



Grounded in Quality

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Karuah East Quarry

Environmental Monitoring Report:

April 2022

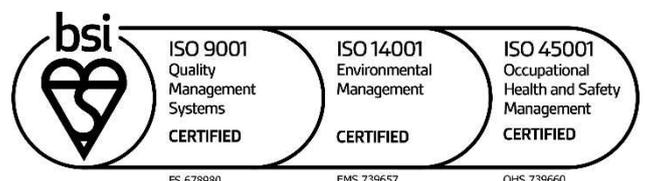


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Appendix 1

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 April 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 for the 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 April 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
6/05/2021	3/06/2021	0.3	0.3	0.3	0.4	0.6
3/06/2021	5/07/2021	0.2	0.4	0.2	0.2	- ¹
5/07/2021	5/08/2021	0.5	0.4	0.5	1.0	0.2
5/08/2021	6/09/2021	2.3	0.8	1.4	0.6	1.2
6/09/2021	6/10/2021	0.7	0.4	0.5	0.4	0.4
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
YTD average		1.1	0.7	0.5	0.4	0.6

Note¹: DDG5 was not able to be analysed for period 03/06/2021 to 05/07/2021 due to sample jar breaking the laboratory during analysis.

Monitoring results indicate that for the period from 5 April 2022 to 5 May 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 April 2022, the report average and a rolling annual average are shown in 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)
4/04/2022	13	10
10/04/2022	12	9
16/04/2022	12	8
22/04/2022	13	9
28/04/2022	26	9
24hr Average Criteria¹	N/A	50
Annual Average Criteria¹	90	30
Progressive Annual Average²	18.8	12.2

Note: ¹. Criteria as specified in PA 09_0175.

². The progressive annual average is from 01/01/2022 to 28/04/2022, this is not a measure of compliance.

All HVAS monitoring results for the period to and including April 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).

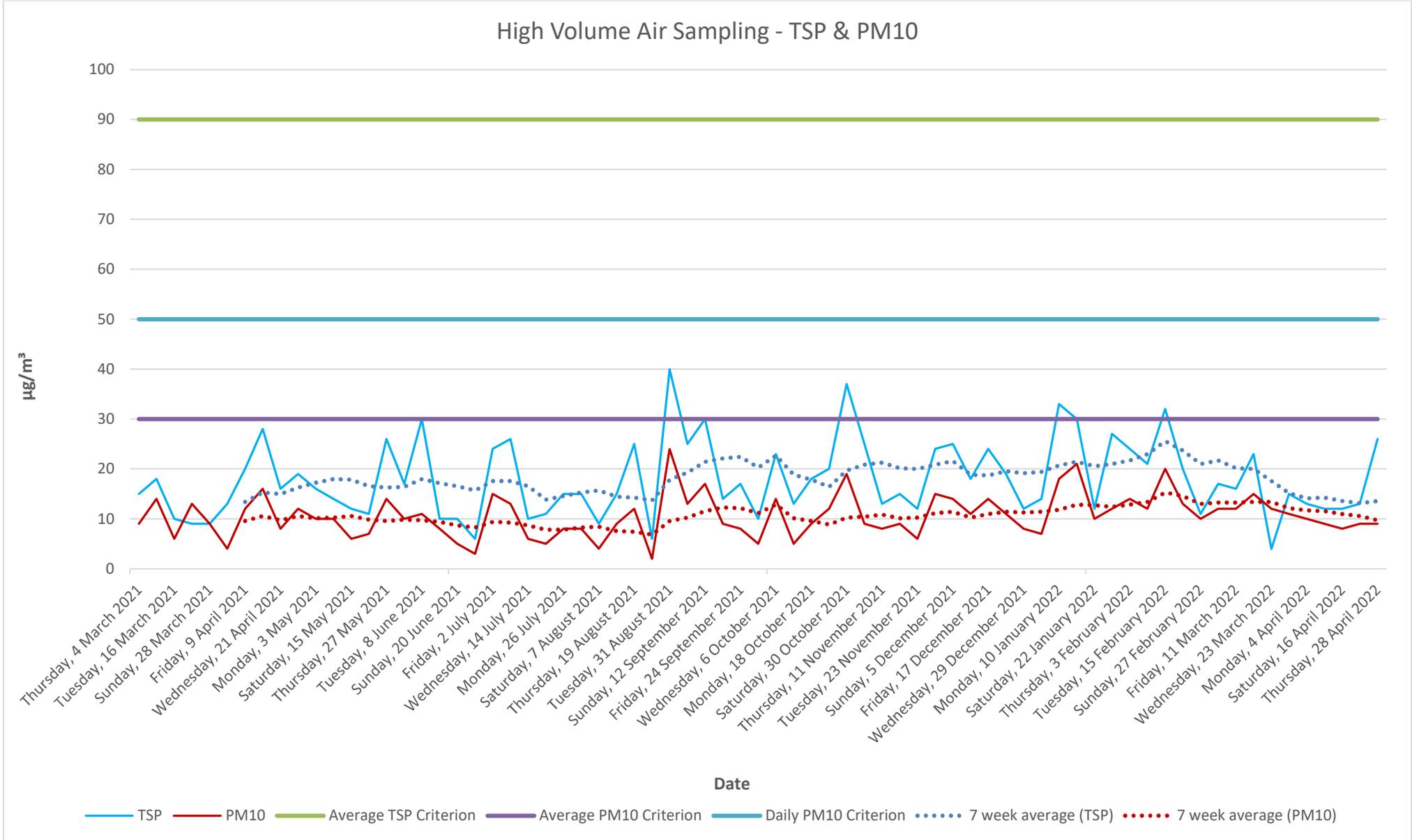


Figure 1 High Volume Air Sampling: Year-to-date results

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 3 blasts conducted in April 2022, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Overpressure (dB(L))	Vibration (mm/s)
Thursday, 7 April 2022	1:38 PM	Nil Trigger	Nil Trigger
Thursday, 14 April 2022	11:29am	Nil Trigger	Nil Trigger
Friday, 29 April 2022	12:29pm	112.3	0.73

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*, the Consent (*Schedule 3, condition 3 to 7*) and the EPL (*conditions L4 and M8*).

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 14* of the Consent (see Table 11) at the locations identified in Table 12.

Table 11 Operational Noise Criteria (dB(A) LA_{eq(15min)})

Location	Criteria (day ¹)
Residence on Lot 11 DP10244564	43
A	40
B	37
G	38
All other residence	35

Note 1: A day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.

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	Quarterly	Refer to Table 11
Unattended noise monitoring	G	Quarterly	Refer to Table 11

4.1 ATTENDED MONITORING

The most recent results for attended monitoring, undertaken 16 March 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 operation was inaudible at all locations except for Location G, where engine revs and the processing plant were audible, however; compliant with noise 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 results (extracted from quarterly noise monitoring report prepared by EMM March, 2022)

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

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

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

5 SURFACE WATER MONITORING

5.1 MONTHLY SURFACE WATER MONITORING PROGRAM

Monthly water monitoring was undertaken on 5 April 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	7.50	6.89	7.35	7.23	6.65
Total suspended solids	Milligrams per litre	40	2115	5	441	340	80
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	425	1111	366	322	142
Total dissolved solids	mg/L	--	1015	690	248	281	376
Total phosphorus	mg/L	0.025	0.71	<0.01	0.27	0.2	0.24
Ammonia	mg/L	0.2	0.01	0.02	<0.01	0.02	0.02
Nitrogen (Nitrate)	mg/L	0.350	8.76	0.15	1.18	0.09	0.02
Total hardness (as CaCO ₃)	mg/L	--	11	336	53	38	20
Arsenic	mg/L	0.024	0.006	<0.001	0.002	0.002	0.002
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	--	1	100	13	7	3
Chromium	mg/L	0.001	0.033	<0.001	0.017	0.013	0.009
Copper	mg/L	0.0014	0.057	<0.001	0.019	0.014	0.01
Lead	mg/L	0.0034	0.03	<0.001	0.01	0.006	0.006
Magnesium	mg/L	--	2	21	5	5	3
Manganese	mg/L	1.9	1.12	0.934	0.576	0.357	0.174
Nickel	mg/L	0.011	0.022	0.001	0.014	0.011	0.006

Potassium	mg/L	--	1	1	1	2	1
Sodium	mg/L	--	82	75	50	52	23
Vanadium	mg/L	--	0.14	<0.01	0.06	0.04	0.03
Zinc	mg/L	0.0312	0.175	<0.005	0.076	0.059	0.038

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 four days of uncontrolled discharging during the month of April. Daily monitoring during discharge was conducted and results were not compliant with pollution concentration limits (see Table 16). This non-compliance is elaborated in Section 7.3.

Table 16 Discharge monitoring – LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
Friday, 1 April 2022	7.1	2,500	None visible	No
Saturday, 2 April 2022	7.1	2,300	None visible	No
Sunday, 3 April 2022	7.1	1,700	None visible	No
Monday, 4 April 2022	7.1	1,100	None visible	No

5.2.2 Dam 2 (LDP2)

Dam 2 had two days of controlled discharging and one day of uncontrolled discharging during the month of April. Daily monitoring during discharge was conducted and results during uncontrolled discharging were not compliant with pollution concentration limits (see Table 17). This non-compliance is elaborated in Section 7.3.

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
Friday, 1 April 2022	6.8	490	None visible	No
Tuesday, 19 April 2022	7.2	<5	None visible	Yes
Tuesday, 26 April 2022	6.9	8	None visible	Yes

5.2.3 Dam 3 (LDP3)

Dam 3 had six days of controlled discharging and one day of uncontrolled discharging during the month of April. Daily monitoring during discharge was conducted and results during uncontrolled discharging were not compliant with pollution concentration limits (see Table 18). This non-compliance is elaborated in Section 7.3.

Table 18 Discharge monitoring – LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
Friday, 1 April 2022	7.1	500	None visible	No
Tuesday, 19 April 2022	7.4	15	None visible	Yes
Wednesday, 20 April 2022	7.4	16	None visible	Yes
Thursday, 21 April 2022	7.3	17	None visible	Yes
Tuesday, 26 April 2022	7.4	39	None visible	Yes
Wednesday, 27 April 2022	7.4	26	None visible	Yes
Thursday, 28 April 2022	7.4	30	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 April 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 April 2022.

Monthly Weather Summary



Site: **Karuah Quarry**

Month: **April 2022**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain ² mm
		Max ¹	Min ²	Ave ¹	Max ¹	Min ²	Ave ¹	Max Gust ¹	Ave Speed ¹	Dir Ave ¹	Max ¹	Ave ¹	
		°C	°C	°C	°C	°C	°C	km/h	km/h	deg	W/m ²	W/m ²	
1	Fri	17.5	14.4	16.3	18.0	14.5	16.6	41.4	7.3	226	277.4	51.8	58.6
2	Sat	23.4	14.8	15.6	21.8	14.7	15.8	23.7	3.2	194	370.0	75.3	6.2
3	Sun	26.1	10.5	17.9	24.5	11.5	18.3	21.3	2.4	179	430.8	92.4	
4	Mon	30.2	12.9	19.4	27.7	13.9	19.6	18.9	3.1	220	304.2	91.8	
5	Tue	29.4	12.3	18.8	26.0	13.2	18.6	20.1	3.0	181	357.5	96.2	
6	Wed	26.3	12.9	19.2	23.0	13.4	19.0	23.7	3.8	161	504.9	84.6	
7	Thu	22.5	15.4	18.3	21.0	16.1	18.4	35.5	4.8	166	264.2	61.8	
8	Fri	25.6	16.6	18.5	23.3	16.9	18.4	36.7	3.8	160	415.8	81.4	55.2
9	Sat	25.4	14.4	18.6	23.4	15.0	18.7	27.2	2.8	152	461.6	101.6	6.4
10	Sun	27.1	14.5	18.7	24.0	15.1	18.7	16.6	2.6	167	412.5	83.3	0.2
11	Mon	30.2	13.6	21.9	26.8	14.4	21.6	22.5	3.8	175	295.8	83.3	0.2
12	Tue	23.9	18.4	18.1	22.4	18.3	17.9	27.2	3.3	174	473.3	73.0	24.8
13	Wed	19.9	15.2	16.1	19.2	15.6	16.1	15.4	2.5	187	395.0	69.3	11.8
14	Thu	23.8	13.1	16.3	21.9	13.5	16.4	33.1	3.3	179	461.6	84.3	2.0
15	Fri	25.3	11.9	16.4	23.0	12.3	16.6	14.2	2.1	169	250.8	74.5	0.6
16	Sat	26.7	11.7	17.1	23.7	12.0	17.0	18.9	2.8	199	341.6	86.5	0.2
17	Sun	26.5	11.0	17.7	23.6	11.7	18.2	22.5	2.7	161	412.4	94.1	
18	Mon	28.0	12.7	19.0	26.1	13.6	19.3	14.2	2.2	126	358.3	102.3	
19	Tue	29.6	13.1	20.8	26.6	13.9	20.8	42.6	6.2	190	413.3	100.0	
20	Wed	25.0	15.0	15.7	23.1	15.8	16.1	34.3	3.8	219	319.1	91.7	
21	Thu	25.2	8.9	18.7	21.9	9.9	18.1	29.6	5.2	172	348.3	96.1	
22	Fri	20.3	15.3	15.8	19.7	15.5	16.0	27.2	2.7	187	244.9	47.3	34.0
23	Sat	19.4	13.5	16.4	18.9	13.9	16.3	21.3	2.4	176	343.3	49.5	6.8
24	Sun	23.4	14.2	15.2	21.4	14.5	15.2	20.1	2.1	199	385.8	69.3	3.8
25	Mon	22.5	10.8	16.5	20.3	10.8	16.2	17.8	2.3	192	334.1	74.2	
26	Tue	20.8	13.5	16.9	19.9	13.8	16.9	11.8	1.8	166	219.2	44.7	
27	Wed	24.7	14.6	19.4	23.2	14.9	19.7	22.5	3.4	132	412.5	60.7	
28	Thu	28.3	17.0	20.8	26.4	17.6	20.8	15.4	2.1	141	369.2	70.8	1.0
29	Fri	28.5	15.7	21.3	26.2	16.3	21.3	14.2	3.1	145	423.3	86.3	
30	Sat	22.7	17.1	14.8	22.1	17.9	15.3	24.9	2.6	217	134.1	37.5	
Ave or Total		24.9	13.8	17.9	23.0	14.4	17.9	23.8	3.2	177.1	357.8	77.2	211.8
High		30.2	18.4	21.9	27.7	18.3	21.6	42.6	7.3		504.9	102.3	58.6
Low		17.5	8.9	14.8	18.0	9.9	15.2	11.8	1.8		134.1	37.5	
												No. rain days >1mm:	10

Notes: 1. Values are for the 24 hour period from 9am to 9am next day.
 2. Values are for the 24 hours to 9am.

Figure 2 Monthly weather summary – April 2022

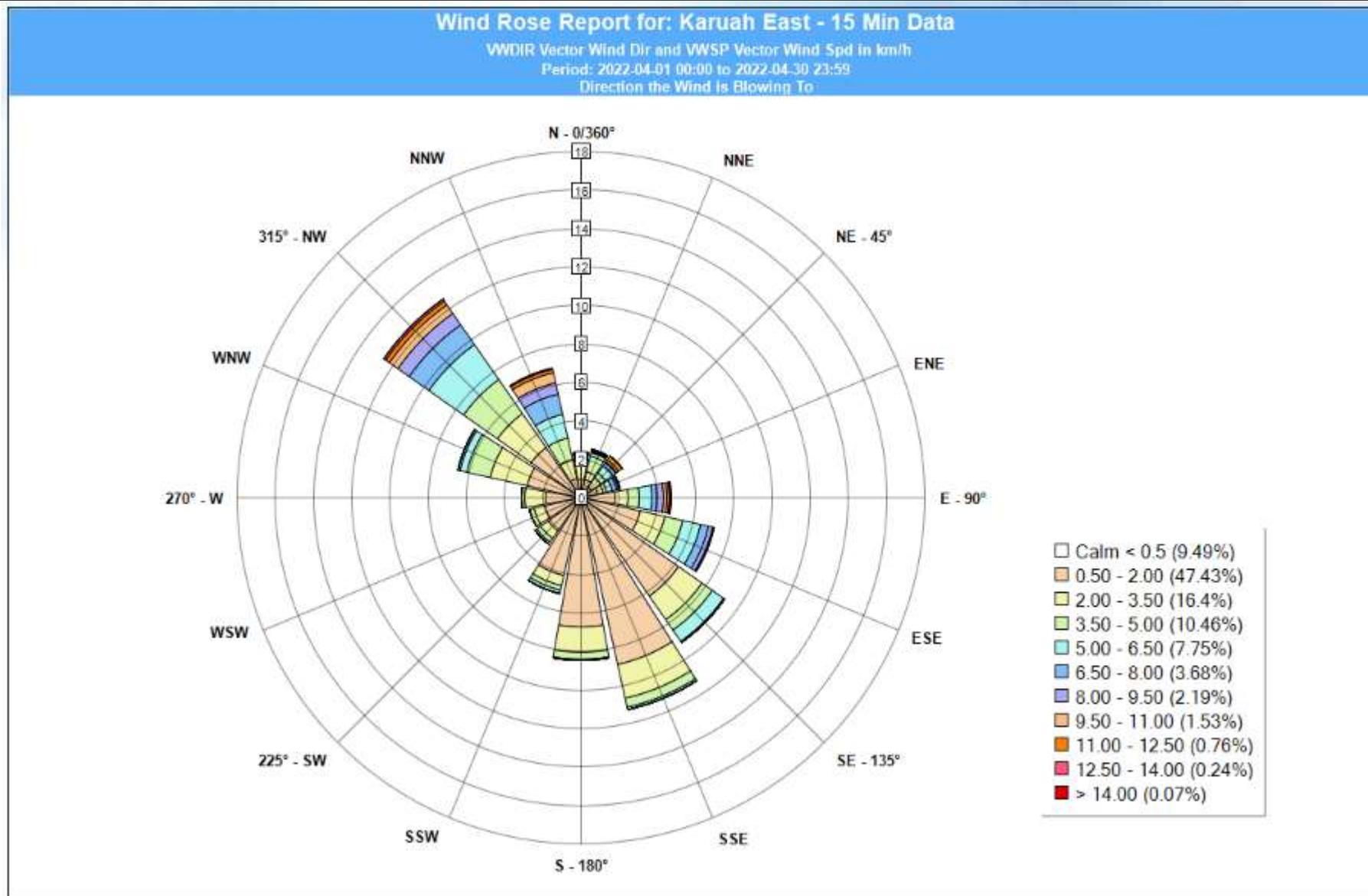


Figure 3 KEQ Meteorological Station – Wind rose for April 2022

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 14 March, the first KEQ CCC meeting for 2022 was held, below are the key details:

- A site inspection was undertaken with two KEQPL representatives and one community representative.
- The meeting was facilitated at the Karuah RSL with one chairperson, four community representatives and two KEQPL representatives.
- Next meeting scheduled for September 2022.

7.2 PRODUCTION

For the month of April, 56,469 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

There was one environmental incident that lead to one non-compliance during April 2022, further details are provide Table 19.

Table 19 Non-compliance register

Date	Nature of Incident	Action
31/03/2022 to 4/04/2022	Following substantial rainfall across ten days reaching 256.4mm, KEQ Dam 1, Dam 2 and Dam 3 breached storage capacity and commenced an uncontrolled discharge. Daily monitoring during discharge showed exceedances of the EPL and Consent pollution concentration limits for TSS.	KEQPL enacted the Pollution Incident Response Management Plan. Notification was made to neighbouring residents. Regulatory authorities (EPA and DPE) were notified and provided a report detailing the incident. KEQPL will continue to manager water and maintain erosion and sediment controls across KEQ.

7.4 COMPLAINTS

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

Table 20 Complaints Register - April 2022

Date	Nature of Complaint	Action
April 2022	Nil complaints received.	Nil action required.

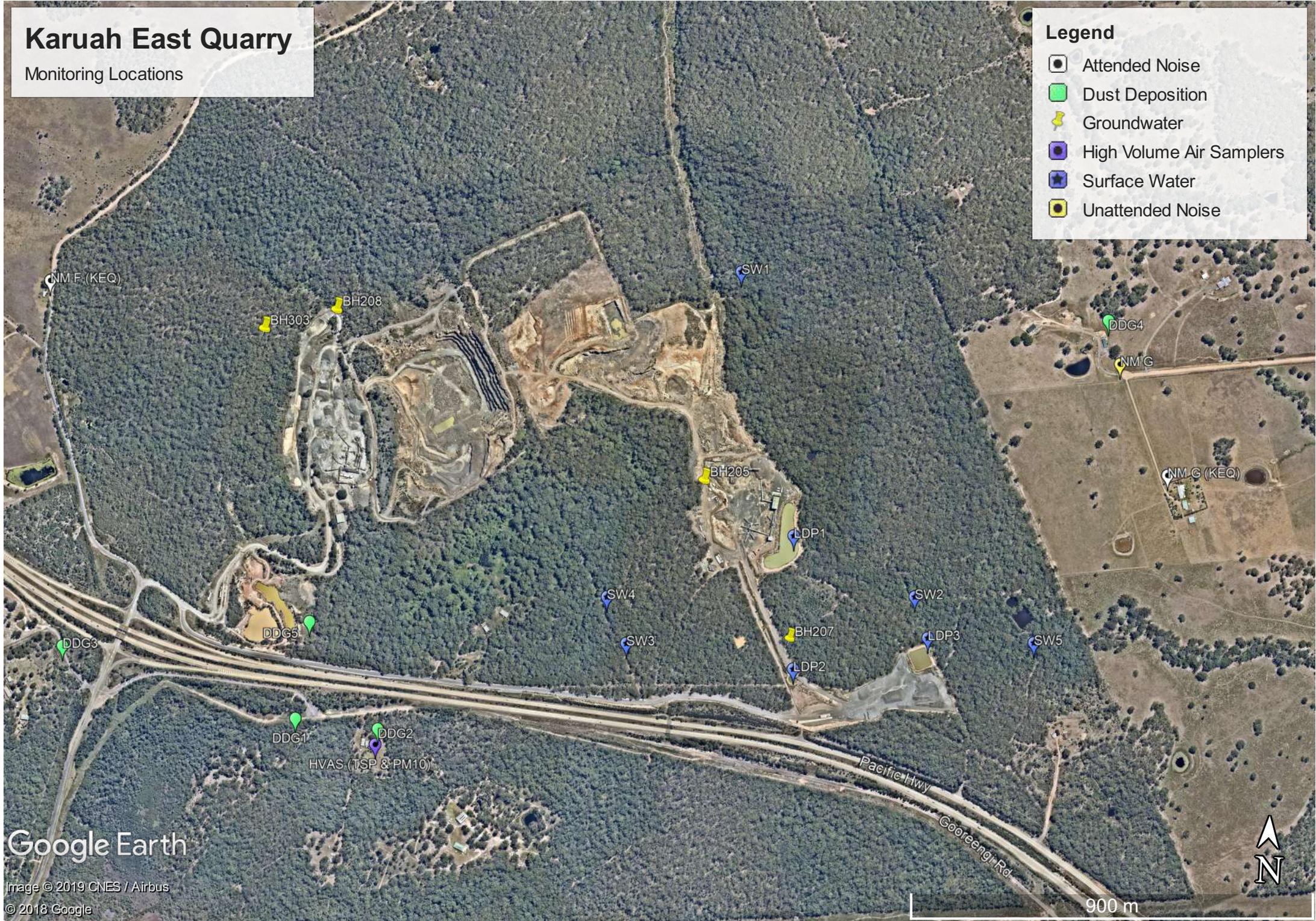
Appendix 1 – Monitoring Locations

Karuah East Quarry

Monitoring Locations

Legend

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



Google Earth

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900 m

