



Grounded in Quality

A proud member of the Hunter Construction Group

Karuah East Quarry

Environmental Monitoring Report:

October 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 October 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 October 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
02/11/2020	03/12/2020	3.2	2.3	0.8	0.7	4.7
03/12/2020	04/01/2021	0.3	0.5	<0.1	0.4	1.5
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	-
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
YTD average		1.2	0.8	0.7	0.7	1.3

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 6 October 2021 to 3 November 2021 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 October 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 PM ₁₀ (µg/m ³)
06/10/2021	23	14
12/10/2021	13	5
18/10/2021	18	9
24/10/2021	20	12
30/10/2021	37	19
24hr Average Criteria¹	N/A	50
Annual Average Criteria¹	90	30
Progressive Annual Average²	17.9	10.5

Note: ¹ Criteria as specified in PA 09_0175.

² The progressive annual average is from 01/01/2020 to 30/10/2021, this is not a measure of compliance.

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

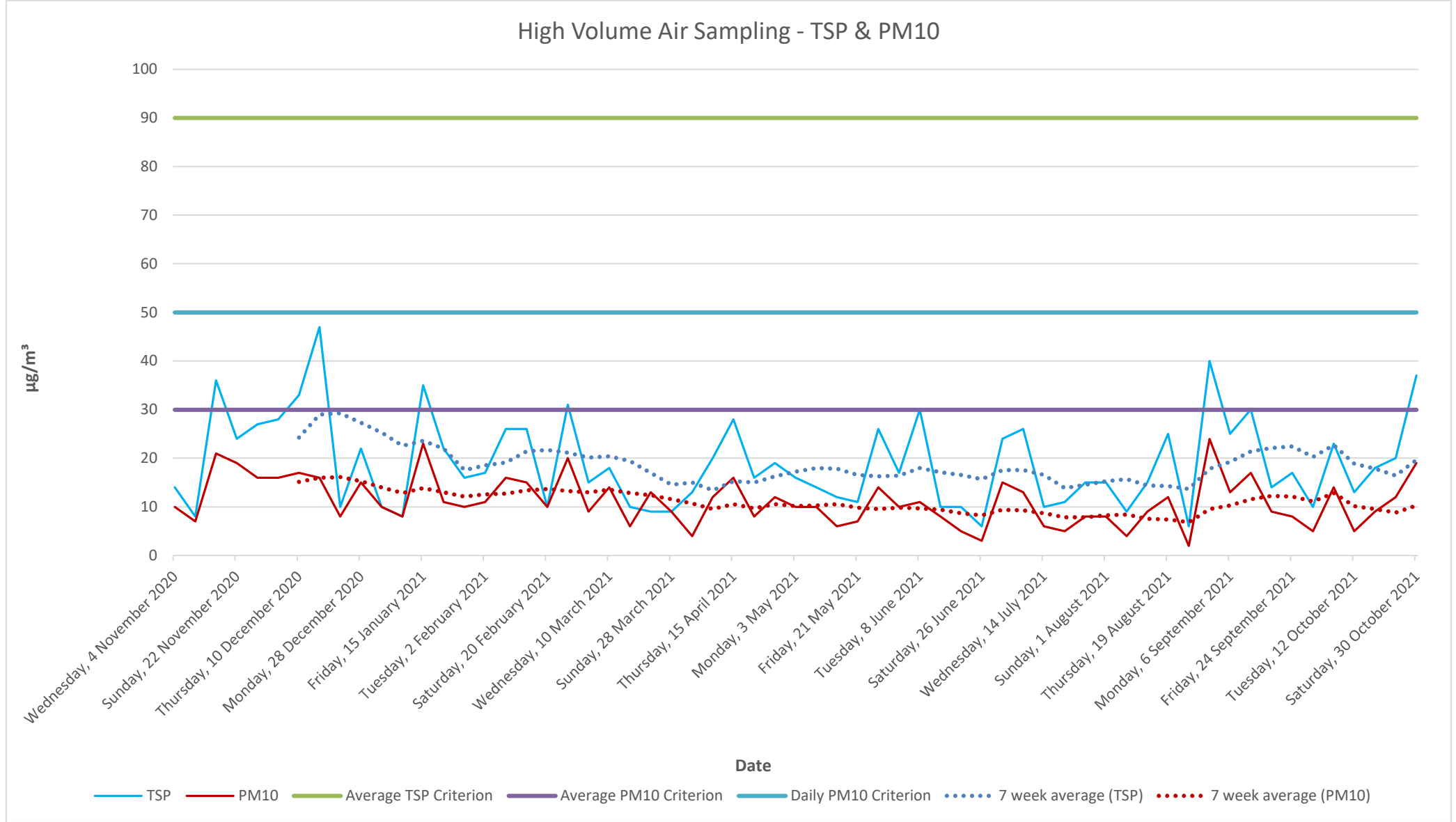


Figure 1 High Volume Air Sampling: Year-to-date results

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 were two blasts conducted in October 2021, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Overpressure (dB(L))	Vibration (mm/s)
Friday, 15 October 2021	11:58AM	Nil Trigger	Nil Trigger
Tuesday, 26 October 2021	12:30PM	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

Attended noise monitoring is required to be undertaken at locations (A, B, F and G) quarterly. The most recent attended noise monitoring was undertaken in August 2021. The results for the most recent attended monitoring program are shown in Table 13. The results show background noise levels include noise sources such as wind noise, 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 September, 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	31/8	10:36	39	45	50	53	55	62	65	Nil	IA	40 / 42	1.2 m/s @ 359° A stability class Y	Nil	Karuah East Quarry inaudible. Traffic on the Pacific Highway and bird noise consistently audible.
B	31/8	10:55	42	52	61	66	69	74	70	Nil	IA	37 / 40	1.4 m/s @ 0° A stability class Y	Nil	Karuah East Quarry inaudible. Traffic on the Pacific Highway and bird noise consistently audible. Karuah Quarry occasionally audible (37 dB L _{Aeq,15 minute}).
F	31/8	11:13	36	41	47	49	54	70	59	Nil	IA	35 / 40	1.0 m/s @ 41° A stability class Y	Nil	Karuah East Quarry inaudible. Distant traffic on the Pacific Highway and bird noise consistently audible. Wind in foliage occasionally audible.
G	31/8	11:37	33	35	43	46	54	60	63	Nil	37	38 / 43	1.4 m/s @ 314° A stability class Y	Nil	Karuah East Quarry engine revs and processing plant consistently audible with alarms and bangs on occasion. Distant traffic on the Pacific Highway and bird noise consistently audible. Aircraft noise, dogs barking and wind in foliage 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

Monthly water monitoring was undertaken on 6 October 2021 in accordance with the *Surface Water Monitoring Program* outlined in the *KEQ Water Management Plan (2015)*. Results are displayed in Table 14 accompanied 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	6.81	6.94	6.79	6.71	-
Total suspended solids	Milligrams per litre	40	614	37	227	161	-
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	581	523	602	601	-
Total dissolved solids	mg/L	--	720	351	465	453	-
Total phosphorus	mg/L	0.025	0.3	<0.01	0.04	0.08	-
Ammonia	mg/L	0.2	0.02	0.04	0.04	0.03	-
Nitrogen (Nitrate)	mg/L	0.350	13.5	0.71	11.8	10.6	-
Total hardness (as CaCO ₃)	mg/L	--	21	125	45	45	-
Arsenic	mg/L	0.024	0.002	<0.001	<0.001	<0.001	-
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-
Calcium	mg/L	--	2	37	8	8	-
Chromium	mg/L	0.001	0.016	<0.001	0.005	0.003	-
Copper	mg/L	0.0014	0.017	0.004	0.007	0.004	-
Lead	mg/L	0.0034	0.008	<0.001	0.003	0.002	-
Magnesium	mg/L	--	4	8	6	6	-

Manganese	mg/L	1.9	0.396	0.094	0.176	0.071	-
Nickel	mg/L	0.011	0.011	0.001	0.004	0.003	-
Potassium	mg/L	--	2	1	2	2	-
Sodium	mg/L	--	96	41	97	96	-
Vanadium	mg/L	--	0.06	<0.01	0.02	0.01	-
Zinc	mg/L	0.0312	0.142	0.026	0.066	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 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 a total of three days discharging during the month of October (see Table 16).

Table 16 Discharge monitoring – LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
Wednesday, 27 October 2021	7.5	15	None-visible	Yes
Thursday, 28 October 2021	7.5	7	NV	Yes
Friday, 29 October 2021	7.4	8	NV	Yes

5.2.2 Dam 2 (LDP2)

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

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
Tuesday, 26 October 2021	7.1	32	NV	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 October 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 October 2021.

Monthly Weather Summary



Site: **Karuah Quarry**
 Month: **October 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	Fri	26.8	13.0	16.1	24.6	13.9	16.0	29.6	3.4	180	783.2	168.5	0.2
2	Sat	25.8	9.6	18.3	23.7	10.4	18.6	29.6	5.6	247	923.3	199.1	4.4
3	Sun	26.3	11.4	18.8	25.0	13.1	18.8	29.6	3.8	200	925.0	187.0	
4	Mon	30.0	13.4	20.1	27.7	14.3	20.7	43.8	8.1	241	783.2	230.5	
5	Tue	24.3	8.8	16.4	22.3	11.7	16.6	42.6	8.1	257	947.4	219.2	
6	Wed	25.9	6.8	16.0	24.3	8.4	15.9	24.9	4.0	199	811.7	241.7	
7	Thu	30.0	8.1	20.6	28.8	9.1	20.4	35.5	6.1	202	922.5	182.4	
8	Fri	23.4	14.3	17.2	20.5	14.4	17.2	30.8	4.9	127	856.7	153.9	
9	Sat	31.3	11.1	21.5	28.5	12.1	22.2	22.5	4.5	173	788.3	235.8	
10	Sun	35.2	14.3	21.3	33.5	16.3	20.8	60.3	6.2	208	962.4	152.8	
11	Mon	15.2	13.8	13.3	15.0	13.7	13.3	34.3	4.3	164	375.8	51.7	24.8
12	Tue	17.6	12.0	14.1	17.2	12.1	14.1	36.7	3.7	162	356.6	64.9	10.0
13	Wed	20.5	13.4	17.4	19.2	13.3	17.3	31.9	6.9	111	897.4	144.1	20.4
14	Thu	27.1	15.4	19.8	25.3	15.8	19.8	33.1	6.2	117	839.2	231.2	1.6
15	Fri	25.3	13.3	17.1	23.6	14.5	16.8	61.5	11.8	268	892.5	232.3	0.8
16	Sat	22.6	12.2	16.1	20.9	12.6	16.3	59.2	10.4	243	863.2	254.1	0.6
17	Sun	26.1	7.5	16.5	23.3	8.5	16.3	23.7	4.6	172	853.3	256.6	
18	Mon	28.2	8.7	18.0	24.7	9.2	17.8	21.3	3.4	169	971.7	252.6	
19	Tue	30.0	10.0	18.8	27.3	11.0	18.1	37.9	6.0	190	825.8	225.2	
20	Wed	22.0	11.7	15.9	19.0	12.4	15.2	28.4	4.5	207	1133.2	164.5	2.0
21	Thu	24.2	11.3	17.0	21.5	11.7	16.6	28.4	4.9	183	1224.0	210.2	2.6
22	Fri	25.6	11.5	18.4	22.5	11.4	18.1	27.2	4.3	164	1044.2	196.5	
23	Sat	31.4	12.1	22.2	27.8	12.7	21.5	49.7	5.7	184	814.2	242.0	
24	Sun	23.9	15.3	17.5	20.5	16.1	16.9	34.3	5.6	173	1099.2	191.5	11.6
25	Mon	26.5	12.1	17.8	24.1	12.5	17.5	31.9	4.9	189	1004.2	250.8	
26	Tue	24.4	11.0	16.9	20.6	11.7	16.4	29.6	5.4	160	1066.7	210.0	0.4
27	Wed	29.2	10.3	21.0	26.0	10.9	20.6	28.4	4.3	147	866.7	269.7	0.2
28	Thu	33.8	15.1	22.0	30.8	16.1	22.2	21.3	3.7	168	974.9	198.4	
29	Fri	32.3	15.6	22.6	30.9	17.5	23.2	50.9	4.9	198	869.2	146.9	
30	Sat	22.0	12.7	16.2	19.6	14.0	15.7	34.3	7.3	173	959.1	129.9	
31	Sun	23.7	12.6	14.9	20.3	12.6	14.6	28.4	4.7	159	1094.2	212.0	0.8
Ave or Total		26.1	11.9	18.1	23.8	12.7	17.9	34.9	5.6	184.9	894.5	197.0	80.4
High		35.2	15.6	22.6	33.5	17.5	23.2	61.5	11.8		1224.0	269.7	24.8
Low		15.2	6.8	13.3	15.0	8.4	13.3	21.3	3.4		356.6	51.7	
Notes: 1. Values are for the 24 hour period from 9am to 9am next day.												No. rain days >1mm:	8
2. Values are for the 24 hours to 9am.													

Figure 2 Weather Summary October 2021

Wind Rose Report for: Karuah East - 15 Min Data
 WDIR Vector Wind Dir and VWSP Vector Wind Spd in km/h
 Period: 2021-10-01 00:00 to 2021-10-31 23:59
 Direction the Wind is Blowing To

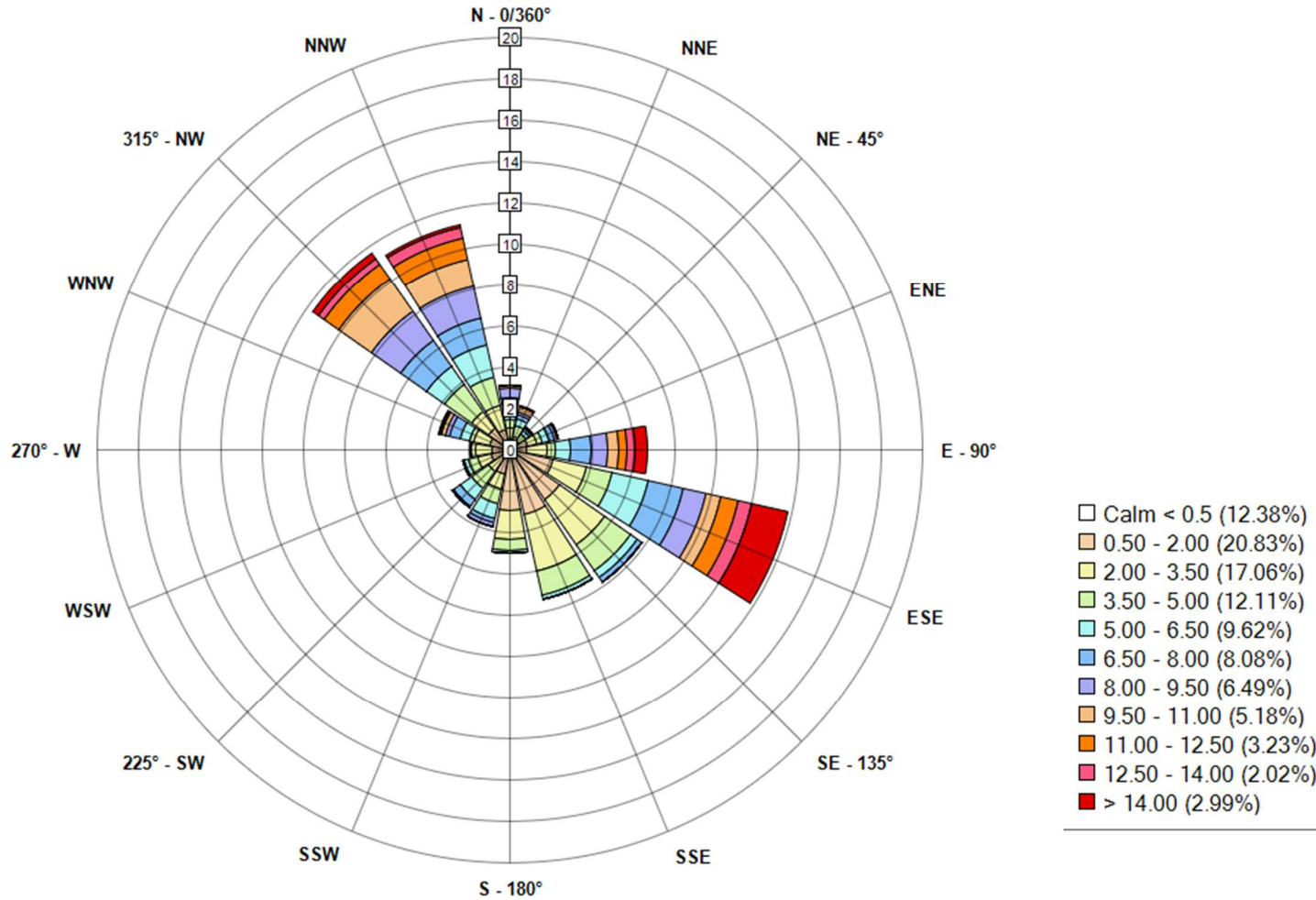


Figure 3 Wind rose October 2021

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 has been postponed due to the current COVID-19 pandemic.

7.2 PRODUCTION

For the month of October 72,865 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

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

7.4 COMPLAINTS

There were nil complaints received during October 2021.

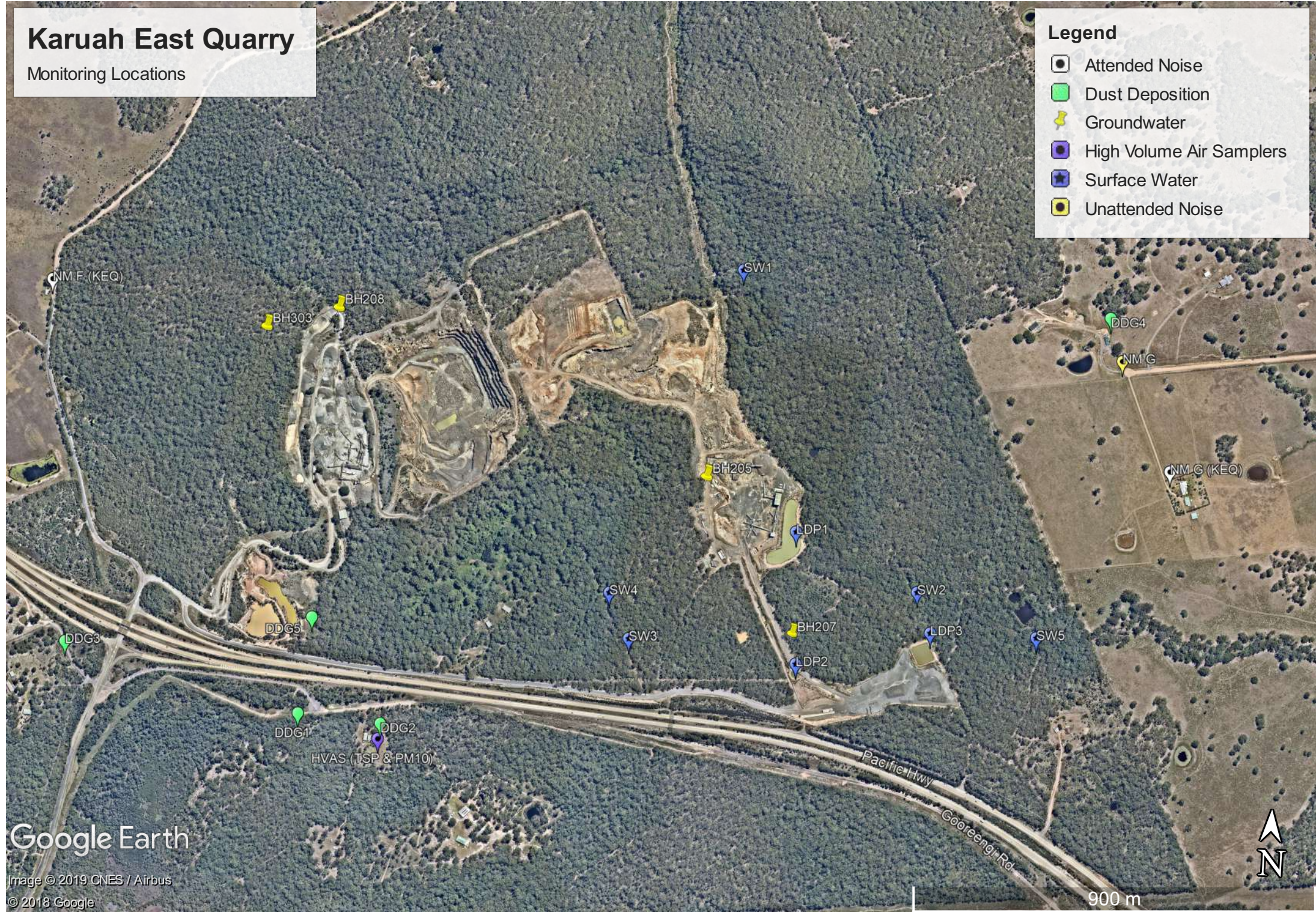
Appendix 1 – Monitoring Locations

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
© 2018 Google

900 m

