



Grounded in Quality

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Karuah East Quarry

Environmental Monitoring Report:

September 2022

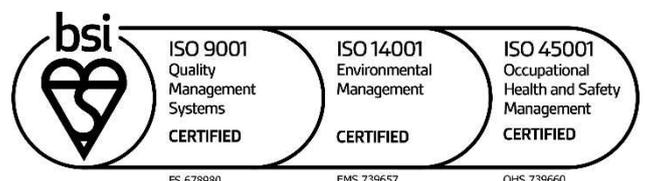


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Appendix 1

Monitoring Locations

1 INTRODUCTION

This report has been completed to meet the requirements of Section 66(6) of the *Protection of the Environment Operations Act 1997* and the NSW Environmental Protection Authority's (EPA) *Requirements for Publishing Pollution Monitoring Data* (EPA, 2013). This report summarises the required monitoring data under *Environmental Protection Licence 20611* (the EPL) (see Table 1) and *Project Approval 09_0175* (the Consent) (see Table 2) for Karuah East Quarry (the Quarry).

Table 1 Environmental Protection Licence 20611 information

Environmental Protection Licence Number	20611
Licensee's Name	Karuah East Quarry Pty Limited
Licensee's Address	Licensee Postal Address: PO Box 3284 Thornton NSW 2322. Premises Address: Karuah East Quarry, Blue Rock Close, Karuah NSW 2324.
Link to Full Licence on the EPA Website	https://apps.epa.nsw.gov.au/prpoeoapp/

Table 2 Project Approval 09_0175 information

Development Application	PA 09_0175
Applicant	Karuah East Quarry Pty Limited
Approval Authority	Minister for Planning
Link to Full Development Approval on Major Projects Planning Portal	https://www.planningportal.nsw.gov.au/major-projects/project/15026

A summary of the environmental monitoring data for September 2022 is covered in this report.

Tables throughout this report provide key monitoring information from the EPL and the Consent, such as:

- location of monitoring;
- pollutant;
- unit of measurement; and
- monitoring frequency required.

Monitoring locations are identified in Appendix 1.

2 AIR QUALITY MONITORING

Dust emissions generated by the Quarry operation must not cause additional exceedances of ambient air quality criterion outlined in *Schedule 3, Condition 13* of the Consent (see Table 3, Table 4 and Table 5). Deposited dust and TSP/PM₁₀ monitoring is undertaken at the locations listed in Table 6.

Table 3 PA 09_0175 Long Term Assessment Criteria for Deposited Dust

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level ¹	Maximum Total Deposited Dust Level ¹
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note 1: Deposited dust is assessed as insoluble solids as defined by AS 3580.10.1-2003.

Table 4 PA 09_0175 Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Average period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter <10 µm (PM ₁₀)	Annual	30 µg/m ³

Table 5 PA 09_0175 Short Term impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter <10 µm (PM ₁₀)	24 hour	50 µg/m ³

Table 6 Air quality monitoring locations

Site ID	EPL ID	Location	Address	GPS Coordinates
DDG 1	MP 4	South-West of Karuah East Quarry	5760 Pacific Hwy, Karuah NSW 2324	32°38'04"S 151°59'58"E
DDG 2	MP 5	South-West of Karuah East Quarry	5770 Pacific Hwy, Karuah NSW 2324	32°38'02"S 152°00'09"E
DDG 3	MP 6	South-West of Karuah East Quarry	DP 1024341, Karuah	32°37'57"S 151°59'41"E
DDG 4	MP 7	East of Karuah East Quarry	21 Halloran Rd North Arm Cove NSW 2324	32° 37' 30.87"S 152°01'10.18"E
DDG 5	MP 8	South-West of Karuah East Quarry	Lot 21 DP 1024341 Karuah NSW 2324	32° 37' 55.33"S 152°00'2.74"E
HVAS (TSP/PM ₁₀)	MP 9	South-West of Karuah East Quarry	5770 Pacific Hwy, Karuah NSW 2324	32°38'03"S 152°00'09"E

All dust monitoring is undertaken in accordance with the *Approved Methods of Sampling and Analysis of Air Pollutants in NSW* (EPA, 2022).

2.1 DEPOSITED DUST MONITORING

Deposited dust results for the twelve months prior to and including September 2022 are shown in Table 7.

Table 7 Deposited dust monitoring results

Date On	Date Off	DDG 1	DDG 2	DDG 3	DDG 4	DDG 5
6/10/2021	3/11/2021	3.6	0.1	0.5	0.1	0.5
3/11/2021	3/12/2021	0.5	0.2	0.4	0.2	0.5
3/12/2021	4/01/2022	1.3	0.3	0.2	1.0	0.5
4/01/2022	3/02/2022	0.9	0.7	0.3	0.4	0.8
3/02/2022	7/02/2022	1.4	0.8	1.2	0.1	0.9
7/03/2022	5/04/2022	0.8	3.6	0.8	0.4	0.9
5/04/2022	5/05/2022	0.1	0.3	0.1	0.2	0.2
5/05/2022	3/06/2022	0.4	0.6	0.4	0.3	0.3
3/06/2022	5/07/2022	0.3	0.2	0.2	0.2	0.3
5/07/2022	3/08/2022	0.3	0.3	0.4	0.7	0.4
3/08/2022	2/09/2022	0.9	0.9	0.6	1.0	0.9
2/09/2022	4/10/2022	0.5	0.2	0.6	0.3	0.8
YTD average		0.9	0.7	0.5	0.4	0.6

Monitoring results indicate that for the period from 2 September 2022 to 4 October 2022 the insoluble solid levels recorded at DDG 1 to DDG 5 monitoring locations were below the project criterion of 4 g/m²/month over an annual averaging period.

2.2 HIGH VOLUME AIR SAMPLING

The TSP and PM10 results for September 2022, and a progressive annual average are shown in Table 8. Figure 1 illustrates the year-to-date results for HVAS monitoring.

Table 8 High Volume Air Sampling (µg/m³) results

Run Date	HVAS TSP (µg/m ³)	HVAS PM ₁₀ (µg/m ³)
1/09/2022	18	9
7/09/2022	11	5
13/09/2022	11	7
19/09/2022	22	12
25/09/2022	14	6
24hr Average Criteria¹	N/A	50
Annual Average Criteria¹	90	30
Progressive Annual Average²	15.1	8.9

Note: ¹ Criteria as specified in PA 09_0175.

² The progressive annual average is from 01/01/2022 to 25/09/2022, this is not a measure of compliance.

All HVAS monitoring results for September 2022 were compliant with the long term and short term impact assessment criteria outlined in *Schedule 3 Condition 13* of the Consent (see Table 3, Table 4 and Table 5).

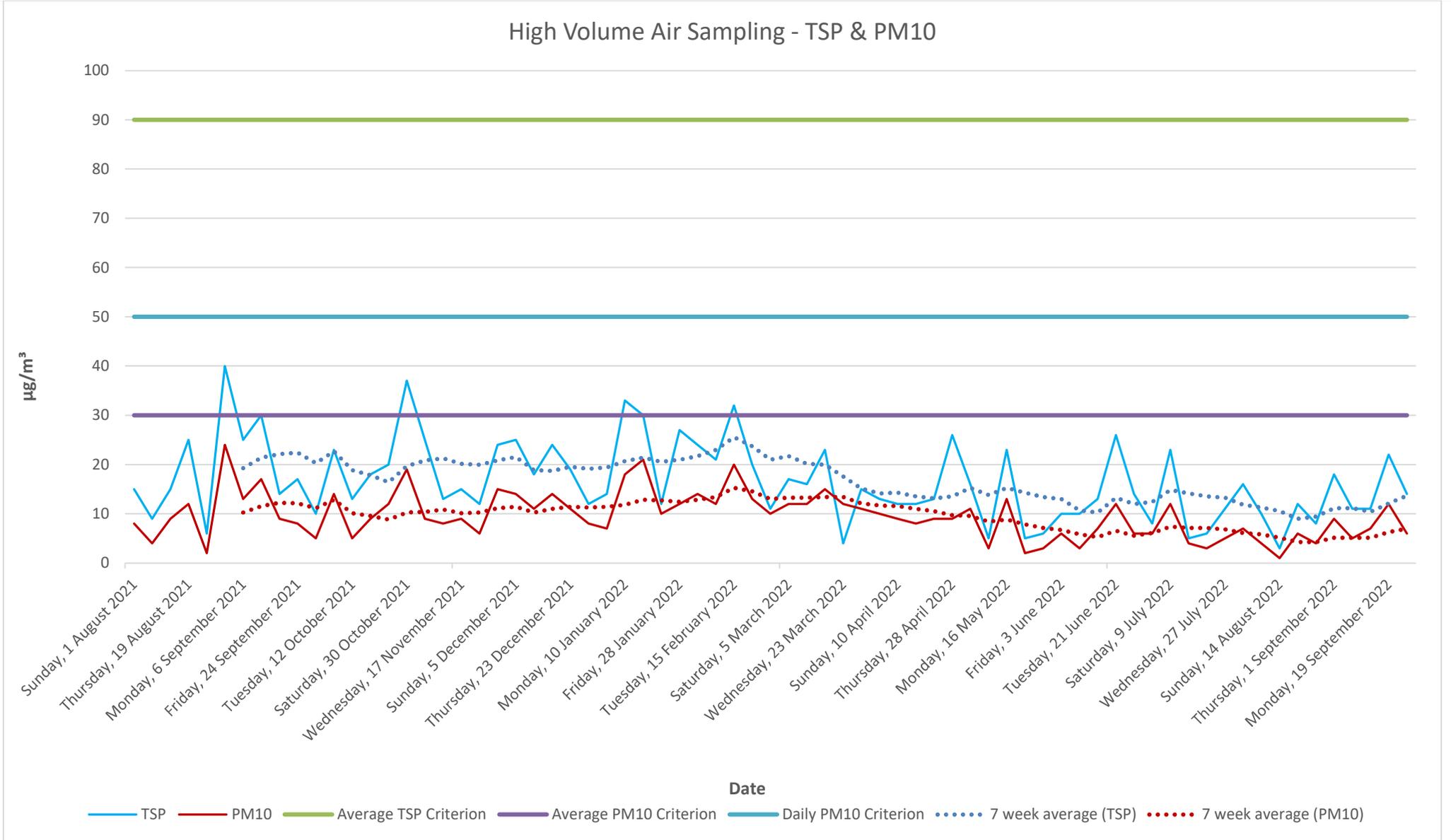


Figure 1 HVAS Sampling Long-term Trends

3 BLAST MONITORING

Blasting must only be carried out between the hours of 9:00 AM and 4:00 PM Monday to Friday. No blasting is permitted on Saturday, Sundays, or Public Holidays. Blasting outside of the hours specified by the EPL/Consent, can only take place with the written approval of relevant regulatory authorities.

KEQ conduct monitoring at the nearest residential location (EPL 20611 EPA identification no. 11) to ensure that airblast overpressure level and ground vibration peak particle velocity do not exceed the EPL and Consent criteria (see Table 9).

Table 9 Blasting criteria

Location	Airblast Overpressure (Decibels (Linear Peak))	Ground Vibration Peak Particle Velocity (Millimetres/second)	Allowable exceedance
Private residence (Location B)	120	10	0%
	115	5	5% of total blasts over 12 months

There were three blasts conducted in September 2022, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Location	Overpressure (dB(L))	Vibration (mm/s)
Monday, 9 September 2022	12:28pm	RL 120	111	0.91
Monday, 19 September 2022	1:13pm	RL 145-135	Nil trigger	Nil trigger
Friday, 30 September 2022	12:29pm	RL 120-105	Nil trigger	Nil trigger

The monitoring results demonstrate compliance with blasting criteria of the Consent and the EPL.

4 NOISE MONITORING

Noise monitoring is undertaken in accordance with the approved *Noise Management Plan* (April, 2022).

As the Quarry is operational with no construction activities being completed, construction noise is not being considered. Table 11 summarises the operational noise criteria.

Noise generated by the Quarry operation must not exceed the criteria specified in *Schedule 3 , Condition 3* of the Consent at each location outlined in Table 11.

Table 11 Operational Noise Criteria (dB(A) $L_{Aeq(15min)}/L_{A(max)}$)

Monitoring Location ID	Description	Easting (MGA)	Northing (MGA)	Applicable noise limit, dB		
				Morning Shoulder $L_{Aeq(15\text{ minute})}/L_{Amax}$	Day $L_{Aeq(15\text{ minute})}$	Evening $L_{Aeq(15\text{ minute})}$
A	Mill Hill Close West	406623	6388704	35/52	42	40
B	Mill Hill Close West	406405	6388859	35/52	40	40
F	The Branch Lane West	405639	6389782	35/52	40	35
G	Halloran Road South	408154	6389523	35/52	43	39
H	Halloran Road West	407795	6389868	35/52	44	46

In accordance with the Consent, a noise monitoring program has been implemented. A summary of this monitoring program is outlined in Table 12.

Table 12 Noise monitoring locations

Monitoring Method	Location	Frequency	Criteria
Attended noise monitoring	A, B, F, G, H	Quarterly	Refer to Table 11

4.1 ATTENDED MONITORING

The most recent results for attended monitoring, undertaken 18 August 2022 and 22 August 2022 (see Table 13), show ambient noise levels include noise sources such as traffic from the nearby Pacific Highway and wildlife such as insects and birds. The Quarry operations were audible at location G and H during day and evening period. Monitoring for all locations across all periods was compliant with the criteria.

4.2 UNATTENDED NOISE MONITORING

A review of the historical unattended noise monitoring data by expert noise consultants (EMM) found no evident trends associated with Karuah East Quarry operations. As a result of this review, Karuah East Quarry has decided to cease the unattended noise monitoring component of the quarterly compliance noise monitoring program.

Table 13 Attended Noise Monitoring (EMM, August 2022)

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions ² EPL limits apply (Y/N)	Exceedance, dB	Comments
			L _{Amin}	L _{A90}	L _{Aeq}	L _{A10}	L _{A1}	L _{Amax}	L _{Ceq}	Mod. Factor ¹	L _{Aeq}	L _{Amax}	L _{Aeq}	L _{Amax}			
A	22/8	05:02 MS	41	53	64	67	75	77	72	Nil	IA	IA	NS / 35	52	0.6 m/s @ 336° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible.
B	22/8	05:18 MS	47	54	62	65	71	76	69	Nil	IA	IA	NS / 35	52	0.4 m/s @ 345° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible.
F	22/8	05:36 MS	44	47	53	53	57	81	61	Nil	IA	IA	NS / 35	52	0.4 m/s @ 2° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. A traffic passby briefly audible.
G	22/8	06:00 MS	34	38	42	45	51	62	56	Nil	<30	47	NS / 35	52	0.7 m/s @ 330° F stability class Y	Nil	Karuah East Quarry engine revs and truck loading occasionally audible. Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Distant dogs barking occasionally audible.
H	22/8	06:16 MS	35	37	43	44	53	68	56	Nil	<30	48	NS / 35	52	0.8 m/s @ 306° F stability class Y	Nil	Karuah East Quarry engine revs and truck loading occasionally audible. Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Distant dogs barking and aircraft noise occasionally audible.

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions ² EPL limits apply (Y/N)	Exceedance, dB	Comments
			L _{Amin}	L _{A90}	L _{Aeq}	L _{A10}	L _{A1}	L _{Amax}	L _{Ceq}	Mod. Factor ¹	L _{Aeq}	L _{Amax}	L _{Aeq}	L _{Amax}			
A	18/8	16:01 Day	47	51	55	57	61	73	71	Nil	IA	N/A	40 / 42	N/A	0.8 m/s @ 2° A stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Dogs barking occasionally audible. Traffic passby on one occasion.
B	18/8	16:20 Day	53	59	65	68	71	73	74	Nil	IA	N/A	37 / 40	N/A	1.1 m/s @ 359° A stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise and resident noise frequently audible.
F	18/8	16:39 Day	42	45	56	53	66	81	65	Nil	IA	N/A	35 / 40	N/A	0.3 m/s @ 56° A stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs, and traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Distant dogs barking and traffic passbys occasionally audible.
G	18/8	17:02 Day	34	37	50	51	62	67	59	Nil	30	N/A	38 / 43	N/A	0.2 m/s @ 29° B stability class Y	Nil	Karuah East Quarry engine revs consistently audible. Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise and dogs barking frequently audible.
H	18/8	17:22 Day	30	33	38	39	46	64	53	Nil	30	N/A	NS / 44	N/A	0.2 m/s @ 17° A stability class Y	Nil	Karuah East Quarry engine revs consistently audible. Traffic on the Pacific Highway consistently audible. Bird noise frequently audible. Aircraft noise, dogs barking, livestock and nearby animals occasionally audible.

Location	Date	Start time (Period)	Total noise levels, dB							Site contribution, dB			EPL / PA Limits, dB		Meteorological conditions ² EPL limits apply (Y/N)	Exceedance, dB	Comments
			L _{Amin}	L _{A90}	L _{Aeq}	L _{A10}	L _{A1}	L _{Amax}	L _{Ceq}	Mod. Factor ¹	L _{Aeq}	L _{Amax}	L _{Aeq}	L _{Amax}			
A	18/8	19:19 Eve.	44	49	55	57	65	73	67	Nil	IA	N/A	NS / 40	N/A	0.1 m/s @ 132° F stability class Y	Nil	Karuah East Quarry inaudible. Distant traffic on the Pacific Highway, insects and frogs consistently audible. Dogs barking occasionally audible.
B	18/8	19:01 Eve.	49	55	63	67	71	73	71	Nil	IA	N/A	NS / 40	N/A	0.3 m/s @ 161° F stability class Y	Nil	Karuah East Quarry inaudible. Distant traffic on the Pacific Highway, insects and frogs consistently audible. Bird noise occasionally audible.
F	18/8	18:42 Eve.	44	48	55	57	59	80	65	Nil	IA	N/A	NS / 35	N/A	0.3 m/s @ 148° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible. Bird noise occasionally audible. Traffic passby on one occasion.
G	18/8	18:18 Eve.	35	38	48	44	62	72	57	Nil	IA	N/A	NS / 39	N/A	0.1 m/s @ 108° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs and traffic on the Pacific Highway consistently audible. Dogs barking and aircraft noise occasionally audible. Traffic passby on one occasion.
H	18/8	18:00 Eve.	32	35	64	41	78	89	65	Nil	IA	N/A	NS / 46	N/A	0.2 m/s @ 30° F stability class Y	Nil	Karuah East Quarry inaudible. Insects, frogs, bird noise and traffic on the Pacific Highway consistently audible. Dogs barking frequently audible. Resident noise occasionally audible.

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

5 SURFACE WATER MONITORING

5.1 MONTHLY SURFACE WATER MONITORING PROGRAM

Monthly water monitoring was undertaken on 2 September 2022 in accordance with the *Surface Water Monitoring Program* outlined in the *KEQ Water Management Plan (2015)*. Results are displayed in Table 14 along with the EPL discharge criterion and ANZECC (2000) Guidelines. These results do not determine compliance, they are used to analyse trends and assist with water management.

Table 14 Water monitoring results

Parameter	Units of measure	EPL 20611 concentration limit during discharge	Dam 1	Dam 2	Dam 3	SW 2	SW 3
Oil and grease	Milligrams per litre	5 and/or non-visible	<5	<5	<5	<5	<5
pH	pH	6.5 – 8.5	8.29	7.62	7.73	7.35	6.78
Total suspended solids	Milligrams per litre	40	33	13	104	252	9
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	612	1582	633	380	1655
Total dissolved solids	mg/L	--	387	999	419	342	408
Total phosphorus	mg/L	0.025	0.03	0.02	0.03	0.08	0.17
Ammonia	mg/L	0.2	0.07	0.12	0.03	0.02	<0.01
Nitrogen (Nitrate)	mg/L	0.350	9.92	0.88	3.67	3.46	0.15
Total hardness (as CaCO ₃)	mg/L	--	81	596	144	45	22
Arsenic	mg/L	0.024	<0.001	<0.001	<0.001	<0.001	0.002
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Calcium	mg/L	--	21	222	46	8	4
Chromium	mg/L	0.001	0.001	<0.001	<0.001	0.005	0.014
Copper	mg/L	0.0014	0.002	<0.001	<0.001	0.004	0.01
Lead	mg/L	0.0034	<0.001	<0.001	<0.001	0.003	0.008
Magnesium	mg/L	--	7	10	7	6	3
Manganese	mg/L	1.9	0.055	0.213	0.057	0.12	0.261
Nickel	mg/L	0.011	0.002	<0.001	<0.001	0.004	0.009

Potassium	mg/L	--	2	11	2	2	6
Sodium	mg/L	--	84	48	60	53	24
Vanadium	mg/L	--	<0.01	<0.01	<0.01	0.02	0.04
Zinc	mg/L	0.0312	0.013	<0.005	<0.005	0.023	0.066

Note 1 – Key default trigger values presented in ANZECC 2000 for slightly disturbed upland rivers in NSW. Heavy metals based on hard water (120-179 mg CaCO³/L).

5.2 DISCHARGE MONITORING

Condition L2 of the EPL outlines the requirement to monitor water discharges from the Quarry via the licensed discharge points (LDP1, LDP2 and LDP3), see Table 15.

Table 15 EPL20611 - Pollutant concentration limits

Pollutant	Units of Measure	Concentration Limit
Oil and Grease	Visible	5 &/or none visible
pH	pH units	6.5 – 8.5
Total suspended solids	Milligrams per litre	40

5.2.1 Dam 1 (LDP1)

Dam 1 had three days of discharge during the month of September. Daily monitoring during discharging was conducted and results were compliant with pollution concentration limits (see Table 16).

Table 16 Discharge monitoring – LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
Thursday, 1 September	7.6	25	None visible	Yes
Friday, 2 September	7.8	20	None visible	Yes
Monday, 26 September	8.5	26	<5	Yes

5.2.2 Dam 2 (LDP2)

Dam 2 had two days of controlled discharging during the month of September. Daily monitoring during discharge was conducted and all results were compliant with pollution concentration limits (see Table 17).

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
Thursday, 8 September	7	<5	None visible	Yes
Monday, 26 September	7.4	8	None visible	Yes

5.2.3 Dam 3 (LDP3)

Dam 3 had seven days of controlled discharging during the month of September. Daily monitoring during discharge was conducted and all results were compliant with pollution concentration limits (see Table 18).

Table 18 Discharge monitoring – LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
Thursday, 1 September	7.3	13	None visible	Yes
Friday, 2 September	7	10	None visible	Yes
Monday, 26 September	8	24	None visible	Yes
Tuesday, 27 September	8.1	19	None visible	Yes
Wednesday, 28 September	8.3	16	None visible	Yes
Thursday, 29 September	8.4	19	None visible	Yes
Friday, 30 September	8.1	20	None visible	Yes

6 WEATHER MONITORING

Karuah East Quarry has a permanent meteorological station to monitor various weather parameters including temperature, wind speed/direction, solar radiation, and rainfall.

Figure 2 shows the recorded results for the local weather during September 2022.

A wind rose is a graphic tool used to depict the average direction and speed of the wind over a recorded period. Figure 3 shows the wind rose generated from data gathered during September 2022.

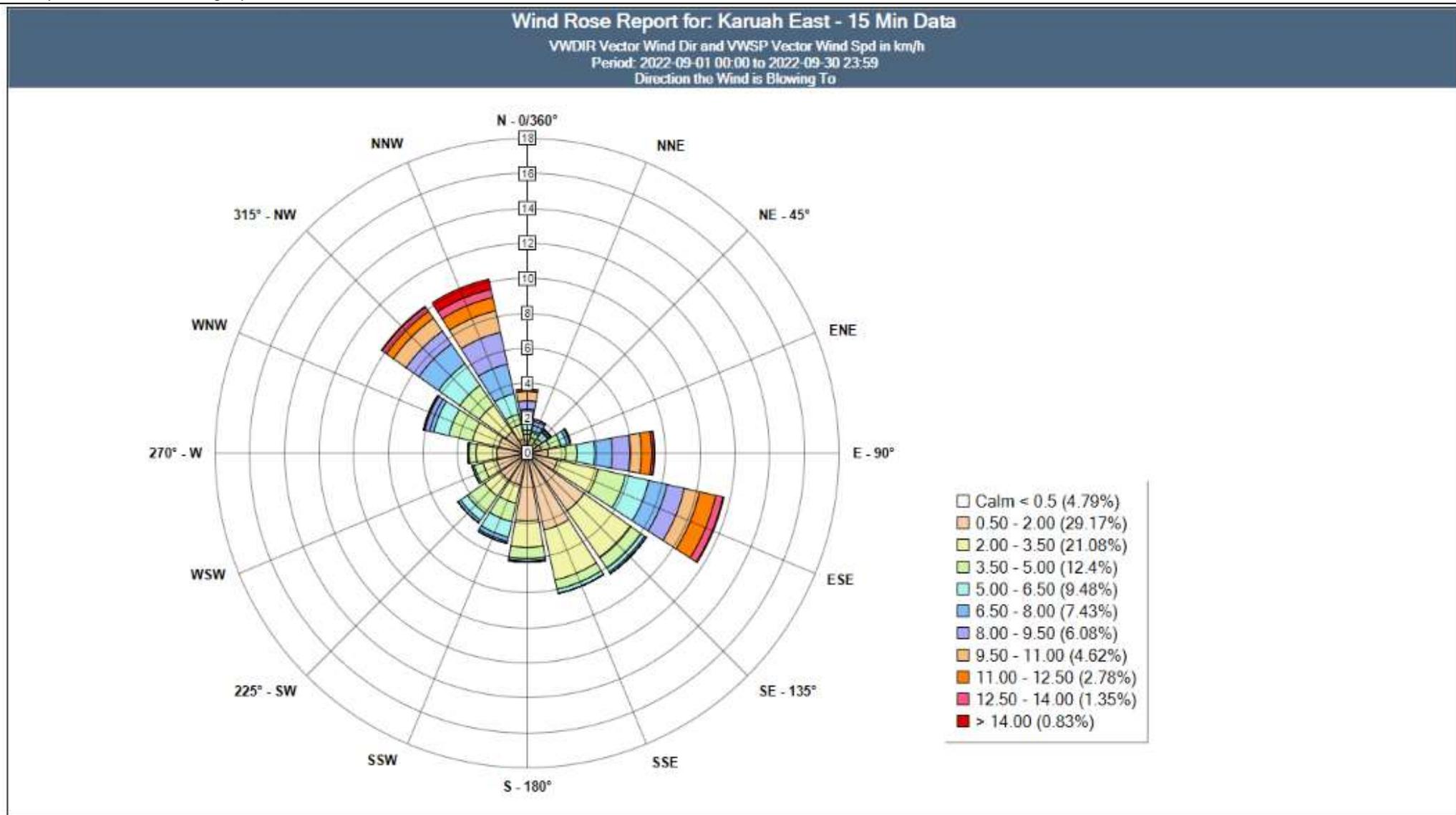


Figure 3 Wind Rose - September 2022

7 REPORTING

7.1 COMMUNITY CONSULTATIVE COMMITTEE

The purpose of a Community Consultative Committee (CCC) is to provide a forum for discussion between a proponent (KEQPL) and representatives of the community, stakeholder groups and the local council on issues directly relating to a specific State Significant Project (KEQ).

The KEQ CCC generally meets biannually (twice a year). Meeting minutes can be found at Hunter Quarries website <<https://hunterquarries.com.au/>>.

On 19 September, the second KEQ CCC meeting for 2022 was held, below are the key details:

- A site inspection was undertaken with three KEQPL representatives and two community representative.
- The meeting was facilitated at the Karuah RSL with one chairperson, five community representatives and three KEQPL representatives.
- The next CCC meeting is scheduled for March 2023.

7.2 PRODUCTION

For the month of September, 78'969 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

There were nil non-compliance event during September 2022 to report (see Table 19).

Table 19 Non-compliance Register

Date	Nature of Incident	Action
September 2022	Nil complaints received	Nil action required

7.4 COMPLAINTS

There were nil complaints received during September 2022 (see Table 20).

Table 20 Complaints Register

Date	Nature of Complaint	Action
September 2022	Nil complaints received	Nil action required

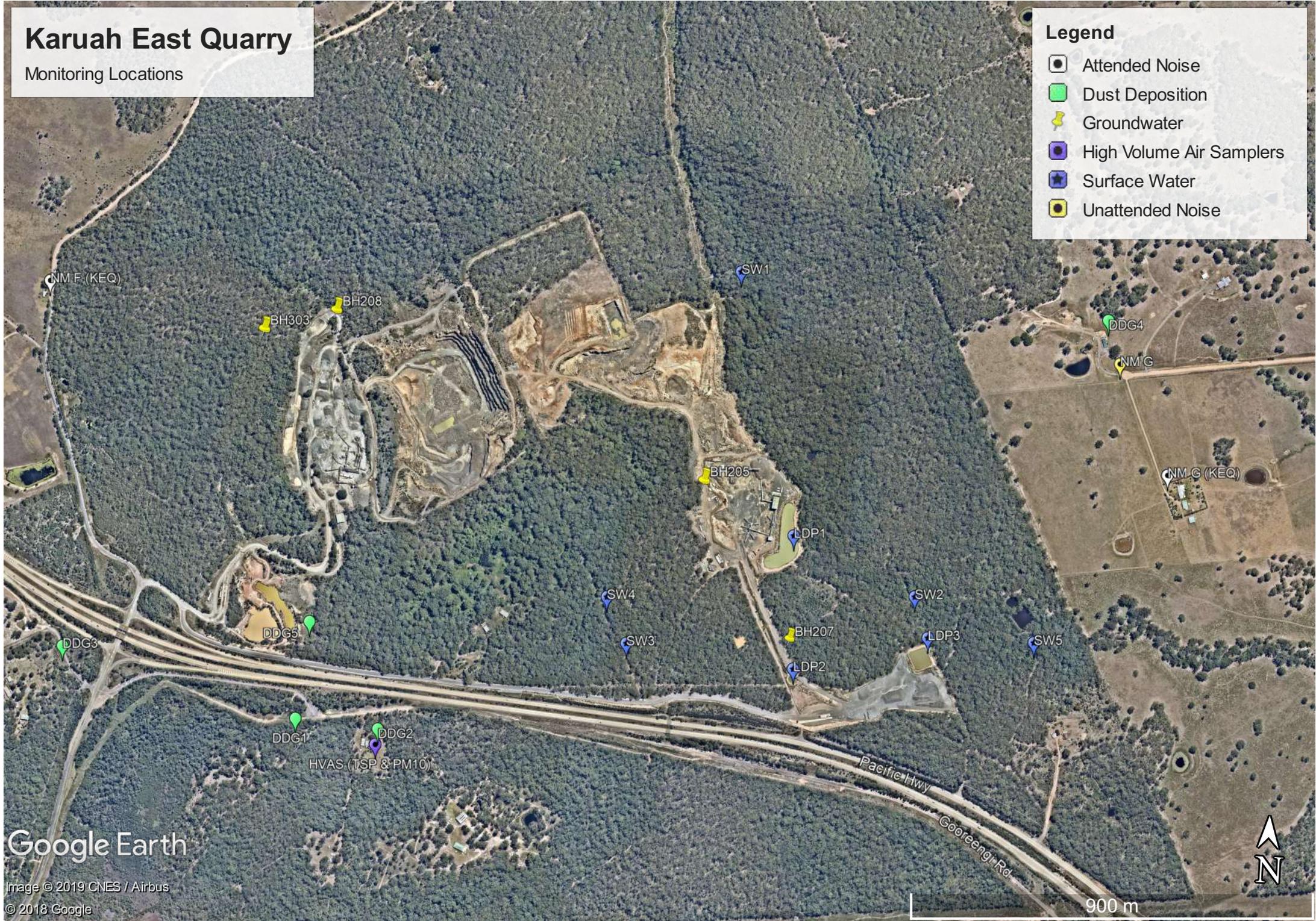
Appendix 1 – Monitoring Locations

Karuah East Quarry

Monitoring Locations

Legend

- Attended Noise
- Dust Deposition
- Groundwater
- High Volume Air Samplers
- Surface Water
- Unattended Noise



Google Earth

Image © 2019 CNES / Airbus
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900 m

