



Grounded in Quality

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Karuah East Quarry

Environmental Monitoring Report:

December 2021

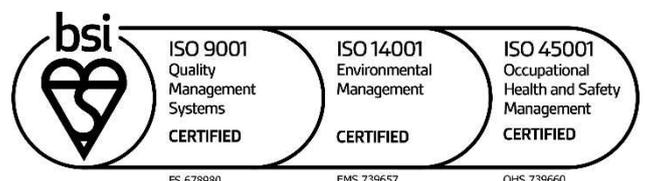


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1 INTRODUCTION

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 December 2021 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 December 2021 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
04/01/2021	04/02/2021	1.5	0.9	0.7	0.3	1.2
04/02/2021	05/03/2021	0.4	0.4	0.7	0.2	1.6
05/03/2021	06/04/2021	0.8	1.3	0.5	0.7	0.7
06/04/2021	06/05/2021	0.7	1.4	2.2	3.7	1.9
06/05/2021	03/06/2021	0.3	0.3	0.3	0.4	0.6
03/06/2021	05/07/2021	0.2	0.4	0.2	0.2	- ¹
05/07/2021	05/08/2021	0.5	0.4	0.5	1.0	0.2
05/08/2021	06/09/2021	2.3	0.8	1.4	0.6	1.2
06/09/2021	06/10/2021	0.7	0.4	0.5	0.4	0.4
06/10/2021	03/11/2021	3.6	0.1	0.5	0.1	0.5
03/11/2021	03/12/2021	0.5	0.2	0.4	0.2	0.5
03/12/2021	04/01/2022	1.3	0.3	0.2	1.0	0.5
YTD average		1.1	0.6	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 3 December 2021 to 4 January 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 December 2021, 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 PM10 (µg/m ³)
5/12/2021	25	14
11/12/2021	18	11
17/12/2021	24	14
23/12/2021	19	11
29/12/2021	12	8
24hr Average Criteria¹	N/A	50
Annual Average Criteria¹	90	30
Progressive Annual Average²	18	10.5

Note: ¹ Criteria as specified in PA 09_0175.

² The progressive annual average is from 01/01/2021 to 29/11/2021, this is not a measure of compliance.

All HVAS monitoring results for the period to and including December 2021 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).

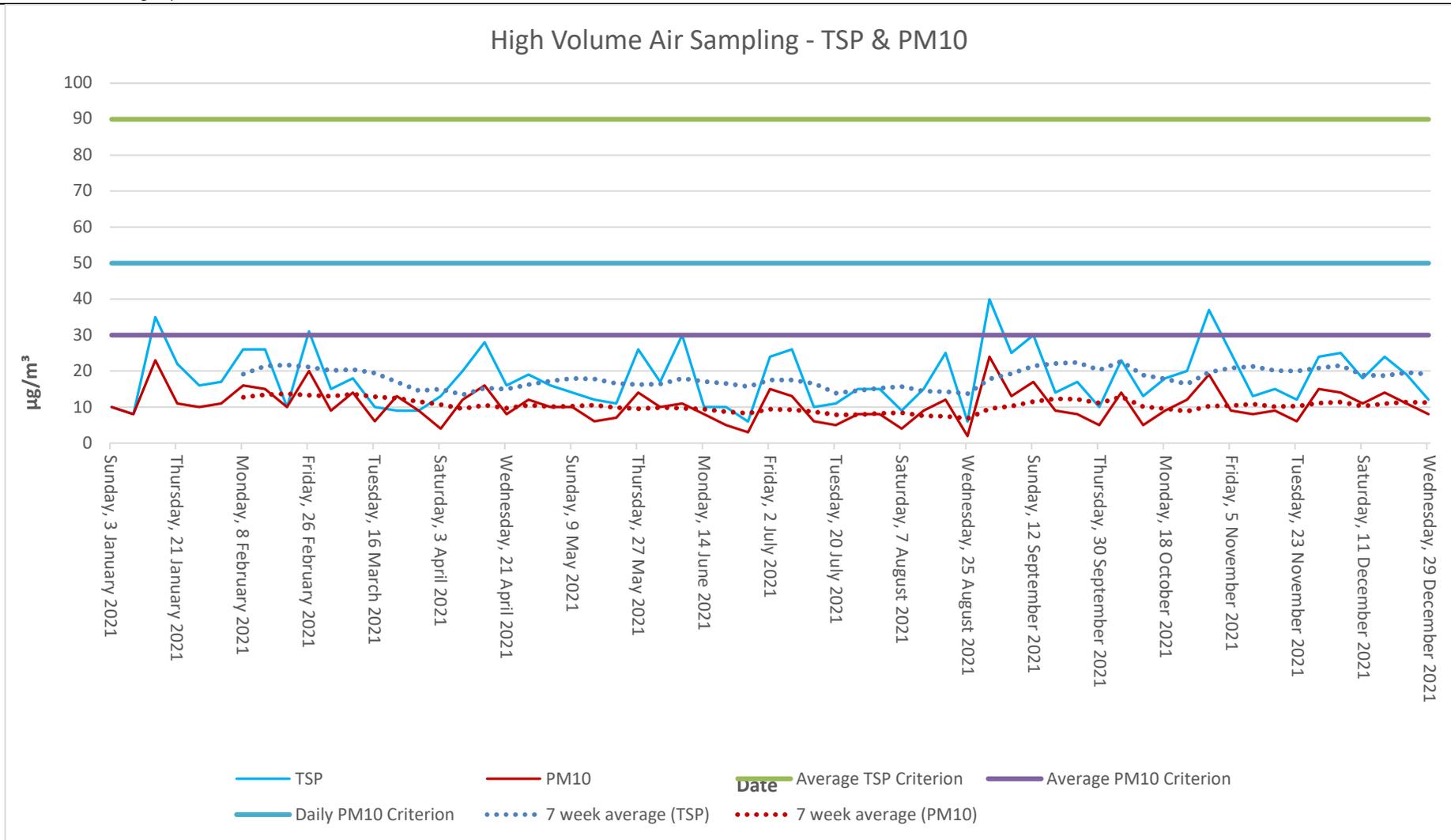


Figure 1 High Volume Air Sampling: Year-to-date results

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 EPL 20611 Condition M7.1 Blasting

Parameter	Units of Measure	Frequency	Sampling Method
Airblast Overpressure	Decibels (Linear Peak)	All blasts	Australian Standard AS 2187.2-2006
Ground Vibration Peak Particle Velocity	Millimetres/second	All blasts	Australian Standard AS 2187.2-2006

There was one blast conducted in December 2021, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Overpressure (dB(L))	Vibration (mm/s)
Friday, 17 December 2021	1:45 PM	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

Quarterly noise monitoring was undertaken contains the results for the most recent attended noise monitoring, undertaken in November 2021.

The results for attended monitoring undertaken 19 November 2021 (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 November, 2021)

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	19/11	10:44	45	48	66	53	81	96	70	Nil	IA	40 / 42	0.5 m/s @ 213° A stability class Y	Nil	Karuah East Quarry inaudible. Traffic on the Pacific Highway, insects, frogs and bird noise consistently audible. Resident noise and a dog barking frequently audible.
B	19/11	11:19	56	59	63	65	68	69	70	Nil	IA	37 / 40	0.8 m/s @ 219° A stability class Y	Nil	Karuah East Quarry inaudible. Traffic on the Pacific Highway and bird noise consistently audible.
F	19/11	10:10	42	44	59	49	68	89	64	Nil	IA	35 / 40	0.5 m/s @ 213° A stability class Y	Nil	Karuah East Quarry inaudible. Distant traffic on the Pacific Highway, insects and bird noise consistently audible. Car passbys occasionally audible.
G	19/11	11:48	36	39	43	45	53	60	63	Nil	37	38 / 43	0.8 m/s @ 219° A stability class Y	Nil	Karuah East Quarry engine revs and processing plant consistently audible with bangs on occasion. Distant traffic on the Pacific Highway, insects, frogs and bird noise consistently audible. Aircraft noise, resident noise and livestock 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 SURFACE WATER MONITORING

5.1 SURFACE WATER MONITORING PROGRAM

Monthly water monitoring was undertaken on 3 December 2021 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	<5
pH	pH	6.5 – 8.5	7.41	7.07	7.88	6.40	6.97
Total suspended solids	Milligrams per litre	40	193	68	74	37	23
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	733	246	475	377	476
Total dissolved solids	mg/L	--	755	247	336	316	345
Total phosphorus	mg/L	0.025	0.14	0.07	0.09	0.08	0.07
Ammonia	mg/L	0.2	0.06	0.01	0.02	0.02	0.06
Nitrogen (Nitrate)	mg/L	0.350	17.1	0.23	4.79	0.15	0.05
Total hardness (as CaCO ₃)	mg/L	--	65	52	62	52	76
Arsenic	mg/L	0.024	0.002	<0.001	0.003	0.001	0.001
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Calcium	mg/L	--	13	16	15	6	14
Chromium	mg/L	0.001	0.01	0.004	0.004	0.003	0.002
Copper	mg/L	0.0014	0.013	0.005	0.007	0.002	0.012
Lead	mg/L	0.0034	0.006	0.003	0.003	0.002	0.002
Magnesium	mg/L	--	8	3	6	9	10

Manganese	mg/L	1.9	0.277	0.12	0.109	0.051	0.084
Nickel	mg/L	0.011	0.006	0.002	0.004	0.001	0.001
Potassium	mg/L	--	2	1	2	2	2
Sodium	mg/L	--	117	25	76	51	62
Vanadium	mg/L	--	0.04	0.02	0.02	<0.01	<0.01
Zinc	mg/L	0.0312	0.049	0.026	0.029	0.018	0.024

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.

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 non-visible
pH	pH units	6.5 – 8.5
Total suspended solids	Milligrams per litre	40

5.2.1 Dam 1 (LDP1)

Dam 1 had no days discharging during the month of December (see Table 16).

Table 16 Discharge monitoring – LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
-	-	-	-	-

5.2.2 Dam 2 (LDP2)

Dam 2 had a total of one day discharging during the month of December (see Table 17).

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
08/12/2021	6.6	9	Non-visible	Yes

5.2.3 Dam 3 (LDP3)

Dam 3 had no days of discharging during the month of December (see Table 18).

Table 18 Discharge monitoring – LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
-	-	-	-	-

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 December 2021.

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 December 2021.

Monthly Weather Summary



Site: **Karuah Quarry**
 Month: **December 2021**

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	Wed	23.0	18.1	19.8	21.7	18.2	19.5	23.7	3.4	155	847.5	100.2	0.2
2	Thu	27.6	17.2	20.5	24.7	17.4	20.1	26.0	5.2	149	1165.8	226.6	1.2
3	Fri	34.7	14.1	23.5	31.1	15.0	22.8	28.4	3.3	163	957.4	214.7	0.2
4	Sat	24.8	19.9	20.4	22.7	19.8	20.1	36.7	8.6	168	685.0	101.8	
5	Sun	23.0	17.2	18.3	21.4	18.2	18.0	36.7	7.2	161	1218.3	143.2	0.6
6	Mon	24.2	15.3	19.8	22.3	15.7	19.4	27.2	4.1	133	1235.0	132.2	0.2
7	Tue	31.9	17.2	20.7	28.8	17.1	20.6	29.6	4.0	183	1091.7	183.6	4.2
8	Wed	25.5	16.5	19.9	22.8	16.7	19.3	28.4	5.6	184	1142.5	146.1	13.4
9	Thu	28.3	15.6	19.6	24.5	15.7	19.1	30.8	4.8	190	1136.7	245.4	16.8
10	Fri	26.8	11.9	20.1	25.0	13.4	19.6	42.6	10.1	227	1085.8	258.1	6.8
11	Sat	21.7	16.0	17.5	20.2	15.9	17.2	46.1	7.1	223	627.5	125.7	0.2
12	Sun	26.2	13.9	19.0	21.9	14.4	18.2	33.1	6.6	189	1284.9	261.7	2.8
13	Mon	26.3	13.6	19.1	22.3	14.2	18.0	26.0	4.5	182	941.7	315.3	
14	Tue	27.0	13.3	18.7	23.1	13.7	17.8	30.8	4.1	194	1062.4	278.3	
15	Wed	33.7	12.0	24.9	30.2	12.5	24.0	45.0	5.4	160	935.8	291.3	
16	Thu	28.9	20.1	22.1	25.3	19.8	21.4	33.1	5.8	172	1136.6	169.7	
17	Fri	28.1	18.7	21.6	24.4	18.8	21.2	31.9	4.7	133	1204.0	198.2	0.8
18	Sat	34.6	16.2	27.1	32.5	17.1	26.5	30.8	4.6	150	1010.7	254.1	
19	Sun	37.9	20.9	26.4	35.4	21.6	26.1	34.3	4.7	208	1140.7	221.9	
20	Mon	34.1	19.2	26.5	30.3	19.6	25.3	26.0	4.8	167	889.2	285.5	0.8
21	Tue	37.8	19.9	27.8	33.2	20.1	26.5	27.2	5.5	173	894.9	285.3	0.2
22	Wed	31.2	22.3	24.6	27.3	22.4	23.5	35.5	5.0	169	1254.9	182.6	
23	Thu	31.0	20.4	21.7	27.6	20.4	21.6	18.9	3.7	158	1106.6	148.1	8.8
24	Fri	30.4	16.9	23.3	26.7	17.3	22.7	28.4	4.7	156	1082.5	238.7	1.6
25	Sat	32.5	16.8	23.9	29.0	17.3	23.3	33.1	4.8	138	1170.8	283.0	
26	Sun	31.4	16.2	24.1	27.8	16.9	23.4	34.3	8.9	154	978.2	253.7	
27	Mon	22.8	19.5	18.3	22.2	19.5	18.6	45.0	7.9	164	675.8	76.4	36.4
28	Tue	25.5	15.7	18.3	22.1	15.8	17.6	31.9	5.0	188	1159.9	187.9	15.0
29	Wed	24.9	15.5	17.7	22.5	15.4	17.5	21.3	3.2	184	949.9	154.4	2.6
30	Thu	27.6	12.7	20.8	24.9	13.2	20.7	34.3	5.8	131	1235.0	247.2	2.6
31	Fri	30.4	14.7	23.4	27.6	15.6	22.9	31.9	6.8	116	1072.4	289.5	0.2
Ave or Total		28.8	16.7	21.6	25.9	17.1	21.0	31.9	5.5	168.4	1044.5	209.7	115.6
High		37.9	22.3	27.8	35.4	22.4	26.5	46.1	10.1		1284.9	315.3	36.4
Low		21.7	11.9	17.5	20.2	12.5	17.2	18.9	3.2		627.5	76.4	
Notes: 1. Values are for the 24 hour period from 9am to 9am next day.												No. rain days >1mm:	12
2. Values are for the 24 hours to 9am.													

Figure 2 Weather Summary December 2021

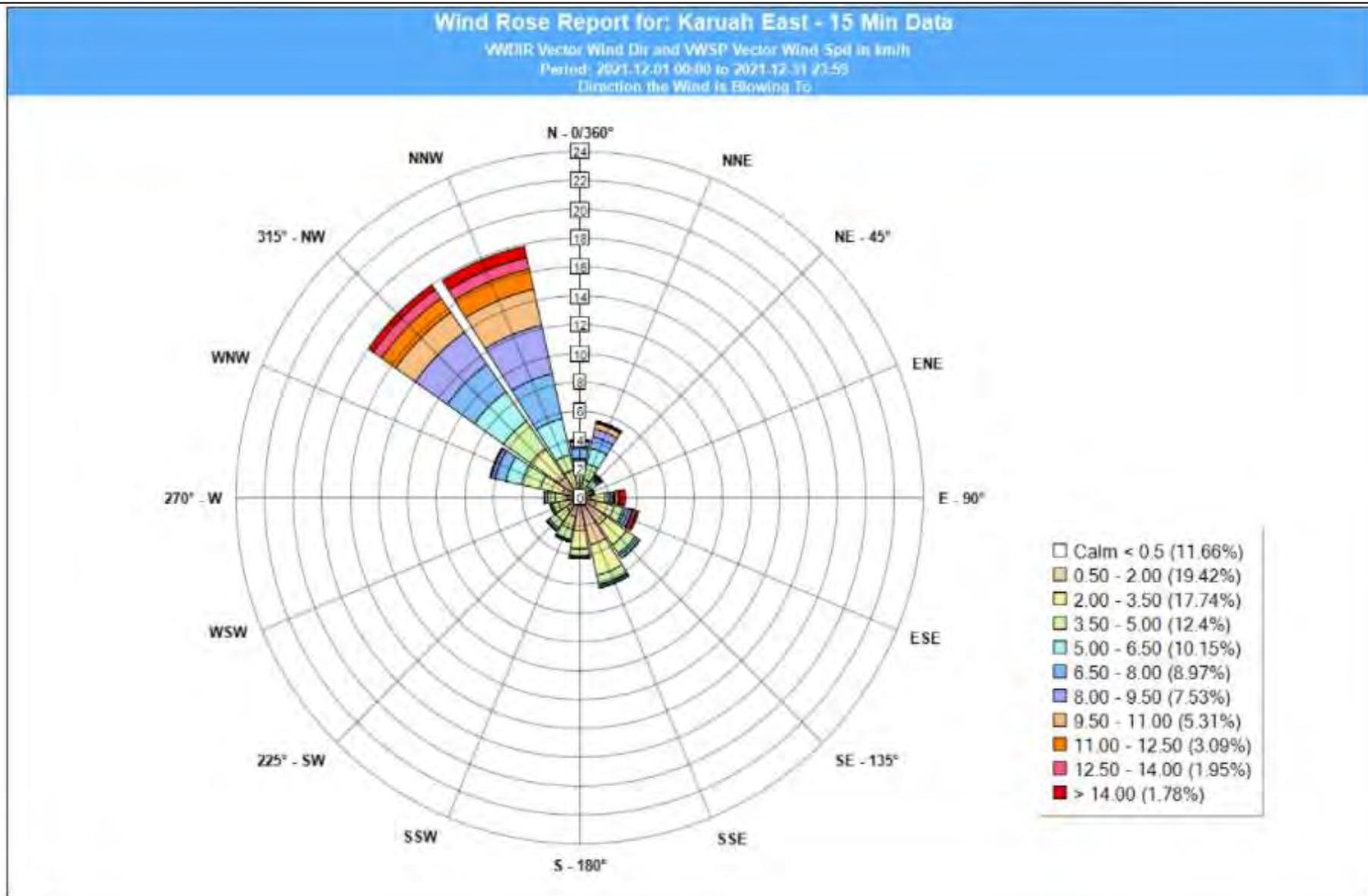


Figure 3 Wind rose December 2021

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/>>.

The first meeting of 2021 was held at the Quarry 29 March 2021 and included a site inspection.

An extraordinary meeting was held 5 July 2021 to discuss *Project Approval 09_0175 Modification 9 (Extended operating hours)*.

The CCC meeting scheduled for September 2021 had to be postponed due to the current COVID-19 pandemic. The final CCC meeting for 2021 was held on 6 December at Karuah RSL. Due to numerous new members joining the CCC, a site inspection was not undertaken to allow for greater time for introductions and a greater summary of the KEQ operation provided to new members.

A key matter discussed at the December CCC meeting was the approval *Project Approval 09_0175 Modification 9 (Extended operating hours)*. The consolidated consent can be found at Hunter Quarries website <<https://hunterquarries.com.au/>>.

7.2 PRODUCTION

For the month of December 64,008 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

There were nil non-compliance events during December 2021 to report.

7.4 COMPLAINTS

There were nil complaints received during December 2021.

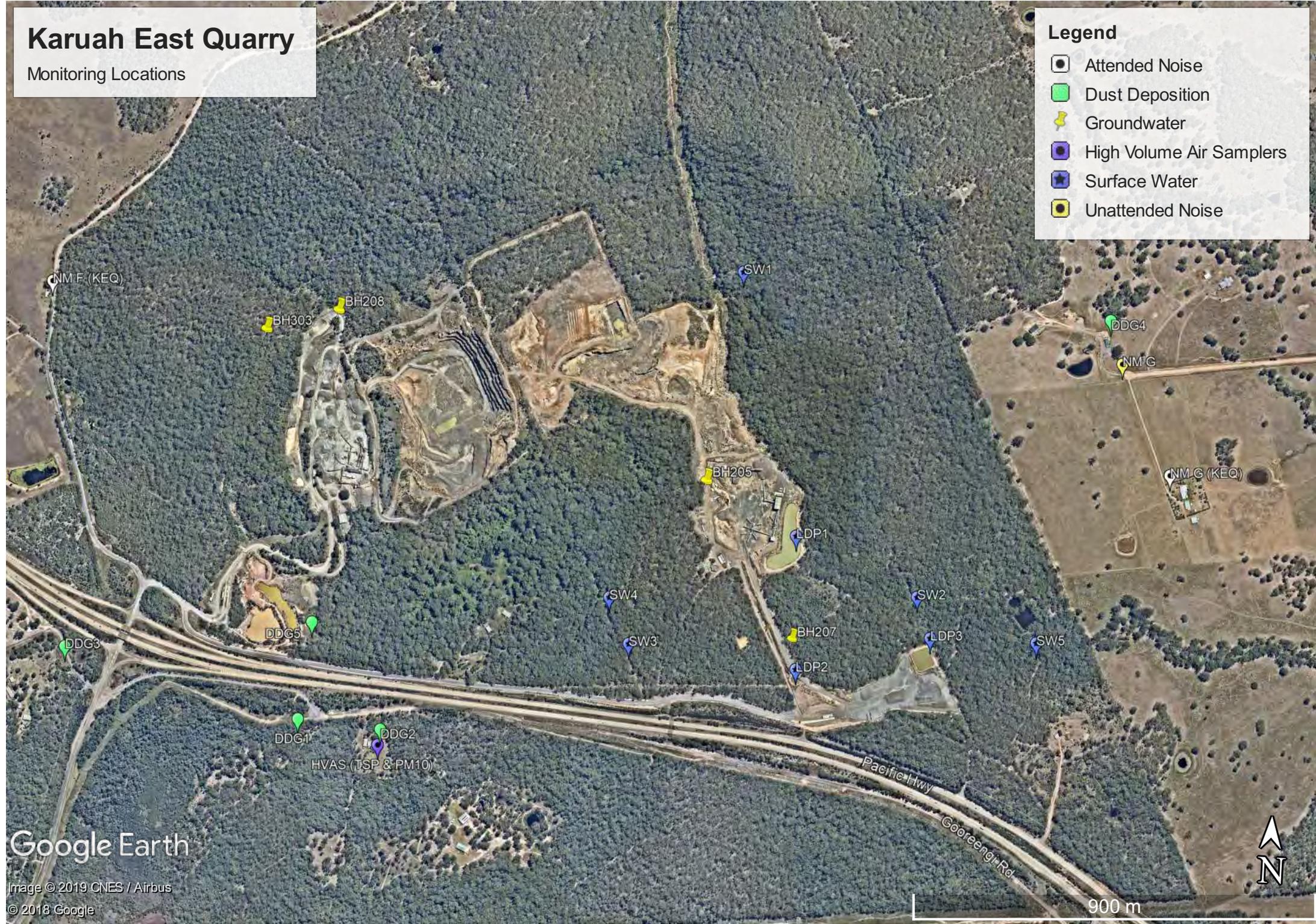
Appendix 1 – Monitoring Locations

Karuah East Quarry

Monitoring Locations

Legend

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



Google Earth

Image © 2019 CNES / Airbus
© 2018 Google

900 m

