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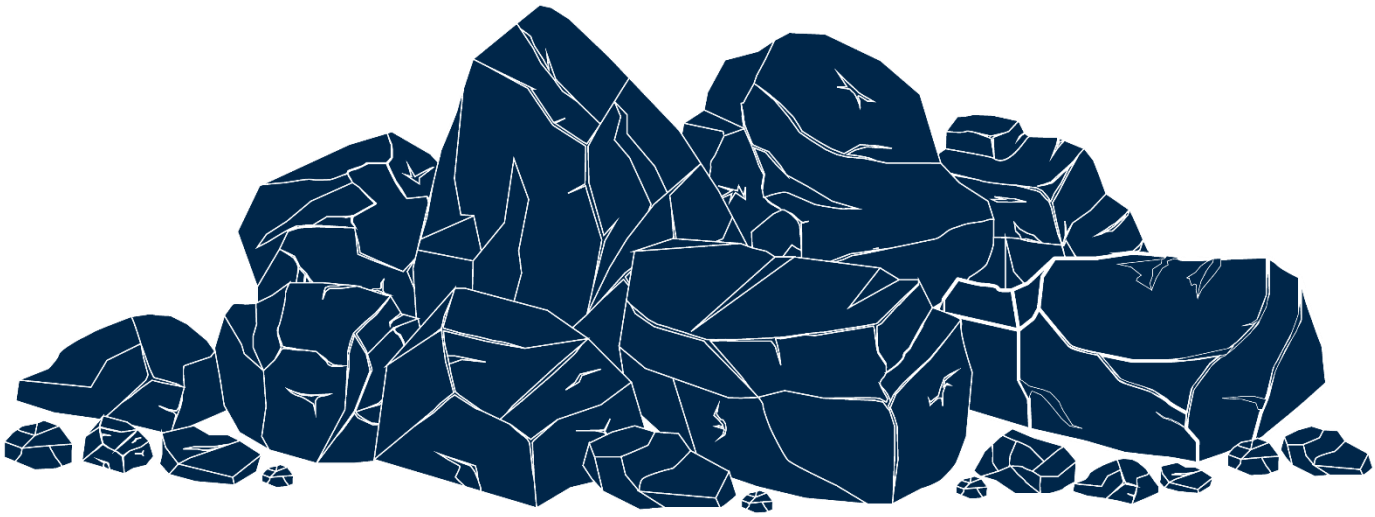
Karuah Hard Rock Quarry

Annual Review 2024

16 January 2024 to 15 January 2025



Annual Review Title Block

Table 1 Karuah Hard Rock Quarry Annual Review 2024 Title Block.

Name of Operation:	Karuah Hard Rock Quarry
Name of Operator:	Hunter Quarries Pty Ltd
Development Consent:	DA 265-10-2004
Name of holder of Development Consent:	Hunter Quarries Pty Ltd
Mining Lease:	N/A
Water Licences:	None
MOP / RMP:	N/A
Annual Review Start Date:	16 January 2024
Annual Review End Date:	15 January 2025

I, **Scott Ellerton**, certify that this audit report is a true and accurate record of the compliance status of **Karuah Hard Rock Quarry** for the period **16 January 2024** to **15 January 2025** and that I am authorised to make this statement on behalf of **Hunter Quarries Pty Ltd**.

Note.

A. *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.*

B. *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:	Scott Ellerton
Title of Authorised Reporting Officer:	Environment & Development Manager
Signature of Authorised Reporting Officer:	
Date:	14 March 2025

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Glossary

Abbreviation / Term	Meaning
ACH	Aboriginal Cultural Heritage
AR / AEMR	Annual Review / Annual Environmental Management Report
AQMP	Air Quality Monitoring Program
BfMP	Bushfire Management Plan
CCC	Community Consultative Committee
COA	Conservation Offset Area
DA	Development Application
DDG	Dust Deposition Gauge
EA	Environmental Assessment
EC	Electrical Conductivity measured in µS/cm
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management Strategy
EMS&MP	Environmental Management Strategy & Monitoring Program
EPA	NSW Environment Protection Authority
EPL	NSW Environment Protection Licence
F&FMP	Flora & Fauna Management Plan
HVAS	High Volume Air Sampler
HQPL	Hunter Quarries Pty Ltd
IEA	Independent Environmental Audit
KHRQ	Karuah Hard Rock Quarry
KEQ	Karuah East Quarry
KEQPL	Karuah East Quarry Pty Limited
km	Kilometre
ML	Megalitre
LDP	Licenced Discharge Point
MCC	MidCoast Council
NSW Planning	NSW Department of Planning, Housing and Infrastructure
NMP	Noise Monitoring Program
NTU	Nephelometric Turbidity Unit
POEO Act	*Protection of the Environment Operations Act 1997*
RAR	Response to Audit Recommendations
RAP	Registered Aboriginal Parties
RCP	Rehabilitation and Closure Plan
RFS	NSW Rural Fire Service
RL	Reduced Level
SD2	Sediment Dam 2
SWMP	Site Water Management Plan
Tpa	tonnes per annum
TSS	Total Suspended Solids measured in mg/L
WPC	Wedgetail Project Consulting

1.0 Statement of Compliance

The compliance status of the Karuah Hard Rock Quarry (KHRQ) site at the end of the 2024 Annual Review reporting period is summarised by **Table 2**, **Table 3**, and **Table 4** below, in reference to the site's Development Consent and Environment Protection Licence (EPL).

Table 2 Statement of Compliance.

Were all conditions of the relevant approval(s) complied with?	
Development Consent (DA 265-10-2004)	No
Environment Protection Licence (EPL 11569)	Yes

Table 3 Compliance Status Key (NSW Planning Annual Review Guideline, October 2015).

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.
Administrative	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 4 Summary of Non-Compliances.

Relevant Approval	Condition	Condition Aspect	Compliance Status	Description	Section
Development Consent	Schedule 3, Condition 13	Air Quality	Non-compliant	Anomalous exceedance of one Depositional Dust Gauge in the October 2024 monitoring period.	**Section 6.2 and Section 11.0**

2.0 Introduction

This Annual Review covers the reporting period from the **16 January 2024** to **15 January 2025** for the Karuah Hard Rock Quarry site.

Mountain Industries obtained approval to operate the Karuah Hard Rock Quarry (KHRQ) in 1997, with the site subsequently purchased by Hunter Quarries Pty Ltd (HQPL) in 2002. In October 2004, HQPL applied to the then Department of Infrastructure, Planning and Natural Resources (now known as the Department of Planning, Housing and Infrastructure – NSW Planning) for approval to expand the quarry into adjoining lands (the Stage 2 Extraction Area) to allow the extraction of further andesite reserves.

Development Consent was granted by the Minister for Infrastructure, Planning and Natural Resources on 03 June 2005 (DA 265-10-2004), with the approved development including:

- Implementing the remainder of the approved Stage 1 Extraction Area;
- Extending the quarry operations into the Stage 2 Extraction Area;
- Upgrading and using existing infrastructure on site;
- Rehabilitating the site by re-contouring and revegetating exposed surfaces; and
- Producing up to 500,000 tonnes per annum of andesite product over the next 22 years.

The KHRQ site contributes materials to the construction, civil infrastructure and land development industries in the Greater Newcastle, Hunter Valley and Mid-North Coast regions. The site is located approximately five kilometres north-east of the village of Karuah in the MidCoast LGA. The overall site covers an area of approximately 78.5 Ha across the following properties as outlined by **Figure 1**:

- Lot 21 DP 1024564 consisting of material processing and product stockpiling;
- Lot 11 DP 1024564 consisting of the Stage 2 Extraction Area; and
- Part Lot 12 DP 1024564 consisting of the Conservation Offset Area (COA).

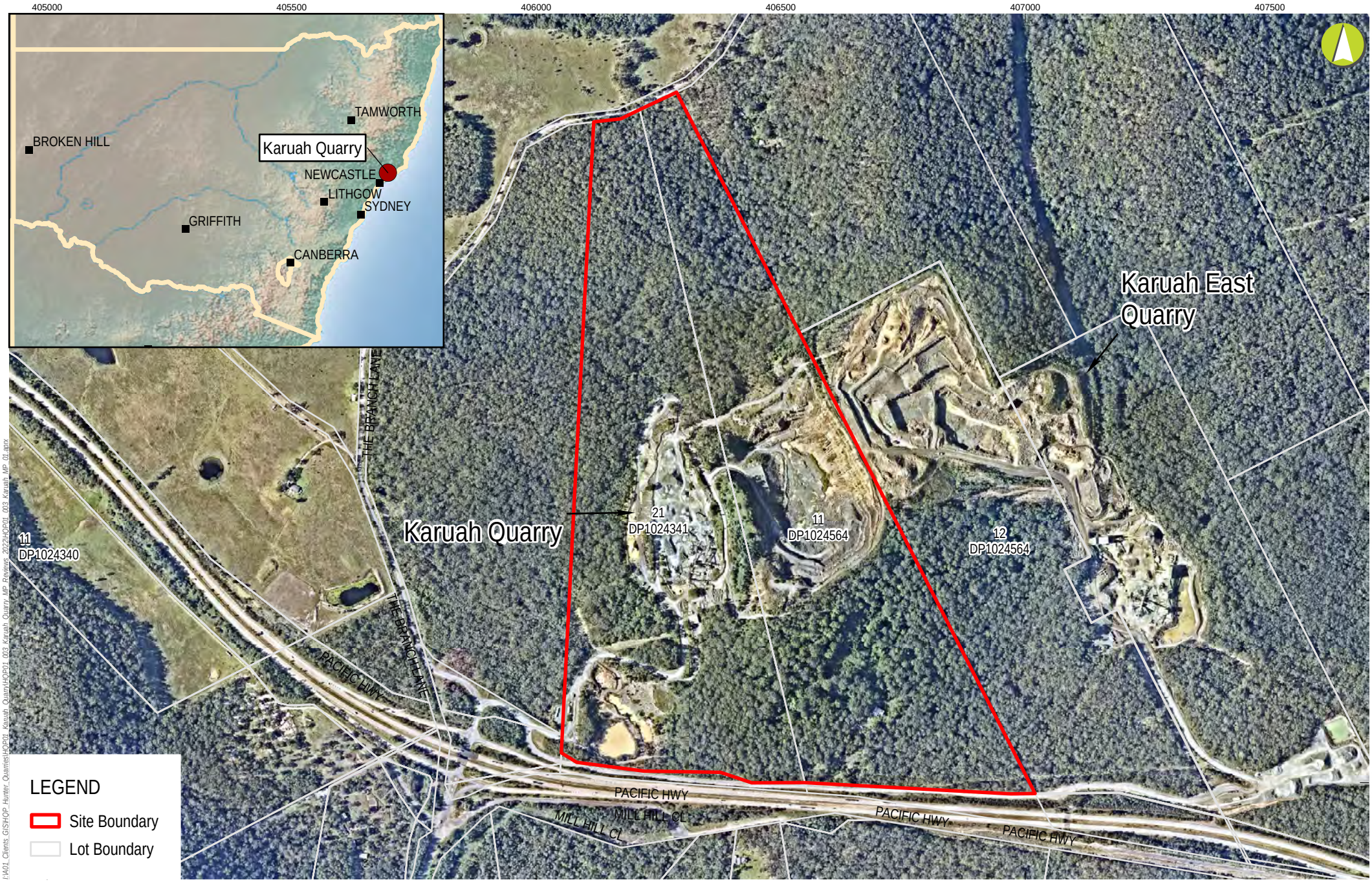
Figure 1 and **Figure 2** illustrate the site within its broader regional context and site layouts respectively.

2.1 Quarry Contacts

Key personnel who are responsible for environmental management of the operation are provided by **Table 5.**

Table 5 Key Quarry Contacts.

Position	Name	Contact	Contact Priority
Environment & Development Manager	Scott Ellerton	0447 044 646	Primary Contact
Quarry Manager	Darryn Bosch	0490 405 375	Secondary Contact
General Manager	Dylan Nagle	0438 380 701	–



Karuah Hard Rock Quarry

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FIGURE 1 - Regional and Local Context

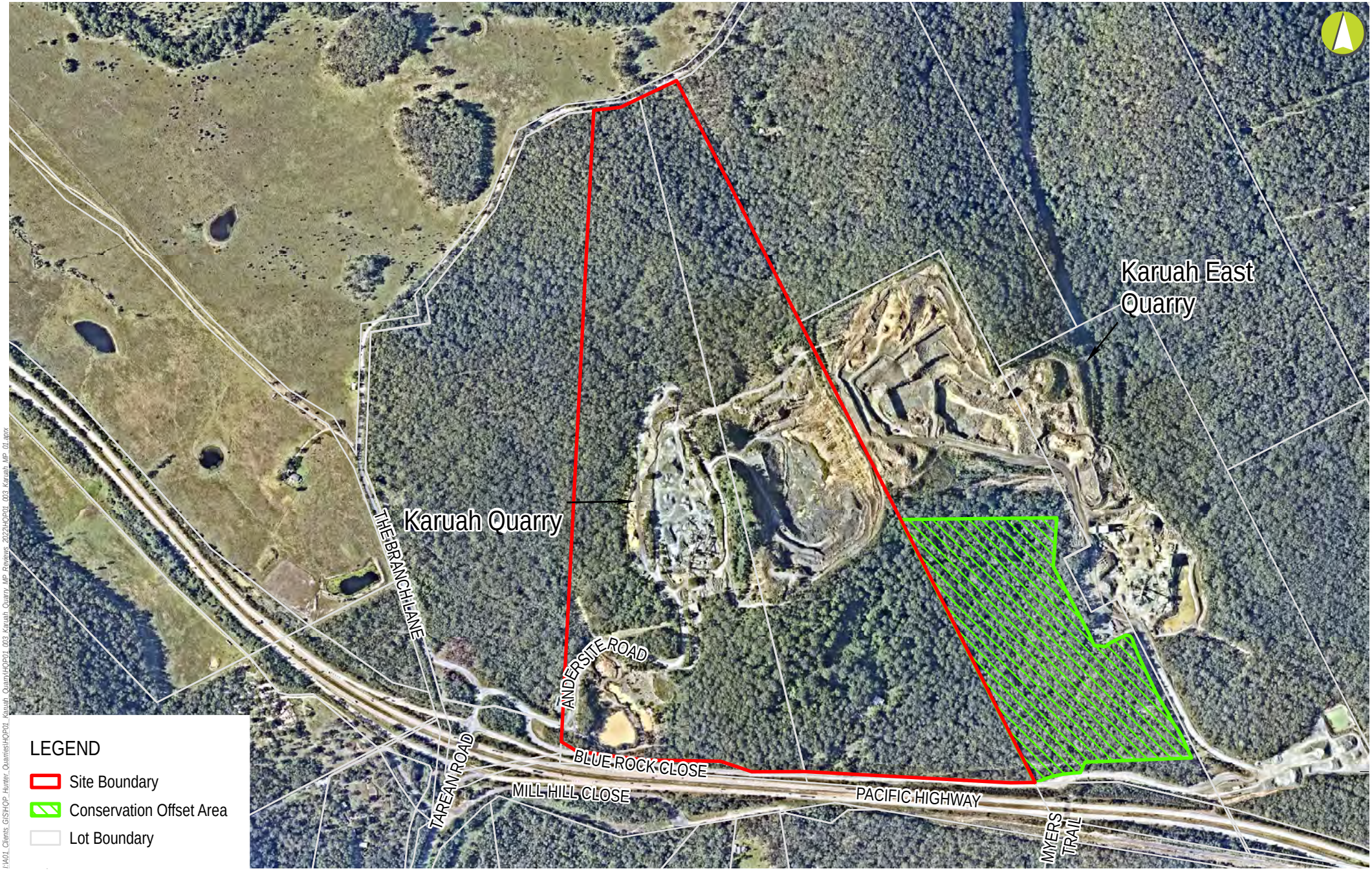

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FIGURE 2 - Locality Plan

3.0 Approvals

3.1 State Approvals

A summary of the approvals benefiting the Karuah Hard Rock Quarry are provided in **Table 6**. The Development Consent was granted in 2005 for 22-years allowing the extraction of a total of 11.2 Mt of andesite. No modifications have been approved to the Development Consent.

Since the granting of the Development Consent on 03 June 2005, the Environment Protection Licence (EPL) has been subject to eight variations as summarised by **Table 7**.

In 2024, one variation application was approved to undertake minor adjustments to the locations of the site's Depositional Dust Gauges (DDG).

Table 6 Approvals associated with the Karuah Hard Rock Quarry.

Instrument	Grant Date	Expiry Date	Comments
Development Consent (DA 265-10-2004)	03/06/2005	03/06/2027	Primary statutory approval for the site under NSW *Environmental Planning and Assessment Act 1979*.
Environment Protection Licence (EPL 11569)	16/01/2015	-	Primary statutory licence for the site under NSW *Protection of the Environment Operations Act 1997.*

Table 7 Variations to the Environment Protection Licence for the Karuah Hard Rock Quarry.

No.	Variation Date	Description
1	30/06/2005	Increase in fee-based activity classifications.
2	14/09/2006	Licence review to remove completed Pollution Reduction Programs.
3	16/04/2007	Variation of Condition L6.3 to be consistent with the KHRQ Development Consent.
4	04/05/2010	Licence review and subsequent administrative changes.
5	29/12/2011	EPA software upgrade.
6	26/08/2016	Licence review and subsequent modernisation of licence conditions.
7	20/07/2020	Licence review and subsequent administrative changes.
8	06/12/2024	Minor adjustment of DDG locations.

3.2 Statutory Requirements of this Annual Review

Requirements of the Annual Review are summarised in **Table 8**.

Table 8 Summary of Statutory Requirements of the Annual Review.

No.	Aspect	Requirement	Section
Schedule 3 – Specific Environmental Conditions			
Condition 23	**FLORA AND FAUNA**	***Reporting*** *The Applicant shall include a progress report on the implementation and performance of the Flora and Fauna Management Plan and the Conservation Offset Strategy in the AEMR.*	**Section 6.6**
Condition 29	**VISUAL IMPACT**	*The Applicant shall:* *a) implement all practicable measures to minimise the visual impacts of the development;* *b) retain, re-vegetate and subsequently maintain a visual bund within the Stage 1 works area (in accordance with Figures 13 and 14 of the EIS) to minimise the visual impacts of development;* *c) include a progress report on the re-vegetation and maintenance of the visual bund in the AEMR,* *to the satisfaction of the Director General.*	**Section 8.2**
Condition 34	**WASTE MANAGEMENT**	*The Applicant shall:* *a) monitor the amount of waste generated by the development;* *b) investigate ways to minimise waste generated by the development;* *c) implement reasonable and feasible measures to minimise waste generated by the development; and* *d) report on waste management and minimisation in the AEMR.* *to the satisfaction of the Director-General.*	**Section 6.7**
Condition 37	**PRODUCTION DATA**	*The Applicant shall:* *a) provide annual production data to the DPI (Minerals) using the standard form for that purpose; and* *b) include a copy of this data in the AEMR.*	**Section 4.1**
Condition 39	**REHABILITATION**	***Reporting*** *The Applicant shall include a progress report on the Rehabilitation Management Plan in the AEMR.*	**Section 8.1**
Schedule 4 – Environmental Management, Monitoring, Auditing and Reporting			
Condition 5	**ANNUAL REPORTING**	*The Applicant shall prepare and submit an AEMR to the Director-General and the relevant agencies. This report must address:* *a) identify the standards and performance measures that apply to the development;*	**Section 6.0, Section 7.0 and Section 8.0**
		b) describe the works carried out in the last 12 months;	**Section 4.0 and Section 5.0**

No.	Aspect	Requirement	Section
Condition 5 cont.	ANNUAL REPORTING	*c) describe the works that will be carried out in the next 12 months;*	**Section 4.6 and Section 12.0**
		d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;	**Section 9.0**
		e) include a summary of the monitoring results for the development during the past year;	**Section 6.0 and Section 7.0**
		f) include an analysis of these monitoring results against the relevant: • *impact assessment criteria;* • *monitoring results from previous years; and* • *predictions in the EIS;*	**Section 6.0 and Section 7.0**
		g) identify any trends in the monitoring results over the life of the development;	**Section 6.0 and Section 7.0**
		h) identify any non-compliance during the previous year; and	**Section 11.0**
		i) describe what actions were, or are being taken to ensure compliance.	**Section 11.0 and Section 12.0**

3.3 Summary of Environmental Management Plans

A summary of the site's Environmental Management Plans is provided in **Table 9**.

Table 9 Summary of Statutory Environmental Management Plans.

Environmental Management Plan	Status	2025 Action
Environmental Management Strategy & Monitoring Program	Comprehensive review and document consolidation completed in June 2024 and approved by NSW Planning on 18 December 2024.	Complete a review of the document incorporating in the findings of the 2024 IEA.
Bushfire Management Plan	Comprehensive review last completed in May 2023 by IEMA.	–
Flora and Fauna Management Plan	Comprehensive review last completed in September 2020 by SLR Consulting Australia.	Complete the statutory 5-yearly comprehensive review.
Site Water Management Plan	Comprehensive review last completed in September 2023 by IEMA. An administrative update was completed in December 2024 by HQPL.	–
Rehabilitation and Closure Plan	Comprehensive review completed in 2023 and approved by NSW Planning on 29 November 2024.	Continue to review document incorporating the outcomes of detailed closure investigations and land-use planning.

4.0 Operations Summary

The Karuah Hard Rock Quarry site operated during the 2024 Annual Review reporting period as outlined below.

4.1 Quarry Production Summary

The monthly production summary during the reporting period is included in **Table 10**; and a long-term production summary is provided in **Table 11** since 2005.

In 2024, increased production from the site (compared to 2021 and 2022) continued during the first four months of the year due to on-going major supply contracts for state significant infrastructure projects including the Newcastle Inner City Bypass (SSI-6888) and the M1 Pacific Motorway Extension to Raymond Terrace (SSI-7319).

Schedule 2, Condition 7 outlines a life of quarry production limit of 11.2 Mt of andesite and forecast production for 2025 will remain within this limit.

Table 10 Monthly Quarry Production Data.

Month	Production (t)	Truck Loads (#)
16 to 31 Jan-24	31,111	928
Feb-24	73,874	2,247
Mar-24	46,529	1,419
Apr-24	35,168	1,076
May-24	13,584	419
Jun-24	17,217	511
Jul-24	19,502	629
Aug-24	14,401	497
Sep-24	16,140	504
Oct-24	16,648	494
Nov-24	12,490	413
Dec-24	10,755	295
01 to 15 Jan-25	3,257	2,247
2024 TOTAL:	**310,676**	**11,679**
2025 FORECAST:	**180,000**	**6,000**

Table 11 Production Data Summary since 2005.

Annual Review Reporting Period	Production (t)	Notes
01/01/2005 – 31/07/2006	595,898	19-month period
01/08/2006 – 31/07/2007	338,528	
01/08/2007 – 31/07/2008	494,117	
01/08/2008 – 31/07/2009	779,006	
01/08/2008 – 31/07/2009	460,294	
01/08/2010 – 15/01/2012	637,234	16-month period
16/01/2012 – 15/01/2013	460,148	
16/01/2013 – 15/01/2014	458,040	
16/01/2014 – 15/01/2015	442,831	
16/01/2015 – 15/01/2016	412,779	
16/01/2016 – 15/01/2017	497,077	
16/01/2017 – 15/01/2018	498,752	
16/01/2018 – 15/01/2019	459,059	
16/01/2019 – 15/01/2020	456,990	
16/01/2020 – 15/01/2021	95,648	
16/01/2021 – 15/01/2022	119,833	
16/01/2022 – 15/01/2023	148,515	
16/01/2023 – 15/01/2024	276,605	
16/01/2024 – 15/01/2025	310,676	
TOTAL:	**7,942,030**	

4.2 Land Preparation

Extraction Boundary Audit

In November 2024, minor land clearing was conducted within the approved Stage 2 Extraction Area following the outcomes of a survey audit of the approved extraction boundary of Stage 2 Extraction Area.

In October 2024, ADW Johnson Pty Ltd prepared a survey audit of the previously approved survey plan (Asquith de Witt, 2006) and associated physical survey marks installed within the approved Stage 2 Extraction Area, as required by Schedule 2, Condition 12(c) of the Development Consent. The audit resulted in nominal adjustments to the approved extraction boundary, informed by the following process:

- Digitisation of the approved pit shell to accurately identify the approved extraction limits as provided within Appendix 1 of the Development Consent (DA 265-10-2004);
- Previously identified coordinates and survey marks were located and replaced where appropriate (and able to be safely accessed); and
- New survey marks were installed as required and delineated in continuous yellow flagging tape.

A new survey plan of extraction (inclusive of coordinates) was produced and submitted to NSW Planning on 03 October 2024, in accordance with Schedule 2, Condition 12(b) of the Development Consent, which was formally acknowledged on 14 October 2024 via the NSW Major Projects Portal.

Minor Land Clearing

Following confirmation and survey marking of the approved extraction boundary, the need for minor clearing was identified. The clearing was completed during November 2024. In accordance with the Vegetation Clearing Protocol in the approved Flora and Fauna Management Plan (dated September 2020), the following occurred prior to and during clearing:

- A pre-clearance survey was undertaken by a suitably qualified ecologist from Wedgetail Project Consulting (WPC) on 22 October 2024. Refer to the Pre-Clearing Survey Report dated 13 November 2024, provided in **Appendix 2**.
- Felling supervision for habitat trees was undertaken by a suitably qualified ecologist from WPC on 14 November 2024, addressing the soft felling of a total of three (3) hollow bearing trees. Refer to the Habitat Tree Felling Supervision Report dated 22 November 2024 provided in **Appendix 2**.

4.3 Construction Activities

No construction activities were completed during the 2024 reporting period.

4.4 Operating Hours

For the 2024 reporting period the KHRQ site was operated within the operating hours provided by Schedule 3, Condition 2 of the Development Consent as outlined by **Figure 3**.

No temporary extensions to operating hours were sought from the Planning Secretary and no directions from statutory authorities were received during the 2024 reporting period.

Operating Hours

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

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

Table 1: Operating Hours for the Development

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

Figure 3 Operating Hours as specified in the Development Consent.

4.5 Operating Equipment

During the 2024 reporting period the following equipment was available for use during operational periods:

- 2x Excavators,
- 2x Front End Loaders,
- 2x Articulated Haul Trucks,
- 1x Mini Digger,
- 1x Posi-track,
- 1x Mobile Screen,
- 1x Mobile Stacker,
- 1x 15,000 litre Water Cart,
- 1x Elevated Work Platform, and
- 1x Telehandler.

4.6 Next Reporting Period

Forecast operations for the next 2025 reporting period are summarised by **Table 12**.

Table 12 Forecast Operations for the Next 2025 Reporting Period.

Aspect	Forecast Operations for the Next 2025 Reporting Period
Quarrying Operations	Continuation of quarrying activities within the approved extraction pit until approximately Q4 CY2025 when site works for rehabilitation are planned to commence on Lot 11. Processing and sales of remaining stockpiled material are expected to continue through to early 2026 on Lot 21.
Infrastructure Upgrades	No major infrastructure upgrades are planned; however, routine maintenance to structural assets will continue to be completed subject to economic business cases and in accordance with operational requirements and the expected life of fixed plant.
Equipment Upgrades	No major equipment upgrades are planned; however, routine replacement of equipment will continue to be completed subject to economic business cases and in accordance with operational requirements and the expected life of mobile plant and equipment.
Rehabilitation	Rehabilitation is proposed to commence in Q4 CY2025 in accordance with the schedule as outlined by the approved Rehabilitation and Closure Plan.

5.0 Actions Required from Previous Annual Reviews

HQPL received correspondence from NSW Planning on 26 September 2024 regarding the 2023 Annual Review, which confirmed that NSW Planning considered the document to generally satisfy the reporting requirements of the Development Consent and the Annual Review Guideline (October, 2015).

A summary of the actions required as an outcome of the previous 2023 Annual Review are summarised in **Table 13**.

Table 13 Summary of Previous Actions.

ID	Action Required	Status	Section
KHRQ Findings – 2022 Annual Review			
2022-8	Seek approval from DPE for several updated Management Plans, including: • Site Water Management Plan, • Bushfire Management Plan, • Environmental Monitoring Program, • Surface Water Monitoring Plan, • Rehabilitation and Closure Plan, • Environmental Management Strategy, and • Flora and Fauna Management Plan.	**Complete** All Management Plans requiring comprehensive reviews have now been undertaken, except for the Flora and Fauna Management Plan which is addressed by **Action #2023-3**.	**Section 3.3**
KHRQ Findings – 2023 Annual Review			
2023-1	Submit final revision of the Rehabilitation and Closure Plan to NSW Planning for approval, following consultation with MidCoast Council.	**Complete** NSW Planning approved the Rehabilitation and Closure Plan on 29 November 2024.	**Section 3.3**
2023-2	Complete the statutory 5-year comprehensive review of the Environmental Management Strategy.	**Complete** NSW Planning approved the consolidated Environmental Management Strategy & Monitoring Program on 18 December 2024.	**Section 3.3**
2023-3	Complete the statutory 5-year comprehensive review of the Flora and Fauna Management Plan.	**On-going – DUE 30/09/2025** The Flora & Fauna Management Plan was last reviewed in September 2020; and therefore the 5-year statutory review is due by 30 September 2025. This review will incorporate any findings of the 2024 IEA.	**Section 3.3**
2023-4	Undertake the statutory 5-year Independent Environmental Audit (IEA).	**Complete** Talis Consultants commenced the 2024 IEA on 04 November 2024, with final submission of the IEA Report and HQPL's Response to Audit Findings submitted on 04 March 2025. An update on actions are provided by **Section 10.0** and **Section 12.0**.	**Section 10.0 and Section 12.0**

ID	Action Required	Status	Section
2023-5	Submit EPL Variation (in conjunction with KEQPL) to undertake minor relocation of two depositional dust gauges.	**<u>On-going – DUE 30/06/2025</u>** Variation 8 to the EPL was approved by the EPA on 06 December 2024. The corresponding variation application to EPL 20611 for the adjacent Karuah East Quarry was approved on 17 February 2025. At the time of writing, the minor relocation works are currently being scheduled with HQPL's contractor.	**Section 3.2 and Section 6.2**
2023-6	Complete (or continue) rehabilitation activities: **A.** Side-casting of the northern quarry face with any available material will continue in 2024. **B.** Detailed civil design of the final landform, including water management infrastructure, such as the final void spillway, will commence. **C.** Geotechnical stability assessments will commence as final bench positions are reached. **D.** Seed collection will continue in 2024.	**<u>On-going</u>** On-going actions to be progressed in 2025 in accordance with the approved Rehabilitation and Closure Plan.	**Section 8.1**

6.0 Environmental Performance

HQPL undertakes environmental monitoring in accordance with the Development Consent and Environment Protection Licence. Key monitoring locations are illustrated by **Figure 4**.

Table 14 provides a summary of the environmental performance at the site for the 2024 reporting period.

Table 14 Summary of Environmental Performance During the 2024 Reporting Period.

Aspect	Approval Criteria OR EIS Prediction	Performance During the Operating Period	Trend OR Key Management Implications	Implemented OR Proposed Management Actions
Air Quality	Development Consent – Schedule 3, Condition 13	1x Depositional Dust Exceedance	Anomalous dust exceedance.	Minor relocation of 2x DDG's to minimise exceedance risk as far as reasonably practicable.
Blasting	Development Consent – Schedule 3, Conditions 4 & 5	Compliant	Within criteria	Continued monitoring
Noise	Development Consent – Schedule 3, Condition 1	Compliant	Within criteria	Continued monitoring
Heritage	–	Not triggered	No specific criteria	No additional management proposed.
Biodiversity	Development Consent – Schedule 3, Condition 17 to 23	Compliant	Within criteria for F&FMP	Continued management
Waste	Development Consent – Schedule 3, Conditions 34 & 35	Compliant	Stabilised waste generation volumes associated with improved housekeeping processes.	Comprehensive review of waste management processes.
Water	Development Consent – Schedule 3, Condition 19	Compliant	Within discharge criteria	Continued monitoring

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FIGURE 4 - Environmental Monitoring Locations

6.1 Meteorological Monitoring

For the 2024 reporting period the KHRQ site operated a meteorological monitoring station in accordance with Schedule 3, Condition 16 of the Development Consent as illustrated by **Figure 5**.

> [4]**METEOROLOGICAL MONITORING**
>
> 16. Within 6 months of this consent, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the development in accordance with the requirements in Approved Methods for Sampling of Air Pollutants in New South Wales, and to the satisfaction of the DEC and the Director-General.

Figure 5 Meteorological Monitoring Requirements from the Development Consent.

The meteorological monitoring station was installed in August 2016 adjacent to the site's weighbridge as illustrated by **Figure 4** and currently services both quarries at the Karuah Quarry Complex. On 26 March 2024 the station was serviced and subject to the required annual field calibration.

Table 15 summarises the meteorological data collected by the meteorological station during 2024.

Table 15 Recorded 2024 Meteorological Data.

Month	Temperature (°C)			Rainfall (mm)		Wet Days (No. >1 mm.)	Wind [Max Gust] (km/h)
	Min	Ave	Max	Total	Max Daily		
Jan-24	14.7	24.6	45.1	36.2	12.2	8	45.0
Feb-24	15.6	23.9	39.2	107.4	42.8	9	52.1
Mar-24	12.3	21.7	40.0	71.6	15.8	9	56.8
Apr-24	9.4	18.1	30.4	308.4	117.6	9	46.1
May-24	4.2	14.2	23.2	285.2	40.2	14	47.3
Jun-24	2.7	11.7	22.6	192.4	54.6	8	42.6
Jul-24	2.1	11.5	23.3	65.4	10.4	11	65.1
Aug-24	3.6	14.1	30.9	85.2	16.2	10	65.1
Sep-24	3.7	15.4	29.3	147.0	52.6	10	61.5
Oct-24	7.2	17.5	32.6	79.4	18.8	9	45.0
Nov-24	12.0	21.8	39.3	56.4	16.8	10	50.9
Dec-24	11.7	23.6	39.3	64.4	29.8	7	49.7

Average monthly temperatures during 2024 ranged from 11.5 to 24.6 °C, with a maximum temperature of 45.1 °C recorded in January 2024. Total monthly rainfall ranged from 36.2 mm (January) to 308.4 mm (April), with the maximum daily rainfall recorded at 117.6 mm on 06 April 2024. The maximum wind gust was recorded at 65.1 km/h on both 21 July 2024 and 29 August 2024.

The total rainfall for 2024 was 1,504.0 mm which can be compared to 931.2 mm in 2023.

6.2 Air Quality

EIS Predictions

The 2004 EIS for the then 'Proposed Hard Rock Quarry Extension' predicted that dust levels from the operation would be within the criteria of 4 g/m^2/month. The obtained depositional dust monitoring data since this time demonstrates that the operation is meeting these predicted dust levels.

Approval Criteria

Air quality criteria is provided in Schedule 3, Condition 13 of the Development Consent as outlined by **Figure 6**. However, no specific limits are specified for air quality emissions by the EPL, however, the EPA does mandate the use of Approved Methods as outlined by their guidance document – *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022).

Air Quality Impact Assessment Criteria

13. The Applicant shall ensure that the dust emissions generated by the development do not cause additional exceedances of the ambient air quality impact assessment criteria listed in Tables 6, 7, and 8 at any residence on, or on more than 25 percent of, any privately owned land.

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

Table 6: Long Term Impact Assessment Criteria for Particulate Matter

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

Table 7: Short Term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Table 8: Long Term Impact Assessment Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 2003, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Figure 6 Air Quality Criteria provided by the Development Consent.

The main source of air pollution at the quarry is in the form of airborne dust, which arises from activities such as quarry operations, material processing and vehicle movements. Air quality monitoring has been performed to meet the EPA's Approved Methods (EPA, 2022) using four (4x) Depositional Dust Gauges. The location of these monitoring locations are illustrated by **Figure 4**.

Environmental Performance Results

Depositional dust results are outlined within **Table 16**. The 2024 monitoring results indicated that the maximum deposited dust levels measured at DDG 1 to DDG 4 were generally 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.

Table 16 Summary of Depositional Dust Gauge Results During 2024.

Monitoring Details				*Deposited Dust (g/m^2/month)*			
Reporting Period	**Start Date**	**End Date**	**Days**	**DDG 1 EPL ID 2**	**DDG 2 EPL ID 3**	**DDG 3 EPL ID 4**	**DDG 4 EPL ID 5**
Jan-24	28/12/2023	25/01/2024	28	1.4	1.2	1.0	1.2
Feb-24	25/01/2024	26/02/2024	32	1.1	0.8	1.3	1.3
Mar-24	26/02/2024	28/03/2024	31	0.8	0.9	1.8	0.6
Apr-24	28/03/2024	29/04/2024	32	0.9	0.4	0.5	0.8
May-24	29/04/2024	29/05/2024	30	0.5	0.3	0.2	0.4
Jun-24	29/05/2024	28/06/2024	30	0.7	0.5	0.5	0.7
Jul-24	28/06/2024	30/07/2024	32	1.1	0.8	0.6	0.9
Aug-24	30/07/2024	30/08/2024	31	0.7	0.5	0.7	0.9
Sep-24	30/08/2024	30/09/2024	31	2.2	1.2	1.3	1.2
Oct-24	30/09/2024	31/10/2024	31	1.0	0.7	0.7	5.1*
Nov-24	31/10/2024	29/11/2024	29	1.4	1.1	1.1	1.7
Dec-24	29/11/2024	30/12/2024	29	0.6	1.4	1.3	3.1
			2024 Average:	**1.0**	**0.8**	**0.9**	**1.5**
			2024 Minimum:	**0.5**	**0.3**	**0.2**	**0.4**
			2024 Maximum:	**2.2**	**1.4**	**1.8**	**5.1**

However, it should be noted that an anomalous exceedance was recorded at DDG4 during the October 2024 monitoring period which was subsequently reported to the NSW Department of Planning, Housing & Infrastructure (NSW Planning), the NSW EPA and surrounding landholders in accordance with the relevant conditions of the Consent and EPL. NSW Planning subsequently determined to record a breach of the Development Consent on 16 December 2024.

Long-term dust results are summarised by **Table 17**, with consistent results from 2014 to 2024.

Table 17 Long-term summary of Depositional Dust Gauge Results.

Reporting Period	*Deposited Dust Gauge*											
	DDG 1 (EPL ID 2)			**DDG 2 (EPL ID 3)**			**DDG 3 (EPL ID 4)**			**DDG 4 (EPL ID 5)**		
	min	**ave**	**max**	**min**	**ave**	**max**	**min**	**ave**	**max**	**min**	**ave**	**max**
2014	0.5	1.2	2.2	0.4	0.9	2.2	0.3	0.8	1.4	0.3	1.6	7.1
2015	0.3	1.5	6.4	0.3	0.9	3.7	0.1	0.6	2.8	0.3	1.2	4.1
2016	0.4	1.9	4.0	0.3	1.0	3.0	0.1	0.7	1.3	0.3	1.3	3.2
2017	0.4	0.9	1.7	0.1	0.7	1.8	0.5	0.9	1.4	0.5	1.5	3.8
2018	0.6	1.1	1.6	0.4	0.9	3.4	0.4	0.9	3.4	0.2	1.3	3.0
2019	0.3	1.5	3.8	0.5	1.8	4.0	0.2	1.3	3.5	0.1	1.6	4.8
2020	0.1	1.5	3.4	0.1	0.8	2.3	0.1	0.7	2.3	0.1	0.9	3.5
2021	0.2	1.5	3.6	0.1	0.6	1.4	0.2	0.7	2.2	0.1	0.8	3.7
2022	0.1	0.6	1.4	0.2	0.8	3.6	0.1	0.5	1.2	0.1	0.5	1.2
2023	0.2	0.8	1.6	0.3	1.2	2.5	0.2	1.0	2.2	0.1	0.8	1.6
2024	0.5	1.0	2.2	0.3	08	1.4	0.2	0.9	1.8	0.4	1.5	5.1

A High-Volume Air Sampler (HVAS) operated at the site from October 2006 until December 2008. It was demonstrated that measured particulate matter was at a sufficiently low level to not require on-going monitoring and its removal was approved by NSW Planning and the EPA.

In 2024, as outlined by the approved Environmental Management Strategy & Monitoring Program (EMS&MP), no air quality complaints or directions from NSW Planning were received requiring a review of the Karuah East Quarry's particulate matter results.

Management Measures

The following best practice air quality control measures continued to be implemented in 2024, including:

- Air quality monitoring;
- Minimising disturbance of land to only what is required by quarry activities;
- Minimising distance travelled by hauling rock the shortest distance possible;
- Utilising quarry runoff water for dust suppression on roads, stockpiles, production plant and work areas. A 25,000 litre (L) water cart is used at the site to assist with firefighting capabilities and dust management. Water is regularly collected from Sediment Dam 2 and sprayed on roads throughout the quarry to minimise dust generated from vehicle movements;
- Engaging the services of a contract road sweeper to regularly clean roadways around the entrance to the quarry; and
- Ensuring loads are covered when leaving the site.

Improvements

HQPL will continue to monitor air quality in accordance with the conditions of the Development Consent and EPL.

In response to DDG contamination events in 2023, HQPL currently propose to undertake minor adjustments to the locations of two DDG's. The EPA approved this adjustment through Variation 8; and, at the time of writing, the minor relocation works are currently being scheduled with HQPL's contractor.

6.3 Blasting

EIS Predictions

The 2004 EIS predicted that air blast and ground vibration levels will meet the EPA Guidelines at all residential locations surrounding the development with appropriate maximum instantaneous charge (MIC) limits in place.

Approval Criteria

Blasting criteria for the site are provided in Schedule 3, Condition 4 (airblast overpressure) and Schedule 3, Condition 5 (ground vibration) of the Development Consent as outlined by **Figure 7**. Additionally, Conditions L4.1 to 4.7 of the EPL detail consistent blast limits for the project.

Airblast Overpressure Criteria

4. The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 3 at any residence or sensitive receiver on privately owned land.

Airblast overpressure level [dB(Lin Peak)]	Allowable exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

Table 3: Airblast Overpressure Limits

Ground Vibration Criteria

5. The Applicant shall ensure that the peak particle velocity from blasting at the development does not exceed the criteria in Table 4 at any residence or sensitive receiver on privately owned land.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts over a period of 12 months
10	0%

Table 4: Ground Vibration Limits

Figure 7 Blasting Criteria provided by the Development Consent.

Environmental Performance Results

In the 2024 reporting period, ten (10x) blast events were completed at the site as summarised by **Table 18**. All blasts were within the limits provided by the Development Consent and EPL.

Table 18 Blast Monitoring Results for the 2024 Reporting Period.

Date	Time	Location	Airblast Overpressure* (dB [Lin Peak])	Ground Vibration* PPV (mm/s)
12/01/2024	12:38	RL 76 & 115	108.9	1.18
23/01/2024	09:03	RL 76 & 115	108.9	0.81
02/02/2024	13:04	RL 105	111.2	0.86
23/02/2024	13:32	RL 76	111.9	1.72
15/03/2024	12:55	RL 77	107.4	0.87
26/03/2024	13:09	RL 96	104.6	0.66
06/06/2024	11:31	RL 99	108.3	0.84
28/06/2024	10:37	RL 107	114.6	1.24
10/10/2024	13:37	RL 95	110.9	1.31
06/12/2024	12:24	RL 85	110.6	1.14
		2024 Average:	**109.7 dBL**	**1.06 mm/s**
		2024 Minimum:	**104.6 dBL**	**0.66 mm/s**
		2024 Maximum:	**114.6 dBL**	**1.72 mm/s**

Management Measures and Improvements

No exceedances were identified and therefore no further controls are considered necessary.

6.4 Noise

EIS Predictions

The 2004 EIS noted that operational noise levels are predicted to meet project specific noise goals at all nearest, potentially affected privately-owned residential locations surrounding the site. The 2004 EIS predicted that there would be no increase in road traffic noise levels due to quarry-related traffic discernible at any residential location adjacent to the Pacific Highway.

Approval Criteria

Noise criteria for the site are provided in Schedule 3, Condition 1 of the Development Consent as outlined by **Figure 8**.

Environmental Performance Results

Attended and unattended noise monitoring was conducted at the two nearest residential receivers (NM1 and NM2) on a six-monthly basis by EMM Consulting in accordance with the Development Consent and EPL. The two monitoring reports for the 2024 reporting period are provided by **Appendix 3**.

Noise results, attributable to quarry-operations, for both residential receptors were assessed as being within compliance limits for both monitoring rounds.

Management Measures and Improvements

No exceedances were identified and therefore no further controls are considered necessary.

Noise Impact Assessment Criteria

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

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

Table 2: Noise Impact Assessment Criteria for the Development

Notes:

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

Figure 8 Noise Criteria provided by the Development Consent.

6.5 Heritage (Aboriginal Cultural Heritage & Historic Heritage)

EIS Predictions

The archaeological survey conducted for the EIS (ADW, 2004) process did not find any heritage items onsite and there were no predicted impacts to heritage from the Karuah Hard Rock Quarry.

Approval Criteria

There are no specific criteria associated with heritage relating to the project. The process for managing any unexpected heritage items is outlined below under *Management Measures and Improvements*.

Environmental Performance Results

There were no issues or unexpected finds relating to Aboriginal cultural heritage during the reporting period.

Management Measures and Improvements

Should unexpected Aboriginal objects/features be encountered, work must stop immediately, and the area cordoned off with a high visibility barrier. The Environment & Development 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 Environment & Development Manager is to implement the mitigation measures that are recommended by the heritage consultant and agreed to by the RAPs and in accordance with Heritage NSW regulations. If additional visual inspection and salvage is recommended, the Environment & Development Manager is to arrange for the heritage consultant and RAPs to undertake those works.

Provided that these heritage contingency protocols have been followed, works within the project area may proceed. As there have been no heritage items located to date, no improvements to management measures are proposed.

6.6 Biodiversity

EIS Predictions

The 2004 Stage 2 EIS stated:

> *"The proposed extension will impact on four endangered species, one directly and the others indirectly. The impacts can be adequately mitigated to allow these species to continue to function unimpeded by the proposed extension. A conservation off-set of 16 hectares will be provided on adjacent land. The off-set will comprise similar habitat to that which will be disturbed by quarrying. The off-set will ensure an appropriate level of formal protection for threatened flora and fauna species in the long-term."*

Approval Criteria

There are no specific criteria associated with biodiversity management for the site. Activities need to be completed in accordance with the EIS.

Environmental Performance Results

HQPL implement a Flora and Fauna Management Plan. The key components and management measures of the Flora and Fauna Management Plan include a Vegetation Clearing Protocol, a Remnant Vegetation Conservation Plan, and a Conservation Offset Management Plan.

Ecological monitoring is undertaken on a two-yearly basis with the latest monitoring round being undertaken during the 2024-25 spring and summer periods, with the Ecological Monitoring Report for the reporting period provided by **Appendix 4**.

Management Measures and Improvements

HQPL will continue to undertake weed control measures particularly around haul roads and within rehabilitation areas in 2025. Site inspections for the identification of noxious weeds will continue to be undertaken.

6.7 Waste Management

Approval Criteria

Waste management requirements for the site are provided in Schedule 3, Condition 34 and 35 of the Development Consent as outlined by **Figure 9**.

WASTE MANAGEMENT

34. The Applicant shall:
    a) monitor the amount of waste generated by the development;
    b) investigate ways to minimise waste generated by the development;
    c) implement reasonable and feasible measures to minimise waste generated by the development; and
    d) report on waste management and minimisation in the AEMR.
    to the satisfaction of the Director-General.

35. The Applicant must not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing or disposal or any waste generated at the site to be disposed of at the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997.

    Note: the above condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the site if it requires an environment protection licence under the Protection of the Environment Operations Act 1997.

Figure 9 Waste Management Requirements provided by the Development Consent.

Environmental Performance Results

A licenced waste contractor removes waste from a 3 m^3 waste bin at the site. There were 49 collections during the reporting period, with capacity of the bin ranging from 50% to 80%, or a total of approximately 93 m^3 of waste being removed from site. This represents a stabilisation in the increase in waste generation compared to 87 m^3 in 2023 and 68 m^3 in 2022 which was be attributed to greater housekeeping processes being implemented in the previous reporting period.

No waste material was imported onto the site during the reporting period as per Schedule 3, Condition 35.

Management Measures and Improvement

HQPL use a licensed contractor for waste removal at the site. Typical waste at the quarry generally consists of non-hazardous and general wastes, as well as oily wastes. The general and non-hazardous wastes are placed in a skip bin and removed from site.

Oily water accumulates in the workshop sump within a bunded area and is removed by a licenced contractor when the sump is full. Additionally, scrap steel and tyres are separated and stockpiled until there is enough quantity for removal by a licensed contractor for recycling.

HQPL will undertake a review of the site's waste management processes in 2025, particularly in relation to waste minimisation and diversion methodologies.

7.0 Water Management

Overview

Surface water at Karuah Hard Rock Quarry is managed in accordance with the Site Water Management Plan (SWMP). The primary objective of water management at the site is to remain compliant with the Development Consent and EPL. As such, water contained within the footprint of the development is directed to Sediment Dam 2; or where this is not possible, water is directed through sediment control structures such as silt fences and retention sumps in accordance with the provisions of the Blue Book.

The capacity of Sediment Dam 2 is approximately 18 ML and primarily used for dirty water management, including the storage and re-use for:

- Dust suppression on internal access and haul roads; and
- Process water/dust suppression for the crusher, conveyors and stockpiles.

EIS Predictions

The 2004 EIS noted:

> *"No ground water or creeks will be affected by the proposed quarry extension. Water will be retained on site for reuse on site for quarry operations and for environmental mitigation. No run-off is expected from the site. Water quality management facilities are already in place as part of the existing quarry to ensure the quality of the water should any run-off occur. These existing measures will be upgraded."*

Approval Criteria

Discharge criteria is provided in Condition L2.4 of the EPL and summarised in **Table 19**. These pollutants will be tested during discharge events from LDP 1 (Sediment Dam 2).

Table 19 EPL Discharge Monitoring Criteria for LDP 1 (Sediment Dam 2).

Parameter	Units of Measure	EPL Discharge Limits (100 Percentile Concentration Limit)
Oil and Grease	mg/L and/or Visibility	5 and/or non-visible
pH	pH	6.5 – 8.5
Total Suspended Solids	mg/L	50
Total Nitogen	mg/L	–
Total Phosphorus	mg/L	–

Environmental Performance Results (Discharge)

Water quality monitoring is undertaken daily during discharge to demonstrate compliance with parameters specified in the EPL. During 2024, there were 9 days of discharges from the LDP located at Sediment Dam 2, as summarised in **Table 20**.

Each day of discharge complied with the EPL limits for pH, Total Suspended Solids (TSS) and Oil & Grease.

Table 20 Discharge Monitoring Results for Sediment Dam 2.

Date	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)	Oil & Grease (mg/L)	Total N (mg/L)	Total P (mg/L)
13/07/2024	7.4	536	50	21	NV	0.4	<0.05
14/07/2024	7.2	583	26	10	NV	0.4	<0.05
15/07/2024	7.4	592	33	22	NV	0.4	<0.05
17/07/2024	7.4	629	28	22	NV	0.4	<0.05
18/07/2024	7.1	622	17	5	NV	0.4	<0.05
19/07/2024	7.5	634	16	8	NV	0.4	<0.05
20/07/2024	7.5	661	20	20	NV	0.4	<0.05
22/07/2024	7.4	670	13	6	NV	0.3	<0.05
23/07/2024	7.2	673	9.4	<5	NV	0.3	<0.05

Environmental Performance Results (Monitoring)

Six-monthly surface water monitoring results for Sediment Dam 2 site are provided by **Table 21**. The monitoring results indicate the dam was compliant for pH and oil and grease; however, TSS was above the discharge limit in April 2024. Prior to any potential discharges the dams are treated (dosed) with Calcium Chloride flocculant to reduce the TSS to below 50 mg/L to comply with the Development Consent and EPL.

Table 21 Six-Monthly Surface Water Monitoring Results for Sediment Dam 2.

Parameter	Units	EPL Discharge Limits	H1 2024 (10/04/2024)	H2 2024 (30/09/2024)
Oil and Grease	mg/L	5 and/or non-visible	Non-visible	Non-visible
pH	pH	6.5 – 8.5	7.4	7.3
Total Suspended Solids, TSS	mg/L	50	80	12
Turbidity	NTU	–	470	23
Electrical Conductivity, EC	µS/cm	–	542	580
Total Nitrogen	mg/L	–	0.50	0.2
Total Phosphorus	mg/L	–	0.20	<0.05

Management Measures and Improvements

No non-compliant or uncontrolled discharges occurred during the reporting period, and therefore no improvements are considered necessary.

Other Water Management Matters

- Water Licencing: HQPL holds no surface water or groundwater extraction licences.
- Salinity Trading: HQPL does not participate in any salinity trading schemes.
- Compensatory Water Supply: HQPL has not impacted any neighbouring landholders' water supply schemes requiring the provision of compensatory water supply.

8.0 Rehabilitation

8.1 Site Rehabilitation

The KHRQ Rehabilitation and Closure Plan (RCP) has been prepared to meet the requirements of Schedule 3, Condition 39 (Rehabilitation Management Plan) and Schedule 3, Condition 44 (Quarry Closure Plan) of the Development Consent. The current RCP (IEMA, April 2024) was approved by NSW Planning on 29 November 2024.

Side-casting of the eastern quarry face was undertaken in 2020 and 2021; and in 2023 side-casting commenced along the northern quarry face. There have been limited further opportunities to establish rehabilitation at the quarry site to-date, due to the configuration of the quarry and the progressive nature of the working operational areas, particularly in light of increased production associated with state significant infrastructure projects, including the Newcastle Inner City Bypass (SSI-6888) and the M1 Pacific Motorway Extension to Raymond Terrace (SSI-7319).

A summary of rehabilitation works completed in 2024 is provided by **Table 22**; and a status update of total rehabilitation is provided by **Table 23**. Planned rehabilitation actions for 2025 are summarised by **Table 24.**

Table 22 Summary of Rehabilitation Performance During the 2024 Reporting Period.

Rehabilitation Performance Details	KHRQ Site Comments
Extent of the operations and rehabilitation at completion of the reporting period.	–
Agreed post-rehabilitation land-use.	Final land-use is outlined within the RCP. The vegetation at closure will be native woodland consistent with the surrounding bushland; with the quarry void remaining as a water storage.
Key rehabilitation performance indicators.	–
Renovation or removal of buildings.	–
Any other Rehabilitation undertaken including: ▪ Exploration activities; ▪ Infrastructure; ▪ Dams; and ▪ The installation or maintenance of fences, bunds and any other works.	–
Rehabilitation sign-off status of completed areas against the land-use objectives and completion criteria.	–
Variations to activities undertaken to those proposed (including why there were variations and whether the Resources Regulator was notified)	–
Outcomes of trials, research projects and other initiatives.	–
Key issues that may affect successful rehabilitation.	–

Table 23 Disturbance and Rehabilitation Status.

ID	Quarry Area Type	Previous 2023 Reporting Period [actual] (Ha)	Current 2024 Reporting Period [actual] (Ha)	Next 2025 Reporting Period [forecast] (Ha)
A	Total Quarry Footprint	28.8	28.8	28.8
B	Total Active Disturbance	28.8	28.8	28.8
C	Land Being Prepared for Rehabilitation	1.6	0	8.5
D	Land Under Active Rehabilitation	1.8	0	1.8
E	Completed Rehabilitation	11.2	11.2	11.2

Table 24 Actions for the Next 2025 Reporting Period.

Action	KHRQ Site Comments
Describe the steps to be undertaken to progress agreement during next reporting period, where final rehabilitation outcomes have not yet been agreed between stakeholders.	▪ Continue engaging with NSW Planning and the KEQ CCC regarding future land-use options and the feasibility of potential adaptive re-use projects for the KHRQ site (Lot 21). ▪ Continue engaging with Wedgerock Pty Ltd (owners of Lot 11) regarding handover of the site and rehabilitation responsibilities should the Karuah South Quarry be approved and become operational.
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.	▪ Continue detailed closure planning for the Stage 2 Extraction Area (Lot 11) including civil designs of the final landform and water management infrastructure. ▪ Continue seed collection. ▪ Commence final geotechnical stability assessments as final bench positions are reached. ▪ Commence site works in Q4 2025.

8.2 Visual Bund

During the 2024 reporting period, no material maintenance activities were required to the site's visual bund.

9.0 Community

9.1 Community Engagement

In both 2007 and 2011, HQPL sent flyers to nearby neighbours and advertised for expressions of interest for a Community Consultative Committee (CCC). There was no interest received and therefore a CCC was not formed. In the neighbouring Karuah East Quarry, during six-monthly annual CCC meetings, community members are able to discuss Karuah Hard Rock Quarry if required.

HQPL have committed to sending out a six-monthly report to nearby residents and MidCoast Council updating these stakeholders on the environmental performance of the quarry from January to June and July to December of each year. Therefore, information can be accessed by the community twice a year through this report, as well as this Annual Review. The Community Consultation Reports (CCR's) can be found on the HQPL website at https://hunterquarries.com.au/reporting/.

More detail on this Community Communication Strategy is available in Section 5.1 of the EMS&MP.

9.2 Community Contributions

In 2024, HQPL supported the following organisations:

- Karuah Pearls Netball Club;
- Karuah Roos Rugby League Football Club;
- Karuah & District Tennis Club;
- North Arm Cove Community Association;
- Victoria Hotel Bullarama;
- Ringwood Motorsport Park;
- Bulahdelah Men's Shed;
- Rotary Clubs of Maitland;
- Stroud Show;
- Karuah Oyster & Timber Festival; and
- Karuah RSL.

9.3 Community Complaints

Members of the community are encouraged to report any issues that are identified associated with our operations via the dedicated **Community Call Line** on **1800 329 161**. The Environment & Development Manager reviews, investigates, and reports all complaints received in accordance with the Development Consent, EPL, and the site's EMS&MP.

The Community Call Line is advertised by:

- Signage at the entrance to the quarry premises;
- Inclusion of the Community Call Line in prominent locations on the Hunter Quarries' website; and
- Inclusion of the Community Call Line in communications with the KEQ CCC.

In 2024, one community complaint was reported to HQPL, which is consistent with the typical results of one to two complaints per year as summarised by the compliants history provided in **Table 25**.

The complaint was received on 28 February 2024, by a resident on Tarean Road who raised concerns regarding dust emissions from the site. HQPL staff reviewed the previous six months of depositional dust data (i.e. September 2023 to February 2024), which confirmed that site was compliant with the performance criteria provided by the Development Consent. The complainant was advised in writing on 1 March 2024 the outcome of this review.

Table 25 Community Complaints 2012-2024.

Year	Number of Complaints Received
2012	0
2013	0
2014	0
2015	0
2016	0
2017	1
2018	1
2019	1
2020	2
2021	2
2022	1
2023	0
2024	1

10.0 Independent Environment Audit

In accordance with Schedule 4, Condition 6 of the Development Consent, HQPL has commissioned an Independent Environment Audit (IEA) every five years as summarised by **Figure 10**.

INDEPENDENT ENVIRONMENTAL AUDIT

6. Within 2 years of the date of this consent, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall 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 person whose appointment has been endorsed by the Director-General;
   b) be consistent with *ISO 19011:2002 - Guidelines for Quality and/ or Environmental Systems Auditing*, or updated versions of this guideline;
   c) assess the environmental performance of the development, and its effects on the surrounding environment;
   d) assess whether the development is complying with the relevant standards, performance measures, and statutory requirements;
   e) review the adequacy of the Applicant's Environmental Management Strategy and Environmental Monitoring Program; and
   f) if necessary, recommend measures or actions to improve the environmental performance of the development, and/or the environmental management and monitoring systems.

7. Within 3 months of commissioning this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General, with a response to the recommendations contained in the audit report.

Figure 10 Independent Environmental Audit (IEA) requirements from the Development Consent.

In 2024, HQPL engaged Talis Consultants to complete the 2024 IEA of the site. Lead Auditor, Leanne Cross, and Auditor, Alfred Davis, were subsequently approved by NSW Planning as suitably qualified, experienced and independent persons in accordance with the Development Consent and Independent Audit Guideline (May, 2020) on 04 November 2024.

A site inspection was conducted on 10 December 2024, with the submission of the final Audit Report and HQPL's Response to Audit Recommendations (RAR) to NSW Planning on 04 March 2025 (within 3 months of commencement). A copy of these audit reports have been publicly published on the Hunter Quarries' website at https://hunterquarries.com.au/reporting/.

The audit assessed a total of 15 conditions as non-compliant out of a total of 64 conditions, representing a non-compliance rate of approximately 23%. The key audit findings include:

- Various administrative non-compliances associated with the submission of documents within statutory timeframes;
- Uncertainty regarding the methodology used to determine s94 Council Contributions;
- Uncertainty regarding the approval status of consolidated sub-plans into the approved EMS&MP;
- On-going implementation status of surface water monitoring infrastructure; and
- Uncertainty regarding the implementation of waste minimisation measures.

A summary of all assessed non-compliances and recommendations for improvement opportunities is provided by HQPL's RAR in **Appendix 5**; whilst a summary of accepted corrective actions are provided in **Section 12.0** to be addressed in 2025.

11.0 Incidents & Non-Compliances During the Reporting Period

In 2024, one exceedance of performance criteria occurred related to air quality.

- **October 2024 – Exceedance of Depositional Dust Criteria**

An anomalous exceedance was recorded at DDG4 during the October 2024 monitoring period which was subsequently reported to NSW Planning, the NSW EPA and surrounding landholders in accordance with the relevant conditions of the Development Consent and EPL. NSW Planning subsequently determined to record a breach of the Development Consent on 16 December 2024.

However, it should be noted that the results remain well within long-term criteria compliance limits.

12.0 Activities to be Completed in the Next Reporting Period

Table 26 outlines the actions to be completed within the 2025 reporting period.

Table 26 Proposed Actions for the Next 2025 Reporting Period.

ID	Action	Timeline
KHRQ Findings – 2023 Annual Review		
2023-3	Complete the statutory 5-year comprehensive review of the Flora and Fauna Management Plan.	**On-going – DUE 30/09/2025** The Flora & Fauna Management Plan was last reviewed in September 2020; and therefore the 5-year statutory review is due by **30 September 2025**. This review will incorporate any findings of the 2024 IEA.
2023-5	Submit EPL Variation (in conjunction with KEQPL) to undertake minor relocation of two depositional dust gauges.	**On-going – DUE 30/06/2025** Variation 8 to the EPL was approved by the EPA on 06 December 2024. The corresponding variation application to EPL 20611 for the adjacent Karuah East Quarry was approved on 17 February 2025. At the time of writing, the minor relocation works are currently being scheduled with HQPL's contractor.
KHRQ Findings – 2024 Annual Review		
2024-1	Continue detailed rehabilitation planning for Lot 11 (Stage 2 Extraction Area) ahead of commencement of site works.	Complete planning by Q4 2025.
2024-2	Complete a comprehensive review of the site's Environmental Management Strategy & Monitoring Program (EMS&MP).	Complete review, and if necessary, update by 04 June 2025, subject to resolution of HQPL's management plan structure (**Action 2024-4**).
KHRQ Findings – 2024 Independent Environmental Audit		
2024-3	Review the calculation methodology used to determine s94 Contributions to MidCoast Council made between 2019 and 2024 to confirm compliance with amended condition.	Complete review by 31 December 2025.
2024-4	Consult with NSW Planning regarding HQPL's management plan structure to consolidate the site's Environmental Management Strategy, Environmental Monitoring Program, Community Consultation Strategy, Air Quality Monitoring Program and Noise Monitoring Program into a single document.	Complete consultation by 04 April 2025.
2024-5	Finalise installation of surface water monitoring hardware and implement an appropriate record keeping system.	Complete works by 31 December 2025.
2024-6	Complete a comprehensive review of the site's waste management processes.	Complete review by 31 December 2025.

Appendix 1 – NSW Planning Correspondence

NSW Planning Response to KHRQ Annual Review 2023

Department of Planning, Housing and Infrastructure

NSW Planning ref: DA265-10-2004-PA-27

Scott Ellerton
Environment & Development Manager
Hunter Quarries Pty Ltd
Worimi Country
PO Box 23
KARUAH NSW 2324

26/09/2024

Sent via the Major Projects Portal only

Subject: Karuah Quarry - 2023 Annual Environmental Management Report

Dear Mr Ellerton

I refer to the Annual Environmental Management Report (AEMR) for Karuah Quarry for the period 16 January 2023 to 15 January 2024 submitted as required by Schedule 4 Condition 5 of development consent DA265-10-2004 as modified (the consent) to the NSW Department of Planning, Housing and Infrastructure (NSW Planning) on 10 March 2024.

NSW Planning has reviewed the AEMR and considers it to generally satisfy the reporting requirements of the consent and the NSW Planning Annual Review Guideline (October 2015).

Please note that the NSW Planning's acceptance of this Annual Review is not an endorsement of the compliance status of the project.

Should you wish to discuss the matter further, please contact Jennifer Sage, Senior Compliance Officer on 6575 3420 or email compliance@planning.nsw.gov.au

Yours sincerely

Heidi Watters
Team Leader
Compliance

As nominee of the Planning Secretary

Appendix 2 – Land Clearing Reports

Pre-Clearing Survey Report – 13 November 2024

Habitat Tree Felling Supervision Report – 22 November 2024

Wednesday, 13 November 2024

Hunter Quarries
Karuah East Quarry
Blue Rock Close
Karuah NSW 2324

Attention: Scott Ellerton

Sent by email to: se@hunterquarries.com.au

SUBJECT: Karuah Hard Rock Quarry Pre-Clearing Survey, October 2024.

Dear Scott,

This letter provides a summary of work undertaken on October 22, 2024. Wedgetail Project Consulting Ecologist Shea Brunt, Theo Tasoulis and Debbie Plunket were present to undertake a pre-clearing survey for habitat hollows within the Karuah hard Rock Quarry (KHRQ).

PRE-CLEARING SURVEY NOVEMBER 2024

On the 22nd October 2024 WPC ecologists, inspected an area of vegetation that has been approved for vegetation clearing within Karuah Hard Rock Quarry (KHRQ). The pre-clearance survey involved marking all habitat trees with spray paint and/or flagging tape within native vegetation to the south of the existing hard rock quarry. The location of the habitat trees was mapped accordingly (**Figure 1**).

No evidence of fauna habitation was detected during the pre-clearance surveys. Clearing of all vegetation (excluding habitat trees) can now commence without the supervision of an ecologist.

In accordance with the Vegetation Clearing Protocol in Hunter Quarries, Karuah Hard Rock Quarry Flora and Fauna Management Plan 2020, all habitat trees identified during pre-clearance surveys are required to be left standing for two days after the surrounding vegetation has been cleared. An ecologist will be required to supervise the felling of all habitat trees.

Table 1 Hollow bearing trees

Habitat Tree	Number and Size of Recorded Hollows			Notes
	Small (<5 cm)	Medium (5 cm – <20 cm)	Large (>20 cm)	
1 – Ironbark	-	1	-	Fissure in tree. Maximum hollow height 4m
2 – Fallen Log	1	1	-	Fallen habitat log
3 – Lophostemon	1	1	-	Max hollow height 6m
4 – Grey gum	2	-	-	Scratches on surface of tree
5 – Fallen log	-	-	1	Fallen habitat log
6 – Fallen Log	-	1	-	Fallen habitat log

PO Box 234
Cardiff, NSW 2285
ABN: 93 640 388 683

Habitat Tree	Number and Size of Recorded Hollows			Notes
	Small (<5 cm)	Medium (5 cm – <20 cm)	Large (>20 cm)	
7 – Grey Gum	1	1	-	Maximum hollow height 15m
Totals	**5**	**5**	**1**	**Total: 11 hollows**

For any further questions, please do not hesitate to call me.

Sincerely,

Shea Brunt
Ecologist

M: 0401 046 326
sbrunt@wedgetail.com.au

WEDGETAIL
PROJECT CONSULTING PTY LTD

HQ Pit Shell Boundary
HBT Survey Tracks
Hollow-bearing Tree
Minor watercourse
Contours (10m)
Contours (5m)
Local Road

Figure 1

Pre-Clear Survey

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 14/11/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Clearing Supervision\@GIS\Clearing_KaruahQuarries.qgz

Friday, 22 November 2024

Hunter Quarries
Karuah Hard Rock Quarry
Blue Rock Close
Karuah NSW 2324

Attention: Scott Ellerton

Sent by email to: se@hunterquarries.com.au

SUBJECT: Karuah Hard Rock Quarry Habitat Tree Removal Supervision November 2024.

Dear Scott,

This letter provides a summary of work undertaken on November 22, 2024. Wedgetail Project Consulting Ecologist Olivia Szekelyhidy was present to undertake a clearing supervision for habitat trees within the Karuah hard Rock Quarry (KHRQ).

HABITAT CLEARING SUPERVISION OCTOBER/NOVEMBER 2024

On the 22nd of October 2024 WPC ecologists, inspected an area of vegetation that has been approved for vegetation clearing within Karuah Hard Rock Quarry (KHRQ). The pre-clearance survey involved marking all habitat trees with spray paint and/or flagging tape within native vegetation to the south of the existing hard rock quarry. The location of the habitat trees was mapped accordingly (**Figure 1**).

Pre-clearing surveys were conducted by Olivia Szekelyhidy on 14th November 2024 where no evidence of fauna habitation was detected. On this date, the three (3) fallen logs were inspected for fauna, and were removed from the clearing area.

In accordance with the Vegetation Clearing Protocol in Hunter Quarries, Karuah Hard Rock Quarry Flora and Fauna Management Plan 2020, all habitat trees identified during pre-clearance surveys were required to be left standing for a minimum of two days after the surrounding vegetation was cleared.

On the 22nd of November 2024, a total of three (3) hollow-bearing habitat trees were soft-felled within the clearing area (**Figure 1**). A total of five (5) small hollows were identified within the habitat trees which were inspected for fauna after felling (**Table 1**). No fauna species were found during the clearing supervision.

PO Box 234
Cardiff, NSW 2285
ABN: 93 640 388 683

Table 1: **Updated details of habitat trees and hollows in the course of the clearing operations on 22 November 2024.**

Habitat Tree	Number and Size of Recorded Hollows			Notes
	Small (<5 cm)	Medium (5 cm – <20 cm)	Large (>20 cm)	
1 – Ironbark*	-	1	-	Fissure in tree. Maximum hollow height 4m
2 – Fallen Log**	1	1	-	Fallen habitat log
3 – Lophostemon	1	-	-	Max hollow height 6m
4 – Grey gum	1	-	-	Scratches on surface of tree
5 – Fallen Log**	-	-	1	Fallen habitat log
6 – Fallen Log**	-	1	-	Fallen habitat log
7 – Grey Gum	1	-	-	Maximum hollow height 15m
Totals	4	3	1	**Total: 8 hollows**

Ironbark*. This tree was not cleared as it was not within the impact area.
Fallen Log**. Removed during pre-clearing event on November 14th.

For any further questions, please do not hesitate to call me.

Sincerely,

Olivia Szekelyhidy
Ecologist

M: 0466 615 588
oszekelyhidy@wedgetail.com.au

WEDGETAIL
PROJECT CONSULTING PTY LTD

HQ Pit Shell Boundary
HBT Survey Tracks
Hollow-bearing Tree
Minor watercourse
Contours (10m)
Contours (5m)
Local Road

Figure 1

Pre-Clear Survey

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 14/11/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Clearing Supervision\@GIS\Clearing_KaruahQuarries.qgz

Appendix 3 – Noise Monitoring Reports

Noise Monitoring Report – H1 2024

Noise Monitoring Report – H2 2024

Karuah Quarry

Biannual Attended Noise Monitoring - Semester 1 2024

Prepared for Hunter Quarries Pty Limited

June 2024

Karuah Quarry

Biannual Attended Noise Monitoring - Semester 1 2024

Hunter Quarries Pty Limited

E240073 RP1

June 2024

Version	Date	Prepared by	Reviewed by	Comments
1	14 June 2024	Isaac Hepworth / Lucas Adamson	Najah Ishac	Draft
2	14 June 2024	Lucas Adamson	Najah Ishac	Final

Approved by

Najah Ishac
Director
14 June 2024

Level 3 175 Scott Street
Newcastle NSW 2300

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at Karuah Quarry (KQ, the site) located at Blue Rock Close, Karuah NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period on Thursday 23 May 2024 at two monitoring locations, required by the environmental monitoring program (EMP). It is of note that the site currently operates during the day period only and as such, noise monitoring during the evening and nigh-time periods is not required.

1.2 Attended monitoring locations

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

Table 1.1 Attended noise monitoring locations

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

KEY

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

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

0 0.5 1 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM3\2021\E210782 - KEO Noise monitoring\8 GIS\02 Maps\N001 NoiseMonitoringLocations 20211206 01.mxd 6/12/2021

Noise monitoring locations

Karuah Quarry
Bi-annual noise monitoring
Figure 3.1

EMM
creating opportunities

1.3 Terminology and abbreviations

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

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

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

2.2 Environment protection licence

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

2.3 Environmental monitoring program

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

2.4 Noise limits

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

Table 2.1 Noise impact limits, dB

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

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

2.5 Meteorological conditions

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

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

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

2.6 Additional requirements

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

2.7 Very noise-enhancing meteorological conditions

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

The NPfI states that:

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

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

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done as guided by Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the site automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site's contribution (if any) to measured levels. At each monitoring location, the site only $L_{Aeq,15minute}$ were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were extremely low and unlikely, in many cases, to be noticed
- Site noise levels were masked by other more dominant noise sources that are characteristic of the environment, such as breeze in foliage or continuous road traffic noise, that cannot be eliminated by monitoring at an alternate or intermediate location
- It was not feasible or reasonable to employ methods such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Unattended noise monitoring

The unattended noise monitoring was carried out using two Acoustic Research Labs (ARL) Ngara unattended noise loggers. These environmental noise loggers were in place from Thursday 23 to Thursday 30 May 2024.

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

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

3.4 Meteorological data

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

3.5 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.6 Instrumentation

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

Table 3.1 Noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	00701424	01/06/2025	IEC 61672-1:2002
Pulsar Model 106 calibrator	81334	21/06/2024	IEC 60942:2003
ARL Ngara unattended noise logger	8780D7	11/09/2024	IEC 61672-3:2013
ARL Ngara unattended noise logger	8780F0	12/02/2025	IEC 61672-3:2013

4 Results

4.1 Attended noise monitoring

4.1.1 Total measured noise levels and atmospheric conditions

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

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

Location	Start date and time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
NM2	23/05/2024 08:13	70	68	65	62	60	56	48
NM1	23/05/2024 08:35	70	57	54	52	52	49	45

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

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Semester 1 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north [1]	Cloud cover 1/8s
NM2	23/05/2024 08:13	14	<0.5	-	7
NM1	23/05/2024 08:35	16	<0.5	-	7

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

4.1.2 Site only noise levels

i Modifying factors

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

ii Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – Semester 1 2024

Location	Start Date and Time	Wind		Stability Class	Standard limits apply? [1]	Limits, dB	Site levels, dB	Exceedances, dB [1]
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	$L_{Aeq,15minute}$ [2]	$L_{Aeq,15minute}$
NM2	23/05/2024 08:13	0.7	232	A	Y	48	IA	Nil
NM1	23/05/2024 08:35	0.4	209	A	Y	48	IA	Nil

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

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

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

4.2 Unattended noise monitoring

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

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

Location	Period	Measured noise levels, dB	
		RBL	$L_{Aeq,period}$
NM1 23 May-30 May 2024	Day	46	53
	Evening	45	55
	Night	45	52
NM2 23 May-30 May 2024	Day	57	65
	Evening	49	65
	Night	40	62

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

5 Discussion

5.1 Attended noise monitoring

5.1.1 Noted noise sources

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

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

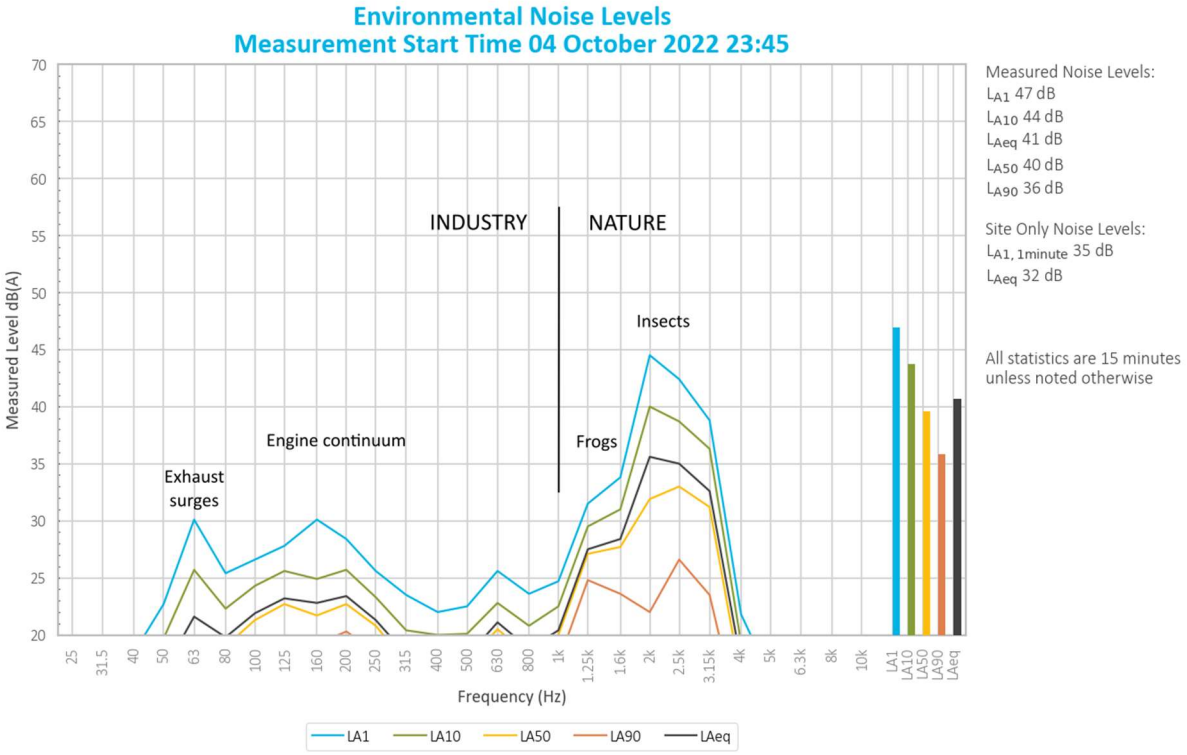

Figure 5.1 Example graph

5.1.2 NM1

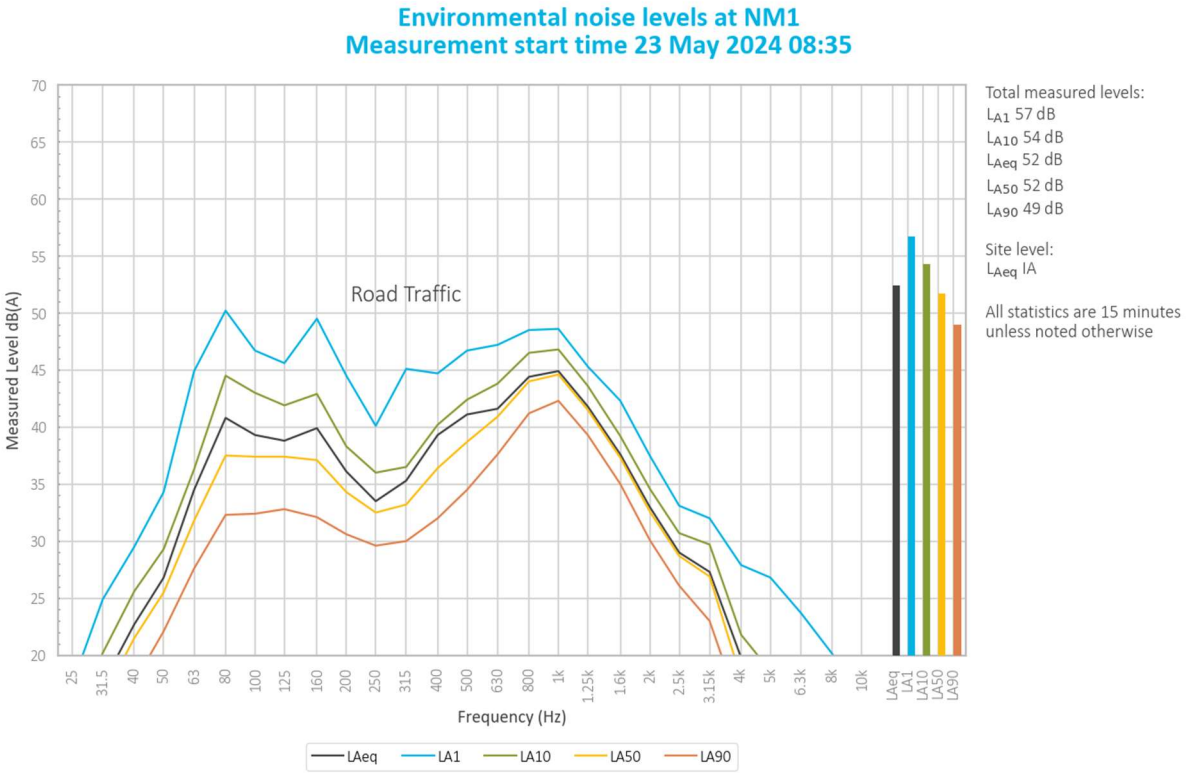

Figure 5.2 Environmental Noise Levels – NM1

Karuah Quarry operations were inaudible during the entire measurement.

Road traffic noise dominated total measured noise levels.

Noise from birds, dogs, frogs and insects was also noted at relatively low levels.

5.1.3 NM2

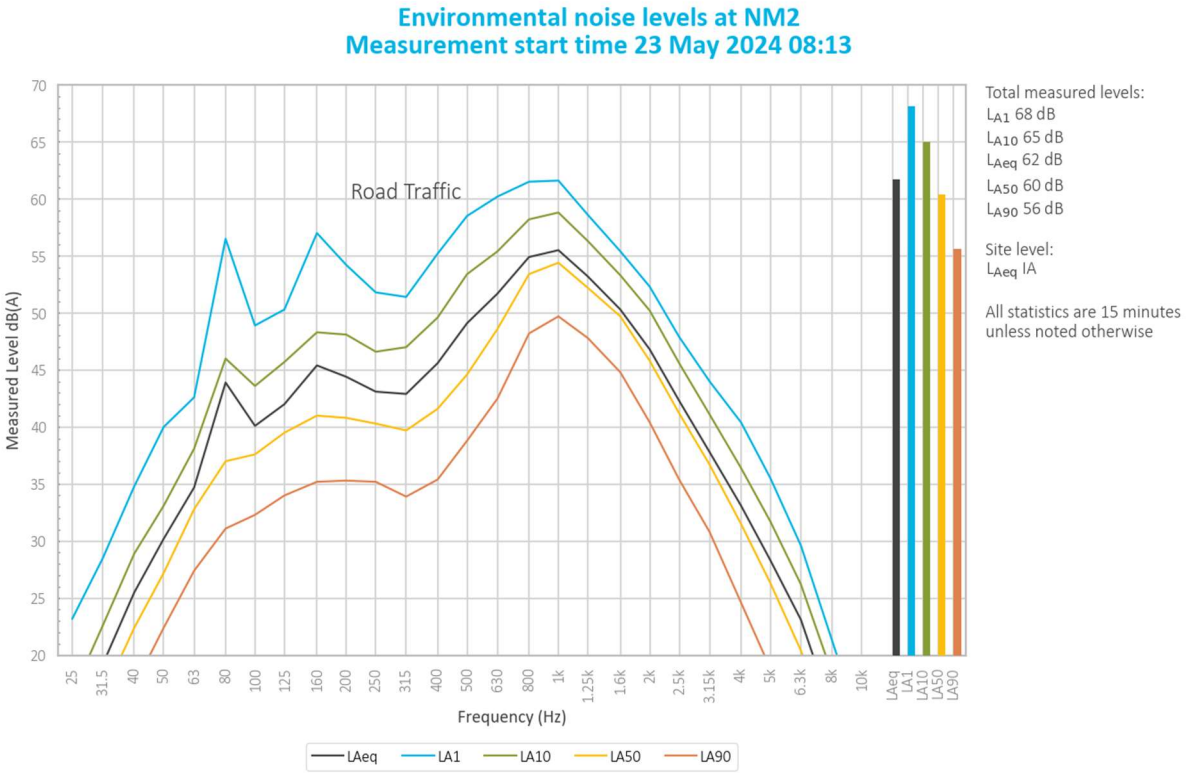

Figure 5.3 Environmental Noise Levels – NM2

Karuah Quarry operations were inaudible during the entire measurement.

Road traffic noise dominated total measured noise levels.

Noise from birds was also noted at relatively low levels.

5.2 Unattended noise monitoring

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

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

6 Summary

EMM was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at the site surrounds. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period on Thursday 23 May 2024 at two monitoring locations, as required by the EMP.

Noise levels from site complied with relevant limits at all monitoring locations during the Semester 1 2024 survey.

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

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

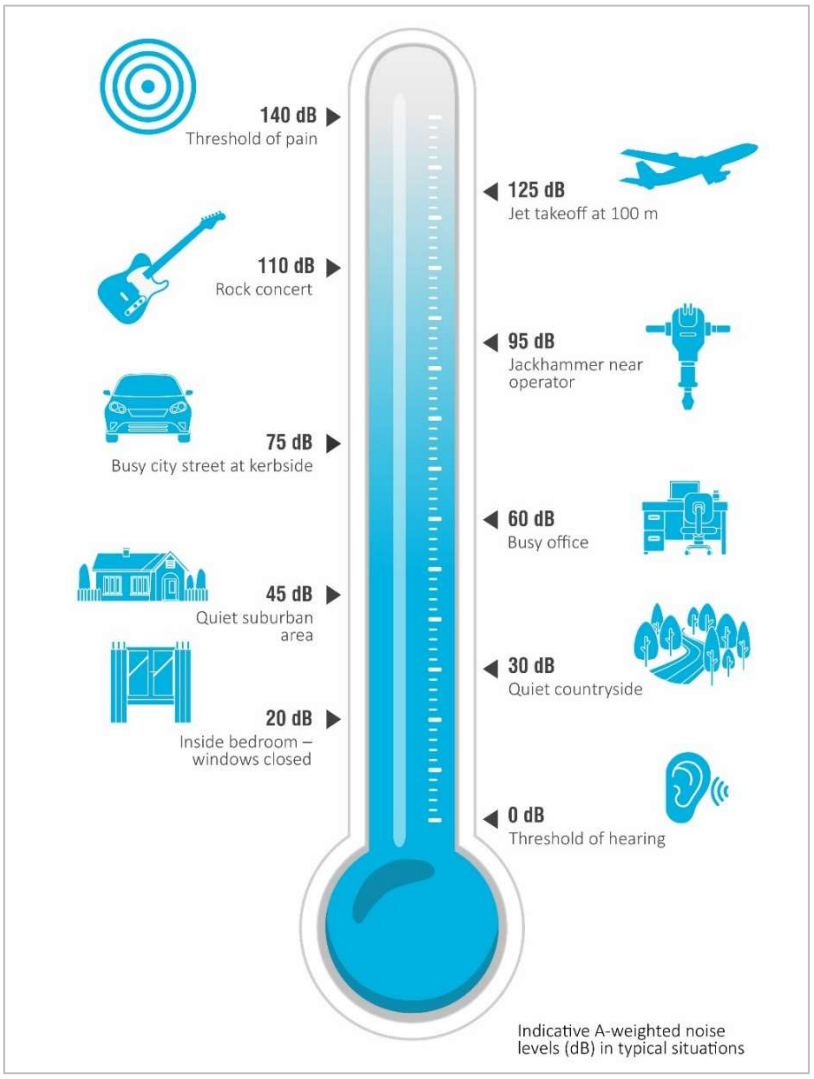

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development Consent

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

[1]NOISE

Noise Impact Assessment Criteria

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

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

Table 2: Noise Impact Assessment Criteria for the Development

Notes:

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

Operating Hours

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

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

Table 1: Operating Hours for the Development

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

Noise Monitoring

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

[1] Incorporates DEC GTAs

B.2 Environmental monitoring program

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

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

5.4 Noise and Blast Monitoring

5.4.1 Operational Noise

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

Table 6: Noise Impact Assessment Criteria for the Development

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

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

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

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

5.4.2 Monitoring of Operational Blasting (Vibration and Overpressure)

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

Appendix C
Calibration certificates

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

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23317

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463
Firmware Version :	2.0

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24°C	**Ambient Temperature :**	22.6°C
Relative Humidity :	46%	**Relative Humidity :**	46.6%
Barometric Pressure :	100.6kPa	**Barometric Pressure :**	100.6kPa

Calibration Technician :	Max Moore	**Secondary Check:**	Dylan Selge
Calibration Date :	1 Jun 2023	**Report Issue Date :**	2 Jun 2023

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

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

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

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

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

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

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

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

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C23389

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 81334

Atmospheric Conditions
Ambient Temperature : 22.6°C
Relative Humidity : 35.5%
Barometric Pressure : 101.43kPa

Calibration Technician : Shaheen Boaz
Secondary Check: Dhanush Bonu
Calibration Date : 21 Jun 2023
Report Issue Date : 21 Jun 2023

Approved Signatory : Ken Williams

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

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.18	1000.30

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.10dB*	*Temperature*	*±0.1°C*
Frequency	*±0.07%*	*Relative Humidity*	*±1.9%*
Distortion	*±0.20%*	*Barometric Pressure*	*±0.014kPa*

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

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

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

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

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Karuah Quarry

Biannual Attended Noise Monitoring - Semester 2 2024

Prepared for Hunter Quarries Pty Limited

November 2024

Karuah Quarry

Biannual Attended Noise Monitoring - Semester 2 2024

Hunter Quarries Pty Limited

E240073 RP6

November 2024

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

Approved by

Robert Kirwan
Associate Acoustics Consultant
29 November 2024

Level 3 175 Scott Street
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TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at Karuah Quarry (KQ, the site) located at Blue Rock Close, Karuah NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period on Monday 25 November 2024 at two monitoring locations, required by the environmental monitoring program (EMP). It is of note that the site currently operates during the day period only and as such, noise monitoring during the evening and nigh-time periods is not required.

1.2 Attended monitoring locations

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

Table 1.1 Attended noise monitoring locations

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

KEY

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

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

0 0.5 1 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM3\2021\E210782 - KEO Noise monitoring\8 GIS\02 Maps\N001 NoiseMonitoringLocations 20211206 01.mxd 6/12/2021

Noise monitoring locations

Karuah Quarry
Bi-annual noise monitoring
Figure 3.1

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1.3 Terminology and abbreviations

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

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

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

2.2 Environment protection licence

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

2.3 Environmental monitoring program

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

2.4 Noise limits

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

Table 2.1 Noise impact limits, dB

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

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

2.5 Meteorological conditions

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

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

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

2.6 Additional requirements

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

2.7 Very noise-enhancing meteorological conditions

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

The NPfI states that:

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

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

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done as guided by Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the site automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site's contribution (if any) to measured levels. At each monitoring location, the site only $L_{Aeq,15minute}$ were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were extremely low and unlikely, in many cases, to be noticed
- Site noise levels were masked by other more dominant noise sources that are characteristic of the environment, such as breeze in foliage or continuous road traffic noise, that cannot be eliminated by monitoring at an alternate or intermediate location
- It was not feasible or reasonable to employ methods such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Unattended noise monitoring

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

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

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

3.4 Meteorological data

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

3.5 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.6 Instrumentation

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

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

Table 3.1 Noise monitoring equipment

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

4 Results

4.1 Attended noise monitoring

4.1.1 Total measured noise levels and atmospheric conditions

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

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

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

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

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Semester 2 2024

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

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

4.1.2 Site only noise levels

i Modifying factors

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

ii Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – Semester 2 2024

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

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

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

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

4.2 Unattended noise monitoring

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

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

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

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

5 Discussion

5.1 Attended noise monitoring

5.1.1 Noted noise sources

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

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

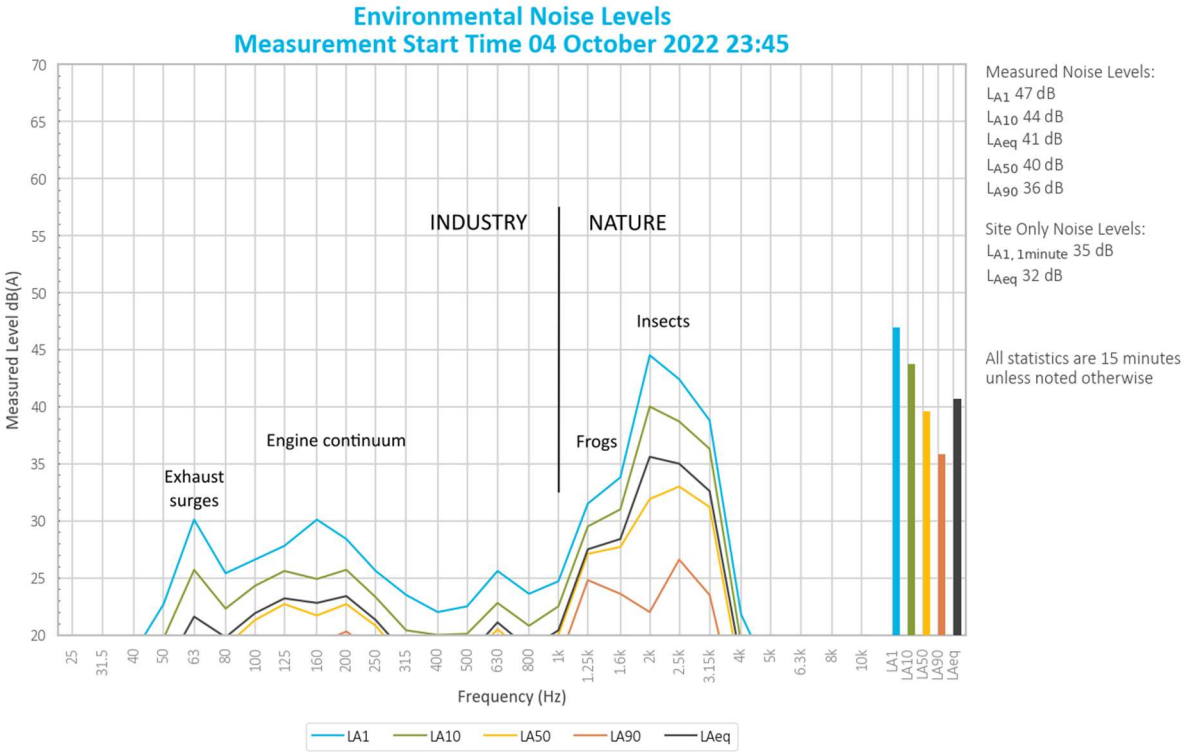

Figure 5.1 Example graph

5.1.2 NM1

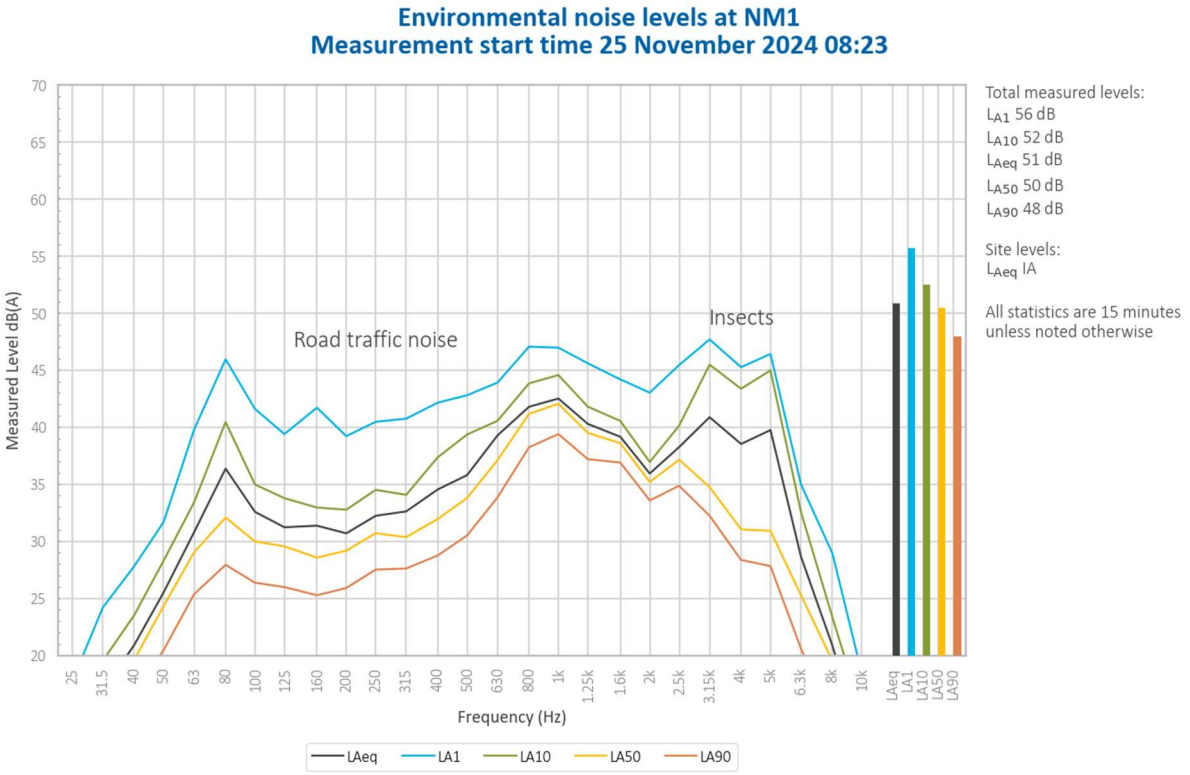

Figure 5.2 Environmental Noise Levels – NM1

Karuah Quarry operations were inaudible during the entire measurement.

Insects and road traffic noise dominated total measured noise levels.

Noise from birds was also noted.

5.1.3 NM2

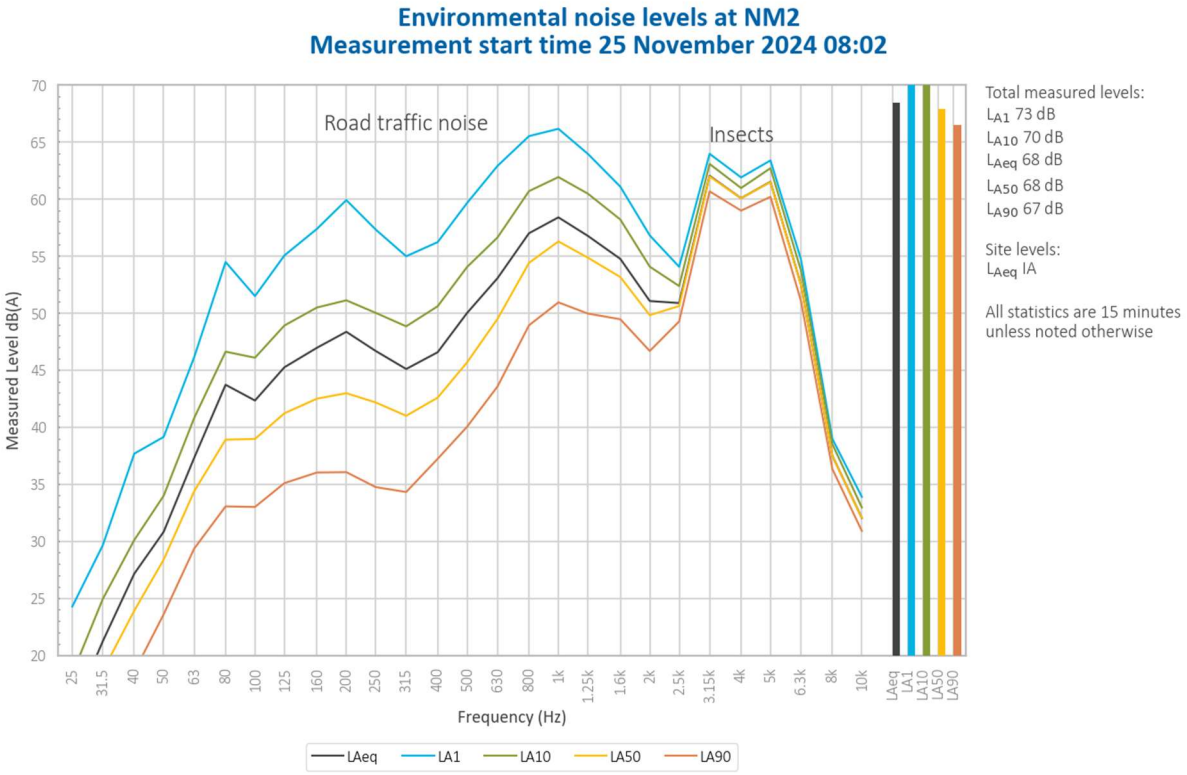

Figure 5.3 Environmental Noise Levels – NM2

Karuah Quarry operations were inaudible during the entire measurement.

Insects and road traffic noise dominated total measured noise levels.

Noise from birds was also noted.

5.2 Unattended noise monitoring

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

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

6 Summary

EMM was engaged by Hunter Quarries Pty Limited to conduct a bi-annual noise survey of operations at the site surrounds. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period on Monday 25 November 2024 at two monitoring locations, as required by the EMP.

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

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

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

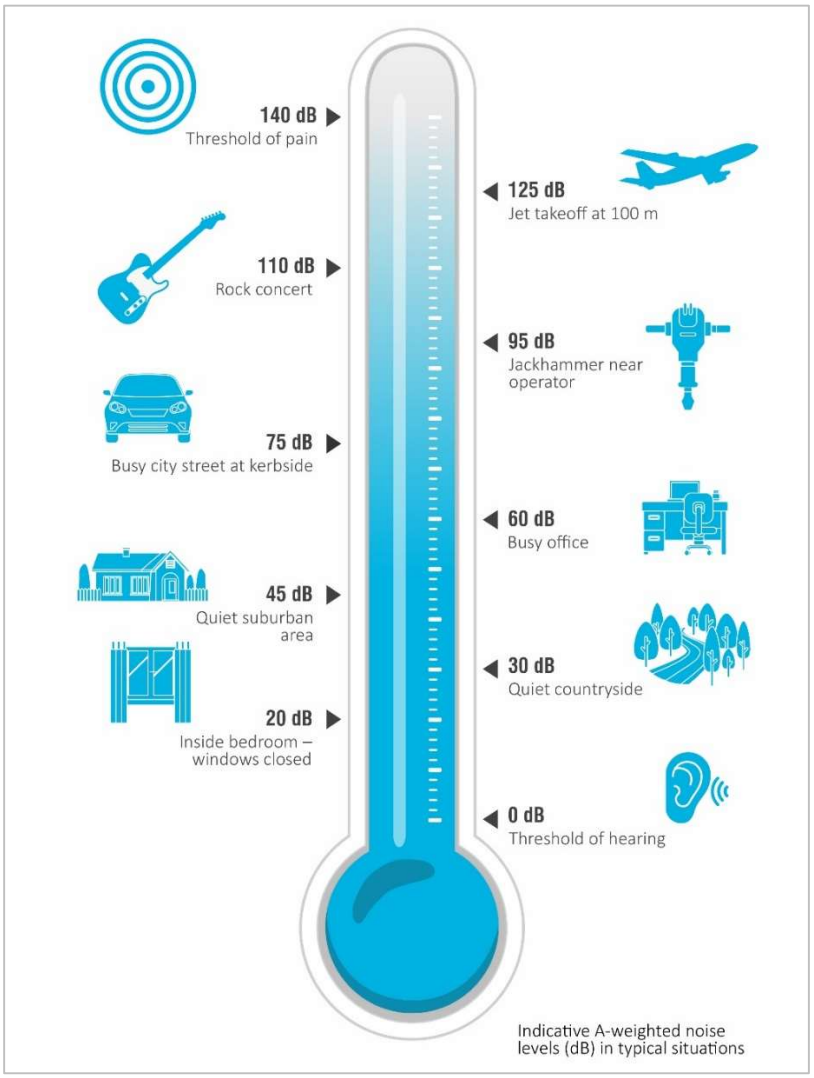

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development Consent

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

[1]NOISE

Noise Impact Assessment Criteria

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

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

Table 2: Noise Impact Assessment Criteria for the Development

Notes:

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

Operating Hours

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

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

Table 1: Operating Hours for the Development

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

Noise Monitoring

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

[1] Incorporates DEC GTAs

B.2 Environmental monitoring program

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

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

5.4 Noise and Blast Monitoring

5.4.1 Operational Noise

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

Table 6: Noise Impact Assessment Criteria for the Development

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

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

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

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

5.4.2 Monitoring of Operational Blasting (Vibration and Overpressure)

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

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C51438

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 79952
Class: 1
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	02/10/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	09/10/2024
Relative Humidity	42	% ±5%	**Date of Issue :**	09/10/2024

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

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

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

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

Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

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

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

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

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

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

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

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil

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

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23804

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

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

Calibration Technician : Shaheen Boaz
Secondary Check: Dhanush Bonu
Calibration Date : 3 Nov 2023
Report Issue Date : 6 Nov 2023

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*N/A*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

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

Uncertainties of Measurement -

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

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

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

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

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

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

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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
AS 1259-1:1990 - AS 1259-2:1990
Calibration Certificate

Calibration Number C23153

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

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

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

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

Approved Signatory :  Ken Williams

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

Uncertainties of Measurement -

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

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

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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

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

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Canberra City ACT 2601

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Appendix 4 – 2024-25 Ecological Monitoring Report

Karuah Quarry

Biennial Ecological Monitoring Report 2024-2025

Andersite Road, Karuah NSW 2324

Report prepared for:
Hunter Quarries

Rev 1
28 February 2025

Karuah Quarry

Biennial Ecological Monitoring Report 2024-2025

Andersite Road, Karuah NSW 2324

Report Prepared for Hunter Quarries

Version Control

Rev. No.	Revision Date	Author/s	Reviewer	Details
Rev 1	26 February 2025	Rachel Neal	Mark Dean	Draft for Client review
Rev 2	28 February 2025	Rachel Neal	Mark Dean	Revised Final

Report Prepared by Wedgetail Project Consulting
Po Box 234
Cardiff NSW 2285

ABN: 93 640 388 683

Contents

Figures

Tables

Charts

1. INTRODUCTION

1.1 BACKGROUND

Karuah Quarry is a hard rock quarry located at Andersite Road, off the Pacific Highway at Karuah NSW (**Figure 1**). The quarry has operated under Hunter Quarries Pty Ltd since 2002 (Mountain Industries prior to 2002) and extracts a resource known as Andesite. Andesite has a variety of uses including road base material, construction aggregate, aggregate used in concrete batching, drainage works, fill and landscaping.

On 3 June 2005, Development Consent DA265-10-2004 was granted by the Department of Planning (DoP), approving the quarry's proposed expansion to extract an additional 500,000 tonnes of product per annum over 22 years. Stage 2 of the quarry comprises an area of 160 metres to the east, 180 metres to the north and 40 metres to the south. Approximately 11.2 ha of remnant vegetation was modified for Stage 2.

The original ecological assessment for Stage 2 of the quarry was completed in 2004 by HWR Ecological. This report had a number of recommendations, one of which was to set aside an area of similar vegetation (in terms of structure and floristics), to the vegetation in the Stage 2 quarry, and for such vegetation to be protected and effectively managed (HWR, 2004). The conditions of consent which were issued in 2005 stipulated that a Conservation Area was to be set aside within the southern portion of Lot 12 DP 1024564. Under schedule 19 of the conditions of consent a Flora and Fauna Management Plan was to be prepared to include the following:

- Condition 20 - Vegetation Clearing Protocol.
- Condition 21 - Remnant Vegetation Conservation Plan.
- Condition 22 - Conservation Offset Management Plan.

HWR Ecological prepared a Flora and Fauna Management Plan in December 2005 to meet the above three conditions of consent. RPS undertook baseline ecological surveys (2007/08) and began annual monitoring to examine trends throughout the remnant vegetation and the Conservation Offset Areas. Annual ecological monitoring for Karuah Quarry was undertaken from 2009 to 2011. No annual monitoring has been undertaken from 2012 to 2019 (RPS 2008, 2009, 2010, 2011). The 2020 monitoring round was undertaken by Kleinfelder and represented a continuation in annual monitoring from the previous 2011 round (undertaken by RPS). As of 2020, ecological monitoring for Karuah Quarry was to be conducted by Wedgetail Project Consulting on a biennial (once every two years) basis as per the Karuah Quarry Flora and Fauna Management Plan (SLR, 2020).

1.2 SCOPE

Wedgetail has been engaged by Hunter Quarries Pty Ltd to undertake biennial ecological monitoring (previously undertaken by RPS and Kleinfelder) of remnant vegetation and the conservation offset, as required under Condition 23, (implementation and performance of the Flora and Fauna Management Plan and Conservation Offset Strategy), of the Development Consent (DA 265/10/2004) for Karuah Quarry. Remnant vegetation includes vegetation to the west and north-west of the Karuah Quarry extraction area. A range of vegetation communities (**Table 1, Section 2**) and previously recorded threatened species, such as *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* (**Section 2.1**), exist within this area. The Conservation Offset Area lies to the south-east of Karuah Quarry extraction area. This area contains approximately 16 hectares of vegetation that contain core habitat elements and key habitat elements for a range of threatened species, such as Brush-tailed Phascogale (*Phascogale tapoatafa*), Koala (*Phascolarctos cinereus*) and Powerful Owl (*Ninox strenua*). A small

population of *Tetratheca juncea* (Black-eyed Susan) is known to exist within the Conservation Offset Area.

Surveys to be undertaken as part of the biennial monitoring include the following:

- Eight (8) 20 m x 20 m vegetation monitoring plots.
- Ten (10) 5 m x 5 m *Tetratheca juncea* monitoring plots.
- Three (3) 20 m x 20 m *Grevillea parviflora subsp. parviflora* monitoring plots.
- Five (5) Koala Spot Assessment Technique (SAT) plots.
- Seven (7) remote camera transects.
- Four (4) spotlighting transects.
- Four (3) call playback broadcast locations.
- Four (4) Anabat (passive microbat call detection) survey locations.

Locations of the flora and fauna surveys (**Figure 1**, **Figure 2**, **Figure 3**) were delineated in the predefined Flora and Fauna Management Plan (HWR, 2005), with the exception of *Grevillea parviflora subsp. parviflora* monitoring, in which monitoring plots were established in 2020 and baseline floristic data collected. Targeted surveys for microbats were also conducted in 2020 (**Figure 4)** using passive microbat call detection (Anabat).

Site Boundary
Conservation Offset Area
Cadastre
National Park

Major watercourse
Minor watercourse
Primary Road
Arterial Road

100 200 300 400 500 m

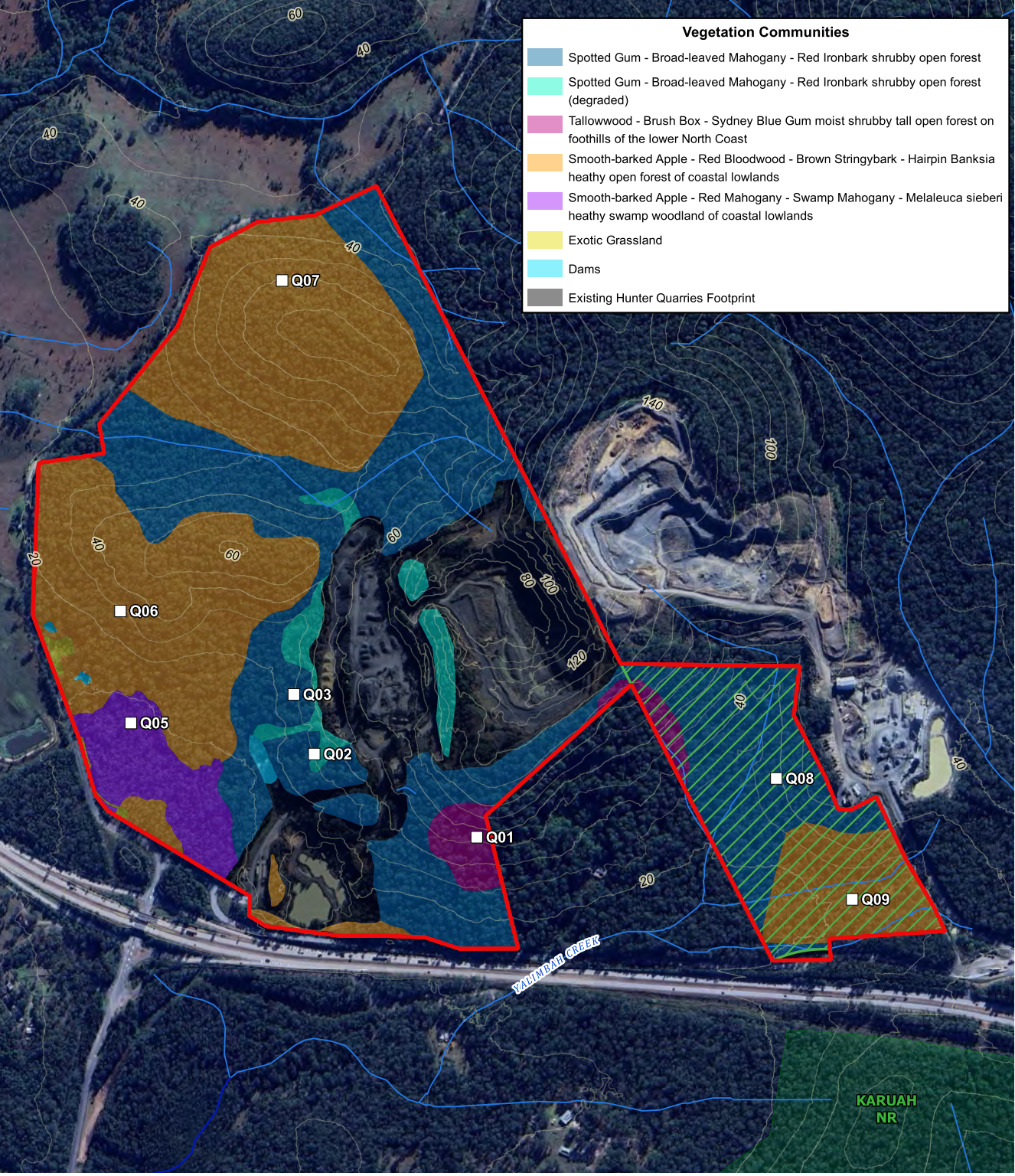
N

GDA94 / MGA zone 56
EPSG:28356

WEDGETAIL
PROJECT CONSULTING

Map Produced: 27/02/2025
Produced By: Keryn Dowling

Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Bi-annual Monitoring\@GIS\Karuah_Monitoring_Themes.qgz



Site Boundary
Conservation Offset Area
Vegetation Monitoring Plots
National Park
Contours (10m)
Major watercourse
Minor watercourse

100 200 300 400 500 m

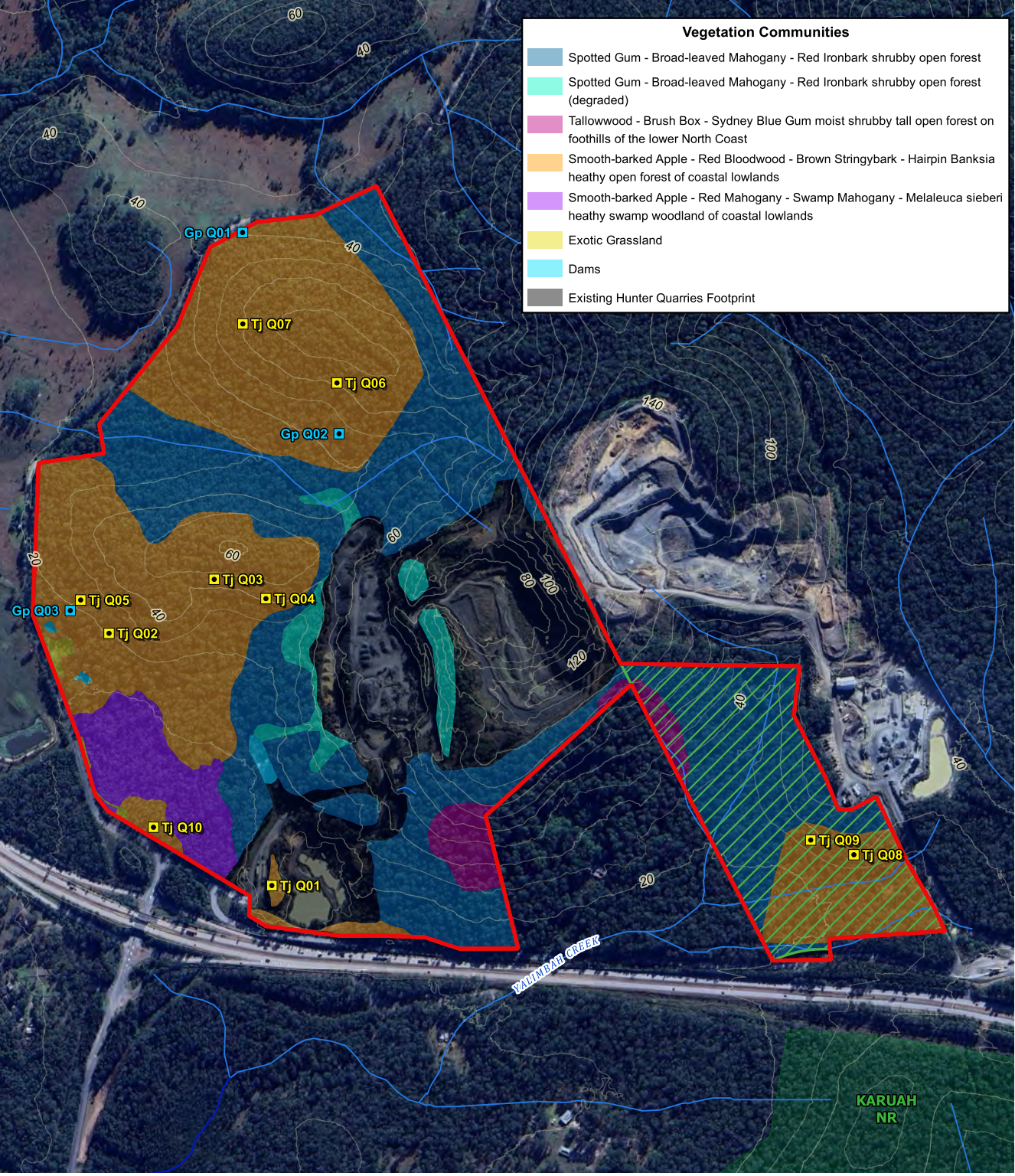
N

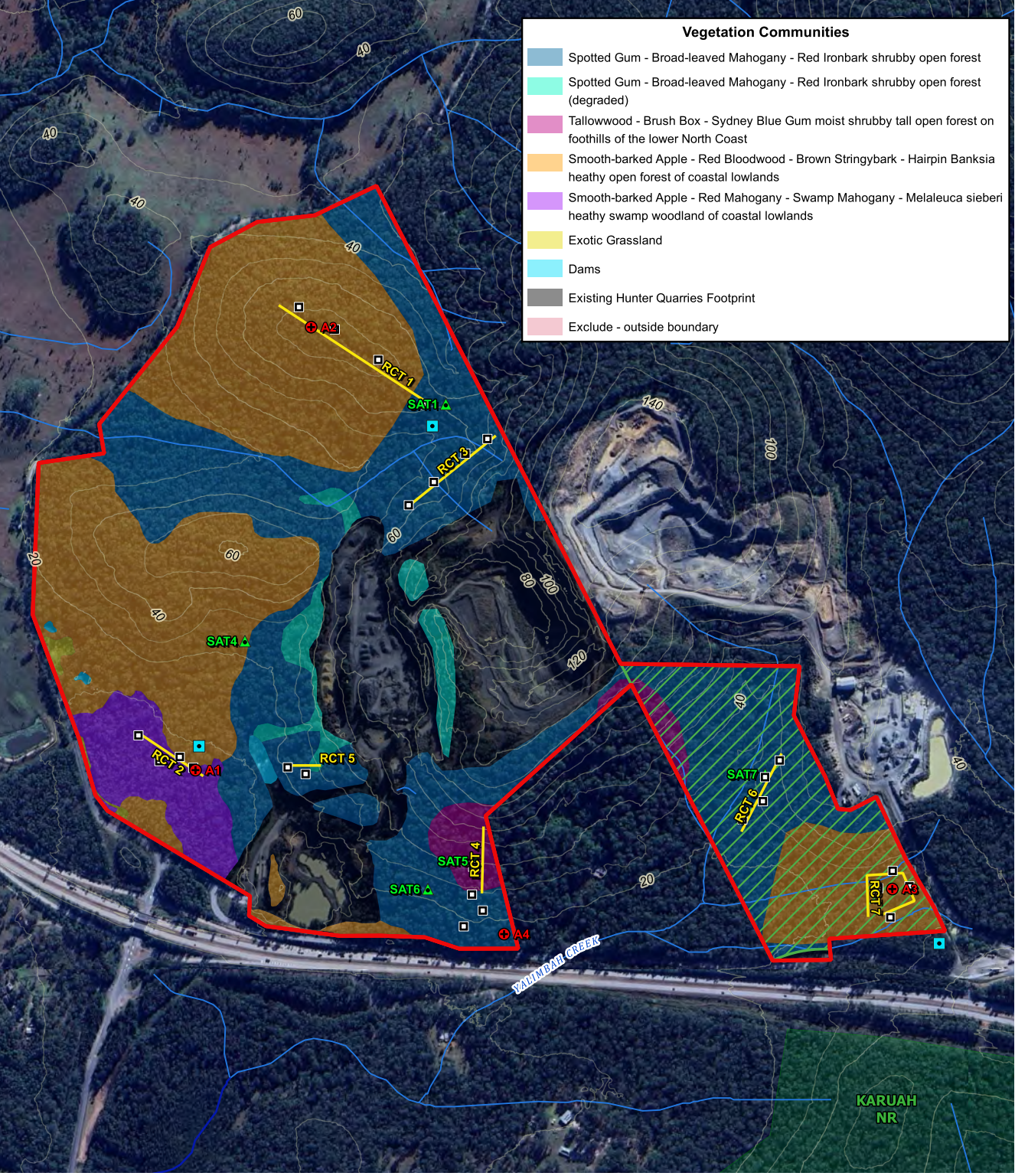
GDA94 / MGA zone 56
EPSG:28356

WEDGETAIL PROJECT CONSULTING

Map Produced: 27/02/2025
Produced By: Keryn Dowling

Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Bi-annual Monitoring\@GIS\Karuah_Monitoring_Themes.qgz


Vegetation Communities
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (degraded)
Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast
Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands
Smooth-barked Apple - Red Mahogany - Swamp Mahogany - Melaleuca sieberi heathy swamp woodland of coastal lowlands
Exotic Grassland
Dams
Existing Hunter Quarries Footprint
Gp Q01
Tj Q07
Tj Q06
Gp Q02
Tj Q03
Tj Q05
Tj Q04
Gp Q03
Tj Q02
Tj Q10
Tj Q01
Tj Q09
Tj Q08
VALIMBAH CREEK
KARUAH NR
Site Boundary
Conservation Offset Area
Grevillea parviflora Monitoring Plot
Tetratheca juncea Monitoring Plot
National Park
Contours (10m)
Major watercourse
Minor watercourse
100 200 300 400 500 m
N
GDA94 / MGA zone 56
EPSG:28356
WEDGETAIL PROJECT CONSULTING
Map Produced: 27/02/2025
Produced By: Keryn Dowling
Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Bi-annual Monitoring\@GIS\Karuah_Monitoring_Themes.qgz



Site Boundary
Conservation Offset Area
Anabat
Camera - Arboreal
Remote Camera Transect
Koala SAT
Owl Call Playback
National Park
Contours (10m)
Major watercourse
Minor watercourse

100 200 300 400 500 m

N

GDA94 / MGA zone 56
EPSG:28356

WEDGETAIL PROJECT CONSULTING

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2. METHODOLOGY

2.1 VEGETATION AND THREATENED FLORA MONITORING

2.2 ECOLOGICAL COMMUNITIES

In 2007/08, nine (9) 20 m x 20 m flora monitoring plots were established across each vegetation community as part of the baseline survey. Each plot has been surveyed in previous annual monitoring events. Expansion of Karuah Quarry has resulted in the loss of one monitoring plot (Quadrat 4), leaving eight (8) plots remaining.

The following vegetation communities, including number of plots per community, are presented in **Table 1**.

Table 1: The number of ecological monitoring plots within each vegetation community.

Vegetation Community	Area (ha) Remnant Vegetation	Area (ha) Conservation Offset	Number of Monitoring Plots
Riparian Melaleuca Swamp Woodland	4.8	-	1 - remnant
Blue Gum - Brush Box - Closed Forest	1.7	0.7	2 - remnant
Smooth-barked Apple - Red Bloodwood Open Forest	35.2	5.5	2 - remnant 1 - conservation
Spotted Gum Ironbark Open Forest	31.7	9.8	**1 - remnant 1 - conservation
Cleared easements and Quarry workings	26.2	-	-
Total	**99.6**	**16.0**	**8**

** denotes a reduction in the number of remnant monitoring plots (loss of Q4) within the Spotted Gum Ironbark Open Forest due to expansion of the Karauh East Quarry extraction area. The area of each vegetation community within the remnant vegetation and Conservation Offset are also displayed.

Surveys were conducted across eight (8) predefined 20 m x 20 m vegetation plots, six (6) within remnant vegetation and two (2) within the conservation offset. Locations of plots (**Figure 2**) have been previously marked in the field by metal star pickets and by GPS position. Previous photo points were also used to help identify the orientation of the plot in order to keep consistency across monitoring events.

For each plot, the following floristics were collected:

- Species abundance and diversity, including native and exotic species composition.
- Projected foliage cover (PFC) for each vegetation layer.
- Average height (m) of each vegetation layer.

Table 2: Location of ecological monitoring plots

Quadrat Number	Vegetation Community	Conservation / Remnant Vegetation	Easting (GDA 94 Zone 56)	Northing (GDA 94 Zone 56)
Q01	Blue Gum - Brush Box - Closed Forest	Remnant	406485	6389170
Q02	Blue Gum - Brush Box - Closed Forest	Remnant	406159	6389346
Q03	Spotted Gum Ironbark Open Forest	Remnant	406114	6389455

Quadrat Number	Vegetation Community	Conservation / Remnant Vegetation	Easting (GDA 94 Zone 56)	Northing (GDA 94 Zone 56)
Q05	Riparian Melaleuca Swamp Woodland	Remnant	405816	6389403
Q06	Smooth-barked Apple - Red Bloodwood Open Forest	Remnant	405802	6389609
Q07	Smooth-barked Apple - Red Bloodwood Open Forest	Remnant	406087	6390232
Q08	Spotted Gum Ironbark Open Forest	Conservation	406006	6389323
Q09	Smooth-barked Apple - Red Bloodwood Open Forest	Conservation	406170	6389093

Species diversity comprised of the total number of flora species, number and percentage of native flora species and number and percentage of introduced flora species. Flora species cover and abundance were recorded in accordance with the modified Braun–Blanquet cover and abundance scale (**Table 3**).

Table 3: Braun-Blanquet Cover and Abundance Scale

Cover Code	Projected Canopy Cover
1	<5% and uncommon
2	<5% and common
3	6-20%
4	21-50%
5	51-75%
6	76-100%

A walkover of the remnant and conservation areas, assessing weed infestations, erosion and disturbance, was conducted in conjunction with the Ecological Communities' quadrat monitoring. The results of the walkover are included in **Section 3.2.1** and a brief discussion over the findings are included in **Section 4.1.1**.

2.3 TETRATHECA JUNCEA

Ten (10) predefined 5 m x 5 m monitoring plots, eight (8) within remnant vegetation and two (2) within the Conservation Offset Area, were monitored between the peak flowering period of *T. juncea* (August – December). Due to the persistent lack of *Tetratheca juncea* present at Tj Q01, this monitoring point was removed in 2024-2025. For consistency with previous monitoring events, the results of Tj Q01 will be discussed herein, but will not be included in future monitoring events.

The locations of each plot have previously been GPS marked (**Table 4**), and the corners delineated by timber survey pegs. Previous photo points were used to help with plot orientation due to missing corner pegs (rotted and decayed) in some plots. The following data was collected for each plot:

- Number of *T. juncea* clumps within each plot, adhering to the standardized method as set out by Payne et al. (2002). Separation of clumps of *T. juncea* is delineated by a distance of 30 cm or more.

- Number of stems on each plant clump. Stems were counted by tracing their origins to the point of insertion of the root system. Care was taken not to damage stems during the process and to replace leaf litter that was moved aside for counting.
- Number of flowers on each plant clump.
- Number of fruits on each plant clump.
- Other plant species flowering or fruiting at time of survey.
- Species composition of the plot.
- Average height (m) of species identified within the plot.
- Cover and abundance (modified Braun-Blanquet Scale) of each species within the plot.

Table 4: Location of each *Tetratheca juncea* monitoring plot

Quadrat Number	Easting (GDA 94 Zone 56)	Northing (GDA 94 Zone 56)
Tj Q01	406095.48	6389113.53
Tj Q02	405793.75	6389580.47
Tj Q03	405987.22	6389676.00
Tj Q04	406082.59	6389647.17
Tj Q05	405737.17	6389642.01
Tj Q06	406215.20	6390043.90
Tj Q07	406036.27	6390152.72
Tj Q08	407172.83	6389173.06
Tj Q09	407086.76	6389197.85
Tj Q10	405874.97	6389226.18

2.4 GREVILLEA PARVIFLORA SUBSP. PARVIFLORA

Biennial monitoring for *Grevillea parviflora* subsp. *parviflora* was recommended as part of the 2020 update to the Karuah Quarry Flora and Fauna Management Plan (new requirement). Three (3) predefined 20 m x 20 m plots within the remnant area were monitored. The location of each plot (northern corner) was marked using a handheld GPS unit (**Table 5**). The following floristics were collected at each plot location:

- Height of each individual stem.
- Proportion of stems within each size class (<10 cm, 11-30 cm, 31-60 cm & >60 cm) as a percentage.
- Proportion of flower-bearing stems in relation to their size class.

Due to the rhizomatous growth habit of *G. parviflora* and the density of the population within the plots, floristic data has been collected based on individual stems, rather than individual plants.

Table 5: Location of *Grevillea parviflora* subsp. *parviflora* plot

Quadrat Number	Easting (GDA 94 Zone 56)	Northing (GDA 94 Zone 56)
Gp Q01	406039	6390326
Gp Q02	406218	6389953
Gp Q03	405720	6389626

2.5 THREATENED FAUNA MONITORING

2.5.1 Koala Scat Surveys

Five Koala scat surveys (Spot Assessment Technique – SAT) at predefined locations, four within remnant vegetation and one within the Conservation Offset Area, were conducted as part of the monitoring. Seven (7) were recorded in previous years though due to the Karuah East Quarry two SAT locations were removed in 2022. The SAT surveys are standardized at each location and follow the method detailed in Phillips and Callaghan (2011). A central tree is located as the starting point of the survey and is chosen based on one or more of the following criteria:

a) A tree of any species in which one or more *Phascolarctos cinereus* fecal pellets have been observed; and/or

b) A tree in which *P. cinereus* has been observed; and/or

c) Any other tree considered or known to be of importance to *P. cinereus*, or of interest for other assessment purposes.

The bases of twenty-nine (29) of the nearest trees to the central tree and including the central tree (30 trees in total), were surveyed for *P. cinereus* fecal pellets. Searches lasted approximately 2-person minutes per tree or until *P. cinereus* fecal pellets were detected. Each search consisted of visually examining and sifting through the leaf litter of each tree while radiating out to a maximum of 100cm from the base. A tree is considered a living woody stem of any plant species (except palms, Cycads, tree ferns and grass trees) with a diameter at breast height (DBH) of 10cm or greater.

2.5.2 Remote Camera Surveys

Remote cameras were installed at seven predefined transects, five in remnant vegetation and two in the Conservation Offset Area. Four cameras were used per transect except for Transect 5 where two cameras were used, totaling 26 cameras. Remote cameras were installed at heights of three (3) meters and baited with a mixture of rolled oats, honey, treacle and peanut butter. Cameras were left to record for 12 consecutive nights. As detailed in the Karuah Quarry Flora and Fauna Management Plan (updated in 2020), remote cameras replace the need hair-tube trapping and have greater ability to detect arboreal fauna.

2.5.3 Call Playback

Call playback was broadcast at three separate locations, one call playback location per nocturnal (spotlighting) transect. Call playback was conducted during the month of February and targeted threatened forest owls, (Masked Owl, Powerful Owl, Barking Owl and the Sooty Owl) and other threatened arboreal mammals, such as Koalas. Calls were broadcast for 15 minutes followed by spotlighting searches for 10 minutes. An additional five minutes of intermittent call playback was conducted after spotlighting, followed by second 10-minute spotlighting search. This aids in the detection of species which may be attracted by the call playback but themselves are not vocalizing.

2.5.4 Nocturnal Surveys

Spotlighting was undertaken across four predefined transects over two nights. Spotlighting efforts consisted of a one person-hour meander along each transect using high-powered hand-held torches and head lamps. Each transect was survey on two separate nights (one person-hour on each night).

Binoculars were also used in conjunction with high-powered torches to help with identification of fauna species.

2.5.5 Anabat Surveys

Anabats were installed at four predefined locations, three in remnant vegetation and one in the Conservation Offset Area. Each Anabat was left to record for one night (Anabat 1 and Anabat 2 – 29/01/25; Anabat 3 and Anabat 4 – 30/01/25).

2.6 DATA ANALYSIS

Analysis of data was conducted using Microsoft Excel™.

3. RESULTS

3.1 WEATHER CONDITIONS

The weather conditions experienced during flora and fauna surveys for the 2024-2025 monitoring period are displayed below in **Table 6.**

Table 6: Weather conditions during the 2024-2025 monitoring period (Williamtown weather station: 061078)

Date	Temp (°C)		Rain (mm)	9 am				3 pm			
	Min.	Max.		Temp (°C)	RH (%)	Wind		Temp (°C)	RH (%)	Wind	
						Dir.	Spd. (km/hr)			Dir.	Spd. (km/hr)
Flora											
23/10/24	9.7	30	0.2	18.1	66	NNW	13	28.9	41	NNW	11
24/10/24	16.1	23.2	0	21.4	73	S	33	21.4	62	SE	31
28/10/24	13.1	30.8	0	20.5	58	NW	22	25.1	39	S	56
29/10/24	17.6	22.1	0.4	18.9	62	SSE	15	21.5	58	ESE	19
01/11/24	15.5	23.1	1	20.5	73	SW	13	21.5	67	ESE	22
08/11/24	17.5	28.8	25.6	22.5	59	WSW	20	26.3	50	SE	15
Fauna											
28/01/25	23.2	40.7	0	28.8	67	NNW	9	38.9	31	NW	24
29/01/25	21.1	25.1	6.6	22.9	74	SSW	22	23.6	72	SSE	22
30/01/25	20.8	26.8	1.6	22.2	88	W	9	25.4	80	SSW	20
10/02/25	20.1	26.0	0	25.3	78	SW	11	20.7	89	SSW	13

3.2 VEGETATION AND THREATENED FLORA

3.3 ECOLOGICAL COMMUNITIES

A total of 171 flora species were recorded during the 2024-2025 monitoring round across eight ecological community plots, and the *Tetratheca juncea* monitoring plots. This includes two new species that have not been previously recorded, totaling 381 species since monitoring began in 2004. A comprehensive list of flora species recorded over all monitoring periods, including species recorded from *Tetratheca juncea* surveys, is located in **Appendix A**.

3.3.1.1 Flora diversity and native species composition

Floristic diversity across each ecological plot is displayed in **Table 7** including the percentage of native species compared to exotic species. In 2024-2025 floristic diversity was highest within the Smooth-barked Apple-Red Bloodwood community with quadrat 7 recording 56 total species.

All ecological communities displayed a high proportion of native species compared to exotic species in 2024-2025 with all quadrats recording a greater than 93% composition of native species (**Table 7**). The average percentage of native species compared to exotic species was highest within the Riparian Melaleuca Swamp Forest where no exotic species were recorded in 2024-2025. On average, the Blue Gum Brush-Box Forest had the lowest composition of native species at 95.5%.

Table 7: Number of species recorded in each ecological community.

Vegetation Community	Quadrat Number	Total Species	Number of Native Species	Percentage (%) of Native Species	Number of Exotic Species	Percentage (%) of Exotic Species	Mean Percentage (%) of native species
Blue Gum Brush Box Forest	Q01*	46	43	93%	3	7%	95.5%
	Q02*	50	49	98%	1	2%	
Spotted Gum Ironbark Forest	Q03*	54	52	96%	2	4%	97%
	Q08**	40	39	98%	1	3%	
Riparian Melaleuca Swamp Forest	Q05*	38	38	100%	0	0%	100%
Smooth-barked Apple / Red Bloodwood open Forest	Q06*	32	32	100%	0	0%	98.7%
	Q07*	56	54	96%	2	4%	
	Q09**	51	51	100%	0	0%	

'*' Denotes an ecological monitoring plot located within the remnant vegetation. '**' Denotes an ecological monitoring plot located within the Conservation Offset Area.

Chart 1 displays the total percentage of exotic species recorded across within each quadrat during each survey event. The current monitoring period has recorded the lowest total exotic species composition since monitoring first began, while the 2008/09 and 2010/11 monitoring rounds recorded the highest total exotic composition. Over all years of monitoring, total exotic species composition has decreased.

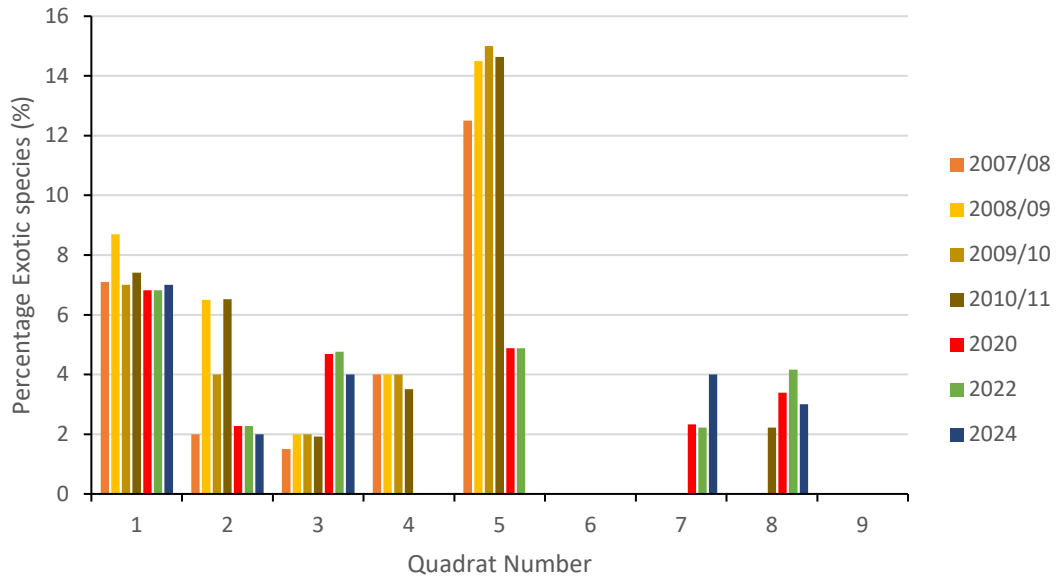

Chart 1: Percentage of exotic species per monitoring quadrat across all years of monitoring.

A walkover of the remnant and conservation areas found that gravel from Quarry areas have been deposited into vegetated areas via runoff along drainages lines that run through the remnant vegetation area (**Figure 5**). Gravel has accumulated in a small dam within the remnant vegetation area.

Site Boundary
Conservation Offset Area
Gravel Impacted Areas
National Park
Major watercourse
Minor watercourse

100 200 300 400 500 m

N

GDA94 / MGA zone 56
EPSG:28356

WEDGETAIL
PROJECT CONSULTING

Map Produced: 27/02/2025
Produced By: Keryn Dowling

Wedgetail Project Consulting\Hunter Quarries - Documents\KQ - Bi-annual Monitoring\@GIS\Karuah_Monitoring_Themes.qgz

3.3.2 *Tetratheca juncea*

Tetratheca juncea monitoring occurred across ten (10) monitoring locations. Eight locations occur within the remnant vegetation area and two occur within the Conservation Offset Area. Data was collected for *T. juncea,* including floristic composition data, which was recorded within each of the 5 m x 5 m monitoring plots.

Tetratheca juncea clumps are known to be long lived and can proliferate generously from a single rootstock, despite apparent senescence. However, *Tetratheca juncea* has not been recorded in Tj Q01 in the previous ten years of monitoring (since 2010) and though future resprouting is possible, it is regarded as unlikely due to the continuing decline of *Tetratheca juncea* amongst other quadrats and its proximity to quarry operations. Therefore, Tj Q01 for *Tetratheca juncea* will not be monitored in future events.

3.3.2.1 Total plant clumps

The total number of *Tetratheca juncea* plant clumps increased from 63 in 2007/08 to its highest in 2009/10 and 2010/11 at a total of 83 clumps, before decreasing in the 2020 survey period to 45 clumps (**Chart 2**). The number of *T. juncea* clumps have declined since the previous survey, with only 34 clumps recorded during this event.

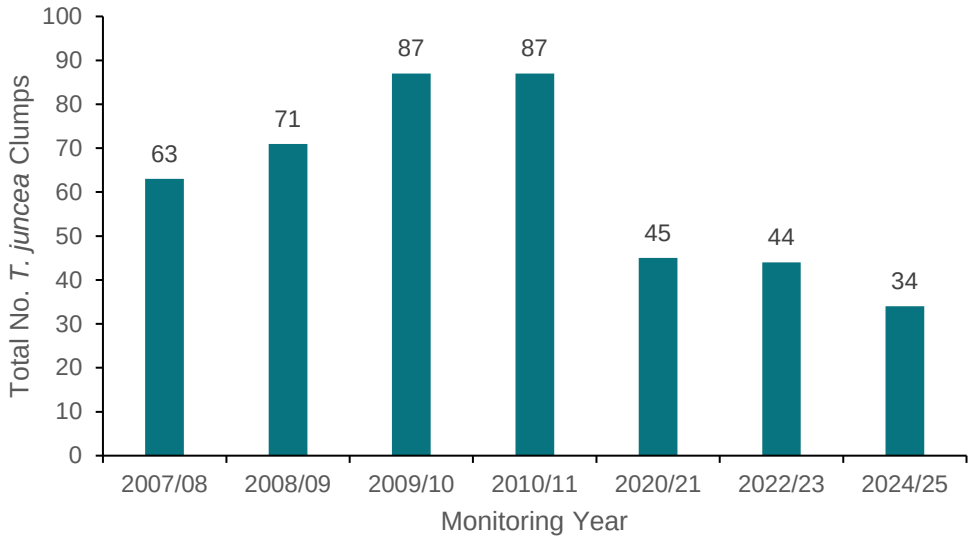

Chart 2: Total amount of *Tetratheca juncea* plant clumps recorded across all monitoring plots and across all years of monitoring.

3.3.2.2 Total number of fruits

Total number of *Tetratheca juncea* fruit has fluctuated across each monitoring year, with the 2008/09 monitoring year recording the highest amount of fruit; with 259 recorded (**Chart 3**). Fruit has remained largely similar to previous years with 175 fruits observed during this monitoring event; 14 less than 2022.

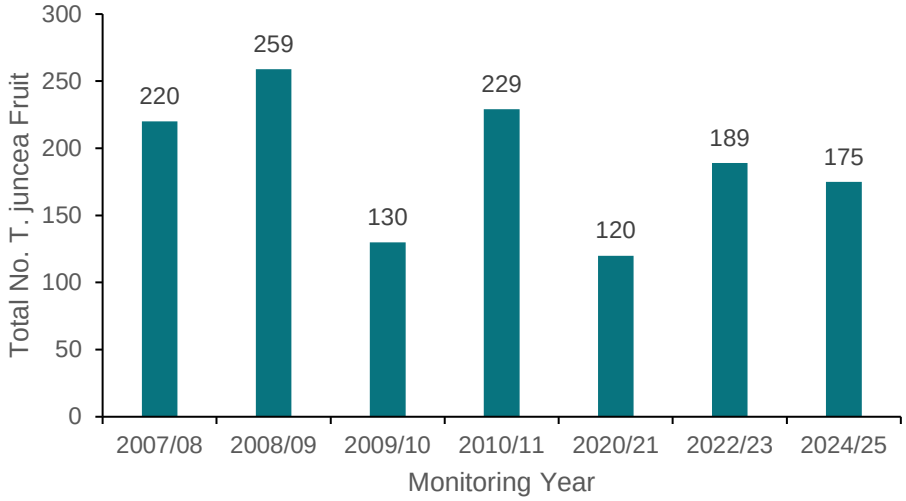

Chart 3: Total number of *T. juncea* fruits recorded across all monitoring plots and across all years of monitoring.

3.3.2.3 Total number of flowers

The total number of recorded *Tetratheca juncea* flowers was highest in 2010/11 at 2886 flowers, likely due a greater number of plants and therefore stems during this period. However, as plant clumps have declined over the years, so too have the number of flowers. The number of flowers recorded at this monitoring event are largely similar to previous years at 121 recorded in 2022/23 to 125 recorded in 2024-2025 (**Chart 4**).

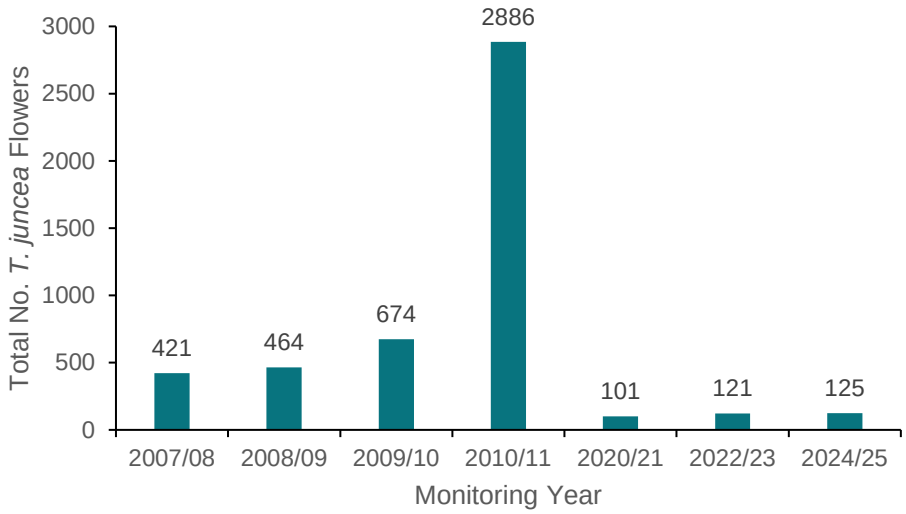

Chart 4: Total number of *T. juncea* flowers recorded across all monitoring plots and across all years of monitoring.

3.3.3 *Grevillea parviflora* subsp. *parviflora*

Gp Q01 increased from 115 stems in 2022 to 160 stems in 2024-2025, Gp Q02 declined from 195 in 2022 to 153 in 2024-2025, and Gp Q03 increased from 49 in 2022 to 52 in 2024-2025. In Gp Q01 this increase occurred in all stem classes except those <10cm. In Gp Q02 this decline occurred in

the stem classes between 30-60cm and those >60cm, despite an increase in stems between 11-30cm. In Gp Q03, this increase occurred in the stem class of those 31-60cm and those >60cm, despite a decrease in the stem class 11-30cm.

In 2024-2025 Gp Q01 and Gp Q02 recorded the greatest proportion of stems within the >60 cm height range, while Gp Q03 recorded the same highest proportion of stem heights across the 31-60 cm range and the >60cm range. All quadrats recorded the lowest proportion of stems at heights less than 10 cm (**Chart 5**).

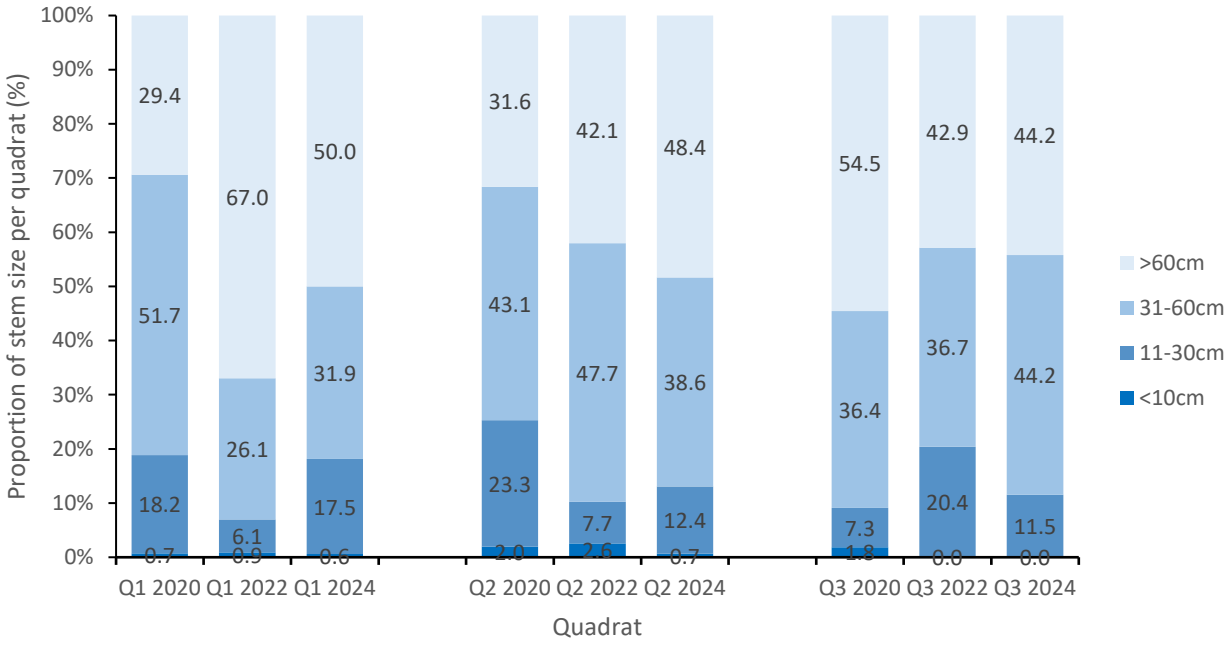

Chart 5: Proportion of *G. parviflora subsp. parviflora* stems, as a percentage, within height classes (<10 cm, 11-30 cm, 31-60 cm and >60 cm) across all quadrats.

All quadrats recorded a decline in the total number of recorded flowers, though total stems have also decreased, and so proportions remain largely the same.

There was a large decline in the total number of flowers recorded in Gp Q01; declined from 115 flowers in 2022 to 40 total recorded flowers in 2024-2025. Gp Q02 decreased from 183 in 2022 to 55 in 2024-2025. Gp Q03 decreased from 79 recorded in 2022 to 35 recorded in 2024-2025.

Gp Q01 and Gp Q03 recorded an increase in the total number of fruits; Gp Q01 recording no fruit in 2022 to 1 fruit in 2024-2025 and Gp Q03 recorded 2 fruits in 2022 to 40 fruits in 2024-2025. Gp Q02 recorded a large decline in fruit with 130 recorded in 2022 to 35 recorded in 2024-2025.

The proportion of flowering to non-flowering stems declined in Gp Q01, while there was an increase in the proportion of flowering stems in both Gp Q02 and Gp Q03 (**Chart 6**).

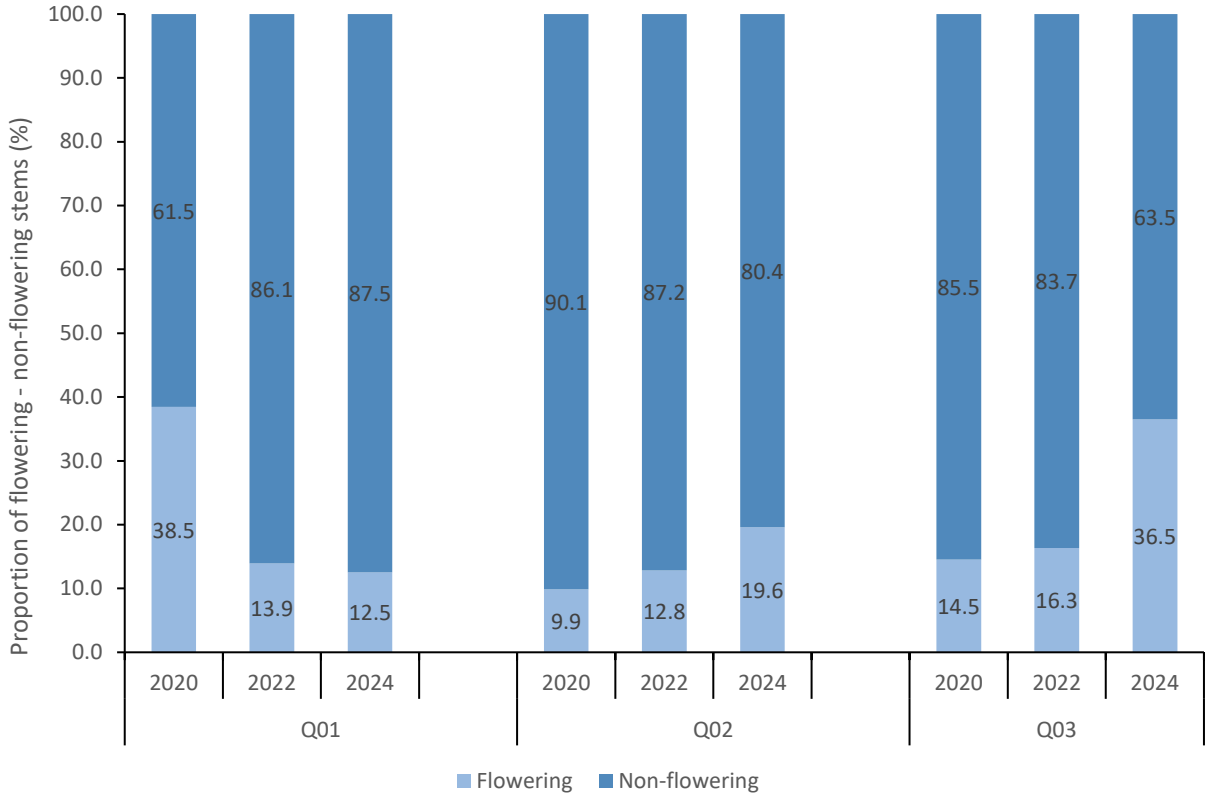

Chart 6: Proportion of flowering stems to non-flowering stems (*G. parviflora subsp. parviflora)*, as a percentage across all quadrats.

3.4 FAUNA

3.5 DIURNAL KOALA HABITAT SEARCHES

The SAT surveys did not detect any koala scats during the 2024-2025 monitoring event, though have been recorded during previous monitoring events.

3.6 REMOTE CAMERA SURVEYS

Unfortunately, unprecedented poor weather occurred on site during camera deployment and therefore a lack of fauna species diversity ensued. Remote camera surveys detected a total of five species. Two threatened species (Vulnerable under BC Act), the Squirrel Glider (*Petaurus norfolcensis*) and Brush-tailed Phascogale (*Phascogale tapoatafa*) have been recorded in previous surveys, though only the Squirrel Glider was detected during this monitoring event. Remote camera results are summarized in **Table 8**.

Table 8: Summary of species recorded with remote cameras

Remote Cameras	Transects						
Species	**T1 (R)**	**T2 (R)**	**T3 (R)**	**T4 (R)**	**T5 (R)**	**T6 (O)**	**T7 (O)**
Antechinus stuartii (Brown antechinus)	+		+	+	+	+	+
Trichosurus vulpecula (Common Brushtail Possum)	+	+	+	+			
Acrobates pygmaeus (Feathertail Glider)				+			
Petaurus breviceps (Sugar Glider)	+	+		+		+	+
Petaurus norfolcensis (Squirrel Glider)		+					

3.7 CALL PLAYBACK

No responses were recorded to the playback of calls from the Masked Owl, Sooty Owl, Powerful Owl, Barking Owl or the Koala.

3.8 SPOTLIGHTING

Unfortunately, poor weather conditions in the days preceding spotlight occurred on site and therefore a lack of fauna species diversity ensued. Only one Sugar Glider (*Petaurus breviceps*) was recorded along Transect line 1. No further species were recorded during spotlighting.

3.9 ANABAT SURVEYS

Anabat surveys detected a total of 17 Microbat species at all locations (**Figure 4).** Six species are listed as threatened under the BC Act. These species are as follows:

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Little Bent-wing Bat (*Miniopterus australis*)
- Large Bent-winged Bat *(Miniopterus orianae oceanensis)*
- Eastern Coastal Free-tailed Bat (*Mormopterus norfolkensis)*
- Southern Myotis *(Myotis Macropus)*
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris)*

4. DISCUSSION

4.1 FLORA

4.1.1 Ecological Communities

Floristic diversity within the quadrats remained consistent since the previous monitoring event with similar species diversity and exotic species proportions. Between the 2020 and 2011 surveys there was a substantial change which was attributed to the large period between survey events and the drought conditions which occurred during part of this period (2017 to 2020).

Exotic species recorded in 2024-2025, and in previous years, have a low cover and abundance, suggesting that they are largely out competed by high cover of native species and unable to establish. There is a decreasing trend in proportion of exotic species over time, though exotic species such as *Lantana camara* and *Andropogon virginicus* (Whisky Grass) have been recorded across all years of monitoring, suggesting that they are established. *Lantana camara*, in particular has historically recorded high cover and abundance within quadrats 1, 2 and 3, and this has since increased in 2024-2025. It was noted that scattered and medium levels of *Lantana* infestation were detected along most drainage lines within the remnant and Conservation Offset Areas and in proximity to the Tallowwood community (around Quadrat 1).

No substantial change in the proportion of native species to exotic species across all ecological communities is evident. The high proportion of native species within each community suggests that these communities are generally healthy. Despite, the low proportion of exotic species, management should be considered for high threat exotic species and established species, such as *Lantana camara*, which have the potential to cause significant impacts.

During a walkover of the remnant area in 2022, it was observed that some sections contained deposits of gravel, originating from the stockpile areas and from haul roads. As a result, ground cover vegetation was suppressed, and deposits collecting in permanent waterbodies were determined to limit habitat availability. In 2024-2025, gravel deposits remain and ground cover continues to be lacking, though some shrub and tree species were observed re-establishing in the area. These gravel deposits, if allowed to continue to accumulate may further impact vegetation downslope in which remediation of these areas are recommended.

4.1.2 Tetratheca juncea

There was a reduction in the total amount of Tetratheca juncea plant clumps recorded since the previous monitoring event (decline of 10 clumps), though this variation is likely due to plant clump senescence making individual clumps difficult to identify. Reductions in *T. juncea* clumps over time has been observed in previous studies (Driscoll, 2013), in which resprouting from rootstock is expected in the coming years. The reduction in clumps resulted in a reduction of plant stems and subsequently a reduction in fruits and flowers, though the proportion of which remains generally consistent with previous monitoring. This maintenance of similar clump numbers to the previous survey and in flowering and fruiting demonstrates that the population has stabilized.

4.1.3 Grevillea parviflora subsp. parviflora

There was an increase in the number of stems recorded across quadrats 1 and 3, with some decline observed in quadrat 2, which, as expected, corresponded with the number flowers and fruits, respectively. As such, proportions remain largely consistent with previous monitoring. As dieback

was not observed and recorded plants were typically mature and healthy, this suggests that fluctuations in populations are likely unremarkable and expected with varying environmental conditions. The population was determined to be well established and stable across all years and all quadrats, unlikely to have been impacted by quarry operations.

4.1.4 Threatened Fauna Monitoring

The three fauna species targeted within the surveys included the Brush-tailed Phascogale (*Phascogale tapoatafa*), the Koala (*Phascolarctos cinereus*) and the Powerful Owl (*Ninox strenua*).

The Brush-tailed Phascogale was first identified in the original survey (HWR 2004) and was captured on a remote camera trap in 2022, although was not recorded during this monitoring event. The condition of the woodland and open forest areas located on site offer suitable habitat for the species, the cryptic nature of this species may be the cause of the lack of recordings, coupled with the poor weather conditions during the survey period.

Phascolarctos cinereus (Koala) has not been seen during the initial survey (HWR, 2004) or the five subsequent annual monitoring periods until 2022 where a Koala was recorded via remote camera trap. No Koalas were detected during the 2024-2025 survey effort, though Hunter Quarry staff have reported regular sightings of Koalas throughout the lots that encompass Karuah Quarries. Failure to identify any evidence of koalas during the SAT surveys, or during spotlight searches, suggests that few koalas occur on the site, or that the study site may only be utilized on an occasional basis (such as during dispersal/immigration/emigration movements). Previous unrelated surveys undertaken within the remnant vegetation area have detected a small number of potential Koala Scats.

Ninox strenua (Powerful Owl) was recorded during the initial survey (HWR, 2004), and the third annual monitoring (conducted by RPS) but was not recorded during the 2024-2025 surveys. Due to the large home ranges (400–1450ha) for the species, it is likely that the species has previously been detected flying in some distance from their roost/nesting tree. In fact, the Powerful Owl has been detected during surveys in lots of Karuah Quarries adjacent to the current monitoring area and thus is likely to be detected in future surveys.

The lack of previous detections of Squirrel Gliders likely to be the result of less reliable survey methods. Previous monitoring included hair-tube trapping and analysis of hairs that are caught in the trap. Unfortunately, with this method, it is not possible to tell the difference between Sugar Glider and Squirrel Glider hair. With the use of more sophisticated technologies, remote camera trapping increases the likelihood of detecting arboreal fauna and the imagery is usually of sufficient quality to identify species. Since the improvement of detection methods (2020), the Squirrel Glider (*Petaurus norfolcensis*) has been detected at every monitoring event including the current surveys (Transect 2).

5. CONCLUSION

5.1 FLORA

No substantial change in the proportion of exotic species to native species has occurred. A decreasing trend in exotic species and an increasing trend in native species over time is still evident. The high proportion of native species and the low proportion of exotic species, which mainly consist of annuals with a low cover, suggests that the ecological communities remain in good condition. The tending decline in exotic species and persistent low cover suggest that there are no major impacts from quarry operations that are affecting floristic composition. Although, it should be noted that the ecological plots represent only a small area of each community and therefore, reflect a proportion of the broader vegetation type.

Population dynamics of *Tetratheca juncea* remained relatively consistent with previous monitoring results. Across all monitoring plots, population size (number of plant clumps) remained consistent, with the total number of flowers and fruit also consistent.

The *Grevillea parviflora* subsp. *parviflora* monitoring indicated that population fluctuated, but has remained healthy with mature individuals producing mature fruit.

Areas of remnant vegetation continued to be subject to gravel deposits from the stockpile areas and haul roads. In some areas these deposits are impacting on waterbodies and creek lines, which is suppressing the growth of emergent vegetation. There is potential for continual expansion of the deposits through the remnant vegetation, as well as new deposits from the lower stockpile area, in which remediation is recommended.

5.2 FAUNA

Fauna surveys conducted across the monitoring area show that species diversity has reduced since the previous monitoring event, although this is largely attributed to poor weather conditions during the current 2024-2025 survey period. Some fauna species are absent from this year's monitoring effort although this could be due to natural fluctuations, movement through the area or poor weather conditions during surveys. With continued monitoring on a biennial basis, greater numbers of species are expected to be recorded that will provide a more comprehensive understanding of the diversity of fauna species within the remnant and Conservation Offset Areas.

Also changes in survey techniques from the 2011 surveys undertaken by RPS is likely to have influenced the numbers of species detected during earlier monitoring events. With the use of sophisticated monitoring methods/devices (remote cameras and Anabat call recorded), future monitoring efforts are better positioned to draw reliable conclusions on the influence of adjacent quarrying operation on native fauna within the remnant and Conservation Offset Areas.

6. RECOMMENDATIONS

In consideration of the findings from the 2024-2025 ecological monitoring, the following recommendations have been made:

- Continue to conduct remnant vegetation and Conservation Offset Area walkovers, focusing on general ecosystem health, for example.
    - recruitment and regeneration of canopy and shrub species.
    - Infestation level and extent of high threat weed species, such as *Lantana camara*.
    - Erosion.
- Continue to monitor the population of *Tetratheca juncea* within the offset areas, including conducting surveys during the peak local flowering period (August/September).
- Continue to monitor *Grevillea parviflora subsp. parviflora* and include mapping the extent of the populations located within the 20m x 20m quadrats.
- Undertake weed control targeting areas currently supporting infestations of high threat weeds, particularly *Lantana camara* in Q1, Q2 and Q3.
- Accurately map the extent of gravel which has been deposited within the remnant vegetation area and remediate impacted areas on a risk assessed basis.
- Ensure erosion control measures are implemented to prevent further gravel washing into the remnant vegetation area.
- Consider upgrading the corners of all pre-existing monitoring plots with permanent, coloured star-pickets.

7. REFERENCES

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APPENDIX A. FLORA SPECIES RECORDED ACROSS ALL MONITORING YEARS

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Apiaceae	*Apium leptophyllum**	Slender Celery	Exotic		+	+	+	+			
Asclepidaceae	*Gomphocarpus fruiticosus**	Narrow Leaf Cotton Bush	Exotic			+	+	+			
Asclepidaceae	*Gomphocarpus physocarpus**	Cotton Bush	Exotic	+	+	+	+	+			
Asparagaceae	*Asparagus aethiopicus**		Exotic						+	+	
Asteraceae	*Ageratina adenophora**	Crofton Weed	Exotic						+	+	
Asteraceae	*Bidens pilosa**	Cobbler's Pegs	Exotic					+			
Asteraceae	*Cirsium vulgare**	Spear Thistle	Exotic					+			
Asteraceae	*Conyza sumatrensis**	Fleabane	Exotic	+	+	+	+	+			
Asteraceae	*Cyanthillium cinereum* var. *cinereum**	-	Exotic							+	+
Asteraceae	*Erechtites valerianifolia**	Brazilian Fireweed	Exotic	+	+	+	+	+			
Asteraceae	*Gnaphalium americanum**	Cudweed	Exotic	+	+	+	+	+			
Asteraceae	*Hypochaeris radicata**	Flatweed	Exotic	+	+	+	+	+		+	
Asteraceae	*Senecio madagascariensis**	Fireweed	Exotic	+	+	+	+	+	+		
Caryophyllaceae	*Stellaria media**	Common Chickweed	Exotic			+	+	+			+
Cyperaceae	*Cyperus congestus**	-	Exotic		+	+	+	+			
Euphorbiaceae	*Ricinus communis**	Castor Oil Plant	Exotic	+	+	+	+	+			
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow	Exotic		+	+	+	+			
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne	Exotic	+	+	+	+	+			
Passifloraceae	*Passiflora subpeltata**		Exotic						+	+	+
Phytolaccaceae	*Phytolacca octandra**	Inkweed	Exotic	+	+	+	+	+			
Plantaginaceae	*Plantago lanceolata**	Ribwort	Exotic			+	+	+			
Poaceae	*Andropogon virginicus**	Whisky Grass	Exotic	+	+	+	+	+	+	+	+
Poaceae	*Briza maxima**	Quaking Grass	Exotic		+	+	+	+			
Poaceae	*Ehrharta erecta**	Panic Veldtgrass	Exotic		+	+	+	+			
Poaceae	*Eragrostis curvula**		Exotic						+		
Poaceae	*Paspalum quadrifarium**		Exotic						+	+	+
Poaceae	*Paspalum urvillei**	Vasey Grass	Exotic	+	+	+	+	+			
Poaceae	*Pennisetum clandestinum**	Kikuyu	Exotic		+	+	+	+			
Poaceae	*Setaria gracilis**	Slender Pigeon Grass	Exotic			+	+	+			
Poaceae	*Sporobolus africanus**	Parramatta Grass	Exotic		+	+	+	+			
Poaceae	*Sporobolus fertilis**		Exotic						+		
Solanaceae	*Physalis peruviana**	Cape Gooseberry	Exotic	+	+	+	+				
Solanaceae	*Solanum erianthum**	Wild Tobacco	Exotic			+	+				
Solanaceae	*Solanum mauritianum**	Wild Tobacco	Exotic	+	+	+	+	+			
Solanaceae	*Solanum nigrum**	Black Nightshade	Exotic	+	+	+	+	+			
Verbenaceae	*Lantana camara**	Lantana	Exotic	+	+	+	+	+	+	+	+
Verbenaceae	*Verbena bonariensis**	Purpletop	Exotic	+	+	+	+	+			
Acanthaceae	*Brunoniella australis*		Native						+	+	+
Acanthaceae	*Brunoniella pumilio*	Dwarf Blue Trumpet	Native	+	+	+	+	+			
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower	Native	+	+	+	+	+	+	+	+
Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair	Native	+	+	+	+	+			+
Adiantaceae	*Adiantum formosum*	Giant Maidenhair	Native	+	+	+	+	+	+	+	+
Anthericaceae	*Arthropodium milleflorum*	Pale Vanilla Lily	Native	+	+	+	+	+	+		

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Anthericaceae	*Caesia calliantha*	Pale Grass-lily	Native	+							
Anthericaceae	*Tricoryne elatior*	Yellow Rush Lily	Native	+	+	+	+	+			
Apiaceae	*Centella asiatica*	Swamp Pennywort	Native	+	+	+	+	+	+	+	+
Apiaceae	*Hydrocotyle geraniifolia*	Forest Pennywort	Native	+	+	+	+	+			
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort	Native	+	+	+	+	+			+
Apiaceae	*Hydrocotyle peduncularis*	Pennywort	Native	+	+	+	+	+			
Apiaceae	*Hydrocotyle tripartita*	Pennywort	Native			+	+	+			
Apiaceae	*Xanthosia tridentata*	Rock Xanthosia	Native			+	+	+	+	+	
Apocynaceae	*Marsdenia flavenscens*	Hairy Milk Vine	Native								
Apocynaceae	*Marsdenia liisae*		Native						+	+	+
Apocynaceae	*Marsdenia rostrata*	Common Milk Vine	Native							+	
Apocynaceae	*Parsonsia straminea*	Common Silkpod	Native			+	+	+	+	+	+
Apocynaceae	*Tylophora barbata*	Bearded Tylophora	Native	+	+	+	+	+			
Araceae	*Gymnostachys anceps*	Settlers Flax	Native	+	+	+	+	+	+	+	+
Araliaceae	*Cephalaralia cephalobotrys*	Climbing Panax	Native	+							
Araliaceae	*Polyscias sambucifolia*		Native						+		+
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm	Native	+	+	+	+	+	+	+	+
Arecaceae	*Livistona australis*	Cabbage Tree Palm	Native	+	+	+	+	+	+	+	+
Asteraceae	*Epaltes australis*	-	Native	+	+	+	+	+			
Asteraceae	*Lagenifera gracilis*	-	Native	+							
Asteraceae	*Lagenophora stipitata*	-	Native			+	+	+	+	+	+
Asteraceae	*Ozothamnus diosmifolius*	Ball Everlasting	Native	+	+	+	+	+			
Asteraceae	*Sigesbeckia orientalis*	Indian Weed	Native	+	+	+	+	+	+	+	
Asteraceae	*Vernonia cinerea*	-	Native	+	+	+	+	+	+		
Bignoniaceae	*Pandorea pandorana*	Wonga Vine	Native	+	+	+	+	+	+	+	+
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern	Native					+	+	+	+
Blechnaceae	*Doodia aspera*	Rasp Fern	Native	+	+	+	+	+	+	+	+
Boraginaceae	*Ehretia acuminata var. acuminata*		Native						+	+	+
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	Native		+	+	+	+			
Campanulaceae	*Wahlenbergia gracilis*	Australian Bluebell	Native	+	+	+	+	+			
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak	Native	+	+	+	+	+	+	+	+
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	Native	+	+	+	+	+	+	+	+
Celastraceae	*Cassine australis var. australis*	Red Olive Plum	Native	+	+	+	+	+			
Celastraceae	*Denhamia silvestris*	-	Native	+	+	+	+	+			+
Celastraceae	*Maytenus spp.*		Native						+	+	
Clusiaceae	*Hypericum japonicum*	Matted St Johns Wort	Native	+							
Colchicaceae	*Burchardia umbellata*	Milkmaids	Native						+		
Commelinaceae	*Aneilema acuminatum*	Pointed Aneilema	Native	+	+	+	+	+			
Commelinaceae	*Commelina cyanea*	Scurvy Weed	Native	+	+	+	+	+			
Convolvulaceae	*Convolvulus erubescens*	Austrialian Bindweed	Native			+	+	+			
Convolvulaceae	*Dichondra repens*	Kidney Weed	Native	+	+	+	+	+	+	+	+
Convolvulaceae	*Polymeria calycina*	Bindweed	Native	+	+	+	+	+	+	+	+
Cunoniaceae	*Aphanopetalum resinosum*	Gum Vine	Native	+	+	+	+	+	+	+	+

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush	Native	+	+	+	+	+			
Cunoniaceae	*Schizomeria ovata*	Crab Apple	Native	+	+	+	+	+			
Cyperaceae	*Carex appressa*	Tall Sedge	Native			+	+	+			
Cyperaceae	*Carex longebrachiata*	Bergalia Tussock	Native	+	+	+	+	+	+	+	+
Cyperaceae	*Cyathochaeta diandra*	-	Native							+	
Cyperaceae	*Eleocharis cylindrostachys*	-	Native	+	+	+	+	+			
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-rush	Native	+	+	+	+	+			
Cyperaceae	*Gahnia aspera*	Saw Sedge	Native	+	+	+	+	+			
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge	Native	+	+	+	+	+	+	+	+
Cyperaceae	*Gahnia melanocarpa*	Black-fruit Saw-sedge	Native			+	+	+	+		
Cyperaceae	*Gahnia radula*	-	Native	+	+	+	+	+	+	+	+
Cyperaceae	*Lepidosperma filiforme*	-	Native			+	+	+			
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	Native	+	+	+	+	+	+	+	+
Cyperaceae	*Lepidosperma neesii*	-	Native	+	+	+	+	+	+	+	
Cyperaceae	*Lepidosperma quadrangulatum*	-	Native	+	+	+	+	+			
Cyperaceae	*Ptilothrix deusta*	-	Native			+	+	+	+	+	+
Cyperaceae	*Schoenus melanostachys*	Black Bog Rush	Native	+	+	+	+	+			
Davalliaceae	*Arthropteris tenella*	-	Native	+							
Dennstaedtiaceae	*Hypolepis muelleri*		Native						+	+	+
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	Native	+	+	+	+	+	+	+	+
Dicksoniaceae	*Calochlaena dubia*	False Bracken	Native	+	+	+	+	+	+	+	+
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower	Native	+	+	+	+	+	+	+	+
Dilleniaceae	*Hibbertia dentata*	Twining Guinea Flower	Native	+	+	+	+	+	+	+	+
Dilleniaceae	*Hibbertia empetrifolia subsp. empetrifolia*		Native						+	+	+
Dilleniaceae	*Hibbertia monogyna*	-	Native	+	+	+	+	+			
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	Native							+	
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea-flower	Native		+	+	+	+			
Dilleniaceae	*Hibbertia vestita*	-	Native			+	+	+	+	+	+
Dilleniaceae	*Hibbertis diffusa*	Wedge Guinea Flower	Native								+
Dioscoreaceae	*Dioscorea transversa*	Native Yam	Native	+	+	+	+	+	+	+	+
Doryanthaceae	*Doryanthes excelsa*	Gymea Lily	Native	+	+	+	+	+	+	+	+
Ebenaceae	*Diospyros australis*	Black Plum	Native	+	+	+	+	+	+	+	+
Elaeocarpaceae	*Elaeocarpus grandis*		Native						+	+	+
Elaeocarpaceae	*Sloanea australis*	Maidens Blush	Native	+	+	+	+	+			
Ericaceae (Epacridoideae)	*Acrotriche divaricata*		Native							+	+
Ericaceae (Epacridoideae)	*Epacris pulchella*	NSW Coral Heath	Native	+	+	+	+	+	+	+	+
Ericaceae (Epacridoideae)	*Leucopogon juniperinus*	Prickly Beard-heath	Native	+	+	+	+	+	+	+	+
Ericaceae (Epacridoideae)	*Monotoca scoparia*	Prickly Broom-heath	Native	+	+	+	+	+	+		
Ericaceae (Epacridoideae)	*Trochocarpa laurina*		Native						+	+	+
Euphorbiaceae	*Alchornea illicifolia*	Native Holly	Native	+							
Euphorbiaceae	*Croton verrauxii*		Native						+	+	+
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart	Native	+	+	+	+	+			
Euphorbiaceae	*Poranthera corymbosa*	-	Native					+			

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Eupomatiaceae	*Eupomatia laurina*	Bolwarra	Native	+	+	+	+	+			
Fabaceae (Faboideae)	*Bossiaea rhombifolia*		Native						+	+	
Fabaceae (Faboideae)	*Daviesia ulicifolia*	Gorse Bitter Pea	Native	+	+	+	+	+		+	
Fabaceae (Faboideae)	*Desmodium gunnii*		Native						+	+	+
Fabaceae (Faboideae)	*Desmodium rhytidophyllum*	-	Native	+	+	+	+	+	+	+	+
Fabaceae (Faboideae)	*Desmodium varians*	-	Native	+	+	+	+	+	+	+	+
Fabaceae (Faboideae)	*Dillwynia retorta var. retorta*	Eggs and Bacon	Native		+	+	+	+			
Fabaceae (Faboideae)	*Glycine clandestina*	Twining Glycine	Native	+	+	+	+	+	+	+	+
Fabaceae (Faboideae)	*Glycine microphylla*		Native						+	+	+
Fabaceae (Faboideae)	*Glycine tabacina*	Twining Glycine	Native			+	+	+	+	+	+
Fabaceae (Faboideae)	*Gompholobium latifolium*	Broad-leaf Wedge-pea	Native	+	+	+	+	+		+	+
Fabaceae (Faboideae)	*Gompholobium pinnatum*	-	Native		+	+	+	+			
Fabaceae (Faboideae)	*Gompholobium sp.*		Native						+	+	
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsparilla	Native			+	+	+	+	+	+
Fabaceae (Faboideae)	*Hovea linearis*		Native						+	+	
Fabaceae (Faboideae)	*Hovea longifolia*	-	Native			+	+	+			
Fabaceae (Faboideae)	*Indigofera australis*	Native Indigo	Native	+	+	+	+	+			+
Fabaceae (Faboideae)	*Jacksonia scoparia*	Dogwood	Native			+	+	+			
Fabaceae (Faboideae)	*Kennedia rubicunda*	Dusky Coral Pea	Native	+	+	+	+	+			
Fabaceae (Faboideae)	*Pultanaea myrtoides*	Myrtle bush pea	Native								+
Fabaceae (Faboideae)	*Pultenaea daphnoides*	Large-leaf Bush Pea	Native		+	+	+	+	+		
Fabaceae (Faboideae)	*Pultenaea euchila*		Native						+	+	+
Fabaceae (Faboideae)	*Pultenaea paleacea*	-	Native	+	+	+	+	+		+	
Fabaceae (Faboideae)	*Pultenaea retusa*	-	Native	+	+	+	+	+			
Fabaceae (Faboideae)	*Pultenaea villosa*	-	Native	+	+	+	+	+	+	+	+
Fabaceae (Faboideae)	*Zornia dyctiocarpa*	Zornia	Native			+	+	+			
Fabaceae (Mimosaceae)	*Acacia falcata*	Sickle Wattle	Native	+	+	+	+	+			
Fabaceae (Mimosaceae)	*Acacia floribunda*	Sally Wattle	Native			+	+	+			
Fabaceae (Mimosaceae)	*Acacia implexa*		Native						+		
Fabaceae (Mimosaceae)	*Acacia irrorata subsp. irrorata*	Green Wattle	Native	+	+	+	+	+	+	+	+
Fabaceae (Mimosaceae)	*Acacia longifolia var. longifolia*	Sydney Golden Wattle	Native	+	+	+	+	+	+	+	+
Fabaceae (Mimosaceae)	*Acacia longissima*		Native						+	+	
Fabaceae (Mimosaceae)	*Acacia maidenii*		Native						+	+	+
Fabaceae (Mimosaceae)	*Acacia myrtifolia*	Red Stem Wattle	Native	+	+	+	+	+	+	+	
Fabaceae (Mimosaceae)	*Acacia stricta*	Hop Wattle	Native	+	+	+	+				
Fabaceae (Mimosaceae)	*Acacia suaveolens*	Sweet Scented Wattle	Native			+	+	+			
Fabaceae (Mimosaceae)	*Acacia terminalis*	Sunshine Wattle	Native	+	+	+	+	+	+		
Fabaceae (Mimosaceae)	*Acacia ulicifolia*	Prickly Moses	Native	+	+	+	+	+	+	+	+
Fabaceae (Mimosaceae)	*Daphnandra micrantha*	Socket Wood	Native	+							
Fabaceae (Mimosaceae)	*Doryphora sassafras*	Sassafras	Native	+	+	+	+	+			
Fabaceae (Mimosaceae)	*Palmeria scandens*	Anchor Vine	Native	+	+	+	+	+			
Fabaceae (Mimosaceae)	*Parachidendron pruinosum*	Snow-wood	Native	+							
Flacourtiaceae	*Scolopia braunii*	Flintwood	Native	+	+	+	+				

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Goodeniaceae	*Goodenia bellidifolia*	Daisy-leaved Goodenia	Native	+	+	+	+	+			
Goodeniaceae	*Goodenia heterophylla subsp. heterophylla*	Variable Leaved Goodenia	Native	+	+	+	+	+	+	+	+
Goodeniaceae	*Goodenia ovata*	-	Native	+	+	+	+	+			
Goodeniaceae	*Goodenia paniculata*	Swamp Goodenia	Native	+	+	+	+	+	+		
Haemodoraceae	*Haemodorum planifolium*	Bloodroot	Native	+	+	+	+	+			
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort	Native	+	+	+	+	+			
Haloragaceae	*Gonocarpus teucrioides*		Native						+	+	+
Iridaceae	*Patersonia sericea*	Wild Iris	Native			+	+	+	+	+	+
Iridaceae	*Patersonia sp.*		Native						+	+	
Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower	Native	+	+	+	+	+			
Lauraceae	*Cassytha glabella forma glabella*	Slender Devil's Twine	Native	+	+	+	+	+	+	+	+
Lauraceae	*Cassytha pubescens*	Common Devil's Twine	Native	+	+	+	+	+			
Lauraceae	*Cryptocarya glaucescens*	Jackwood	Native			+	+	+	+	+	+
Lauraceae	*Cryptocarya microneura*	Murrogun	Native	+	+	+	+	+			
Lauraceae	*Cryptocarya rigida*		Native						+	+	+
Lauraceae	*Litsea reticulata*		Native						+	+	+
Lauraceae	*Neolitsea australiensis*	Green Bolly Gum	Native	+	+	+	+	+			
Lauraceae	*Neolitsea dealbata*	White Bolly Gum	Native	+	+	+	+	+	+	+	+
Lindsaeaceae	*Lindsaea linearis*	Screw Fern	Native	+	+	+	+	+	+	+	+
Lobeliaceae	*Lobelia purpurascens*	Whiteroot	Native	+	+	+	+	+	+	+	+
Lomandraceae	*Lomandra confertifolia*		Native						+		+
Lomandraceae	*Lomandra cylindrica*	-	Native			+	+	+			
Lomandraceae	*Lomandra filiformis subsp. coriacea*	Wattle Mat-rush	Native	+	+	+	+	+	+	+	
Lomandraceae	*Lomandra filiformis subsp. filiformis*	Wattle Mat-rush	Native			+	+	+		+	+
Lomandraceae	*Lomandra glauca*	-	Native	+	+	+	+	+	+	+	
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush	Native	+	+	+	+	+	+	+	+
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	Native	+	+	+	+	+	+		
Lomandraceae	*Lomandra obliqua*	Twisted Mat-rush	Native	+	+	+	+	+	+	+	+
Loranthaceae	*Amyema cambagei*		Native						+	+	+
Loranthaceae	*Dendrophthoe vitellina*	Mistletoe	Native	+	+	+	+	+			+
Loranthaceae	*Muellerina eucalyptoides*	Mistletoe	Native		+	+	+	+			
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	Native	+	+	+	+	+	+	+	+
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	Native	+	+	+	+	+	+	+	+
Malvaceae	*Hibiscus heterophyllus subsp. heterophyllus*		Native						+	+	
Meliaceae	*Dysoxylum fraserianum*		Native						+	+	+
Meliaceae	*Synoum glandulosum*	Scentless Rosewood	Native	+	+	+	+	+			
Menispermiaceae	*Sarcopetalum harveyanum*	Pearl Vine	Native	+	+	+	+	+	+	+	+
Menispermiaceae	*Stephania japonica var. discolor*	Snake Vine	Native	+	+	+	+	+	+	+	+
Moraceae	*Ficus coronata*	Sandpaper Fig	Native	+	+	+	+	+	+	+	+
Moraceae	*Ficus obliqua*		Native						+	+	+
Moraceae	*Ficus rubiginosa*	Port Jackson Fig	Native	+	+	+	+	+			
Moraceae	*Ficus watkinsiana*	Strangling Fig	Native	+							
Myrsinaceae	*Myrsine variabilis*		Native						+	+	+

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Myrsinaceae	*Rapanea variabilis*	Muttonwood	Native	+	+	+	+	+			
Myrtaceae	*Acmena smithii*	Lilly Pilly	Native						+	+	+
Myrtaceae	*Angophora costata*	Smooth-barked Apple	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	Native	+	+	+	+	+			
Myrtaceae	*Angophora inopina*	-	Native	+	+	+	+	+			
Myrtaceae	*Backhousia myrtifolia*	Grey Myrtle	Native			+	+	+			
Myrtaceae	*Baloghia inophylla*	Brush Bloodwood	Native			+	+	+			
Myrtaceae	*Callistemon linearis*	Narrow-leaved Bottlebrush	Native		+	+	+	+	+	+	+
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush	Native			+	+	+	+	+	+
Myrtaceae	*Corymbia gummifera*	Red Bloodwood	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Corymbia maculata*	Spotted Gum	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus acmenoides*	White Mahogany	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	Native	+	+	+	+	+			
Myrtaceae	*Eucalyptus fibrosa*	Broad Leaved Ironbark	Native		+	+	+	+			
Myrtaceae	*Eucalyptus globoidea*	White Stringybark	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus microcorys*	Tallowwood	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus paniculata subsp. paniculata*	Grey Ironbark	Native	+	+	+	+	+			
Myrtaceae	*Eucalyptus piperita subsp. piperita*	Sydney Peppermint	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus propinqua var. propinqua*	Small Fruited Grey Gum	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus punctata*	Grey Gum	Native	+	+	+	+	+			
Myrtaceae	*Eucalyptus resinifera subsp. resinifera*	Red Mahogany	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	Native	+	+	+	+	+			+
Myrtaceae	*Eucalyptus siderophloia*	Northern Grey Ironbark	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Eucalyptus umbra*	Broad-leaved White Mahogany	Native	+	+	+	+	+	+		
Myrtaceae	*Leptospermum juniperinum*		Native						+		
Myrtaceae	*Leptospermum polygalifolium*	Lemon Scented Tea-tree	Native			+	+	+	+	+	+
Myrtaceae	*Leptospermum polygalifolium subsp. cismontanum*	Lemon Scented Tea-tree	Native	+	+	+	+	+			
Myrtaceae	*Lophostemon confertus*	Brush Box	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Melaleuca linariifolia*	Snow in Summer	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Melaleuca nodosa*	Ball Honey Myrtle	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Melaleuca sieberi*	-	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree	Native	+	+	+	+	+	+	+	+
Myrtaceae	*Syncarpia glomulifera*		Native						+	+	+
Oleaceae	*Jasminum volubile*		Native						+	+	+
Oleaceae	*Notelaea longifolia*	Mock Olive	Native	+	+	+	+	+	+	+	+
Oleaceae	*Notelaea venosa*	Veined Mock Olive	Native			+	+	+			
Orchidaceae	*Acianthus sp.*	Gnat Orchid	Native	+	+	+	+	+	+	+	+
Orchidaceae	*Calochilus sp.*	Beard Orchid	Native	+	+	+	+	+	+		
Orchidaceae	*Chiloglottis sp.*	Bird-Orchid	Native	+	+	+	+				
Orchidaceae	*Corybas aconitiflorus*	Spurred Helment Orchid	Native							+	
Orchidaceae	*Cryptostylis hunteriana*	Leafless Toungue Orchid	Native						+		
Orchidaceae	*Cryptostylis sp.*		Native						+		

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Orchidaceae	*Cryptostylis subulata*	Large Tongue Orchid	Native	+	+	+	+	+		+	
Orchidaceae	*Cymbidium suave*	Native Cymbidium	Native	+	+	+	+	+	+		
Orchidaceae	*Dendrobium aemulum*	White Feather Orchid	Native	+	+	+	+	+			
Orchidaceae	*Dipodium variegatum*	Blotched Hyacinth Orchid	Native		+	+	+				
Orchidaceae	*Lyperanthus suaveolens*		Native						+	+	
Orchidaceae	*Microtis unifolia*	Common Onion Orchid	Native	+							
Orchidaceae	*Pterostylis sp.*		Native						+		
Orchidaceae	*Thelymitra pauciflora*	Slender Sun Orchid	Native					+			
Oxalidaceae	*Oxalis exilis*	-	Native	+	+	+	+	+			
Oxalidaceae	*Oxalis perrenans*	-	Native			+	+	+	+	+	+
Passifloraceae	*Passiflora herbertiana*	Native Passionfruit	Native	+	+	+	+	+			+
Philydraceae	*Philydrum lanuginosum*	Woolly Frogmouth	Native	+	+	+	+	+			
Phormiaceae	*Dianella caerulea var. producta*	Blue Flax Lily	Native	+	+	+	+	+	+	+	+
Phormiaceae	*Dianella longifolia*		Native						+		
Phormiaceae	*Dianella revoluta var. revoluta*	Spreading Flax Lily	Native			+	+	+	+	+	
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	Native	+	+	+	+	+	+	+	+
Phyllanthaceae	*Glochidion ferdinandii*	Cheese Tree	Native	+	+	+	+	+	+	+	+
Phyllanthaceae	*Phyllanthus gunnii*	Spurge	Native	+	+	+	+	+	+	+	
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	Native	+	+	+	+	+	+	+	+
Pittosporaceae	*Billardiera scandens var. scandens*	Apple Dumplings	Native	+	+	+	+	+	+	+	+
Pittosporaceae	*Hymenosporum flavum*		Native						+	+	+
Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn	Native	+	+	+	+	+			+
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum	Native	+	+	+	+	+	+	+	+
Poaceae	*Aristida vagans*	Three-awn Speargrass	Native			+	+	+	+	+	+
Poaceae	*Austrodanthonia tenuior*	Wallaby Grass	Native			+	+	+			
Poaceae	*Austrostipa pubescens*	Tall Speargrass	Native	+	+	+	+	+		+	
Poaceae	*Cymbopogon refractus*	Barbwire Grass	Native	+	+	+	+	+	+		
Poaceae	*Cynodon dactylon*	Common Couch	Native	+	+	+	+	+			
Poaceae	*Deyeuxia parviseta var. parviseta*		Native						+		
Poaceae	*Dichelachne micrantha*	Short-hair Plume Grass	Native	+	+	+	+	+	+		
Poaceae	*Digitaria parviflora*	Small-flowered Finger Grass	Native	+	+	+	+	+	+	+	+
Poaceae	*Digitaria sp.*		Native						+	+	
Poaceae	*Echinopogon caespitosus var. caespitosus*	Tufted Hedgehog Grass	Native	+	+	+	+	+	+	+	+
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	Native			+	+	+			
Poaceae	*Entolasia marginata*	Bordered Panic	Native	+	+	+	+	+	+	+	+
Poaceae	*Entolasia stricta*	Wiry Panic	Native	+	+	+	+	+	+	+	+
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	Native	+	+	+	+	+			
Poaceae	*Imperata cylindrica var. major*	Blady Grass	Native	+	+	+	+	+	+	+	+
Poaceae	*Microlaena stipoides var. stipoides*	Weeping Rice Grass	Native	+	+	+	+	+	+	+	+
Poaceae	*Oplismenus aemulus*	Basket Grass	Native	+	+	+	+	+			+
Poaceae	*Oplismenus imbecillis*	-	Native			+	+	+	+	+	+
Poaceae	*Panicum simile*	Two Colour Panic	Native	+	+	+	+	+	+	+	+
Poaceae	*Poa labillardieri var. labillardieri*	Tussock Grass	Native	+	+	+	+	+	+	+	+

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Poaceae	*Poa sp.*		Native						+		
Poaceae	*Rytidosperma pallidum*	Silvertop Wallaby Grass	Native							+	
Poaceae	*Rytidosperma sp.*		Native						+	+	+
Poaceae	*Rytidosperma fulvum*	Wallaby Grass	Native							+	
Poaceae	*Themeda triandra*	Kangaroo Grass	Native	+	+	+	+	+	+	+	+
Polygalaceae	*Comesperma ericinum*	Matchheads	Native	+	+	+	+	+			
Polygalaceae	*Comesperma sphaerocarpum*	-	Native		+	+	+	+			
Polygalaceae	*Comesperma volubile*	Love Creeper	Native	+	+	+	+	+			
Polygonaceae	*Muehlenbeckia gracillima*	Slender Lignum	Native	+	+	+	+	+			
Proteaceae	*Banksia oblongifolia*	-	Native			+	+	+	+	+	+
Proteaceae	*Banksia spinulosa var. collina*	Hairpin Banksia	Native	+	+	+	+	+	+	+	+
Proteaceae	*Grevillea parviflora subsp. parviflora*		Native						+	+	
Proteaceae	*Lambertia formosa*	Mountain Devil	Native	+	+	+	+	+	+	+	
Proteaceae	*Lomatia myricoides*	River Lomatia	Native	+	+	+	+	+			
Proteaceae	*Lomatia silaifolia*	Crinkle Bush	Native	+	+	+	+	+	+	+	+
Proteaceae	*Persoonia levis*		Native						+		
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung	Native	+	+	+	+	+	+	+	+
Proteaceae	*Telopea speciosissima*	Waratah	Native	+	+	+	+	+			
Proteaceae	*Xylomelum pyriforme*	Woody Pear	Native	+	+	+	+	+	+	+	
Pteridaceae	*Adiantum atroviride*		Native						+	+	+
Pteridaceae	*Cheilanthes sieberi subsp. pseudovellea*	-	Native			+	+				
Pteridaceae	*Cheilanthes sieberi subsp. sieberi*	Poison Rock Fern	Native	+	+	+	+	+	+	+	+
Pteridaceae	*Pteris umbrosa*	Jungle Brake	Native	+	+	+	+	+			
Ranunculaceae	*Clematis aristata*	Old Man's Beard	Native	+	+	+	+	+	+	+	
Ranunculaceae	*Clematis glycinoides var. glycinoides*	Clematis	Native	+	+	+	+	+	+	+	+
Ranunculaceae	*Ranunculus lappaceus var. lappaceus*	Glossy Buttercup	Native					+			
Ranunculaceae	*Ranunculus plebeius*	Hairy Buttercup	Native	+	+	+	+	+			
Restionaceae	*Lepyrodia scariosa*	Scale Rush	Native	+	+	+	+	+			
Rosaceae	*Rubus moluccanus*	Broad-leaf Bramble	Native	+	+	+	+	+	+	+	+
Rosaceae	*Rubus moorei*		Native						+	+	+
Rosaceae	*Rubus nebulosus*	Bramble	Native	+							
Rosaceae	*Rubus parvifolius*	Native Raspberry	Native	+	+	+	+	+			
Rosaceae	*Rubus rosifolius*	Forest Bramble	Native					+	+	+	+
Rubiaceae	*Asperula asthenes*		Native						+	+	+
Rubiaceae	*Galium binifolium*	-	Native	+	+	+	+	+			
Rubiaceae	*Galium gaudichaudii*	Rough Bedstraw	Native	+	+	+	+	+			
Rubiaceae	*Galium proquinquum*	Bedstraw	Native	+	+	+	+	+			
Rubiaceae	*Morinda jasminoides*	-	Native	+	+	+	+	+	+	+	+
Rubiaceae	*Opercularia diphylla*		Native						+	+	+
Rubiaceae	*Pomax umbellata*	Pomax	Native	+	+	+	+	+			
Rubiaceae	*Psychotria loniceroides*	Hairy psychotria	Native	+	+	+	+	+			
Rutaceae	*Boronia pinnata*	Pinnate Boronia	Native	+	+	+	+	+	+	+	
Rutaceae	*Boronia polygalifolia*	Milkwort Boronia	Native	+	+	+	+	+	+	+	

Family	Scientific Name	Common Name	Status	HWR Species 2004	2008 Species	2009 Species	Feb 2010 Species	SEP 2010 Species	Oct/Nov 2020	2022/23	2024/25
Rutaceae	*Melicope micrococca*	White Euodia	Native	+	+	+	+	+			
Santalaceae	*Exocarpos cupressiformis*	Native Cherry	Native			+	+	+	+	+	+
Sapindaceae	*Diploglottis australis*	Native Tamarind	Native	+	+	+	+	+			
Sapindaceae	*Dodonaea triquetra*	Hop Bush	Native	+	+	+	+	+	+	+	+
Sapindaceae	*Guioa semiglauca*	Guioa	Native	+	+	+	+	+	+	+	+
Schizaeaceae	*Schizaea bifida*	Forked Comb Fern	Native							+	+
Scrophulariaceae	*Veronica calycina*	Hairy Speedwell	Native	+	+	+	+	+			
Sinopteridaceae	*Pellaea falcata*	Sickle Fern	Native	+	+	+	+	+			
Sinopteridaceae	*Pellaea paradoxa*	-	Native	+	+	+	+	+	+	+	+
Smilacaceae	*Ripogonum album*	White Supplejack	Native	+	+	+	+	+			
Smilacaceae	*Ripogonum fawcettianum*	Small Supplejack	Native	+	+	+	+	+	+	+	+
Smilacaceae	*Smilax australis*	Lawyer Vine	Native	+	+	+	+	+	+	+	+
Smilacaceae	*Smilax glyciphylla*	Sarsaparilla	Native	+	+	+	+	+	+	+	+
Solanaceae	*Solanum prinophyllum*	Forest Nightshade	Native	+	+	+	+	+			
Solanaceae	*Solanum pungetium*	Eastern Nightshade	Native			+	+	+			
Solanaceae	*Solanum stelligerum*	Devil's Needles	Native	+	+	+	+	+	+	+	
Stylidiaceae	*Stylidium graminifolium*	Trigger Plant	Native	+	+	+	+	+	+	+	
Thelypteridaceae	*Christella dentata*	-	Native	+	+	+	+	+			+
Thelypteridaceae	*Cyclosorus interruptus*		Native						+	+	+
Thymelaeaceae	*Pimelea linifolia subsp. linifolia*	Slender Rice Flower	Native	+	+	+	+	+			
Tremandraceae	***Tetratheca juncea***	Black-eyed Susan	Native	+	+	+	+	+	+	+	+
Ulmaceae	*Treme tomentosa var. viridis*	Native Peach	Native	+	+	+	+	+			
Uvulariaceae	*Schelhammera undulata*	Lilac Lily	Native	+	+	+	+	+			
Uvulariaceae	*Tripladenia cunninghamii*		Native						+	+	+
Verbenaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum	Native	+	+	+	+	+	+	+	+
Violaceae	*Hybanthus monopetalus*	Slender Violet	Native	+	+	+	+	+			
Violaceae	*Viola betonicifolia*	-	Native	+	+	+	+	+			
Violaceae	*Viola hederacea*	Ivy-leaved Violet	Native	+	+	+	+	+			
Vitaceae	*Cayratia clematidea*	Slender Grape	Native	+	+	+	+	+	+	+	+
Vitaceae	*Cissus antarctica*	Native Grape	Native	+	+	+	+	+	+	+	+
Vitaceae	*Cissus hypoglauca*	Water Vine	Native	+	+	+	+	+	+	+	+
Vitaceae	*Tetrastigma nitens*	Three-leaf Water Vine	Native	+	+	+	+	+	+	+	+
Xanthorrhoaceae	*Xanthorrhoea fulva*	-	Native	+	+	+	+	+			
Xanthorrhoaceae	*Xanthorrhoea latifolia subsp. latifolia*	-	Native			+	+	+	+	+	+
Xanthorrhoaceae	*Xanthorrhoea macronema*	-	Native	+	+	+	+	+			+
Zamiaceae	*Macrozamia flexuosa*	-	Native		+	+	+	+	+	+	+
Zamiaceae	*Macrozamia spiralis*	-	Native	+	+	+	+	+			
Zingiberaceae	*Alpinia caerulea*	Native Ginger	Native	+	+	+	+	+			

APPENDIX B. FAUNA SPECIES LIST

No.	Scientific Name	Common Name	Status		Observation Type	Location
			BC	EPBC		
1.	*Acrobates pygmaeus*	Feathertail Glider	P	-	Remote Camera	RC46
2.	*Antechinus stuartii*	Brown Antechinus	P	-	Remote Camera	RC32, RC33, RC34, RC41, RC45, RC52, RC53, RC56, RC58
3.	*Austronomus australis*	White-striped Freetail-bat	P	-	Anabat	A4
4.	*Chalinolobus gouldii*	Gould's Wattled Bat	P	-	Anabat	A1, A3, A4
5.	*Chalinolobus morio*	Chocolate Wattled Bat	P	-	Anabat	A1, A2
6.	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P	-	Anabat	A4
7.	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P	-	Anabat	A4
8.	*Miniopterus australis*	Little Bent-winged Bat	V,P	-	Anabat	A4
9.	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P	-	Anabat	A4
10.	*Mormopterus petersi*	Inland Free-tailed Bat	P	-	Anabat	A4
11.	*Myotis macropus*	Southern Myotis	V,P	-	Anabat	A2, A4
12.	*Nyctophilus sp.*	long-eared bat	P	-	Anabat	A1, A2, A3, A4
13.	*Ozimops ridei*	Eastern Free-tailed Bat	P	-	Anabat	A1, A3
14.	*Petaurus breviceps*	Sugar Glider	P	-	Remote Camera and Spotlighting	RC34, RC35, RC39, RC42, RC43, RC44, RC47, RC48, RC50, RC51, RC56, RC57, RC59, TL1
15.	*Petaurus norfolcensis*	Squirrel Glider	V,P	-	Remote Camera	RC42
16.	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat	P	-	Anabat	A2, A3
17.	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P	-	Anabat	A4
18.	*Scotorepens balstoni*	Inland Broad-nosed Bat	P	-	Anabat	A4
19.	*Scotorepens orion*	Eastern Broad-nosed Bat	P	-	Anabat	A4
20.	*Trichosurus vulpecula*	Common Brushtail Possum	P	-	Remote Camera	RC38, RC42, RC46, RC56
21.	*Vespadelus pumilus*	Eastern Forest Bat	P	-	Anabat	A1, A2, A3, A4

22.	*Vespadelus vulturnus*	Little Forest Bat	P	-	Anabat	A4

APPENDIX C. *TETRATHECA JUNCEA* MONITORING PLOTS

***T. juncea* Monitoring Plot 1**

***T. juncea* Monitoring Plot 2**

***T. juncea* Monitoring Plot 3**

***T. juncea* Monitoring Plot 4**

***T. juncea* Monitoring Plot 5**

***T. juncea* Monitoring Plot 6**

***T. juncea* Monitoring Plot 7**

***T. juncea* Monitoring Plot 8**

***T. juncea* Monitoring Plot 9**

***T. juncea* Monitoring Plot 10**

APPENDIX D. *GREVILLEA PARVIFLORA* MONITORING PLOTS

***Grevillea parviflora* subsp. *parviflora* Monitoring Plot 1**

***Grevillea parviflora* subsp. *parviflora* Monitoring Plot 2**

***Grevillea parviflora* subsp. *parviflora* Monitoring Plot 3**

APPENDIX E. STAFF CONTRIBUTIONS

The following staff were involved in the project:

Name	Qualification	Title	Contribution
Kane Blundell	Grad Dip Spatial Sc (in progress)	GIS	GIS and Figures
Rachel Neal	BBsc (Hons)	Ecologist	Field surveys – plot/transect surveys Report Writing
Shea Brunt	BEnvSc & Mgt	Ecologist	Field surveys – plot/transect surveys
Jake Mauger	BEnvSc & Mgt	Ecologist	Field surveys – fauna surveys
Stephanie Gilmour	BZoology	Ecologist	Field surveys – fauna surveys
Olivia Szekelyhidy	BZoology	Ecologist	Field surveys – fauna surveys
Mark Dean	BEnvSc Accredited BAM Assessor	Ecologist	Report Review

Appendix 5 – KHRQ IEA 2024: Response to Audit Recommendations

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S2, C4	**Terms of Approval** The Applicant shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of: (a) any reports, plans or correspondence that are submitted in accordance with this development consent; and (b) the implementation of any actions or measures contained in these reports, plans or correspondence.	**ASSESSMENT:** There was one instance identified where the Secretary of DPIE provided that HQPL did not comply with the following requirements, being: 1) Warning Letter from DPIE dated 03 July 2020 Breach of Section 4.2 of the EP&A Act 1979 i.e., "...alleges that HQPL has breached schedule 4, condition 19 of DA 265-10-2004. HQPL failed to implement FFMP for Karuah Quarry as approved by the Secretary in 2008". DPIE requested a revised FFMP be submitted by 2 September 2020 and review and, if required, revise the EMP and EMS. HQPL undertook a review of the FFMP and Environmental Management Strategy (EMS) which was submitted to DPIE for approval 26 August 2020. There was no evidence that the Environmental Monitoring Program (EMP) was reviewed per DPIEs request until it was resubmitted and approved September 2023. **RECOMMENDATION:** Action closed. Refer opportunity for improvement in section 4.2. A number of non-compliances were identified during the audit period where review of management plans and key dates were missed. Given this it is recommended that HQPL establish a compliance tracking system or similar to record all compliance tasks and due dates including management plan reviews, requirements arising from government agencies and actions following audits.	**RESPONSE:** HQPL acknowledges that various directions were received by NSW Planning to review or update documents may have not been completed within the designated timeframes. **ACTION:** HQPL have since updated our processes (inclusive of task calendars and checklists) to ensure that these directions are completed in a timely and responsive fashion. **STATUS:** HQPL considers this matter to be resolved.
S2, C13	**Section 94 Contributions** The Applicant shall pay a contribution of 4.7 cents per cubic meter of material per kilometer hauled to Council for the maintenance/repair of public roads in accordance with Council's Section 94 Plan for road haulage, to the satisfaction of Council. Note: The applicable contribution rate is reviewed annually by Council and new rates, if applicable become operational from 1 July each year. The contribution is to be paid at the rate that is current at the time.	**ASSESSMENT:** There was no evidence that section 94 contributions had been paid to Council on a yearly basis within 14 days of 31 December or that the annual payments were calculated accordingly. Invoices were sighted to show that payments for the years 2018 – 2022 were made to Council as a lump sum payment, June 2023 and annual payments made August 2023 and July 2024. **RECOMMENDATION:** If is recommended that HQPL make annual payments to Council within 14 days of 31 December each year and that the annual payment amount is verified to be correct for each payment made between 2019 and 2024 and for each future payment.	**RESPONSE:** HQPL notes the recent upload to the NSW Planning Portal of the consolidated Development Consent (DA 265-10-2004) inclusive of the instrument changes made by the NSW Land and Environment Court on 29 September 2006. This court determination provided the legal basis for the calculated section 94 Contributions payable to MidCoast Council. **ACTION:** HQPL will review the calculation methodology used to determine the payments made between 2019 and 2024 to confirm compliance with the amended condition. **DUE:** HQPL will complete the review by **31 December 2025** (or prior to the next payment round).
S3, C3	**Noise Monitoring** Within 6 months of the date of this consent, the Applicant shall prepare and implement a Noise Monitoring Program for the development to evaluate compliance with the noise impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.	**ASSESSMENT:** A revised Noise Monitoring Program (NMP) has been prepared and contained in the EMP (revision 6C, dated 11 September 2023). The EMP has been approved by DPE however, there is no evidence to confirm that the NMP (contained within the EMP) has undergone consultation and / or approved to supersede the previous approved version (Version 5, December 2014). **RECOMMENDATION:** It is recommended that HQPL seek clarification from DPHI to confirm the NMP has been approved by virtue of approval of the EMP or otherwise seek approval from DPHI for the NMP.	**RESPONSE:** HQPL notes that the Noise Monitoring Program is detailed in Environmental Management Strategy & Monitoring Program (EMS&MP) approved by NSW Planning on 18 December 2024. **ACTION:** HQPL will consult with NSW Planning to seek approval for HQPL's management plan structure. **DUE:** HQPL will seek approval by **04 April 2025**.

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S3, C13	**Air Quality Impact Assessment Criteria** The Applicant shall ensure that the dust emissions generated by the development do not cause additional exceedances of the ambient air quality impact assessment criteria listed in Tables 6, 7, and 8 at any residence on, or on more than 25 percent of, any privately owned land.	**ASSESSMENT:** Particulate matter monitoring using high volume air samplers established by HQPL for the Karuah East Quarry is being used by HQPL to assess compliance against the criteria listed in Table 6 and 7 at Karuah Quarry. This is not consistent with the Air Quality Monitoring Program (AQMP) and therefore the data collected for Karuah East cannot be verified as adequate and representative of Karuah Quarry to demonstrate compliance with the condition. Further, exceedances of the depositional dust criteria have been reported. These exceedances include: • June 2023 monitoring period (6 June to 4 July 2023) monitoring results indicated that total dust from DDG4 exceeded the limit of 4 g/m2/month due to becoming contaminated with combustible organic material; and • November 2023 monitoring period (2 November to 30 November 2023) monitoring results indicated that DDG2 exceeded the monthly limit of 4 g/m2/month due to becoming contaminated with combustible organic material. **RECOMMENDATION:** It is recommended that HQPL undertake air quality monitoring in accordance with conditions of approval to ensure that compliance with the air quality impact assessment criteria is being met and can be verified. An amendment to the AQMP and / or Development Consent may be required to ensure consistency.	**RESPONSE:** HQPL acknowledges the potential for various exceedances of air quality performance criteria due both quarry-related contributions and ambient or third-party sources. HQPL notes all exceedances have been investigated to determine a potential source, as far as reasonably practicable, and reported to NSW Planning, the NSW EPA and surrounding landholders in accordance with the Development Consent. **ACTION:** HQPL considers no actions to be necessary. **STATUS:** HQPL considers this matter to be resolved.
S3, C15	**Air Quality Monitoring** Within 6 months of the date of this consent, the Applicant shall prepare and implement an Air Quality Monitoring Program for the development to evaluate compliance with the air quality impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.	**ASSESSMENT:** A revised AQMP has been prepared and contained in the EMP (revision 6C, dated 11 September 2023). The EMP has been approved by DPE however there is no evidence to confirm that the AQMP (contained within the EMP) has undergone consultation and / or been approved to supersede the previous version. Consistent with the AQMP contained in the EMP, deposition dust monitoring is being carried out at 4 monitoring locations. However, particulate matter monitoring is not being implemented consistent with the requirements of the AQMP. The AQMP states 'High Volume Air Sampler (HVAS) will be used by HQPL in the event that they are required to investigate any air quality complaints unless otherwise directed by DPE, the results of the HVAS monitoring shall be reported as per Section 3.0 of this EMP'. Instead, HQPL are reporting particulate matter monitoring results from the adjoining Hunter Quarry Karuah East site and using the results to assess compliance of Karuah Quarry against the Development Consent and reporting associated non-compliances. **RECOMMENDATION:** It is recommended that HQPL seek clarification from DPHI to confirm the AQMP has been approved by virtue of approval of the EMP or otherwise seek approval from DPHI for the NMP.	**RESPONSE:** HQPL acknowledges the wording of the Environmental Monitoring Program (version 6C) could be interpreted in an inconsistent manner as outlined by the auditor's comments. **ACTION:** HQPL have since revised the Air Quality Monitoring Program as detailed in Environmental Management Strategy & Monitoring Program (EMS&MP) approved by NSW Planning on 18 December 2024, which addressed this matter. **STATUS:** HQPL considers this matter to be resolved.

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S3, C19	**Flora and Fauna Management Plan** Before carrying out any clearing associated with Stage 2 of the development, the Applicant shall prepare, and subsequently implement, a Flora and Fauna Management Plan for the development to the satisfaction of the Director-General. This plan must include: (a) a Vegetation Clearing Protocol; (b) a Remnant Vegetation Conservation Plan; and (c) a Conservation Offset Management Plan.	**ASSESSMENT:** A revised FFMP has been prepared (September 2020) and approved by DPIE (October 2020) and includes the requirements of condition 19a - 19c. Consistent with correspondence issued from the DPIE (dated 03 July 2020) HQPL failed to implement the FFMP in 2019 and up until the approval of its revision in September 2020, as annual ecological monitoring was not undertaken annually in accordance with the requirements. The FFMP has been amended to require biannual monitoring and was evidenced to be implemented. Ecological monitoring reports for 2020 and 2022 were sighted. **RECOMMENDATION:** The FFMP has been revised during the audit period and subsequently approved by DPIE (13 October 2020). Implementation of the Program was evident from the 2020 and 2022 ecological monitoring reports. As such it is recommended that HQPL continue to implement the Program.	**RESPONSE:** HQPL acknowledges that no two-yearly ecology monitoring was not completed prior to 2020 (i.e. within the start of this audit period). HQPL have since updated our processes to ensure that the two-yearly monitoring is completed and reported in the Annual Reviews. **ACTION:** HQPL considers no further actions to be necessary. **STATUS:** HQPL considers this matter to be resolved.
S3, C24	**Pollution of Waters** Except as may be expressly provided by an Environment Protection License, the Applicant shall comply with section 120 of the Protection of the Environment Operations Act 1997 during the carrying out of the development.	**ASSESSMENT:** An uncontrolled discharge occurred from sediment dam 2 (SD2) via LDP001 was experienced on 26 October 2020, where the Quarry received 278.4mm of rain in a period of 12 hours. HQPL self-reported the incident using the EPA Pollution hotline and a summary of the incident was provided to both DPIE and the NSW EPA. A discharge event, consisting of six days of uncontrolled discharges from SD2 occurred between 18 March 2021 to 23 March 2021. The uncontrolled discharges from this period exceeded the TSS limit of the EPL (50mg/L). The EPA Pollution Hotline was contacted to self-report the incident. DPE and the NSW EPA were also both contacted and provided with a summary of the incident and an environmental incident report. **RECOMMENDATION:** It is recommended that HQPL undertake a holistic review and risk assessment of the site water management including water monitoring devices on site and in use, the measuring and monitoring requirements of condition 27 schedule 2 and history of related water discharge incidents. Accordingly, HQPL should review and update to the site water management plan and the associated erosion and sediment control plan, surface water monitoring program and site water balance to address the respective condition, risks and the operations on site.	**RESPONSE:** HQPL acknowledges the potential for uncontrolled discharges of sediment-laden water following major rainfall events greater than the designated 95th percentile 5-day rainfall depth of 90.6 mm as prescribed in Landcom's Blue Book (Managing Urban Stormwater: Soils and construction - Volume 2E). **ACTION:** HQPL reviewed the Site Water Management Plan and associated subplans in 2023 and was approved by NSW Planning on 03 October 2023 and therefore considers no further actions to be necessary. **STATUS:** HQPL considers this matter to be resolved.
S3, C25	**Water Discharge Limit** The Applicant shall only discharge water from the development in accordance with the provisions of a DEC Environment Protection License.	**ASSESSMENT:** Water was discharged from the development outside of the provisions of the Environment Protection Licence and reported to the EPA as an incident. See details above. **RECOMMENDATION:** As above.	Refer to commentary provided for Schedule 3, Condition 24.

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S3, C26	**Site Water Management Plan** Within 12 months of the date of this consent, the Applicant shall prepare, subsequently implement, a Site Water Management Plan for the development, in consultation with the DEC, and to the satisfaction of the Director-General. The plan shall detail how site water management on site will be integrated with existing surface water management and erosion and sediment control systems and address surface water management and erosion and sediment control at both the construction and operation phases of the development. This plan must include: (a) an Erosion and Sediment Control Plan; (b) a Surface Water Monitoring Program; and (c) a site water balance.	**RECOMMENDATION:** Several non-compliances related to site water management and water quality were identified. Given this it is recommended that HQPL undertake a holistic review and risk assessment of the site water management including water monitoring devices on site and in use, the measuring and monitoring requirements of condition 27 schedule 2 and history of related water discharge incidents. Accordingly, HQPL should review and update to the site water management plan and the associated erosion and sediment control plan, surface water monitoring program and site water balance to address the respective condition, risks and the operations on site.	Refer to commentary provided for Schedule 3, Condition 24.
S3, C28	**Surface Water Monitoring** The Applicant shall: (d) measure: • the volume of water discharged from the site via licensed discharge points; • water use on the site; • water transfers across the site; and • dam and water structure storage levels. (e) regularly monitor the quality of the surface water discharged from the licensed discharge points onthe site; to the satisfaction of the DEC and the Director-General.	**ASSESSMENT:** Records and evidence to demonstrate that HQPL are measuring and monitoring water discharge, use, transfer and storage in accordance with the condition was not provided. It was advised that HQPL, in 2024 had installed flow meters at discharge points and data loggers to record dam levels. **RECOMMENDATION:** It is recommended that HQPL establish required monitoring equipment and record keeping processes to accurately record: • the volume of water discharged from the site via licensed discharge points; • water use on the site; • water transfers across the site; and • dam and water structure storage levels.	**RESPONSE:** HQPL acknowledges the continuing project to install the required surface water monitoring equipment and develop an appropriate record keeping system. **ACTION:** HQPL will finalise the installation of the required monitoring hardware and implement an appropriate record keeping system. **DUE:** HQPL will complete the works by **31 December 2025**.
S3, C29	**Visual Impact** The Applicant shall: (a) implement all practicable measures to minimise the visual impacts of the development; (b) retain, re-vegetate and subsequently maintain a visual bund within the Stage 1 works area (in accordance with Figures 13 and 14 of the EIS) to minimise the visual impacts of development; (c) include a progress report on the re-vegetation and maintenance of the visual bund in the AEMR, to the satisfaction of the Director General.	**ASSESSMENT:** Evidence of progress reporting on the revegetation and maintenance of the visual bund within the AEMRs was not sighted. **RECOMMENDATION:** It is recommended that HQPL monitor the re-vegetation and maintenance of the visual bund and report on its progress within the AEMRs.	**RESPONSE:** HQPL acknowledges the opportunity for improved reporting of management activities undertaken to maintain the visual bund in each year's Annual Review. **ACTION:** HQPL has included an additional section in the 2024 Annual Review submission in accordance with the Development Consent. **STATUS:** HQPL considers this matter to be resolved.

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S3, C34	**Waste Management** The Applicant shall: (a) monitor the amount of waste generated by the development; (b) investigate ways to minimise waste generated by the development; (c) implement reasonable and feasible measures to minimise waste generated by the development; and (d) report on waste management and minimisation in the AEMR, to the satisfaction of the Director-General.	**ASSESSMENT:** There was no evidence sighted to demonstrated methods that HQPL had used to minimise waste generation, and/or the implementation of waste minimisation methods. Further, waste management and minimisation were not reported in the AEMRs during the audit period. **RECOMMENDATION:** It is recommended that HQPL investigate, implement and report in the AEMRs actions to minimise waste generation.	**RESPONSE:** HQPL acknowledges the opportunity to review waste management processes across the site, particularly in relation to waste minimisation and diversion methodologies. **ACTION:** HQPL will complete a comprehensive review of the site's waste management processes. **DUE:** HQPL will complete the review by **31 December 2025**.
S3, C43	**Rehabilitation Bond** Within 3 years of lodging the rehabilitation bond with the Director-General, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall review, and if necessary revise, the sum of the rehabilitation bond to the satisfaction of the Director-General. This review must consider: (a) the effects of inflation; (b) any changes to the area of disturbance; and (c) the performance of any progressive rehabilitation which has been undertaken at the site.	**ASSESSMENT:** The sum of the rehabilitation bond was not revised within 5 years as required. Instead, a revision was undertaken 2023 / 2024. The revised sum has since been approved by DPE (dated, 9 January 2024) and the Bank Guarantee lodged. **RECOMMENDATION:** The rehabilitation bond bank guarantee was reviewed and revised 2023 / 2024. As such, it is recommended that HQPL undertake the next five-year review to meet the timeframes of the condition.	**RESPONSE:** HQPL acknowledges that the site's Rehabilitation Bond was not reviewed between 2016 and 2023 (i.e. not within the required 5-year review frequency). **ACTION:** HQPL notes that the 2023 Rehabilitation Bond was approved by NSW Planning on 09 January 2024 and therefore considers no further actions to be necessary. **STATUS:** HQPL considers this matter to be resolved.
S4, C2	**Environmental Management Strategy** Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Management Strategy to the satisfaction of the Director-General.	**ASSESSMENT:** The previous IEA was completed 16 October 2019. An update to the EMS following the IEA was undertaken in August 2020. There is no evidence that a review of the EMS was undertaken within 3 months of the IEA and therefore, the Auditor cannot verify compliance with this condition. **RECOMMENDATION:** The Auditor recommends that HQPL reviews and revises the EMS to the satisfaction of the Department within the specified timeframe of the completion of the IEA.	**RESPONSE:** HQPL acknowledges the Environmental Management Strategy (EMS) was not updated within the required 3-month period required by the Development Consent. **ACTION:** HQPL will review and update the site's Environmental Management Strategy and Monitoring Program (EMS&MP), incorporating any findings from this Independent Environmental Audit. **DUE:** HQPL will complete the review and re-submit any required revisions to NSW Planning for approval by **04 June 2025**, subject to resolution of the HQPL's management plan structure.
S4, C4	**Environmental Monitoring Program** Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Monitoring Program to the satisfaction of the Director-General.	**ASSESSMENT:** No evidence has been sighted to verify that the EMP was updated following the previous IEA (October 2019). An update to the EMP following the IEA was undertaken in May 2023. There is no evidence that a review of the EMP was undertaken within 3 months of the IEA and therefore, compliance against this condition of this consent cannot be verified. **RECOMMENDATION:** The Auditor recommends that HQPL reviews and revises the EMP to the satisfaction of the Department within the specified timeframe of the completion of the IEA.	**RESPONSE:** HQPL acknowledges there is no evidence available to determine if the Environmental Monitoring Program (EMP) was reviewed within the required 3-month period required by the Development Consent. **ACTION:** HQPL will review and update the site's Environmental Management Strategy and Monitoring Program (EMS&MP), incorporating any findings from this Independent Environmental Audit. **DUE:** HQPL will complete the review and re-submit any required revisions to NSW Planning for approval by **04 June 2025**, subject to resolution of the HQPL's management plan structure.

KHRQ IEA 2024 – Response to Audit Recommendations

Karuah Hard Rock Quarry (DA 265-10-2004) – 2024 IEA Findings and HQPL Response			
No	*Requirement*	*2024 IEA Assessment & Recommendation*	*2024 HQPL Response & Action*
S4, C10	**Community Consultative Committee** If the Applicant does not receive at least two expressions of interest to serve on the CCC the Applicant shall instead develop a communications strategy for consulting with Council and residents within 2 km of the development, to the satisfaction of the Director-General. This strategy should outline how the Applicant will advise Council and nearby residents on its environmental management plans, monitoring results, audit reports or complaints. This communication should occur twice a year. Notes: If during the course of the development, a Community Consultative Committee that has been established is found to be no longer effective, the Director-General may agree to its disbandment.	**ASSESSMENT:** A communication strategy has been prepared and contained in the EMP (revision 6C, dated 11 September 2023). The EMP has been approved by DPE however there is no evidence to confirm that the communications strategy (contained within the EMP) has been approved. **RECOMMENDATION:** It is recommended that HQPL seek clarification from DPHI to confirm the communication strategy has been approved by virtue of approval of the EMP or otherwise seek approval from DPHI for the communication strategy.	**RESPONSE:** HQPL notes that the Communications Strategy is detailed in Environmental Management Strategy & Monitoring Program (EMS&MP) approved by NSW Planning on 18 December 2024. **ACTION:** HQPL will consult with NSW Planning to seek approval for HQPL's management plan structure. **DUE:** HQPL will seek approval by **04 April 2025**.