



Environmental Monitoring Report

March 2021

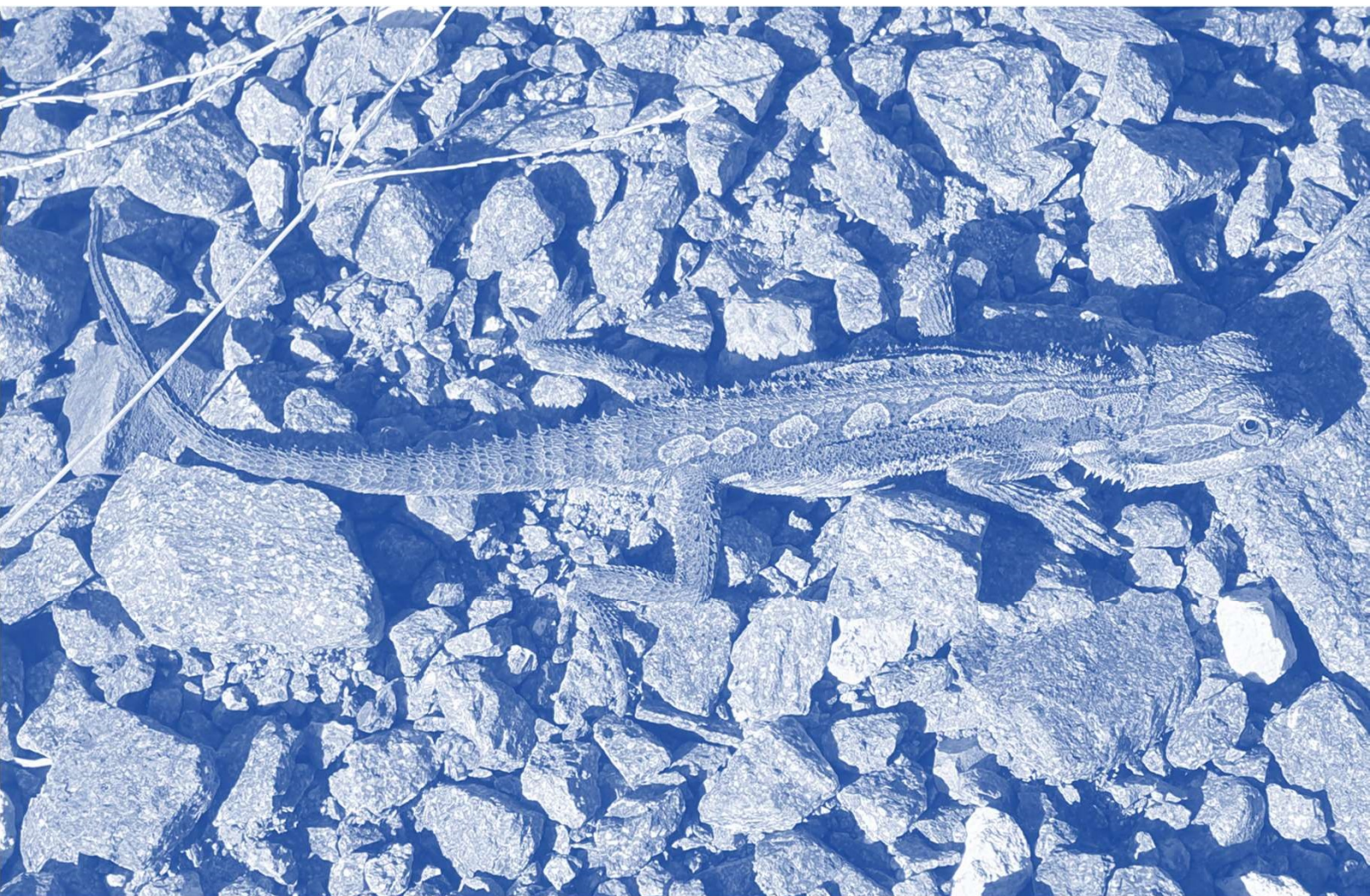


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Appendix 1

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	EPL 20611

Table 2 Project Approval 09_0175 information

Development Application	PA 09_0175
Applicant	Karuah East Quarry Pty Limited
Approval Authority	Minister for Planning
Land	Lot 12 DP 1024564; Lot 13 DP 1024564; Lot 202 DP 1042537; Lot 26 DP1024341; Lot 27 DP 1024341; Lot 16 DP 1024564; Lot 17 DP 1024564

A summary of the environmental monitoring data for March 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 March 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
9/04/2020	7/05/2020	1.2	0.9	1.0	- ¹	1.3
7/05/2020	4/06/2020	0.2	0.3	0.3	0.7	0.1
4/06/2020	2/07/2020	0.1	0.2	0.3	0.3	0.3
2/07/2020	31/07/2020	0.2	<0.1	0.2	0.6	<0.1
31/07/2020	1/09/2020	0.4	0.2	0.4	1.0	<0.1
1/09/2020	1/10/2020	0.6	0.5	0.4	1.0	1.0
1/10/2020	2/11/2020	0.2	<0.1	1.3	0.7	0.6
2/11/2020	3/12/2020	3.2	2.3	0.8	0.7	4.7
3/12/2020	4/01/2021	0.3	0.5	<0.1	0.4	1.5
4/01/2021	4/02/2021	1.5	0.9	0.7	0.3	1.2
4/02/2021	5/03/2021	0.4	0.4	0.7	0.2	1.6
5/03/2021	6/04/2021	0.8	1.3	0.5	0.7	0.7
YTD average		0.8	0.6	0.6	0.6	1.1

Note ¹: DDG4 was not able to be analysed for period 9/4/2020 to 7/05/2020 due to sample jar breaking during collection and transportation to the laboratory.

Monitoring results indicate that for the period 5 March 2021 to 6 April 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 March 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)
4/03/2021	15	9
10/03/2021	18	14
16/03/2021	10	6
22/03/2021	- ¹	13
28/03/2021	- ¹	9
24hr Average Criteria²	N/A	50
Annual Average Criteria²	90	30
Progressive Annual Average³	17.9	11.9

Note: ¹ Sampling for HVAS TSP was not possible on dates 22/03/2021 and 28/03/2021 due to mechanical issues.

²Criteria as specified in PA 09_0175.

³ The progressive annual average is from 1/01/2020 to 31/03/2021, this is not a measure of compliance.

Due to mechanical issues with the HVAS TSP sampling instrument, no runs were conducted on the dates 22nd and 28th of March (refer to Section 6.2 for further information).

All HVAS monitoring results, to the end of March 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).

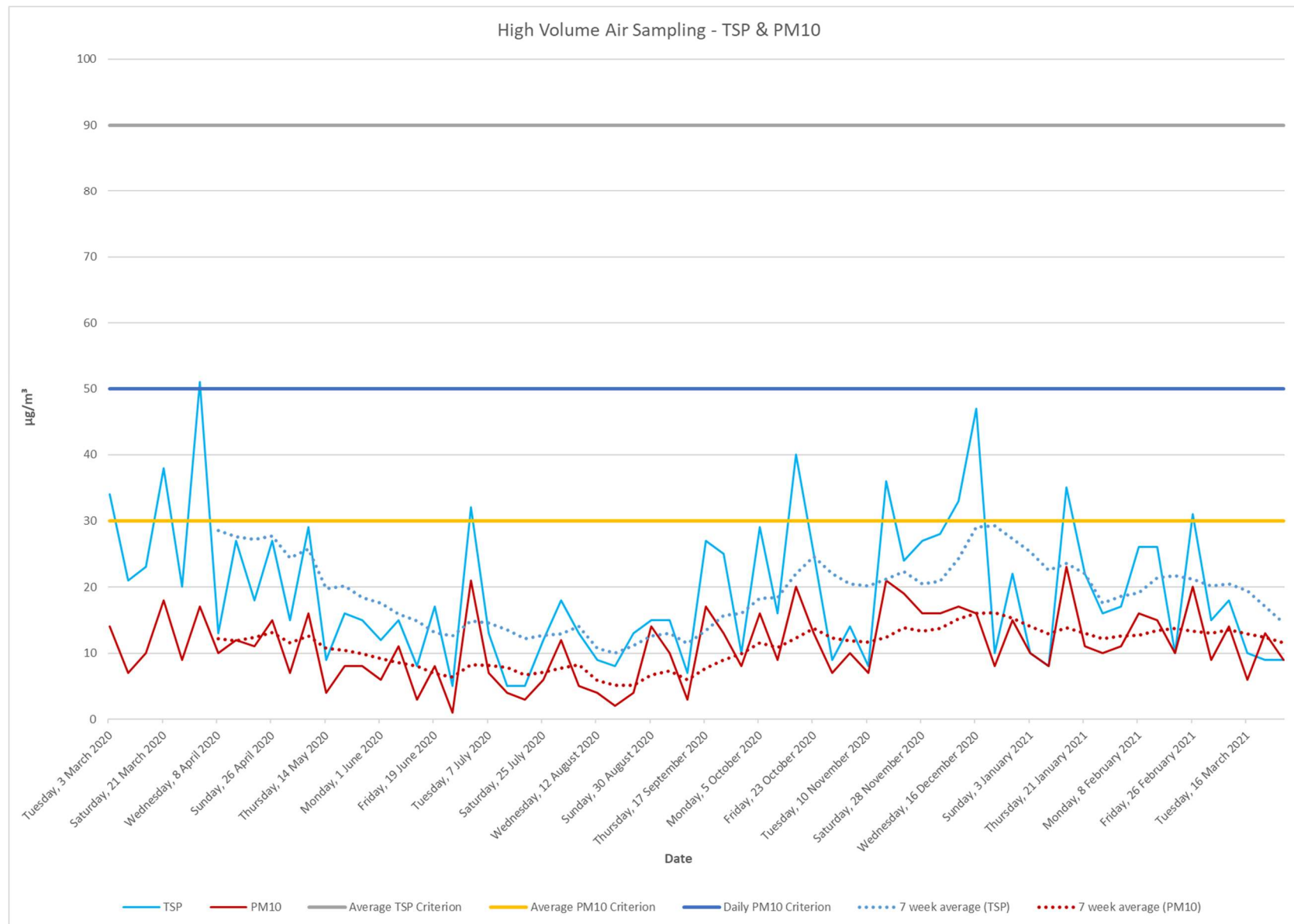


Figure 1 High Volume Air Sampling: Year-to-date results

3 BLAST MONITORING

The following conditions from the EPL refer to blast management:

L5.1 Blasting in or on the premises must only be carried out between the hours of 9:00 am and 4:00 pm Monday to Friday. No blasting is permitted on Saturdays, Sundays or public holidays. Blasting outside of the hours specified in this condition can only take place with the written approval of the EPA.

L5.2 Blasting is not permitted simultaneously with adjacent quarry(s).

*L5.3 The airblast overpressure level from blasting operations in or on the premises must not exceed:
 a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and
 b) 120 dB (Lin Peak) at any time,
 at monitoring point 11 detailed in Condition P1.4.*

*L5.4 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:
 a) 5 mm/second for more than 5% of the total number of blasts during each reporting period; and
 b) 10 mm/second at any time,
 at monitoring point 11 detailed in Condition P1.4.*

L5.5 Error margins associated with any monitoring equipment used to measure airblast overpressure or peak particle velocity are not to be taken into account in determining whether or not the limit has been exceeded.

L5.6 The airblast overpressure and ground vibration levels in the conditions above do not apply at noise sensitive locations that are owned by the licensee or subject to a private agreement, relating to airblast overpressure and ground vibration levels, between the licensee and land owner.

L5.7 Offensive blast fume must not be emitted from the premises.

*M7.1 To determine compliance with Blast Limit conditions of this licence:
 a) Airblast overpressure and ground vibration levels must be measured and electronically recorded for monitoring point 11 for the parameters specified in Column 1 of the table below; and
 b) The licensee must use the units of measure, sampling method, and sample at the frequency specified opposite in the other columns.*

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 March 2021, see Table 10 for monitoring results.

Table 10 Blast monitoring results

Date	Time	Overpressure (dB(L))	Vibration (mm/s)
Friday, 5 March 2021	11:00 AM	Nil Trigger	Nil Trigger
Friday, 26 March 2021	12:27 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

There was no noise monitoring undertaken in March, Table 13 contains the results for the most recently attended noise monitoring undertaken in February.

Table 13 Attended noise monitoring results

Location	Date/Start Time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LA _{max}	LA1	LA10	LA90	LA _{eq}	
A	23/02/2021 10:23 AM Calm	85	60	57	52	55	Birds 50-55 Pacific Highway 55 Karuah East Quarry inaudible
B	23/02/2021 10:53 AM Calm	86	71	67	59	64	Pacific Highway 60-65 Karuah East Quarry inaudible
F	23/02/2021 11:28 AM Calm	88	53	57	53	56	Birds and insects 40 Local traffic 65 Pacific Highway 55

							Karuah East Quarry inaudible
G	23/02/2021 12:07 PM Calm	75	57	56	50	54	Birds and insects 40-55 Pacific Highway 50 Karuah East Quarry inaudible

The results of the attended monitoring (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.

4.2 UNATTENDED NOISE MONITORING

There was no noise monitoring undertaken in March, Table 14 contains the results for the most recently unattended noise monitoring undertaken in February.

Table 14 Unattended noise monitoring results

INP Period	L _{A1}	L _{A10}	L _{A90}	L _{AEQ}
Day	59	54	48	53
Evening	62	59	52	57
Night	58	56	50	54

4.3 NOISE MONITORING SUMMARY

The attended noise monitoring conducted during February 2021 identified that the Quarry was not audible at Location A, B, F and G. Therefore, the Quarry is determined to be complaint for the monitoring completed in February 2021.

5 SURFACE WATER MONITORING

5.1 MONTHLY MONITORING RESULTS

Monthly water monitoring was undertaken on 5 March 2021 in accordance with the *Surface Water Monitoring Program* outlined in the *KEQ Water Management Plan (2015)*. Results are displayed in Table 15 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 15 Water monitoring results

Parameter	Units of measure	EPL 20611 concentration limit	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	7.01	6.68	7.26	7.01	6.45
Total suspended solids	Milligrams per litre	40	81	38	140	35	40
		ANZECC Guidelines¹					
Conductivity	µS/cm	125 – 2200	712	1864	670	645	364
Total dissolved solids	mg/L	--	519	1398	439	435	272
Total phosphorus	mg/L	0.025	0.22	0.04	0.1	0.08	0.25
Ammonia	mg/L	0.2	0.07	0.03	0.05	0.02	0.02
Nitrogen (Nitrate)	mg/L	0.350	21	1.11	2.31	4.13	0.08
Total hardness (as CaCO ₃)	mg/L	--	35	96	84	28	17
Arsenic	mg/L	0.024	0.002	<0.001	<0.001	<0.001	0.003
Cadmium	mg/L	0.0002	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	--	4	30	22	3	2
Chromium	mg/L	0.001	0.009	<0.001	0.003	0.004	0.02
Copper	mg/L	0.0014	0.012	0.009	0.007	0.005	0.021
Lead	mg/L	0.0034	0.006	0.001	0.003	0.002	0.013
Magnesium	mg/L	--	6	5	7	5	3
Manganese	mg/L	1.9	0.344	0.105	0.135	0.076	0.417
Nickel	mg/L	0.011	0.006	0.002	0.003	0.002	0.013

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Potassium	mg/L	--	2	1	2	2	1
Sodium	mg/L	--	129	35	83	66	40
Vanadium	mg/L	--	0.04	<0.01	0.01	0.01	0.06
Zinc	mg/L	0.0312	0.072	0.046	0.041	0.027	0.11

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 16.

Table 16 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 a total of eighteen days discharging during the month of March (see Table 17). Due to extreme rainfall received in March, there were six days of uncontrolled discharge during which there were exceedances of TSS concentration limits; see Section 6.2 for further information.

Table 17 Discharge monitoring - LDP1

Date	pH	Total suspended solids	Oil and grease	Controlled
2/03/2021	6.9	33	Non-visible	Yes
3/03/2021	6.9	29	Non-visible	Yes
4/03/2021	6.7	21	Non-visible	Yes
5/03/2021	6.7	29	Non-visible	Yes
8/03/2021	6.8	37	Non-visible	Yes
9/03/2021	6.8	11	Non-visible	Yes
11/03/2021	6.7	32	Non-visible	Yes
12/03/2021	7.0	32	Non-visible	Yes
15/03/2021	7.0	<5	Non-visible	Yes
16/03/2021	6.8	4	Non-visible	Yes
17/03/2021	6.8	<5	Non-visible	Yes
18/03/2021	6.9	18	Non-visible	Yes
18/03/2021	6.8	1260	Non-visible	No
19/03/2021	6.9	868	Non-visible	No
20/03/2021	7.0	576	Non-visible	No
21/03/2021	7.2	816	Non-visible	No
22/03/2021	7.0	404	Non-visible	No
23/03/2021	6.9	385	Non-visible	No

5.2.2 Dam 2 (LDP2)

Dam 2 had a total of eleven days discharging during the month of March (see Table 18). Due to extreme rainfall received in March, there were six days of uncontrolled discharge during which there were exceedances of TSS concentration limits; see Section 6.2 for further information.

Table 18 Discharge monitoring - LDP2

Date	pH	Total suspended solids	Oil and grease	Controlled
4/03/2021	6.6	29	Non-visible	Yes
5/03/2021	6.7	20	Non-visible	Yes
8/03/2021	6.9	24	Non-visible	Yes
15/03/2021	6.7	11	Non-visible	Yes
16/03/2021	6.6	11	Non-visible	Yes
18/03/2021	7.1	636	Non-visible	No
19/03/2021	6.9	532	Non-visible	No
20/03/2021	7.0	311	Non-visible	No
21/03/2021	7.0	294	Non-visible	No
22/03/2021	7.0	92	Non-visible	No
23/03/2021	7.0	236	Non-visible	No

5.2.3 Dam 3 (LDP3)

Due to extreme rainfall received in March, Dam 3 had six days of uncontrolled discharge (see Table 19Table 17), during which there were exceedances of pH concentration limits; see Section 6.2 for further information.

Table 19 Discharge monitoring - LDP3

Date	pH	Total suspended solids	Oil and grease	Controlled
18/03/2021	7.5	406	Non-visible	No
19/03/2021	7.1	592	Non-visible	No
20/03/2021	7	340	Non-visible	No
21/03/2021	7	336	Non-visible	No
22/03/2021	7.2	184	Non-visible	No
23/03/2021	7.1	237	Non-visible	No

6 REPORTING

6.1 INCIDENT

Due to an active La Niña climate driver influencing weather along the east coast of Australia since September 2020, the Quarry experienced greater than average rainfall from October 2020; during which month a 1 in 200 year rainfall event was experienced resulting in 355.2mm received over the whole month. Successively, the Quarry received 241.8mm in January, 200.4mm in February and 606.6mm in March.

As a result of the above average rainfall received since October 2020 on a regional scale, soil saturation levels were already high when the extreme rainfall event hit in March. This resulted in very little surface water being absorbed and instead a lot of surface water runoff. All three of the Quarry dams eventually reached storage capacity and uncontrolled discharge commenced from 18 March 2021. It was therefore deemed necessary to enact the PIRMP to minimise pollution and follow the due process to notify appropriate regulatory authorities and nearby residents. The EPA Pollution Hotline was contacted to self-report uncontrolled discharge from all dams (see Section 6.1 for further information).

6.2 NON-COMPLIANCE

There were two non-compliances during March 2021:

Air Quality Monitoring

On 23 March 2021, it was discovered that the High Volume Air Sampling unit (for TSP) was not working. This equipment failed during the period of extreme rainfall. The manufacturer of the equipment advised that mechanical issues may occur during periods of wet weather, as the units are sensitive recording devices and are exposed to the natural elements. Due to the equipment failure, there were three scheduled runs missed (22/03/2021; 28/03/2021 and 3/04/2021). These runs dates were made up on 6/04/2021; 7/04/2021 and 12/04/2021 respectively.

This non-compliance was reported to the appropriate regulatory authorities for investigation. At the time of publishing this report, KEQ had not received a response.

Water Quality Monitoring

As described in Section 6.1, during the month of March the Quarry received extreme rainfall. Subsequently, all three of the Quarry dams eventually reached storage capacity resulting in uncontrolled discharging. While uncontrolled discharging occurring, water quality monitoring was undertaken and found that the EPL concentration limits for TSS were exceeded.

This non-compliance was reported to the appropriate regulatory authorities for investigation. At the time of publishing this report, KEQ had not received a response.

6.3 COMPLAINTS

There were nil complaints received during March 2021.

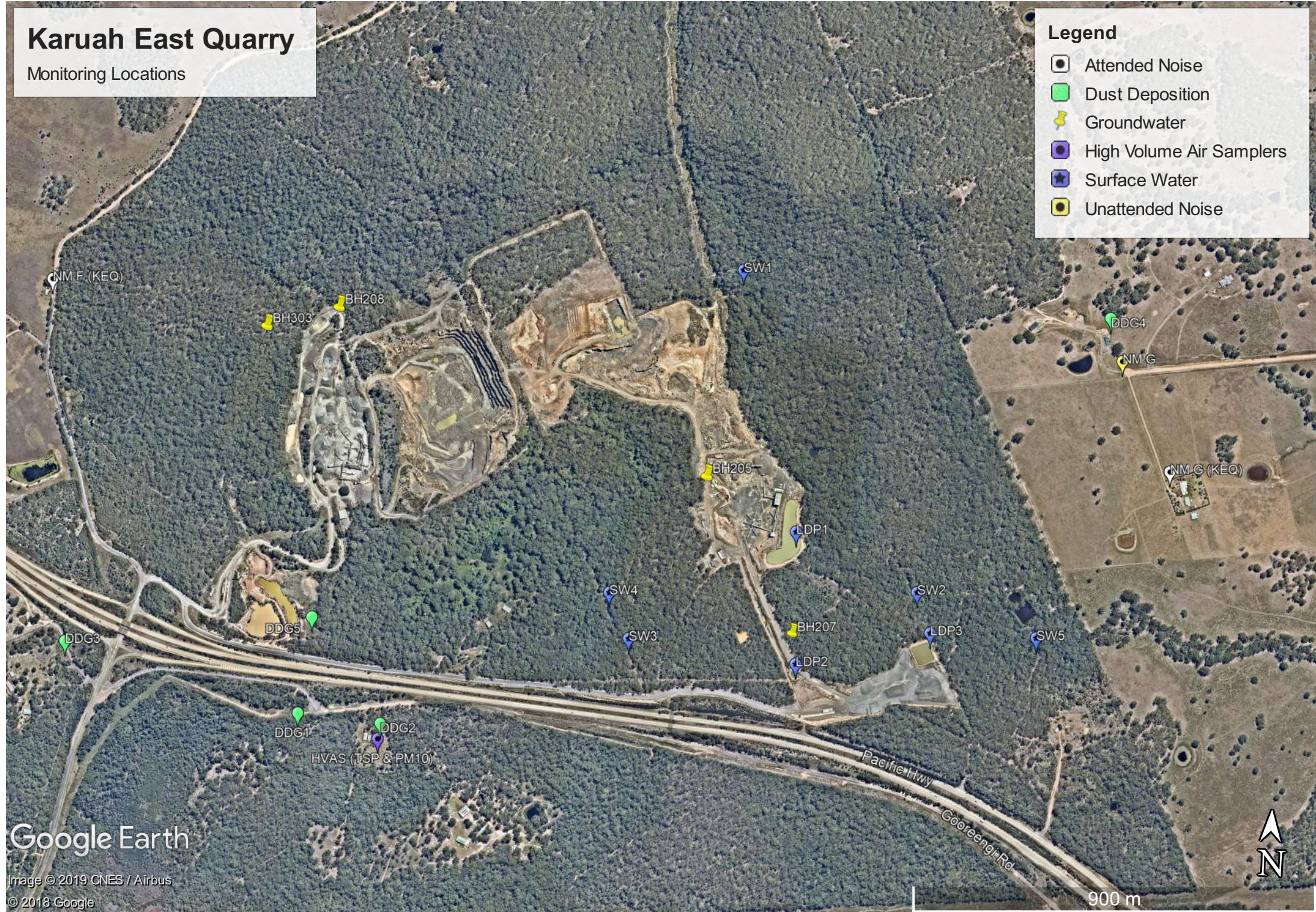
Appendix 1 – Monitoring Locations

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
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900 m

