Biodiversity Offset Area;

(g) providing for the incorporation of the final rehabilitated landform into the Biodiversity Offset Area and its management;

(h) include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial preparation of the plan), including the procedures to be implemented for:

- enhancing the quality of remnant vegetation and fauna habitat;
- restoring native endemic vegetation and fauna habitat within the parts of the Biodiversity Offset Area that are cleared or modified, including details of the target revegetation communities of the restored landform;

- coordinating the relocation of native fauna to protected habitats associated with pre-clearing fauna surveys;
- collecting and propagating seed;
- maximising the protection and restoration of threatened species, populations and habitats in the Biodiversity Offset Area;
- maximising fauna movement between the Biodiversity Offset Area and adjacent habitats;
- controlling weeds and feral pests;
- controlling erosion;
- controlling access and providing for management trails; and
- bushfire management and implementation of ecologically appropriate bushfire intervals.

(i) include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
(j) identify the potential risks to successful implementation of the Biodiversity Offset program, and include a description of the contingency measures that would be implemented to mitigate these risks;
(k) include details of who would be responsible for monitoring, reviewing, and implementing the plan;
(l) include details of the indicative costs of management actions; and
(m) include details as to the timing of actions set-out in the plan.

Conservation & Rehabilitation Bond

34. The Applicant must lodge a Conservation and Rehabilitation Bond with the Department to ensure that the Biodiversity Offset Strategy and the rehabilitation of the site is implemented in accordance with the performance and completion criteria set out in the Landscape and Rehabilitation Management Plan. The sum of the bond must be determined by:
(a) calculating the cost of implementing the Biodiversity Offset Strategy over the next 3 years;
(b) calculating the cost of rehabilitating disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and
(c) employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Planning Secretary.

Notes:
- *If capital and other expenditure required by the Landscape and Rehabilitation Management Plan is largely complete, the Planning Secretary may waive the requirement for the lodgement of a bond in respect of the remaining expenditure.*
- *If the Biodiversity Offset Strategy and rehabilitation of the site area are completed to the satisfaction of the Planning Secretary, then the Planning Secretary will release the bond. If the Biodiversity Offset Strategy and rehabilitation of the site are not completed to the satisfaction of the Planning Secretary, then the Planning Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.*
- *The component of the bond relating to the implementation of the Biodiversity Offset Strategy may be waived, if a separate arrangement is entered into between the Applicant and BCD which satisfactorily replaces that component, to the satisfaction of the Planning Secretary.*

35. Within 3 months of each Independent Environmental Audit (see condition 9 of Schedule 5), the Applicant must review, and if necessary, revise the sum of the Conservation and Rehabilitation Bond to the satisfaction of the Planning Secretary. This review must:
(a) consider the performance of the implementation of the Biodiversity Offset Strategy and rehabilitation of the site to date;
(b) consider the effects of inflation; and
(c) calculate the cost of implementing the Biodiversity Offset Strategy and rehabilitating the disturbed areas of the site (taking into account the likely surface disturbance over the next 3 years of quarrying operations).

HERITAGE

Heritage Management Plan

36. The Applicant must prepare a Heritage Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
    (a) be prepared by a suitably qualified expert whose appointment has been approved by the Planning Secretary;
    (b) be prepared in consultation with the local Aboriginal community and BCD, and submitted to the Planning Secretary for approval prior to the commencement of construction activities;
    (c) describe the measures that would be implemented to:
        - monitor initial surface disturbance on site for Aboriginal cultural heritage sites or objects;
        - manage the discovery of Aboriginal cultural heritage sites, objects or human remains on site; and
        - ensure ongoing consultation with Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage values on site.

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

VISUAL

37. The Applicant must:
    (a) ensure that clearing vegetation from any visually prominent ridgeline is undertaken in a progressive manner, to provide for a maximum of 6 months of future quarrying operations; and
    (b) mitigate the visual impact of the development through the progressive and early rehabilitation of the upper quarry benches in accordance with the objectives in Table 11,

    to the satisfaction of the Planning Secretary.

Advertising Signage

38. The Applicant must not erect or display any advertising structure or sign on the site without the written approval of the Planning Secretary.

    Note: This condition does not apply to business identification, traffic management, and/or safety or environmental signs.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods and Hazardous Materials

39. The Applicant must ensure that the storage, handling, and transport of dangerous goods and hazardous materials is conducted in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

40. The Applicant must secure the site to ensure public safety at all times, to the satisfaction of the Planning Secretary.

Bushfire Management

41. The Applicant must:
    (a) ensure that the development is suitably equipped to respond to any fires on site; and
    (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the surrounding area.

WASTE

42. The Applicant must:
    (a) minimise the waste generated by the development; and

(b) ensure that the waste generated by the development is appropriately stored, handled, and disposed of,

to the satisfaction of the Planning Secretary.

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable and no longer than 7 days after obtaining monitoring results showing an:
   (a) exceedance of any noise, blasting and air quality criteria in Schedule 3, the Applicant must provide the details of the exceedance to any affected landowners and/or tenants; and
   (b) an exceedance of the relevant air quality criteria in Schedule 3, the Applicant must send a copy of the NSW Health fact sheet entitled *"Mine Dust and You"* (as may be updated from time to time) to the affected landowners and/or existing tenants of the land.

INDEPENDENT REVIEW

2. If a landowner considers the development to be exceeding any noise, blasting or air quality criterion in Schedule 3 of this consent, they may ask the Planning Secretary in writing for an independent review of the impacts of the development on their land.

3. If the Planning Secretary is not satisfied that an independent review is warranted, the Planning Secretary will notify the landowner in writing of that decision, and the reasons for that decision, within 21 days of the request for a review.

4. If the Planning Secretary is satisfied that an independent review is warranted, within 3 months, or as otherwise agreed by the Planning Secretary and the landowner, of the Planning Secretary's decision, the Applicant must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Planning Secretary, to:
      (i) consult with the landowner to determine their concerns;
      (ii) conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3 of this consent; and
      (iii) if the development is not complying with that criteria, identify measures that could be implemented to ensure compliance with the relevant criteria;
   (b) give the Planning Secretary and landowner a copy of the independent review; and
   (c) comply with any written requests made by the Planning Secretary to implement any findings of the review.

MITIGATION UPON REQUEST

5. Upon receiving a written request for mitigation from the owner of any residence on privately-owned land listed in Table 12, the Applicant must implement additional mitigation measures at or in the vicinity of the residence in consultation with the landowner. These measures must be consistent with the measures outlined in the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Development* (NSW Government, 2014). They must also be reasonable and feasible, proportionate to the level of predicted impact and directed towards reducing the noise impacts of the development. The Applicant must also be responsible for the reasonable costs of ongoing maintenance of these additional mitigation measures until the cessation of quarrying operations.

Table 12: Land subject to additional mitigation upon request

Mitigation Basis	Land[a]
Noise	H

a The location of the land referred to in Table 12 is shown in Appendix 2

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Planning Secretary. This strategy must:
   (a) be submitted to the Planning Secretary for approval prior to the commencement of construction activities;
   (b) provide the strategic framework for environmental management of the development;
   (c) identify the statutory approvals that apply to the development;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
   (e) describe the procedures that would be implemented to:
   - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
   - receive, handle, respond to, and record complaints;
   - resolve any disputes that may arise during the course of the development;
   - respond to any non-compliance; and
   - respond to emergencies; and (f) include:
   - copies of any strategies, plans and programs approved under the conditions of this consent; and
   - a clear plan depicting all the monitoring required to be carried out under the conditions of this consent.

   The Applicant must implement the strategy as approved by the Planning Secretary.

Adaptive Management

2. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in this consent. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

   Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:
   (a) take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;
   (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
   (c) implement remediation measures as directed by the Planning Secretary.

Management Plan Requirements

3. The Applicant must ensure that the Management Plans required under this consent are prepared in accordance with any relevant guidelines, and include:
   (a) detailed baseline data;
   (b) a description of:
   - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
   - any relevant commitments or recommendations identified in the documents listed in condition 2(d) of Schedule 2;
   - any relevant limits or performance measures/criteria; and
   - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
   (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;

(d) a program to monitor and report on the:
- impacts and environmental performance of the development; and
- effectiveness of any management measures (see (c) above);

(e) a contingency plan to manage any unpredicted impacts and their consequences;
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;
(g) a protocol for managing and reporting any:
- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria; and

(h) a protocol for periodic review of the plan.

Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Annual Review

4. By the end of March each year, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:
(a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;
(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against:
- the relevant statutory requirements, limits or performance measures/criteria;
- the monitoring results of previous years; and
- the relevant predictions in the documents referred to in condition 2(d) of Schedule 2 of this consent;

(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
(d) identify any trends in the monitoring data over the life of the development;
(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
(f) describe the measures that would be implemented over the current calendar year to improve the environmental performance of the development.

;

Revision of Strategies, Plans and Programs

5. Within 3 months of:
(a) the submission of an annual review under Condition 4 above;
(b) the submission of an incident report under Condition 7 below;
(c) the submission of an audit report under Condition 9 below; or
(d) any modification to the conditions of this consent, (unless the conditions require otherwise),
the Applicant must review the strategies, plans, and programs required under this consent, to the satisfaction of the Planning Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Planning Secretary.

Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the development.

Community Consultative Committee

6. The Applicant must establish and operate a Community Consultative Committee (CCC) for the development. The CCC must:
(a) be established and operated in general accordance with the *Community Consultative Committees Guidelines for State Significant Projects* (Department of Planning and Environment, 2016); and

(b) be established prior to the commencement of construction activities, to the satisfaction of the Planning Secretary.

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
- *In accordance with the guideline, the Committee should comprise an independent chair and appropriate representation from the Applicant, Council, recognised environmental groups and the local community.*

REPORTING

Incident Notification

7. The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name) and set out the location and nature of the incident.

Non-compliance Notification

7A. Within seven days of becoming aware of a non-compliance, The Applicant must notify the Department of the non-compliance. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

Regular Reporting

8. The Applicant must regularly report on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

INDEPENDENT ENVIRONMENTAL AUDIT

9. Within 12 months of the commencement of development on the site, and every 3 years thereafter, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
   (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary;
   (b) include consultation with the relevant agencies;
   (c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL and/or Water Licence (including any assessment, plan or program required under these approvals);
   (d) review the adequacy of any approved strategy, plan or program required under these approvals; and
   (e) recommend measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under these approvals.

Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Planning Secretary.

10. Within three months of commencing an Independent Environmental Audit, or within another timeframe agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Planning Secretary.

ACCESS TO INFORMATION

11. The Applicant must:

(a) make the following information publicly available on its website:

- the documents referred to in condition 2(d) of Schedule 2 of this consent;
- any statutory approvals for the development;
- approved strategies, plans and/ programs;
- a summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;
- a complaints register, updated quarterly;
- minutes of CCC meetings;
- annual reviews;
- any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
- any other matter required by the Planning Secretary; and

(b) keep this information up-to-date, to the satisfaction of the Planning Secretary

APPENDIX 1
DEVELOPMENT LAYOUT

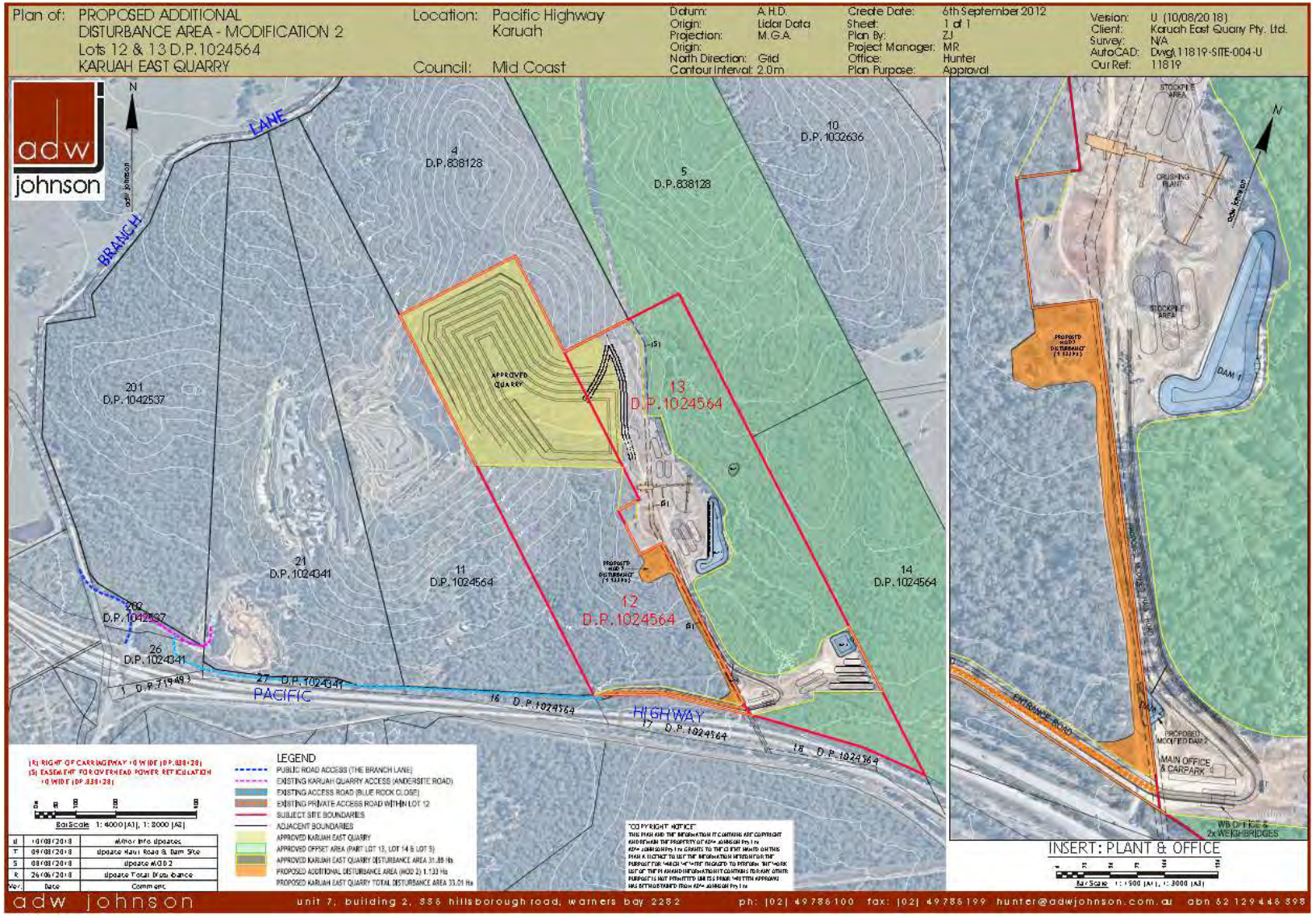


***Figure 1:** Development Layout*

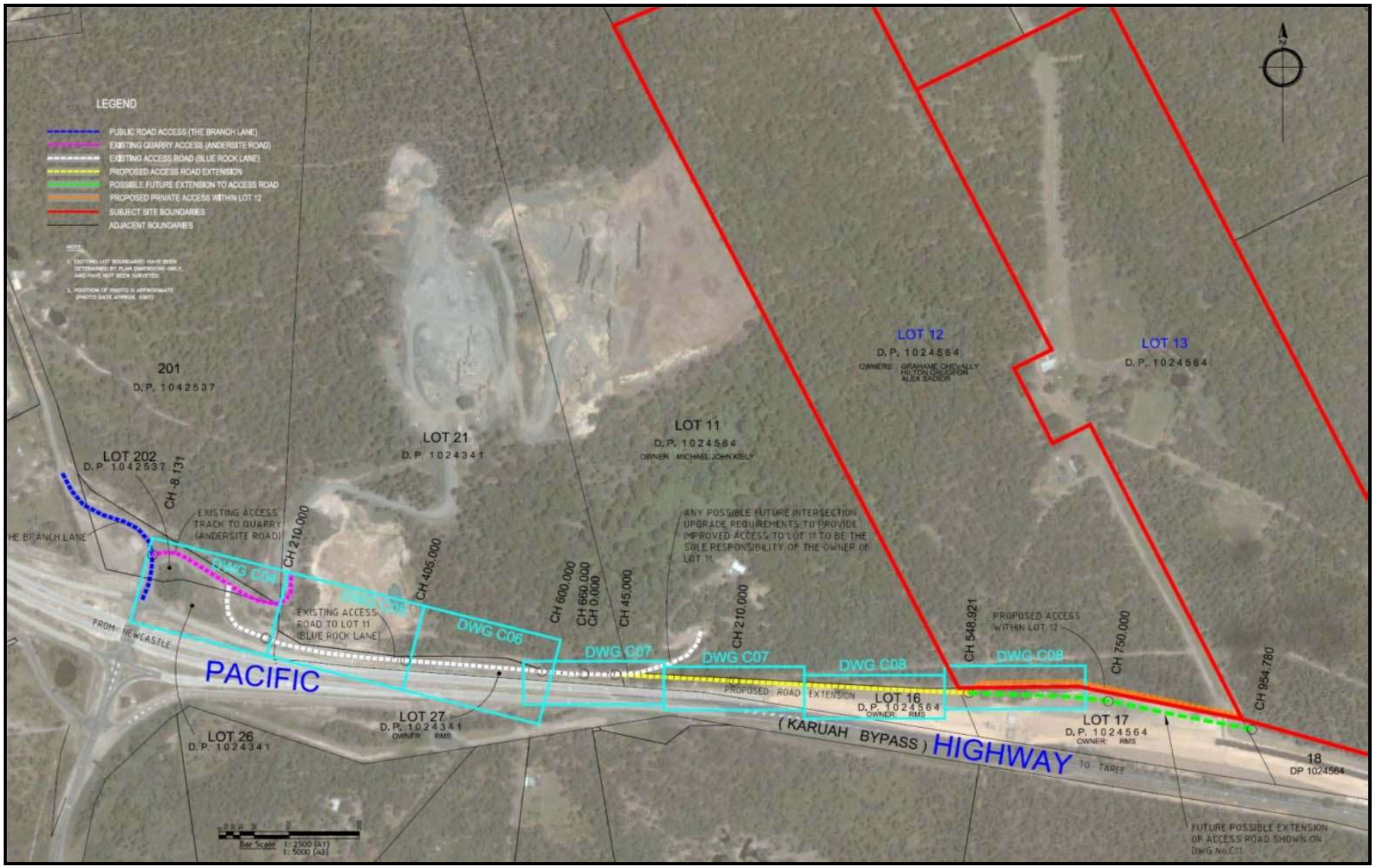


Figure 2: *Proposed roadworks*

APPENDIX 2
RESIDENCES (NOISE ASSESSMENT LOCATIONS)

Figure 1: *Noise Assessment Locations*

APPENDIX 3

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APPENDIX 4
CONCEPTUAL BIODIVERSITY OFFSET AREA

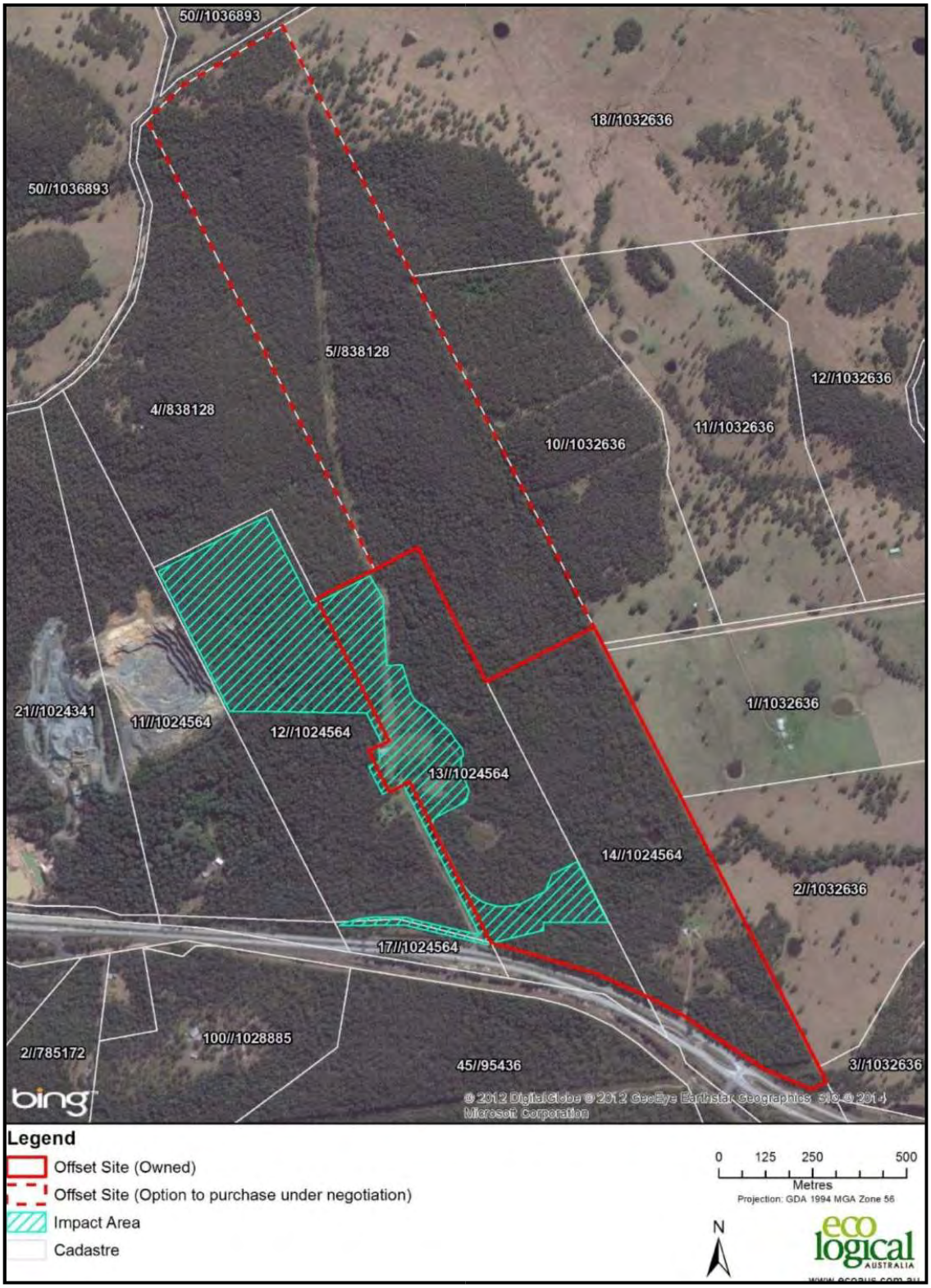

Figure 1: *Conceptual Biodiversity Offset Area*

APPENDIX 5
REHABILITATION STRATEGY

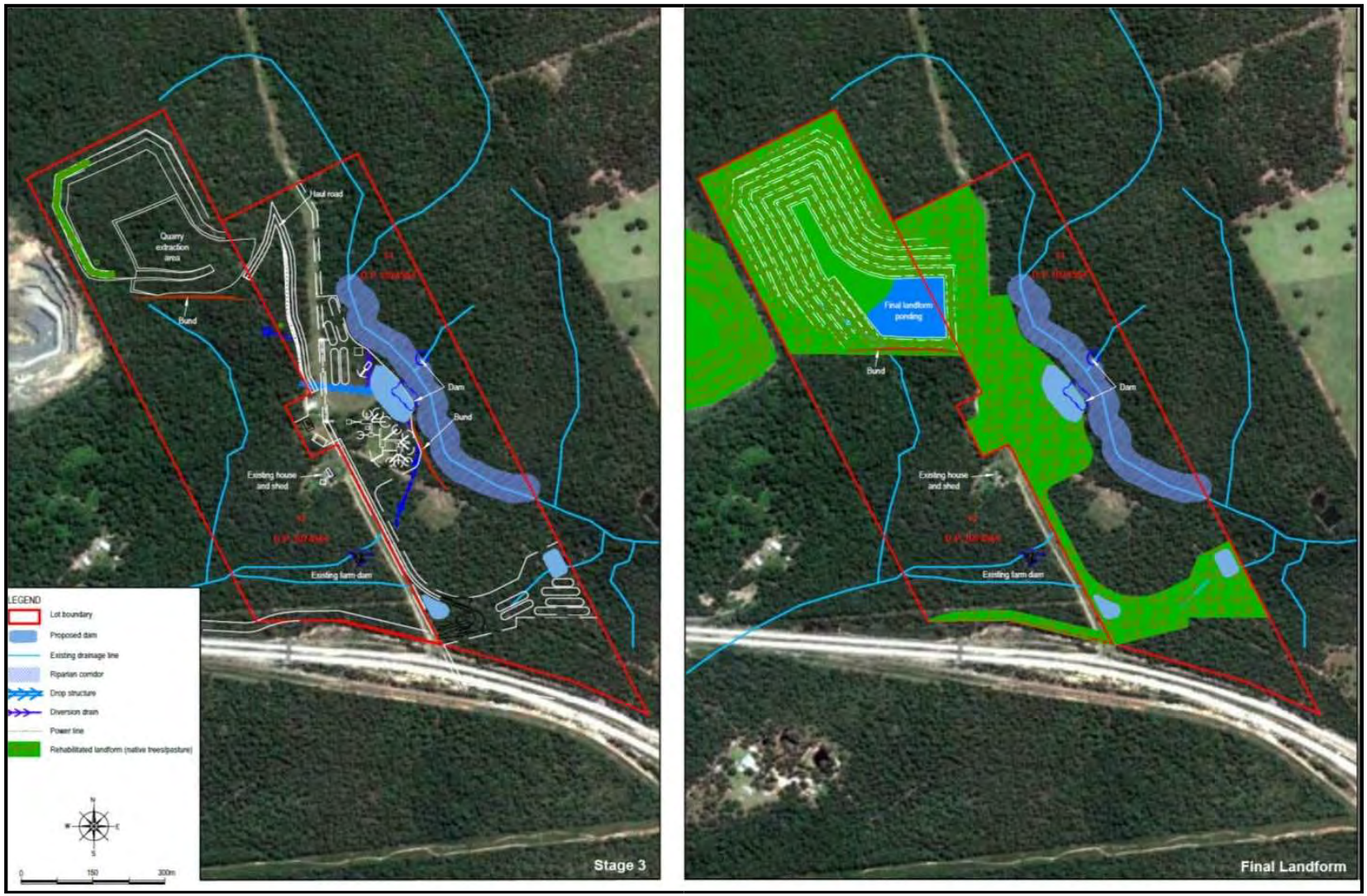

Figure 1: *Conceptual Rehabilitated Landform*

APPENDIX 6
STATEMENT OF COMMITMENTS

STATEMENT OF COMMITMENTS

The following section outlines the Applicant's commitment to implement construction and operational strategies relating to environmental management and mitigation measures. This section details how the proposal and its environmental safeguards will be implemented and managed in an integrated and feasible manner.

1.0 PLANS, DOCUMENTS AND APPROVALS

The proposed development will be completed in accordance with the submitted plans and descriptions of the proposed development provided in the Environmental Assessment Report (31 January 2013) and the Preferred Project Report (30 July 2013).

Any changes to the proposed development will require further approval of the relevant authorities.

The proposed development will be carried out in accordance with all approvals granted by relevant authorities.

2.0 SUMMARY OF MANAGEMENT PLANS

The following management plans will be prepared prior to commencement of construction works:

- Construction Environmental Management Plan (CEMP);
- Environmental Management Plan (EMP). The EMP will ensure that the commitments made in the EA Report and Preferred Project Report and the requirements under subsequent approval and license conditions are fully implemented. The EMP will confirm who is responsible and when the commitments associated with the mitigation and monitoring strategies should be implemented/undertaken;
- Annual Environmental Management Report (AEMR);
- Pre- clearing survey;
- Vegetation Management / Monitoring Plan;
- Conservation Management Plan;
- Soil Management Plan;
- Groundwater Monitoring Plan;
- Surface Water Management Plan (including erosion and sediment control and monitoring);
- Noise Monitoring Plan;
- Blasting Management Plan;
- Air Quality Monitoring Plan;
- Construction Traffic Management Plan;
- Environmental Management Strategy;
- Quarry Closure and Rehabilitation Plan; and
- Waste Management Plan.

3.0 SOIL AND WATER

3.1 Soil Management

Soil Management

The following will be undertaken:

- Topsoil will be stripped in accordance with the recommended stripping depth for each soil type, together with area of land and calculated volume which are provided in the table below;
- Topsoil disturbance resulting from the excavation of the open cut pit will not be stripped. Areas to be disturbed within the infrastructure boundary will be stripped and stockpiled for re-use in rehabilitation for the area from where it was stripped;
- Only the sandy clay loam topsoil of Soil Type 1 will be used as the final surface topdressing in rehabilitation;
- Rehabilitation involving topsoil respreading will occur on the entire infrastructure area. The open cut footprint will be rehabilitated through direct tree planting and more specific rehabilitation measures; and
- Topsoil will be respread on final landforms at a minimum of 15cm, and an intermediate layer will be established at a minimum of 30cm.

Where topsoil stripping and transportation is required, the following topsoil handling techniques will be implemented to prevent excessive soil deterioration, note this also applies to subsoil stripping:

- Strip material to the depths stated in the table above, subject to further investigation as required;
- Topsoil will be maintained in a slightly moist condition during stripping. Material will not be stripped in either an excessively dry or wet condition;
- Place stripped material directly onto reshaped overburden and spread immediately to avoid the requirement for stockpiling;
- Clay material will be applied first to create an intermediate layer. The loam topsoil will then be spread to overlie this layer;

- The surface of soil stockpiles will be left in as coarsely structured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming;
- Maintain a maximum stockpile height of 3m;
- If long-term stockpiling is planned (i.e. greater than 12 months), stockpiles will be seeded and fertilised as soon as possible; and
- Prior to re-spreading stockpiled topsoil onto reshaped overburden an assessment of weed infestation on stockpiles will be undertaken to determine if individual stockpiles require herbicide application and/or "scalping" of weed species prior to topsoil spreading.

Table 1 - Recommended Stripping Depths

Soil Type	Development Soil Name	Soil Layer	Recommended Stripping Depth (m)	Area (ha)	Volume (m^3)
1	Brown Chromosols	Topsoil	0.30	8.63	25,890
		Subsoil	0.90	8.63	77,670
2	Red Dermosols	Topsoil	0.10	4.55	4,550
		Subsoil	1.10	4.55	50,050
3	Leptic Tenosols	Topsoil	0.0	16.4	0
		Subsoil	0.0	16.4	0
Total Volume					**158,160**
Total Volume (10% handling loss allowance)					**142,344**

An inventory of available soil will be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.

The respread topsoil surface will be scarified prior to, or during seeding, to reduce run-off and increase infiltration.

3.2 Groundwater Management

- Prior to commencement of works, further investigation of groundwater conditions will be conducted in consultation with the NSW Office of Water;
- Benches and the pit floor will be graded to promote drainage toward the entrance to the pit;
- Minor seepage and ponding water from excessive rainfall will be managed by conventional drainage measures within the quarry such as periodic pumping out to the surrounding drainage controls. Water will be retained on site for quarry operations and for environmental mitigation;
- Only emergency vehicles repairs will be carried out onsite and any major vehicle repairs/maintenance will occur offsite;
- Refuelling will be undertaken in a designated non-permeable (compacted clay or concrete) area;
- Runoff water from the development site will be collected and monitored for environmental mitigation to prevent chemicals and hydrocarbon pollutants such as petroleum, diesel, and oil seeping into the groundwater system;
- Fuel storage facilities will be installed in accordance with relevant statutory requirements. Handling and storage of fuel and oil within the development site will be in accordance with Australian Standards, AS 1940-2004 (Storage and Handling of Flammable and Combustible Liquids) and NSW Work Cover 2005 Code of Practice for Storage and Handling of Dangerous Goods to reduce the risk of any spills or environmental release. Above ground storage in a bunded facility will be used;
- Material Safety Data Sheets (MSDS) will be kept in the site safety system for all chemicals used on site. The MSDS will contain information on the environmental impacts of the use of certain chemicals and include detail on emergency response, clean up and disposal. Handling and storage of all chemicals within the development site will be in accordance with Dangerous Goods Act 1975 (NSW), and Australian standards, including AS 1940-2004 (Storage and Handling of Flammable and Combustible Liquids); and
- Quarry rehabilitation will use spoil, and clean fill fit for purpose and in accord with relevant statutory requirements.

<u>Contingency, Monitoring and Reporting for Groundwater Management</u>

Contingency Plans

Emergency Response Procedures will be developed and implemented for the proposed Karuah East quarry.

Contingency plans will be developed to address actions that are required where unforeseen events occur. Contingency plans will consider the following:

- Groundwater levels: If groundwater level monitoring indicates abrupt changes, additional investigations will be carried out to implement necessary measures; and

- Groundwater quality: In the event that the groundwater quality monitoring indicates a deteriorating change of groundwater quality in relation to the proposed quarrying operations, the appropriate authority will be contacted to discuss the implementation of necessary measures.

Monitoring Plan

Monitoring of groundwater levels and groundwater quality will be conducted prior to the start of quarry operations. The existing monitoring bores at BH205, BH207, BH208 and BH303 will be used for monitoring groundwater of the quarry area.

New monitoring bores will be installed if any existing monitoring bores are destroyed during the quarry operations or are subject to general failure. Surface runoff water will also be monitored.

Groundwater Levels

Groundwater levels will be monitored on a quarterly basis to identify any adverse impacts arising from the operation of the quarry in the future, and to identify long-term groundwater level trends.

Groundwater Quality

Groundwater samples will be collected for laboratory analysis on a 6-monthly basis. The groundwater quality results will be laboratory analysed for the parameters below and compared to background water quality results. The groundwater sampling will be carried out by an experienced groundwater professional or environmental scientist in accordance with Australian sampling standards.

The basic analyte and parameter suite applies to all samples. The additional extended analytic suite should apply annually together with the basic suite.

Basic Analytes and Parameters – 6 monthly (every sample):

- ph, Electrical Conductivity (EC), Total Dissolved Solids (TDS); Alkalinity;
- Total nitrogen, total phosphorus;
- Major ions, calcium, magnesium, sodium, potassium, chloride, sulphate, carbonate, bicarbonate;
- Total Petroleum Hydrocarbon (TPH); and
- BTEX (benzene, toluene, ethyl benzene, exylene).

Additional Analysis – 12 monthly (every second sample only):
- Nutrient suite: total nitrogen, nitrate, total Kjeldahl nitrogen, total phosphorus, phosphate;
- Metals (arsenic, cadmium, chromium, copper, lead, zinc, nickel, manganese, mercury, total iron, filterable iron);
- Polycyclic Aromatic Hydrocarbon (PAH); and
- Organophosphorus pesticides, phenoxy acid herbicides.

Reporting

The recording date, time and parameters of monitoring data will be collected and tabulated. All original laboratory reports will be maintained on file. Monitoring records will be kept until the closure stage of the quarry for inspection on request by government agencies.

3.3 Surface Water – Proposed Water Management System

The following surface water management measures will be implemented:

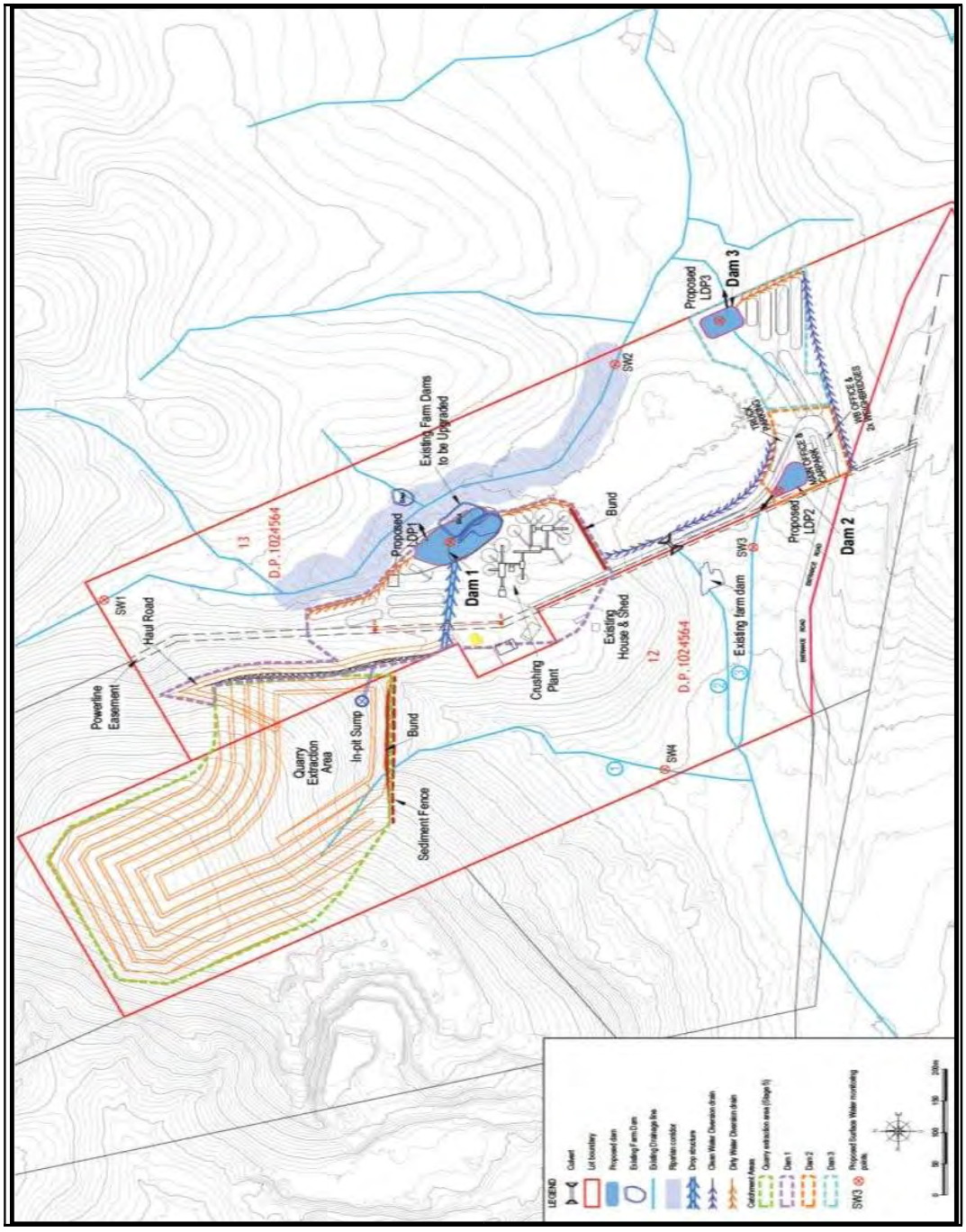

Figure 1: Surface Water Management Plan.

Quarry Extraction Area

- Runoff generated within the active quarry extraction area will be directed into an inpit sump where it will be contained and pumped out as required so as not to impede quarrying activity;
- A bund and sediment fence will be maintained along the southern boundary of the quarry, to minimise the risk of sediment being washed downstream of the quarry;
- Construction of the quarry floor will be managed in such a way so as to direct all runoff to the in-pit sump. The location of this sump will change as quarrying progresses, however it will generally be located in the south east corner of the quarry;
- Water collected in the in-pit sump will be pumped out as required into a rock lined table drain adjacent to the main haul road. The water will flow down this drain to the main dirty water dam, Dam 1, via a rock lined drop structure; and
- Progressive rehabilitation of all formed surfaces, such as quarry benches and long-term soil stockpiles, will occur wherever possible to reduce the amount of total suspended solids (TSS) in runoff from disturbed areas.

Dam 1 Catchment (crushing plant and product stockpiles)

- An existing farm dam will be upgraded and used as a sediment dam (Dam 1);
- The crushing plant area will be graded such that runoff from this area will flow into Dam 1;
- Water for haul road and some stockpile dust suppression, as well as for the crushing plant will be sourced from Dam 1; and
- A diversion bund will be constructed along the eastern boundary of this catchment area, to direct runoff from the area into Dam 1.

Dam 2 Catchment (product stockpiles and office infrastructure area)

- A second sediment dam, Dam 2, will be constructed adjacent to the main haul road to capture runoff from this area. Water collected in Dam 2 will be re-used for dust suppression on the product stockpiles.

Dam 3 Catchment (product stockpiles)

- A third sediment dam, Dam 3, will be constructed in the north-east corner of the southern stockpile area. Water collected in dam 3 will be re-used for dust suppression on the adjacent product stockpiles.

During Construction

Sediment laden runoff from disturbed areas during construction will be managed by implementing the following erosion and sedimentation control principles:

- Conducting best practice land clearing procedures for all proposed disturbance areas;
- Minimising the disturbance footprint;
- Coordinating construction sequences to minimise exposure of disturbed soils to the elements;
- Separate/diversion of upslope 'clean' water catchment runoff prior to land disturbance;
- Ensuring sediment-laden runoff is treated via designated sediment control devices;
- Appropriate storage of topsoil stockpiles in areas away from roadways and other drainage lines;
- Revegetation of disturbed areas as soon as possible following the completion of construction activities; and
- Implementing an effective maintenance period.

Surface Water Management – Final Landform

- Dams 1, 2 & 3 will remain in place for post-mining landuse. Consultation will be undertaken with relevant government agencies in relation to licensing conditions at that time; and
- If deemed necessary by the relevant government agency, the dams will be removed.

Dam Design

Each dam will be constructed to the following capacity in accordance with 'Blue Book' requirements:

Table 2 – Summary of Proposed Dams

Dam	Sediment Zone (ML)	Settling Zone (ML)	Additional water storage capacity (ML)	Total Capacity (ML)
Dam 1	3.4	5.4	3.6	12.4
Dam 2	0.4	0.9	0	1.3
Dam 3	0.6	1.7	0	2.3

Management and Maintenance of Dams

- In the event that water is required to be discharged offsite, the water will be tested prior to discharge to ensure appropriate discharge criteria are met, such as Total Suspended Solids (TSS) below a concentration of 50mg/L. Where this is not the case, water will be treated, for example through the use of chemical flocculation, to achieve a suitable water quality; and
- An inspection of the sediment dams will be undertaken as part of the routine site environmental inspection program or following significant rainfall. Various information, such as the general condition of the dam, evidence of overflow, condition of downstream catchments, water colour, evidence of eroding surfaces and approximate retained capacity, will be recorded.

Mitigation Measures for Drainage Lines

- A sediment fence will be installed along the downstream side of the entire southern face of the quarry as a sediment control measure to minimise the transport of any sediment into the remaining section of the first order drainage line to the south of the extraction area;

This drainage line will be reinstated as close as possible to its original path following completion of extraction activities at the quarry as part of the final rehabilitation of the site;

- A Site Water Management Plan (SWMP) for Karuah East will be prepared and include details on the drainage line rehabilitation works. Works within the restored drainage lines will be generally undertaken in accordance with Section 5.3.3 of the Blue Book (Volume 1) and the 'Guidelines for Controlled Activities – In-Stream Works' (DWE, 2008) for watercourse rehabilitation and riparian zone rehabilitation. Key design elements of channel establishment works will include:
  - Implement temporary erosion controls to provide for the short-term stabilisation of the channel;
  - Design and construct the stream channel so that it will be stable for the longterm and minimizes the potential for the migration of any erosion upstream or downstream;
  - The drainage line will be re-instated as a compound channel with a main channel conveying the small to medium flows, and a floodplain used to convey the high overbank flows;
  - The main channel forming part of the re-instated central drainage line will be generally trapezoidal in shape with 3:1 (H:V) bank batters;
  - Natural meanders will be used instead of straight lines to reflect natural stream characteristics;
  - Where there are high erosive forces (such as high flow velocity or steep grades) the channel bed will be rock lined where required and constructed in accordance with the 'Blue Book', including the placement of appropriately sized rocks above a filter layer of suitable geotextile; and
  - Soil will be packed in between rocks to allow sedges and grasses to be established within the channel to provide for long-term channel stability.

- Following earthworks and channel establishment, a riparian corridor will be established with a minimum width of 10 m, measured horizontally and at right angles to the flow from the top of both banks on the streams. Key design elements of the riparian corridor establishment will include:
  - Implement temporary erosion controls to provide for the short-term stabilisation of the riparian corridor;
  - Restore a vegetated riparian corridor along the stream channel (10 m from top of bank);
  - Establish a diverse range of locally occurring vegetation species;
  - Establish a full range of vegetation types, including trees, shrubs and grass covers;
  - No exotics species are to be introduced; and
  - Maintain the rehabilitated riparian corridor for two years after initial rehabilitation.

Licensed Discharge Point / Licensing Requirements

- A Licensed Discharge Point (LDP) will be installed is required at the outlets of Dam 1, Dam 2 and Dam 3. An application to the BCD for the establishment of the LDP's will be made; and
- The controlled release of water will preferentially be made from Dam 1 and Dam 3. The water management system will be set up to allow for water to be pumped from Dam 2 to Dam 1 as required for release.

Site Water Balance

- The proposed dams will be built to at least the specified sizes (Table 2 above), and made larger where practical in consultation with DPIE Water;
- That controlled discharge of treated (e.g. flocculated) water be undertaken when total site storage levels are above 4.3ML, which would provide the capacity to contain more rainfall events and reduce wet weather discharges (this assumes the dams are built to the capacities presented in Table 2 above); and
- All water usage will be monitored across the site to enable an update of the water balance using actual metered water usage data after 12 months of operation.

Site Water Management Plan

A Site Water Management Plan (SWMP) will be prepared following development consent in accordance with regulatory requirements and conditions of consent. The SWMP will be developed in accordance with the *Blue Book* (Volume 1 and Volume 2E).
The SWMP will incorporate the following:

- On-site soil and water management principles and objectives, including the following:
  - Containment of dirty water runoff from the active quarry area by directing this water into in-pit sumps;
  - Directing sediment-laden runoff from disturbance areas and rehabilitated areas into designated sediment control dams;
  - Installing temporary erosion and sediment control devices as required (i.e. sediment fences sandbag weirs) to minimise the discharge of sediment laden water from newly disturbed areas;
  - Diverting clean water runoff unaffected by the operations away from disturbed areas and offsite, where possible;
  - Maintaining sediment control structures to ensure that the designed capacities are maintained for optimum settling of sediments; and
  - Implementing an effective revegetation and maintenance program for the site.

- Identification of sources of sedimentation and erosion.
- Soil Best Management Practices (BMPs) to be implemented on-site, including:
  - quarry planning considerations (such as minimising disturbance);

- topsoil/subsoil handling and stockpiling procedures; and
- topsoil/subsoil respreading procedures.

- Water BMPs to be implemented on-site, including; o clean water diversions;
  - dirty water capture and treatment;
  - additional sediment protection measures to be employed during the life of the Development; and
  - maintenance of sediment control structures.

- Drainage line rehabilitation.
- Water monitoring procedures.
- Documentation and reporting procedures.

Surface Water Monitoring Program

A Surface Water Monitoring Program will be implemented to monitor both the surface water quality upstream and downstream of the site, and the effectiveness of the Site Water Management Plan, including:

- The results of Surface water monitoring undertaken during quarrying operations at Karuah East will be compared against the baseline data collected as part of the Surface Water Assessment;
- A baseline ecological health condition assessment of Yalimbah Creek will be undertaken prior to commencement of operations, and monitoring of Yalimbah Creek will continue as part of the annual ecological monitoring of offset areas;
- The following parameters (see Table 3 below) will be measured at each monitoring location via collection of a grab sample. The recorded values for the parameters measured will be assessed as a minimum against baseline water quality results as well as the ANZECC trigger values presented below, and plotted to identify any trends over time. The BCD will be notified in the event of increasing levels of any parameter; and
- The range of analytes measured will be reviewed following the first 12 months of monitoring and a diagnostic set of analytes adopted for ongoing monitoring.

Table 3 – Surface Water Monitoring Parameters

Parameter	Unit	ANZECC Guidelines[1]
pH (Field)	--	6.5 – 8.5
Conductivity (Field)	uS/cm	125 – 2200
Conductivity (Lab)	uS/cm	125 – 2200
Total Dissolved Solids	mg/L	-
Parameter	**Unit**	**ANZECC Guidelines[1]**
Total Phosphorus	mg/L	0.025
Ammonia	mg/L	0.02
Nitrogen (Nitrate)	mg/L	0.350
Total Hardness (as CaCO3)	mg/L	--
Oil & Grease	mg/L	--
Arsenic	mg/L	0.024
Cadmium	mg/L	0.0002
Calcium	mg/L	--
Chromium	mg/L	0.001
Copper	mg/L	0.0014
Lead	mg/L	0.0034
Magnesium	mg/L	--
Manganese	mg/L	1.9
Nickel	mg/L	0.011
Potassium	mg/L	--
Sodium	mg/L	--
Vanadium	Mg/L	--
Zinc	mg/L	0.0312

[1] *Key default trigger values presented in ANZECC 2000 for slightly disturbed upland rivers in NSW. Heavy metals based on hard water (120-179 mgCaCO3/L)*

Surface water monitoring locations will be as follows:

- Dam 1;
- Dam 2;
- Dam 3;
- SW 1 & SW 2 - Existing second order drainage line (within Lot 13 flowing along the eastern boundary of the Study Area); both upstream and downstream of the quarry;
- SW 3 - Existing drainage line downstream of Dam 2; and
- SW 4 - Existing drainage line downstream of the quarry extraction area.

The table below identifies the monitoring point locations, the type of monitoring point, and the frequency of sampling.

Table 4 - Proposed Surface Water Monitoring Locations

Location	Type of Monitoring Point	Description of Location	Frequency
Dam 1	Water Quality	Proposed dam located in crushing plant area	Monthly, and within 24 hours of any discharge. Also prior to any controlled (i.e. planned) discharge.
Dam 2	Water Quality	Proposed dam located in western section of stockpile area	Monthly, and within 24 hours of any discharge. Also prior to any controlled (i.e. planned) discharge.
Dam 3	Water Quality	Proposed dam located in eastern section of stockpile area	Monthly and within 24 hours of any discharge. Also prior to any controlled (ie. planned) discharge.
SW1	Water Quality	Existing second order drainage line upstream of site	Monthly (if creek flowing)
SW2	Water Quality	Existing second order drainage line downstream of site	Monthly (if creek flowing) and within 24 hours of any discharge.
SW3	Water Quality	Downstream of Dam 2	Monthly (if creek flowing) and within 24 hours of any discharge.
SW4	Water Quality	Downstream of quarry extraction area.	Monthly (if creek flowing).

Water management (erosion and sediment	Erosion and Sediment Control	All noted erosion and sediment control structures.	Monthly and after significant rainfall events.

Reporting of Monitoring Data

- Karuah East Quarry Pty Ltd will collate surface water analysis data and maintain an up to date record of analysis both in hard copy (laboratory reports) and electronic (results) format. These results will be interpreted as they are received in order to ensure appropriate operational guidance on maintaining water quality within desired parameters;
- The results of water quality analysis will be reported in the Annual Environmental Management Report (AEMR); and
- In the event that an exceedance in surface water quality criteria is identified, the exceedance will need to be reported to the relevant agencies in accordance with the requirements of the EPL.

4.0 BIODIVERSITY & CONSERVATION OFFSET

4.1 Flora and Fauna

The following will be implemented by the Applicant:

Vegetation Clearing Management

Site Survey and Exclusion Fencing

The extraction area/forest interface will be delineated to protect retained bushland areas on Lot 12 and 13. To achieve this, the quarry footprint boundary will be surveyed and pegged by a Registered Surveyor prior to the conduct of clearing operations. Plastic mesh fencing or star pickets and flagging tape will be installed along the extraction boundary for use as exclusion fencing. The fencing will function as a clearly marked 'exclusion' boundary for the machinery operations.

Permanent chain wire metal exclusion fencing will be installed around the entire perimeter of the quarry footprint (except at the designated aerial fauna crossings) prior to the commencement of quarry operations.

Clearing Protocol

The following protocol will be undertaken as part of the clearing activity on the subject site:

- All contractors conducting clearing, earth works or quarrying activities within the subject site will be informed of the restrictions to the clearing of vegetation outside the 'exclusion fencing'. A construction protocol will be prepared requiring all earthworks, machinery and personnel be strictly controlled and be restricted to the extraction footprint. No storage of materials, vehicle parking or other disturbance will be undertaken outside the exclusion fencing. Contractors will be supplied with the construction protocol regarding the clearing restrictions through a work site induction program;
- Trees will be felled away from the refined bushland on the subject site back into the extraction areas; and
- Domestic fauna (ie. dogs) will be prohibited from entering the subject site with Contractors.

Fauna Management

Pre-Clearing Surveys

Where possible, vegetation clearing activity will be timed so as to avoid the following breeding periods for hollow dependant fauna:

- October – February (microbats); and
- June – August (large forest owls and microbats in torpor).

If restricting the clearing to these limited times is not found to be practical, then ecological pre-clearing surveys will be undertaken within two weeks prior to the commencement of the clearing.

If required, components of the pre-clearing surveys will include:

Threatened Fauna Searches

Within one week prior to commencement of vegetation clearing, searches for signs of Threatened species occurring within the quarry footprint will be undertaken. These searches would include but not be limited to;

- Searches for nests of threatened raptors; and
- Searches for whitewash or other signs of roosting or nesting Powerful and Masked Owls.

If a threatened raptor or owl nest site is recorded within the subject site during the surveys, clearing activity will not take place in the vicinity of the nest (within 50 metres) until the nest is vacated by the affected species (including fledglings). Recorded nest sites would be subject to a monitoring program to ensure that no clearing activity is undertaken until the nest sites are vacated.

Small Mammal Trapping

Elliott trapping will be undertaken within one week prior to commencement of vegetation clearing over a 4 night period, targeting the Brush-tailed Phascogale (*Phascogale tapoatafe*) and Squirrel Glider (*Petaurus norfolcensis*). A total of 4 trap lines (equating to 160 arboreal Elliott traps and 400 terrestrial Elliott trap nights) will be established across the subject site (2 lines/stratification unit).

Stag Watching and Anabat Survey

A combined Stag Watching and Anabat survey would be conducted within the subject site over a 4 night period in an attempt to identify potential Microchiropteran bat roost trees. Should further investigations reveal the presence of a maternity colony, no clearing would be undertaken until after the completion of the breeding period (mid October – mid February inclusive).

Reporting

A report detailing the methods and results of the pre-clearing surveys will be prepared and submitted to BCD immediately prior to the commencement of the clearing operations.

Ecological Clearing Supervision

The removal of all identified hollow bearing trees will be undertaken with the presence of a qualified and suitably experienced fauna ecologist.

A tree felling protocol will be developed to minimise harm to hollow obligates during the clearing of trees for the proposal. The tree felling protocol will be developed by a suitably qualified and licenced ecologist with previous experience supervising felling trees. The tree felling protocol will comprise pre-felling identification and mapping of hollow bearing trees, inspections of trees on the day of clearing, procedures for the safe removal of fauna species from trees prior to and post felling, a relocation/release procedure and a methodology for salvaging (and relocating) tree hollows where practicable.

The relevance of the marked hollow bearing trees and requirements for ecological clearing supervision and hollow resource recovery will be communicated to the clearing Contractor as part of a site induction program.

Nest Box Program

One nest box will be installed for each hollow to be lost as a result of the proposal. Softwood pine (plywood) nest boxes will be used and will be specifically designed for Threatened hollow obligates. Nest boxes will have swivel mounts and be fitted with screw lids to prevent damage from brushtail possums.

Nest boxes will be placed in retained habitats in the study area onto host trees that do not already support hollows at a minimum height of 3 metres (aboveground) in an orientation other than west and north-west to minimise exposure to the afternoon sun.

Nest boxes will be erected prior to the commencement of clearing operations and will be subject to 2 yearly maintenance for the life of the quarry.

Feral bees found to colonise the nest boxes will be eradicated by a specialist pest contractor.

Nest box installation will be supervised by a suitably experienced fauna ecologist.

Aerial Fauna Crossings

Two (2) dedicated aerial fauna crossings will be installed.

- The western aerial fauna crossing will to be located at the existing quarry haul road approximately 250 metres north east from the existing quarry site office; and
- The eastern aerial fauna crossing is proposed on Lot 13 along the north-south running access road.

The canopy bridges will comprise rope netting suspended across the entire width of the haul roads connected to two (2) poles placed on opposite side of the roads. The western canopy bridge would be approximately 40-45m in length and 50cm wide whilst the eastern canopy bridge would be approximately 55 metres in length and 50cm in width.

The netting of both canopy bridges would comprise 14mm diameter marine grade ‘silver rope’ in a flat lattice-work configuration (ie. analogous to a rope ladder laid horizontally).

The height of the poles and canopy crossing above the road surface would be between 6 – 12 metres, depending on the road profile.

Single strands of rope will extend from the timber poles into the canopy of adjacent trees to facilitate access by arboreal mammals.

The final design of the canopy rope bridges would be chosen as part of detailed design following development consent.

A twelve month monitoring program will be undertaken using a motion detecting camera system mounted on each pole at each of the two (2) aerial crossings.

Salvage **and Relocation of Terrestrial Habitat Structures**

Large fallen logs will be salvaged during the clearing operations and relocated into retained forested habitats on Lots 12 and 13.

Threatened **Plant Populations**

Salvage and Reintroduction
A salvage program for Tetratheca juncea will be implemented. The salvage program will compromise the excavation of clumps (along with rhizomes and surrounding root balls) proposed for removal and their reintroduction into prepared 'beds' within suitable habitats nearby.

Application for a Section 91 licence from BCD for the salvage program will be made and will be subject to a detailed Salvage Plan to be prepared by the Applicant (and endorsed by BCD and Department of Planning) prior to commencement of the works.

Monitoring

Threatened plant sub-populations of *Tetratheca juncea, Grevillea parviflora* subsp. *parviflora and Asperula* asthenes situated within retained bushland habitats on Lots 12-14 will be monitored annually by a suitably qualified and experienced botanist for the life of the quarry operation.

A Monitoring Plan will be prepared prior to the commencement of clearing activity to detail survey design, data collection and reporting. Adaptive management will be employed for the life of the quarry to respond to population issues that are identified, including weed control.

4.2 Biodiversity Offset Strategy

The proposed offset site is identified as Part Lot 13 DP 1024564, Lot 14 DP 1024546 and Lot 5 DP 838128 (provided that an option to purchase Lot 5 has been secured by the Applicant). In the event that Lot 5 DP 838128 is unable to be secured by the Applicant, the Applicant will purchase an alternate offset site, which, combined with Lots 13 and 14, will provide a total biodiversity offset area of not less than 129.32 ha. The alternate offset site will be required to be agreed to by BCD and be to the satisfaction of the Planning Secretary.

The following will be undertaken by the Applicant in relation to the proposed offset site identified as Part Lot 13 DP 1024564, Lot 14 DP 1024546 and Lot 5 DP 838128:

- Seasonal flora and fauna survey of the offset site will be undertaken in accordance with relevant BCD guidelines. In particular, seasonal survey for tetratheca juncea and grevillea parviflora ssp parviflora will be undertaken and reported to the BCD;
- Prior to establishment of the proposed quarry, the Applicant will purchase Lot 5 DP 838128 (provided than an option to purchase has been secured). In the event that Lot 5 DP 838128 is unable to be secured by the Applicant, as noted above, the Applicant will purchase an alternate offset site (to be agreed to by BCD and be to the satisfaction of the Planning Secretary).
- Upon approval of the development, in consultation with the BCD, the Applicant will secure the offset lands via a Conservation Agreement under Part 4, Division 12 of the National Parks and Wildlife Act 1974;
- A Conservation Management Plan will be developed. The plan will:
  - Confirm required on ground works such as weed control, fencing, signage and pest control;
  - Confirm the timing / schedule of the abovementioned works; and
  - Specify restrictions to the existing two (2) residences of Lot 5 and Lot 14 (if purchase of Lot 5 is secured by the Applicant). If an alternate offset site is provided instead of Lot 5 (as noted above) any restrictions on this land will be specified in the Conservation Management Plan.
- Monitoring of the offset land will be undertaken annually. Results of the monitoring will be used to provide input into the priority areas for the following year(s) of ground maintenance works.

5.0 NOISE, BLASTING AND VIBRATION

The following will be undertaken:

- Enclosure of the Jaw Crusher with 100 mm thick concrete panels on the North, East and South sides. Roofing materials to have an acoustic rating of STC28;
- Enclosure of the Cone Crushers on the Northern and eastern elevations with materials having an acoustic rating of STC28. Southern and western elevations and roof to be enclosed with Colorbond;
- Purchase and use of generator sets which are acoustically treated including complete enclosure of the engine and generator, acoustically treated exhaust systems and cooling systems;
- Noise compliance monitoring will be undertaken in accordance with conditions of consent and Noise Management Plan by a suitably qualified acoustic expert. The monitoring will consider the performance of the quarry in relation to the development specific noise (as established in the EMM Revised Noise Impact Assessment August 2021) and vibration and blast criteria established in the SLR Noise and Blasting Impact Assessment (dated 2 November 2012);
- The Applicant will not fire blasts at the existing quarry and the proposed Karuah East quarry at the same time;
- The Applicant will implement a blasting program where nearby receivers are notified in advance of a blast;
- The following control measures for vibration will be undertaken:
  - Reducing the maximum instantaneous charge (MIC) by using delays, reduced hole diameter and/or deck loading;
  - Changing the burden and spacing by altering the drill pattern and/or delay layout or altering the hole inclination;
  - Use the minimum practicable sub drilling which gives satisfactory toe conditions; and
  - Investigate alternative rock breaking techniques.
- The following control measures for air blasting will be undertaken:
  - Reducing the maximum instantaneous charge (MIC) by using delays, reduced hole diameter and/or deck loading;
  - Ensure stemming depth and type is adequate;
  - Eliminate exposed detonating cord and secondary blasting;
  - Restrict blasting events to favourable weather conditions;
  - Orient quarry faces away from potentially sensitive receivers;
  - Use a hole spacing and burden which will ensure that the explosive force is just sufficient to break the ore to the required size; and
  - The Applicant will take particular care where the face is already broken and consider deck loading where appropriate to avoid broken ground or cavities in the face.
- Splitting or hammering of Class 1 (700 mm – 1200 mm) and Class 2 (400 mm – 700 mm) rock will not be undertaken after 6:00 pm;
- The Applicant will implement training to ensure staff are aware of the sensitivity of noise emissions;
- Product will be loaded into trucks from as low a height as possible.
- Loading of Class 1 (700 mm – 1200 mm) and Class 2 (400 mm – 700 mm) rock for dispatch during the following hours will be undertaken via excavator 'grabs' using the hydraulic excavator rock grab attachment rather than a bucket attachment:
  - 5:00 am to 7:00 am, Monday to Friday;
  - 6:00 pm to 9:00 pm, Monday to Friday;
  - 9:00 pm to 10:00 pm, Monday to Friday on up to 50 calendar days per year; and
  - 6:00 am to 7:00 am, Saturdays.

6.0 TRANSPORT

Karuah East Quarry Pty Ltd will undertake the following road works as part of the proposed development:

- Upgrade and extend Blue Rock Lane;
- Realign Andesite Drive and Blue Rock Lane intersection; and
- Adjust road marking at Branch Lane and Andesite Road intersection.

The works will be undertaken in accordance with the upgrade plans prepared by GCA numbered C00-C27. Road construction and drainage works will comply with Great Lakes Council and NSW TfNSW standards.

7.0 AIR QUALITY & GREENHOUSE GAS EMISSION

7.1 Air Quality

The following will be undertaken:

- Air quality monitoring will be undertaken in accordance with conditions of consent by a suitably qualified acoustic expert. The monitoring will consider the performance of the quarry in relation to the criteria outlined in the SLR Air Quality Impact Assessment
- (dated July 2013);Haul Roads from the site to the Pacific Highway will be sealed;
- Watering of any unsealed roads – Level 1 Watering at 2L/m2/hour;
- The crusher will be enclosed; and
- Stockpiles will be subject to both water spraying and wind breaks will be installed.

7.2 Greenhouse Gas

The following practices will be adopted to assist in the reduction of Greenhouse Gas emissions from operations at the development site:
Relating to diesel / petroleum consumption:

- Emissions from construction / transport vehicles and on site machinery will comply with the relevant Australian Standards;
- All vehicles and machinery will be regularly maintained to ensure proper and efficient working order and therefore minimise emissions;
- Optimum vehicle / equipment tire pressures will be maintained;
- Vehicle idling time will be reduced where possible;
- The finished site topography will ensure that no excessive engine use is required; and
- Optimisation of incline / decline of roads within the construction area on the development site will be considered to reduce transport distances for vehicles entering / exiting the development site.

Relating to electricity consumption:

- Use of efficient construction equipment technology;
- Use of efficient crushing and processing plant technology; and
- Continued monitoring of site electricity usage and review of techniques to reduce usage (if possible).

8.0 HERITAGE

The following will be adopted by the Applicant.

8.1 Aboriginal Archaeology

- If Aboriginal site/s are identified in the study area during works, then all activity in the area will cease, the area cordoned off and contact made with the Office of Environment and Heritage Enviroline 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed; and
- In the event that skeletal remains are uncovered, work will cease immediately in the vicinity and the site fenced. The Applicant will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If determined to be Aboriginal, contact will be made with the BCD Enviroline 131 555 and relevant Aboriginal stakeholders in order to determine an action plan for the management of the skeletal remains prior to works re-commencing on site.

8.2 European Heritage

- If, during the course of development works, significant European cultural heritage material is uncovered, work will cease in that area immediately. The BCD will be notified and works only recommenced when an appropriate and approved management strategy has been instigated.

9.0 VISUAL

The following will be undertaken:

- Trees will be planted as soon as practical on the initial benches on the western face of the quarry; and
- The proposed infrastructure area will be painted in an appropriate colour to blend in with the natural surroundings.

10.0 ENVIRONMENTAL MANAGEMENT STRATEGY

The Environmental Management Strategy dated August 2011 developed by GSS Environmental for the Karuah East Quarry will be adopted & implemented in full by Karuah East Pty Ltd.

11.0 QUARRY CLOSURE & REHABILITATION

The Quarry Closure & Rehabilitation Plan dated November 2012 prepared by GSS Environmental for the Karuah East Quarry will be adopted and implemented in full by the Applicant for the Karuah East Hard Rock Quarry (Appendix H of the EA Report dated 31 January 2013) will be adopted & implemented in full by Karuah East Pty Ltd.

11.1 Rehabilitation Management Plan

Until such time that extraction has ceased, rehabilitation will occur around the perimeter of the pit only along the benches and will not involve the pit floor. As the extraction progresses through the resource, 15m wide benches will be left every 15m of depth to provide a horizontal platform on which native flora species will be established.

The revegetation program will re-establish native tree / shrub / ground cover and will stabilise reshaped and benched areas. Benches will be deep ripped to actively promote infiltration of water which will enhance soil moisture requirements for direct tree seeding and minimise surface runoff to underlying benches and the pit floor dirty water control system.

On completion of quarry operations, the pit floor will be re-shaped and revegetated with wetland plant species to form a free draining wetland environment.

Topsoil Management

Topsoil stripping within the disturbed area will be undertaken when the soil is in a slightly moist condition to reducing damage to soil structure. Stripped material will be placed directly onto the disturbed areas and spread immediately if excavation sequences, equipment scheduling and weather conditions permit.

A maximum stockpile height of 3m will be maintained to preserve viability and reduce soil deterioration.

Stockpiles will be protected with sediment fencing and planted with a sterile cover crop (annual species) to ensure stabilisation. Surface drainage in the vicinity of the stockpiles will be configured so as to direct any runoff around the stockpile.

Where the stockpile is not wholly contained within the "closed loop" water management system, temporary sediment control measures such as sand bags and silt fences will be used to prevent sediment from leaving the disturbed areas.

Topsoil will be re-spread in the reverse sequence to its removal, so that the organic layer, containing any seed or vegetation, is returned to the surface. Topsoil will be spread to a minimum depth of 50mm on 3:1 or steeper slopes and to a minimum depth of 150mm on flatter slopes.

Re-spread topsoil will be levelled to achieve an even surface, avoiding a compacted or an over-smooth finish.

Surface Preparation

Thorough site preparation will be undertaken to ensure rapid establishment and growth of seedlings. All areas proposed for seeding will be deep ripped to an approximate depth of 400 – 500mm.

Where ripping on slopes is required, the ripping will be undertaken around the contour of the land at right angles to water flow.

Direct Seeding

A mixture of native trees and shrubs endemic to the area will be sown onto the majority of the reshaped and benched pit areas following topdressing and site preparation.

The seed will be sourced from reputable seed supply agents. Native seed for revegetation of the quarry will be appropriately pre-treated in order to break dormancy restrictions.

The native tree and shrub seed mix will be sown at a total combined rate of approximately 6.3 kg/ha. Seed will be broadcast evenly onto top-dressed areas. Seeding will be conducted in late spring, summer and early autumn.

Exotic pasture species (warm season perennial, cool season perennial, year long green perennial and annual) will be sown where the risk of erosion is less and on the more protected aspects of landforms.

All legumes will be inoculated and lime pelleted prior to seeding. Oats and/or rycorn/millet (depending on season) will be utilised as the cover crop species.

Revegetation activities will generally be undertaken in spring and autumn; however opportunistic revegetation will be undertaken if areas become available for sowing in summer or winter. After surface soil amelioration and tillage is completed for any given area, revegetation will commence as soon as practicable. The proposed method of sowing will be via conventional spreading using agricultural broadcasting equipment, or by hand if the terrain is difficult and machinery use is not possible.

Slope stabilising techniques such as hydro seeding and straw mulching will be undertaken on slopes exceeding 180 for enhancement of pasture germination.

Fencing and Weed Control

Fencing (or a similar barrier) will be erected and maintained to exclude and prohibit the movement of persons and vehicles into areas that have been rehabilitated. The fencing will be routinely checked and repaired where necessary. Signs will be placed in prominent locations to indicate areas that are undergoing rehabilitation.
Weed control will be undertaken on an "as required" basis should cyclical weed invasion events occur.

Rehabilitation Maintenance

All erosion and sediment control measures will be maintained in a functioning condition until individual areas have been deemed "successfully" rehabilitated. Structural soil conservation works will be inspected after high intensity rainfall so that de-silting and prompt repairs and/or replacement of damaged works can be initiated as required.

Rehabilitation Monitoring

Regular monitoring of the revegetated areas will be undertaken during the initial vegetation establishment period and beyond. The table below presents the monitoring program, including the specific aspects and elements to be monitored and frequencies for those various aspects.

Monitoring will be conducted periodically by independent, suitably qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness. The outcome of these reviews will be included in each Annual Environmental Management Report (AEMR).

In addition to the rehabilitated areas, at least two reference sites will be monitored to allow a comparison of the development and success of the rehabilitation against a control. Reference sites indicate the condition of surrounding un-disturbed areas.

Table 5 - Proposed Rehabilitation Monitoring Program

Aspect of Rehabilitation	Elements to be Monitored	Monitoring Frequency
Ecosystem Establishment		
General Description	□ Describe the vegetation in general terms, e.g. mixed eucalypt woodland with grass understorey and scattered shrubs, dense Acacia scrub, etc.	12 months after establishment and then every 2 years
2m x 2m quadrants	• Count the number of plants of all species, excluding grass. • Measure live vegetation cover for understorey and grasses (separately) using a line intercept	12 months after establishment and then every 2 years

Aspect of Rehabilitation	Elements to be Monitored	Monitoring Frequency
	method. □ Record details of ground cover (litter, logs, rocks etc).	

20m x 10m plots	• Count, by species, all trees >1.6m tall. • Tag and measure DBH of trees >1.6m tall, to a maximum of 10 for any one species. • Record canopy cover over the whole 20m centreline when trees are tall enough. • Subjectively describe tree health, by species if relevant, noting signs of drought stress, nutrient deficiencies, disease and severe insect attack. Where health problems are noted record the percentage of unhealthy trees. • Record any new plant species not present in the smaller plots, including any problem and declared noxious weeds. • Take five surface soil samples (e.g. at approx. 5m intervals along the centreline) and bulk these for analyses of: PH, EC, chloride and sulfate; exchangeable Ca/Mg/K/Na; cation exchange capacity; particle size analysis and R1 dispersion index; 15 bar and field capacity moisture content; organic carbon; total and nitrate nitrogen; total and extractable phosphorus; Cu, Mn and Zn.	12 months after establishment and then every 2 years
50m transect	• Along the 50m erosion monitoring transect, record the location, number and dimension of all gullies >30cm wide and/or 30cm deep. • Erosion pins may be established in plots located in newer rehabilitation to record sheet erosion if present.	12 months after establishment and then every 2 years
Rehabilitation general in	• When traversing between monitoring plots, note the presence of species of interest not previously recorded (e.g. key functional or structural species, protected species, noxious weeds), as well as obvious problems including any extensive bare areas (e.g. those greater than 0.1ha). • Observation such as this can provide useful, broad scale information on rehabilitation success and problems.	12 months after establishment and then every 2 years

Aspect of Rehabilitation	Elements to be Monitored	Monitoring Frequency
Photographic record	For each 20m x 10m plot, a photograph should be taken at each end of the plot, along the centreline looking in.	12 months after establishment and then every 2 years

Habitat	• General observations relating to the availability and variety of food sources (e.g. flowering/ fruiting trees, presence of invertebrates etc). • Availability and variety of shelter (e.g. depth of leaf litter, presence of logs, hollows etc). • Presence/absence of free water in the rehabilitation areas.	12 months after establishment and then every 2 years
Fauna	• General observations of vertebrate species (including species of conservation significance). • Detailed fauna surveys including presence and approximate abundance and distribution of vertebrate species (focusing on species of conservation significance).	After rehabilitation is three years old undertake monitoring in every 2 years after establishment in both Autumn and Spring
Weeds and pests	• Species identity. • Approximate numbers/level of infestation. • Observation of impact on rehabilitation (if any).	Quarterly during the first two years and biannually after that. Inspections should be opportunistic after significant rainfall events.
Geotechnical Stability		
	• Assessment of the stability of batters and also looking at surface settlements (sink holes). In particular where these features could impact on the performance of any surface water management system. • Surface integrity of landform cover/capping (measurement of extent of integrity failure). • Presence/ absence of landform slumping.	Annually
Aspect of Rehabilitation	**Elements to be Monitored**	**Monitoring Frequency**
Surface and Groundwater		

	Groundwater quality and depth Efficiency of landform surface water drainage systems (integrity of banks and drains). Water quality including pH, EC and total suspended solids of water in water storages, and pits, sedimentation dams.	Quarterly or following rainfall events. Monitoring of receiving waters during a rainfall event which results in runoff.

11.2 Final Void Managements

Void Water Quality

Water will only be permitted to accumulate in the void if it maintains a quality that does not compromise its intended final use or surrounding groundwater systems. The following aspects will be considered with respect to managing final void water quality:

- Concentration of elements resulting from the quarrying of material;
- Control of surface flow into the void; and Rainfall and evaporation.

Post closure a water monitoring program will remain in place to monitor any changes to chemistry within the void.

Void Slope Stability

The surrounding final slopes will be left in a condition where the risk of slope failure is minimised. This may require the benches to be battered back from the vertical to enable a stable overall slope angle.
The following will be considered when assessing the geotechnical stability of highwalls:

- Long term final void water levels;
- Height and inclination of slope and number and spacing of intermediate benches;
- Shear strength of the highwall soils and rocks;
- Density and orientation of fractures, faults, bedding planes, and any other discontinuities, and the strength along them; and
- The effects of the external factors, such as surface runoff.

Prior to closure, investigations will be undertaken to confirm the criteria above.

Control of Surface Inflow

Drainage will be directed away from the highwall face through the construction of interceptor channels around the perimeter of the highwall and spoon drains will be utilised on the upslope side of all benches.
The catchment area of the final void will be minimised by the installation of diversion drains.

Safety

The following will be considered at the time of closure to ensure that the void is left in a safe manner.

- All high will to be left geotechnically stable;
- A barrier at a safe distance from the perimeter of the void to prevent human access will be constructed. The highwall areas will be secured by the construction of a trench and a safety berm, as well as a security fence along the entire length of the remaining high wall;
- Suitable signs, clearly stating the risk to public safety and prohibiting public access will be erected at 50m intervals outside the safety fence;
- Surface runoff from land surrounding the void will be diverted from entering the void; and
- Shrub and/or tree planting along the outside edge of the bund wall will be implemented where practicable to lessen the visual impact of the wall, and will be in accordance with the agreed post mining rehabilitation criteria and land use.

Monitoring and Management

After decommissioning works have been undertaken, whether progressive or final, a monitoring program will be designed to demonstrate that the completion criteria have been met and that the site is not resulting in any off-site effects.

Closure Liability
In accordance with the Department of Trade and Investment Regional Infrastructure and Services ESG1 – Rehabilitation Cost Estimate Guidelines, the closure liability for the Karuah East Quarry is **$468,134**.

12.0 WASTE MANAGEMENT

All waste or recyclable material will be handled as follows:

During Construction

Material Type
Excavation Material & Green Waste - Will be stockpiled on site in accordance with the quarry rehabilitation plan.

Bricks – Any remaining bricks will be removed from the site by a suitably qualified contractor and transported to a local crushing and recycling company.

Concrete - Any remaining concrete will be removed from the site by a suitably qualified contractor and transported to a crushing and recycling company.

Timber – Any excess timber will be removed from the site by a suitably qualified contractor and transported to a landscaping supply company for chipping and composting.

Plasterboard – Any excess plasterboard will be removed from the site by a suitably qualified contractor and taken to landscape supply company.

Metals – Any excess metal will be removed from the site by a suitably qualified contractor and transported to a metal recycling facility.

Other – Any other materials not noted above will be removed from the site by a suitably qualified contractor and transported to an appropriate facility.

During Operation

Quarry Activity
Excavation Material & Green Waste - Will be stockpiled on site in accordance with the quarry rehabilitation plan.

Bricks – Any remaining bricks will be removed from the site by a suitably qualified contractor and transported to a local crushing and recycling company.

Concrete - Any remaining concrete will be removed from the site by a suitably qualified contractor and transported to a crushing and recycling company.

Timber – Any excess timber will be removed from the site by a suitably qualified contractor and transported to a landscaping supply company for chipping and composting.

Metals – Any excess metal will be removed from the site by a suitably qualified contractor and transported to a metal recycling facility.

Other – Any other materials not noted above will be removed from the site by a suitably qualified contractor and transported to an appropriate facility.

General Waste & Recyclables from Staff within the Plant Area

Recyclables
Paper, cardboard, glass, aluminium & plastic
Temporary recycle bins will be provided within staff areas of the plant. Management will ensure that bins are regularly collected and transported to an appropriate recycling facility.

Non Recyclables
Food scraps and other waste
Temporary waste bins will be provided within staff areas of the plant. Management will ensure that bins are regularly collected and transported to an appropriate recycling facility.

Quarry Closure

Waste and recyclable material associated with the quarry closure and decommissioning will be undertaken in accordance with the Quarry Closure and Rehabilitation Plan. This will include:

Site Services
All services including power, water, data and telephone on the site will be isolated, disconnected and terminated to make them safe. All underground services will be made safe and left buried in the ground. Overhead power lines (where they are not used by others) will be removed and the materials (i.e. poles and wire) recovered for potential re-sale or recycling as applicable.

Infrastructure and Buildings

- All sumps will be de-watered and de-silted prior to the commencement of demolition. In addition, all items of equipment will be de-oiled, degassed, depressurised and isolated and any hazardous materials (HAZMATs) removed from the site;
- All infrastructure, including the office buildings, workshops, parking areas, crushing plant, wash plant and product storage areas will be demolished and removed from the site. Where possible assets may be reused or sold to other operations. Otherwise they will be removed from the site by a suitably qualified contractor and transported to an appropriate recycling facility;
- The remaining items will be demolished, removed and transported from the site as required. All recoverable scrap steel will be sold and recycled, with the remaining non-recyclable wastes being taken to a licenced landfill. Prior to disposal, all wastes will be assessed and classified in accordance with *Waste Classification Guidelines (DECC, 2008);* and
- All concrete footings and pads will be broken up to at least 1.5m below the surface. The waste concrete will be crushed to produce an aggregate that can either be used on the site or sold for some other beneficial use.

Roadways, Car Parks and Hardstand
The roadways, car parks, and hardstand areas around the processing and administration areas will be ripped up. All areas will be reshaped, deep ripped, topsoiled and seeded in accordance with the rehabilitation plan.

Fuel Farm and Lubricant Storage Area
Leading up to closure, a preliminary sampling and analysis programme (Phase 1) will be implemented to determine whether a more detailed assessment (Phase 2 – detailed investigation of contamination involving drilling, etc) should be conducted.

13.0 HAZARDOUS MATERIALS / DANGEROUS GOODS

All fuel storage and storage of any required chemicals will be within the specified bunded area of the infrastructure plant. Material Safety Data Sheets will be recorded in the site safety system for all chemicals used on site. This will contain information on the environmental impacts for the use of certain chemicals and include detail on emergency response, clean up and disposal should a highly unlikely event of a spill occur.

14.0 UTILITIES

The proposed development will comply with the requirements of the relevant utility authorities and evidence of the necessary approvals will be provided to the NSW DoPI prior to construction works.

15.0 OUTDOOR LIGHTING

All outdoor lighting associated with the proposed development will be designed to comply with the requirements of AS 4282, Control of Obtrusive Effects of Outdoor Lighting.

APPENDIX 2 – Environment Protection Licence

Environment Protection Licence

Licence - 20611

Licence Details	
Number:	20611
Anniversary Date:	26-August

Licensee

KARUAH EAST QUARRY PTY LIMITED

PO BOX 3284

THORNTON NSW 2322

Premises

KARUAH EAST QUARRY

PACIFIC HIGHWAY

KARUAH NSW 2324

Scheduled Activity

Crushing, grinding or separating

Extractive activities

Fee Based Activity	Scale
Crushing, grinding or separating	> 500000-2000000 T annual processing capacity
Extractive activities	> 500000-2000000 T annually extracted or processed

Contact Us

NSW EPA

4 Parramatta Square

12 Darcy Street

PARRAMATTA NSW 2150

Phone: 131 555

Email: info@epa.nsw.gov.au

Locked Bag 5022

PARRAMATTA NSW 2124

Environment Protection Licence

Licence - 20611

Environment Protection Licence

Environment Protection Licence

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

KARUAH EAST QUARRY PTY LIMITED
PO BOX 3284
THORNTON NSW 2322

subject to the conditions which follow.

Environment Protection Licence

Licence - 20611

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled development work listed below at the premises listed in A2:
Works necessary to commence quarry operations (eg stormwater controls, development of roads).

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Crushing, grinding or separating	Crushing, grinding or separating	> 500000 - 2000000 T annual processing capacity
Extractive activities	Extractive activities	> 500000 - 2000000 T annually extracted or processed

A1.3 Notwithstanding the condition above, the scale of the land-based extractive activity and / or scale of crushing, grinding and separating authorised under this licence must not exceed 1.5 million tonnes of quarry products per annum, being the amount equivalent to the extraction limit approved by the project approval MP09_0175 granted under the *Environmental Planning and Assessment Act 1979* for the premises specified in A2.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
KARUAH EAST QUARRY
PACIFIC HIGHWAY
KARUAH
NSW 2324
LOT 26 DP 1024341, LOT 27 DP 1024341, LOT 12 DP 1024564, LOT 13 DP 1024564, LOT 16 DP 1024564, LOT 17 DP 1024564, LOT 202 DP 1042537

Environment Protection Licence

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

Any other document and/or management plan is not to be taken as part of the documentation in condition A3.1, other than those documents and/or management plans specifically referenced in this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
4	Air emissions monitoring		Adjacent to Residence C at 5760 Pacific Highway, Karuah, referred to as DDG1 on Figure 2 "Sensitive Receivers & Air Quality Monitoring Locations" in draft Karuah East Quarry Project Air Quality Plan", July 2015. Located within EPA document DOC15/281558.
5	Air emissions monitoring		Adjacent to Residence B at 5770 Pacific Hwy, Karuah, referred to as DDG2 on Figure 2 titled "Sensitive Receivers & Air Quality Monitoring Locations" in draft Karuah East Quarry Project Air Quality Plan", July 2015. Located within EPA document DOC15/281558
6	Air emissions monitoring		Located Lot 24 DP 1024341 Pacific Karuah, referred to as DDG3 on Figure 2 titled "Sensitive Receivers and Air Quality Monitoring Locations" in draft Karuah East Quarry Project Air Quality Plan", July 2015. Located within EPA document DOC15/281558.

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7	Air emissions monitoring	Located at 21 Halloran Road, North Arm Cove, referred to as DDG4 on Figure 2 titled "Sensitive Receivers and Air Quality Monitoring Locations" in draft Karuah East Quarry Project Air Quality Plan", July 2015. Located within EPA document DOC15/281558.
8	Air emission monitoring	Located on Lot21 DP1024341 Pacific Hwy, Karuah, referred to as DDG5 on Fig 2 "Karuah East Quarry - Sensitive Receivers & Air Quality Monitoring Locations" attached to licence variation application received 16/12/16. Located within EPA document DOC16/58114
9	Air emission monitoring	Residence B located at Lot 3 DP 785172, Karuah, referred to as "B" HVAS on Fig 2 "Karuah East Quarry - Sensitive Receivers & Air Quality Monitoring Locations" in licence variation application received 16/12/16. Located within EPA document DOC16/581149

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to waters	Discharge to waters	The discharge point from Dam 1 as shown on the plan titled "Proposed Surface Water Management Plan - Figure 3", which is filed as part of EPA document DOC15/253402.
2	Discharge to waters	Discharge to waters	The discharge point from Dam 2 as shown on as shown on the plan titled "Proposed Surface Water Management Plan - Figure 3", which is filed as part of EPA document DOC15/253402.
3	Discharge to waters	Discharge to waters	The discharge from Dam 3 as shown on the plan titled "Proposed Surface Water Management Plan - Figure 3", which is filed as part of EPA document DOC15/253402.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Environment Protection Licence

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
11	Air blast overpressure & ground vibration peak particle velocity monitoring	Blast monitor located adjacent to Residence B as identified in 'Figure 1 - Appendix 2 - Noise Receiver Locations' located in EPA document DOC15/253402.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring\discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the 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

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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:

Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:

1. *are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or*
2. *interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.*

L6 Hours of operation

L6.1 Hours of operation for each activity type permitted by this Licence are shown in the table below:.

Activity	Operating hours
Quarrying Operations	7:00 am to 9:00 pm, Monday to Friday. No quarrying operations on Sundays or Public Holidays. 7:00 am to 10:00 pm Monday to Friday on 50 calendar days per year; and 7:00am to 6:00 pm, Saturday. No drilling 6:00 pm to 10:00 pm Monday to Friday or 1:00 pm to 6:00 pm Saturday.
Product loading and dispatch	5:00 am to 9:00 pm Monday to Friday 5:00 am to 10:00 pm Monday to Friday on 50 calendar days per year 6:00 am to 6:00 pm Saturday No product loading and dispatch on Sundays or Public Holidays
Construction activities	7.00 am to 6.00 pm, Monday to Friday; and 8.00 am to 1.00 pm, Saturdays, unless noise from these activities does not exceed 40 dB(A) LAeq(15 min) at any privately-owned residence.
Maintenance activities	24 hours a day, 7 days per week, providing maintenance activities are inaudible at any privately-owned residence

L7 Potentially offensive odour

L7.1 No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was

emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All areas in or on the premises must be maintained in a condition that prevents or minimises the emission of dust to the air.

O3.2 Any activity carried out in or on the premises must be carried out by such practical means as to prevent dust or minimise the emission of dust to the air.

O3.3 Any plant operated in or on the premises must be operated by such practical means to prevent or minimise dust or other air pollutants.

O3.4 All trafficable areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the emission of dust to the air, or emission from the premises of wind-blown or traffic generated dust.

O3.5 The licensee must ensure it has sufficient water during all stages of the quarry, and if necessary adjust the scale of quarrying operations on the premises to match its available supply.

O3.6 Trucks entering and leaving the premises that are carrying loads of dust generating materials must have their loads covered at all times, except during loading and unloading.

O4 Emergency response

Note: The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that

occur at the premises and which are likely to cause harm to the environment.

The PIRMP must be tested at least annually or following a pollution incident.

The licensee must develop the PIRMP in accordance with the requirements in Part 5.7A of the Protection of the Environment Operations (POEO) Act 1997 and POEO Regulations.

O5 Processes and management

O5.1 All tanks and storage areas for drums containing material that has potential to cause environmental harm must be bunded or have an alternative spill containment system in-place.

The bunding and/or spill containment systems must be properly designed, engineered, and constructed to be suitable for the material types and quantities stored therein in accordance with all appropriate standards, including Australian Standards (AS)1940 and AS1596.

O5.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank where a group of tanks are installed);
c) have floors graded to a collection sump;
d) not have a drain valve incorporated in the bund structure;
or be constructed and operated in a manner that achieves the same environmental outcome.

O5.3 All refuelling must be undertaken in a dedicated refuelling area. The refuelling area must be a hardstand and suitably bunded in accordance with EPA bunding guidance.

O5.4 The licensee must, before undertaking any earthmoving or vegetation removal works, implement erosion and sediment control measures to prevent pollution of waters in accordance with Soils and Construction: Managing Urban Stormwater 2004 (Landcom, 2004).

O5.5 Stormwater from all areas of the premises which has the potential to mobilise sediments and other material must be controlled and diverted through the appropriate erosion and sediment control and/or pollution control measures/structures, so as not to cause, permit or allow water pollution to occur.

O5.6 The in-pit sump must be sized at all times to prevent a discharge to waters in the event of pump failure.

O6 Waste management

O6.1 The licensee must not irrigate, discharge or dispose of sewage effluent, on the premises.

O6.2 The licensee must operate and maintain a wastewater collection and storage tank/s to enable the pump out and offsite disposal of any sewage effluent.

O6.3 The licensee must ensure that sewage effluent collected at the premises is pumped out and disposed of in a lawful manner.

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O7 Other operating conditions

Noise and Blast Management

O7.1 The licensee must implement all necessary procedural controls to all mobile plant to limit engine RPM (revolutions per minute) so as to reduce noise in order to achieve compliance with the noise limits specified in this licence.

Bitumin Pre-coat Plant

O7.2 The licensee must not have a bitumin pre-coat plant on the site. Project Approval MP09_0175 did not assess or approve such a plant.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 4,5,6,7,8

Pollutant	Units of measure	Frequency	Sampling Method

Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

POINT 9

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Every 6 days	AM-18
Total suspended particles	micrograms per cubic metre	Every 6 days	AM-15

M2.3 Water and/ or Land Monitoring Requirements

POINT 1,2,3

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample
Turbidity	nephelometric turbidity units	Special Frequency 1	Grab sample

Note: For the purposes of the table above 'Special Frequency 1' means:
(a) within 12 hours prior to any controlled discharge; and
(b) daily during a controlled discharge; or
(c) daily during any uncontrolled discharge.

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2021* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Weather monitoring

M4.1 Prior to the commencement of operation of the development, the Proponent must establish a permanent meterological station complying with the Approved Methods for Sampling and Analysis and the Australian Standard AS2923 - 1987, at the facility. The meterological station must monitor the following parameters:

Parameter	Units of measure	Averaging period	Frequency	Sampling Method
Rainfall	mm/hr	1 hour	Continuous	AM-4
Sigma Theta @ 10m	degrees	1 hour	Continuous	AM-2
Siting	-	-	-	AM-1
Temperature @ 10m	Kelvin	1 hour	Continuous	AM-4
Temperature @ 2m	Kelvin	1 hour	Continuous	Am-4
Total Solar Radiation @ 10m	W/m2	1 hour	Continuous	AM-4
Wind direction @ 10m	degrees	1 hour	Continuous	AM-2
Wind speed @ 10m	m/s	1 hour	Continuous	AM-2

Note: Sampling methods as identified in the table above refer to those outlined in NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

M4.2 The location of the site chosen for the station and details of equipment, measurement and maintenance / service procedures and scedules to be installed and maintained must be submitted to the EPA and approved in writing by the EPA before any sampling or analysis is carried out.

M4.3 The meterological monitoring station must be calibrated at least once every 12 months. The EPA is to be provided with data on request in a Microsoft Office software compatible format.

M5 Recording of pollution complaints

M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M5.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

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

the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

Environment Protection Licence

R4 Other reporting conditions

Reporting blasting limit exceedance

R4.1 The licensee must report any exceedance of the licence blasting limits to the regional office of the EPA as soon as practicable after the exceedance becomes known to the licensee or to one of the licensee's employees or agents.

Annual Blast Monitoring Report

R4.2 The licensee must supply a Blast Monitoring Report with the EPA licence Annual Return, which must include the following information relating to each blast carried out within the premises during the respective reporting period:
a) the date and time of the blast;
b) the location of the blast on the premises;
c) the blast monitoring results at each blast monitoring station;
d) an explanation for any missing blast monitoring results.

Noise Monitoring Report

R4.3 A quarterly noise monitoring report must be submitted to the EPA within 30 days of completion of each round of quarterly noise monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
a) a description of the plant in operation and activities being undertaken on the premises during each noise monitoring assessment;
b) an assessment of compliance with noise limits presented in this licence; and
c) an outline of any management actions taken within the monitoring period to address any exceedances of the limits contained in this licence.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 **Completed Programs**

Environment Protection Licence

Licence - 20611

Program	Description	Completed Date
Pollution Reduction Study 1 - Design the Necessary Noise Mitigation Measures	Engage an acoustic engineer to investigate the site-specific noise mitigation measure/s that are necessary to meet the noise limits of this licence at all times.	01-March-2019

Environment Protection Licence

Licence - 20611

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 20611

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 20611

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste
Wellhead	Has the same meaning as in Schedule 1 to the Protection of the Environment Operations (General) Regulation 2021.

Mr Peter Jamieson

Environment Protection Authority

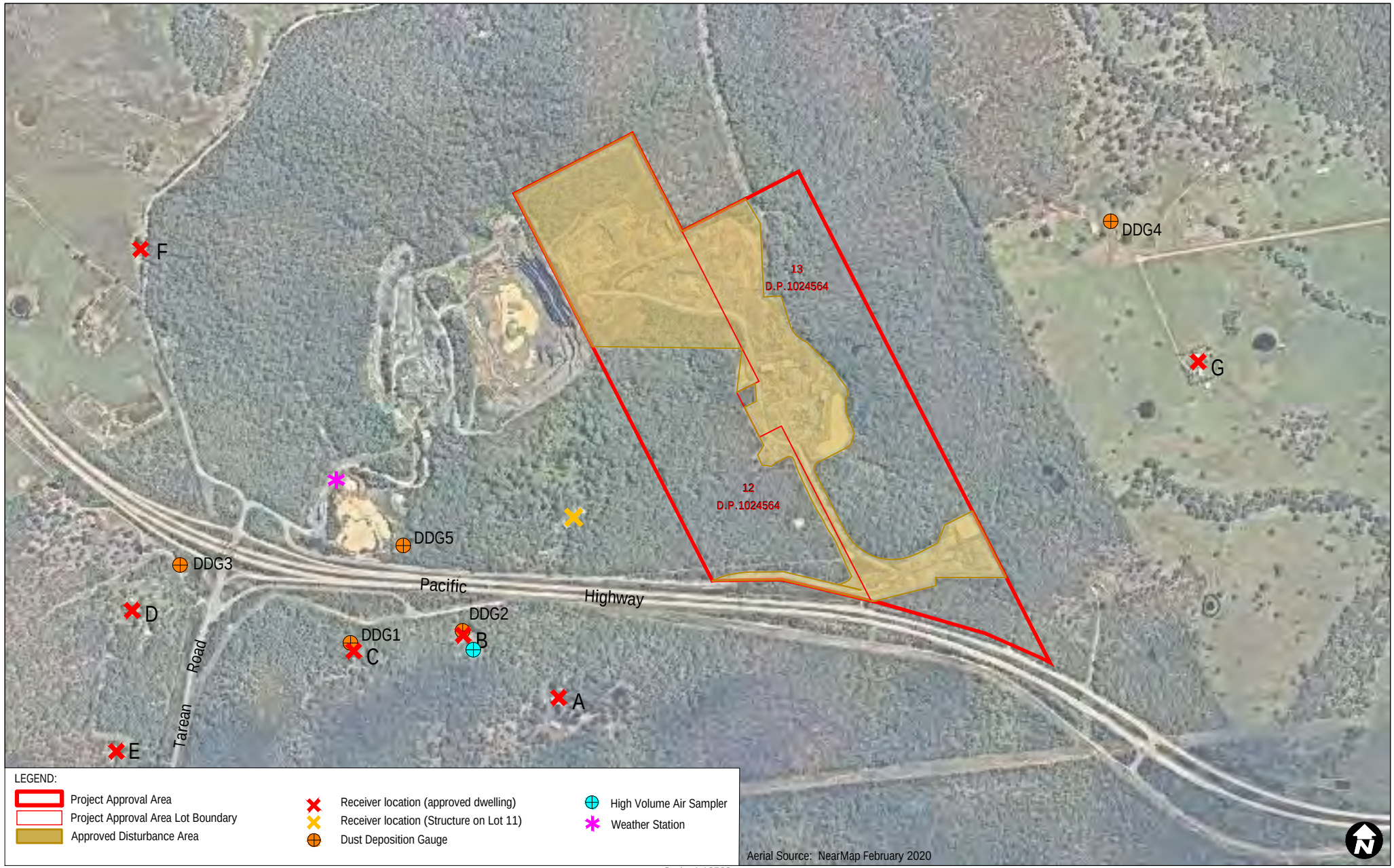
(By Delegation)

Date of this edition: 26-August-2015

End Notes

2	Licence varied by notice 1533596 issued on 21-Sep-2015
3	Licence varied by notice 1547416 issued on 06-Dec-2016
4	Licence varied by notice 1571215 issued on 16-Jan-2019
5	Licence varied by notice 1578081 issued on 25-Jun-2019
6	Licence format updated on 18-Jul-2019
7	Licence varied by notice 1621603 issued on 02-Sep-2022
8	Licence varied by notice 1623762 issued on 07-Nov-2022

APPENDIX 3 – Key Figures/Plans



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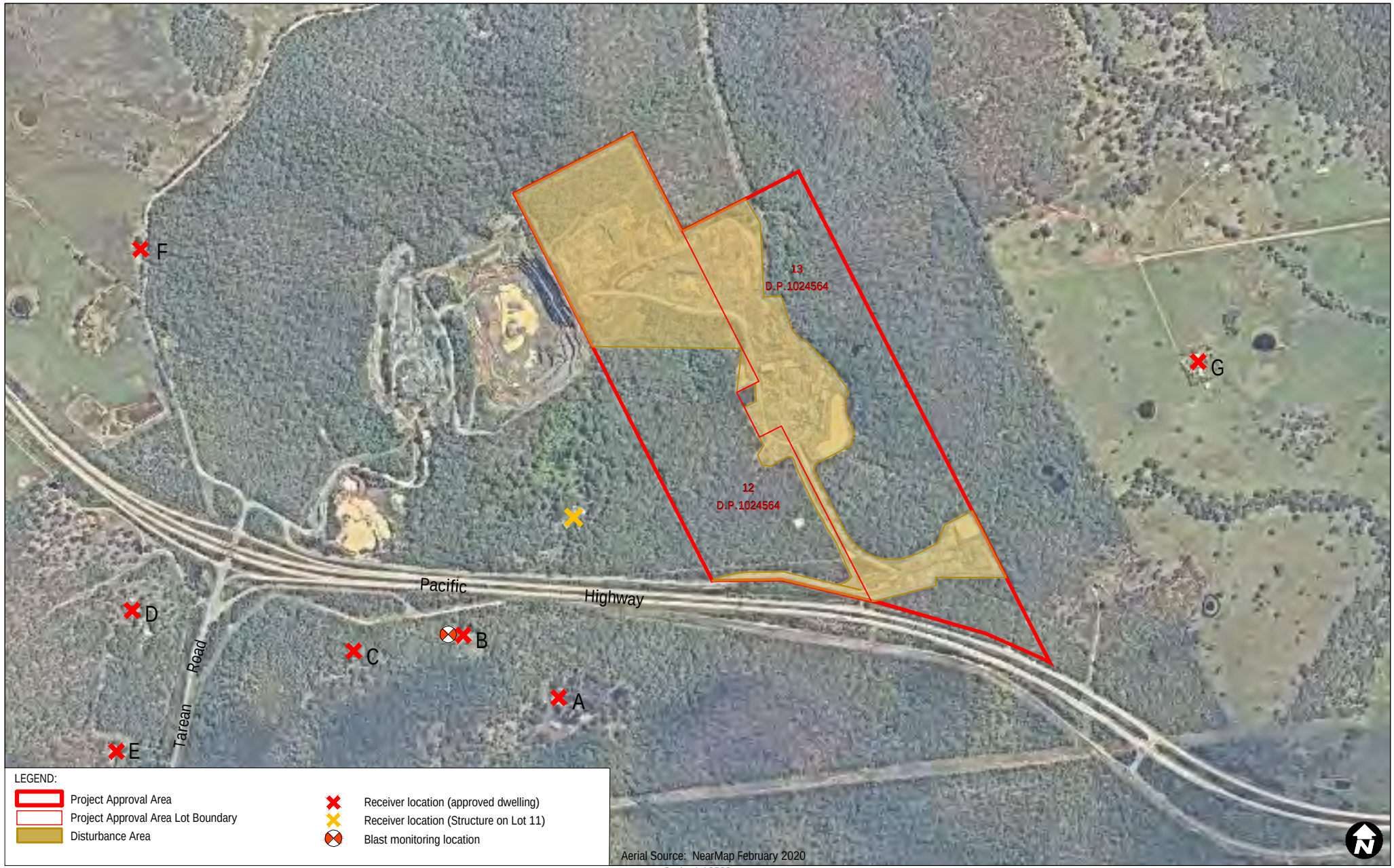
KARUAH EAST QUARRY SENSITIVE RECEIVERS AND AIR QUALITY MONITORING LOCATIONS

FIGURE 1



KARUAH EAST QUARRY SENSITIVE RECEIVERS AND BLAST MONITORING LOCATIONS

FIGURE 2

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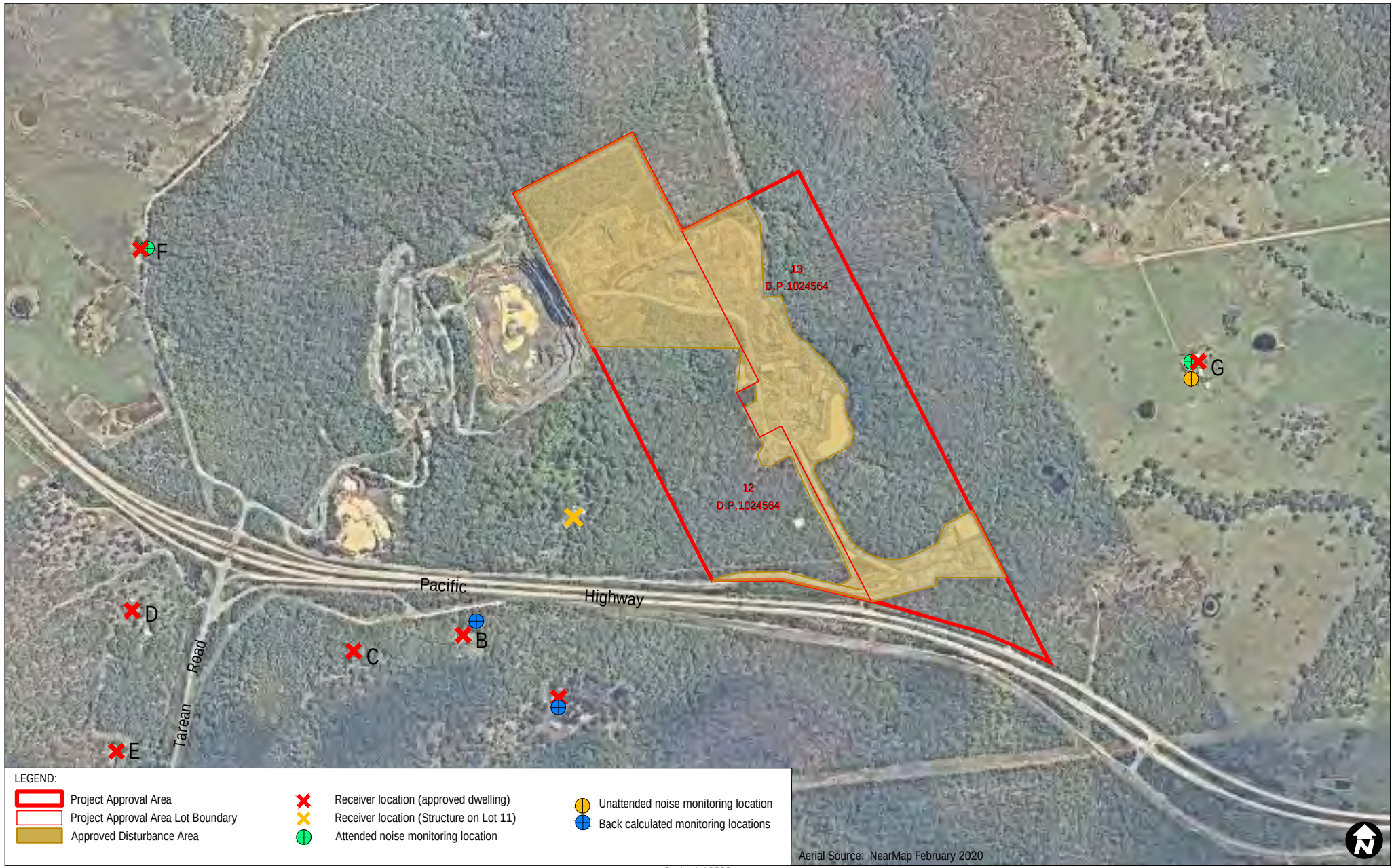

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KARUAH EAST QUARRY SENSITIVE RECEIVERS AND MONITORING LOCATIONS

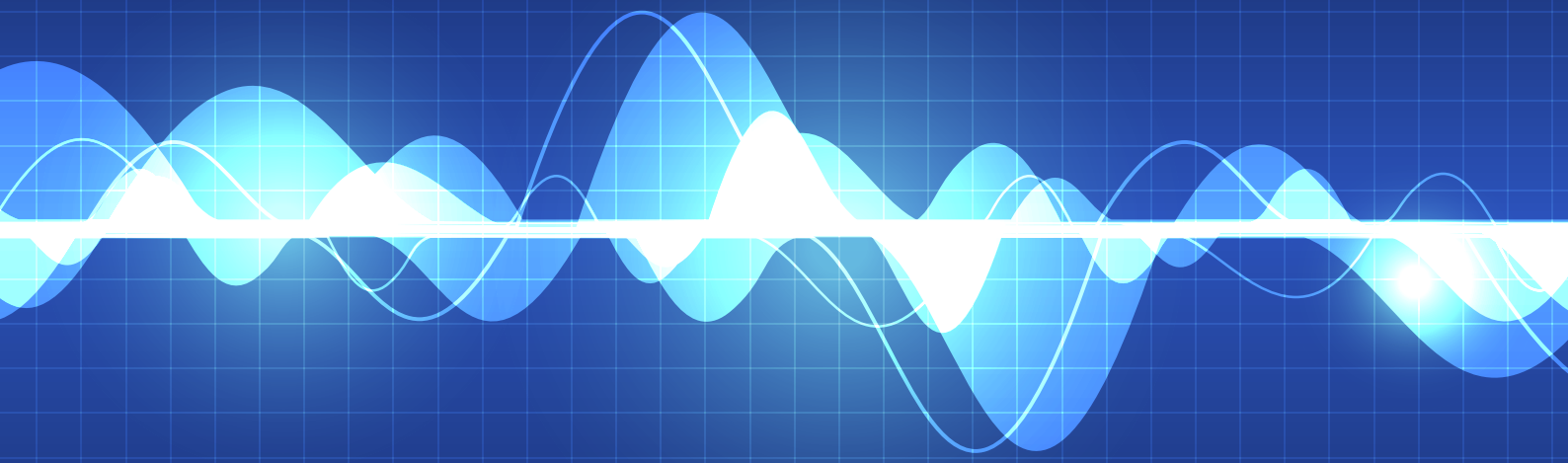
FIGURE 3

APPENDIX 4 – Noise Monitoring Reports

Karuah East Quarry

EPL quarterly attended noise monitoring
Quarter M - 202H

Prepared for Karuah East Quarry Pty Ltd
April 2022



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Karuah East Quarry

Quarterly attended noise monitoring - Q1 2022

Prepared for Karuah East Quarry Pty Ltd
April 2022

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Karuah East Quarry

Quarterly attended noise monitoring - Q1 2022

Report Number

E220174 RP#1

Client

Karuah East Quarry Pty Ltd

Date

12 April 2022

Version

v1-0 Final

Prepared by

Lucas Adamson
Senior Acoustic Consultant
12 April 2022

Approved by

Katie Teyhan
Associate
12 April 2022

Table of Contents

Appendices

Tables

Figures

1 Introduction

EMM Consulting Pty Limited (EMM) was engaged to undertake noise compliance monitoring on behalf of Karuah East Quarry Pty Ltd.

This report presents the results and findings of attended noise monitoring conducted on 16 March 2022.

Noise compliance monitoring is required to be undertaken in accordance with the *Karuah East Quarry Project Noise Management Plan* (NMP) which has been prepared to meet the relevant requirements of Department of Planning and Environment (DPE), Project Approval PA 09_0175, as modified in December 2020 (current as of 16 March 2022) and Environment Protection Authority (EPA) Environment Protection Licence (EPL) 20611 as varied on 18 July 2019 (current as of 16 March 2022).

The Noise Policy for Industry (NPfI) (EPA 2017) has also been referenced as part of this assessment.

Several technical terms are discussed in this report. These are explained in the Glossary.

2 Noise limits and monitoring requirements

2.1 Noise limits

Karuah East Quarry noise limits are provided in Table 2, Condition 3 of PA 09_0175 and Condition L4.1 of EPL 20611. Extracts of the relevant sections of PA 09_0175 and EPL 20611 pertaining to noise are provided in Appendix A and B, respectively. The approved NMP adopts four attended noise monitoring locations that are representative of residences outlined in the PA 09_0175 and EPL 20611. The noise monitoring locations and relevant criteria from the PA 09_0175, EPL 20611 and NMP are summarised in Table 2.1.

Table 2.1 Noise limits

Monitoring location	Location description	EPL Day $L_{Aeq,15\ minute}$, dB	PA Day $L_{Aeq,15\ minute}$, dB
A	Residence A on Lot 100 DP 785172	40	42
B	Residence B on Lot 3 DP 785172	37	40
G	Residence G on Lot 1 DP 1032636	38	43
H	Residence H on Lot 10 DP 1032636	Not specified	45
Any approved residence on Lot 11 DP 1024564		43	Not Specified
Any other residence or sensitive receiver not subject to a private negotiated agreement		35	40

Condition L4.4 of EPL 20611 states that the noise measurement equipment must be located:

- 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 closest to the premises;
- approximately on the property, where any dwelling is situated 30 metres or less from the property boundary 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.

2.2 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 Noise Policy for Industry. This is consistent with the requirements of Condition L4.3 of EPL 20611 which states 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.

2.3 Modifying factors

2.3.1 Low frequency noise criteria

Condition L4.5 of EPL 20611 requires that the modifying factor adjustments outlined in Fact Sheet C of the NPfI (EPA 2017) are to be used when assessing the characteristics of a noise source (eg low frequency noise).

Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for low frequency noise (LFN) emissions. The NPfI specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values (ie threshold levels) in Table C2 of the NPfI, which has been reproduced in Table 2.2.

Table 2.2 One-third octave LFN threshold levels

	One-third octave $L_{Zeq,15\ minute}$ threshold levels												
Frequency (Hz)	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
dB (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more, and:

- where any of the one-third octave noise levels in Table 3.2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or
- where any of the one-third octave noise levels in Table 3.2 are exceeded by more than 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the daytime period and a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period.

Hence, where possible throughout each survey the operator has estimated the difference between site 'C-weighted' and site 'A-weighted' noise emission levels by matching audible sounds with the response of the sound analyser (L_{Ceq}-L_{Aeq}). Where this was deemed to be 15 dB or greater, the measured one-third octave centre frequency levels have been compared to the values in Table 2.2 to identify the relevant modifying factor correction (if applicable). This method has been applied to this assessment as presented in Section 5.

It is of note that the NPfI states that LFN corrections only apply under the standard or noise-enhancing meteorological conditions. In this case, the standard or noise-enhancing meteorological conditions are the same as those under which the noise limits are applicable.

2.3.2 Tonal noise

Tonal noise is defined in the NPfI as noise containing a prominent frequency and characterised by a definite pitch. Examples of tonal noise sources include ventilation fans, reversing beepers or alarms. It is of note that Karuah East Quarry uses broadband reversing alarms instead of beeping alarms. Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for tonal noise emissions.

The NPfI specifies that a 5 dB positive adjustment to measured/predicted A-weighted levels applies if the level of one-third octave band centre frequency (measured using unweighted or Z-weighted weighting) exceeds the level of the adjacent band on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10,000 Hz; or
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160-400 Hz; or
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.

Quarry noise experienced at the nearest residences is relatively continuous (e.g. quarry hum). Field observations during the noise compliance monitoring, and the measured one-third octave noise levels from 25 Hz to 12 kHz, confirm that site noise is not tonal in nature at any of the monitoring locations. Hence, adjustments to measured levels are not required for tonality.

2.4 Noise monitoring methodology requirements

Condition M8.1 of the EPL states that noise generated by Karuah East Quarry is to be measured in accordance with a number of requirements. An extract of the requirements outlined in Condition M8.1 is provided here.

> 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.

2.5 Unattended noise monitoring

Section 8.4 of the NMP states that unattended noise monitoring will be undertaken each quarter to quantify overall ambient noise levels in the vicinity of location G (see Figure 4.1). An extract of the requirements outlined in Section 8.4 of the NMP is provided here.

> In order to supplement the operator-attended measurements, unattended continuous noise monitoring shall be conducted at Locations G, for a minimum period of seven (7) days per quarter during operations, to quantify overall ambient noise amenity levels resulting from quarrying, road traffic and other environmental noise sources.
>
> …
>
> Unattended noise monitoring will be conducted initially on a quarterly basis. The frequency of monitoring will be reviewed after the first 12 months of operations in order to determine future requirements.

A review of the historical unattended noise monitoring data (undertaken in Quarter 3 2021) found no evident trends associated with Karuah East Quarry operations. Without an operator present to discern the noise sources contributing to the measured noise levels, it is difficult to establish any meaningful conclusions or trends from the historical unattended noise monitoring data.

As a result, the Karuah East Quarry has ceased the unattended noise monitoring component of the quarterly compliance noise monitoring program.

3 Assessment methodology

3.1 Attended noise monitoring

To quantify noise emissions from Karuah East Quarry, 15-minute attended noise monitoring surveys were completed at representative monitoring locations with reference to the sites approved NMP.

The attended noise monitoring locations, as per the sites approved NMP, and their coordinates are listed in Table 3.1 and are shown in Figure 3.1.

Table 3.1 Attended noise monitoring locations

Monitoring location	Location description	Coordinates (MGA56)	
		Easting	Northing
A	74 Mill Hill Close, Karuah	406623	6388704
B	64 Mill Hill Close, Karuah	406405	6388859
G	2 Halloran Road, North Arm Cove	405629	6389766
F	1714 The Branch Lane, Karuah	408154	6385923

3.2 Instrumentation

A Brüel & Kjær (B&K) 2250 Type 1 sound analyser (s/n 3029363) was used to conduct 15-minute attended measurements and record 1/3 octave centre frequency and statistical noise indices. The sound analyser was calibrated before and on completion of the survey using a Svantek SV36 calibrator (s/n 79952). The instruments were within their NATA laboratory calibration period during the time of these readings and certificates are provided in Appendix C.

Where possible throughout each survey, the operator quantified the contribution of each significant noise source. This was done by matching audible sounds with the response of the sound analyser (where applicable) and/or via post-analysis of recorded noise data.

3.3 Weather and operating conditions

The meteorological data was obtained from the Karuah East Quarry on-site weather station. Communications with the site operator and observations made during the attended measurements confirmed that the site was operating as normal during the noise surveys.

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 4.1

EMM creating opportunities

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

0 0.5 1 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\emm3\2021\E210782 - KEQ Noise monitoring\8 GIS\02 Maps\G001 SiteLocation 20210908 01.mxd 8/09/2021

4 Review of data and discussion

4.1 Summary

The results of EMM's attended noise measurements are summarised in Table 4.1. Karuah East Quarry's noise contribution was determined using in-field observations and post-analysis of recorded data as required. Attended noise monitoring was completed on 16 March 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the EPL and PA. In accordance with the EPL and PA, noise limits were applicable during all four measurements.

Low frequency noise was conservatively assessed by comparison of the site measured one-third octave L_{Aeq} noise levels to the NPfI one-third octave low-frequency noise thresholds. Site measured noise levels did not exceed the relevant LFN thresholds during any of the measurements. Therefore, in accordance with the NPfI, LFN modifying factors were not applied to estimated site noise levels at any of the monitoring locations. Graphs of the total linear noise levels measured in one-third octave frequency bands are presented in Appendix D.

Karuah East Quarry noise contributions and cumulative quarry noise contributions were below (i.e. complied with) the relevant noise limits at all monitoring locations.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q1 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB		EPL / PA Limits, dB	Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	LFN mod. Factor[1]	L_{Aeq}	L_{Aeq}			
A	16/3	10:38	44	47	51	54	55	59	66	Nil	IA	40 / 42	2.9 m/s @ 71° A stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway and insects consistently audible. Nearby excavator (unrelated to KEQ) frequently audible. Dogs barking and aircraft noise occasionally audible.
B	16/3	10:55	49	57	62	65	67	71	71	Nil	IA	37 / 40	2.0 m/s @ 152° A stability class Y	Nil	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway and insects consistently audible. Bird noise occasionally audible.
F	16/3	10:13	38	42	51	49	56	78	62	Nil	IA	35 / 40	1.7 m/s @ 162° A stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and bird noise consistently audible. Aircraft noise and car passbys occasionally audible.
G	16/3	11:21	31	34	40	42	51	57	55	Nil	<20	38 / 43	2.9 m/s @ 169° A stability class Y	Nil	**Karuah East Quarry engine revs briefly audible on two occasions.** Distant traffic on the Pacific Highway and insects consistently audible. Bird noise and dogs barking occasionally audible.

Notes: *1. Modifying factor correction for LFN in accordance with Fact sheet C of the NPfI.*
2. Meteorological data were taken as an average over 15 minutes from the Karuah East Quarry on-site weather station (Refer to Section 5.1).
3. IA = inaudible.
4. N/A = not applicable.

5 Conclusion

EMM has completed a review of operational noise from Karuah East Quarry within the surrounding community based on attended measurements conducted on 16 March 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the EPL. In accordance with the EPL, noise limits were applicable during all four measurements.

The assessment of noise contributions from site included consideration of modifying factors for noise characteristics where relevant and in accordance with the NPfI.

Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

Glossary

Several technical terms are discussed in this report. These are explained in Table G.1.

Table G.1 Glossary of acoustic terms

Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The 'A-weighted' noise level which is exceeded 1% of the time.
$L_{A1,1minute}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq,15\ minute}$ descriptor refers to an L_{Aeq} noise level measured over a 15 minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L_{Ceq}	The equivalent continuous 'C-weighted' sound pressure level over a given period. The $L_{Ceq,15\ minute}$ descriptor refers to an L_{Ceq} noise level measured over a 15 minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature Inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of the decibel (dB), the unit of noise measurement. Table G.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure G.1.

Table G.2 Perceived change in noise level

Change in sound pressure level (dB)	Perceived change in noise
up to 2	not perceptible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

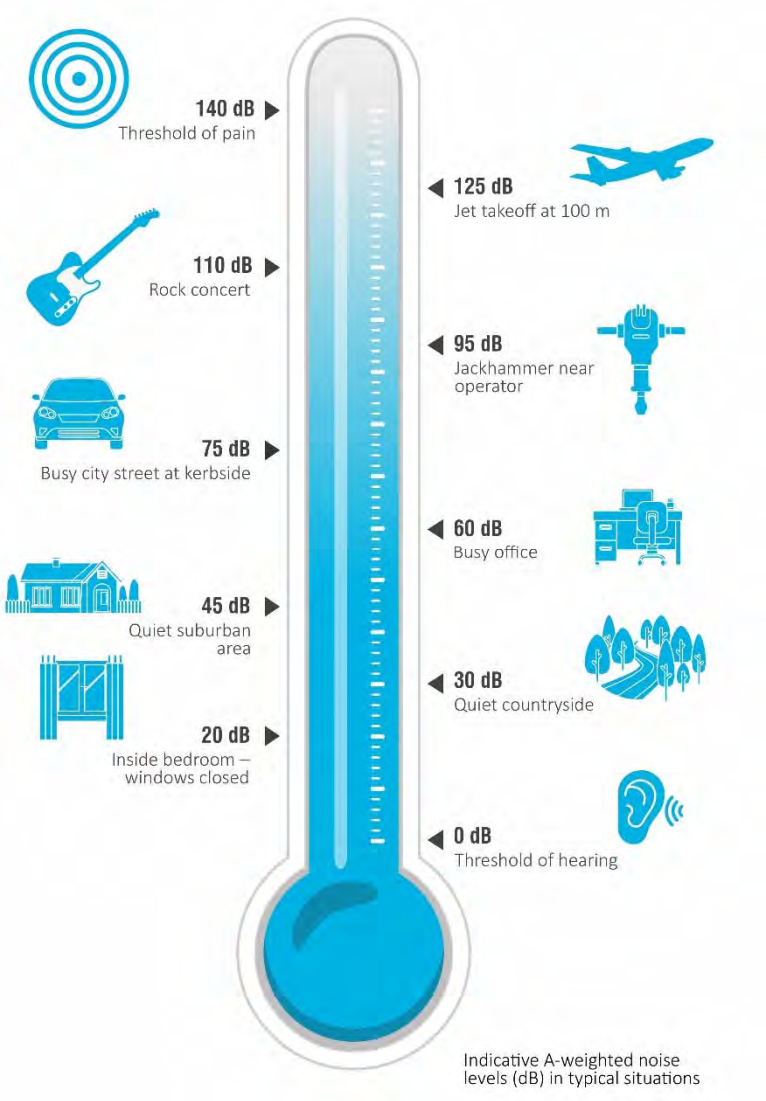

Figure G.1 Common noise levels

References

Department of Planning and Environment (DPE), Project Approval PA 09_0175, 2020.

Environment Protection Authority, Environment Protection Licence 20611, 2019.

Environment Protection Authority, Industrial Noise Policy Application notes, 2013.

Environment Protection Authority, Industrial Noise Policy, 2000.

Environment Protection Authority, Noise Policy for Industry, 2017.

SLR Consulting, Karuah East Quarry Project Noise Management Plan, 2015.

Appendix A

Project approval extract

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(A) $L_{Aeq(15\ min)}$)

Residence (Noise Assessment Location)[a]	***Criteria (Day)***
A	42
G	43
H	45
All other residences	40

[a] *The Residences (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.

Appendix B

EPL extract

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 3 and Figure 10 of the document entitled Environmental Assessment Report - Proposed Karuah East Quarry (ADW Johnson Pty Limited 2013) which has been filed on EPA file LIC08/1088-03.

Location	Noise Limit dB(A)
	Day LAeq (15 minute)
Residence A on Lot 100 DP 785172	40
Residence B on Lot 3 DP 785172	37
Residence G on Lot 1 DP 1032636	38
Any other residence or sensitive receiver not subject to a private negotiated agreement	35
Any approved residence on Lot 11 DP 1024564	43

L4.2 For the purpose of the table above, Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.

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:

Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:

1. *are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or*
2. *interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.*

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: The frequency of noise monitoring will be reviewed, upon request, after two years of quarterly monitoring (approximately June 2021).

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,

Appendix C

Calibration certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C30591

EQUIPMENT TESTED : Sound Level Calibrator

Manufacturer: Svantek
Type No: SV-36 **Serial No:** 79952
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details overleaf. All Test Passed.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	94.12 dB	999.99 Hz	1.58 %
Level2:	NA	N	114.05 dB	999.99 Hz	1.12 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:

Ambient Pressure 1007 hPa ±1 hPa
Temperature 21 °C ±1° C
Relative Humidity 43 % ±5%

Date of Receipt : 16/09/2021
Date of Calibration : 16/09/2021
Date of Issue : 16/09/2021

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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

Acu-Vib Electronics
CALIBRATIONS SALES RENTALS REPAIRS
Head Office & Calibration Laboratory
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(02) 9680 8133
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HBK HOTTINGER BRÜEL & KJÆR
The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark

ilac-MRA DANAK
CAL Reg.No. 307
Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2007931 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 3029363	Id: -
Microphone:	Brüel & Kjær Type 4189	No: 3260501	
PreAmplifier:	Brüel & Kjær Type ZC-0032	No: 30109	
Supplied Calibrator:	None		
Software version:	BZ7222 Version 4.7.6	Pattern Approval:	-
Instruction manual:	BE1712-22		

CUSTOMER

EMM Consulting
Ground Floor, Suite 1
20 Chandos Street
2065 St Leonards
New South Wales, Australia

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 8.2 - DB: 8.20) by using procedure B&K proc 2250, 4189 (IEC 61672:2013).

RESULTS

Calibration Mode: **Calibration as received.**

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: 2020-11-26

Date of issue: 2020-11-26

Lene Petersen
Calibration Technician

Erik Bruus
Approved Signatory

Appendix D

Low Frequency Noise analysis

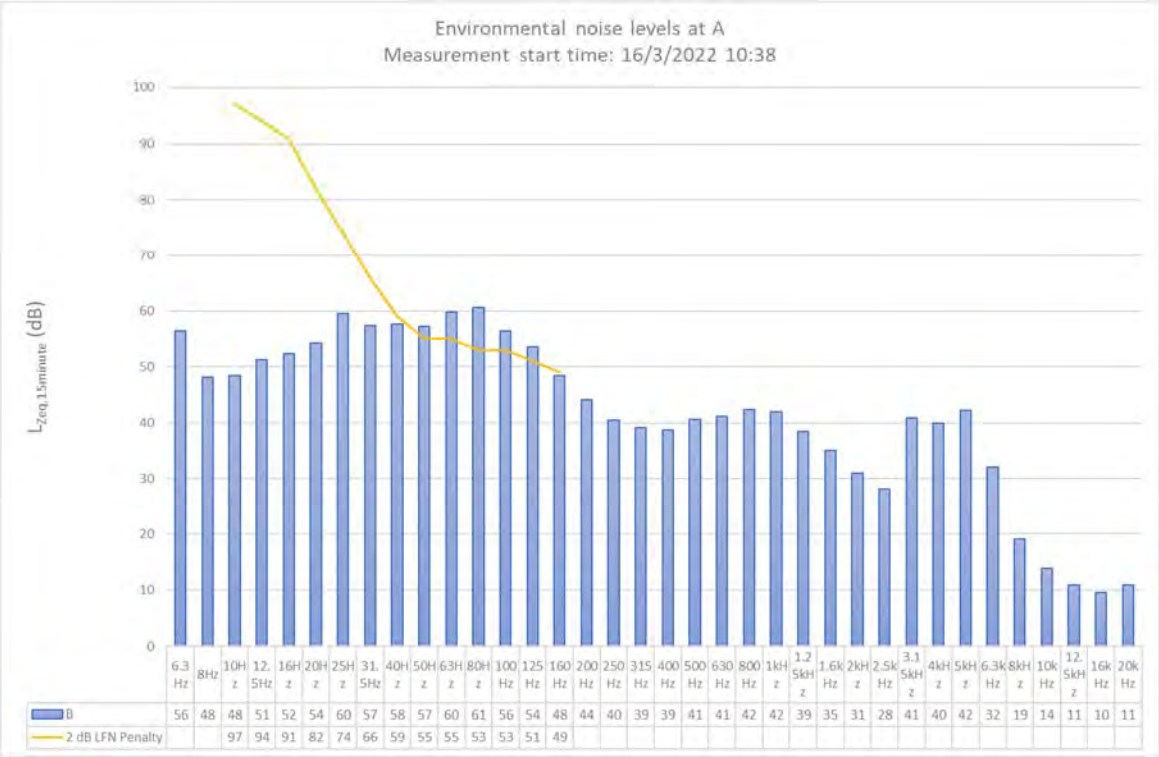

Figure D.1 Location A - Total measured one-third octave band frequencies

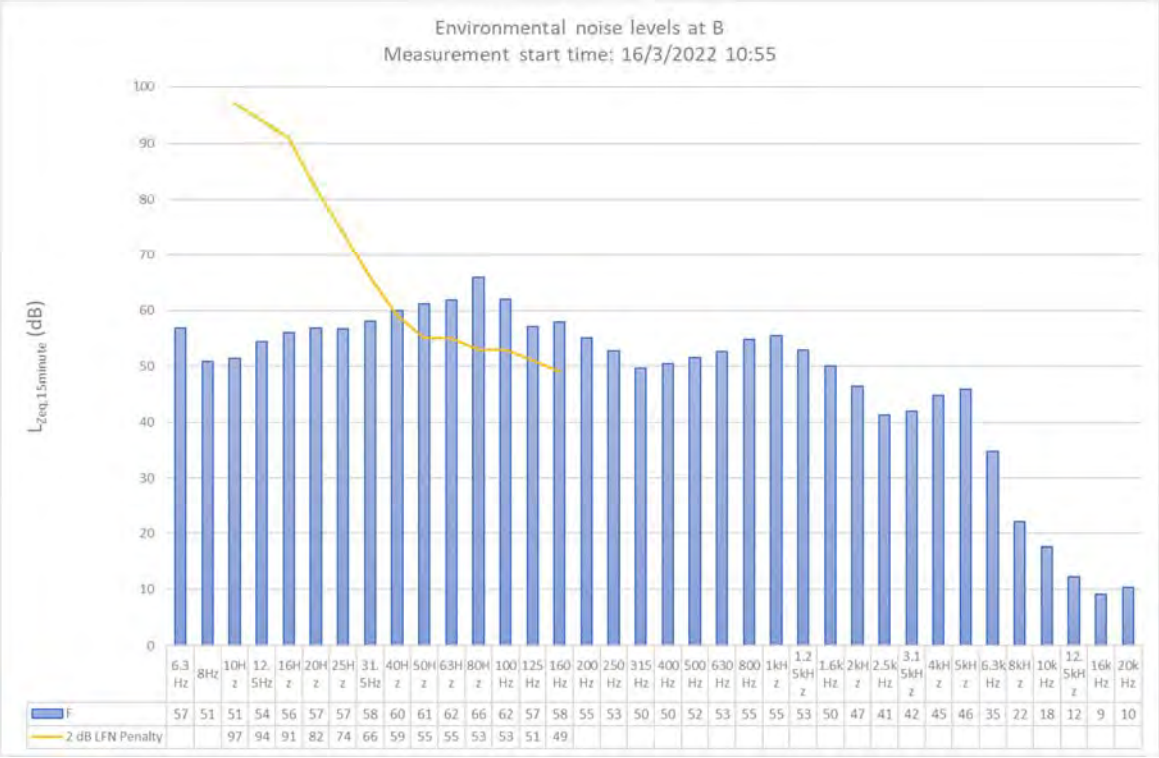

Figure D.2 Location B - Total measured one-third octave band frequencies

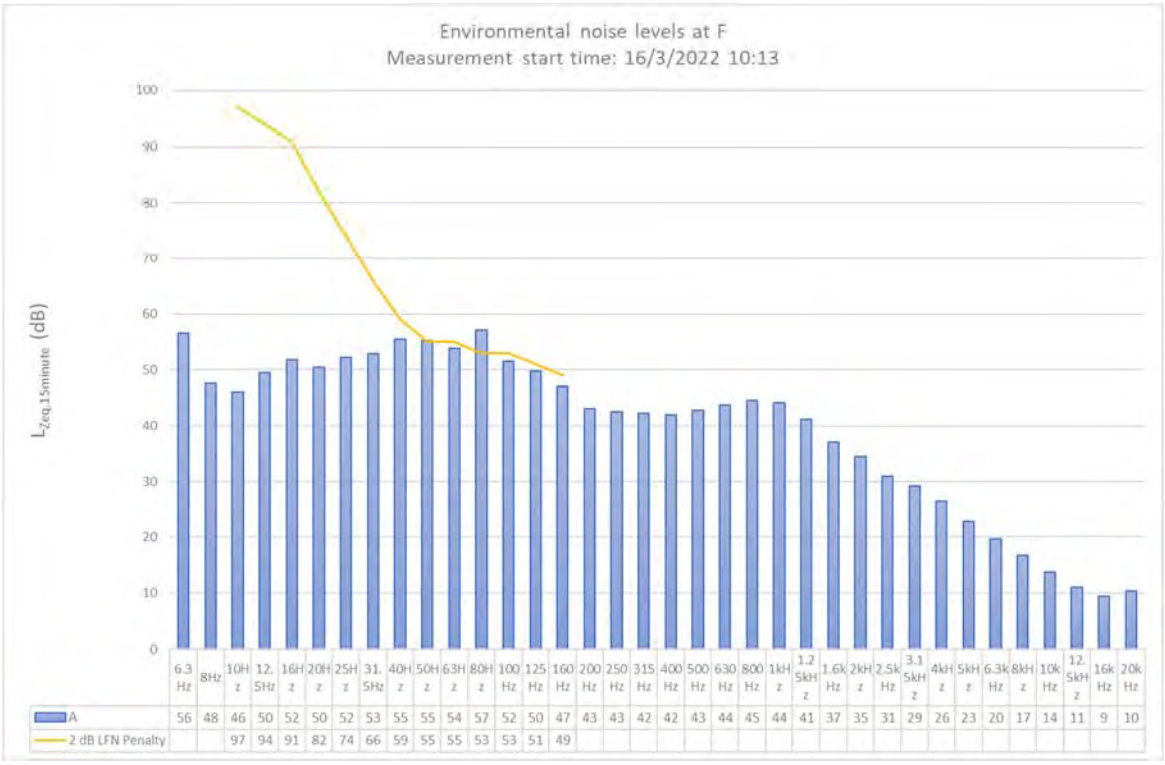

Figure D.3 Location F - Total measured one-third octave band frequencies

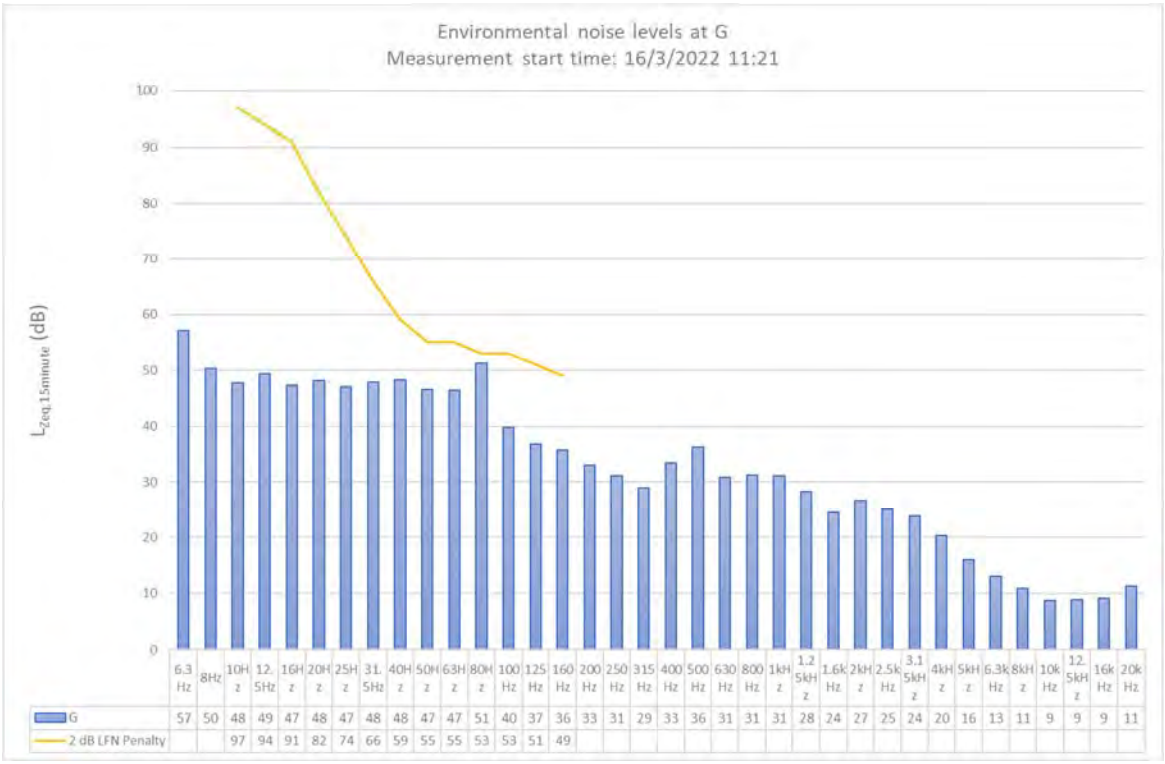

Figure D.4 Location G - Total measured one-third octave band frequencies

Karuah East Quarry

Quarterly attended noise monitoring - Q2 2022

Prepared for Karuah East Quarry Pty Limited

July 2022

Karuah East Quarry

Quarterly attended noise monitoring - Q2 2022

Karuah East Quarry Pty Limited

E220174 RP#2

July 2022

Version	Date	Prepared by	Approved by	Comments
1	18 July 2022	Lucas Adamson	Katie Teyhan	

Approved by

Katie Teyhan
Associate
18 July 2022

Level 3 175 Scott Street
Newcastle NSW 2300

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

EMM Consulting Pty Limited (EMM) was engaged to undertake noise compliance monitoring on behalf of Karuah East Quarry Pty Ltd.

This report presents the results and findings of attended noise monitoring conducted during the day, evening and morning shoulder periods on 16 and 28 June 2022.

Noise compliance monitoring is required to be undertaken in accordance with the *Karuah East Quarry Noise Management Plan* (NMP) which has been prepared to meet the relevant requirements of Department of Planning and Environment (DPE), Project Approval PA 09_0175, as modified in November 2021 (current as of 28 June 2022) and Environment Protection Authority (EPA) Environment Protection Licence (EPL) 20611 as varied on 18 July 2019 (current as of 28 June 2022).

The Noise Policy for Industry (NPfI) (EPA 2017) has also been referenced as part of this assessment.

Several technical terms are discussed in this report. These are explained in the Glossary.

2 Noise limits and monitoring requirements

2.1 Noise limits

Karuah East Quarry noise limits are provided in Table 2, Condition 3 of PA 09_0175 and Condition L4.1 of EPL 20611. Extracts of the relevant sections of PA 09_0175 and EPL 20611 pertaining to noise are provided in Appendix A and B, respectively. The approved NMP adopts five attended noise monitoring locations that are representative of residences outlined in the PA 09_0175 and EPL 20611. The noise monitoring locations and relevant criteria from the PA 09_0175, EPL 20611 and NMP are summarised in Table 2.1.

Table 2.1 Noise limits

Monitoring location	Location description	EPL Day $L_{Aeq,15\ minute}$, dB	PA Day $L_{Aeq,15\ minute}$, dB	PA Evening $L_{Aeq,15\ minute}$, dB	PA Morning Shoulder $L_{Aeq,15\ minute}$, dB	PA Morning Shoulder L_{Amax}, dB
A	Residence A on Lot 100 DP 785172	40	42	40	35	52
B	Residence B on Lot 3 DP 785172	37	40	40	35	52
G	Residence G on Lot 1 DP 1032636	38	43	39	35	52
H	Residence H on Lot 10 DP 1032636	Not specified	44	46	35	52
I	Residence I on Lot 11 DP 1032636	Not specified	40	37	35	52
Any approved residence on Lot 11 DP 1024564		43	Not Specified	Not Specified	Not Specified	Not Specified
Any other residence or sensitive receiver not subject to a private negotiated agreement		35	40	35	35	52

Condition L4.4 of EPL 20611 states that the noise measurement equipment must be located:

- 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 closest to the premises;
- approximately on the property, where any dwelling is situated 30 metres or less from the property boundary 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.

2.2 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 Noise Policy for Industry.

This is consistent with the requirements of Condition L4.3 of EPL 20611 which states 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.

2.3 Modifying factors

2.3.1 Low frequency noise criteria

Condition L4.5 of EPL 20611 requires that the modifying factor adjustments outlined in Fact Sheet C of the NPfI (EPA 2017) are to be used when assessing the characteristics of a noise source (eg low frequency noise).

Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for low frequency noise (LFN) emissions. The NPfI specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values (ie threshold levels) in Table C2 of the NPfI, which has been reproduced in Table 2.2.

Table 2.2 One-third octave LFN threshold levels

	One-third octave $L_{Zeq,15\ minute}$ threshold levels												
Frequency (Hz)	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
dB (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more, and:

- where any of the one-third octave noise levels in Table 3.2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or
- where any of the one-third octave noise levels in Table 3.2 are exceeded by more than 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the daytime period and a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period.

Hence, where possible throughout each survey, the operator has estimated the difference between site 'C-weighted' and site 'A-weighted' noise emission levels by matching audible sounds with the response of the sound analyser (L_{Ceq}-L_{Aeq}). Where this was deemed to be 15 dB or greater, the measured one-third octave centre frequency levels have been compared to the values in Table 2.2 to identify the relevant modifying factor correction (if applicable). This method has been applied to this assessment as presented in Section 5.

It is of note that the NPfI states that LFN corrections only apply under the standard or noise-enhancing meteorological conditions. In this case, the standard or noise-enhancing meteorological conditions are the same as those under which the noise limits are applicable.

2.3.2 Tonal noise

Tonal noise is defined in the NPfI as noise containing a prominent frequency and characterised by a definite pitch. Examples of tonal noise sources include ventilation fans, reversing beepers or alarms. It is of note that Karuah East Quarry uses broadband reversing alarms instead of beeping alarms. Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for tonal noise emissions.

The NPfI specifies that a 5 dB positive adjustment to measured/predicted A-weighted levels applies if the level of one-third octave band centre frequency (measured using unweighted or Z-weighted weighting) exceeds the level of the adjacent band on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10,000 Hz; or
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160-400 Hz; or
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.

Quarry noise experienced at the nearest residences is relatively continuous (e.g. quarry hum). Field observations during the noise compliance monitoring, and the measured one-third octave noise levels from 25 Hz to 12 kHz, confirm that site noise is not tonal in nature at any of the monitoring locations. Hence, adjustments to measured levels are not required for tonality.

2.4 Noise monitoring methodology requirements

Condition M8.1 of the EPL states that noise generated by Karuah East Quarry is to be measured in accordance with a number of requirements. An extract of the requirements outlined in Condition M8.1 is provided here.

> 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.

3 Assessment methodology

3.1 Attended noise monitoring

To quantify noise emissions from Karuah East Quarry, 15-minute attended noise monitoring surveys were completed at representative monitoring locations with reference to the site's approved NMP.

The attended noise monitoring locations, as per the sites approved NMP, and their coordinates are listed in Table 3.1 and are shown in Figure 3.1.

Table 3.1 Attended noise monitoring locations

Monitoring location	Location description	Coordinates (MGA56)	
		Easting	Northing
A	74 Mill Hill Close, Karuah	406623	6388704
B	64 Mill Hill Close, Karuah	406405	6388859
F	1714 The Branch Lane, Karuah	405639	6389782
G	2 Halloran Road, North Arm Cove	405629	6389766
H	21 Halloran Road, North Arm Cove	407795	6389868

3.2 Instrumentation

A Brüel & Kjær (B&K) 2250 Type 1 sound analyser (s/n 3029363) was used to conduct 15-minute attended measurements and record 1/3 octave centre frequency and statistical noise indices. The sound analyser was calibrated before and on completion of the survey using a Svantek SV-36 calibrator (s/n 79952). The instruments were within their NATA laboratory calibration period during the time of these readings and certificates are provided in Appendix C.

Where possible throughout each survey, the operator quantified the contribution of each significant noise source. This was done by matching audible sounds with the response of the sound analyser (where applicable) and/or via post-analysis of recorded noise data.

3.3 Weather and operating conditions

The meteorological data was obtained from the Karuah East Quarry on-site weather station. Communications with the site operator and observations made during the attended measurements confirmed that the site was operating as normal during the noise surveys.

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

Attended noise monitoring locations

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

Karuah East Quarry
Quarterly attended noise monitoring
Figure 4.1

EMM creating opportunities

\\emmsvr1\EMM2\2022\E220174 - Karuah East Quarry Noise Monitoring 2022\8 GIS\02_Maps\G001_Site Location_20220718_01.mxd 18/07/2022

4 Review of data and discussion

4.1 Summary

The results of EMM's attended noise measurements are summarised in Table 4.1. Karuah East Quarry's noise contribution was determined using in-field observations and post-analysis of recorded data as required. Attended noise monitoring was completed during the day, evening and morning shoulder periods on 16 and 28 June 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the EPL and PA. In accordance with the EPL and PA, noise limits were applicable during all 15 measurements.

Low frequency noise was conservatively assessed by comparison of the site measured one-third octave L_{Aeq} noise levels to the NPfI one-third octave low-frequency noise thresholds. Measured site noise levels exceeded the relevant LFN thresholds during one measurement, at location H during the day period. Therefore, in accordance with the NPfI, a positive 2 dB LFN modifying factor was applied to estimated site noise levels at location H during the day period. LFN modifying factors were not applied to estimated site noise levels at any of the other noise monitoring locations since site noise was not audible or the measured total noiselevels above the relevant LFN thresholds were determined to be attributable to extraneous noise sources (eg traffic on the Pacific Highway). Graphs of the total linear noise levels measured in one-third octave frequency bands are presented in Appendix D.

Karuah East Quarry noise contributions and cumulative quarry noise contributions were below (i.e. complied with) the relevant daytime, evening and morning shoulder noise limits at all monitoring locations.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q2 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
F	16/6	05:00 MS	41	46	52	55	57	60	60	Nil	IA	IA	NS / 35	52	0.6 m/s @ 326° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise occasionally audible.
A	16/6	05:19 MS	48	53	64	68	75	79	72	Nil	IA	IA	NS / 35	52	0.6 m/s @ 298° E stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise and a traffic passby occasionally audible.
B	16/6	05:36 MS	48	54	62	65	69	71	69	Nil	IA	IA	NS / 35	52	0.8 m/s @ 300° E stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise occasionally audible.
G	16/6	06:06 MS	39	41	54	50	65	79	60	Nil	IA	IA	NS / 35	52	0.6 m/s @ 289° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Bird noise and resident noise occasionally audible.
H	16/6	06:24 MS	36	39	43	44	50	57	54	Nil	IA	IA	NS / 35	52	0.6 m/s @ 306° E stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Aircraft noise occasionally audible.
G	16/6	07:00 Day	39	42	45	47	50	55	60	Nil	38	N/A	38 / 43	N/A	0.9 m/s @ 308° B stability class Y	Nil	**Karuah East Quarry processing plant and engine revs consistently audible.** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Aircraft noise, local traffic and livestock occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q2 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
H	16/6	07:21 Day	39	44	52	56	61	66	60	2 dB	44 (42+2)	N/A	NS / 44	N/A	0.8 m/s @ 303° B stability class Y	Nil	**Karuah East Quarry processing plant and engine revs consistently audible.** Distant traffic on the Pacific Highway consistently audible. Bird noise and dogs barking frequently audible. Aircraft noise occasionally audible.
F	16/6	07:47 Day	49	52	55	58	62	66	63	Nil	IA	N/A	35 / 40	N/A	0.9 m/s @ 313° B stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Aircraft noise and local traffic occasionally audible.
A	16/6	08:16 Day	47	51	54	56	58	69	67	Nil	IA	N/A	40 / 42	N/A	0.3 m/s @ 297° A stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Dogs barking occasionally audible.
B	16/6	08:38 Day	52	59	63	66	69	71	71	Nil	IA	N/A	37 / 40	N/A	0.3 m/s @ 307° A stability class Y	Nil	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway consistently audible. Bird noise and resident noise occasionally audible.
A	28/6	18:00 Eve.	41	47	52	55	59	66	64	Nil	IA	N/A	NS / 40	N/A	0.4 m/s @ 2° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway and insects consistently audible. Dogs barking frequently audible. Bird noise occasionally audible.
B	28/6	18:17 Eve.	51	56	64	67	70	73	71	Nil	IA	N/A	NS / 40	N/A	0.6 m/s @ 332° F stability class Y	Nil	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway consistently audible. Bird noise occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q2 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
F	28/6	18:36 Eve.	42	48	58	56	59	89	64	Nil	IA	N/A	NS / 35	N/A	0.6 m/s @ 342° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Distant dogs barking and traffic passbys occasionally audible.
G	28/6	19:00 Eve.	37	40	44	47	48	52	56	Nil	≤30	N/A	NS / 39	N/A	0.4 m/s @ 341° F stability class Y	Nil	**Karuah East Quarry hum and engine revs occasionally audible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible.
H	28/6	19:17 Eve.	38	41	43	45	48	56	57	Nil	≤30	N/A	NS / 46	N/A	0.6 m/s @ 340° F stability class Y	Nil	**Karuah East Quarry hum and engine revs occasionally audible.** Distant traffic on the Pacific Highway, insects, frogs and hum from nearby shed (unrelated to Karuah East Quarry) consistently audible.

Notes:
1. Modifying factor correction for LFN in accordance with Fact sheet C of the NPfI.
2. Meteorological data were taken as an average over 15 minutes from the Karuah East Quarry on-site weather station (Refer to Section 5.1).
3. IA = inaudible.
4. N/A = not applicable.
5. NS = not specified.

5 Conclusion

EMM has completed a review of operational noise from Karuah East Quarry within the surrounding community based on attended measurements conducted during the day, evening and morning shoulder periods on 16 and 28 June 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the PA and EPL. In accordance with the PA and EPL, noise limits were applicable during all 15 measurements.

The assessment of noise contributions from site included consideration of modifying factors for noise characteristics where relevant and in accordance with the NPfI.

Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

Glossary

Several technical terms are discussed in this report. These are explained in Table G.1.

Table G.1 Glossary of acoustic terms

Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The 'A-weighted' noise level which is exceeded 1% of the time.
$L_{A1,1minute}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq,15\ minute}$ descriptor refers to an L_{Aeq} noise level measured over a 15 minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L_{Ceq}	The equivalent continuous 'C-weighted' sound pressure level over a given period. The $L_{Ceq,15\ minute}$ descriptor refers to an L_{Ceq} noise level measured over a 15 minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature Inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of the decibel (dB), the unit of noise measurement. Table G.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure G.1.

Table G.2 Perceived change in noise level

Change in sound pressure level (dB)	Perceived change in noise
up to 2	not perceptible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

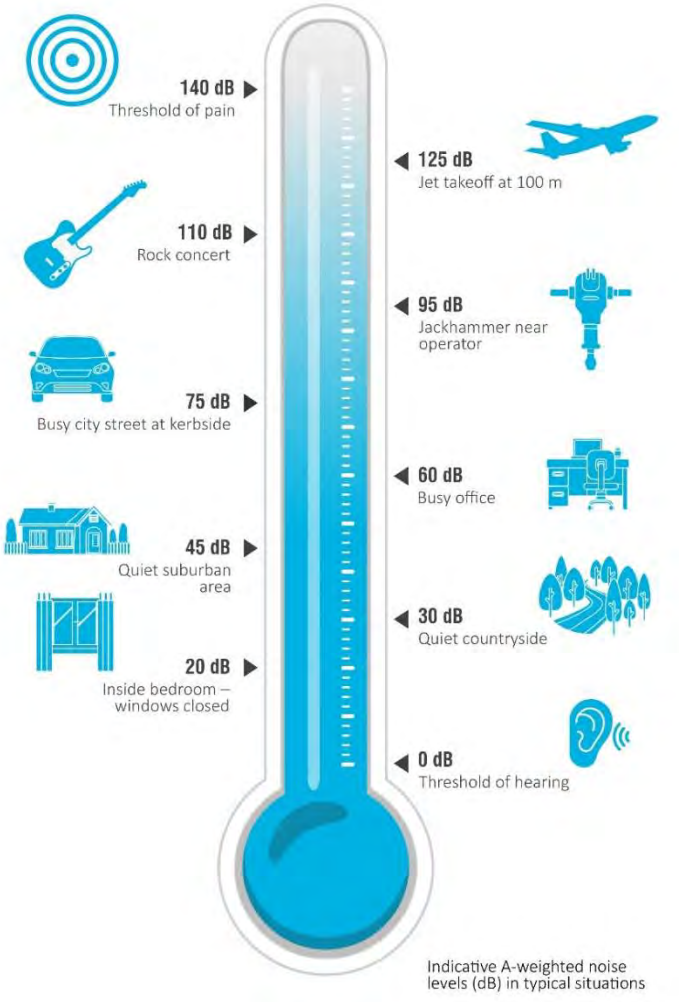

Figure G.1 Common noise levels

References

Department of Planning and Environment (DPE), Project Approval PA 09_0175, 2022.

Environment Protection Authority, Environment Protection Licence 20611, 2019.

Environment Protection Authority, Industrial Noise Policy Application notes, 2013.

Environment Protection Authority, Industrial Noise Policy, 2000.

Environment Protection Authority, Noise Policy for Industry, 2017.

EMM Consulting, Karuah East Quarry Project Noise Management Plan, 2022.

Appendix A
Project approval extract

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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.

Appendix B
EPL extract

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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 3 and Figure 10 of the document entitled Environmental Assessment Report - Proposed Karuah East Quarry (ADW Johnson Pty Limited 2013) which has been filed on EPA file LIC08/1088-03.

Location	Noise Limit dB(A)
	Day LAeq (15 minute)
Residence A on Lot 100 DP 785172	40
Residence B on Lot 3 DP 785172	37
Residence G on Lot 1 DP 1032636	38
Any other residence or sensitive receiver not subject to a private negotiated agreement	35
Any approved residence on Lot 11 DP 1024564	43

L4.2 For the purpose of the table above, Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.

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:

Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:

1. *are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or*
2. *interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.*

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: The frequency of noise monitoring will be reviewed, upon request, after two years of quarterly monitoring (approximately June 2021).

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,

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C30591

EQUIPMENT TESTED : Sound Level Calibrator

Manufacturer: Svantek
Type No: SV-36 **Serial No:** 79952
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details overleaf. All Test Passed.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	94.12 dB	999.99 Hz	1.58 %
Level2:	NA	N	114.05 dB	999.99 Hz	1.12 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:

Ambient Pressure 1007 hPa ±1 hPa
Temperature 21 °C ±1° C
Relative Humidity 43 % ±5%

Date of Receipt : 16/09/2021
Date of Calibration : 16/09/2021
Date of Issue : 16/09/2021

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

NATA
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The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark

ilac-MRA DANAK
CAL Reg.No. 307
Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2007931 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 3029363	Id: -
Microphone:	Brüel & Kjær Type 4189	No: 3260501	
PreAmplifier:	Brüel & Kjær Type ZC-0032	No: 30109	
Supplied Calibrator:	None		
Software version:	BZ7222 Version 4.7.6	Pattern Approval:	-
Instruction manual:	BE1712-22		

CUSTOMER

EMM Consulting
Ground Floor, Suite 1
20 Chandos Street
2065 St Leonards
New South Wales, Australia

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 8.2 - DB: 8.20) by using procedure B&K proc 2250, 4189 (IEC 61672:2013).

RESULTS

Calibration Mode: **Calibration as received.**

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: 2020-11-26

Date of issue: 2020-11-26

Lene Petersen
Calibration Technician

Erik Bruus
Approved Signatory

Appendix D

Low Frequency Noise analysis

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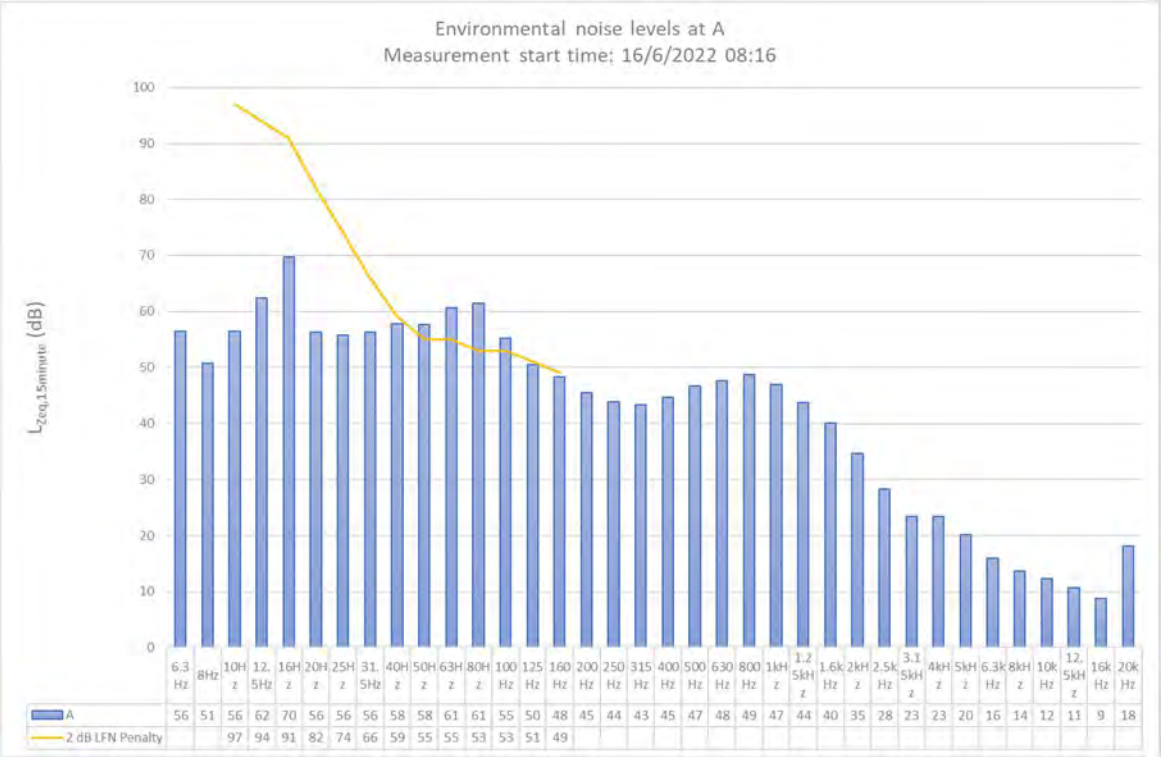

Figure D.1 Location A (Day)- Total measured one-third octave band frequencies

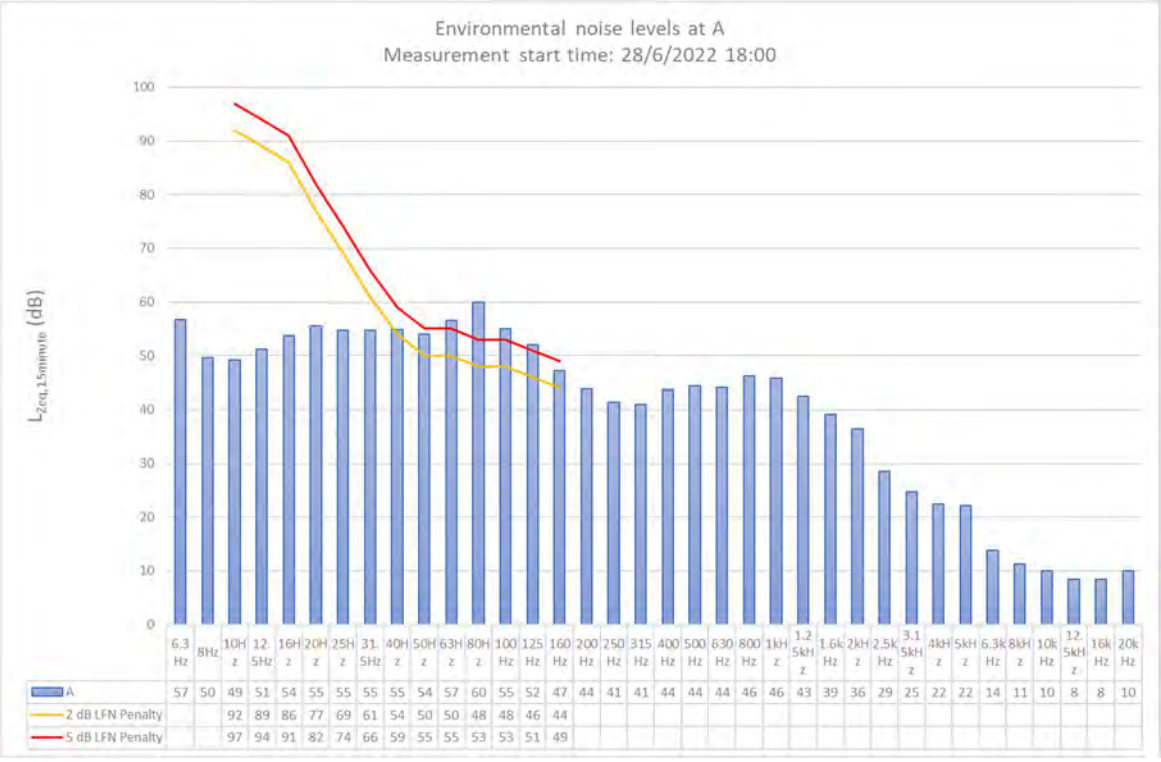

Figure D.2 Location A (Evening)- Total measured one-third octave band frequencies

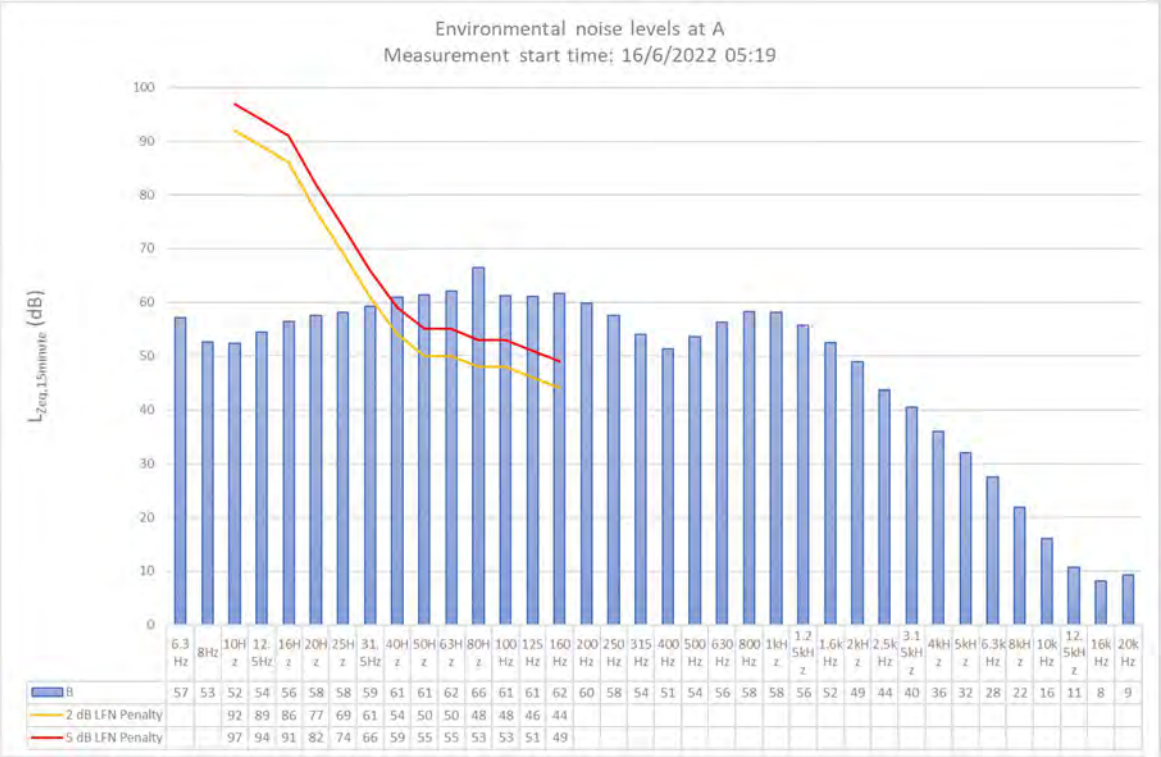

Figure D.3 Location A (Morning Shoulder)- Total measured one-third octave band frequencies

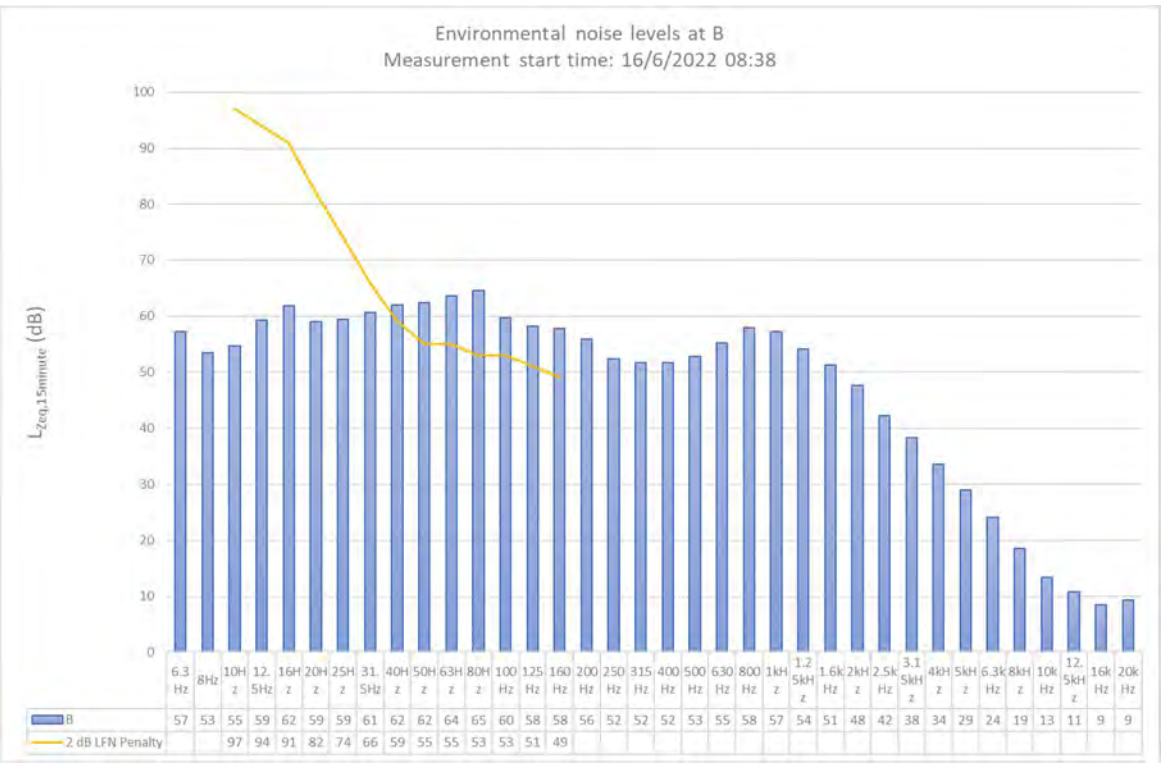

Figure D.4 Location B (Day) - Total measured one-third octave band frequencies

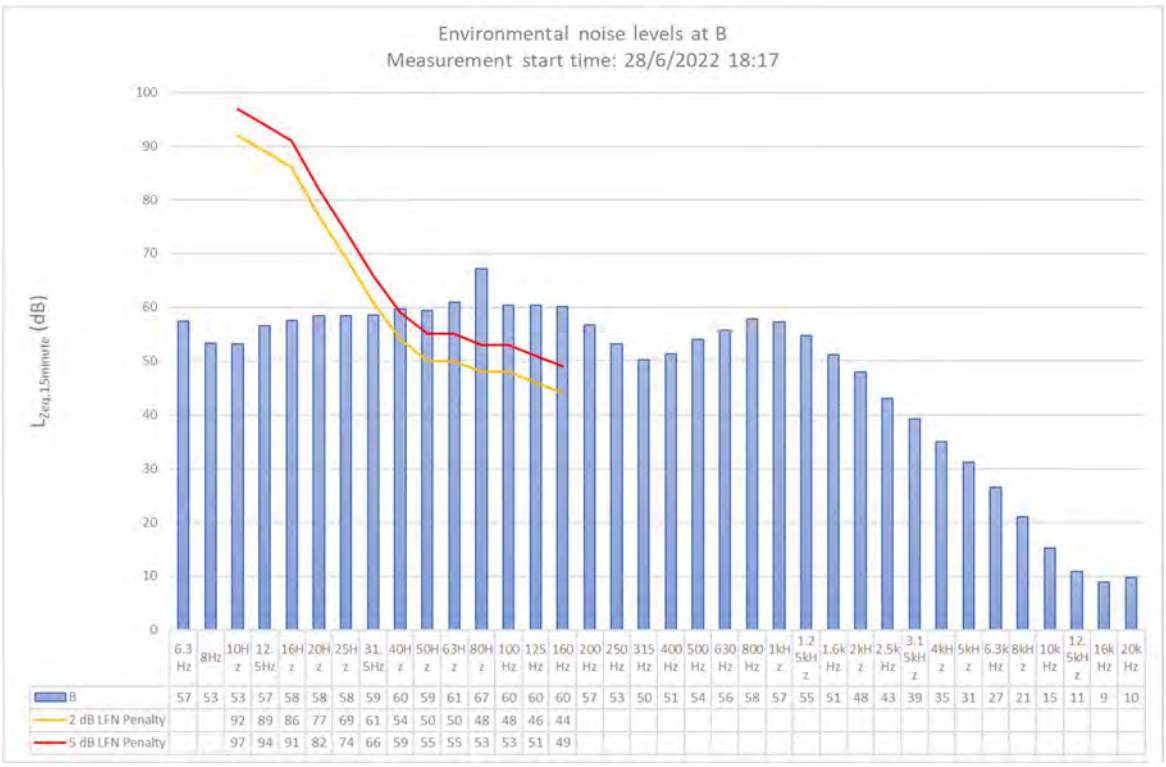

Figure D.5 Location B (Evening) - Total measured one-third octave band frequencies

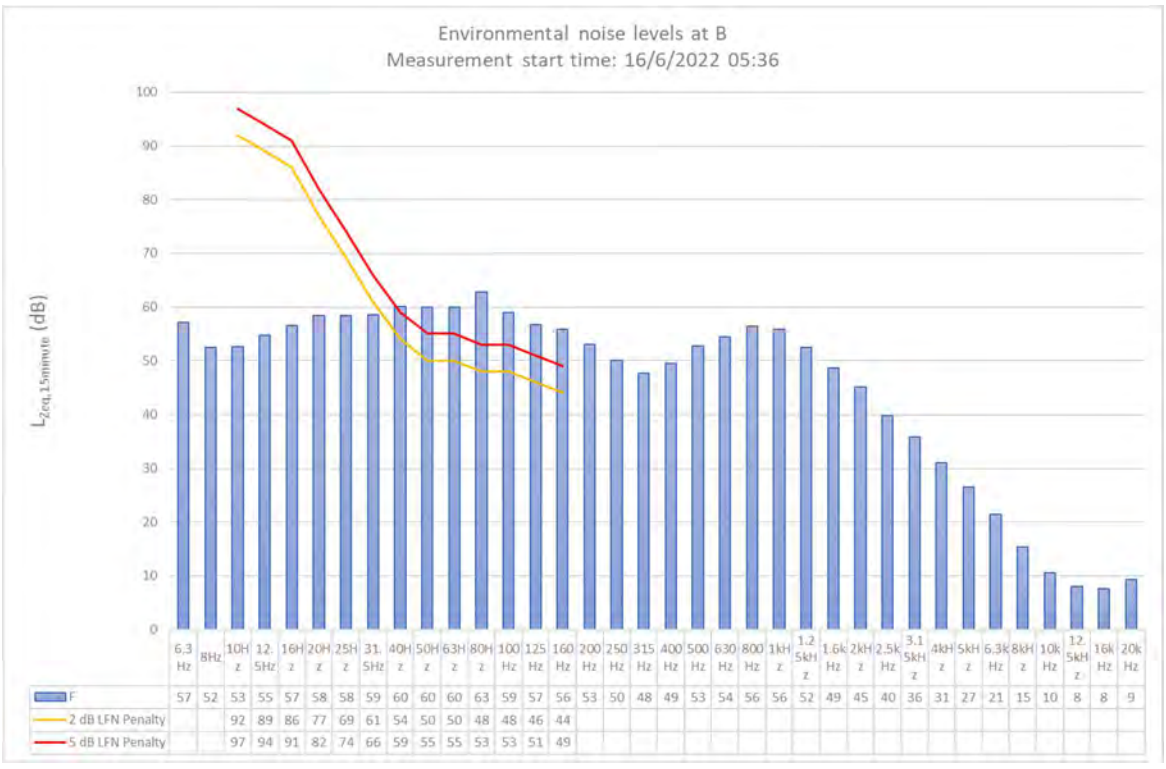

Figure D.6 Location B (Morning Shoulder) - Total measured one-third octave band frequencies

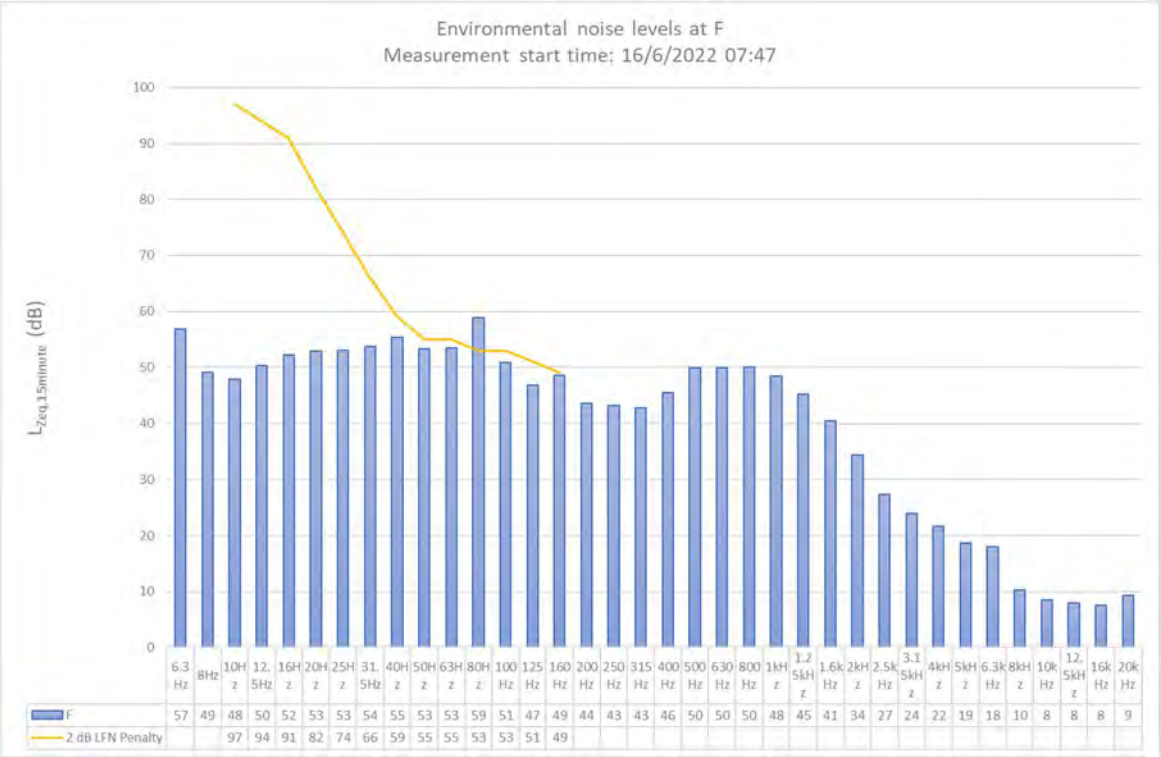

Figure D.7 Location F (Day)- Total measured one-third octave band frequencies

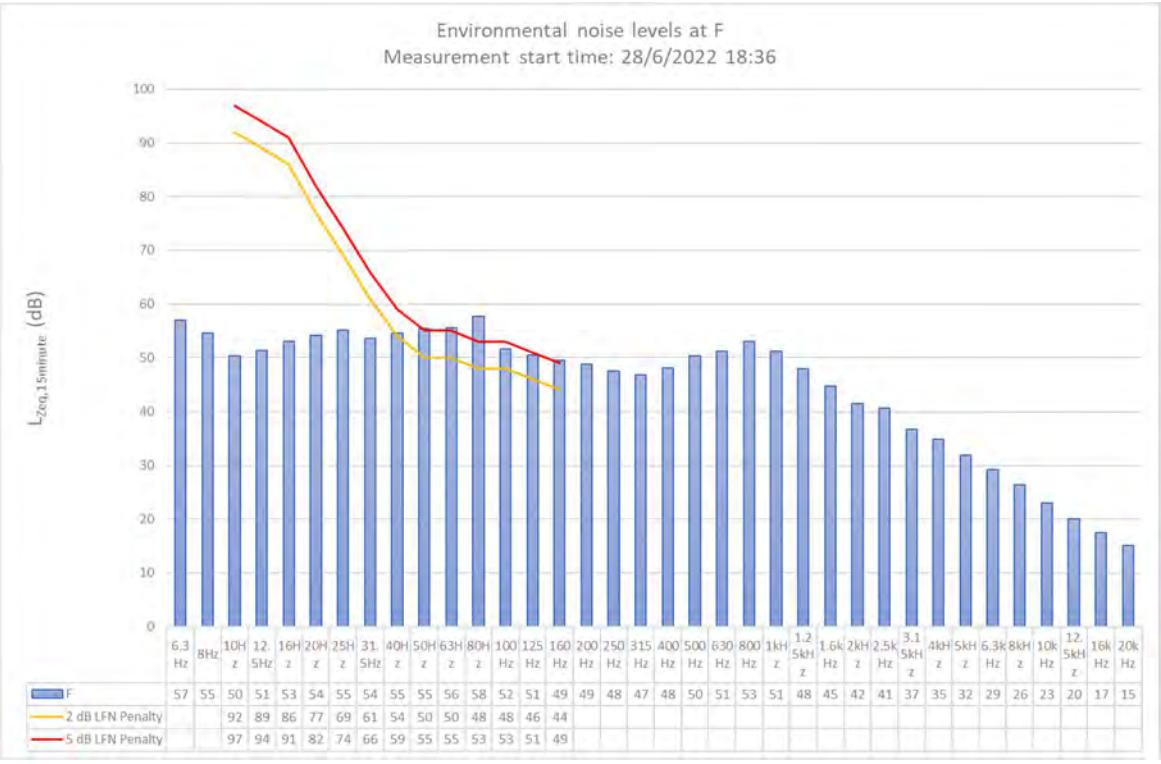

Figure D.8 Location F (Evening)- Total measured one-third octave band frequencies

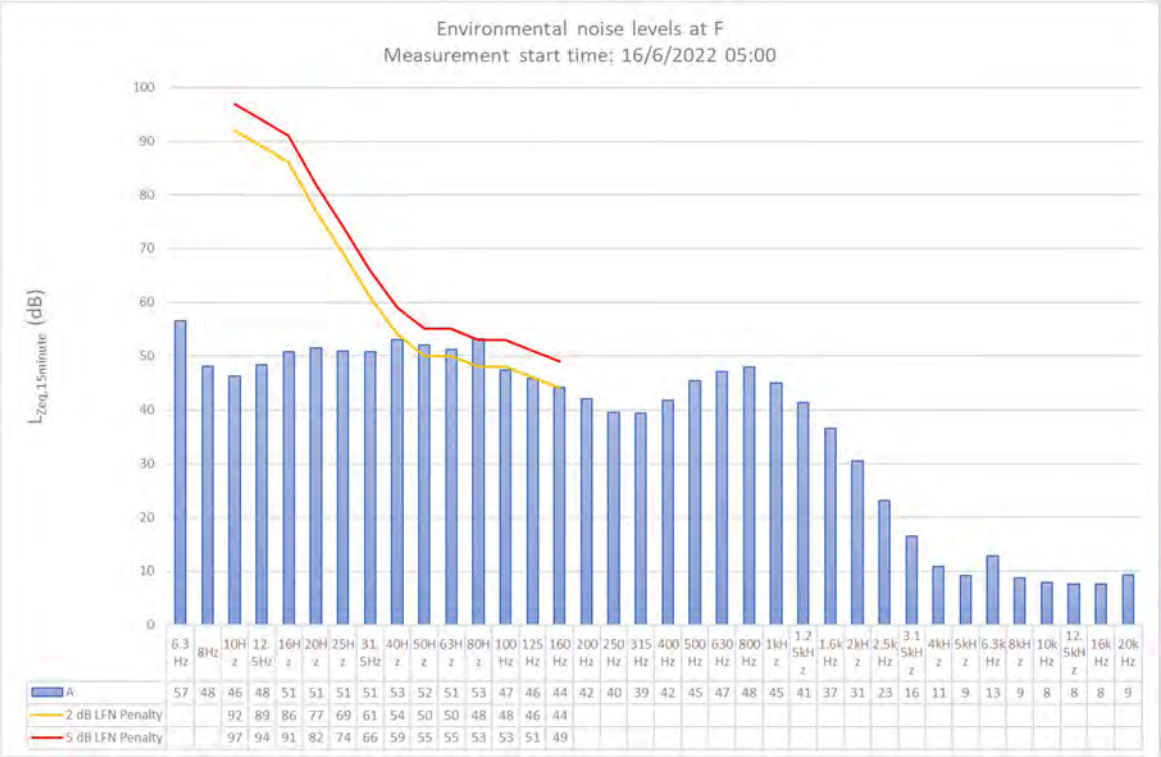

Figure D.9 Location F (Morning Shoulder)- Total measured one-third octave band frequencies

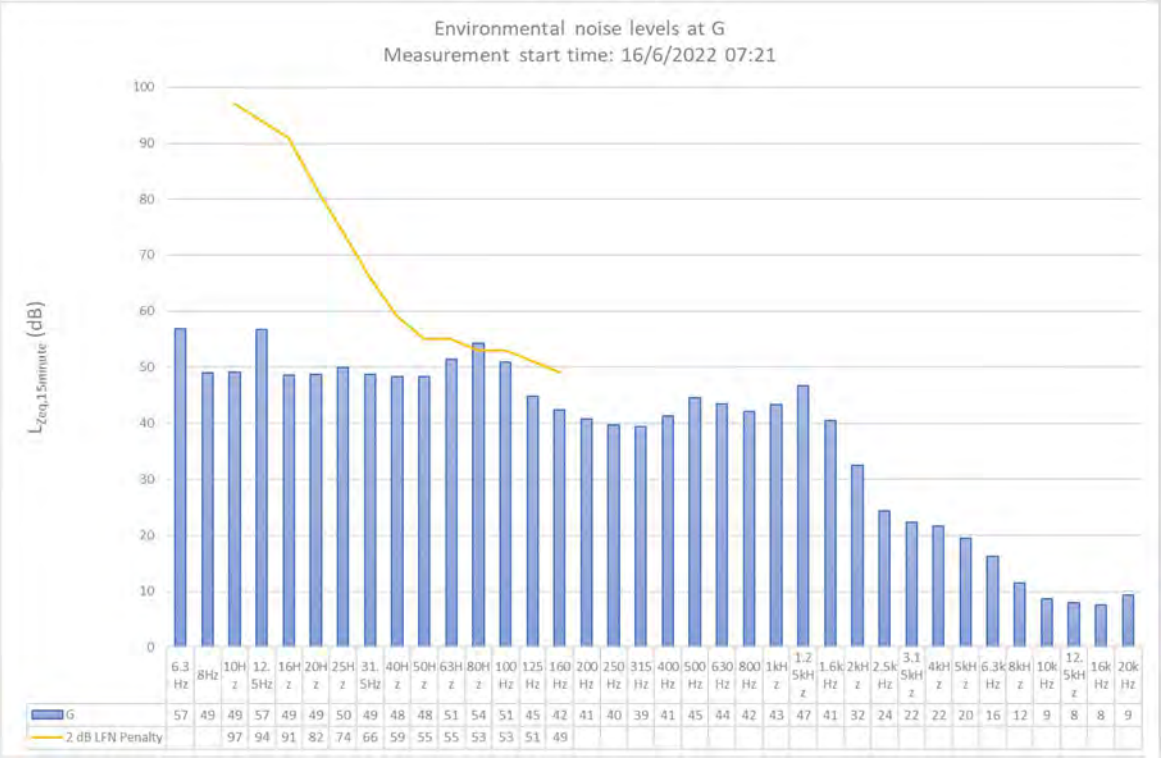

Figure D.10 Location G (Day) - Total measured one-third octave band frequencies

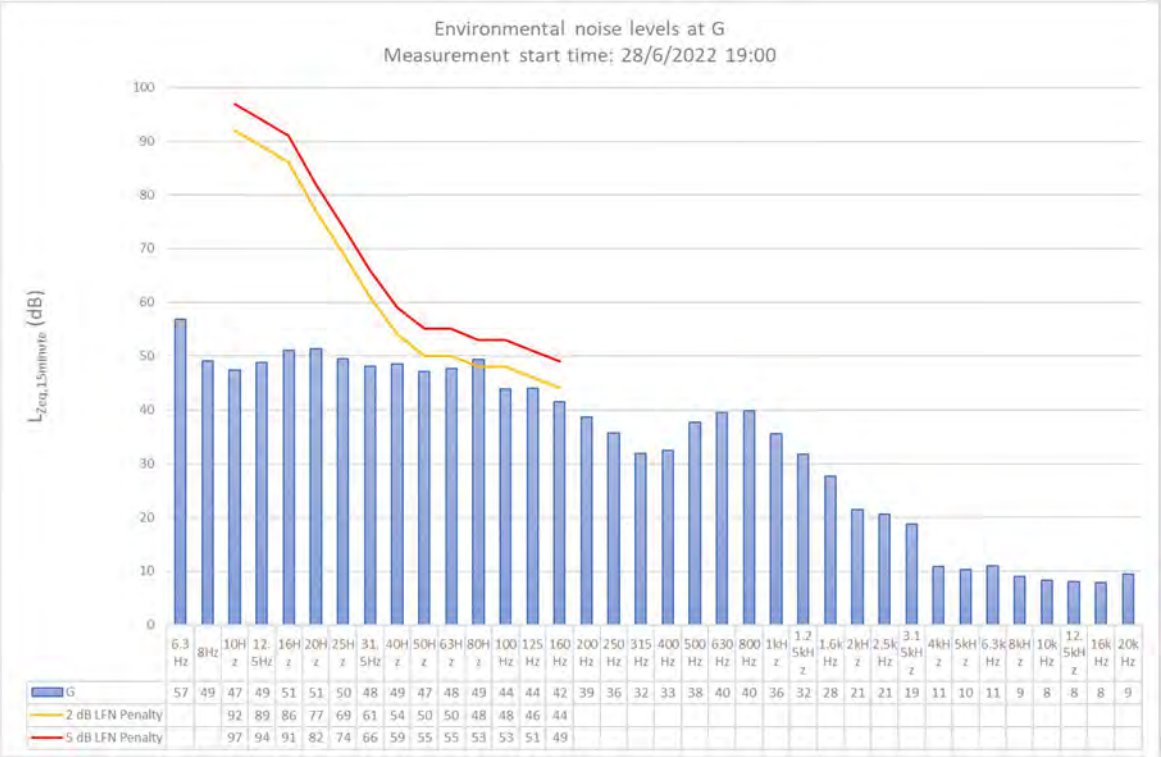

Figure D.11 Location G (Evening) - Total measured one-third octave band frequencies

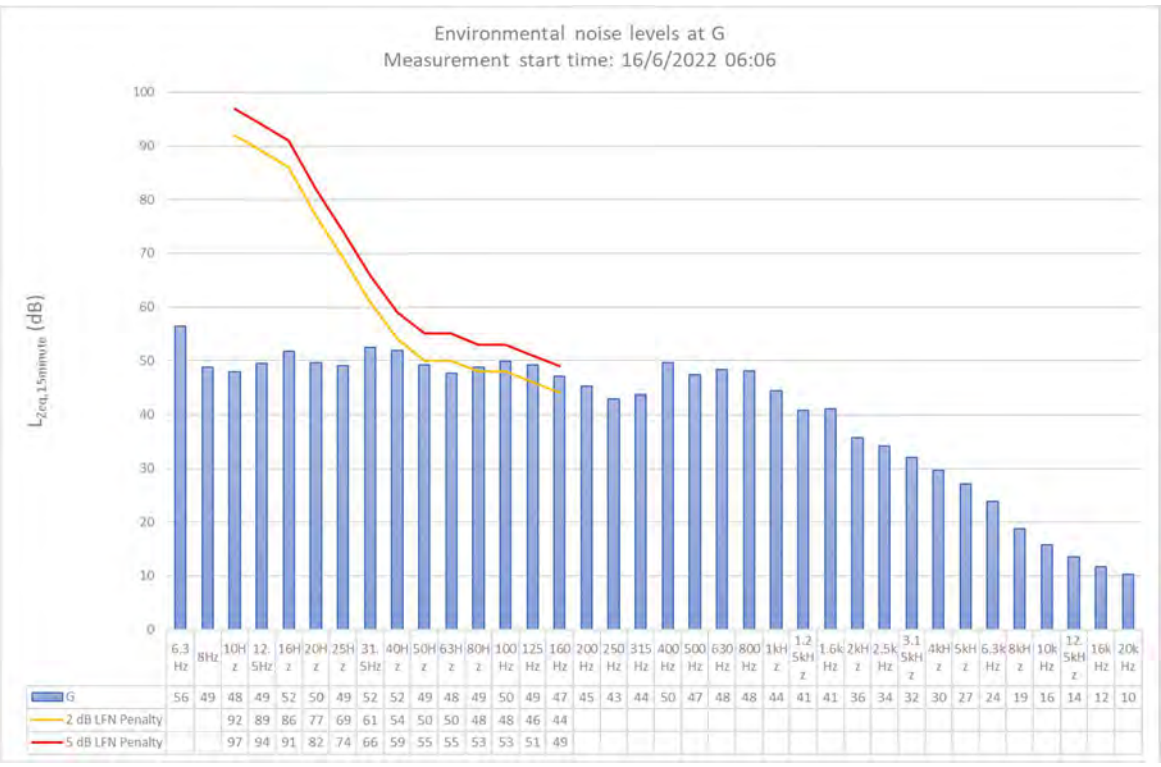

Figure D.12 Location G (Morning Shoulder) - Total measured one-third octave band frequencies

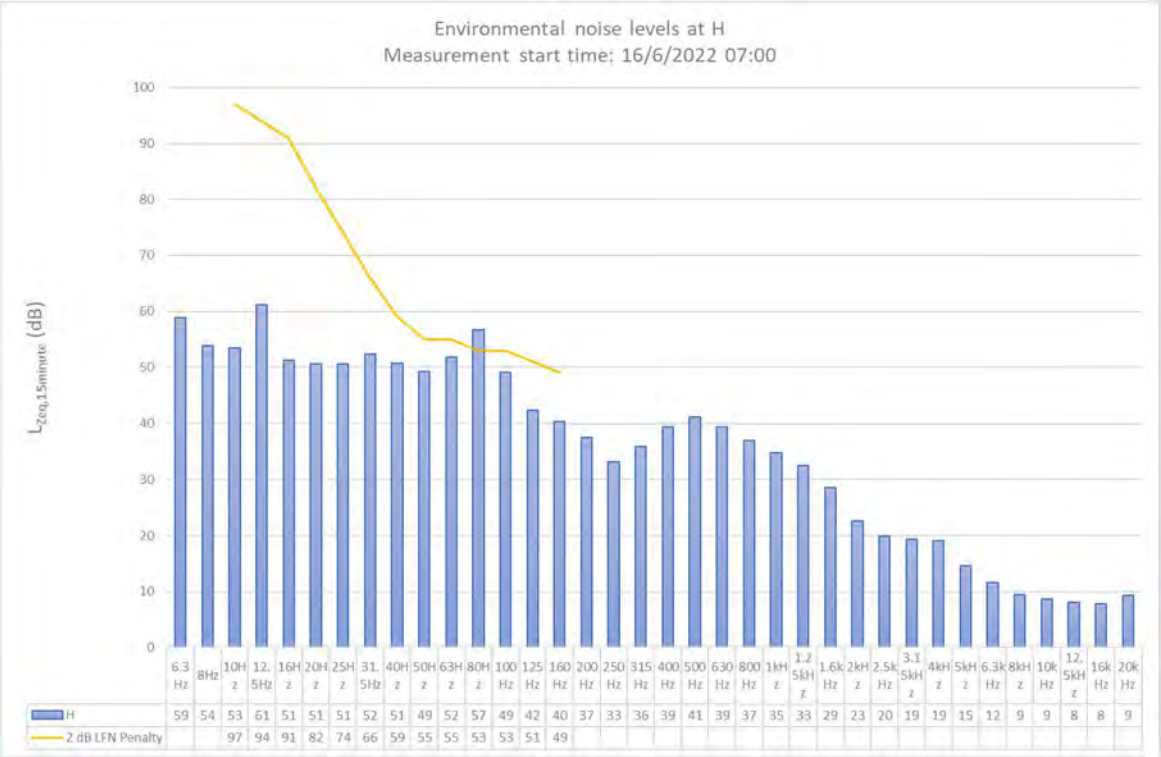

Figure D.13 Location H (Day) - Total measured one-third octave band frequencies

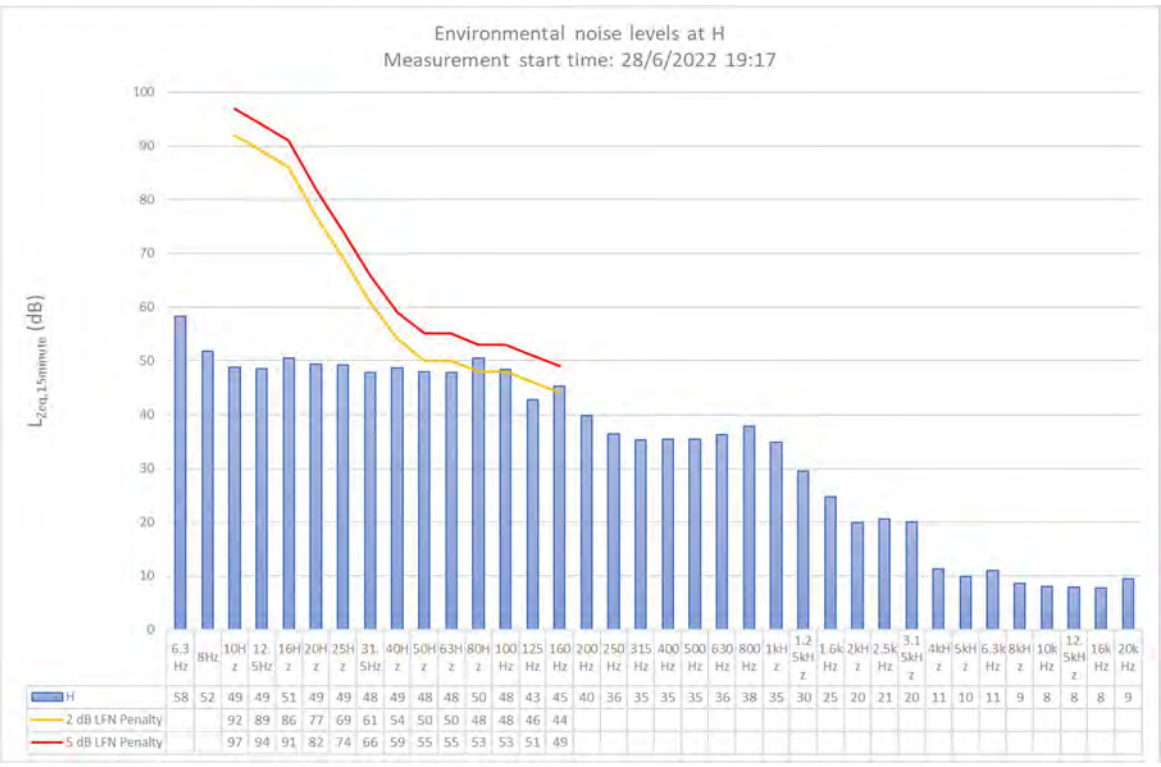

Figure D.14 Location H (Evening) - Total measured one-third octave band frequencies

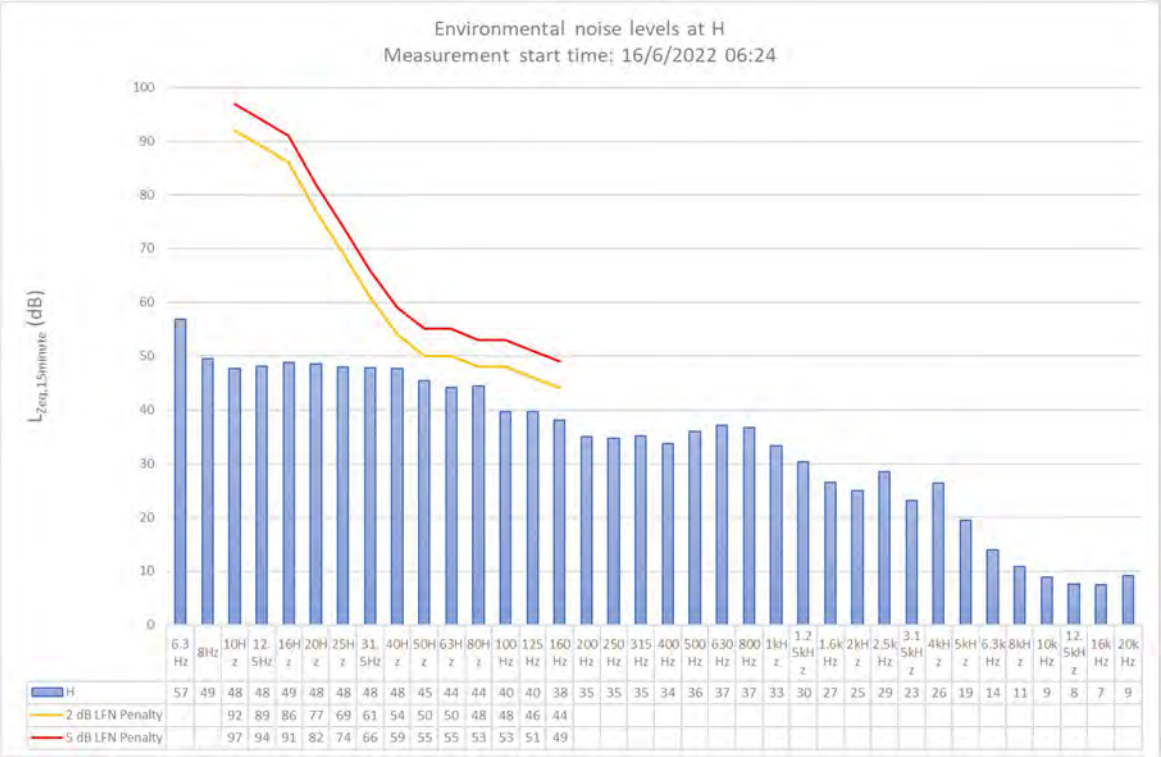

Figure D.15 Location H (Morning Shoulder) - Total measured one-third octave band frequencies

Australia

SYDNEY
Ground floor 20 Chandos Street
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
Level 2 Suite 2.04
15 London Circuit
Canberra City ACT 2601

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

MELBOURNE
Suite 8.03 Level 8 454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 9.02 Level 9 109 St Georges Terrace
Perth WA 6000

Canada

TORONTO
2345 Younge Street Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

Karuah East Quarry

Quarterly attended noise monitoring - Q3 2022

Prepared for Karuah East Quarry Pty Limited

September 2022

Karuah East Quarry

Quarterly attended noise monitoring - Q3 2022

Karuah East Quarry Pty Limited

E220174 RP#4

September 2022

Version	Date	Prepared by	Approved by	Comments
1	14 September 2022	Lucas Adamson	Najah Ishac	

Approved by

Najah Ishac
Director
14 September 2022

Level 3 175 Scott Street
Newcastle NSW 2300

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

EMM Consulting Pty Limited (EMM) was engaged to undertake noise compliance monitoring on behalf of Karuah East Quarry Pty Ltd.

This report presents the results and findings of attended noise monitoring conducted during the day, evening and morning shoulder periods on 18 and 22 August 2022.

Noise compliance monitoring is required to be undertaken in accordance with the *Karuah East Quarry Noise Management Plan* (NMP) which has been prepared to meet the relevant requirements of Department of Planning and Environment (DPE), Project Approval PA 09_0175, as modified in November 2021 (current as of 22 August 2022) and Environment Protection Authority (EPA) Environment Protection Licence (EPL) 20611 as varied on 18 July 2019 (current as of 22 August 2022).

The Noise Policy for Industry (NPfI) (EPA 2017) has also been referenced as part of this assessment.

Several technical terms are discussed in this report. These are explained in the Glossary.

2 Noise limits and monitoring requirements

2.1 Noise limits

Karuah East Quarry noise limits are provided in Table 2, Condition 3 of PA 09_0175 and Condition L4.1 of EPL 20611. Extracts of the relevant sections of PA 09_0175 and EPL 20611 pertaining to noise are provided in Appendix A and B, respectively. The approved NMP adopts five attended noise monitoring locations that are representative of residences outlined in the PA 09_0175 and EPL 20611. The noise monitoring locations and relevant criteria from the PA 09_0175, EPL 20611 and NMP are summarised in Table 2.1.

Table 2.1 Noise limits

Monitoring location	Location description	EPL Day $L_{Aeq,15\ minute}$, dB	PA Day $L_{Aeq,15\ minute}$, dB	PA Evening $L_{Aeq,15\ minute}$, dB	PA Morning Shoulder $L_{Aeq,15\ minute}$, dB	PA Morning Shoulder L_{Amax}, dB
A	Residence A on Lot 100 DP 785172	40	42	40	35	52
B	Residence B on Lot 3 DP 785172	37	40	40	35	52
G	Residence G on Lot 1 DP 1032636	38	43	39	35	52
H	Residence H on Lot 10 DP 1032636	Not specified	44	46	35	52
I	Residence I on Lot 11 DP 1032636	Not specified	40	37	35	52
Any approved residence on Lot 11 DP 1024564		43	Not Specified	Not Specified	Not Specified	Not Specified
Any other residence or sensitive receiver not subject to a private negotiated agreement		35	40	35	35	52

Condition L4.4 of EPL 20611 states that the noise measurement equipment must be located:

- 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 closest to the premises;
- approximately on the property, where any dwelling is situated 30 metres or less from the property boundary 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.

2.2 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 Noise Policy for Industry.

Similarly, the requirements of 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.

2.3 Modifying factors

2.3.1 Low frequency noise criteria

Condition L4.5 of EPL 20611 requires that the modifying factor adjustments outlined in Fact Sheet C of the NPfI (EPA 2017) are to be used when assessing the characteristics of a noise source (eg low frequency noise).

Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for low frequency noise (LFN) emissions. The NPfI specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values (ie threshold levels) in Table C2 of the NPfI, which has been reproduced in Table 2.2.

Table 2.2 One-third octave LFN threshold levels

	One-third octave $L_{Zeq,15\ minute}$ threshold levels												
Frequency (Hz)	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
dB (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more, and:

- where any of the one-third octave noise levels in Table 3.2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or
- where any of the one-third octave noise levels in Table 3.2 are exceeded by more than 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the daytime period and a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period.

Hence, where possible throughout each survey, the operator has estimated the difference between site 'C-weighted' and site 'A-weighted' noise emission levels by matching audible sounds with the response of the sound analyser (L_{Ceq}-L_{Aeq}). Where this was deemed to be 15 dB or greater, the measured one-third octave centre frequency levels have been compared to the values in Table 2.2 to identify the relevant modifying factor correction (if applicable). This method has been applied to this assessment as presented in Section 5.

It is of note that the NPfI states that LFN corrections only apply under the standard or noise-enhancing meteorological conditions. In this case, the standard or noise-enhancing meteorological conditions are the same as those under which the noise limits are applicable.

2.3.2 Tonal noise

Tonal noise is defined in the NPfI as noise containing a prominent frequency and characterised by a definite pitch. Examples of tonal noise sources include ventilation fans, reversing beepers or alarms. It is of note that Karuah East Quarry uses broadband reversing alarms instead of beeping alarms. Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for tonal noise emissions.

The NPfI specifies that a 5 dB positive adjustment to measured/predicted A-weighted levels applies if the level of one-third octave band centre frequency (measured using unweighted or Z-weighted weighting) exceeds the level of the adjacent band on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10,000 Hz; or
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160-400 Hz; or
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.

Quarry noise experienced at the nearest residences is relatively continuous (e.g. quarry hum). Field observations during the noise compliance monitoring, and the measured one-third octave noise levels from 25 Hz to 12 kHz, confirm that site noise is not tonal in nature at any of the monitoring locations. Hence, adjustments to measured levels are not required for tonality.

2.4 Noise monitoring methodology requirements

Condition M8.1 of the EPL states that noise generated by Karuah East Quarry is to be measured in accordance with a number of requirements. An extract of the requirements outlined in Condition M8.1 is provided here.

> 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.

3 Assessment methodology

3.1 Attended noise monitoring

To quantify noise emissions from Karuah East Quarry, 15-minute attended noise monitoring surveys were completed at representative monitoring locations with reference to the site's approved NMP.

The attended noise monitoring locations, as per the sites approved NMP, and their coordinates are listed in Table 3.1 and are shown in Figure 3.1.

Table 3.1 Attended noise monitoring locations

Monitoring location	Location description	Coordinates (MGA56)	
		Easting	Northing
A	74 Mill Hill Close, Karuah	406623	6388704
B	64 Mill Hill Close, Karuah	406405	6388859
F	1714 The Branch Lane, Karuah	405639	6389782
G	2 Halloran Road, North Arm Cove	405629	6389766
H	21 Halloran Road, North Arm Cove	407795	6389868

3.2 Instrumentation

A Brüel & Kjær (B&K) 2250 Type 1 sound analyser (s/n 3029363) was used to conduct 15-minute attended measurements and record 1/3 octave centre frequency and statistical noise indices. The sound analyser was calibrated before and on completion of the survey using a Svantek SV-36 calibrator (s/n 79952). The instruments were within their NATA laboratory calibration period during the time of these readings and certificates are provided in Appendix C.

Where possible throughout each survey, the operator quantified the contribution of each significant noise source. This was done by matching audible sounds with the response of the sound analyser (where applicable) and/or via post-analysis of recorded noise data.

3.3 Weather and operating conditions

The meteorological data was obtained from the Karuah East Quarry on-site weather station. Communications with the site operator and observations made during the attended measurements confirmed that the site was operating as normal during the noise surveys.

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

Attended noise monitoring locations

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

Karuah East Quarry
Quarterly attended noise monitoring
Figure 4.1

EMM creating opportunities

\\emmsvr1\EMM2\2022\E220174 - Karuah East Quarry Noise Monitoring 2022\8 GIS\02_Maps\G001_Site Location_20220718_01.mxd 18/07/2022

4 Review of data and discussion

4.1 Summary

The results of EMM's attended noise measurements are summarised in Table 4.1. Karuah East Quarry's noise contribution was determined using in-field observations and post-analysis of recorded data as required. Attended noise monitoring was completed during the day, evening and morning shoulder periods on 18 and 22 August 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the EPL and PA. In accordance with the EPL and PA, noise limits were applicable during all 15 measurements.

Low frequency noise was conservatively assessed by comparison of the total measured one-third octave L_{Aeq} noise levels to the NPfI one-third octave low-frequency noise thresholds. LFN modifying factors were not applied to estimated site noise levels at any of the noise monitoring locations since site noise was not audible or the measured total noise levels above the relevant LFN thresholds were determined to be attributable to extraneous noise sources (eg traffic on the Pacific Highway). Graphs of the total linear noise levels measured in one-third octave frequency bands are presented in Appendix D.

Karuah East Quarry noise contributions and cumulative quarry noise contributions were below (i.e. complied with) the relevant daytime, evening and morning shoulder noise limits at all monitoring locations.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q3 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB				EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}				
A	22/8	05:02 MS	41	53	64	67	75	77	72	Nil	IA	IA	NS / 35	52	0.6 m/s @ 336° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible.
B	22/8	05:18 MS	47	54	62	65	71	76	69	Nil	IA	IA	NS / 35	52	0.4 m/s @ 345° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible.
F	22/8	05:36 MS	44	47	53	53	57	81	61	Nil	IA	IA	NS / 35	52	0.4 m/s @ 2° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. A traffic passby briefly audible.
G	22/8	06:00 MS	34	38	42	45	51	62	56	Nil	<30	47	NS / 35	52	0.7 m/s @ 330° F stability class Y	Nil	**Karuah East Quarry engine revs and truck loading occasionally audible.** Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Distant dogs barking occasionally audible.
H	22/8	06:16 MS	35	37	43	44	53	68	56	Nil	<30	48	NS / 35	52	0.8 m/s @ 306° F stability class Y	Nil	**Karuah East Quarry engine revs and truck loading occasionally audible.** Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Distant dogs barking and aircraft noise occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q3 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
A	18/8	16:01 Day	47	51	55	57	61	73	71	Nil	IA	N/A	40 / 42	N/A	0.8 m/s @ 2° A stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Dogs barking occasionally audible. Traffic passby on one occasion.
B	18/8	16:20 Day	53	59	65	68	71	73	74	Nil	IA	N/A	37 / 40	N/A	1.1 m/s @ 359° A stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise and resident noise frequently audible.
F	18/8	16:39 Day	42	45	56	53	66	81	65	Nil	IA	N/A	35 / 40	N/A	0.3 m/s @ 56° A stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs, and traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Distant dogs barking and traffic passbys occasionally audible.
G	18/8	17:02 Day	34	37	50	51	62	67	59	Nil	30	N/A	38 / 43	N/A	0.2 m/s @ 29° B stability class Y	Nil	**Karuah East Quarry engine revs consistently audible.** Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise and dogs barking frequently audible.
H	18/8	17:22 Day	30	33	38	39	46	64	53	Nil	30	N/A	NS / 44	N/A	0.2 m/s @ 17° A stability class Y	Nil	**Karuah East Quarry engine revs consistently audible.** Traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Aircraft noise, dogs barking, livestock and nearby animals occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q3 2022

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	L_{Ceq}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
A	18/8	19:19 Eve.	44	49	55	57	65	73	67	Nil	IA	N/A	NS / 40	N/A	0.1 m/s @ 132° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Dogs barking occasionally audible.
B	18/8	19:01 Eve.	49	55	63	67	71	73	71	Nil	IA	N/A	NS / 40	N/A	0.3 m/s @ 161° F stability class Y	Nil	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Bird noise occasionally audible.
F	18/8	18:42 Eve.	44	48	55	57	59	80	65	Nil	IA	N/A	NS / 35	N/A	0.3 m/s @ 148° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise occasionally audible. Traffic passby on one occasion.
G	18/8	18:18 Eve.	35	38	48	44	62	72	57	Nil	IA	N/A	NS / 39	N/A	0.1 m/s @ 108° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs and traffic on the Pacific Highway consistently audible. Dogs barking and aircraft noise occasionally audible. Traffic passby on one occasion.
H	18/8	18:00 Eve.	32	35	64	41	78	89	65	Nil	IA	N/A	NS / 46	N/A	0.2 m/s @ 30° F stability class Y	Nil	**Karuah East Quarry inaudible.** Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Dogs barking frequently audible. Resident noise occasionally audible.

Notes:
1. Modifying factor correction for LFN in accordance with Fact sheet C of the NPfI.
2. Meteorological data were taken as an average over 15 minutes from the Karuah East Quarry on-site weather station (Refer to Section 5.1).
3. IA = inaudible.
4. N/A = not applicable.
5. NS = not specified.

5 Conclusion

EMM has completed a review of operational noise from Karuah East Quarry within the surrounding community based on attended measurements conducted during the day, evening and morning shoulder periods on 18 and 22 August 2022.

The meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the PA and EPL. In accordance with the PA and EPL, noise limits were applicable during all 15 measurements.

The assessment of noise contributions from site included consideration of modifying factors for noise characteristics where relevant and in accordance with the NPfI.

Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

Glossary

Several technical terms are discussed in this report. These are explained in Table G.1.

Table G.1 Glossary of acoustic terms

Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The 'A-weighted' noise level which is exceeded 1% of the time.
$L_{A1,1minute}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq,15\ minute}$ descriptor refers to an L_{Aeq} noise level measured over a 15 minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L_{Ceq}	The equivalent continuous 'C-weighted' sound pressure level over a given period. The $L_{Ceq,15\ minute}$ descriptor refers to an L_{Ceq} noise level measured over a 15 minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature Inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of the decibel (dB), the unit of noise measurement. Table G.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure G.1.

Table G.2 Perceived change in noise level

Change in sound pressure level (dB)	Perceived change in noise
up to 2	not perceptible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

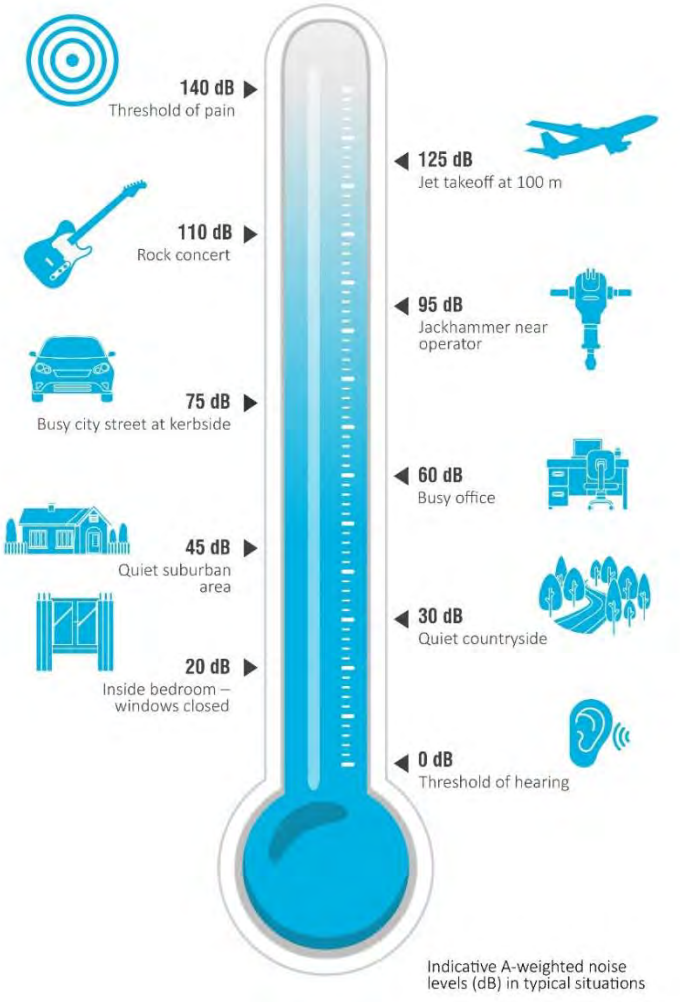

Figure G.1 Common noise levels

References

Department of Planning and Environment (DPE), Project Approval PA 09_0175, 2022.

Environment Protection Authority, Environment Protection Licence 20611, 2019.

Environment Protection Authority, Industrial Noise Policy Application notes, 2013.

Environment Protection Authority, Industrial Noise Policy, 2000.

Environment Protection Authority, Noise Policy for Industry, 2017.

EMM Consulting, Karuah East Quarry Project Noise Management Plan, 2022.

Appendix A
Project approval extract

EMM
creating opportunities

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.

Appendix B
EPL extract

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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 3 and Figure 10 of the document entitled Environmental Assessment Report - Proposed Karuah East Quarry (ADW Johnson Pty Limited 2013) which has been filed on EPA file LIC08/1088-03.

Location	Noise Limit dB(A)
	Day LAeq (15 minute)
Residence A on Lot 100 DP 785172	40
Residence B on Lot 3 DP 785172	37
Residence G on Lot 1 DP 1032636	38
Any other residence or sensitive receiver not subject to a private negotiated agreement	35
Any approved residence on Lot 11 DP 1024564	43

L4.2 For the purpose of the table above, Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.

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:

Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:

1. *are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or*
2. *interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.*

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: The frequency of noise monitoring will be reviewed, upon request, after two years of quarterly monitoring (approximately June 2021).

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,

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C30591

EQUIPMENT TESTED : Sound Level Calibrator

Manufacturer: Svantek
Type No: SV-36 **Serial No:** 79952
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details overleaf. All Test Passed.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	94.12 dB	999.99 Hz	1.58 %
Level2:	NA	N	114.05 dB	999.99 Hz	1.12 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:

Ambient Pressure 1007 hPa ±1 hPa
Temperature 21 °C ±1° C
Relative Humidity 43 % ±5%

Date of Receipt : 16/09/2021
Date of Calibration : 16/09/2021
Date of Issue : 16/09/2021

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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

Acu-Vib Electronics
CALIBRATIONS SALES RENTALS REPAIRS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

HBK HOTTINGER BRÜEL & KJÆR
The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark

ilac-MRA DANAK
CAL Reg.No. 307
Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2007931 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 3029363	Id: -
Microphone:	Brüel & Kjær Type 4189	No: 3260501	
PreAmplifier:	Brüel & Kjær Type ZC-0032	No: 30109	
Supplied Calibrator:	None		
Software version:	BZ7222 Version 4.7.6	Pattern Approval:	-
Instruction manual:	BE1712-22		

CUSTOMER

EMM Consulting
Ground Floor, Suite 1
20 Chandos Street
2065 St Leonards
New South Wales, Australia

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 8.2 - DB: 8.20) by using procedure B&K proc 2250, 4189 (IEC 61672:2013).

RESULTS

Calibration Mode: **Calibration as received.**

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: 2020-11-26

Date of issue: 2020-11-26

Lene Petersen
Calibration Technician

Erik Bruus
Approved Signatory

Appendix D

Low Frequency Noise analysis

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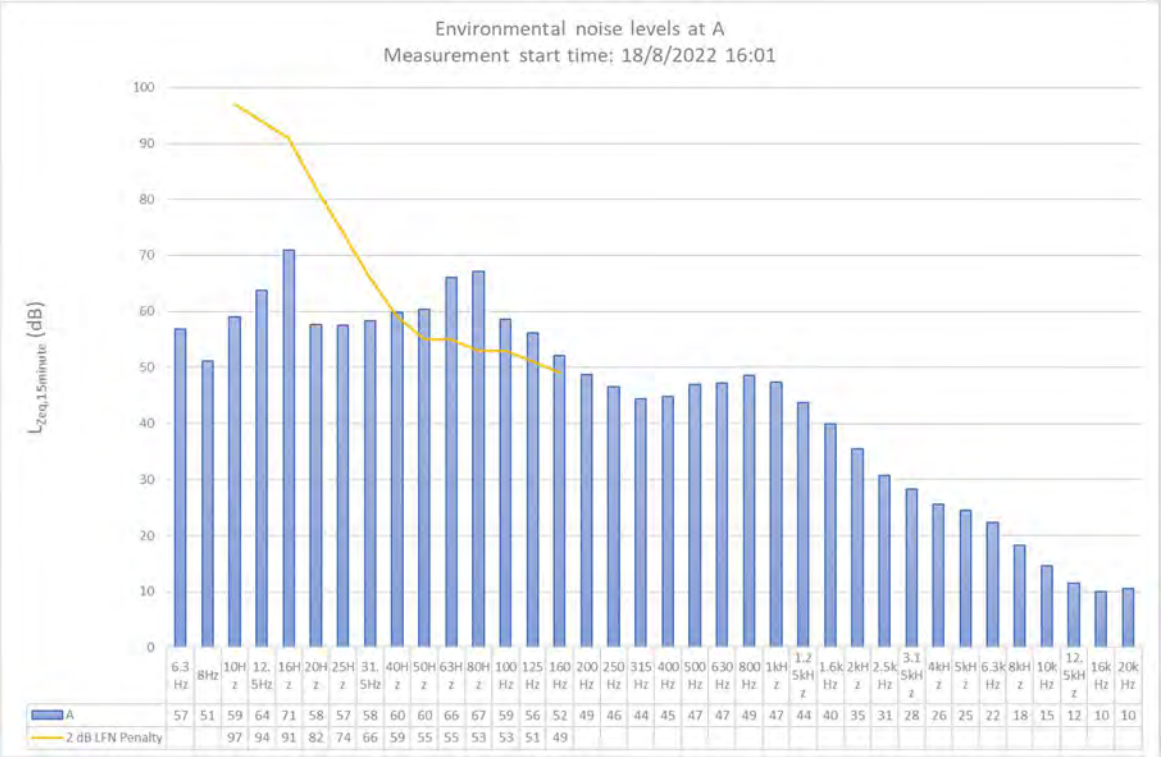

Figure D.1 Location A (Day)- Total measured one-third octave band frequencies

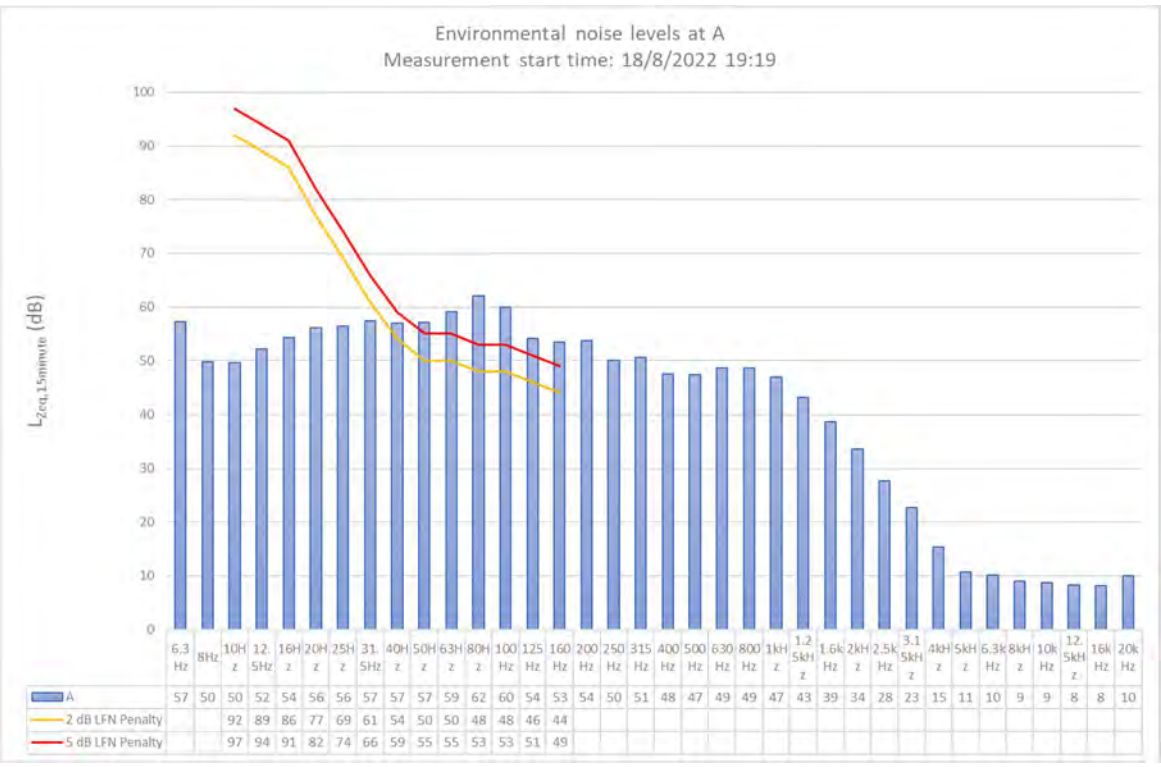

Figure D.2 Location A (Evening)- Total measured one-third octave band frequencies

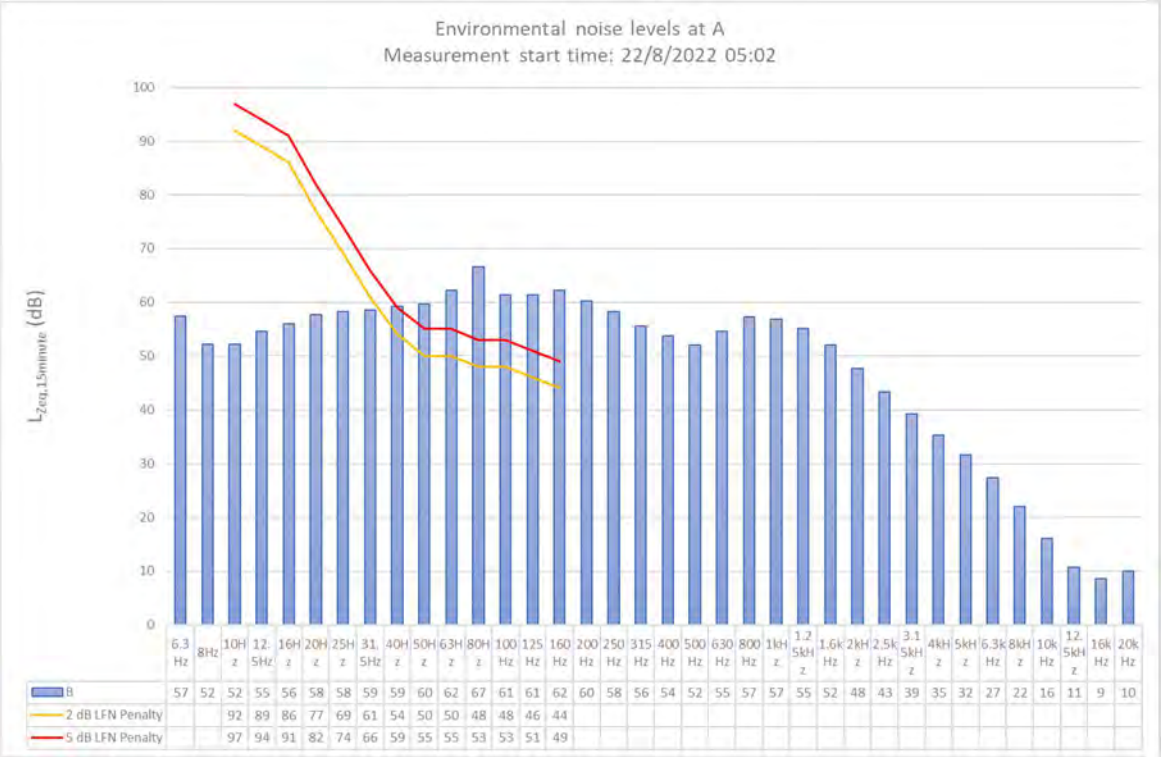

Figure D.3 Location A (Morning Shoulder)- Total measured one-third octave band frequencies

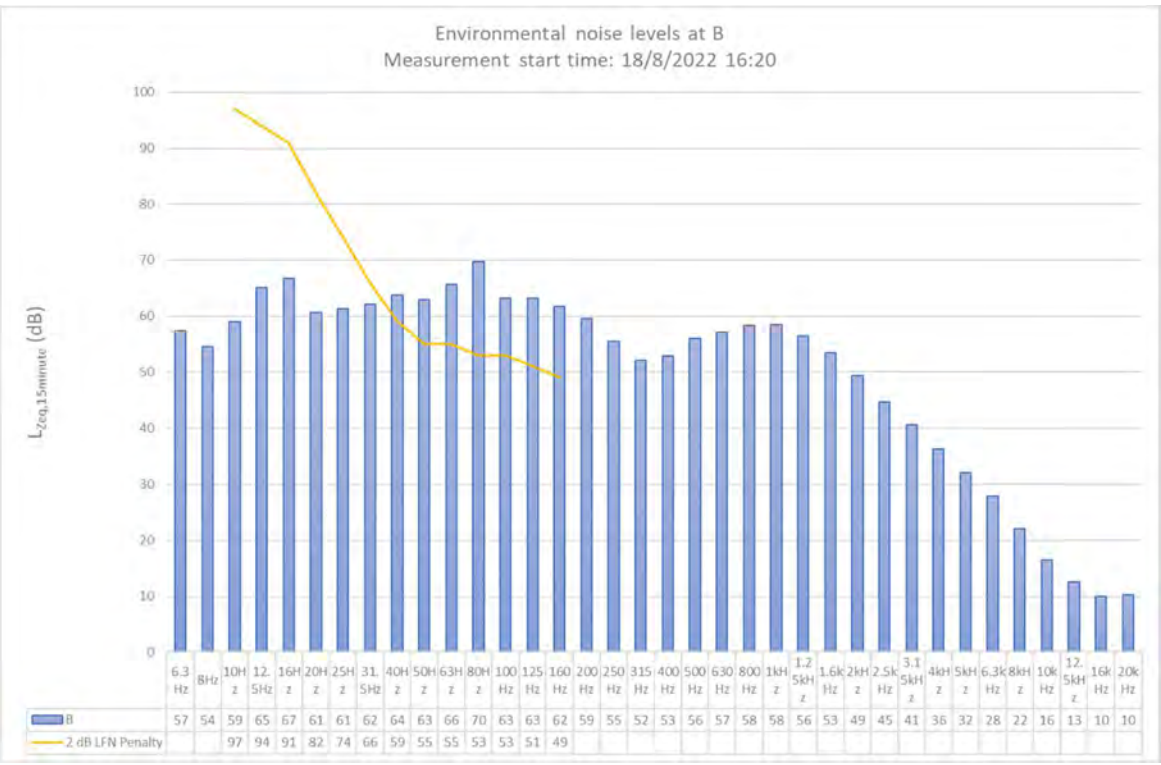

Figure D.4 Location B (Day) - Total measured one-third octave band frequencies

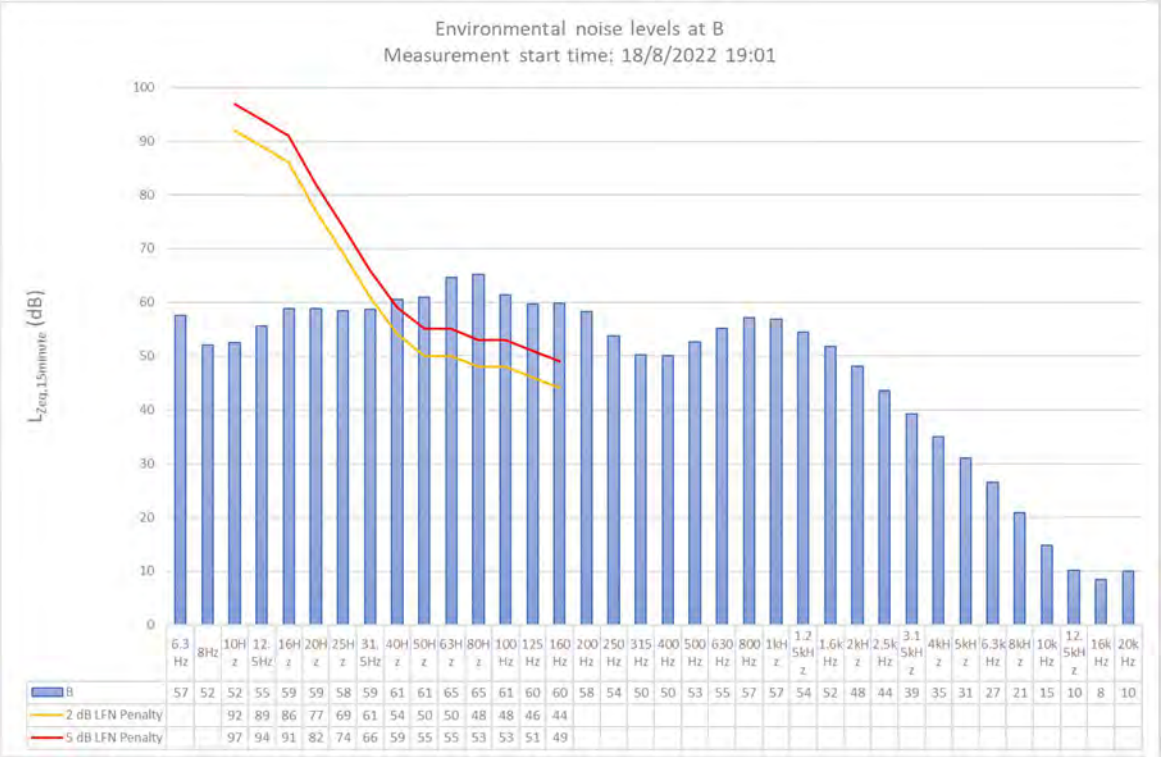

Figure D.5 **Location B (Evening) - Total measured one-third octave band frequencies**

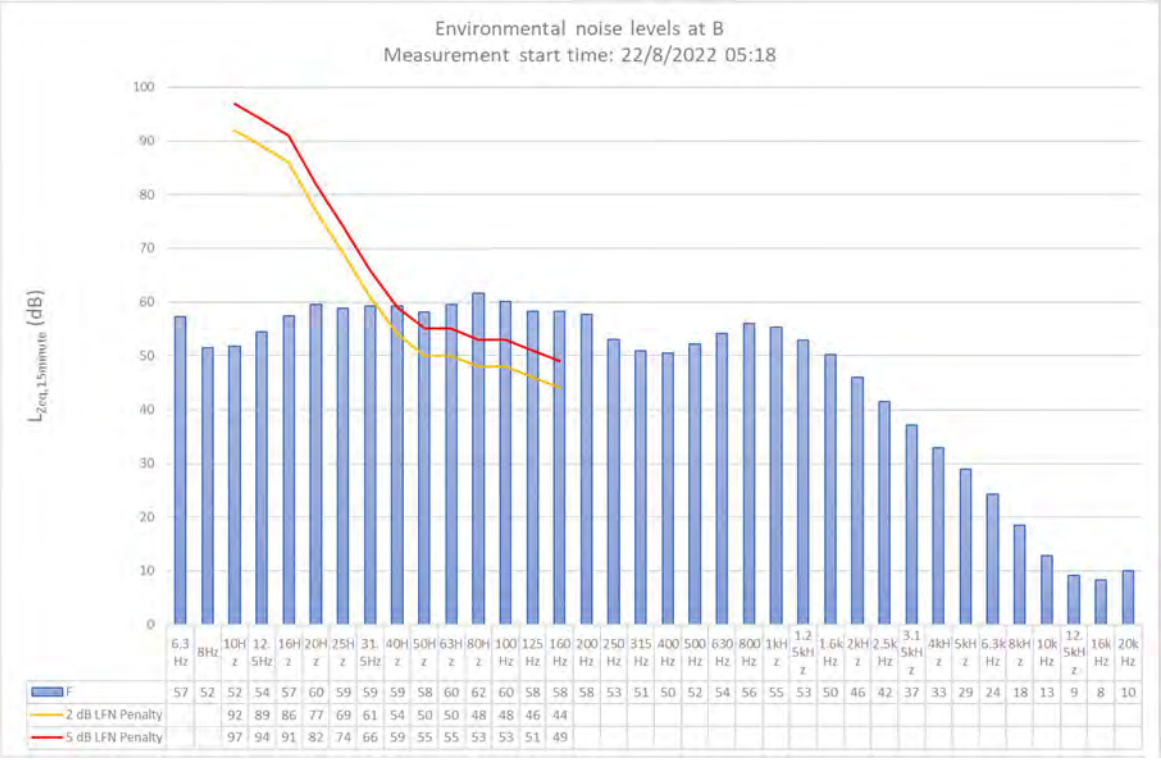

Figure D.6 **Location B (Morning Shoulder) - Total measured one-third octave band frequencies**

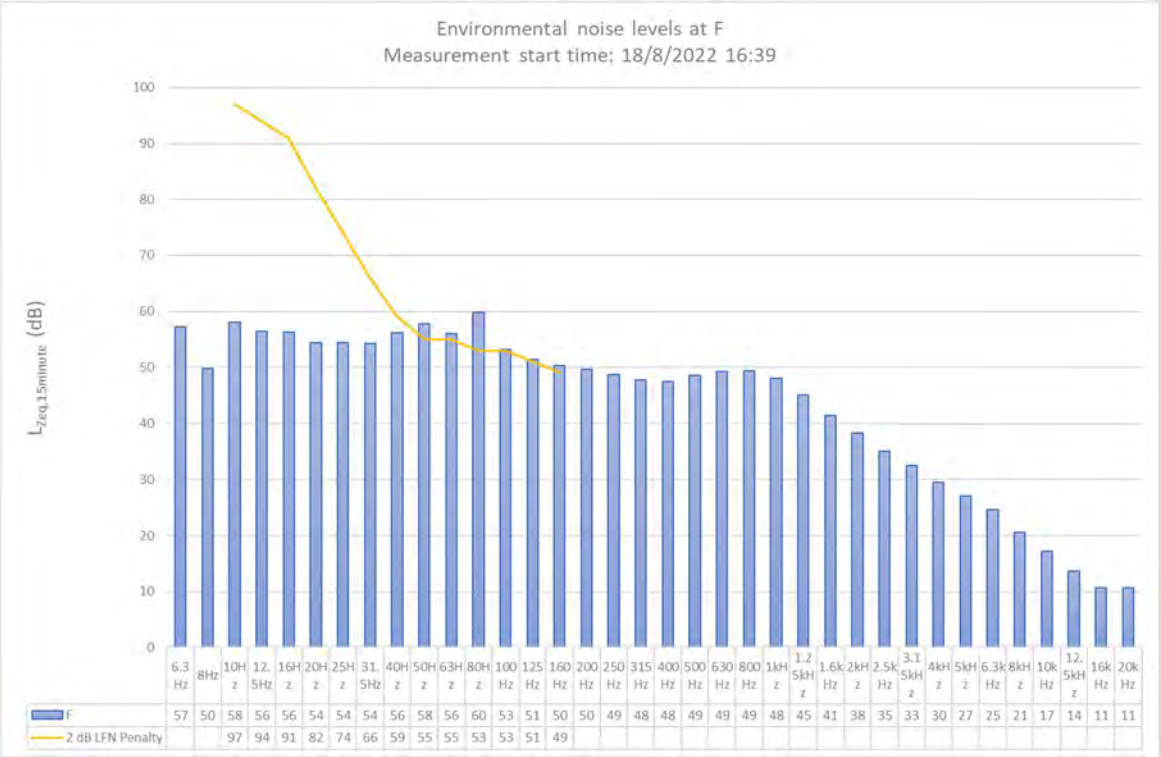

Figure D.7 Location F (Day)- Total measured one-third octave band frequencies

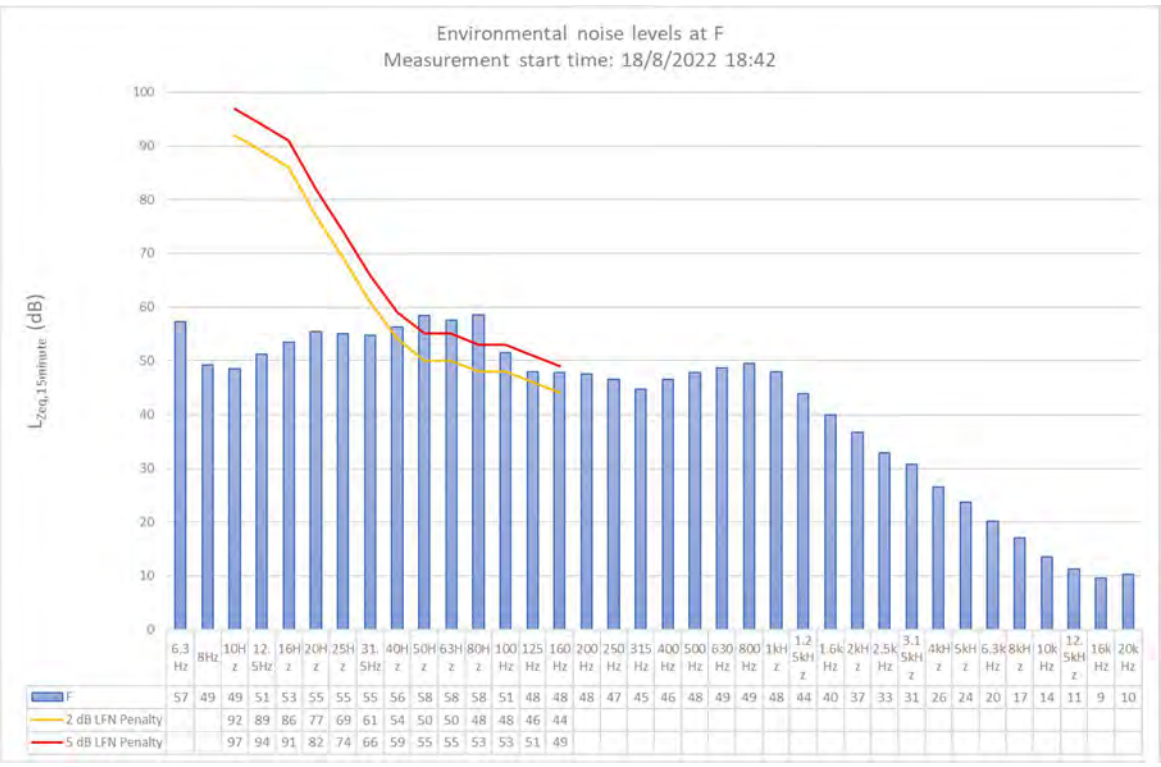

Figure D.8 Location F (Evening)- Total measured one-third octave band frequencies

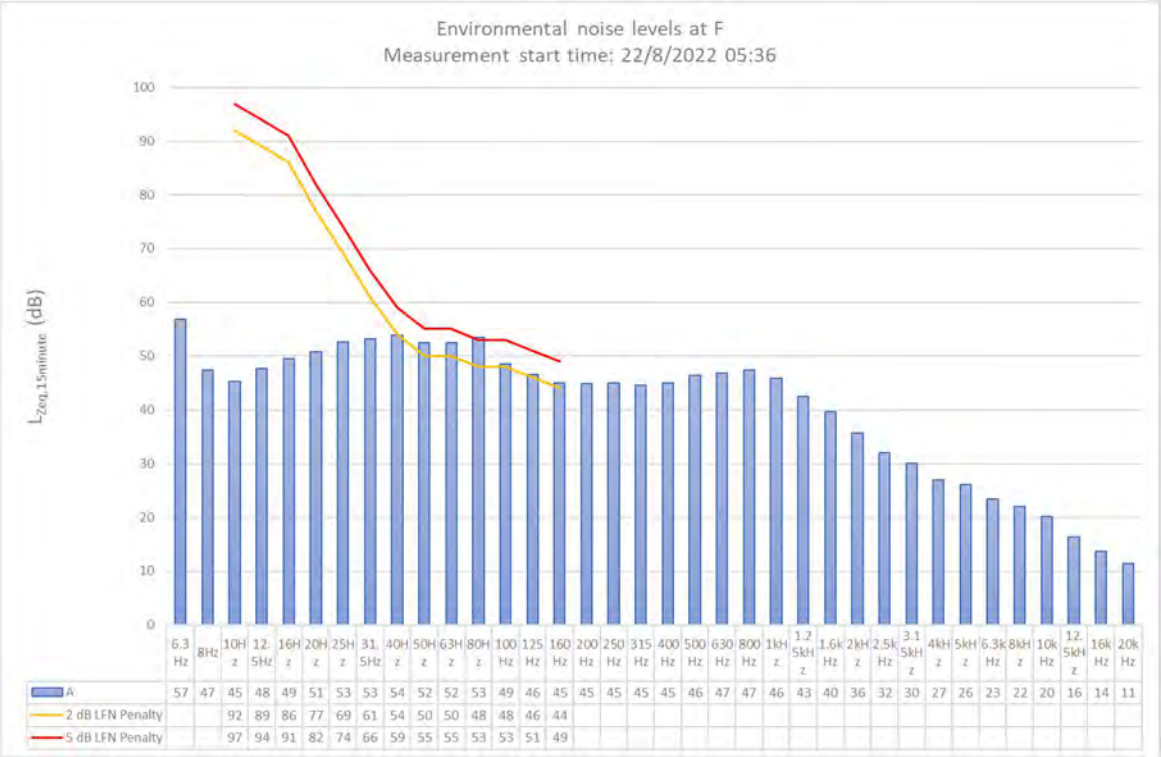

Figure D.9 Location F (Morning Shoulder)- Total measured one-third octave band frequencies

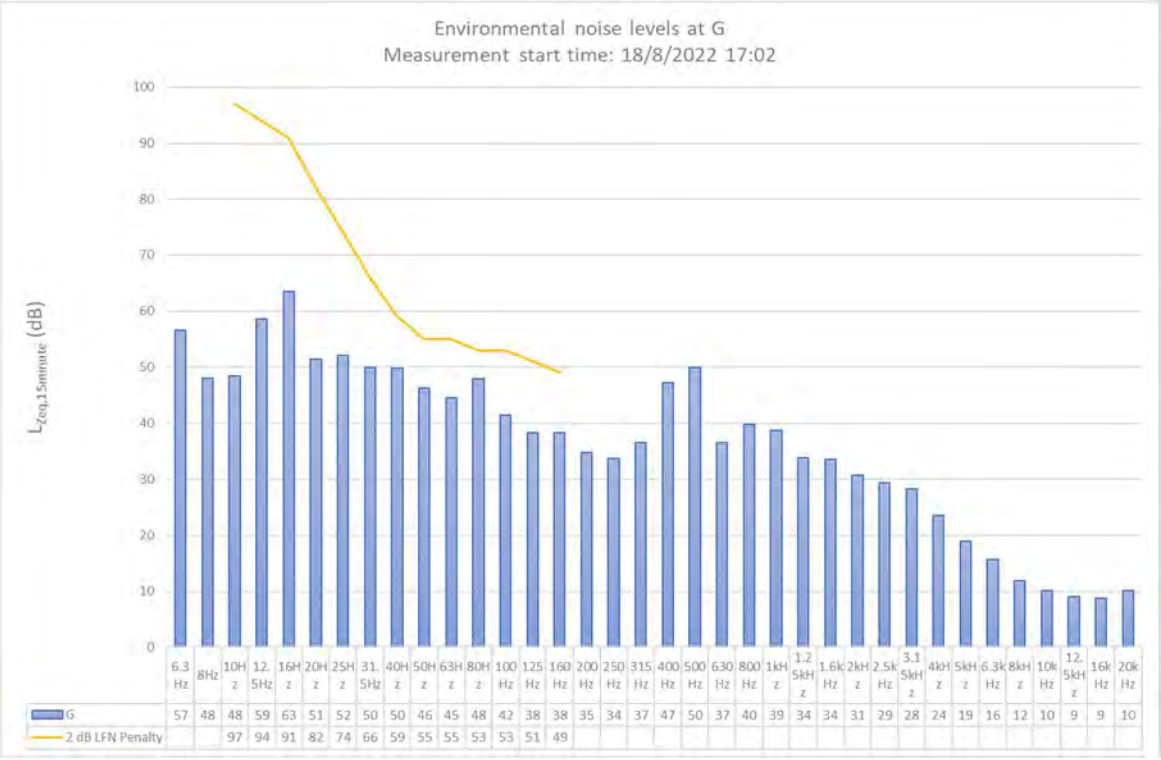

Figure D.10 Location G (Day) - Total measured one-third octave band frequencies

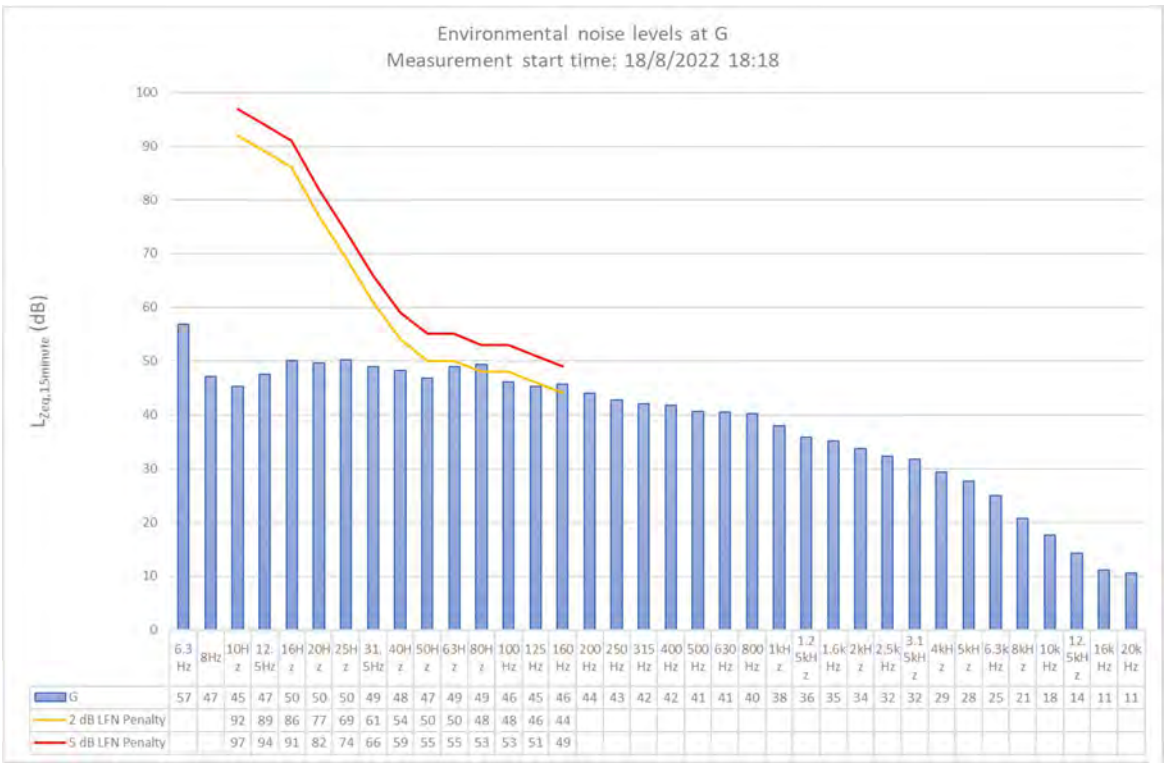

Figure D.11 Location G (Evening) - Total measured one-third octave band frequencies

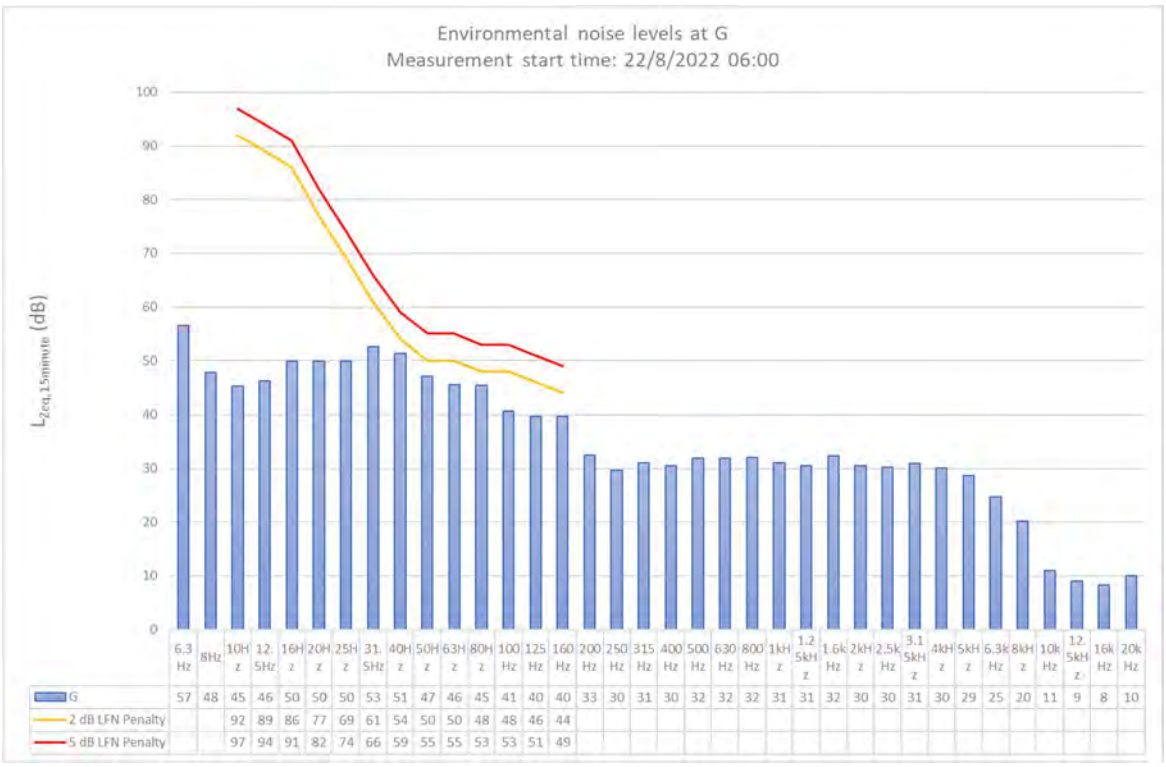

Figure D.12 Location G (Morning Shoulder) - Total measured one-third octave band frequencies

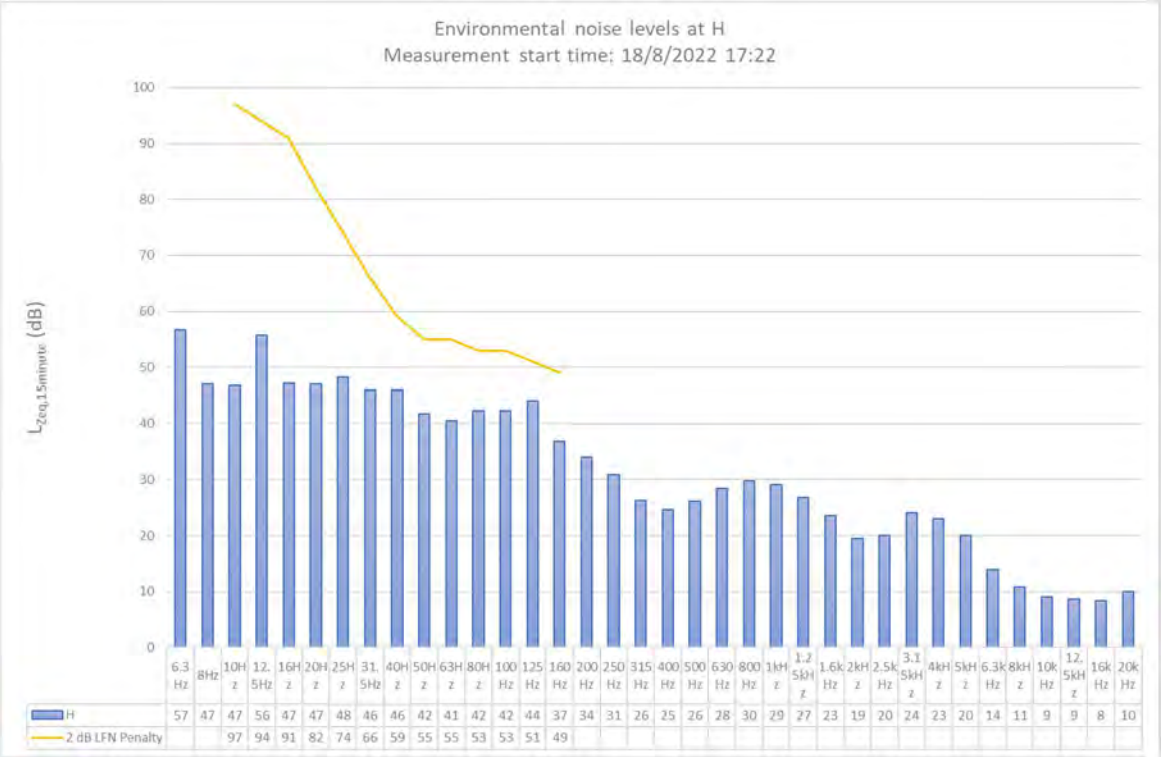

Figure D.13 Location H (Day) - Total measured one-third octave band frequencies

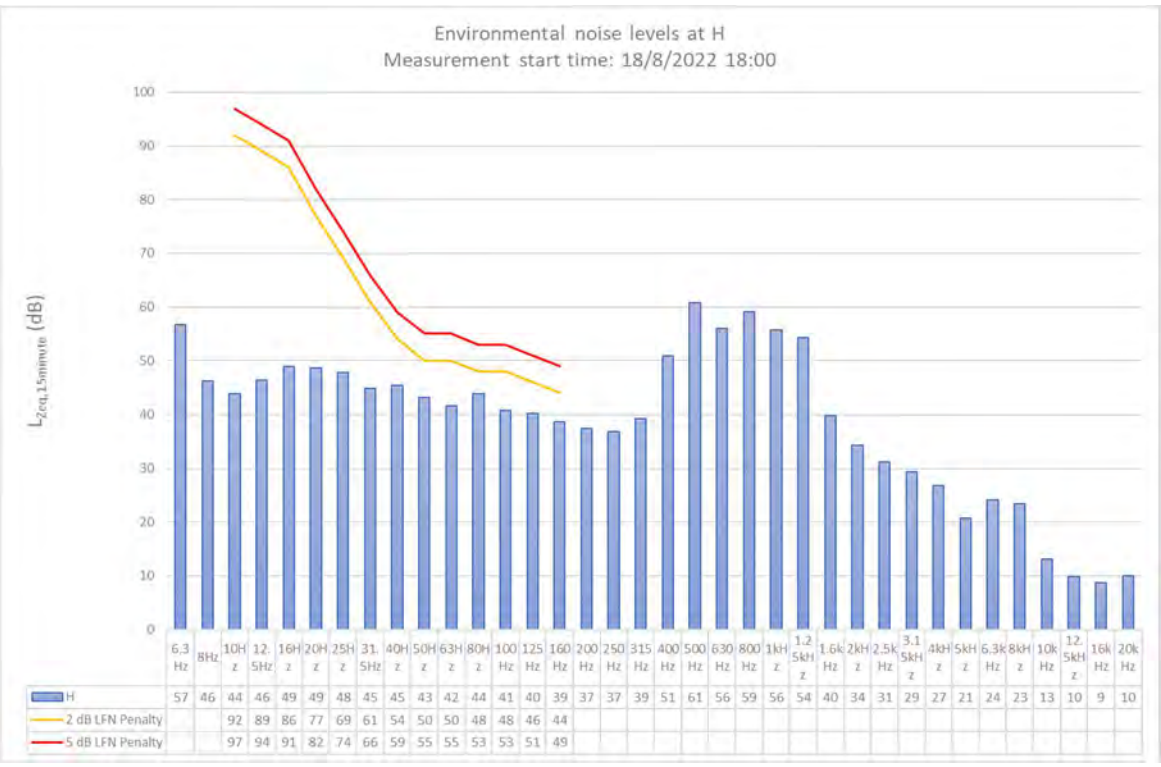

Figure D.14 Location H (Evening) - Total measured one-third octave band frequencies

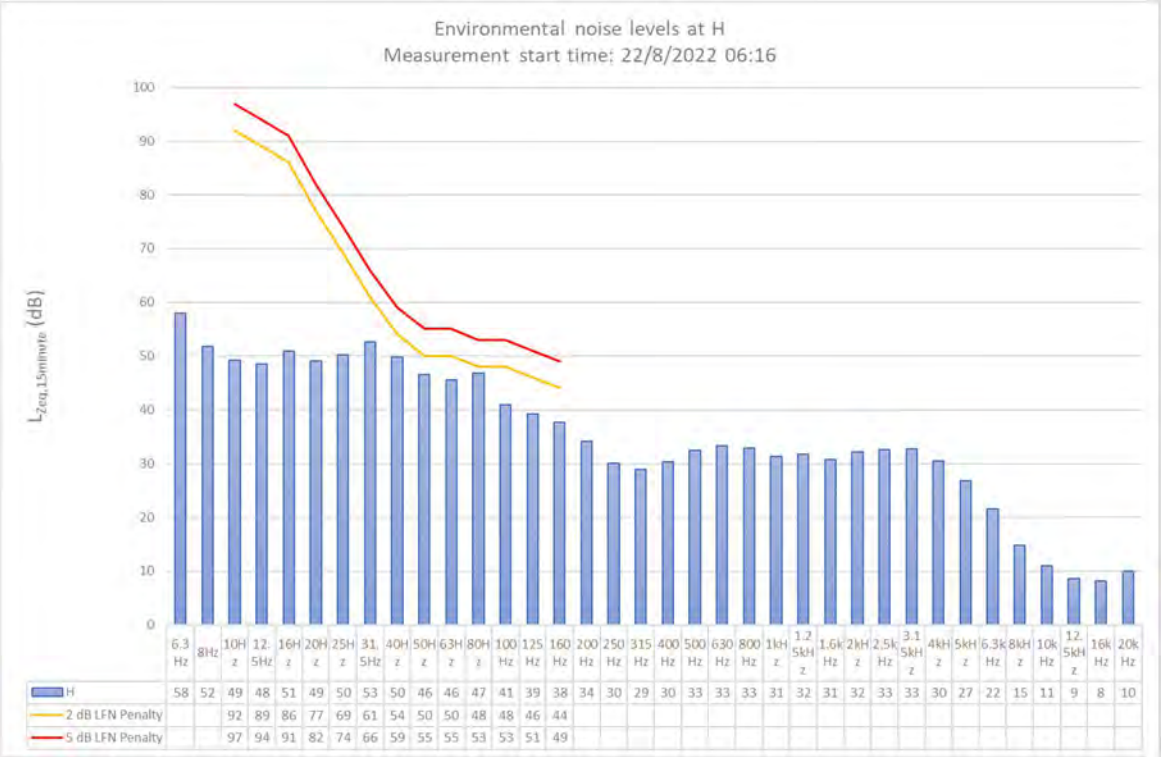

Figure D.15 Location H (Morning Shoulder) - Total measured one-third octave band frequencies

Australia

SYDNEY
Ground floor 20 Chandos Street
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
Level 2 Suite 2.04
15 London Circuit
Canberra City ACT 2601

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

MELBOURNE
Suite 8.03 Level 8 454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 9.02 Level 9 109 St Georges Terrace
Perth WA 6000

Canada

TORONTO
2345 Younge Street Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

Karuah East Quarry

Quarterly attended noise monitoring - Q4 2022

Prepared for Karuah East Quarry Pty Limited

December 2022

Karuah East Quarry

Quarterly attended noise monitoring - Q4 2022

Karuah East Quarry Pty Limited

E220174 RP#5

December 2022

Version	Date	Prepared by	Approved by	Comments
1	16 December 2022	Lucas Adamson	Tony Welbourne	

Approved by

Tony Welbourne
Associate Director
16 December 2022

Level 3 175 Scott Street
Newcastle NSW 2300

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

EMM Consulting Pty Limited (EMM) was engaged to undertake noise compliance monitoring on behalf of Karuah East Quarry Pty Ltd.

This report presents the results and findings of attended noise monitoring done during the day, evening and morning shoulder periods on 23 November and 1 December 2022.

Noise compliance monitoring is required to be undertaken in accordance with the *Karuah East Quarry Noise Management Plan* (NMP) which has been prepared to meet the relevant requirements of Department of Planning and Environment (DPE), Project Approval PA 09_0175, as modified in November 2021 (current as of 1 December 2022) and Environment Protection Authority (EPA) Environment Protection Licence (EPL) 20611 as varied on 2 September 2022 (current as of 1 December 2022).

The Noise Policy for Industry (NPfI) (EPA 2017) has also been referenced as part of this assessment.

Several technical terms are used in this report. These are explained in the Glossary.

2 Noise limits and monitoring requirements

2.1 Noise limits

Karuah East Quarry noise limits as per Condition 3 of PA 09_0175 and Condition L4.1 of EPL 20611 are provided in Table 2. Extracts of PA 09_0175 and EPL 20611, the relevant sections pertaining to noise, are provided in Appendix A and B respectively. The approved NMP adopts five attended noise monitoring locations that are representative of residences outlined in PA 09_0175 and EPL 20611. The noise monitoring locations and relevant criteria from PA 09_0175, EPL 20611 and the NMP are summarised in Table 2.1.

Table 2.1 Noise limits

Monitoring location	EA reference	Day $L_{Aeq,15\ minute}$, dB	Evening $L_{Aeq,15\ minute}$, dB	Morning Shoulder $L_{Aeq,15\ minute}$, dB	Morning Shoulder L_{Amax}, dB
A	Residence A on Lot 100 DP 785172	42	40	35	52
B	Residence B on Lot 3 DP 785172	40	40	35	52
G	Residence G on Lot 1 DP 1032636	43	39	35	52
H	Residence H on Lot 10 DP 1032636	44	46	35	52
N/A[1]	Residence I on Lot 11 DP 1032636	40	37	35	52
F	Any other residence or sensitive receiver not subject to a private negotiated agreement	40	35	35	52

Notes: 1. Although noise limits have been specified, noise monitoring is not required at Residence I as per PA 09_0175 and EPL 20611, given that residence I is located further from site in the same direction as Residence H. Given this, if noise received at Residence H is expected to comply with the relevant noise limits, compliance can also be assumed at Residence I.

Condition L4.4 of EPL 20611 states that the noise measurement equipment must be located:

- 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.

2.2 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 Noise Policy for Industry. Similarly, the requirements of 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.

2.3 Modifying factors

Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

2.4 Noise monitoring methodology requirements

Condition M8.1 of the EPL states that noise generated by Karuah East Quarry is to be measured in accordance with a number of requirements. An extract of the requirements outlined in Condition M8.1 is provided here.

> 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.

3 Assessment methodology

3.1 Attended noise monitoring

To quantify noise emissions from Karuah East Quarry, 15-minute attended noise monitoring surveys were completed at representative monitoring locations with reference to the site's approved NMP.

The attended noise monitoring locations, as per the sites approved NMP, and their coordinates are listed in Table 3.1 and are shown in Figure 3.1.

Table 3.1 Attended noise monitoring locations

Monitoring location	Location description	Coordinates (MGA56)	
		Easting	Northing
A	74 Mill Hill Close, Karuah	406623	6388704
B	64 Mill Hill Close, Karuah	406405	6388859
F	1714 The Branch Lane, Karuah	405639	6389782
G	2 Halloran Road, North Arm Cove	405629	6389766
H	21 Halloran Road, North Arm Cove	407795	6389868

3.2 Instrumentation

A Brüel & Kjær (B&K) 2250 Type 1 sound analyser (s/n 3029363) was used to conduct 15-minute attended measurements and record 1/3 octave centre frequency and statistical noise indices. The sound analyser was calibrated before and on completion of the survey using a Svantek SV-36 calibrator (s/n 79952). The instruments were within their NATA laboratory calibration period during the time of these readings and certificates are provided in Appendix C.

Where possible throughout each survey, the operator quantified the contribution of each significant noise source. This was done by matching audible sounds with the response of the sound analyser (where applicable) and/or via post-analysis of recorded noise data.

3.3 Weather and operating conditions

Meteorological data was obtained from the Karuah East Quarry on-site weather station. Communications with the site operator and observations made during the attended measurements confirmed the site was operating as normal during monitoring.

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 3.1

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4 Review of data and discussion

4.1 Summary

The results of EMM's attended noise measurements are summarised in Table 4.1. Karuah East Quarry's noise contribution was determined using in-field observations and post-analysis of recorded data as required. Attended noise monitoring was completed during the day, evening and morning shoulder periods on 23 November and 1 December 2022.

Meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the EPL and PA. In accordance with the EPL and PA, noise limits are not applicable during three of the 15 measurements due to the presence of wind speeds greater than 3 m/s or the presence of wind speeds greater than 2 m/s in combination with an F atmospheric stability category at the time of the measurement.

Low frequency noise was conservatively assessed by comparison of the site measured one-third octave L_{Aeq} noise levels to the NPfI one-third octave low-frequency noise thresholds. Measured site noise levels exceeded the relevant low frequency noise (LFN) thresholds during two measurements, at locations G and H during the day period. Therefore, in accordance with the NPfI, a positive 2 dB LFN modifying factor was applied to estimated site noise levels at locations G and H during the day period. LFN modifying factors were not applied to estimated site noise levels at any of the other noise monitoring locations since site noise was not audible or the measured total noise levels above the relevant LFN thresholds were determined to be attributable to extraneous noise sources (eg traffic on the Pacific Highway). Graphs of the total linear noise levels measured in one-third octave frequency bands are presented in Appendix D.

Karuah East Quarry noise contributions and cumulative quarry noise contributions were below (i.e. complied with) the relevant daytime, evening and morning shoulder noise limits at all monitoring locations.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q4 2022

Location	Date	Start time (Period)	Total levels, dB						Site levels, dB			EPL/PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
A	23/11	05:03 MS	51	56	66	70	75	78	N/A	IA	IA	35	52	Calm F stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible.
B	23/11	05:19 MS	51	56	66	70	75	80	N/A	IA	IA	35	52	Calm F stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible.
F	23/11	05:38 MS	47	51	56	58	62	75	N/A	IA	IA	35	52	Calm F stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, frogs, birds and traffic on the Pacific Highway consistently audible. A traffic passby briefly audible.
G	23/11	06:03 MS	35	39	41	43	46	51	N/A	IA	IA	35	52	Calm F stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible.
H	23/11	06:19 MS	37	40	45	45	54	70	N/A	IA	IA	35	52	0.6 m/s @ 351° F stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible. Aircraft and resident noise occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q4 2022

Location	Date	Start time (Period)	Total levels, dB						Site levels, dB			EPL/PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
A	23/11	07:07 Day	43	50	54	57	59	62	N/A	IA	N/A	42	N/A	0.9 m/s @ 301° A stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible. Dogs barking occasionally audible.
B	23/11	07:50 Day	50	57	64	67	72	78	N/A	IA	N/A	40	N/A	1.9 m/s @ 284° A stability class Y	N/A	**Karuah East Quarry inaudible.** Insects, birds and traffic on the Pacific Highway consistently audible.
F	23/11	08:25 Day	47	50	57	55	64	83	N/A	IA	N/A	40	N/A	2.7 m/s @ 283° A stability class Y	N/A	**Karuah East Quarry inaudible.** Traffic on the Pacific Highway consistently audible. Wind in foliage frequently audible. Birds and traffic passbys occasionally audible.
G	23/11	08:49 Day	40	43	46	48	51	64	2 dB	43 (41+2)	N/A	43	N/A	2.2 m/s @ 282° B stability class Y	Nil	**Karuah East Quarry processing plant consistently audible.** Insects and traffic on the Pacific Highway consistently audible. Wind in foliage frequently audible. Aircraft and resident noise occasionally audible.
H	23/11	09:06 Day	40	43	46	47	51	62	2 dB	43 (41+2)	N/A	44	N/A	2.5 m/s @ 279° A stability class Y	Nil	**Karuah East Quarry processing plant consistently audible.** Insects, birds, wind in foliage and traffic on the Pacific Highway consistently audible. Aircraft and resident noise occasionally audible.

Table 4.1 Karuah East Quarry attended noise monitoring results – Q4 2022

Location	Date	Start time (Period)	Total levels, dB						Site levels, dB			EPL/PA Limits, dB		Meteorological conditions[2] EPL limits apply (Y/N)	Exceedance, dB	Comments
			L_{Amin}	L_{A90}	L_{Aeq}	L_{A10}	L_{A1}	L_{Amax}	Mod. Factor[1]	L_{Aeq}	L_{Amax}	L_{Aeq}	L_{Amax}			
A	1/12	18:00 Eve.	41	46	50	52	54	60	N/A	IA	N/A	40	N/A	3.3 m/s @ 150° D stability class N	N/A	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Birds frequently audible. Dogs barking and wind in foliage occasionally audible.
B	1/12	18:16 Eve.	46	56	65	68	74	76	N/A	IA	N/A	40	N/A	2.9 m/s @ 152° E stability class Y	N/A	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Birds frequently audible. Wind in foliage occasionally audible.
F	1/12	18:34 Eve.	41	45	60	53	74	85	N/A	IA	N/A	35	N/A	2.9 m/s @ 147° E stability class Y	N/A	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Birds, aircraft, wind in foliage and traffic passbys occasionally audible.
G	1/12	18:57 Eve.	36	39	43	45	50	63	N/A	IA	N/A	39	N/A	3.1 m/s @ 152° D stability class N	N/A	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Bird noise frequently audible. Dogs barking, aircraft noise and wind in foliage occasionally audible.
H	1/12	19:13 Eve.	36	40	45	47	51	62	N/A	IA	N/A	46	N/A	2.6 m/s @ 154° F stability class N	N/A	**Karuah East Quarry inaudible.** Distant traffic on the Pacific Highway, insects and frogs consistently audible. Birds frequently audible. Dogs barking, aircraft and wind in foliage occasionally audible.

Notes:
1. Modifying factor correction for LFN in accordance with Fact sheet C of the NPfI.
2. Meteorological data were taken as an average over 15 minutes from the Karuah East Quarry on-site weather station (Refer to Section 5.1).
3. IA = inaudible.
4. N/A = not applicable.
5. NS = not specified.

5 Conclusion

EMM has completed a review of operational noise from Karuah East Quarry within the surrounding community based on attended measurements done during the day, evening and morning shoulder periods on 23 November and 1 December 2022.

Meteorological data for the monitoring period was sourced from the Karuah East Quarry on-site weather station to determine applicability of criteria in accordance with the PA and EPL. In accordance with the EPL and PA, noise limits were not applicable during three of the 15 measurements due to the presence of wind speeds greater than 3 m/s or the presence of wind speeds greater than 2 m/s in combination with an F atmospheric stability category at the time of the measurement.

The assessment of noise levels from site included consideration of modifying factors for noise characteristics where relevant and in accordance with the NPfI.

Karuah East Quarry noise contributions were below (satisfied) the noise limits at all monitoring locations for this round of monitoring.

Glossary

Several technical terms are discussed in this report. These are explained in Table G.1.

Table G.1 Glossary of acoustic terms

Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The 'A-weighted' noise level which is exceeded 1% of the time.
$L_{A1,1minute}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq,15\ minute}$ descriptor refers to an L_{Aeq} noise level measured over a 15 minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L_{Ceq}	The equivalent continuous 'C-weighted' sound pressure level over a given period. The $L_{Ceq,15\ minute}$ descriptor refers to an L_{Ceq} noise level measured over a 15 minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature Inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of the decibel (dB), the unit of noise measurement. Table G.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure G.1.

Table G.2 Perceived change in noise level

Change in sound pressure level (dB)	Perceived change in noise
up to 2	not perceptible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

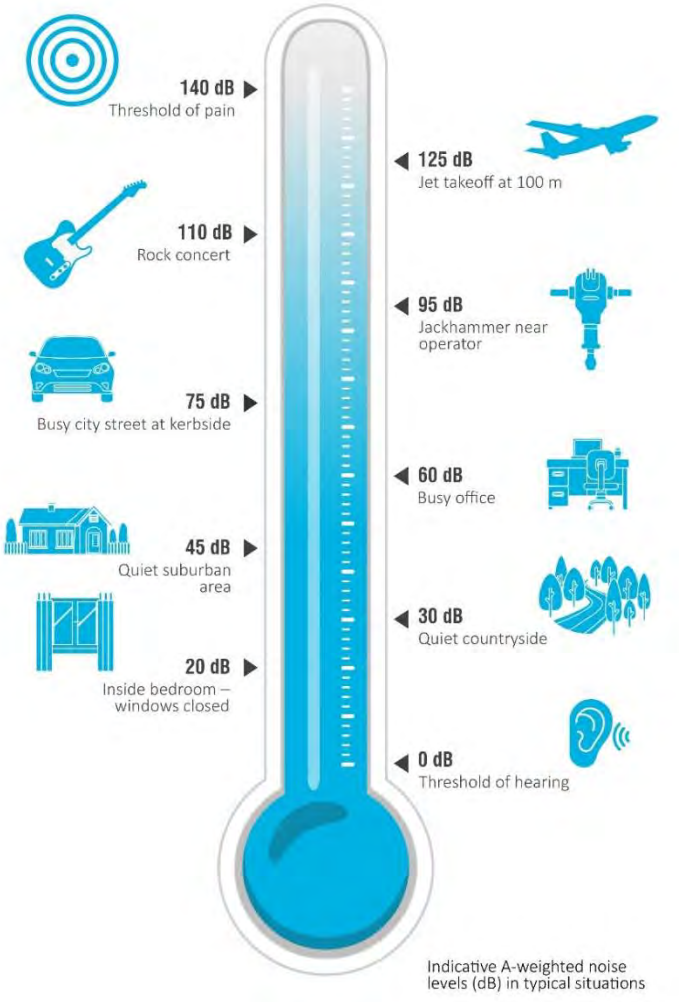

Figure G.1 Common noise levels

References

Department of Planning and Environment (DPE), Project Approval PA 09_0175, 2022.

Environment Protection Authority, Environment Protection Licence 20611, 2022.

Environment Protection Authority, Noise Policy for Industry, 2017.

EMM Consulting, Karuah East Quarry Project Noise Management Plan, 2022.

Appendix A
Project approval extract

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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.

Appendix B
EPL extract

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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
I (83 Halloran Road, North Arm Cove Lot 12 DP1032636)	35	52	40	37
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.

a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
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

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C33872

EQUIPMENT TESTED : Sound Level Calibrator

Manufacturer: Svantek
Type No: SV-36 **Serial No:** 79952
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details overleaf. All Test Passed.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	94.09 dB	1000.00 Hz	1.12 %
Level2:	NA	N	114.06 dB	1000.00 Hz	0.71 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:

Ambient Pressure 1004 hPa ±1 hPa
Temperature 23 °C ±1° C
Relative Humidity 55 % ±5%

Date of Receipt : 26/09/2022
Date of Calibration : 29/09/2022
Date of Issue : 29/09/2022

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Acoustic and Vibration Measurements

Acu-Vib Electronics
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Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM34169

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	B & K		
Type No:	2250	**Serial No:**	3029363
Mic. Type:	4189	**Serial No:**	3260501
Pre-Amp. Type:	ZC0032	**Serial No:**	30109
Filter Type:	1/3 Octave	**Test No:**	F034175

Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065

Tests Performed: IEC 61672-3:2013 & IEC 61260-3:2016

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1002	hPa ±1 hPa	**Date of Receipt :**	02/11/2022
Temperature	24	°C ±1° C	**Date of Calibration :**	03/11/2022
Relative Humidity	35	% ±5%	**Date of Issue :**	04/11/2022

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Kielt

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Appendix D

Low Frequency Noise analysis

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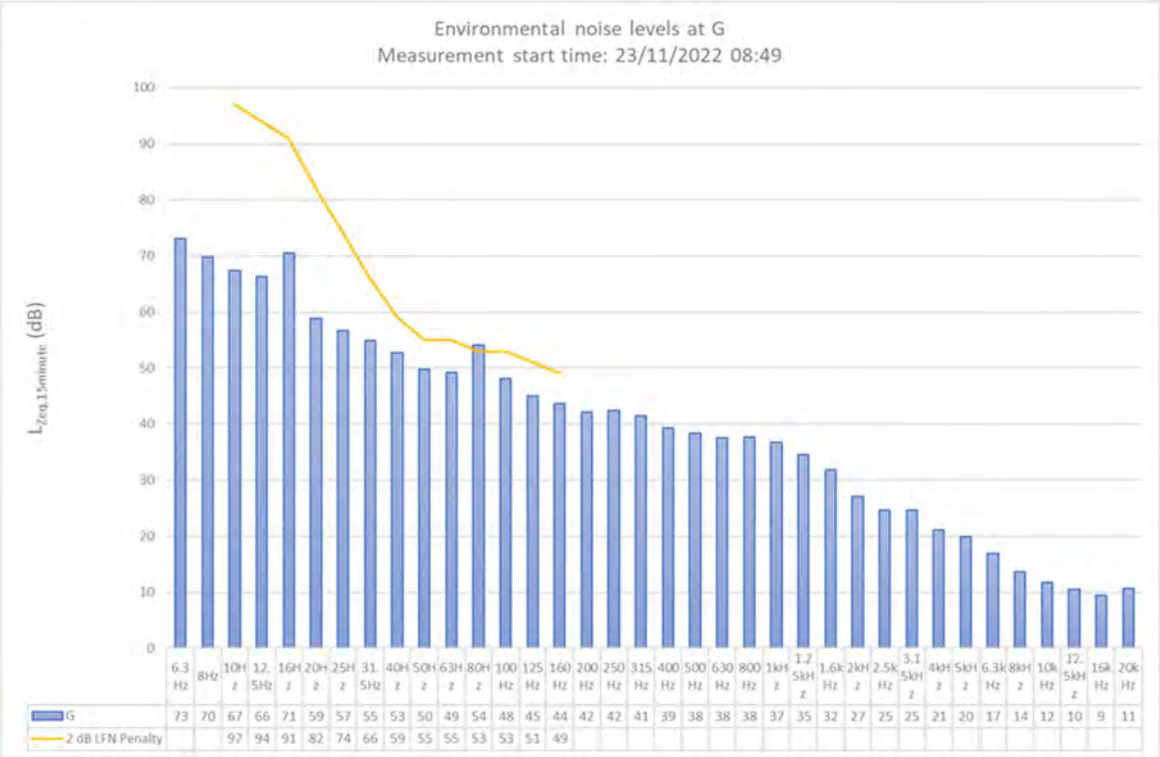

Figure D.1 Location G (Day)- Total measured one-third octave band frequencies

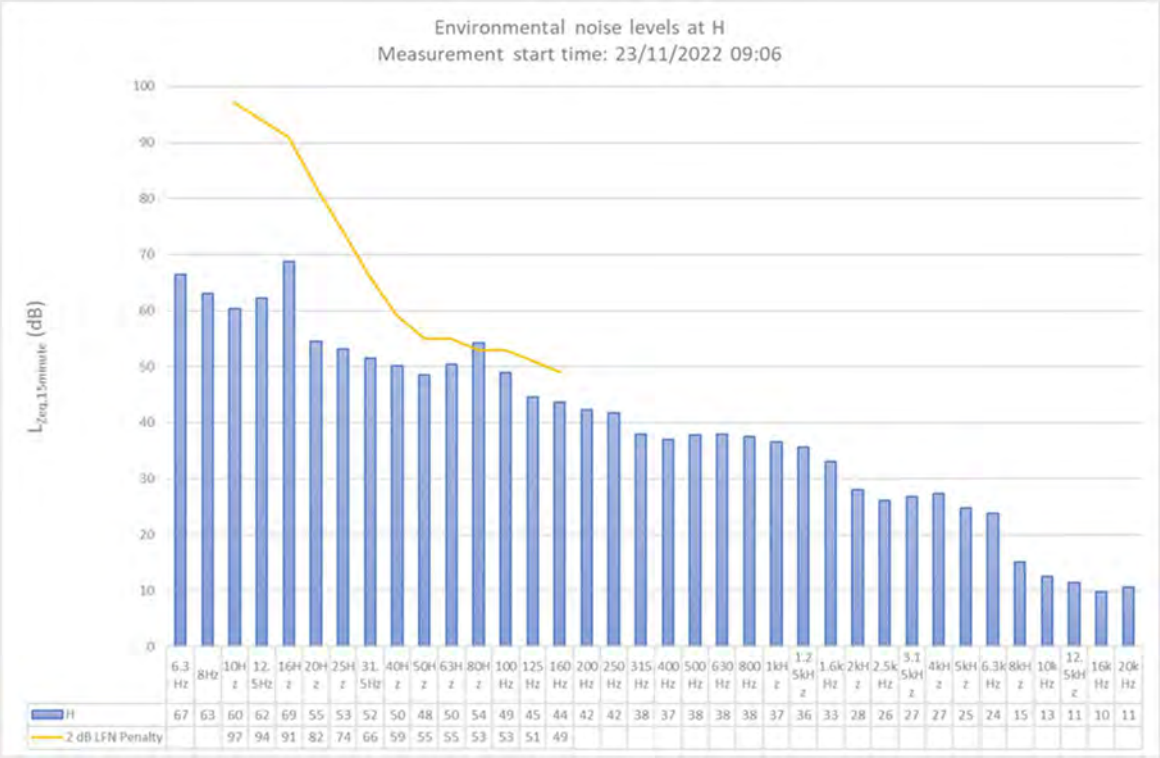

Figure D.2 Location H (Day)- Total measured one-third octave band frequencies

Australia

SYDNEY
Ground floor 20 Chandos Street
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
Level 2 Suite 2.04
15 London Circuit
Canberra City ACT 2601

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

MELBOURNE
Suite 8.03 Level 8 454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 9.02 Level 9 109 St Georges Terrace
Perth WA 6000

Canada

TORONTO
2345 Younge Street Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

APPENDIX 5 – Ecological Monitoring Report

APPENDIX 6 – Water Monitoring Data

Reference	Site	Location	Time / Date	Temp	pH	EC	Turbidity	TSS	Oil and Grease	Discharging	Controlled
12159/1	Karuah East Quarry	KEQ LDP1	Monday, 17 January 2022	24.8	7.6	895	63	20	NV	Yes	Yes
12163/1	Karuah East Quarry	KEQ LDP1	Tuesday, 18 January 2022	24.7	7.6	906	59	24	NV	Yes	Yes
12167/1	Karuah East Quarry	KEQ LDP1	Wednesday, 19 January 2022	23.4	7.5	863	67	29	NV	Yes	Yes
12421/1	Karuah East Quarry	KEQ LDP1	Friday, 4 March 2022	22	7.1	398	2500	**1,600**	<5	Yes	No
12431/1	Karuah East Quarry	KEQ LDP1	Saturday, 5 March 2022	23.5	7.1	506	1800	**1,800**	NV	Yes	No
12431/2	Karuah East Quarry	KEQ LDP1	Sunday, 6 March 2022	22.6	7.2	526	1600	**1,500**	NV	Yes	No
RCA	Karuah East Quarry	KEQ LDP1	Monday, 7 March 2022	-	7.07	546	1360	**984**	<5	Yes	No
12440/1	Karuah East Quarry	KEQ LDP1	Tuesday, 8 March 2022	24.7	7.3	698	990	**750**	NV	Yes	No
12459/1	Karuah East Quarry	KEQ LDP1	Wednesday, 9 March 2022	21.5	7.2	526	2000	**870**	NV	Yes	No
12467/1	Karuah East Quarry	KEQ LDP1	Thursday, 10 March 2022	21.1	7.1	556	1700	**1,100**	NV	Yes	No
12614/1	Karuah East Quarry	KEQ LDP1	Thursday, 31 March 2022	21.7	7.2	297	5000	**3200**	NV	Yes	No
12620/1	Karuah East Quarry	KEQ LDP1	Friday, 1 April 2022	18.8	7.1	284	3100	**2500**	NV	Yes	No
12635/1	Karuah East Quarry	KEQ LDP1	Saturday, 2 April 2022	20.3	7.1	323	2400	**2300**	NV	Yes	No
12635/2	Karuah East Quarry	KEQ LDP1	Sunday, 3 April 2022	21.2	7.1	349	2100	**1700**	NV	Yes	No
12635/3	Karuah East Quarry	KEQ LDP1	Monday, 4 April 2022	21.8	7.1	393	2000	**1100**	NV	Yes	No
13105/1	Karuah East Quarry	KEQ LDP1	Wednesday, 6 July 2022	18.3	7.2	293	2200	**1700**	NV	Yes	No
13108/1	Karuah East Quarry	KEQ LDP1	Thursday, 7 July 2022	17.9	7.2	202	1800	**1300**	NV	Yes	No
13156/1	Karuah East Quarry	KEQ LDP1	Friday, 8 July 2022	16.3	7.2	310	2100	**1100**	NV	Yes	No
13156/4	Karuah East Quarry	KEQ LDP1	Saturday, 9 July 2022	16.8	7	563	230	**110**	NV	Yes	No
13156/6	Karuah East Quarry	KEQ LDP1	Sunday, 10 July 2022	16.5	7	503	1100	**700**	NV	Yes	No
13156/8	Karuah East Quarry	KEQ LDP1	Monday, 11 July 2022	18.8	7.1	415	820	**750**	NV	Yes	No
13201/1	Karuah East Quarry	KEQ LDP1	Tuesday, 12 July 2022	11.1	7	396	1500	**840**	NV	Yes	No
13201/3	Karuah East Quarry	KEQ LDP1	Wednesday, 13 July 2022	13.9	7.1	435	1600	**980**	NV	Yes	No
13438/1	Karuah East Quarry	KEQ LDP1	Thursday, 1 September 2022	19.6	7.6	648	65	25	NV	Yes	Yes
13447/1	Karuah East Quarry	KEQ LDP1	Friday, 2 September 2022	19.4	7.8	599	50	20	NV	Yes	Yes
13551/1	Karuah East Quarry	KEQ LDP1	Monday, 26 September 2022	18.8	8.5	621	65	26	<5	Yes	Yes
13708/1	Karuah East Quarry	KEQ LDP1	Monday, 17 October 2022	20.8	8	700	40	14	NV	Yes	Yes
13714/1	Karuah East Quarry	KEQ LDP1	Tuesday, 18 October 2022	20.2	7.8	657	50	28	NV	Yes	Yes
13724/1	Karuah East Quarry	KEQ LDP1	Wednesday, 19 October 2022	20.3	8	730	55	26	NV	Yes	Yes
13740/1	Karuah East Quarry	KEQ LDP1	Thursday, 20 October 2022	21.9	7.7	664	50	21	NV	Yes	Yes
13844/1	Karuah East Quarry	KEQ LDP1	Friday, 4 November 2022	20.7	7.6	620	100	38	NV	Yes	Yes
13850/1	Karuah East Quarry	KEQ LDP1	Monday, 7 November 2022	21.9	7.5	670	65	33	NV	Yes	Yes
13855/1	Karuah East Quarry	KEQ LDP1	Tuesday, 8 November 2022	21.6	7.3	757	90	39	NV	Yes	Yes
12159/2	Karuah East Quarry	KEQ LDP2	Monday, 17 January 2022	24.7	7	476	40	20	NV	Yes	Yes
12314/2	Karuah East Quarry	KEQ LDP2	Thursday, 10 February 2022	22.6	7.2	578	25	10	NV	Yes	Yes
12489/1	Karuah East Quarry	KEQ LDP2	Monday, 14 March 2022	21.3	6.9	629	15	5	NV	Yes	Yes
12614/2	Karuah East Quarry	KEQ LDP2	Thursday, 31 March 2022	21.9	6.7	102	1600	**1300**	NV	Yes	No
12620/2	Karuah East Quarry	KEQ LDP2	Friday, 1 April 2022	18.5	6.8	279	910	**490**	NV	Yes	No
12720/1	Karuah East Quarry	KEQ LDP2	Tuesday, 19 April 2022	20.4	7.2	484	15	**<5**	NV	Yes	Yes
12754/2	Karuah East Quarry	KEQ LDP2	Tuesday, 26 April 2022	19.4	6.9	445	30	8	NV	Yes	Yes
12831/3	Karuah East Quarry	KEQ LDP2	Thursday, 12 May 2022	19.4	6.8	543	39	13	NV	Yes	Yes
12983/1	Karuah East Quarry	KEQ LDP2	Tuesday, 7 June 2022	23.3	7.3	473	60	22	NV	Yes	Yes

13105/2	Karuah East Quarry	KEQ LDP2	Wednesday, 6 July 2022	18.4	7	194	700	**510**	NV	Yes	No
13108/2	Karuah East Quarry	KEQ LDP2	Thursday, 7 July 2022	17.8	7	130	530	**210**	NV	Yes	No
13214/1	Karuah East Quarry	KEQ LDP2	Monday, 18 July 2022	13.6	7	501	15	**<5**	NV	Yes	Yes
13218/1	Karuah East Quarry	KEQ LDP2	Tuesday, 19 July 2022	15.1	7	516	16	**<5**	NV	Yes	Yes
13357/1	Karuah East Quarry	KEQ LDP2	Thursday, 11 August 2022	16.9	6.6	732	18	6	NV	Yes	Yes
13360/1	Karuah East Quarry	KEQ LDP2	Friday, 12 August 2022	17.1	7	673	39	34	NV	Yes	Yes
13428/1	Karuah East Quarry	KEQ LDP2	Monday, 29 August 2022	17.6	7.1	573	25	9	NV	Yes	Yes
13489/1	Karuah East Quarry	KEQ LDP2	Thursday, 8 September 2022	18	7	583	5.9	**<5**	NV	Yes	Yes
13551/2	Karuah East Quarry	KEQ LDP2	Monday, 26 September 2022	19.3	7.4	717	17	8	NV	Yes	Yes
13768/1	Karuah East Quarry	KEQ LDP2	Monday, 24 October 2022	21.4	7.1	827	14	9	NV	Yes	Yes
13781/1	Karuah East Quarry	KEQ LDP2	Tuesday, 25 October 2022	20.1	7	757	22	10	NV	Yes	Yes
12503/1	Karuah East Quarry	KEQ LDP3	Wednesday, 16 March 2022	21.4	7.7	554	94	40	NV	Yes	Yes
12509/1	Karuah East Quarry	KEQ LDP3	Thursday, 17 March 2022	21.6	7.7	535	85	33	NV	Yes	Yes
12513/1	Karuah East Quarry	KEQ LDP3	Friday, 18 March 2022	22.3	7.7	551	77	32	NV	Yes	Yes
12614/3	Karuah East Quarry	KEQ LDP3	Thursday, 31 March 2022	22.1	7.3	444	170	**120**	NV	Yes	No
12620/3	Karuah East Quarry	KEQ LDP3	Friday, 1 April 2022	18.5	7.1	329	850	**500**	NV	Yes	No
12720/2	Karuah East Quarry	KEQ LDP3	Tuesday, 19 April 2022	20.4	7.4	520	42	15	NV	Yes	Yes
12725/1	Karuah East Quarry	KEQ LDP3	Wednesday, 20 April 2022	20.9	7.4	525	42	16	NV	Yes	Yes
12734/1	Karuah East Quarry	KEQ LDP3	Thursday, 21 April 2022	19.1	7.3	530	40	17	NV	Yes	Yes
12754/3	Karuah East Quarry	KEQ LDP3	Tuesday, 26 April 2022	19.7	7.4	504	62	39	NV	Yes	Yes
12759/1	Karuah East Quarry	KEQ LDP3	Wednesday, 27 April 2022	19.4	7.4	517	65	26	NV	Yes	Yes
12763/1	Karuah East Quarry	KEQ LDP3	Thursday, 28 April 2022	20.5	7.4	521	67	30	NV	Yes	Yes
12796/2	Karuah East Quarry	KEQ LDP3	Wednesday, 4 May 2022	19.6	7.5	628	25	10	NV	Yes	Yes
12809/2	Karuah East Quarry	KEQ LDP3	Thursday, 5 May 2022	22.7	7.5	629	15	6	NV	Yes	Yes
12813/1	Karuah East Quarry	KEQ LDP3	Friday, 6 May 2022	18.8	7.5	654	30	14	NV	Yes	Yes
12831/4	Karuah East Quarry	KEQ LDP3	Thursday, 12 May 2022	19.5	7.6	546	55	26	NV	Yes	Yes
12836/2	Karuah East Quarry	KEQ LDP3	Friday, 13 May 2022	19.7	7.6	539	55	22	NV	Yes	Yes
13105/3	Karuah East Quarry	KEQ LDP3	Wednesday, 6 July 2022	18.8	7.2	239	200	**100**	NV	Yes	No
13108/3	Karuah East Quarry	KEQ LDP3	Thursday, 7 July 2022	17.7	7	174	320	**200**	NV	Yes	No
13156/2	Karuah East Quarry	KEQ LDP3	Friday, 8 July 2022	16	7	225	560	**330**	NV	Yes	No
13244/1	Karuah East Quarry	KEQ LDP3	Wednesday, 27 July 2022	14.6	7.2	491	45	17	NV	Yes	Yes
13253/1	Karuah East Quarry	KEQ LDP3	Thursday, 28 July 2022	13.6	7.2	520	40	14	NV	Yes	Yes
13274/1	Karuah East Quarry	KEQ LDP3	Friday, 29 July 2022	20.9	7.2	551	35	9	NV	Yes	Yes
13357/2	Karuah East Quarry	KEQ LDP3	Thursday, 11 August 2022	19	7.3	622	60	29	NV	Yes	Yes
13360/2	Karuah East Quarry	KEQ LDP3	Friday, 12 August 2022	17.2	7.4	620	36	14	NV	Yes	Yes
13428/2	Karuah East Quarry	KEQ LDP3	Monday, 29 August 2022	18.5	7.9	641	19	6	NV	Yes	Yes
13431/1	Karuah East Quarry	KEQ LDP3	Tuesday, 30 August 2022	19.3	7.9	637	14	5	NV	Yes	Yes
13437/2	Karuah East Quarry	KEQ LDP3	Wednesday, 31 August 2022	21	7.3	667	13	6	NV	Yes	Yes
13438/2	Karuah East Quarry	KEQ LDP3	Thursday, 1 September 2022	19.6	7.3	647	25	13	NV	Yes	Yes
13447/2	Karuah East Quarry	KEQ LDP3	Friday, 2 September 2022	19.1	7	624	21	10	NV	Yes	Yes
13551/3	Karuah East Quarry	KEQ LDP3	Monday, 26 September 2022	18.5	8	546	35	24	NV	Yes	Yes
13560/2	Karuah East Quarry	KEQ LDP3	Tuesday, 27 September 2022	19.4	8.1	557	27	19	NV	Yes	Yes
13565/2	Karuah East Quarry	KEQ LDP3	Wednesday, 28 September 2022	19.3	8.3	561	21	16	NV	Yes	Yes

13576/2	Karuah East Quarry	KEQ LDP3	Thursday, 29 September 2022	21.8	8.4	583	26	19	NV	Yes	Yes
13589/2	Karuah East Quarry	KEQ LDP3	Friday, 30 September 2022	19.4	8.1	549	31	20	NV	Yes	Yes
13768/2	Karuah East Quarry	KEQ LDP3	Monday, 24 October 2022	21.6	7.5	500	70	36	NV	Yes	Yes
13784/1	Karuah East Quarry	KEQ LDP3	Wednesday, 26 October 2022	21.1	7.2	559	60	35	NV	Yes	Yes

Date	pH (pH unit)	TSS (mg/L)	TDS (mg/L)	Turbidity (NTU)	EC (µS/cm)	Nitrogen (Nitrate) (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous (mg/L)	Ammonia (mg/L)	Oil and Grease (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Hardness (as $CaCO_3$)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Nickel (mg/L)	Lead (mg/L)	Manganese (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
EPL & ANZECC Criteria	6.5 - 8.5	40	-	-	125-2200	0.35		0.025	0.02	5	-	-	-	-	-	0.024	0.0002	0.001	0.0014	0.011	0.0034	1.9	-	0.0213
LDP1																								
12/01/2022	6.66	14	598	101	792	0.98	1.5	0.04	0.01	<5	14	8	112	2	68	<0.001	<0.0001	0.002	0.003	0.002	0.001	0.094	<0.01	0.017
14/02/2022	7.42	671	639	439	217	12.8	15.2	0.22	0.02	<5	7	7	117	2	46	0.002	<0.0001	0.012	0.02	0.008	0.008	0.312	0.05	0.064
7/03/2022	7.07	984	1208	1360	546	14.3	14.3	0.63	0.04	<5	3	4	103	2	24	0.006	<0.0001	0.032	0.052	0.02	0.027	0.846	0.13	0.17
5/04/2022	7.5	2115	1015	1780	425	8.76	12.2	0.71	0.01	<5	1	2	82	1	11	0.006	<0.0001	0.033	0.057	0.022	0.03	1.12	0.14	0.175
5/05/2022	7.29	745	455	956	559	8.3	10.1	0.44	0.03	<5	5	6	89	1	37	<0.001	<0.0001	0.005	0.015	0.008	0.008	0.302	0.02	0.063
3/06/2022	7.32	140	586	321	638	13.8	16.4	0.16	0.04	<5	9	8	96	2	55	0.001	<0.0001	0.008	0.011	0.007	0.005	0.292	0.03	0.045
12/07/2022	6.87	1020	970	1680	423	10.2	12.6	0.38	0.1	<5	4	4	68	<1	26	0.005	<0.0001	0.029	0.042	0.023	0.025	0.985	0.11	0.154
3/08/2022	7.24	161	382	247	590	12	14.2	0.09	0.06	<5	8	7	92	2	49	<0.001	<0.0001	0.006	0.006	0.005	0.003	0.258	0.02	0.032
2/09/2022	8.29	33	387	45	612	9.92	10.8	0.03	0.07	<5	21	7	84	2	81	<0.001	<0.0001	0.001	0.002	0.002	<0.001	0.055	<0.01	0.013
4/10/2022	8.49	34	425	91	575	9.36	11	0.1	0.11	<5	10	8	89	2	58	<0.001	<0.0001	0.002	0.003	0.002	0.001	0.086	<0.01	0.012
3/11/2022	6.84	84	307	138	587	10.2	1.2	0.1	0.06	<5	17	6	83	2	67	<0.001	<0.0001	0.004	0.004	0.002	0.002	0.155	0.02	0.022
LDP2																								
12/01/2022	6.59	12	289	60	405	1.79	2.2	0.04	0.02	<5	17	6	33	1	67	<0.001	<0.0001	0.001	0.001	0.001	<0.001	0.076	<0.01	0.008
14/02/2022	6.95	392	283	199	89	1.12	0.5	0.07	0.02	<5	16	7	48	1	69	<0.001	<0.0001	0.004	0.004	0.003	0.002	0.14	0.02	0.021
7/03/2022	6.75	114	278	134	357	0.35	0.6	0.04	0.01	<5	29	5	35	<1	93	<0.001	<0.0001	0.003	0.003	0.002	0.002	0.169	0.01	0.014
5/04/2022	6.89	5	690	9	1111	0.15	0.2	<0.1	0.02	<5	100	21	82	1	336	<0.001	<0.0001	<0.001	<0.001	0.001	<0.001	0.934	<0.01	<0.005
5/05/2022	6.89	27	1820	19	3010	0.51	0.7	0.01	0.01	<5	435	34	85	2	1230	<0.001	<0.0001	<0.001	0.001	0.002	<0.001	1.23	<0.01	<0.005
3/06/2022	7.2	36	383	142	428	0.32	0.7	0.08	0.04	<5	29	5	35	<1	93	<0.001	<0.0001	0.004	0.004	0.002	0.002	0.124	0.01	0.016
12/07/2022	6.81	254	254	376	279	0.18	<1.0	<0.10	0.04	<5	16	3	26	<1	52	0.001	<0.0001	0.007	0.007	0.005	0.005	0.204	0.02	0.032
3/08/2022	7.18	<5	868	4.4	1318	0.64	0.8	0.01	0.02	<5	158	10	52	1	436	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.329	<0.01	<0.005
2/09/2022	7.62	13	999	7	1582	0.88	1.4	0.02	0.12	<5	222	10	48	11	596	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.213	<0.01	<0.005
4/10/2022	7.72	<5	470	11	702	0.73	1.1	0.02	0.02	<5	76	9	49	1	227	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.124	<0.01	<0.005
3/11/2022	6.99	<5	868	3	1573	0.36	0.6	0.02	0.02	<5	251	11	56	2	672	<0.001	<0.0001	<0.001	<0.001	0.002	<0.001	0.228	<0.01	0.014
5/12/2022	7.11	6	1639	4.2	2500	<0.01	0.4	0.01	<0.01	<5	332	20	81	2	911	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.037	<0.01	<0.005
LDP3																								
12/01/2022	9.11	34	397	34	622	15.6	16.2	0.08	0.03	<5	24	7	79	2	89	<0.001	<0.0001	<0.001	0.002	<0.001	<0.001	0.021	<0.01	0.007
14/02/2022	8.16	672	437	174	103	0.51	1.4	0.08	0.02	<5	22	22	93	2	84	<0.001	<0.0001	0.004	0.005	0.004	0.002	0.199	0.01	0.02
7/03/2022	7.02	177	310	226	451	0.98	1.5	0.12	0.02	<5	15	6	71	1	62	0.001	<0.0001	0.006	0.008	0.006	0.004	0.243	0.02	0.034
5/04/2022	7.35	441	248	637	366	1.18	1.7	0.27	<0.001	<5	13	5	50	1	53	0.002	<0.0001	0.017	0.019	0.014	0.01	0.576	0.06	0.076
5/05/2022	7.56	16	395	15	635	3.2	3.7	0.06	0.02	<5	35	6	66	1	112	<0.001	<0.0001	<0.001	0.002	<0.001	<0.001	0.059	<0.01	<0.005
3/06/2022	7.39	29	378	143	463	2.3	3.2	0.11	0.11	<5	17	6	58	1	67	0.001	<0.0001	0.005	0.006	0.005	0.003	0.154	0.02	0.02
12/07/2022	6.92	229	266	339	318	0.9	<1.0	0.28	0.01	<5	18	3	33	<1	57	0.001	<0.0001	0.009	0.012	0.009	0.006	0.317	0.03	0.042
3/08/2022	7.19	7	386	16.2	582	2.23	2.9	0.02	<0.01	<5	46	6	48	1	140	<0.001	<0.0001	0.002	0.003	<0.001	<0.001	0.067	<0.01	<0.005
2/09/2022	7.73	104	419	20	633	3.67	4.4	0.03	0.03	<5	46	7	60	2	144	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.057	<0.01	<0.005
4/10/2022	7.85	<5	312	19	543	2.13	2.8	0.02	0.03	<5	37	7	58	1	121	<0.001	<0.0001	<0.001	0.002	<0.001	<0.001	0.022	<0.01	0.006
3/11/2022	5.79	11	378	15	795	0.92	1.3	<0.01	<0.01	<5	86	7	59	1	244	<0.001	<0.0001	<0.001	0.001	<0.001	<0.001	0.057	<0.01	<0.005
5/12/2022	7.29	7	611	49.9	666	<0.01	0.5	0.04	<0.01	<5	94	7	70	2	264	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.021	<0.01	<0.005
SW2																								
12/01/2022	6.97	19	576	121	720	12.2	14	0.12	0.05	<5	10	9	102	2	62	<0.001	<0.0001	0.004	0.005	0.002	0.002	0.083	0.01	0.017
14/02/2022	7.23	171	651	387	693	9.78	13.4	0.17	0.01	<5	8	9	105	2	57	0.002	<0.0001	0.02	0.015	0.01	0.006	0.257	0.257	0.07
7/03/2022	7.01	393	760	648	387	7.13	8.1	0.48	0.01	<5	4	5	72	2	30	0.004	<0.0001	0.02	0.033	0.108	0.016	0.458	0.08	0.235
5/04/2022	7.23	340	281	332	142	0.02	0.8	0.24	0.02	<5	7	5	52	2	38	0.002	<0.0001	0.013	0.014	0.011	0.008	0.357	0.04	0.059
5/05/2022	6.84	99	321	129	433	0.69	1.5	0.07	0.02	<5	9	8	55	2	55	<0.001	<0.0001	0.004	0.005	0.004	0.002	0.136	0.02	0.019
3/06/2022	6.77	183	661	357	436	4.41	6.3	0.16	0.03	<5	17	6	58	1	41	0.002	<0.0001	0.012	0.016	0.01	0.009	0.302	0.04	0.064
12/07/2022	6.41	276	447	408	248	2.88	4.4	0.16	0.12	<5	3	3	36	<1	20	0.002	<0.0001	0.008	0.011	0.006	0.008	0.256	0.03	0.043
3/08/2022	6.71	42	333	63.3	520	0.39	1	0.04	0.03	<5	11	13	62	2	81	<0.001	<0.0001	0.006	0.003	0.002	0.002	0.087	0.01	0.012
2/09/2022	7.35	252	342	180	380	3.46	4.7	0.08	0.02	<5	8	6	53	2	45	<0.001	<0.0001	0.005	0.004	0.004	0.003	0.12	0.02	0.023
4/10/2022	7.6	23	387	82	387	0.37	1.2	0.06	0.02	<5	7	10	54	2	59	<0.001	<0.0001	0.003	0.002	0.002	0.001	0.077	<0.01	0.009
3/11/2022	7.18	278	657	569	536	4.11	6.4	0.3	0.06	<5	6	7	73	2	44	0.002	<0.0001	0.015	0.021	0.012	0.011	0.406	0.06	0.081
5/12/2022	7.11	24	292	42.2	599	<0.01	1	1	0.03	<5	13	11	87	3	78	0.001	<0.0001	0.001	0.001	0.002	0.002	0.965	<0.01	0.007
SW3																								
5/04/2022	6.65	80	376	218	142	0.02	0.8	0.24	0.02	<5	3	3	23	1	20	0.002	<0.0001	0.009	0.01	0.006	0.006	0.174	0.03	0.038
5/05/2022	6.8	164	325	195	235	0.03	1	0.12	0.02	<5	6	5	29	1	36	0.001	<0.0001	0.008	0.009	0.006	0.005	0.276	0.03	0.043
12/07/2022	6.08	57	290	160	93	<0.01	1.4	<0.10	0.04	<5	1	2	14	<1	11	<0.001	<0.0001	0.006	0.004	0.004	0.004	0.084	0.01	0.021
2/09/2022	6.78	9	408	365	1655	0.15	1.6	0.17	<0.01	<5	4	3	24	6	22	0.002	0.0002	0.014	0.01	0.009	0.008	0.261	0.04	0.066
4/10/2022	6.66	627	482	631	219	0.07	2	0.49	0.01	<5	5	4	33	1	29	<0.001	<0.0001	0.006	0.015	0.008	0.009	0.279	0.02	0.082
Lot 3																								
12/01/2022	7.16	17	238	70	308	0.02	0.6	0.06	0.02	<5	12	6	30	1	55	<0.001	<0.0001	0.002	0.003	0.002	0.001	0.133	<0.01	0.013
14/02/2022	7.05	659	435	847	381	0.17	1.3	0.36	0.01	<5	10	6	51	2	50	0.003	<0.0001	0.026	0.023	0.017	0.013	0.521	0.09	0.129
7/03/2022	6.84	116	307	138	353	0.22	0.8	0.09	0.01	<5	11	8	53	2	60	0.001	<0.0001	0.005	0.007	0.003	0.003	0.084	0.02	0.024
3/06/2022	7.05	15	370	82	485	0.23	0.7	0.06	<0.01	<5	5	7	63	2	71	<0.001	<0.0001	0.002	0.004	0.002	0.002	0.054	<0.01	0.014
3/08/2022	6.92	56	278	75.9	644	0.15	0.6	0.04	<0.01	<5	18	14	78	2	102	<0.001	<0.0001	0.005	0.003	0.003	0.002	0.148	0.01	0.02
3/11/2022	7.05	58	299	71	613	0.09	1	1	0.03	<5	19	14	81	2	105	<0.001	<0.0001	0.002	0.002	0.001	<0.001	0.064	<0.01	0.008
5/12/2022	7.92	23	352	8.2	1007	<0.01	0.8	0.09	<0.01	<5	18	15	83	2	107	<0.001	<0.0001	0.001	<0.001	0.001	<0.001	0.236	<0.01	0.008

APPENDIX 7 – Audit Action Plan

Ref	Recommendation Description	KEQPL Response/Actions	KEQPL Action Timeframe	Annual Review Update: 2021; 2022
PA 09_0175 (as modified)				
Schedule 2, Condition 8	It is recommended that KEQPL confirms that construction and occupation certificates for site infrastructure are in place.	KEQPL have engaged BCA Certifiers Australia Pty Ltd to undertake an assessment of structures at Karuah East Quarry and associated design documents, with the ultimate goal to have all relevant structures certified.	31/01/2021	KEQ engaged BCA who have undertaken audit of construction and reported findings. This report is in the process of being reviewed and corrective actions undertaken. Actions being completed to satisfy BCA audit non-conformances.
Schedule 2, Condition 11	It is recommended that KEQPL confirms that the developer contributions to Council required during the audit period have been made.	KEQPL are investigating payments made to MidCoast Council to ensure that all required developer contribution payments have been made. If payments have not been made, KEQPL will consult with Council to establish a payment plan.	31/01/2020	No further action required. Council Contribution payments have been made. Ongoing action will be required.
Schedule 3, Condition 3	Pending any further directions from EPA and/or DPIE, it is recommended that noise consultant's monitoring reports are updated to include the following additional details: 1. Instrument details and a copy of current instrument calibration certificates as required by relevant Australian Standards. 2. Measurement results for a location representative of Residences A to E and calculated quarry noise levels to these residences, including calculation details and justification of the calculation method. 3. Detailed assessment and reporting of modifying factors as required by relevant policies and conditions, at least including tonal and low frequency characteristics. 4. Traffic noise measurements at the potentially most affected receptors as required by Schedule 3, Condition 4.	KEQPL have been working in consultation with the Department and EPA towards a modification of the Project Approval. Draft conditions were issued 13/10/20. Upon approval of this acoustic modification, KEQPL will seek a variation of the EPL to ensure that commitments between the two documents (Project Approval and EPL) are aligned. At this stage, KEPLQ will additionally review and where necessary revise the NMP. This will include measures for noise monitoring reports to includes details recommended by the auditor.	30/04/2021	MOD 8 approved NMP was revised and approved in 2022. KEQ NMP most recently revised and approved by DPE April 2022. No further action.
Schedule 3, Condition 4	It is recommended that unattended monitoring charts are included in the monthly monitoring reports as required by Section 8.4 of the NMP, or revise the NMP to not require these charts.	As discussed above, following approval of the acoustic medication, KEQPL will review the NMP and revise where necessary to reflect changes in the Consent conditions and EPL (post variation).	30/04/2021	Pending NMP revision and approval. KEQ NMP most recently revised and approved by DPE April 2022. No further action.
Schedule 3, Condition 6	Consider carrying out a review of noise monitoring results upon receipt of each noise compliance report, to reduce response time in the event of non-compliance with criteria or other noise issues.	KEQPL are committed to operating in a compliant manner. When specialist/technical reports are prepared, they are reviewed as soon as practical then lodged with the ARA. KEQPL will take this recommendation into consideration in the process of reviewing management plans and associated procedures.	N/A	NMP approved 2022. KEQ NMP most recently revised and approved by DPE April 2022. No further action.
Schedule 3, Condition 7	It is recommended that the Noise Management Plan is revised to reflect the noise mitigation measures that were adopted by KEQ following completion of the Thearle Acoustics review that are in addition to or change the noise management commitments in the KEQ EA.	As discussed above, following approval of the acoustic medication, KEQPL will review the NMP and revise where necessary to reflect changes in the Consent conditions and EPL (post variation).	30/04/2021	NMP approved 2022. KEQ NMP most recently revised and approved by DPE April 2022. No further action.
Schedule 3, Condition 11	It is recommended that KEQ consult with relevant private landholders and seek to enter into written agreements to allow blasting within 500 m of their land.	KEQPL have operated in accordance with the approved Blast Management Plan (2015) which identifies that there are no residents/receivers within 500 metres from the potentially nearest blasting areas. Refer to *Section 3.4 – Sensitive Receivers* of the *Karuah East Quarry Blast Management Plan* for further details. KEQPL have never received a community complaint regarding blasting undertaken at the Quarry. KEQPL will consult with the Department to determine if any action is required.	31/01/2021	KEQ are in consultation with DPE. Private Landholder Agreement with property owner of Lot 11 has been finalised. KEQ BMP is being revised and will seek approval by DPE in next reporting period.
Schedule 3, Condition 21	It is recommended that written confirmation of approval is sought from DPIE during the next update of the WMP.	KEQPL agree with this recommendation and will consult with the Department during the next review of the WMP.	30/04/2021	WMP revision continued. KEQ WMP is being revised and will seek approval by DPE in next reporting period.

Ref	Recommendation Description	KEQPL Response/Actions	KEQPL Action Timeframe	Annual Review Update: 2021; 2022
Schedule 3, Condition 21	It is recommended that KEQ implement a program to monitor the health of local watercourses under the Water Management Plan.	KEQPL will consult with the Department during the next review of the WMP and BOAMP to determine whether additional monitoring is required to monitor the health of local watercourses. However, let it be noted that local watercourses are monitored and reported on in the annual Biodiversity Offset Area Monitoring Report; this is in line with the approved BOAMP.	30/04/2021	Ecologists have been consulted on this matter. Revision of BOAMP is underway. This recommendation will be further investigated during revision of the WMP. KEQ WMP is being revised and will seek approval by DPE in next reporting period.
Schedule 3, Condition 23, Schedule 5, Condition 11	It is recommended that the information required under this condition is regularly reviewed and published on the KEQ website on a quarterly basis.	KEQPL agree with this recommendation. Future environmental monitoring reports will include information on the factors identified in mentioned conditions.	31/01/2021	Adopted. Action closed out. No update required.
Schedule 3, Condition 27	Cumberland Ecology recommends that the TJTMP be updated to include performance criteria to measure the effectiveness of the program.	The TJTMP ceases after 2020. KEQPL will take this into consideration when reviewing the TJTMP.	30/04/2021	Review of this program and consultation with relevant government department to be undertaken at appropriate time. The KEQ TJTMP monitoring program has been completed, no further formal monitoring is required. No further action.
Schedule 3, Condition 27	Cumberland Ecology recommends that 2020 monitoring include all required monitoring methods, and if undertaken outside of October 2020 an explanation of the change in survey date.	Firebird ecoSultants Pty Ltd were engaged to conduct the TJ monitoring for 2020, however; after attending site and undertaking an inspection, the monitoring was postponed due to a lack of flowering. Monitoring of the TJ has typically been done during it's flowering period, which varies dependant on climatic conditions. The auditor's recommendation will be taken into consideration when a review of the TJTMP is undertaken.	30/04/2021	Review of this program and consultation with relevant government department to be undertaken at appropriate time. The KEQ TJTMP monitoring program has been completed, no further formal monitoring is required. No further action.
Schedule 3, Condition 30	It is recommended that KEQ seek written confirmation from DPIE of an extension to the timeframe required to continue consultation and implement long-term security for the project Biodiversity Offset Strategy.	Officers of the Biodiversity Conservation Trust are attending site in November to assess the Biodiversity Area and consult on the progress of the Biodiversity Offset Strategy. KEQPL will consult with the Department and seek extension to the timeframe required if required.	31/01/2021	Closed out following 2020 and 2021 meetings. MOD 10 was lodged in July 2021 and is under assessment. No update required.
Schedule 3, Condition 32	Cumberland Ecology recommends that the LRMP be updated to include a three year management schedule for the period November 2018 – November 2021.	KEQPL agree with the recommendation made by the auditor and will conduct a revision of the LRMP in the near future. The revisions describe here will be made.	30/04/2021	Pending LRMP revision and approval. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
	It is recommended that KEQ record and report all information required under implementation the LRMP.	During the revision of the LRMP, KEQPL will ensure all procedures to record and report are examined and responsible employees are made aware of their obligations.	30/04/2021	Pending LRMP revision and approval. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
Schedule 3, Condition 33	Cumberland Ecology recommends that the BOAMP be updated to include a three year management schedule for the period November 2018 – November 2021.	KEQPL agree with this recommendation by the auditor. KEQPL have already engaged Kleinfelder to revise the BOAMP to reflect changes to the Project Approval. While this revision is taking place, KEQPL will request Kleinfelder to make these recommended changes.	30/04/2021	Pending LRMP revision and approval. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
Schedule 3, Condition 35	No evidence was available at the time of audit to confirm that the Conservation and Rehabilitation Bond was reviewed within three months of the previous IEA.	This is proposed to be completed.	30/06/2021	Pending completion. The Conservation and Rehabilitation Bond has been reviewed and approved by the DPE. KEQ are currently waiting for the DPE to provide financial information to complete the bond revision with respective financial institute.

Ref	Recommendation Description	KEQPL Response/Actions	KEQPL Action Timeframe	Annual Review Update: 2021; 2022
Schedule 3, Condition 37	It is recommended that KEQ consult with DPIE over the progressive rehabilitation strategy for the visually prominent ridgeline identified in this condition and update the Landscape and Rehabilitation Management Plan, if required.	During the process outline above, KEQPL will consult with the Department over the progressive rehabilitation strategy of the ridgeline. This visual factor has been considered by KEQPL and it believed that as rehabilitation of the neighbouring quarry (Karuah Hard Rock Quarry) is established and finalised over the next few years, this visual impact will be mitigated.	30/04/2021	Pending LRMP revision and approval. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
Schedule 4, Condition 1	It is recommended that KEQ update their notification procedures to ensure the relevant landholders are notified as soon as possible after receipt of monitoring results confirming that an exceedance has occurred.	KEQPL are committed to operating in a compliant manner and maintaining positive relations with community. Over recent years, this positive relationship can be demonstrated by the lack of complaints received from community and positive feedback received at Community Consultation Committee meetings. KEQPL will review and where necessary revise the notification procedures followed when notifying landholders of pollution incidents.	30/04/2021	Pending PIRMP revision and approval. KEQ PIRMP is being revised and will seek approval by DPE in next reporting period.
Schedule 5, Condition 1	It is recommended that KEQ undertake a review of the approved EMS to ensure that the document remains consistent with environmental monitoring requirements and approved site management plans. Consultation with DPIE should be undertaken if major updates to the 2015 version of the EMS are required.	KEQPL will undertake a review of the EMS and revise if deemed necessary at the conclusion of this IEA.	31/01/2021	EMS revision continued in 2021. KEQ EMS is being revised and will seek approval by DPE in next reporting period.
Schedule 5, Condition 2	It is recommended that KEQ update their communications and incident response procedures to ensure that any future exceedances of the Project Approval criteria and any implementation management controls / remediation measures are reported to DPIE at the earliest opportunity once they are identified.	KEQPL re in the process of reviewing and where necessary revising the PIRMP. During this process KEQPL will review all communication and notification procedures for reporting of pollution exceedances to ARAs.	30/04/2021	Pending PIRMP revision and approval. KEQ PIRMP is being revised and will seek approval by DPE in next reporting period.
Schedule 5, Condition 5	It is recommended that KEQ document any reviews undertaken as required under this condition.	KEQPL agree with this recommendation. A controlled templates will be prepared for use when reviewing documents (such as procedures or management plans).	30/04/2021	Pending procedural revision. KEQ have a *Change Management Form* utilised to outline reviews/revisions of documents in the Environmental Management System, in accordance with ISO 14001 certification. No further action.
Schedule 5, Condition 7	Evidence was not available at the time of audit to confirm that KEQ had notified DPE and other relevant regulatory agencies of all environmental incidents.	Complete notifications as per this condition.	31/01/2021	This has been completed. Closed off. No update required.
Schedule 5, Condition 10	It is recommended that the KEQ response this IEA and implementation of actions are summarised in the next KEQ Annual Review.	KEQPL agrees with this recommendation and will ensure that the KEQPL RAR and status of actions is reported in the next Annual Review.	31/03/2021 (due date of next Annual Review)	Completed. No update required.
Schedule 5, Condition 11	The response to the previous IEA recommendations was not available on the KEQ website at the time of the audit.	Add Action Plan	31/01/2021	Completed. No update required.
PA 09_0175 (as modified) SOCs				
SoC 3.1	It is recommended that topsoil stripping depths and associated stockpile locations are recorded during future clearing works to assist with site rehabilitation.	KEQPL agree with this recommendation. During revision of the LRMP, this recommendation will be taken into consideration and if necessary, a procedure will be prepared to ensure future stripping works record critical information (such as stripping depths and stockpile locations).	30/04/2021	LRMP revision continued. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
SoC 3.1	It is also recommended that KEQ develop an internal topsoil stripping and stockpiling procedure to ensure that the information under this SoC is retained on site to assist in site rehabilitation.	KEQPL agree with this recommendation. During revision of the LRMP, this recommendation will be taken into consideration and if necessary, a procedure will be prepared to ensure future stripping works record critical information (such as stripping depths and stockpile locations).	30/04/2021	LRMP revision continued. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.
SoC 4.1	Recommend that KEQ review the process for salvage of large logs during clearing and whether any further emplacement of additional material would be beneficial in Lots 12 and 13.	KEQPL currently use fallen trees to create natural wooden bunding around the boundary of the disturbance area. Additionally, KEQPL have had approximately 300 nest boxes installed through the Biodiversity Offset area. These nest boxes are monitored and maintained yearly by trained ecologists. Albeit, KEPLQ will take this recommendation into consideration when revising the LRMP.	30/04/2021	LRMP revision continued. KEQ LRMP most recently revised and approved by DPE March 2020. KEQ LRMP is currently being revised and approval will be sought by DPE in next reporting period.

Ref	Recommendation Description	KEQPL Response/Actions	KEQPL Action Timeframe	Annual Review Update: 2021; 2022
EPL 20611				
Condition A1.2	It is recommended that KEQPL consult with EPA over the approved use of soil and overburden material from KEQ to assist with the final rehabilitation of the adjacent Karuah Quarry site and confirm whether an associated variation to EPL 20611 is required.	KEPL agree with this recommendation and will consult with the EPA regarding this matter as soon as practical to ensure there are no compliance issues as a result of this process.	31/01/2021	KEQ consulted with the EPA and resolved this matter. No update required.
Condition L4.5	Bridges Acoustics recommendation: Require consultants to specifically report assessment methods and results for tonal and low frequency modifying factors, as required by this condition, for all attended noise compliance surveys.	KEQPL will take this recommendation into consideration when undertaking revision of the NMP.	30/04/2021	NMP revision (approved 2022). No update required.
Condition L5.7	It is recommended that future Annual Reviews provide comment regarding the management of blast fume.	KEQPL agree with this recommendation. During review of the BMP, revision will be made to blast monitoring to direct blast technicians to report on blast fumes in the Post Blast Report. This detail will also be reported on in the Annual Review.	30/04/2021	Pending BMP revision. Post blast fume assessment criteria has been added to the pre/post blast assessment document in the Safety Management System to satisfy this condition. Additionally, the KEQ BMP is being revised and will seek approval by DPE in next reporting period.
Condition M5.1	It is recommended that the Complaints Register available on the KEQ website is updated on a quarterly basis.	KEQPL agree with this recommendation. Fortunately, KEQPL have not received any complaints in recent times, however; understand the importance to keep the register up-to-date and published. Future environmental monitoring reports will include quarterly updates on the Complaints Register.	31/01/2021	Reporting of complaints has been added to the monthly environmental monitoring reports, which are published monthly on the *Hunter Quarries* website. No update required.