



Grounded in Quality

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Karuah East Quarry

Environmental Monitoring Report:

March 2022

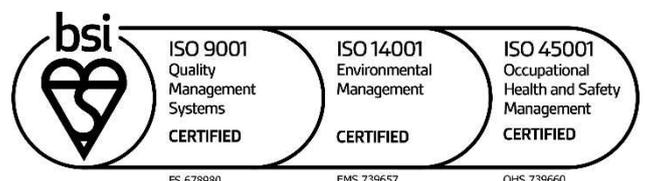


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Appendix 1

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 March 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, 2007).

2.1 DEPOSITED DUST MONITORING

Deposited dust results for the twelve months prior to and including March 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
6/04/2021	6/05/2021	0.7	1.4	2.2	3.7	1.9
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
YTD average		1.1	0.8	0.7	0.7	0.8

Note ¹: 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 7 March 2022 to 5 April 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 March 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)
05/03/2022	17	12
11/03/2022	16	12
17/03/2022	23	15
23/03/2022	4	12
29/03/2022	15	11
24hr Average Criteria¹	N/A	50
Annual Average Criteria¹	90	30
Progressive Annual Average²	19.9	13.3

Note: ¹ Criteria as specified in PA 09_0175.

² The progressive annual average is from 01/01/2022 to 29/03/2022, this is not a measure of compliance.

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

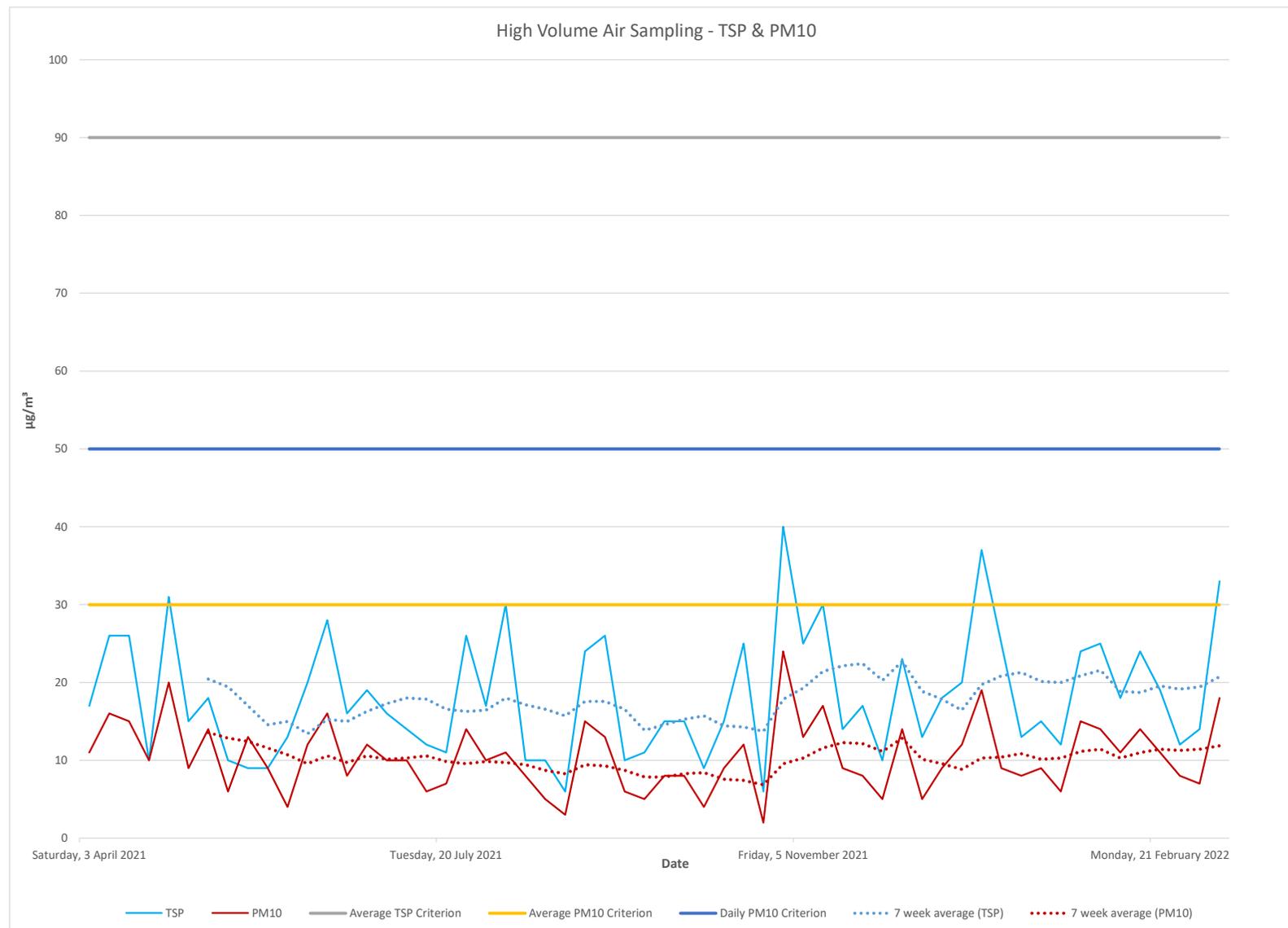


Figure 1 High Volume Air Sampling: Year-to-date results

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 Blasting criteria).

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 was one blast conducted in March 2022, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Overpressure (dB(L))	Vibration (mm/s)
Wednesday, 30 March 2022	12:01pm	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*, 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 were briefly audible on two occasions, 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 7 March 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 (Not flowing)
Oil and grease	Milligrams per litre	5 and/or non-visible	<5	<5	<5	<5	-
pH	pH	6.5 – 8.5	7.07	6.75	7.02	7.01	-
Total suspended solids	Milligrams per litre	40	984	114	177	393	-
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	546	357	451	387	-
Total dissolved solids	mg/L	--	1208	278	310	760	-
Total phosphorus	mg/L	0.025	0.63	0.04	0.12	0.48	-
Ammonia	mg/L	0.2	0.04	0.01	0.02	0.01	-
Nitrogen (Nitrate)	mg/L	0.350	14.3	0.35	0.98	7.13	-
Total hardness (as CaCO ₃)	mg/L	--	24	93	62	30	-
Arsenic	mg/L	0.024	0.006	<0.001	0.001	0.004	-
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-
Calcium	mg/L	--	3	29	15	4	-
Chromium	mg/L	0.001	0.032	0.003	0.006	0.02	-
Copper	mg/L	0.0014	0.052	0.003	0.008	0.033	-
Lead	mg/L	0.0034	0.027	0.002	0.004	0.016	-
Magnesium	mg/L	--	4	5	6	5	-
Manganese	mg/L	1.9	0.846	0.169	0.243	0.458	-
Nickel	mg/L	0.011	0.02	0.002	0.006	0.108	-

Potassium	mg/L	--	2	<1	1	2	-
Sodium	mg/L	--	103	35	71	72	-
Vanadium	mg/L	--	0.13	0.01	0.02	0.08	-
Zinc	mg/L	0.0312	0.17	0.014	0.034	0.235	-

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).

SW3 creek not flowing and therefore no sample was taken.

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

Table 16 Discharge monitoring – LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
Friday, 4 March 2022	7.1	1,600	<5	No
Saturday, 5 March 2022	7.1	1,800	None-visible	No
Sunday, 6 March 2022	7.2	1,500	None-visible	No
Monday, 7 March 2022	7.07	984	<5	No
Tuesday, 8 March 2022	7.3	750	None-visible	No
Wednesday, 9 March 2022	7.2	870	None-visible	No
Thursday, 10 March 2022	7.1	1,100	None-visible	No
Thursday, 31 March 2022	7.1	3,200	None-visible	No

5.2.2 Dam 2 (LDP2)

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

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
Monday, 14 March 2022	6.9	5	None-Visible	Yes
Thursday, 31 March 2022	6.8	490	None-visible	No

5.2.3 Dam 3 (LDP3)

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

Table 18 Discharge monitoring – LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
Wednesday, 16 March 2022	7.7	40	Non-Visible	Yes
Thursday, 17 March 2022	7.7	33	Non-visible	Yes
Friday, 18 March 2022	7.7	32	Non-visible	Yes
Thursday, 31 March 2022	7.1	500	Non-visible	No

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 March 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 March 2022.

Monthly Weather Summary



Site: **Karuah Quarry**

Month: **March 2022**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain ² mm
		Max ¹ °C	Min ² °C	Ave ¹ °C	Max ¹ °C	Min ² °C	Ave ¹ °C	Max Gust ¹ km/h	Ave Speed ¹ km/h	Dir Ave ¹ deg	Max ¹ W/m ²	Ave ¹ W/m ²	
1	Tue	21.8	19.1	20.3	21.7	19.0	20.3	10.6	1.5	158	212.5	59.0	10.8
2	Wed	24.4	19.3	21.2	23.2	19.4	21.0	15.4	2.9	165	490.8	87.4	14.0
3	Thu	22.6	19.6	21.8	23.2	19.5	22.0	21.3	6.3	163	202.5	28.5	20.6
4	Fri	29.5	20.0	22.5	26.8	20.2	22.3	18.9	3.0	178	588.3	100.2	63.4
5	Sat	29.9	19.3	24.3	27.5	19.1	23.9	20.1	4.6	135	395.8	81.7	1.4
6	Sun	29.6	20.4	23.6	26.8	20.4	23.3	27.2	4.3	168	432.5	74.2	6.2
7	Mon	28.7	20.9	23.0	27.1	20.8	22.9	22.5	3.8	151	504.2	76.9	0.8
8	Tue	30.2	19.9	21.4	27.2	20.1	20.8	28.4	5.6	228	543.3	100.5	2.0
9	Wed	23.4	17.8	19.7	22.7	17.6	19.8	40.2	6.4	212	273.3	82.9	10.0
10	Thu	26.2	16.3	19.2	22.7	16.7	18.3	28.4	5.2	209	394.2	107.9	9.2
11	Fri	27.6	14.2	18.6	23.8	14.5	18.1	24.9	3.8	168	494.9	120.2	0.6
12	Sat	26.0	13.4	17.7	23.4	13.6	17.5	20.1	3.3	176	586.6	76.8	0.2
13	Sun	27.1	12.8	18.6	24.5	13.1	18.5	16.6	2.3	188	469.1	87.1	1.0
14	Mon	24.7	13.1	17.5	23.6	13.7	18.0	18.9	2.4	199	191.7	22.5	
15	Tue	26.5	14.3	19.6	24.2	15.0	19.4	29.6	4.6	184	316.6	69.4	2.4
16	Wed	28.5	15.5	20.8	25.7	16.0	20.5	23.7	3.9	177	461.7	102.1	1.2
17	Thu	30.0	15.6	22.1	26.1	16.3	21.9	20.1	3.5	157	391.7	85.4	
18	Fri	30.4	17.6	20.9	26.7	18.4	20.5	23.7	3.8	186	414.1	97.8	
19	Sat	26.7	15.9	18.9	23.7	16.2	19.0	37.9	6.0	185	575.0	85.9	5.6
20	Sun	27.7	14.3	19.3	24.1	15.0	18.9	24.9	4.2	179	448.3	92.8	1.8
21	Mon	27.8	14.1	18.6	24.2	14.7	18.2	26.0	3.9	209	417.5	104.5	
22	Tue	30.2	12.3	21.1	28.0	13.0	21.1	17.8	3.2	147	350.8	110.3	
23	Wed	29.7	15.8	21.9	26.9	16.8	21.4	35.5	5.5	174	422.4	97.2	
24	Thu	18.7	17.4	16.4	18.7	17.4	16.7	24.9	3.2	175	200.0	47.7	28.2
25	Fri	24.6	13.5	19.5	23.1	13.8	19.4	28.4	4.4	174	352.4	77.8	34.6
26	Sat	22.9	16.9	18.3	22.4	16.7	18.2	26.0	2.2	196	451.6	60.4	27.2
27	Sun	22.9	15.9	19.8	22.5	16.2	19.7	10.6	2.1	169	398.3	65.3	10.2
28	Mon	25.4	17.7	21.4	24.3	17.6	21.1	14.2	2.6	171	285.0	99.7	1.2
29	Tue	24.7	19.4	20.0	23.7	19.5	20.3	27.2	3.1	146	257.4	74.5	3.0
30	Wed	22.4	17.3	20.2	22.5	18.0	20.7	40.2	10.1	161	253.3	73.1	10.2
31	Thu	20.3	17.8	17.3	21.8	17.7	17.6	52.1	10.1	191	296.7	40.9	77.0
Ave or Total		26.2	16.7	20.2	24.3	17.0	20.0	25.0	4.3	176.7	389.4	80.3	342.8
High		30.4	20.9	24.3	28.0	20.8	23.9	52.1	10.1		588.3	120.2	77.0
Low		18.7	12.3	16.4	18.7	13.0	16.7	10.6	1.5		191.7	22.5	
Notes: 1. Values are for the 24 hour period from 9am to 9am next day.												No. rain days >1mm:	21
2. Values are for the 24 hours to 9am.													

Figure 2 Monthly weather summary – March 2022

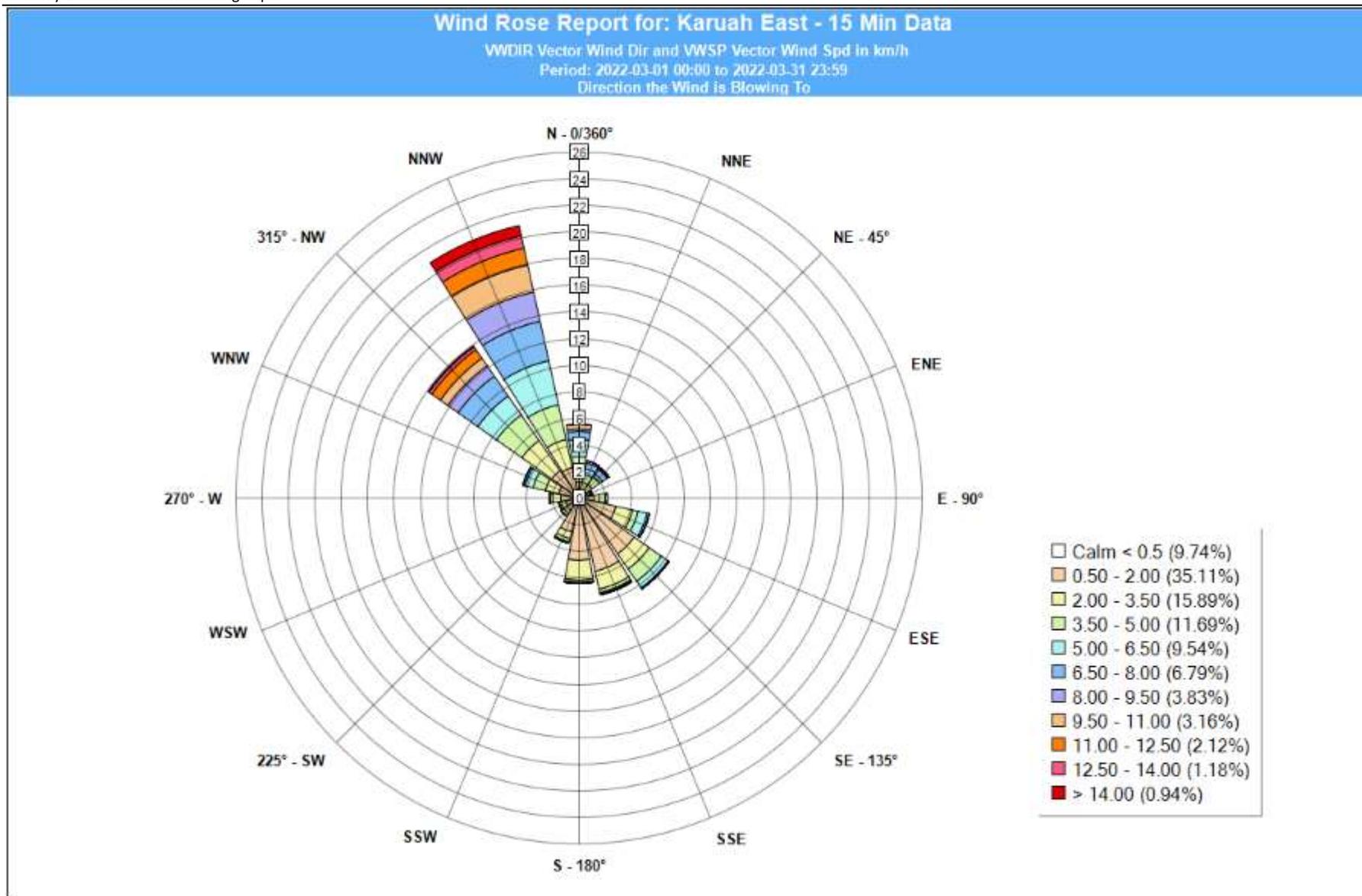


Figure 3 Wind rose report – March 2022

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 March 71,636 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

There were two environmental incidents that lead to two non-compliances during March 2022, further details are provide in Table 19.

Table 19 Complaints register

Date	Nature of Incident	Action
4/03/2022 to 10/03/2022	Following substantial rainfall across thirteen days reaching 178.2mm, KEQ Dam 1 breached storage capacity and commenced an uncontrolled discharge. Daily monitoring during discharge showed exceedances of the EPL and Consent pollution concentration limit 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.
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 March 2022.

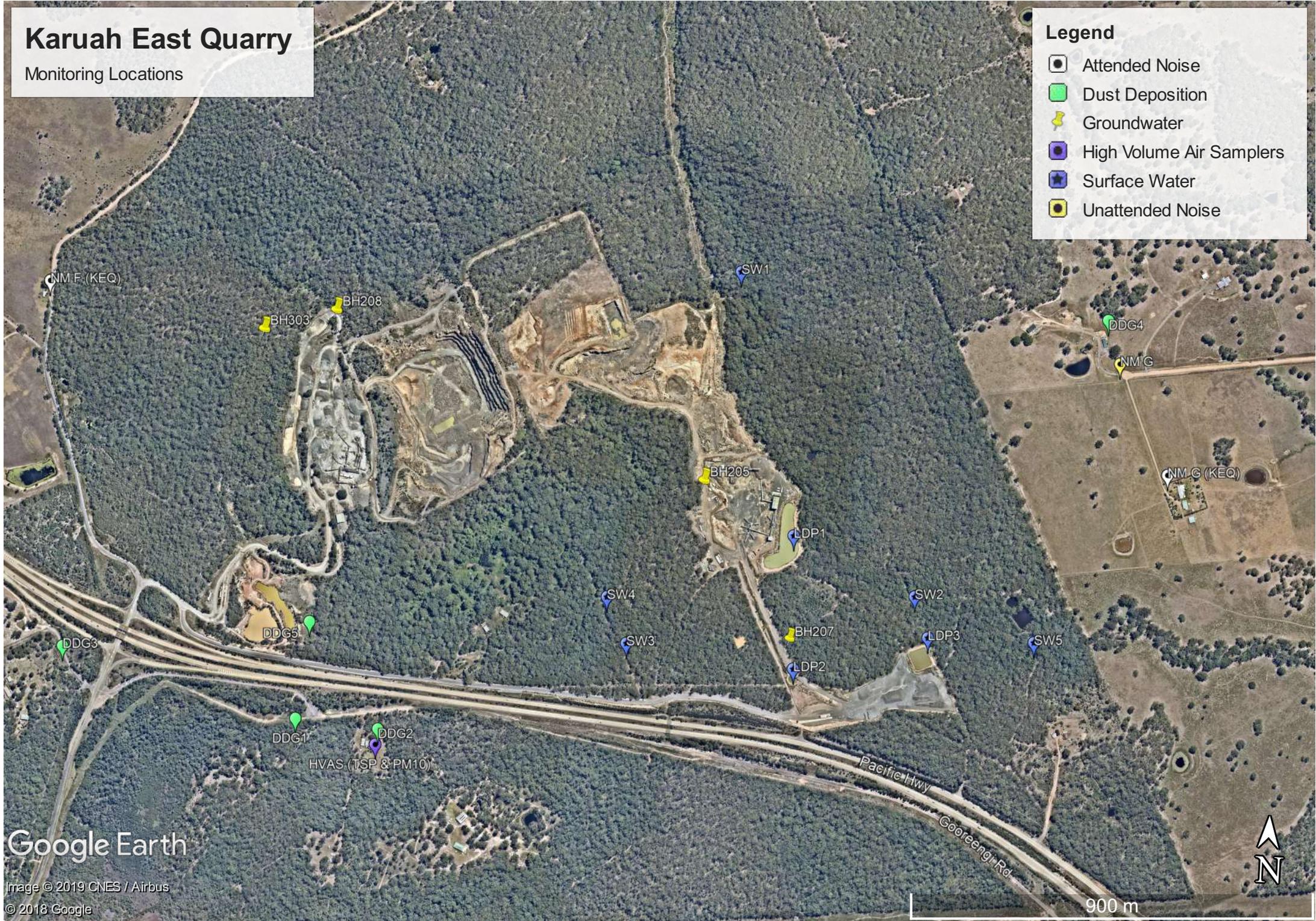
Appendix 1 – Monitoring Locations

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

