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Karuah East Quarry

Environmental Monitoring Report:

May 2022

bsi
ISO 9001 Quality Management Systems CERTIFIED FS 678980
ISO 14001 Environmental Management CERTIFIED EMS 739657
ISO 45001 Occupational Health and Safety Management CERTIFIED OHS 739660

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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 May 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/PM_{10} 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 May 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
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
5/05/2022	3/06/2022	0.4	0.6	0.4	0.3	0.3
YTD average		1.1	0.7	0.5	0.4	0.6

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 5 May 2022 to 3 June 2022 the insoluble solid levels recorded at DDG 1 to DDG 5 monitoring locations were below the project criterion of 4 g/m^2/month over an annual averaging period.

2.2 HIGH VOLUME AIR SAMPLING

The TSP and PM_{10} results for May 2022 and a progressive 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/m³)	HVAS PM_{10} (µg/m³)
4/05/2022	16	11
10/05/2022	5	3
16/05/2022	23	13
22/05/2022	5	2
28/05/2022	6	3
24hr Average Criteria[1]	**N/A**	**50**
Annual Average Criteria[1]	**90**	**30**
Progressive Annual Average[2]	17.2	11.0

Note: **[1.] Criteria as specified in PA 09_0175.**
[2.] The progressive annual average is from 01/01/2022 to 28/05/2022, this is not a measure of compliance.

All HVAS monitoring results for May 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).

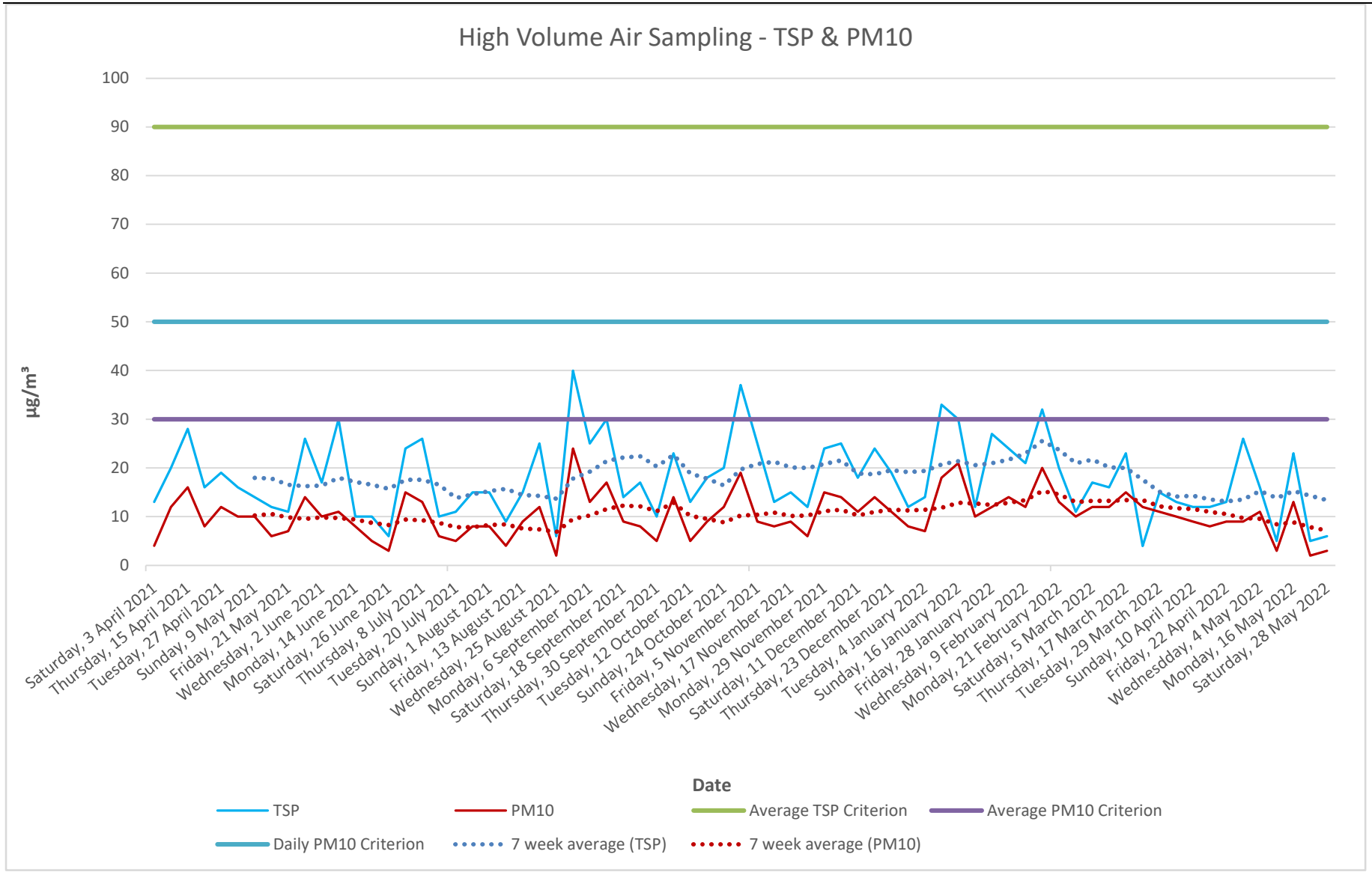


Figure 1 HVAS Sampling Long-Term Results

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 were 2 blasts conducted in May 2022, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Location	Overpressure (dB(L))	Vibration (mm/s)
Friday, 6 May 2022	12:27pm	Bench (RL) 120	112	0.99
Wednesday, 25 May 2022	12:23pm	Top of extraction area	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 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]	L_{Aeq}	L_{Aeq}			
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 May 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	7.29	6.89	7.56	6.84	6.80
Total suspended solids	Milligrams per litre	40	745	27	16	99	164
		ANZECC Guidelines[1]					
Conductivity	µS/cm	125 – 2200	559	3010	635	433	235
Total dissolved solids	mg/L	--	455	1820	395	321	325
Total phosphorus	mg/L	0.025	0.44	0.01	0.06	0.07	0.12
Ammonia	mg/L	0.2	0.03	0.01	0.02	0.02	0.02
Nitrogen (Nitrate)	mg/L	0.350	8.3	0.51	3.2	0.69	0.03
Total hardness (as CaCO3)	mg/L	--	37	1230	112	55	36
Arsenic	mg/L	0.024	<0.001	<0.001	<0.001	<0.001	0.001
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	--	5	435	35	9	6
Chromium	mg/L	0.001	0.005	<0.001	<0.001	0.004	0.008
Copper	mg/L	0.0014	0.015	0.001	0.002	0.005	0.009
Lead	mg/L	0.0034	0.008	<0.001	<0.001	0.002	0.005
Magnesium	mg/L	--	6	34	6	8	5
Manganese	mg/L	1.9	0.302	1.23	0.059	0.136	0.276
Nickel	mg/L	0.011	0.008	0.002	<0.001	0.004	0.006

Potassium	mg/L	--	1	2	1	2	1
Sodium	mg/L	--	89	85	66	55	29
Vanadium	mg/L	--	0.02	<0.01	<0.01	0.02	0.03
Zinc	mg/L	0.0312	0.063	<0.005	<0.005	0.019	0.043

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 $CaCO^3$/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 zero days of discharging during the month of May (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 one day of controlled discharging during the month of May. Daily monitoring during discharge was conducted and results during discharging were compliant with pollution concentration limits (see Table 17).

Table 17 Discharge monitoring – LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
Thursday, 12 May 2022	6.8	13	None visible	Yes

5.2.3 Dam 3 (LDP3)

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

Table 18 Discharge monitoring – LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
Wednesday, 4 May 2022	7.5	10	None visible	Yes
Thursday, 5 May 2022	7.5	6	None visible	Yes
Friday, 6 May 2022	7.5	14	None visible	Yes
Thursday, 12 May 2022	7.6	26	None visible	Yes
Friday, 13 May 2022	7.6	22	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 May 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 May 2022.

Monthly Weather Summary

Site: **Karuah Quarry**
Month: **May 2022**

Date	Day	Temperature @ 2m			Temperature @ 10m			Winds			Solar Radiation		Rain[2]
		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/m²	W/m²	mm
1	Sun	22.0	10.1	14.8	20.4	11.2	14.9	11.8	1.9	218	369.2	64.5	1.6
2	Mon	25.5	10.9	15.0	22.4	11.5	15.3	21.3	2.6	153	421.6	86.8	
3	Tue	25.7	9.4	15.9	22.5	10.4	16.5	17.8	2.5	157	339.2	77.6	0.2
4	Wed	27.5	10.2	19.4	25.6	11.3	19.7	14.2	2.8	152	290.0	73.8	
5	Thu	23.8	15.2	16.6	23.2	16.2	17.1	15.4	2.6	225	480.8	85.9	4.6
6	Fri	21.7	12.4	11.7	19.5	13.2	12.0	20.1	2.6	194	266.7	73.7	0.4
7	Sat	18.9	4.3	11.1	17.1	5.2	12.4	21.3	3.6	242	320.8	76.1	0.2
8	Sun	21.2	5.8	11.5	18.7	8.6	11.8	17.8	3.0	226	267.5	72.5	
9	Mon	22.5	6.5	15.4	20.4	7.1	15.3	20.1	3.1	177	332.4	74.8	
10	Tue	22.7	10.0	16.2	20.6	10.6	16.2	31.9	3.1	145	351.7	70.1	1.0
11	Wed	20.7	13.1	17.0	20.1	13.6	17.3	18.9	2.6	172	169.2	43.8	26.2
12	Thu	19.7	15.9	18.6	20.2	16.1	19.1	21.3	3.8	143	112.5	41.0	8.2
13	Fri	21.0	17.7	19.1	20.9	18.0	19.5	11.8	1.6	138	135.8	40.7	8.4
14	Sat	28.1	15.7	19.5	26.1	16.8	20.0	14.2	2.3	141	303.3	67.2	5.8
15	Sun	24.8	15.1	18.7	23.6	15.9	19.2	20.1	1.9	208	254.1	43.0	0.2
16	Mon	25.1	14.1	14.8	23.1	15.3	15.6	18.9	2.6	192	275.8	72.7	
17	Tue	22.7	8.2	12.8	20.8	9.4	13.7	22.5	3.0	211	285.8	70.4	0.2
18	Wed	19.6	6.8	11.6	19.0	7.5	13.0	27.2	4.0	228	285.8	69.4	
19	Thu	20.1	4.7	11.0	17.6	6.0	11.2	20.1	2.8	242	321.7	67.8	
20	Fri	14.7	6.9	13.0	14.2	7.7	13.0	13.0	2.3	195	146.7	39.4	0.6
21	Sat	17.1	11.3	13.3	16.9	11.1	13.6	26.0	2.8	198	263.3	49.7	17.2
22	Sun	16.7	10.6	13.5	15.9	11.3	13.4	13.0	2.3	197	248.3	60.0	10.8
23	Mon	21.2	12.2	13.9	18.8	12.3	13.7	18.9	2.7	200	295.8	69.4	25.0
24	Tue	17.1	11.4	13.1	16.8	11.5	13.1	23.7	2.8	206	169.2	37.8	2.6
25	Wed	20.3	10.4	13.2	18.8	10.9	13.2	14.2	1.9	187	274.9	83.7	0.4
26	Thu	23.5	9.5	14.0	21.0	9.8	14.5	16.6	2.1	179	130.8	67.6	
27	Fri	23.7	8.7	14.3	20.8	9.3	14.8	11.8	2.1	179	130.8	68.6	
28	Sat	22.9	9.4	13.8	20.9	10.2	14.7	18.9	3.1	235	127.5	73.6	
29	Sun	18.4	8.0	11.4	17.2	10.1	12.4	26.0	5.2	258	161.6	97.2	0.4
30	Mon	18.8	5.4	13.1	17.5	6.7	13.3	67.4	9.7	213	166.7	99.0	
31	Tue	17.3	8.0	12.9	16.8	8.5	13.0	63.9	15.5	274	231.7	110.8	3.2
Ave or Total		**21.5**	**10.3**	**14.5**	**19.9**	**11.1**	**14.9**	**21.9**	**3.4**	**196.3**	**255.8**	**68.7**	**117.2**
High		**28.1**	**17.7**	**19.5**	**26.1**	**18.0**	**20.0**	**67.4**	**15.5**		**480.8**	**110.8**	**26.2**
Low		**14.7**	**4.3**	**11.0**	**14.2**	**5.2**	**11.2**	**11.8**	**1.6**		**112.5**	**37.8**	
												No. rain days >1mm:	**11**

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 Meteorological Station - Monthly Weather Summary

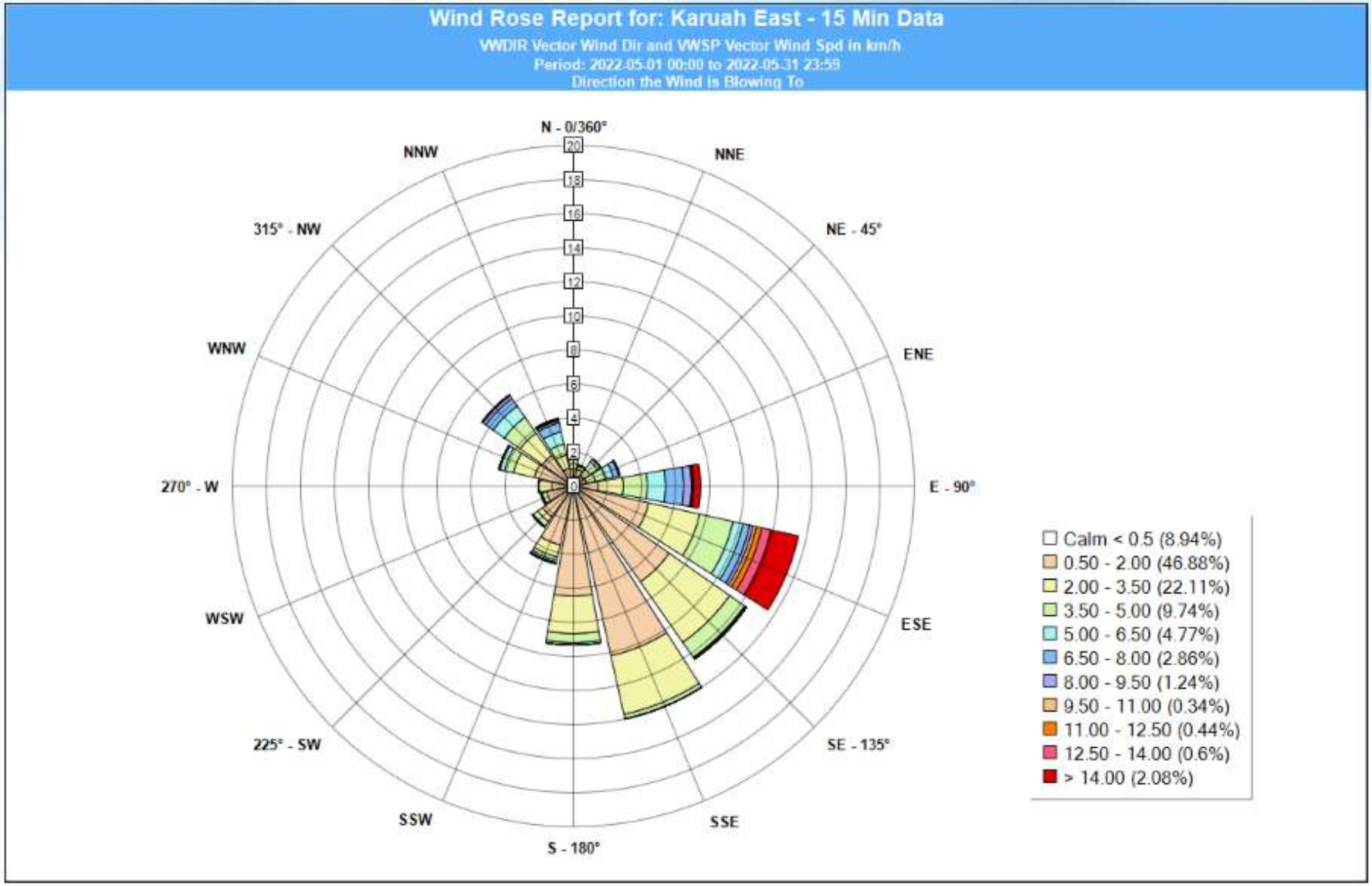


Figure 3 Meteorological Station - Wind Rose

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.
- The next CCC meeting is scheduled for September 2022.

7.2 PRODUCTION

For the month of May 79,231 tonnes of various quarry products were produced.

7.3 NON-COMPLIANCE

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

Table 19 Non-compliance register

Date	Nature of Incident	Action
May 2022	Nil incidents	Nil action required

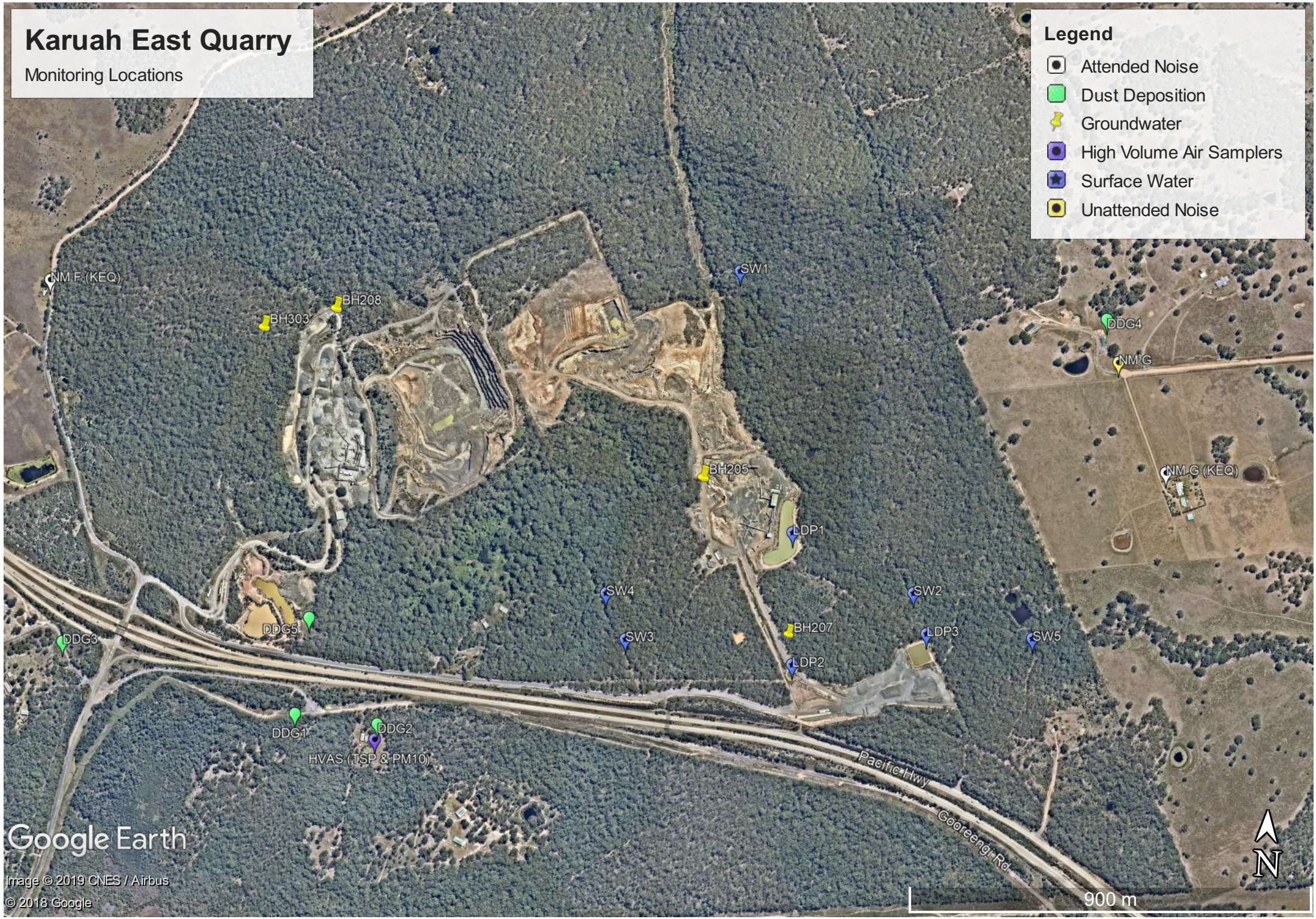
7.4 COMPLAINTS

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

Table 20 Complaints Register

Date	Nature of Complaint	Action
May 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
NM F (KEQ)
BH208
BH303
SW1
DDG4
NM G
NM G (KEQ)
BH205
LDP1
SW4
SW2
DDG5
DDG3
SW3
BH207
LDP3
SW5
LDP2
DDG1
DDG2
HVAS (TSP & PM10)
Pacific Hwy
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