Gunlake Quarry

Marulan

POELA Act 2011

Summary of Environmental Monitoring Data

Environmental Protection Licence Number 13012

Development Consent 2020/327172

Record Updated On: 18th January 2024

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1. INTRODUCTION

Gunlake Quarry holds an Environment Protection Licence (EPL) issued by the EPA under the *Protection of the Environment Operations Act 1997* (POEP Act) and operates under the conditions of Development Consent: 2017/00108663 as modified by Mod 2 consent 2020/327172. This report has been prepared to satisfy the reporting requirements of the POEO Act as directed by the EPA, and also Condition 9, Schedule 5 of the Development Consent.

This report summarises environmental monitoring results received for the Gunlake Quarry Project.

A summary of the EPL information is provided in the following tables. Table 1 shows the licence information and Table 2 summarises the frequency and units for monitoring data for the reporting period.

Table 1 – Licence Information

Environment Protection Licence number	13012
Licensee's Name	Gunlake Quarries Pty Limited
Licensee's Address	PO Box 1665 Double Bay NSW 1360
Premises	Gunlake Quarries 715 Brayton Road Marulan NSW 2579
Link to full licence on the EPA website	http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=38443&SYSUID=1&LICID=13012
Complaints Telephone Line	(02) 4841 1344

Table 2 – Supporting Information for EPL Monitoring Requirements

Parameter	Monitoring Site	Monitoring Frequency	Unit of Measure
Particulates – Deposited Matter (Insoluble Solids)	Point 1 – DDG 1	Monthly	$g/m^2/month$
Particulates – Deposited Matter (Insoluble Solids)	Point 2 – DDG 2	Monthly	$g/m^2/month$
Particulates – Deposited Matter (Insoluble Solids)	Point 3 – DDG 3	Monthly	$g/m^2/month$
PM10	Point 4 – R1 - HVAS	24 hour every six days	ug/m^3
PM10	Point 11 – R4 - HVAS	24 hour every six days	ug/m^3

2. AIR QUALITY MONITORING

The air quality monitoring results for Gunlake Quarry are summarised in the following sections.

2.1 Depositional Dust

Gauges 1, 2 and 3 are dust deposition gauges which measure the levels of coarse dust. Depositional dust results are shown in Table 3 – Depositional Dust (g/m2/month – Insoluble Solids)

Table 3 – Depositional Dust (g/m^2/month – Insoluble Solids)

Date Sampled	Date Results Received	DDG1 (Point 1)	DDG2 (Point 2)	DDG3 (Point 3)
17-Aug-18	26-Aug-18	1.1	N/A#5	0.9
18-Sep-18	27-Sep-18	1.1	8#6	1
25-Oct-18	5-Nov-18	1.2	4.4#7	2.4
22-Nov-18	4-Dec-18	N/A#8	N/A#8	N/A#8
12-Dec-18	20-Dec-18	N/A#9	N/A#9	N/A#9
10-Jan-19	17-Jan-18	2.1	3.9	5.4
22-Feb-19	28-Feb-19	1.4	3.8	3.8
28-Mar-19	10-Apr-19	2.4	3.6	2.0
29-Apr-19	09-May-19	0.6	2.6	1.5
16-May-19	28-May-19	1.2	3.4	1
27-Jun-19	5-Jul-19	4.3	3.8	0.7
25-Jul-19	21-Aug-19	1.2	0.8	0.8
28-Aug-19	30-Aug-19	2.0	2.1	0.6
12-Sep-19	17-Sep-19	1.6	1.7	0.4
24-Oct-19	04-Nov-19	2.0	1.7	1.6
19-Nov-19	22-Nov-19	1.3	4.8	1.1
18-Dec-19	30-Dec-19	3	3.9	1.8
17-Jan-20	7-Feb-20	9.7	9.0	0.4
19-Feb-20	3-Mar-20	4.2	11.4	1.3
16-Apr-20	23-Apr-20	0.5	2.3	1.9
06-May-20	08-May-20	1.9	1.6	0.8
04-Jun-20	11-Jun-20	0.6	2.3	0.4
09-Jul-20	08-May-20	0.6	1.1	4.4
04-Aug-20	11-Jun-20	4.3	2.5	0.7
01-Sep-20	07-Sep-20	2.7	0.8	0.4
06-Oct-20	13-Oct-20	1	1.2	0.6
03-Nov-20	09-Now-20	0.3	1.1	0.9
04-Dec-20	15-Dec-20	1.6	1.8	0.7
05-Jan-21	11-Jan-21	0.6	1.4	0.9

Date Sampled	Date Results Received	DDG1 (Point 1)	DDG2 (Point 2)	DDG3 (Point 3)
04-Feb-21	12-Feb-21	1.4	1.2	2.8
04-Mar-21	12-Mar-21	0.9	2.8	1.7
01-Apr-21	12-Apr-21	0.8	1.8	0.6
06-May-21	13-May-21	1.6	3.8	5
04-Jun-21	11-Jun-21	1.5	1.7	0.9
01-Jul-21	09-Jul-21	0.8	1.2	4.2
06-Aug-21	12-Aug-21	0.4	2.7	0.4
03-Sep-21	07-Sep-21	0.9	2.7	0.3
01-Oct-21	11-Oct-21	1.2	2.4	0.6
04-Nov-21	11-Nov-21	0.8	2.3	0.8
03-12-2021	09-Dec-21	0.4	2.8	0.7
07-01-2022	18-Jan-22	1.2	2.0	5.0
08-02-2022	15-Feb-22	0.5	3.0	18.5
08-03-2022	21-Mar-22	1.8	3.3	3.3
08-04-2022	19-Apr-22	0.3	1.2	1.9
09-05-2022	16-May-22	0.5	3.5	0.6
03-06-2022	10-Jun-22	1.4	1.0	1.0
01-07-2022	8-Jul-22	0.5	1.9	3.4
29-07-2022	5-Aug-22	7.5	2.0	2.6
30-08-2022	5-Sep-22	1.2	2.3	0.5
30-09-2022	10-Oct-22	1.0	6.2	1.6
01-11-2022	08-Nov-22	0.4	2.1	1.4
02-12-2022	09-Dec-22	1.2	3.0	1.2
03-01-2023	09-Jan-23	1.8	2.5	2.5
02-02-2023	08-Feb-23	2.4	2.2	6.8
03-03-2023	10-Mar-23	0.8	2.4	5.7
04-04-2023	13-Apr-23	1.9	0.8	5.8
05-05-2023	31-May-23	0.8	1.6	1.1
06-06-2023	15-Jun-23	2.9	0.9	0.8
07-07-2023	17-Jul-23	2.2	3.1	0.4
07-08-2023	15-Aug-23	1.2	2.6	0.4
12-09-2023	20-Sep-23	4.5	6.6	1.3
11-10-2023	18-Oct-23	2.9	10.8	3.0
8-11-2023	15-Nov-23	1.2	1.8	1.2
6-12-2023	18-Dec-23	1.2	3.9	1.8
5-1-2024	12-Jan-24	1.5	15.3#10	1.3

#5 Broken funnel – sample compromised

#6 Pre-stripping of topsoil in pit extension area causing localised dust. DDG2 located adjacent to new extraction area.

#7 Removal of overburden in pit extension area causing localised dust. DDG2 located adjacent to new extraction area.

#8 Extraordinary event - widespread dust storms 2/11/18

#9 Extraordinary event - widespread dust storms 22/11/18

#10 blasting in pit extension area causing localised dust. DDG2 located adjacent to extraction area, nearest residential assessment location approximately 1km to the northeast.

A graphical representation of depositional dust monitoring data is shown in **Figure 1**.

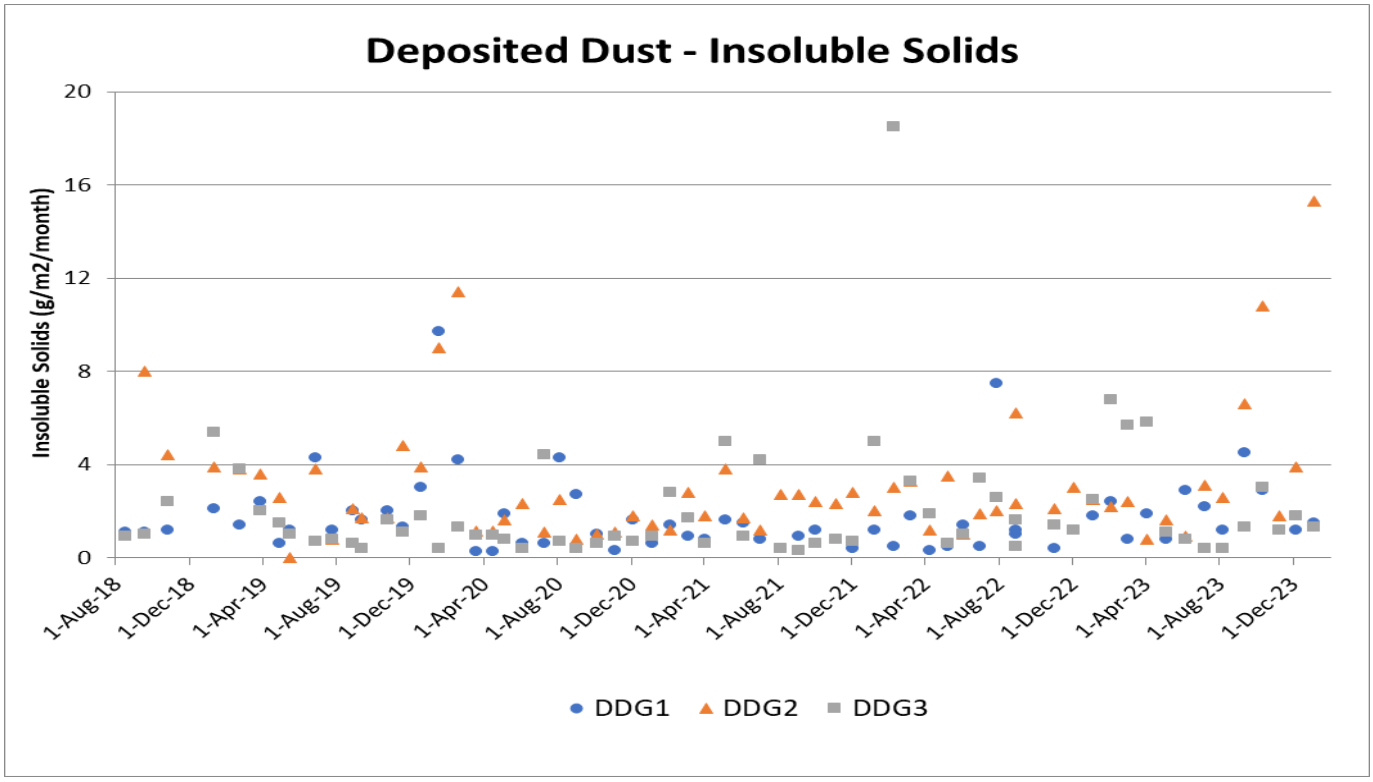


Figure 1 – Monthly Dust Deposition Gauge Results

Figure 2 shows the annual rolling average deposited dust data for compliance purposes.

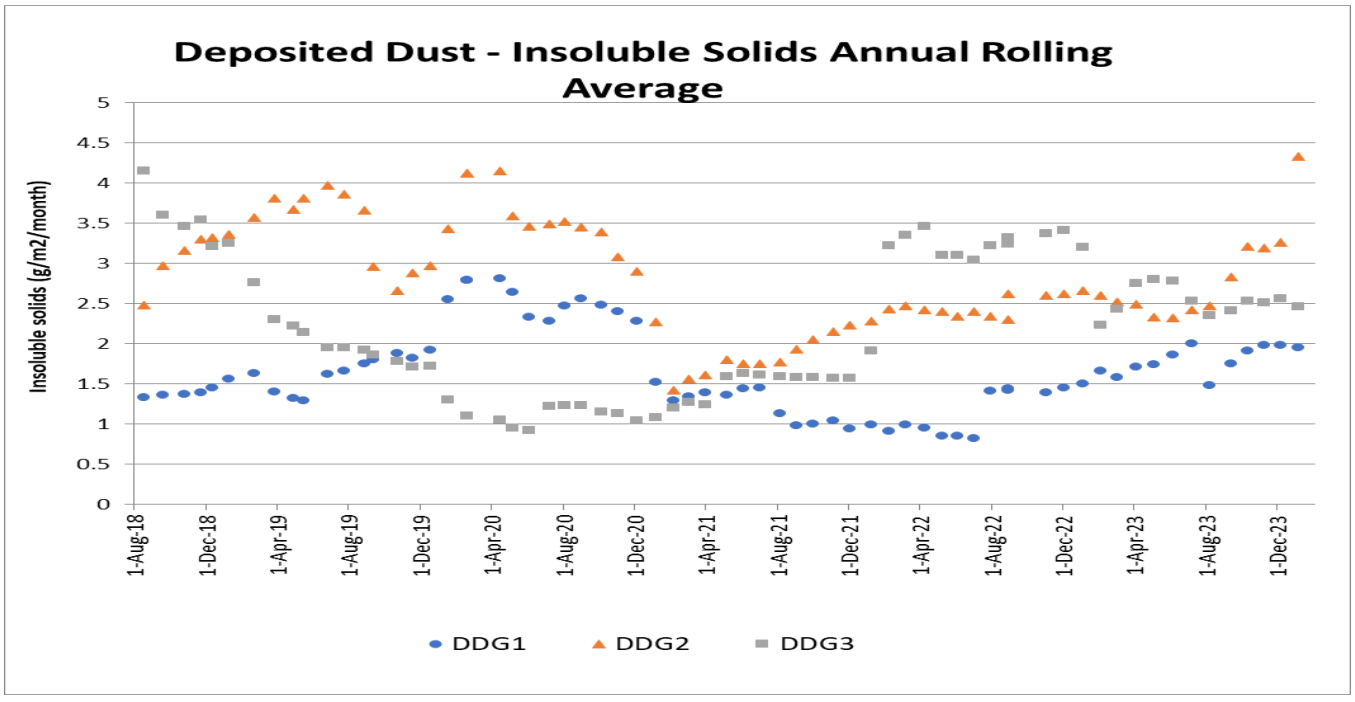


Figure 2 – Monthly Dust Annual Rolling Average – Insoluble Solids

Development consent condition limits: the limits outlined in the Development Consent are detailed in Table 4.

Table 4 –Dust Limits

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
[c]Deposited dust	Annual	[b] 2 g/m^2/month	[a,d] 4 g/m^2/month

a *Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources);*

b *Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development;*

c *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and*

d *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.*

Table 5 –Background Dust Values for Gunlake Quarry Extension Project

	Dust Gauge No 1	Dust Gauge No 2	Dust Gauge No 3
Individual Gauge Background Average	1.5	3.3	3.2
Overall Background Average	2.7		

Table 5 shows the average background deposited dust values recorded prior to any quarry activities taking place at Gunlake.

Compliance: The results for the reporting period comply with EPL.

2.2 Atmospheric Dust – PM10

PM10 monitoring commenced in December 2014 at site R1-HVAS which is located to the northeast of the quarry at R1. PM10 monitoring commenced in July 2018 at site R4-HVAS which is located to the northwest of the quarry at R4.

Table 6 – PM_{10} Monitoring Results R1 (ug/m^2)

Date Sampled R1	Report Received	PM10 (µg/m^3)
6/08/2018	26/8/2018	N/A*
12/08/2018	26/8/2018	N/A*
18/08/2018	26/8/2018	11.9
24/08/2018	27/9/2018	7.2
30/08/2018	27/9/2018	24.6
5/09/2018	27/9/2018	2.2
11/09/2018	27/9/2018	12.5
17/09/2018	27/9/2018	16.5
23/09/2018	31/10/2018	11.5
29/09/2018	31/10/2018	14.7
5/10/2018	31/10/2018	6.7
11/10/2018	31/10/2018	7.2
17/10/2018	31/10/2018	8.4

Date Sampled R1	Report Received	PM10 (µg/m^3)
23/10/2018	27/11/2018	24.6
29/10/2018	27/11/2018	14.8
4/11/2018	27/11/2018	19.1
10/11/2018	27/11/2018	20.7
16/11/2018	27/11/2018	8.1
22/11/2018	18/12/2018	71.4[#]
28/11/2018	18/12/2018	7.8
4/12/2018	18/12/2018	28.1
10/12/2018	17/01/2019	20.2
16/12/2018	17/01/2019	46.4
22/12/2018	17/01/2019	8.1
28/12/2018	17/01/2019	25.7
3/01/2019	17/01/2019	23
9/01/2019	17/01/2019	12.7
15/01/2019	21/02/2019	47.4
21/01/2019	21/02/2019	6.8
27/01/2019	21/02/2019	18.0
2/02/2019	21/02/2019	7.0
8/02/2019	06/03/2019	20.7
14/02/2019	06/03/2019	26.2
20/02/2019	12/04/2019	N/A[*]
26/02/2019	12/04/2019	19.2
4/03/2019	12/04/2019	N/A[*]
10/03/2019	12/04/2019	24.4
16/03/2019	12/04/2019	8.8
22/03/2019	10/05/2019	7.7
28/03/2019	10/05/2019	16.8
3/04/2019	10/05/2019	30.9
9/04/2019	10/05/2019	39.4
15/04/2019	10/05/2019	10.7
21/04/2019	10/05/2019	10.9
27/04/2019	1/07/2019	18.1
3/05/2019	1/07/2019	N/A[*]
9/05/2019	1/07/2019	36.2
15/05/2019	1/07/2019	21.4
21/05/2019	1/07/2019	36.7
27/05/2019	1/07/2019	14.6
2/06/2019	1/07/2019	7.6

Date Sampled R1	Report Received	PM10 (µg/m^3)
8/06/2019	1/07/2019	9.3
14/06/2019	1/07/2019	25
20/06/2019	1/07/2019	24.4
26/06/2019	1/07/2019	2.9
2/07/2019	6/08/2019	50.1
8/07/2019	6/08/2019	20.2
14/07/2019	6/08/2019	4.7
20/07/2019	13/08/2019	1.9
26/07/2019	13/08/2019	18.3
1/08/2019	17/09/2019	N/A*
7/08/2019	17/09/2019	45.5
13/08/2019	17/09/2019	31.5
19/08/2019	17/09/2019	22.0
25/08/2019	17/09/2019	17.2
31/08/2019	17/09/2019	4.3
6/09/2019	26/09/2019	24.8
12/09/2019	26/09/2019	58.2
18/09/2019	04/10/2019	7.1
24/09/2019	04/10/2019	14.2
30/09/2019	04/10/2019	10.8
6/10/2019	04/10/2019	22.4
12/10/2019	2/12/2019	3.0
18/10/2019	2/12/2019	N/A*
24/10/2019	2/12/2019	38
30/10/2019	2/12/2019	40.7
5/11/2019	2/12/2019	7.2
11/11/2019	2/12/2019	11.0
17/11/2019	13/01/2020	14.6
23/11/2019	13/01/2020	29.6
29/11/2019	14/01/2020	42.2
05/12/2019	14/01/2020	52.2#1
11/12/2019	14/01/2020	27.4
17/12/2019	10/02/2020	33.5
23/12/2019	24/03/2020	N/A#2
29/12/2019	24/03/2020	N/A#2
04/01/2020	24/03/2020	N/A#2
10/01/2020	24/03/2020	N/A#2
16/01/2020	24/03/2020	38.8

Date Sampled R1	Report Received	PM10 (µg/m^3)
22/01/2020	24/03/2020	20.4
28/01/2020	24/03/2020	44.4
3/02/2020	24/03/2020	61
9/02/2020	24/03/2020	7.4
15/02/2020	24/03/2020	11.4
21/02/2020	24/03/2020	13.6
27/02/2020	26/03/2020	19.3
4/03/2020	26/03/2020	2.2
10/03/2020	26/03/2020	2.6
16/03/2020	21/04/2020	<1.0
22/03/2020	21/04/2020	10.8
28/03/2020	21/04/2020	7.4
3/04/2020	29/05/2020	3.4
9/04/2020	29/05/2020	3.9
15/04/2020	29/05/2020	27.4
21/04/2020	29/05/2020	14.3
27/04/2020	29/05/2020	5.9
3/05/2020	29/05/2020	1.7
9/05/2020	29/05/2020	8.7
15/05/2020	29/05/2020	10.5
21/05/2020	11/06/2020	3.8
27/05/2020	11/06/2020	4.7
2/06/2020	20/07/2020	18.8
8/06/2020	20/07/2020	3.1
14/06/2020	20/07/2020	6.3
20/06/2020	20/07/2020	4.4
26/06/2020	20/07/2020	14.8
2/07/2020	20/07/2020	12.2
8/07/2020	13/08/2020	1.0
14/07/2020	13/08/2020	0.5
20/07/2020	13/08/2020	35.4
26/07/2020	13/08/2020	1.9
1/08/2020	08/09/2020	12.7
7/08/2020	08/09/2020	12.6
13/08/2020	08/09/2020	24.3
19/08/2020	08/09/2020	10.6
25/08/2020	08/09/2020	18.1
31/08/2020	16/10/2020	19.4

Date Sampled R1	Report Received	PM10 (µg/m^3)
6/09/2020	16/10/2020	8.4
12/09/2020	16/10/2020	13.4
18/09/2020	16/10/2020	7.9
24/09/2020	16/10/2020	14.4
30/09/2020	11/11/2020	11.8
6/10/2020	11/11/2020	9.0
12/10/2020	11/11/2020	22.2
18/10/2020	11/11/2020	8.3
24/10/2020	11/11/2020	10.1
30/10/2020	15/12/2020	10.5
5/11/2020	15/12/2020	6.3
11/11/2020	15/12/2020	15.8
17/11/2020	15/12/2020	22.9
23/11/2020	15/12/2020	15.1
29/11/2020	15/12/2020	17.0
5/12/2020	13/01/2021	17.7
11/12/2020	13/01/2021	14
17/12/2020	13/01/2021	6.2
23/12/2020	13/01/2021	6.0
29/12/2020	13/01/2021	<0.1
4/01/2021	17/02/2021	1.4
12/01/2021	17/02/2021	9.2
21/01/2021	17/02/2021	32.4
27/01/2021	17/02/2021	64.2
2/02/2021	17/02/2021	10.1
9/02/2021	11/03/2021	12.2
15/02/2021	11/03/2021	10.1
21/02/2021	11/03/2021	10.4
27/02/2021	11/03/2021	11.7
5/03/2021	21/04/2021	16.6
11/03/2021	21/04/2021	8.8
17/03/2021	21/04/2021	N/A*
23/03/2021	21/04/2021	1.9
29/03/2021	21/04/2021	11.9
5/04/2021	16/06/2021	10.5
11/04/2021	16/06/2021	4.2
29/04/2021	16/06/2021	16.7
4/05/2021	16/06/2021	8.3

Date Sampled R1	Report Received	PM10 (µg/m^3)
10/05/2021	16/06/2021	10.3
16/05/2021	16/06/2021	0.1
22/05/2021	16/06/2021	14.8
28/05/2021	16/06/2021	9.4
3/06/2021	16/07/2021	5.6
9/06/2021	16/07/2021	9.2
15/06/2021	16/07/2021	8.4
21/06/2021	16/07/2021	2.8
27/06/2021	16/07/2021	2.0
3/07/2021	11/08/2021	4.6
9/07/2021	11/08/2021	9.8
15/07/2021	11/08/2021	10.5
21/07/2021	11/08/2021	9.6
27/07/2021	11/08/2021	5.0
2/08/2021	07/09/2021	5.4
8/08/2021	07/09/2021	5.9
14/08/2021	07/09/2021	5.1
20/08/2021	07/09/2021	17.4
26/08/2021	07/09/2021	2.9
1/09/2021	07/09/2021	13.5
7/09/2021	07/10/2021	61.9
13/09/2021	07/10/2021	7.8
19/09/2021	07/10/2021	7.6
25/09/2021	07/10/2021	13.3
1/10/2021	16/11/2021	5.8
7/10/2021	16/11/2021	30.6
13/10/2021	16/11/2021	4.5
19/10/2021	16/11/2021	21.1
25/10/2021	16/11/2021	22.4
31/10/2021	16/11/2021	8.3
6/11/2021	22/12/2021	10.7
12/11/2021	22/12/2021	3.9
18/11/2021	22/12/2021	12.4
24/11/2021	22/12/2021	6.4
30/11/2021	22/12/2021	12.8
6/12/2021	20/01/2022	11.5
12/12/2021	20/01/2022	11.4
18/12/2021	20/01/2022	21.3

Date Sampled R1	Report Received	PM10 (µg/m^3)
24/12/2021	01/03/2022	4
30/12/2021	01/03/2022	2.4
5/01/2022	01/03/2022	6.5
11/01/2022	01/03/2022	8.9
17/01/2022	01/03/2022	23
23/01/2022	01/03/2022	6.2
29/3/2022	17/02/2022	10.4
4/02/2022	17/02/2022	8.1
10/02/2022	22/02/2022	16.3
16/02/2022	18/03/2022	9.6
22/02/2022	18/03/2022	6.8
28/02/2022	18/03/2022	10.6
6/03/2022	04/05/2022	6.2
12/03/2022	04/05/2022	4.3
18/03/2022	04/05/2022	11.4
24/03/2022	04/05/2022	7.9
30/03/2022	04/05/2022	5.6
5/04/2022	04/05/2022	15.9
11/04/2022	19/05/2022	5.3
17/04/2022	19/05/2022	5.8
23/04/2022	19/05/2022	2.1
29/04/2022	19/05/2022	5.2
5/05/2022	19/05/2022	14.1
11/05/2022	16/06/2022	4.1
17/05/2022	16/06/2022	9.0
23/05/2022	16/06/2022	3.2
29/05/2022	16/06/2022	0.5
4/06/2022	07/07/2022	4.7
10/06/2022	07/07/2022	3.6
16/06/2022	07/07/2022	4
22/06/2022	07/07/2022	3.8
28/06/2022	07/07/2022	16.7
4/07/2022	09/08/2022	1.9
10/07/2022	09/08/2022	3.8
16/07/2022	09/08/2022	6.5
22/07/2022	09/08/2022	3.5
28/07/2022	13/09/2022	3.8
03/08/2022	13/09/2022	9.8

Date Sampled R1	Report Received	PM10 (µg/m^3)
09/08/2022	13/09/2022	11.9
15/08/2022	13/09/2022	3.3
21/08/2022	13/09/2022	5.4
27/08/2022	13/10/2022	11.6
2/09/2022	13/10/2022	13.7
8/09/2022	13/10/2022	10.9
14/09/2022	13/10/2022	32.8
20/09/2022	13/10/2022	12.3
26/09/2022	13/10/2022	22.8
2/10/2022	16/11/2022	3.2
8/10/2022	16/11/2022	3.6
14/10/2022	16/11/2022	5.7
20/10/2022	16/11/2022	5.1
26/10/2022	16/11/2022	6.7
1/11/2022	16/12/2022	3.0
7/11/2022	16/12/2022	6.9
13/11/2022	16/12/2022	5.8
19/11/2022	16/12/2022	5.7
25/11/2022	16/12/2022	12.2
01/12/2022	17/01/2023	16.9
07/12/2022	17/01/2023	17.6
13/12/2022	17/01/2023	12.4
19/12/2022	17/01/2023	17.2
25/12/2022	17/01/2023	12.6
31/12/2022	15/02/2023	4.6
6/01/2023	15/02/2023	10.8
12/01/2023	15/02/2023	25.8
18/01/2023	15/02/2023	33.5
24/01/2023	15/02/2023	8.4
30/01/2023	15/02/2023	12.8
5/02/2023	17/03/2023	14.0
11/02/2023	17/03/2023	21.6
17/02/2023	17/03/2023	29.9
23/02/2023	17/03/2023	13.9
1/03/2023	18/04/2023	15.4
7/03/2023	18/04/2023	28.8
13/03/2023	18/04/2023	7.1
19/03/2023	18/04/2023	14.5

Date Sampled R1	Report Received	PM10 (µg/m^3)
25/03/2023	19/06/2023	5.2
31/03/2023	19/06/2023	12.2
6/04/2023	19/06/2023	6.4
12/04/2023	19/06/2023	<1.0
18/04/2023	19/06/2023	9.7
24/04/2023	20/07/2023	4.6
30/05/2023	20/07/2023	8.2
6/05/2023	20/07/2023	6.9
12/05/2023	20/07/2023	70.4
18/05/2023	20/07/2023	26.0
24/05/2023	20/07/2023	25.5
30/05/2023	20/07/2023	9.2
5/06/2023	20/07/2023	6.3
11/06/2023	20/07/2023	7.5
17/06/2023	20/07/2023	8.0
23/06/2023	20/07/2023	4.8
29/06/2023	20/07/2023	7.6
5/07/2023	31/08/2023	4.6
11/07/2023	31/08/2023	10.2
17/07/2023	31/08/2023	20.8
23/07/2023	31/08/2023	3.9
29/07/2023	31/08/2023	11.0
4/08/2023	21/09/2023	29.5
10/08/2023	21/09/2023	14.5
16/08/2023	21/09/2023	34.1
22/08/2023	21/09/2023	36.6
28/08/2023	21/09/2023	15.7
3/09/2023	21/09/2023	4.6
9/09/2023	20/10/2023	7.2
15/09/2023	20/10/2023	N/A[#3]
21/09/2023	20/10/2023	N/A[#3]
27/09/2023	20/10/2023	16.6
3/10/2023	20/10/2023	21.4
9/10/2023	30/11/2023	30.2
15/10/2023	30/11/2023	9.6
21/10/2023	30/11/2023	28.9
27/10/2023	30/11/2023	7.3
2/11/2023	5/1/2024	16.8

Date Sampled R1	Report Received	PM10 (µg/m^3)
8/11/2023	5/1/2024	30.6
14/11/2023	5/1/2024	26.2
20/11/2023	5/1/2024	28
26/11/2023	5/1/2024	15.1

Extraordinary event – widespread dust storm on day of sampling

#1 High wind on day of sampling dust generation due to exposed agricultural land resulting from drought conditions

*Filter paper damaged. No result

#2 Extraordinary event – regional bushfires with heavy smoke on day of sampling

#3 – system error, result invalid.

Table 7 – PM_{10} Monitoring Results R4 (ug/m^2)

Date Sampled R4	Report Received	PM10 (µg/m^3)
6/08/2018	26/8/2018	9.2
12/08/2018	26/9/2018	4.1
18/08/2018	26/9/2018	6.8
24/08/2018	26/9/2018	7.8
30/08/2018	26/9/2018	25.9
5/09/2018	26/9/2018	6.5
11/09/2018	26/9/2018	7.2
17/09/2018	26/9/2018	12.8
23/09/2018	31/10/2018	9.2
29/09/2018	31/10/2018	3.0*
5/10/2018	31/10/2018	13.2
11/10/2018	31/10/2018	6.1
17/10/2018	31/10/2018	10.1
23/10/2018	27/11/2018	13.6
29/10/2018	27/11/2018	16.1
4/11/2018	27/11/2018	19.2
10/11/2018	27/11/2018	10.4
16/11/2018	27/11/2018	7.2
22/11/2018	18/12/2018	69#
28/11/2018	18/12/2018	9.6
4/12/2018	18/12/2018	16.4
10/12/2018	17/01/2019	18.9
16/12/2018	17/01/2019	49.5
22/12/2018	17/01/2019	8.9
28/12/2018	17/01/2019	27.9
3/01/2019	17/01/2019	18.6
9/01/2019	21/02/2019	8.1

Date Sampled R4	Report Received	PM10 (µg/m^3)
15/01/2019	21/02/2019	8.8
21/01/2019	21/02/2019	19.1
27/01/2019	21/02/2019	7.8
2/02/2019	21/02/2019	31.0
8/02/2019	10/05/2019	13.4
14/02/2019	06/03/2019	64.9[#1]
20/02/2019	12/04/2019	N/A[*]
26/02/2019	12/04/2019	20.7
4/03/2019	12/04/2019	N/A[*]
10/03/2019	12/04/2019	26.8
16/03/2019	12/04/2019	10.2
22/03/2019	12/04/2019	7.8
28/03/2019	10/05/2019	16.1
3/04/2019	10/05/2019	14.5
9/04/2019	10/05/2019	19.9
15/04/2019	10/05/2019	10.8
21/04/2019	10/05/2019	13.2
27/04/2019	1/07/2019	13.5
3/05/2019	1/07/2019	17.4
9/05/2019	1/07/2019	5.7
15/05/2019	1/07/2019	15.5
21/05/2019	1/07/2019	12.3
27/05/2019	1/07/2019	6.3
2/06/2019	1/07/2019	8.5
8/06/2019	1/07/2019	7
14/06/2019	1/07/2019	4.1
20/06/2019	1/07/2019	5.6
26/06/2019	1/07/2019	7.1
2/07/2019	6/08/2019	5.2
8/07/2019	6/08/2019	2.7
14/07/2019	6/08/2019	2.2
20/07/2019	13/08/2019	1.9
26/07/2019	13/08/2019	6.0
1/08/2019	17/09/2019	5.6
7/08/2019	17/09/2019	10.6
13/08/2019	17/09/2019	4.6
19/08/2019	17/09/2019	22.0
25/08/2019	17/09/2019	26.4

Date Sampled R4	Report Received	PM10 (µg/m^3)
31/08/2019	17/09/2019	4.4
6/09/2019	26/09/2019	17.8
12/09/2019	26/09/2019	16.1
18/09/2019	04/10/2019	8.4
24/09/2019	04/10/2019	5.0
30/09/2019	04/10/2019	11.3
6/10/2019	04/10/2019	26.4
12/10/2019	2/12/2019	3.8
18/10/2019	2/12/2019	N/A*
24/10/2019	2/12/2019	21.6
30/10/2019	2/12/2019	33.8
5/11/2019	2/12/2019	6.8
11/11/2019	2/12/2019	6.0
17/11/2019	13/01/2020	14.6
23/11/2019	14/01/2020	51.3#2
29/11/2019	14/01/2020	35.9
05/12/2019	14/01/2020	37.6
11/12/2019	Lab Lost paper	Lab Lost Paper
17/12/2019	10/02/2020	39.1
23/12/2019	24/03/2020	N/A#3
29/12/2019	24/03/2020	N/A#3
04/01/2020	24/03/2020	N/A#3
10/01/2020	24/03/2020	N/A#3
16/01/2020	24/03/2020	36.6
22/01/2020	24/03/2020	19.8
28/01/2020	24/03/2020	23.4
3/02/2020	24/03/2020	40.8
9/02/2020	24/03/2020	6.2
15/02/2020	24/03/2020	13.8
21/02/2020	24/03/2020	12.0
27/02/2020	26/03/2020	18.5
4/03/2020	26/03/2020	2.5
10/03/2020	26/03/2020	6.6
16/03/2020	21/04/2020	7.1
22/03/2020	21/04/2020	11.9
28/03/2020	21/04/2020	6.7
3/04/2020	29/05/2020	2.8
9/04/2020	29/05/2020	3

Date Sampled R4	Report Received	PM10 (µg/m^3)
15/04/2020	29/05/2020	8.2
21/04/2020	29/05/2020	13.5
27/04/2020	29/05/2020	8.1
3/05/2020	29/05/2020	<0.1
9/05/2020	29/05/2020	9.5
15/05/2020	29/05/2020	7.4
21/05/2020	11/06/2020	3.1
27/05/2020	11/06/2020	2.7
2/06/2020	20/07/2020	0.1
8/06/2020	20/07/2020	3.2
14/06/2020	20/07/2020	2.5
20/06/2020	20/07/2020	5.8
26/06/2020	20/07/2020	1.1
2/07/2020	20/07/2020	5.1
8/07/2020	13/08/2020	13.5
14/07/2020	13/08/2020	1.0
20/07/2020	13/08/2020	3.5
26/07/2020	13/08/2020	0.5
1/08/2020	08/09/2020	8.7
7/08/2020	08/09/2020	9.1
13/08/2020	08/09/2020	7.6
19/08/2020	08/09/2020	4.8
25/08/2020	08/09/2020	5.4
6/09/2020	16/10/2020	9.1
12/09/2020	16/10/2020	10.4
18/09/2020	16/10/2020	9.5
24/09/2020	16/10/2020	6.2
30/09/2020	11/11/2020	14.9
6/10/2020	11/11/2020	10.4
12/10/2020	11/11/2020	12
18/10/2020	11/11/2020	10.6
24/10/2020	11/11/2020	11.3
30/10/2020	15/12/2020	7.5
5/11/2020	15/12/2020	4.2
11/11/2020	15/12/2020	14.3
17/11/2020	15/12/2020	22.4
23/11/2020	15/12/2020	10.5
29/11/2020	15/12/2020	17.6

Date Sampled R4	Report Received	PM10 (µg/m^3)
5/12/2020	13/01/2021	18.8
11/12/2020	13/01/2021	16.6
17/12/2020	13/01/2021	1.8
23/12/2020	13/01/2021	<0.1
29/12/2020	17/02/2021	N/A*
4/01/2021	17/02/2021	2.4
10/01/2021	17/02/2021	7.8
16/01/2021	17/02/2021	14.8
22/01/2021	17/02/2021	21
28/01/2021	17/02/2021	11.4
3/02/2021	11/03/2021	13.8
9/02/2021	17/02/2021	9.6
15/02/2021	11/03/2021	12.6
21/02/2021	11/03/2021	10.1
27/02/2021	21/04/2021	8.9
5/03/2021	21/04/2021	13.6
11/03/2021	21/04/2021	8.3
17/03/2021	21/04/2021	6.6
23/03/2021	21/04/2021	5.2
29/03/2021	21/04/2021	8.2
5/04/2021	16/06/2021	10.6
11/04/2021	16/06/2021	10.6
17/04/2021	16/06/2021	16
23/04/2021	16/06/2021	11
29/04/2021	16/06/2021	24.3
4/05/2021	16/06/2021	6.2
10/05/2021	16/06/2021	2.1
16/05/2021	16/06/2021	0.9
22/05/2021	16/06/2021	11.4
28/05/2021	16/06/2021	6.4
3/06/2021	16/07/2021	3.8
9/06/2021	16/07/2021	5.4
15/06/2021	16/07/2021	9.7
21/06/2021	16/07/2021	3.6
27/06/2021	11/08/2021	5.3
3/07/2021	11/08/2021	3.7
9/07/2021	11/08/2021	10.7
15/07/2021	11/08/2021	8.1

Date Sampled R4	Report Received	PM10 (µg/m^3)
21/07/2021	11/08/2021	12.1
27/07/2021	11/08/2021	5.3
2/08/2021	07/09/2021	6.2
8/08/2021	07/09/2021	6.2
14/08/2021	07/09/2021	6.2
20/08/2021	07/09/2021	3.7
26/08/2021	07/09/2021	2.6
1/09/2021	7/10/2021	5.2
7/09/2021	7/10/2021	5.6
13/09/2021	7/10/2021	4.7
19/09/2021	7/10/2021	7.2
25/09/2021	7/10/2021	9.9
1/10/2021	16/11/2021	4.5
7/10/2021	16/11/2021	14.9
13/10/2021	16/11/2021	6.2
19/10/2021	16/11/2021	8
25/10/2021	16/11/2021	8.4
31/10/2021	22/12/2021	12.8
6/11/2021	22/12/2021	7.2
12/11/2021	22/12/2021	3.2
18/11/2021	22/12/2021	15.2
24/11/2021	22/12/2021	7
30/11/2021	22/12/2021	13.3
6/12/2021	20/01/2022	11.2
12/12/2021	20/01/2022	10.2
18/12/2021	20/01/2022	25.7
24/12/2021	01/03/2022	11
30/12/2021	01/03/2022	7.6
5/01/2022	01/03/2022	6.8
11/01/2022	01/03/2022	9.1
17/01/2022	01/03/2022	9.4
23/01/2022	17/02/2022	8.5
29/3/2022	17/02/2022	8.3
4/02/2022	17/02/2022	13.1
10/02/2022	1/03/2022	13.5
16/02/2022	18/03/2022	2.5
22/02/2022	18/03/2022	3.5
28/02/2022	18/03/2022	10.5

Date Sampled R4	Report Received	PM10 (µg/m^3)
6/03/2022	04/05/2022	2.4
12/03/2022	04/05/2022	4.6
18/03/2022	04/05/2022	7.4
24/03/2022	04/05/2022	0.5
30/03/2022	04/05/2022	4.2
5/04/2022	04/05/2022	10.5
11/04/2022	19/05/2022	1.5
17/04/2022	19/05/2022	2
23/04/2022	19/05/2022	4
29/04/2022	19/05/2022	8.7
5/05/2022	16/06/2022	3
11/05/2022	16/06/2022	2.4
17/05/2022	16/06/2022	3.6
23/05/2022	16/06/2022	3.4
29/05/2022	07/07/2022	0.9
4/06/2022	07/07/2022	4.3
10/06/2022	07/07/2022	0.5
16/06/2022	07/07/2022	1.6
22/06/2022	07/07/2022	1.2
28/06/2022	09/08/2022	6.7
4/07/2022	09/08/2022	2.6
10/07/2022	09/08/2022	3.5
16/07/2022	09/08/2022	4.6
22/07/2022	09/08/2022	1.5
28/07/2022	13/09/2022	<1.0
03/08/2022	13/09/2022	5.6
09/08/2022	13/09/2022	3.0
15/08/2022	13/09/2022	2.6
21/08/2022	13/09/2022	1.0
27/08/2022	13/10/2022	5.4
2/09/2022	13/10/2022	11.7
8/09/2022	13/10/2022	15.5
14/09/2022	13/10/2022	5.9
20/09/2022	13/10/2022	8
26/09/2022	13/10/2022	6.2
2/10/2022	16/11/2022	3.4
8/10/2022	16/11/2022	3.1
14/10/2022	16/11/2022	4.7

Date Sampled R4	Report Received	PM10 (µg/m^3)
20/10/2022	16/11/2022	5.4
26/10/2022	16/11/2022	6.7
1/11/2022	16/12/2022	5.6
7/11/2022	16/12/2022	8.3
13/11/2022	16/12/2022	5.8
19/11/2022	16/12/2022	8.5
25/11/2022	16/12/2022	9.6
01/12/2022	17/01/2023	15.9
07/12/2022	17/01/2023	16.6
13/12/2022	17/01/2023	11.5
19/12/2022	17/01/2023	26.9
25/12/2022	17/01/2023	11.5
31/12/2022	15/02/2023	14.3
6/01/2023	15/02/2023	10.8
12/01/2023	15/02/2023	19.8
18/01/2023	15/02/2023	26.3
24/01/2023	15/02/2023	13.5
30/01/2023	17/03/2023	13.0
5/02/2023	17/03/2023	18.4
11/02/2023	17/03/2023	9.9
17/02/2023	17/03/2023	9.8
23/02/2023	17/03/2023	14.5
1/03/2023	18/04/2023	15.0
7/03/2023	18/04/2023	20.0
13/03/2023	18/04/2023	4.3
19/03/2023	18/04/2023	15.6
25/03/2023	18/04/2023	6.7
31/03/2023	19/06/2023	3.9
6/04/2023	19/06/2023	3.1
12/04/2023	19/06/2023	<1.0
18/04/2023	19/06/2023	29.6
24/04/2023	20/07/2023	2.1
30/04/2023	20/07/2023	36.2
6/05/2023	20/07/2023	8.4
12/05/2023	20/07/2023	15.5
18/05/2023	20/07/2023	24.2
24/05/2023	20/07/2023	3.0
30/05/2023	20/07/2023	3.0

Date Sampled R4	Report Received	PM10 (µg/m^3)
5/06/2023	20/07/2023	8.6
11/06/2023	20/07/2023	7.9
17/06/2023	20/07/2023	4.3
23/06/2023	20/07/2023	3.8
29/06/2023	20/07/2023	7.6
5/07/2023	31/08/2023	4.3
11/07/2023	31/08/2023	2.8
17/07/2023	31/08/2023	8.3
23/07/2023	31/08/2023	5.2
29/07/2023	31/08/2023	8.2
4/08/2023	21/09/2023	16.0
10/08/2023	21/09/2023	7.3
16/08/2023	21/09/2023	2.0
22/08/2023	21/09/2023	7.4
28/08/2023	21/09/2023	6.3
3/09/2023	21/09/2023	3.1
9/09/2023	20/10/2023	6.3
15/09/2023	20/10/2023	14.4
21/09/2023	20/10/2023	6.4
27/09/2023	20/10/2023	11.0
3/10/2023	20/10/2023	30.5
9/10/2023	30/11/2023	7.5
15/10/2023	30/11/2023	7.0
21/10/2023	30/11/2023	22.3
27/10/2023	30/11/2023	12.4
2/11/2023	5/1/2024	12.7
8/11/2023	5/1/2024	15.9
14/11/2023	5/1/2024	22.5
20/11/2023	5/1/2024	19.3
26/11/2023	5/1/2024	13.6

*Filter paper damaged.

Extraordinary event – widespread dust storm on day of sampling

#1 High reading at background monitoring site R4 not attributable to quarry – prevailing winds from the N to NNE on day of sampling and quarry located to the SE of R4. Corresponding levels at R1 on day of sampling 26.2 µg/m3.

#2 High reading at background monitoring site R4 not attributable to quarry – prevailing westerly winds on day of sampling and quarry located to the SE of R4. Corresponding levels at R1 on day of sampling 29.6 µg/m3.

#2 Extraordinary event – regional bushfires with heavy smoke on day of sampling

Development consent condition limits: the limits outlined in the Development Consent are detailed in Table 8.

Table 8 – Development Consent Conditions PM_{10} and $PM_{2.5}$ Limits

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a, d] 25 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	24 hour	[b] 25 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, d] 8 µg/m^3

a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development.

c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

Compliance: the results for the reporting period comply with the EPL and development consent.

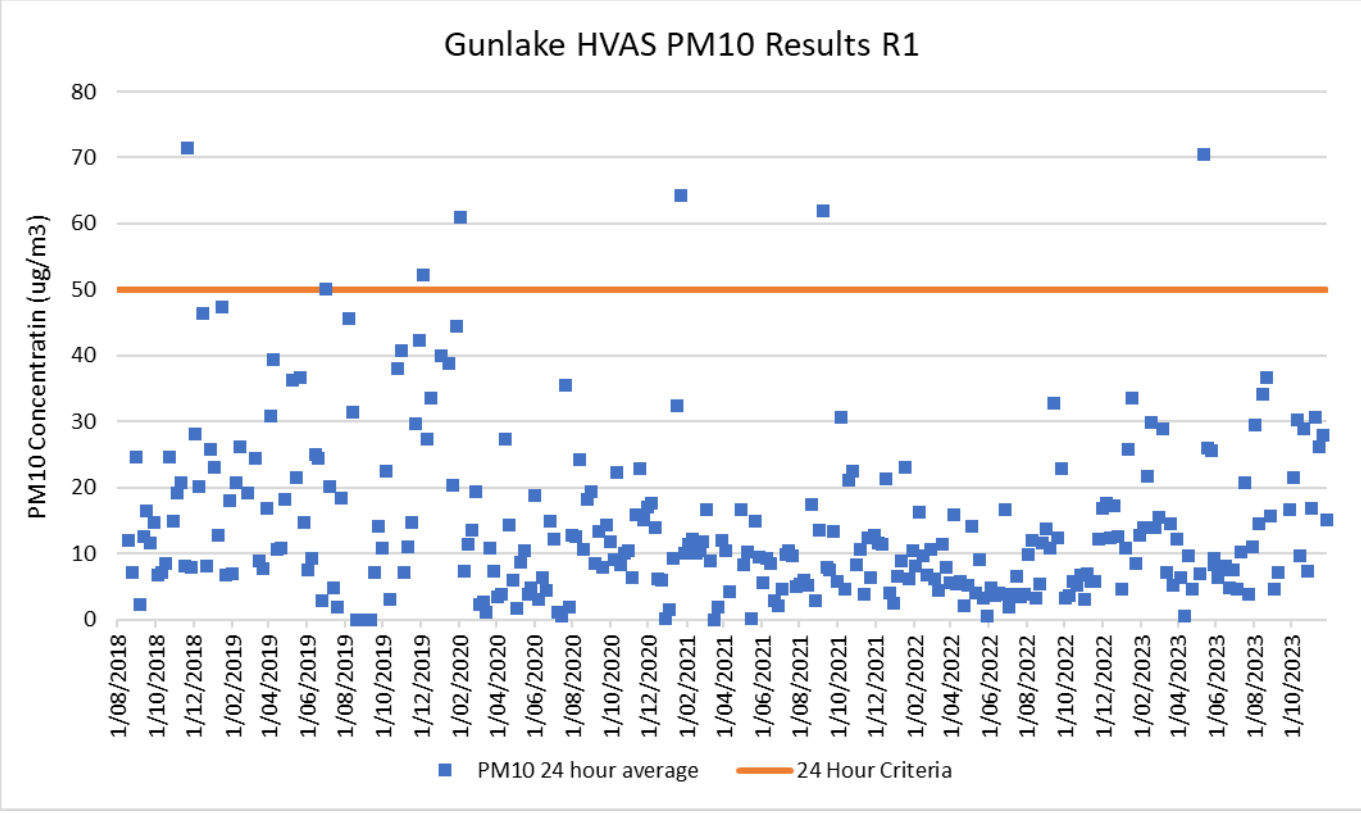


Figure 3 – HVAS PM10 Monitoring Results for R1

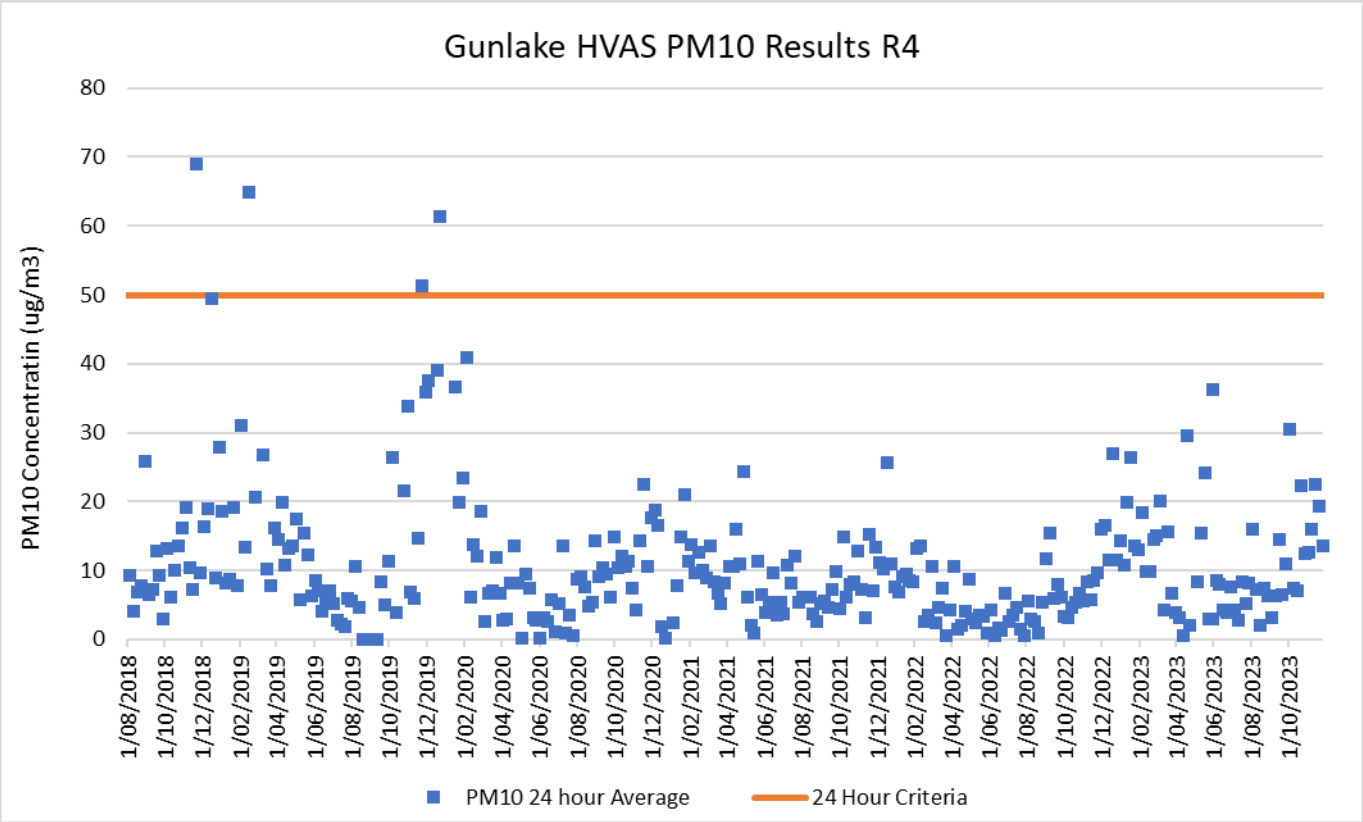


Figure 4 – HVAS PM10 Monitoring Results for R4

2.3 Atmospheric Dust – PM2.5

PM2.5 monitoring commenced at R1 on 13th September 2021, the results of which are provided in Table 9 and shown graphically in Figure 5.

Table 9 – $PM_{2.5}$ Monitoring Results (ug/m^2)

Date Sampled	Report Received	PM2.5 (µg/m³)
13/09/2021	7/10/2021	5.5
19/09/2021	7/10/2021	5.8
25/09/2021	7/10/2021	11.1
1/10/2021	16/12/2021	4.3
7/10/2021	16/12/2021	36.4*
13/10/2021	16/12/2021	2.6
19/10/2021	16/12/2021	25.2*
25/10/2021	16/12/2021	27.2*
31/10/2021	16/12/2021	6.6
6/11/2021	22/12/2021	9.1
12/11/2021	22/12/2021	5.6
18/11/2021	22/12/2021	10.4
24/11/2021	22/12/2021	6
30/11/2021	22/12/2021	7.8

Date Sampled	Report Received	PM2.5 (µg/m^3)
6/12/2021	20/01/2022	7.4
12/12/2021	20/01/2022	9.3
18/12/2021	20/01/2022	18.9
24/12/2021	17/02/2022	6.4
30/12/2021	17/02/2022	4.8
5/01/2022	17/02/2022	5.4
11/01/2022	17/02/2022	6.3
17/01/2022	17/02/2022	20
23/01/2022	17/02/2022	6.1
29/3/2022	17/02/2022	7
4/02/2022	17/02/2022	5
10/02/2022	22/02/2022	9.6
16/02/2022	18/03/2022	5.5
22/02/2022	18/03/2022	3
28/02/2022	18/03/2022	6.9
6/03/2022	04/05/2022	5.9
12/03/2022	04/05/2022	0.5
18/03/2022	04/05/2022	7.8
24/03/2022	04/05/2022	3.8
30/03/2022	04/05/2022	2.6
5/04/2022	04/05/2022	11.2
11/04/2022	19/05/2022	7.3
17/04/2022	19/05/2022	5.3
23/04/2022	19/05/2022	3.9
29/04/2022	19/05/2022	1.4
5/05/2022	16/06/2022	7.8
11/05/2022	16/06/2022	0.5
17/05/2022	16/06/2022	2.6
23/05/2022	16/06/2022	0.5
29/05/2022	07/07/2022	0.5
4/06/2022	07/07/2022	3.3
10/06/2022	07/07/2022	1.6
16/06/2022	07/07/2022	0.5
22/06/2022	07/07/2022	0.5
28/06/2022	07/07/2022	9.5
4/07/2022	08/08/2022	<1.0
10/07/2022	08/08/2022	2.1
16/07/2022	08/08/2022	<1.0

Date Sampled	Report Received	PM2.5 (µg/m^3)
22/07/2022	08/08/2022	1.5
28/07/2022	13/09/2022	2.5
03/08/2022	13/09/2022	8.3
9/08/2022	13/09/2022	5.6
15/08/2022	13/09/2022	2.7
21/08/2022	13/09/2022	4.2
27/08/2022	13/10/2022	5.2
2/09/2022	13/10/2022	4.8
8/09/2022	13/10/2022	8.5
14/09/2022	13/10/2022	6.2
20/09/2022	13/10/2022	5.4
26/09/2022	13/10/2022	10
2/10/2022	16/11/2022	1.3
8/10/2022	16/11/2022	4.1
14/10/2022	16/11/2022	2.9
20/10/2022	16/11/2022	3.4
26/10/2022	16/11/2022	3.9
1/11/2022	16/12/2022	1.9
7/11/2022	16/12/2022	3.0
13/11/2022	16/12/2022	6.5
19/11/2022	16/12/2022	6.5
25/11/2022	16/12/2022	11.4
01/12/2022	11/01/2023	10.2
07/12/2022	11/01/2023	14.8
13/12/2022	11/01/2023	13.0
19/12/2022	11/01/2023	10.0
25/12/2022	11/01/2023	11.1
31/12/2022	15/02/2023	N/A[#]
6/01/2023	15/02/2023	4.2
12/01/2023	15/02/2023	19.5
18/01/2023	15/02/2023	27.8[#1]
24/01/2023	15/02/2023	8.7
30/01/2023	17/03/2023	10.2
5/02/2023	17/03/2023	10.2
11/02/2023	17/03/2023	13.4
17/02/2023	17/03/2023	18.5
23/02/2023	17/03/2023	6.7
1/03/2023	18/04/2023	9.2

Date Sampled	Report Received	PM2.5 (µg/m^3)
7/03/2023	18/04/2023	15.3
13/03/2023	18/04/2023	2.6
19/03/2023	18/04/2023	11.2
25/03/2023	18/04/2023	1.2
31/03/2023	19/06/2023	6.4
6/04/2023	19/06/2023	5.5
12/04/2023	19/06/2023	<1.0
18/04/2023	19/06/2023	4.7
24/04/2023	20/07/2023	3.5
30/04/2023	20/07/2023	5.6
6/05/2023	20/07/2023	6.5
12/05/2023	20/07/2023	32.7
18/05/2023	20/07/2023	20.6
24/05/2023	20/07/2023	10.2
30/05/2023	20/07/2023	5.5
5/06/2023	20/07/2023	1.6
11/06/2023	20/07/2023	4.5
17/06/2023	20/07/2023	4.0
23/06/2023	20/07/2023	4.7
29/06/2023	20/07/2023	3.6
5/07/2023	31/08/2023	<1
11/07/2023	31/08/2023	8.9
17/07/2023	31/08/2023	12.3
23/07/2023	31/08/2023	4.4
29/07/2023	31/08/2023	7.0
4/08/2023	21/09/2023	11.7
10/08/2023	21/09/2023	15.1
16/08/2023	21/09/2023	5.9
22/08/2023	21/09/2023	9.6
28/08/2023	21/09/2023	11.8
3/09/2023	21/09/2023	3.6
9/09/2023	20/10/2023	6.7
15/09/2023	20/10/2023	N/A[#2]
21/09/2023	20/10/2023	N/A[#2]
27/09/2023	20/10/2023	14.8
3/10/2023	20/10/2023	21.3
9/10/2023	30/11/2023	40.6*
15/10/2023	30/11/2023	10.0

Date Sampled	Report Received	PM2.5 (µg/m³)
21/10/2023	30/11/2023	17.8
27/10/2023	30/11/2023	7.3
2/11/2023	5/1/2024	11.2
8/11/2023	5/1/2024	18.6
14/11/2023	5/1/2024	18.4
20/11/2023	5/1/2024	32.4*
26/11/2023	5/1/2024	16.4

*Invalid result. Corresponding PM10 results for same periods at same location were lower than PM2.5 results.

Invalid result, HVAS unit operation error. Quarry closed.

#1 high concentration not attributable to quarry. HVAS located to northeast of the quarry and prevailing winds during the monitoring period were from the northeast.

#2 system error, result invalid.

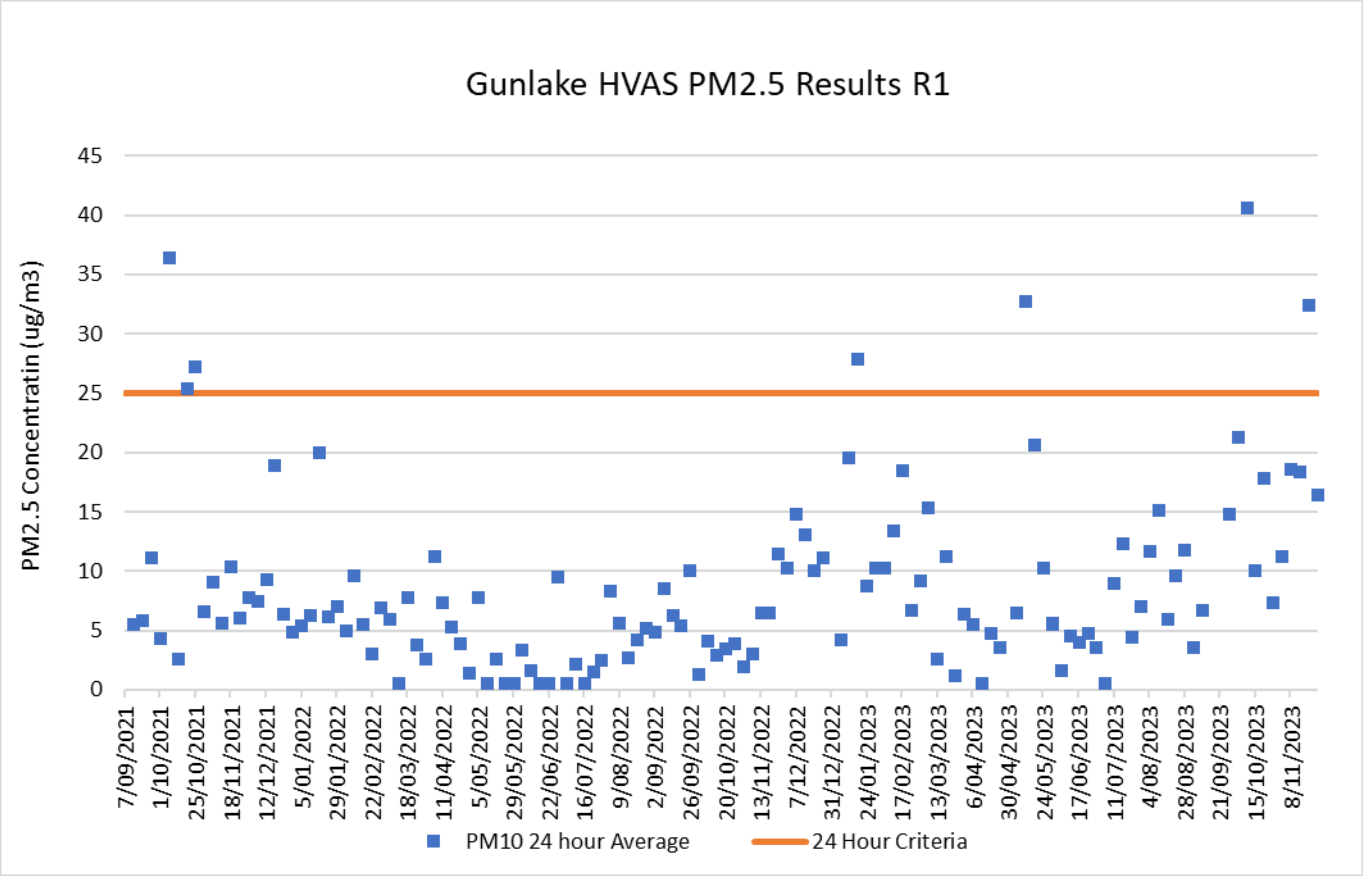


Figure 5 – HVAS PM2.5 Monitoring Results

Compliance: monitoring results comply with the criteria in Table 8.

3. BLAST MONITORING

Airblast Overpressure and the Ground Vibration level are required to be monitored for all blasts undertaken at the quarry.

Levels are recorded at the nearest sensitive receptor Lot 575 Brayton Rd. The results recorded for the blast monitoring are included in Table 10.

Table 10 –Blast Monitoring Results

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
3/9/2018	13.36	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
3/9/2018	13.43	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
17/9/2018	14.58	Lot 575 Brayton Rd	112.0	0.86
25/9/2018	13.43	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
28/9/2018	12.02	Lot 575 Brayton Rd	101.0	1.02
5/10/2018	14.19	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
12/10/2018	12.00	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
19/10/2018	11.23	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
26/10/2018	13.08	Lot 575 Brayton Rd	111.8	0.95
2/11/2018	11.55	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
9/11/2018	11.32	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
26/11/2018	12.00	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
30/11/2018	12.22	Lot 575 Brayton Rd	107	1.5
11/12/2018	14.49	Lot 575 Brayton Rd	105.5	0.751
29/01/2019	12.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
1/02/2019	12.49	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
15/02/2019	12.53	Lot 575 Brayton Rd	109.5	0.696
22/02/2019	9.58	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
1/03/2019	10.40	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
15/03/2019	12.41	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
29/03/2019	13.58	Lot 575 Brayton Rd	111.5	0.925
12/04/2019	12.45	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
26/04/2019	11.01	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
10/05/2019	14.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
20/05/2019	12.19	Lot 575 Brayton Rd	111.2	0.751
31/05/2019	14.04	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
7/06/2019	9.26	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
14/06/2019	12.12	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
14/06/2019	12.12	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
21/06/2019	14.18	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
5/07/2019	12.34	Lot 575 Brayton Rd	104.2	0.582
18/07/2019	14.02	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
26/07/2019	11.07	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
2/08/2019	11.09	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
13/08/2019	12.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
19/08/2019	14.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
20/08/2019	2.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
30/08/2019	3.08	Lot 575 Brayton Rd	112.6	1.264
6/09/2019	11.06	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
13/09/2019	11.59	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
20/09/2019	13.04	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
4/10/2019	13.26	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
18/10/2019	11:58	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
25/10/2019	11:58	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
1/11/2019	10:32	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
11/11/2019	12:03	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
18/11/2019	10:32	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
22/11/2019	12:39	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
6/12/2019	12:41	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
17/1/2020	11:25	Lot 575 Brayton Rd	109.9	0.933
31/1/2020	10:41	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
25/2/2020	12:56	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
6/3/2020	13:47	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
13/3/2020	13:41	Lot 575 Brayton Rd	107.5	0.568
20/4/2020	12:07	Lot 575 Brayton Rd	114.8	1.442
8/5/2020	13:18	Lot 575 Brayton Rd	114.8	0.950
22/5/2020	11:03	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
29/5/2020	14:01	Lot 575 Brayton Rd	114.4	1.164
9/6/2020	14:07	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
12/6/2020	13:30	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
26/6/2020	10:57	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
3/7/2020	10:57	Lot 575 Brayton Rd	113.3.	0.852
24/7/2020	14.02	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
7/8/2020	15.33	Lot 575 Brayton Rd	100.0	0.539
21/8/2020	12.18	Lot 575 Brayton Rd	108	0.730
28/8/2020	14.02	Lot 575 Brayton Rd	101.9	0.741
4/9/2020	14.35	Lot 575 Brayton Rd	110.0	0.524
11/9/2020	11.59	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
29/9/2020	14.11	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
9/10/2020	12.10	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
16/10/2020	11.44	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
20/10/2020	11.47	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
23/10/2020	12.04	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
6/11/2020	12.10	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
13/11/2020	14.24	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
20/11/2020	12.11	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
27/11/2020	12.12	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
4/12/2020	13.51	Lot 575 Brayton Rd	111.2	1.164
18/12/2020	14.24	Lot 575 Brayton Rd	113.3	0.696
15/1/2021	12.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
22/1/2021	14.23	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
5/2/2021	12.05	Lot 575 Brayton Rd	97.5	0.852
12/2/2021	10.26	Lot 575 Brayton Rd	108.4	0.568
19/2/2021	11.59	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
26/2/2021	15.23	Lot 575 Brayton Rd	98.8	0.508
5/3/2021	9.56	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
12/3/2021	13.10	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
24/3/2021	14.38	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
9/4/2021	13.33	Lot 575 Brayton Rd	114.8	1.4
21/4/2021	14.29	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
28/4/2021	11.51	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
30/4/2021	14.12	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
30/4/2021	14.36	Lot 575 Brayton Rd	98.8	0.539
12/5/2021	12.40	Lot 575 Brayton Rd	101.9	0.582
14/5/2021	13.56	Lot 575 Brayton Rd	105.5	0.635
21/5/2021	12.21	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
28/5/2021	12.54	Lot 575 Brayton Rd	107	0.524
9/6/2021	14.02	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
18/6/2021	11.58	Lot 575 Brayton Rd	106.5	0.582
25/6/2021	12.18	Lot 575 Brayton Rd	113.1	1.212
7/7/2021	14.28	Lot 575 Brayton Rd	103.5	0.524
16/7/2021	11.30	Lot 575 Brayton Rd	108.0	0.813
23/7/2021	9.57	Lot 575 Brayton Rd	94.0	0.539
30/7/2021	11.38	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
13/8/2021	13.07	Lot 575 Brayton Rd	107.5	0.861
10/9/2021	12.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
22/9/2021	12.21	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
1/10/2021	12.52	Lot 575 Brayton Rd	113.8	0.852
8/10/2021	12.02	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
18/10/2021	14.37	Lot 575 Brayton Rd	111.2	0.635

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
27/10/2021	13.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
5/11/2021	15.20	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
3/12/2021	11.13	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
10/12/2021	11.55	Lot 575 Brayton Rd	108.8	0.741
17/12/2021	11.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
19/12/2021	14.47	Lot 575 Brayton Rd	111.8	0.684
14/01/2022	14.43	Lot 575 Brayton Rd	107	1.055
28/01/2022	13.30	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
4/02/2022	12.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
11/02/2022	12.16	Lot 575 Brayton Rd	112.8	0.730
24/02/2022	13.00	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
2/03/2022	12.07	Lot 575 Brayton Rd	107	1.276
3/03/2022	13.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
16/03/2022	11.57	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
25/03/2022	12.07	Lot 575 Brayton Rd	105.5	0.582
4/04/2022	13.27	Lot 575 Brayton Rd	110.0	0.684
22/04/2022	12.57	Lot 575 Brayton Rd	101.0	1.403
6/05/2022	11.57	Lot 575 Brayton Rd	104.9	0.718
13/05/2022	13.27	Lot 575 Brayton Rd	113.1	0.660
20/05/2022	12.07	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
27/05/2022	11.57	Lot 575 Brayton Rd	104.2	1.178
6/06/2022	13.26	Lot 575 Brayton Rd	102.8	0.524
10/06/2022	12.59	Lot 575 Brayton Rd	114.2	0.568
17/06/2022	11.56	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
24/06/2022	12.02	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
1/07/2022	13.01	Lot 575 Brayton Rd	111.8	1.231
8/7/2022	13.38	Lot 575 Brayton Rd	109.5	0.660
15/07/2022	12.01	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
22/07/2022	14.38	Lot 575 Brayton Rd	104.2	0.524
29/07/2022	12.29	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
05/08/2022	13.26	Lot 575 Brayton Rd	110.6	0.539
12/08/2022	10.24	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
19/08/2022	11.53	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
02/09/2022	14.04	Lot 575 Brayton Rd	109.5	0.582
09/09/2022	13.04	Lot 575 Brayton Rd	106.0	1.656
16/09/2022	15.04	Lot 575 Brayton Rd	104.9	0.696
30/09/2022	11.14	Lot 575 Brayton Rd	104.9	1.616
14/10/2022	12.32	Lot 575 Brayton Rd	116.7	0.648
28/10/2022	12.57	Lot 575 Brayton Rd	110.2	2.178

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
11/11/2022	11.57	Lot 575 Brayton Rd	101.0	0.684
18/11/2022	10.28	Lot 575 Brayton Rd	101.9	0.648
25/11/2022	14.10	Lot 575 Brayton Rd	104.9	1.631
02/12/2022	14.08	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
09/12/2022	12.42	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
20/1/2023	12.31	Lot 575 Brayton Rd	101.9	0.842
27/1/2023	13.10	Lot 575 Brayton Rd	95.9	0.783
10/2/2023	14.26	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
17/2/2023	12.26	Lot 575 Brayton Rd	95.9	0.783
24/2/2023	12.42	Lot 575 Brayton Rd	95.9	0.783
03/3/2023	13.22	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
10/3/2023	13.05	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
17/3/2023	13.22	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
24/3/2023	13.59	Lot 575 Brayton Rd	97.5	0.967
31/3/2023	12.05	Lot 575 Brayton Rd	106.0	2.166
6/4/2023	11.58	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
14/4/2023	13.10	Lot 575 Brayton Rd	Nil Trigger	1.823
21/4/2023	12.48	Lot 575 Brayton Rd	101.9	0.783
28/4/2023	12.53	Lot 575 Brayton Rd	106.5	1.796
05/5/2023	15.03	Lot 575 Brayton Rd	104.9	0.684
12/5/2023	13.26	Lot 575 Brayton Rd	108.8	0.660
19/5/2023	13.41	Lot 575 Brayton Rd	107.5	1.529
26/5/2023	13.59	Lot 575 Brayton Rd	105.5	1.454
2/6/2023	13.04	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
9/6/2023	12.54	Lot 575 Brayton Rd	108.8	0.622
16/6/2023	14.08	Lot 575 Brayton Rd	104.9	1.550
23/6/2023	15.14	Lot 575 Brayton Rd	Nil Trigger	0.730
29/6/2023	13.55	Lot 575 Brayton Rd	106.0	0.539
30/6/2023	14.30	Lot 575 Brayton Rd	104.2	2.071
07/7/2023	13.31	Lot 575 Brayton Rd	101.9	0.684
14/7/2023	12.59	Lot 575 Brayton Rd	102.8	1.535
21/7/2023	12.34	Lot 575 Brayton Rd	110.2	0.741
24/7/2023	13.28	Lot 575 Brayton Rd	102.8	0.696
28/7/2023	13.30	Lot 575 Brayton Rd	109.9	1.988
04/8/2023	11.29	Lot 575 Brayton Rd	114.2	0.220
11/8/2023	12.33	Lot 575 Brayton Rd	106.5	1.085
18/8/2023	12.59	Lot 575 Brayton Rd	106.0	0.684
25/8/2023	12.49	Lot 575 Brayton Rd	101.0	0.660
1/9/2023	12.16	Lot 575 Brayton Rd	108.8	2.067

Date	Time	Location	Airblast Overpressure (dB (Lin Peak))	Ground Vibration Level (mm/s)
8/9/2023	12.59	Lot 575 Brayton Rd	106.5	1.836
15/9/2023	14.56	Lot 575 Brayton Rd	107.5	0.554
22/9/2023	12.03	Lot 575 Brayton Rd	97.5	0.635
29/9/2023	12.54	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
6/10/2023	09.54	Lot 575 Brayton Rd	101.0	0.684
13/10/2023	12.14	Lot 575 Brayton Rd	101.9	0.524
20/10/2023	12.27	Lot 575 Brayton Rd	108.4	0.823
3/11/2023	12.27	Lot 575 Brayton Rd	Nil Trigger	Nil Trigger
10/11/2023	10.57	Lot 575 Brayton Rd	95.9	0.582
17/11/2023	12.31	Lot 575 Brayton Rd	103.5	1.157
1/12/2023	11.58	Lot 575 Brayton Rd	108.0	1.448
7/12/2023	13.00	Lot 575 Brayton Rd	100.0	0.803
15/12/2023	13.00	Lot 575 Brayton Rd	102.8	0.751
11/1/2024	14.18	Lot 575 Brayton Rd	106.0	0.554

EPL13012 and Development Consent condition limits: Tables 11 and 12 outline the limits for Airblast Overpressure and Ground Vibration level.

Table 11 – Airblast Overpressure Impact Assessment Criteria for Residences on Privately Owned Land

Receiver	***Airblast Overpressure Level (dB(Lin Peak))***	***Allowable Exceedance***
Any residence on privately-owned land	115	5% of the total number of blasts over a period of 12 months
	120	0%

Table 12 –Vibration Impact Assessment Criteria for Residences on Privately Owned Land

Receiver	***Ground Vibration Level (mm/s)***	***Allowable Exceedance***
Any residence on privately-owned land	5	5% of the total number of blasts over a period of 12 months
	10	0%

Compliance: The results from the blast monitoring show that there have been no exceedances of the limits outlined in the above tables in the reporting period.

4. GROUNDWATER MONITORING

Groundwater monitoring us currently undertaken on a quarerly basis at Gunlake, from two monitoring bores located around the quarry. These are referred to as GM 6 (point 7), GM 13 (point 8). Tables 13 to 16 show the results of the water quality monitoring undertaken.

Table 13 –Groundwater Quality Monitoring Results GM 6 (Point 7)

Parameter	Unit of Measure	Sample Date: 25/9/18	Sample Date: 20/12/18	Sample Date: 02/4/19	Sample Date: 02/7/19	Sample Date: 26/9/19	Sample Date: 10/12/19	Sample Date: 10/03/20	Sample Date: 9/06/2020	Sample Date: 01/09/20
pH	pH units	6.84	6.97	7.21	6.83	6.99	7.01	6.43	6.75	6.98
Electrical Conductivity	µS/cm	254	176	201	230	281	294	289	280	206
Total Dissolved Solids	mg/L	165	114	131	150	183		188	182	134
Hardness	mg/L	58	49	55	62	71	80	55	62	40
Chloride	mg/L	24	20	20	24	30	35	32	34	42
Sulfate	mg/L	<5	<1	1	2	<1	<1	6	6	3
Bicarbonate alkalinity	mg/L	90	60	66	79	88	93	42	67	33
Carbonate alkalinity	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide alkalinity	Mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total alkalinity	mg/L	90	60	66	79	88	93	42	67	33
Calcium	mg/L	10	8	9	10	12	14	9	10	6
Iron (dissolved)	mg/L	1.09	0.26	1.94	2.61	0.58	2.0	0.1	0.07	<0.05
Magnesium	mg/L	8	7	8	9	10	11	8	9	6
Potassium	mg/L	3	5	4	4	4	4	5	29	4
Sodium	mg/L	24	21	22	24	25	28	28	5	30
Iron (total)	mg/L	3.85	1.79	4.55	4.91	2.65	5.28	3.72	1.64	0.51
Arsenic	mg/L	0.003	0.002	0.002	0.002	0.001	0.002	0.001	<0.001	<0.001
Cadmium	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.0001	<0.0001
Chromium	mg/L	0.003	0.002	0.003	0.003	0.003	0.003	0.007	0.003	0.003
Copper	mg/L	0.007	0.011	0.006	0.007	0.005	0.004	0.023	0.006	0.006
Lead	mg/L	0.012	0.007	0.009	0.008	0.004	0.005	0.023	0.011	0.002
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.022	0.012	0.015	0.016	0.014	0.014	0.011	0.012	0.032
Zinc	mg/L	0.006	0.047	0.029	0.038	0.012	0.012	0.047	0.017	0.03
Ammonia as N	mg/L	0.17	0.6	0.67	0.61	0.45	0.38	0.11	<0.01	<0.01
Nitrite as N	mg/L	<0.01	0.01	0.02	<0.01	<0.01	0.15	<0.01	0.03	<0.01
Nitrate as N	mg/L	0.33	0.57	0.13	0.3	0.11	0.15	7.27	2.07	0.16

Parameter	Unit of Measure	Sample Date: 25/9/18	Sample Date: 20/12/18	Sample Date: 02/4/19	Sample Date: 02/7/19	Sample Date: 26/9/19	Sample Date: 10/12/19	Sample Date: 10/03/20	Sample Date: 9/06/2020	Sample Date: 01/09/20
Total Phosphorus as P	mg/L	0.11	0.21	0.25	0.08	0.04	0.04	0.09	0.1	0.06
Reactive Phosphorus	mg/L	<0.01	0.09	0.07	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 14 –Groundwater Quality Monitoring Results GM 6 (Point 7) (continued)

Parameter	Unit of Measure	Sample Date: 16/03/2021	Sample Date: 15/06/2021	Sample Date: 01/09/2021	Sample Date: 07/12/2021	Sample Date: 27/04/2022	Sample Date: 21/09/2022	Sample Date: 7/12/2022	Sample Date: 27/04/23	Sample Date: 12/07/23	Sample Date: 6/10/23
pH	pH units	7.03	6.34	6.24	6.62	6.80	6.68	7.12	7.99	6.61	6.98
Electrical Conductivity	µS/cm	239	165	177	192	386	341	316	258	289	303
Total Dissolved Solids	mg/L	155	107	115	125	125				294	264
Hardness	mg/L	49	33	29	40	67	47	47	85	47	50
Sulfate	mg/L	3	5	7	7	10	23	29	<1	26	29
Calcium	mg/L	8	5	5	6	12	9	9	24	9	10
Iron (dissolved)	mg/L	1.73	0.12	0.14	0.12	0.07	0.17	0.76	0.21	2.55	0.83
Magnesium	mg/L	7	5	4	6	9	6	6	6	6	6
Potassium	mg/L	4	4	3	4	6	5	4	4	4	4
Sodium	mg/L	27	22	21	24	41	51	45	19	43	2.53
Iron (total)	mg/L	4.24	0.54	0.53	0.87	0.87	0.117			3.30	1.73
Arsenic	mg/L	0.002	<0.0001	0.001	0.002	<0.001	0.001	0.002	<0.001	0.003	0.002
Cadmium	mg/L	0.0004	0.0001	<0.0001	<0.0001	0.0003	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.005	0.002	0.002	0.002	<0.001	0.0028	0.002	<0.001	0.002	0.002
Copper	mg/L	0.005	0.009	0.010	0.003	0.002	0.005	0.003	0.005	0.004	0.006
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.019	0.008	0.007	0.007	0.005	0.008	0.009	0.004	0.009	0.010
Zinc	mg/L	0.03	0.013	0.014	0.012	0.008	0.040	0.012	<0.005	0.015	0.009
Ammonia as N	mg/L	0.06	<0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.11	0.06
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04
Nitrate as N	mg/L	0.14	0.5	0.18	0.46	0.76	0.76	0.09	0.30	<0.05	0.30
Total Phosphorus as P	mg/L	0.2	0.09	0.06	0.07	0.04	0.04	0.12	0.07	0.26	0.08

Table 15 – Groundwater Quality Monitoring Results GM 13 (Point 8)

Parameter	Unit of Measure	Sample Date: 25/9/18	Sample Date: 20/12/18	Sample Date: 02/4/19	Sample Date: 02/7/19	Sample Date: 26/9/19	Sample Date: 10/12/19	Sample Date: 10/03/20	Sample Date: 9/06/2020	Sample Date: 01/09/20
pH	pH units	7.29	7.33	7.64	7.07	7.52	7.32	7.11	7.08	7.54
Electrical Conductivity	µS/cm	1640	2380	2340	3700	2840	5040	1230	2400	618
Total Dissolved Solids	mg/L	1070	1550	1520	2400	1850	3280	800	1560	402
Hardness	mg/L	548	763	672	1180	994	1770	371	763	175
Chloride	mg/L	384	582	545	937	844	1440	280	636	154
Sulfate	mg/L	11	10	11	12	10	15	7	8	6
Bicarbonate alkalinity	mg/L	282	292	235	325	283	409	174	194	90
Carbonate alkalinity	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide alkalinity	Mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total alkalinity	mg/L	282	292	235	325	283	409	174	194	90
Calcium	mg/L	104	144	124	206	177	308	63	134	32
Iron (dissolved)	mg/L	0.05	0.06	0.11	0.54	0.33	0.32	<0.05	<0.05	<0.05
Magnesium	mg/L	70	98	88	163	134	244	52	104	23
Potassium	mg/L	9	12	10	14	12	17	7	152	4
Sodium	mg/L	120	165	149	243	208	338	102	9	52
Iron (total)	mg/L	0.1	0.06	0.2	1.13	0.47	0.71	0.64	0.23	0.3
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0003	<0.0001
Chromium	mg/L	<0.001	0.001	0.001	0.008	0.003	0.003	0.002	0.001	0.001
Copper	mg/L	0.008	0.015	0.011	0.027	0.013	0.015	0.009	0.006	0.007
Lead	mg/L	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001
Nickel	mg/L	0.037	0.013	0.014	0.032	0.018	0.013	0.004	0.005	0.003
Zinc	mg/L	0.006	0.093	0.033	0.156	0.033	0.052	0.014	0.015	0.011
Ammonia as N	mg/L	0.06	0.1	0.04	0.25	0.17	0.22	0.1	0.98	<0.01
Nitrite as N	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	0.03	<0.01
Nitrate as N	mg/L	0.2	0.16	0.26	0.06	0.14	0.15	14.2	15.2	1.46
Total Phosphorus as P	mg/L	0.01	<0.01	<0.01	0.03	0.01	0.01	0.01	<0.01	0.01
Reactive Phosphorus	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 16 – Groundwater Quality Monitoring Results GM 13 (Point 8) (continued)

Parameter	Unit of Measure	Sample Date: 15/12/20	Sample Date: 16/03/21	Sample Date: 15/06/21	Sample Date: 01/09/21	Sample Date: 07/12/21	Sample Date: 27/04/22	Sample Date: 21/09/22	Sample Date: 07/12/22	Sample Date: 27/04/23	Sample Date: 12/07/23	Sample Date: 6/10/23
pH	pH units	7.44	7.55	7.22	6.83	6.74	7.27	7.32	7.50	7.52	7.31	7.80
Electrical Conductivity	µS/cm	4100	1700	454	823	185	175	166	196	326	257	289
Total Dissolved Solids	mg/L	2660	1100	295	535	120	120				217	238
Hardness	mg/L	1350	517	149	255	64	65	56	66	47	96	103
Sulfate	mg/L	15	9	10	16	<1	<10	9	3	29	4	<1
Calcium	mg/L	243	90	30	51	14	16	14	18	9	27	28
Iron (dissolved)	mg/L	<0.05	<0.05	0.08	<0.05	0.21	0.28	0.32	0.29	0.73	0.24	0.21
Magnesium	mg/L	181	71	18	31	7	6	5	5	6	7	8
Potassium	mg/L	11	6	7	6	3	3	3	3	5	4	4
Sodium	mg/L	252	110	38	55	19	17	21	18	46	20	0.9
Iron (total)	mg/L	0.81	1.08	1.74	0.94	1.15	1.15	1.22			0.38	0.33
Arsenic	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002	<0.001	<0.001
Cadmium	mg/L	0.0005	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.002	0.003	0.003	0.002	0.002	0.001	0.002	0.001	0.002	<.001	<0.001
Copper	mg/L	0.005	0.014	0.012	0.007	0.01	0.005	0.005	0.004	0.004	0.006	0.007
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.038	0.011	0.006	0.007	0.007	0.006	0.004	0.004	0.010	0.006	0.006
Zinc	mg/L	0.013	0.018	0.019	0.011	0.011	0.005	0.008	0.005	0.009	<0.005	<0.005
Ammonia as N	mg/L	<0.01	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02
Nitrite as N	mg/L	0.05	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate as N	mg/L	0.99	1.39	0.05	0.11	0.11	0.06	0.19	0.17	0.35	1.73	0.40
Total Phosphorus as P	mg/L	0.01	0.04	0.07	0.02	0.07	0.04	0.04	0.11	0.06	0.04	<0.01

5. SURFACE WATER MONITORING

Gunlake Quarry undertakes regular monitoring of surface water quality within Chapman's Creek. Under the original Project Approval monitoring was undertaken at three sites within the project boundary. The Figure in **Appendix 1** shows the location of these surface water monitoring sites, which are identified as Sites D, O and I. Monitoring of surface water sites PWD, PDD, RW1 (formerly Site 0) and RW2 has been required since June 2018 following approval of the Gunlake Extension Project. These sites comprise the surface water monitoring network as required by the Gunlake Extension Project SSD Development Consent (2017/00108663). PDD is the pit dewatering dam which has not been constructed as yet and hence no monitoring at this site is currently undertaken but monitoring of the drop cut is being undertaken in the interim. The results from surface water monitoring are shown in Tables 17 to 38. Chapman's Creek flows intermittently and for the majority of the time in the upper reaches of the Gunlake property it is dry (site I). It is only in the lower sections of the creek within the project boundary that pools appear, which tend to dry rapidly in periods of dry weather. Chapman's Creek flows into Joaramin Creek approximately 1.4 km downstream from the Gunlake project boundary, and Joaramin Creek eventually flows into the Wollondilly River.

Table 17 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 27/09/2018)

Analyte	Units	RW1	RW2 (DRY)	PWD
pH	pH units	7.81		9.17
Electrical Conductivity	uS/cm	537		856
Total Suspended Soilds (TSS)	mg/L	68		32
Total Dissolved Solids (TDS)	mg/L	349		556
Total Phosphorus as P (TP)	mg/L	<0.01		<0.01
Total Nitrogen as N (TN)	mg/L	1.1		3.8
Dissolved Oxygen (DO)	mg/L	7.7		9.3
Turbidity	NTU	74.2		29.3
Chloride	mg/L	92		154
Calcium	mg/L	22		18
Magnesium	mg/L	17		25
Sodium	mg/L	44		106
Potassium	mg/L	4		7
Total Aluminium	mg/L	1.79		1.31
Total Arsenic	mg/L	<0.001		<0.001
Total Cobalt	mg/L	<0.001		<0.001
Total Copper	mg/L	0.003		0.004
Total Manganese	mg/L	0.116		0.083
Total Nickel	mg/L	<0.001		<0.001
Total Zinc	mg/L	0.01		<0.005
Total Iron	mg/L	1.28		10.5
Oil and Grease	visual inspection	None visible		None visible

Table 18 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 29/11/2018)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.53	7.79	8.39	8.09
Electrical Conductivity	uS/cm	850	1530	374	1260
Total Suspended Soilds (TSS)	mg/L	194	30	150	14
Total Dissolved Solids (TDS)	mg/L	552	994	243	819
Total Phosphorus as P (TP)	mg/L	0.14	0.07	0.08	0.01
Total Nitrogen as N (TN)	mg/L	1.8	2.2	4.3	11.1
Dissolved Oxygen (DO)	mg/L	9.2	9.4	9.3	9.4
Turbidity	NTU	312	59.5	347	24.3
Chloride	mg/L	259	480	54	349
Calcium	mg/L	23	39	9	42
Magnesium	mg/L	33	64	8	47
Sodium	mg/L	84	156	53	128
Potassium	mg/L	5	5	3	6
Total Aluminium	mg/L	14.8	3.15	12.6	1.12
Total Arsenic	mg/L	0.002	<0.001	0.002	<0.001
Total Cobalt	mg/L	0.005	0.001	0.005	<0.001
Total Copper	mg/L	0.01	0.003	0.007	0.003
Total Manganese	mg/L	0.224	0.115	0.232	0.032
Total Nickel	mg/L	0.007	0.002	0.005	0.001
Total Zinc	mg/L	0.027	0.006	0.034	<0.005
Total Iron	mg/L	11.3	2.26	10.7	0.88
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 19 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 02/4/2019)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.73	7.95	8.21	7.94
Electrical Conductivity	uS/cm	248	4730	518	882
Total Suspended Soilds (TSS)	mg/L	20	10	91	16
Total Dissolved Solids (TDS)	mg/L	161	3070	337	573
Total Phosphorus as P (TP)	mg/L	0.09	<0.01	0.09	0.04
Total Nitrogen as N (TN)	mg/L	0.9	0.6	6.1	5.4
Dissolved Oxygen (DO)	mg/L	6.3	7.4	8.6	8.8
Turbidity	NTU	32.7	1.1	118	7.3
Chloride	mg/L	39	1200	56	162
Calcium	mg/L	13	107	13	29
Magnesium	mg/L	9	172	12	27
Sodium	mg/L	24	428	75	75

Analyte	Units	RW1	RW2	PWD	Drop Cut
Potassium	mg/L	5	8	4	5
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	0.001	<0.001
Total Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.051	0.136	0.071	0.01
Total Nickel	mg/L	0.001	0.001	0.002	<0.001
Total Zinc	mg/L	0.007	<0.005	0.014	<0.005
Total Iron	mg/L	1.26	0.17	4.66	0.18
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 20 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 02/7/2019)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.34	7.98	8.01	8.56
Electrical Conductivity	uS/cm	1760	2860	360	933
Total Suspended Soilds (TSS)	mg/L	14	15	98	5
Total Dissolved Solids (TDS)	mg/L	1140	1860	234	606
Total Phosphorus as P (TP)	mg/L	0.01	<0.01	0.09	<0.01
Total Nitrogen as N (TN)	mg/L	0.8	6.6	3.6	5.8
Dissolved Oxygen (DO)	mg/L	12	11.3	11.3	11.6
Turbidity	NTU	3.9	0.9	218	0.9
Chloride	mg/L	481	733	44	216
Calcium	mg/L	50	67	9	34
Magnesium	mg/L	68	112	8	34
Sodium	mg/L	185	315	54	90
Potassium	mg/L	5	6	3	5
Total Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Total Cobalt	mg/L	<0.001	0.001	0.004	<0.001
Total Copper	mg/L	0.002	0.005	0.006	<0.001
Total Manganese	mg/L	0.011	0.006	0.202	0.006
Total Nickel	mg/L	<0.001	<0.001	0.003	<0.001
Total Zinc	mg/L	<0.005	<0.005	0.03	<0.005
Total Iron	mg/L	0.16	0.05	8.01	0.12
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 21 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 26/9/2019)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.31	7.91	7.83	7.54
Electrical Conductivity	uS/cm	1170	1010	2220	1440
Total Suspended Soilds (TSS)	mg/L	<5	20	11	17
Total Dissolved Solids (TDS)	mg/L	760	656	1440	936

Analyte	Units	RW1	RW2	PWD	Drop Cut
Total Phosphorus as P (TP)	mg/L	0.01	0.03	0.04	0.02
Total Nitrogen as N (TN)	mg/L	7	15	0.7	0.8
Dissolved Oxygen (DO)	mg/L	9.6	9.9	8.7	9.8
Turbidity	NTU	1.1	9	3.1	20.5
Chloride	mg/L	304	208	683	434
Calcium	mg/L	39	27	49	32
Magnesium	mg/L	41	37	85	55
Sodium	mg/L	101	133	215	130
Potassium	mg/L	5	6	5	4
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	0.002	<0.001	<0.001
Total Copper	mg/L	<0.001	0.001	0.002	0.002
Total Manganese	mg/L	0.004	0.024	0.051	0.035
Total Nickel	mg/L	<0.001	<0.001	0.002	0.002
Total Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Total Iron	mg/L	<0.05	0.24	0.08	0.77
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 22 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 10/12/2019)

Analyte	Units	RW1	RW2 (DRY)	PWD	Drop Cut
pH	pH units	7.94		8.18	8.26
Electrical Conductivity	uS/cm	2160		1360	1250
Total Suspended Soilds (TSS)	mg/L	18		10	6
Total Dissolved Solids (TDS)	mg/L	1400		884	812
Total Phosphorus as P (TP)	mg/L	0.01		<0.01	<0.01
Total Nitrogen as N (TN)	mg/L	1		2.1	3.5
Dissolved Oxygen (DO)	mg/L	8.7		9.5	9.8
Turbidity	NTU	14.1		6	4.8
Chloride	mg/L	638		368	318
Calcium	mg/L	56		39	45
Magnesium	mg/L	88		55	51
Sodium	mg/L	226		144	120
Potassium	mg/L	9		7	7
Total Arsenic	mg/L	0.002		0.001	<0.001
Total Cobalt	mg/L	<0.001		<0.001	<0.001
Total Copper	mg/L	0.002		0.002	0.001
Total Manganese	mg/L	0.13		0.025	0.026
Total Nickel	mg/L	0.001		<0.001	<0.001
Total Zinc	mg/L	<0.005		0.013	<0.005
Total Iron	mg/L	0.07		<0.05	<0.05

Analyte	Units	RW1	RW2 (DRY)	PWD	Drop Cut
Oil and Grease	visual inspection	None visible		None visible	None visible

Table 23 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 10/03/2020)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.03	7.76	7.67	7.24
Electrical Conductivity	uS/cm	1520	1200	659	415
Total Suspended Soilds (TSS)	mg/L	6	7	46	30
Total Dissolved Solids (TDS)	mg/L	988	780	428	270
Total Phosphorus as P (TP)	mg/L	0.01	0.04	0.02	0.05
Total Nitrogen as N (TN)	mg/L	4.2	2.2	13	6.7
Dissolved Oxygen (DO)	mg/L	8.6	8.5	8	7
Turbidity	NTU	4.3	11.3	78.6	171
Chloride	mg/L	405	289	61	54
Calcium	mg/L	40	28	11	11
Magnesium	mg/L	59	42	14	10
Sodium	mg/L	192	148	97	46
Potassium	mg/L	5	4	5	4
Total Arsenic	mg/L	<0.001	<0.001	0.002	0.001
Total Cobalt	mg/L	0.001	0.002	0.002	0.004
Total Copper	mg/L	<0.001	<0.001	0.005	0.009
Total Manganese	mg/L	0.029	0.075	0.07	0.078
Total Nickel	mg/L	0.001	0.001	0.002	0.001
Total Zinc	mg/L	<0.005	0.006	0.012	0.014
Total Iron	mg/L	0.17	0.34	2.44	6.8
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 24 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 09/06/2020)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.03	7.88	8.09	7.62
Electrical Conductivity	uS/cm	2990	2620	752	552
Total Suspended Soilds (TSS)	mg/L	<5	6	19	34
Total Dissolved Solids (TDS)	mg/L	1940	1700	489	359
Total Phosphorus as P (TP)	mg/L	<0.01	<0.01	0.01	0.05
Total Nitrogen as N (TN)	mg/L	0.6	0.3	11.4	8.6
Dissolved Oxygen (DO)	mg/L	11.5	11.1	11.4	11.7
Turbidity	NTU	1.3	0.9	26.2	29.7
Chloride	mg/L	801	698	74	72
Calcium	mg/L	80	67	17	18
Magnesium	mg/L	128	113	19	16
Sodium	mg/L	300	266	107	58

Analyte	Units	RW1	RW2	PWD	Drop Cut
Potassium	mg/L	5	5	6	4
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	0.002	0.001
Total Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.026	0.032	0.022	0.016
Total Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Total Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Total Iron	mg/L	<0.05	0.06	0.76	1.68
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 25 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 01/09/2020)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.16	8.26	8.26	7.88
Electrical Conductivity	uS/cm	967	884	586	481
Total Suspended Soilds (TSS)	mg/L	17	17	33	75
Total Dissolved Solids (TDS)	mg/L	628	575	381	313
Total Phosphorus as P (TP)	mg/L	0.03	0.02	0.02	0.02
Total Nitrogen as N (TN)	mg/L	4.6	5.8	9.1	8.2
Dissolved Oxygen (DO)	mg/L	9.8	10.4	10.4	9.4
Turbidity	NTU	10.7	9.5	27.5	92.7
Chloride	mg/L	212	179	73	68
Calcium	mg/L	29	22	11	16
Magnesium	mg/L	35	32	17	15
Sodium	mg/L	112	107	83	62
Potassium	mg/L	6	6	8	4
Total Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Total Cobalt	mg/L	0.001	0.001	0.002	0.002
Total Copper	mg/L	0.003	0.002	0.003	0.004
Total Manganese	mg/L	0.026	0.034	0.051	0.04
Total Nickel	mg/L	0.001	<0.001	<0.001	0.001
Total Zinc	mg/L	0.005	0.006	0.006	0.011
Total Iron	mg/L	0.46	0.38	1.06	2.49
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 26 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 15/12/2020)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.37	8.48	8	7.61
Electrical Conductivity	uS/cm	1340	1310	634	668
Total Suspended Soilds (TSS)	mg/L	7	6	28	24

Analyte	Units	RW1	RW2	PWD	Drop Cut
Total Dissolved Solids (TDS)	mg/L	871	852	412	434
Total Phosphorus as P (TP)	mg/L	<0.01	<0.01	<0.01	<0.01
Total Nitrogen as N (TN)	mg/L	1.2	0.8	7.2	9.1
Dissolved Oxygen (DO)	mg/L	8.9	8.9	8.4	8.6
Turbidity	NTU	2.7	2.6	28.5	18.5
Chloride	mg/L	297	266	76	117
Calcium	mg/L	33	28	14	23
Magnesium	mg/L	49	51	16	19
Sodium	mg/L	151	157	83	76
Potassium	mg/L	6	6	7	12
Total Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	0.001	0.001
Total Copper	mg/L	<0.001	<0.001	0.002	0.002
Total Manganese	mg/L	0.048	0.053	0.028	0.016
Total Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Total Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Total Iron	mg/L	0.16	0.16	1.07	0.94
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 27 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 16/03/2021)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.28	8.15	8.47	7.99
Electrical Conductivity	uS/cm	1360	1670	707	768
Total Suspended Soilds (TSS)	mg/L	10	9	10	<5
Total Dissolved Solids (TDS)	mg/L	884	1080	460	499
Total Phosphorus as P (TP)	mg/L	0.05	0.02	0.02	<0.01
Total Nitrogen as N (TN)	mg/L	0.6	2.3	6.6	8
Dissolved Oxygen (DO)	mg/L	8.6	8.7	8.6	7.6
Turbidity	NTU	9.6	7.3	19	6.1
Chloride	mg/L	294	380	101	131
Calcium	mg/L	36	43	16	26
Magnesium	mg/L	53	65	21	24
Sodium	mg/L	161	197	95	87
Potassium	mg/L	6	7	8	5
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	<0.001	0.001
Total Copper	mg/L	<0.001	<0.001	<0.001	0.002
Total Manganese	mg/L	0.046	0.109	0.024	0.008
Total Nickel	mg/L	0.001	0.001	<0.001	<0.001

Analyte	Units	RW1	RW2	PWD	Drop Cut
Total Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Total Iron	mg/L	0.61	0.47	0.63	0.21
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 28 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 15/06/2021)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.98	7.97	8.29	7.7
Electrical Conductivity	uS/cm	1370	1280	722	646
Total Suspended Soilds (TSS)	mg/L	<5	<5	8	5
Total Dissolved Solids (TDS)	mg/L	890	832	469	420
Total Phosphorus as P (TP)	mg/L	0.02	<0.01	<0.01	<0.01
Total Nitrogen as N (TN)	mg/L	2.3	4.6	9.3	8.3
Dissolved Oxygen (DO)	mg/L	10.2	10.3	11.2	9.6
Turbidity	NTU	6.7	7.3	14.4	10.7
Chloride	mg/L	302	268	96	99
Calcium	mg/L	43	37	16	24
Magnesium	mg/L	58	55	23	21
Sodium	mg/L	144	142	96	74
Potassium	mg/L	5	6	8	5
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	<0.001	<0.001
Total Copper	mg/L	<0.001	<0.001	<0.001	0.001
Total Manganese	mg/L	0.038	0.03	<0.001	0.011
Total Nickel	mg/L	<0.001	0.001	<0.001	<0.001
Total Zinc	mg/L	0.007	0.006	0.006	<0.005
Total Iron	mg/L	0.06	0.06	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 29 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 1/09/2021)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.18	7.31	7.33	6.88
Electrical Conductivity	uS/cm	984	961	689	732
Total Suspended Solids (TSS)	mg/L	8	11	<5	<5
Total Dissolved Solids (TDS)	mg/L	640	625	448	476
Total Phosphorus as P (TP)	mg/L	0.08	0.03	0.01	<0.01
Total Nitrogen as N (TN)	mg/L	2.0	2.8	7.1	8.1
Dissolved Oxygen (DO)	mg/L	11.7	11.7	11.6	11.2
Turbidity	NTU	21.6	26.6	6.4	4.8
Chloride	mg/L	236	221	101	128
Calcium	mg/L	30	26	16	26

Analyte	Units	RW1	RW2	PWD	Drop Cut
Magnesium	mg/L	37	36	21	22
Sodium	mg/L	97	96	80	72
Potassium	mg/L	4	4	7	4
Total Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L	<0.001	<0.001	<0.001	<0.001
Total Copper	mg/L	<0.001	0.001	<0.001	0.001
Total Manganese	mg/L	0.038	0.036	0.004	0.005
Total Nickel	mg/L	0.001	0.001	<0.001	<0.001
Total Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Total Iron	mg/L	0.19	0.13	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 30 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 7/12/2021)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	7.91	7.86	7.77	7.92
Electrical Conductivity	uS/cm	846	762	646	652
Total Suspended Solids (TSS)	mg/L	12	18	8	<5
Total Dissolved Solids (TDS)	mg/L	550	495	420	424
Total Phosphorus as P (TP)	mg/L	0.03	0.04	0.02	0.01
Total Nitrogen as N (TN)	mg/L	3.3	3.7	7.6	9.2
Dissolved Oxygen (DO)	mg/L	8.8	8.4	11.1	9.1
Turbidity	NTU	34.9	48.2	9.9	15.5
Chloride	mg/L	182	158	106	115
Calcium	mg/L	30	23	16	24
Magnesium	mg/L	32	28	21	20
Sodium	mg/L	93	88	81	76
Potassium	mg/L	6	6	8	5
Total Arsenic	mg/L	0.002	0.002	0.001	<0.001
Total Cobalt	mg/L	0.002	0.002	0.001	0.001
Total Copper	mg/L	0.003	0.004	0.002	0.006
Total Manganese	mg/L	0.133	0.08	0.018	0.016
Total Nickel	mg/L	0.002	0.002	<0.001	<0.001
Total Zinc	mg/L	0.006	0.008	<0.005	<0.005
Total Iron	mg/L	2.32	2.35	0.52	0.94
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 31 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 30/03/2022)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.28	8.15	8.47	7.99
Electrical Conductivity	uS/cm	1360	1670	707	768

Analyte	Units	RW1	RW2	PWD	Drop Cut
Total Suspended Solids (TSS)	mg/L	13	71	17	6
Total Phosphorus as P (TP)	mg/L	0.05	0.09	0.07	0.07
Total Nitrogen as N (TN)	mg/L	3.0	4.5	8.5	7.4
Dissolved Oxygen (DO)	mg/L	9.0	8.5	8.6	8.8
Turbidity	NTU	23.6	166	24.1	31.8
Chloride	mg/L	160	173	73	71
Calcium	mg/L	29	33	22	18
Magnesium	mg/L	34	40	18	20
Sodium	mg/L	97	102	62	78
Potassium	mg/L	6	7	5	8
Dissolved Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	<0.001	0.001	<0.001
Dissolved Copper	mg/L	0.001	0.002	0.004	0.002
Dissolved Manganese	mg/L	0.065	0.053	0.007	0.002
Dissolved Nickel	mg/L	0.001	0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	0.22	0.10	0.07	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 32 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 27/06/2022)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.33	8.34	8.39	7.98
Electrical Conductivity	uS/cm	1640	1950	747	695
Total Suspended Solids (TSS)	mg/L	6	7	8	5
Total Phosphorus as P (TP)	mg/L	0.02	0.03	<0.01	0.02
Total Nitrogen as N (TN)	mg/L	1.1	1.1	7.2	7.8
Dissolved Oxygen (DO)	mg/L	11.1	11.2	11.8	10.6
Turbidity	NTU	8.5	5.4	5.2	7.1
Chloride	mg/L	442	519	113	112
Calcium	mg/L	65	69	23	28
Magnesium	mg/L	73	95	26	23
Sodium	mg/L	162	192	86	72
Potassium	mg/L	4	4	8	6
Dissolved Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	<0.001	<0.001	0.001
Dissolved Copper	mg/L	<0.001	<0.001	0.002	0.004
Dissolved Manganese	mg/L	0.248	0.198	0.002	0.013
Dissolved Nickel	mg/L	<0.001	0.001	<0.001	0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005

Analyte	Units	RW1	RW2	PWD	Drop Cut
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 33 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 21/09/2022)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.39	8.32	8.60	8.04
Electrical Conductivity	uS/cm	1960	1460	749	659
Total Suspended Solids (TSS)	mg/L	<5	7	8	<5
Total Phosphorus as P (TP)	mg/L	0.01	0.01	0.01	<0.01
Total Nitrogen as N (TN)	mg/L	0.9	2.4	7.7	8.9
Dissolved Oxygen (DO)	mg/L	10.8	11.2	11.2	10.8
Turbidity	NTU	5.0	6.8	6.6	8.7
Chloride	mg/L	505	363	113	106
Calcium	mg/L	72	49	22	27
Magnesium	mg/L	89	66	28	22
Sodium	mg/L	194	151	86	68
Potassium	mg/L	4	5	7	5
Dissolved Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Cobalt	mg/L	0.001	0.001	<0.001	<0.001
Dissolved Copper	mg/L	<0.001	<0.001	0.002	0.003
Dissolved Manganese	mg/L	0.224	0.224	0.004	<0.001
Dissolved Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 34 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 6/12/2022)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.31	8.11	8.80	8.26
Electrical Conductivity	uS/cm	1230	952	686	690
Total Suspended Solids (TSS)	mg/L	6	14	<5	38
Total Phosphorus as P (TP)	mg/L	0.17	0.02	0.02	0.02
Total Nitrogen as N (TN)	mg/L	1.8	2.2	9.0	11.4
Dissolved Oxygen (DO)	mg/L	9.0	8.9	11.2	9.2
Turbidity	NTU	3.8	9.2	4.4	8.7
Chloride	mg/L	289	189	94	101
Calcium	mg/L	42	30	20	28

Analyte	Units	RW1	RW2	PWD	Drop Cut
Magnesium	mg/L	50	39	24	23
Sodium	mg/L	127	102	84	73
Potassium	mg/L	5	5	7	5
Dissolved Arsenic	mg/L	<0.001	<0.001	0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	0.001	<0.001	0.001
Dissolved Copper	mg/L	<0.001	<0.001	0.001	0.003
Dissolved Manganese	mg/L	0.044	0.331	0.007	0.003
Dissolved Nickel	mg/L	<0.001	0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 35 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 4/4/2023)

Analyte	Units	RW1	RW2	PWD	Drop Cut
pH	pH units	8.67	8.17	8.44	8.28
Electrical Conductivity	uS/cm	1440	1460	441	697
Total Suspended Solids (TSS)	mg/L	<5	<5	49	5
Total Phosphorus as P (TP)	mg/L	0.02	0.03	0.12	0.02
Total Nitrogen as N (TN)	mg/L	0.9	0.8	5.6	10.9
Dissolved Oxygen (DO)	mg/L	11.9	9.2	10.2	9.0
Turbidity	NTU	4.1	8.7	139	7.2
Chloride	mg/L	380	374	52	105
Calcium	mg/L	46	46	14	32
Magnesium	mg/L	60	63	13	25
Sodium	mg/L	165	169	63	80
Potassium	mg/L	6	6	6	6
Dissolved Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	0.002	<0.001	<0.001
Dissolved Copper	mg/L	<0.001	<0.001	<0.001	0.002
Dissolved Manganese	mg/L	0.021	0.619	0.026	0.001
Dissolved Nickel	mg/L	<0.001	0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	0.13	0.39	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 36 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 20/6/2023)

Analyte	Units	Drop Cut	PWD	RW2	RW1
pH	pH units	7.91	8.22	8.18	8.44
Electrical Conductivity	uS/cm	805	840	1640	2690
Total Suspended Solids (TSS)	mg/L	6	10	<5	<5
Total Phosphorus as P (TP)	mg/L	<0.01	0.01	<0.01	<0.01
Total Nitrogen as N (TN)	mg/L	12.4	11.3	6.5	1.1
Dissolved Oxygen (DO)	mg/L	10.7	11.5	12.0	12.2
Turbidity	NTU	6.5	15.3	6.3	6.0
Chloride	mg/L	131	132	362	630
Calcium	mg/L	39	36	55	85
Magnesium	mg/L	28	30	73	133
Sodium	mg/L	82	92	171	268
Potassium	mg/L	6	6	5	4
Dissolved Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Cobalt	mg/L	0.001	<0.001	0.001	<0.001
Dissolved Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Manganese	mg/L	0.019	0.014	0.242	0.155
Dissolved Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 37 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 5/10/2023)

Analyte	Units	Drop Cut	PWD	RW2	RW1
pH	pH units	8.27	8.59	8.18	8.44
Electrical Conductivity	uS/cm	745	716	1640	2690
Total Suspended Solids (TSS)	mg/L	72	6	<5	<5
Total Phosphorus as P (TP)	mg/L	0.01	<0.01	<0.01	<0.01
Total Dissolved Solids (TDS)	mg/L	430	366		
Total Nitrogen as N (TN)	mg/L	9.0	8.7	6.5	1.1
Dissolved Oxygen (DO)	mg/L	9.0	9.2	12.0	12.2
Turbidity	NTU	45.7	10.5	6.3	6.0
Chloride	mg/L	138	124	362	630
Calcium	mg/L	32	25	55	85
Magnesium	mg/L	26	23	73	133
Sodium	mg/L	76	84	171	268
Potassium	mg/L	6	7	5	4
Dissolved Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	<0.001	0.001	<0.001

Analyte	Units	Drop Cut	PWD	RW2	RW1
Dissolved Copper	mg/L	0.001	<0.001	<0.001	<0.001
Dissolved Manganese	mg/L	0.009	<0.001	0.242	0.155
Dissolved Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

Table 38 – Monitoring Results for Sites for, RW1, RW2 and PWD (Sample Date 5/10/2023)

Analyte	Units	Drop Cut	PWD	RW2	RW1
Date		**1/12/23**	**1/12/23**	**1/12/23**	**1/12/23**
pH	pH units	8.19	8.22	8.00	8.21
Electrical Conductivity	uS/cm	833	523	1250	1330
Total Suspended Solids (TSS)	mg/L	18	18	14	14
Total Phosphorus as P (TP)	mg/L	0.01	0.06	0.01	0.03
Total Dissolved Solids (TDS)	mg/L	458	318	682	753
Total Nitrogen as N (TN)	mg/L	9.3	5.0	2.1	2.5
Dissolved Oxygen (DO)	mg/L	9.5	9.6	9.5	9.7
Turbidity	NTU	12.8	53.6	40.8	33.2
Chloride	mg/L	151	66	288	313
Calcium	mg/L	41	15	35	40
Magnesium	mg/L	27	14	44	48
Sodium	mg/L	84	63	128	137
Potassium	mg/L	6	6	7	7
Dissolved Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Cobalt	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Manganese	mg/L	0.011	0.006	0.014	0.003
Dissolved Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
Dissolved Iron	mg/L	<0.05	<0.05	<0.05	0.07
Oil and Grease	visual inspection	None visible	None visible	None visible	None visible

6. TRUCK MOVEMENTS

Condition 23 of Schedule 3 of the Consent requires a summary of truck movements to and from the quarry to be published on the website. This summary is contained in Table 39.

Table 39 – Truck Movement Summary

Gunlake Marulan Quarry **Truck Movement Summary**		
	Inbound	Outbound
July 2023: Max movements	294	294
August 2023: Max movements	294	294
September 2023: Max movements	265	265
July to September 2023: Quarterly Average movements	219	219
October 2023: Max movements	238	238
November 2023: Max movements	253	253
December 2023: Max movements	276	276
October to December 2023: Quarterly Average movements	167	167

7. INCIDENTS

No incidents occurred during the reporting period.

8. COMPLAINTS

Table 40 – Complaints Register

Date and Time	Complainant and Method of Complaint	Nature of Complaint	Recorded By	Corrective Action	Date Closed
30/08/2019 10am	Anthony Deprille Via phone call	Complainant reported that his house shook from blast vibration and that the blast was not monitored.	Mel White / Vince Matthews	The blast contractor was contacted by the quarry manager and it was confirmed that the blast was monitored as required and that the blast criteria were not exceeded. The complainant was then contacted and advised of the findings.	5/09/2019
29/06/2023 3pm	Johnny Kahlbetzer Via phone call	Johnny notified the quarry that on 27/6/23 at approximately 11pm he could hear what sounded like heavy machinery under load which he believed was coming from the quarry.	Blake Langlands / Kirsty Nielsen	Night shift reports for 27/6/23 were reviewed and normal quarry operations were undertaken as per approved operating hours. It was determined unlikely that the noise heard would have originated from the quarry. The complainant was then contacted and advised of the findings and he stated that he had not heard anything since	14/07/2023

Appendix 1

Monitoring Site Locations

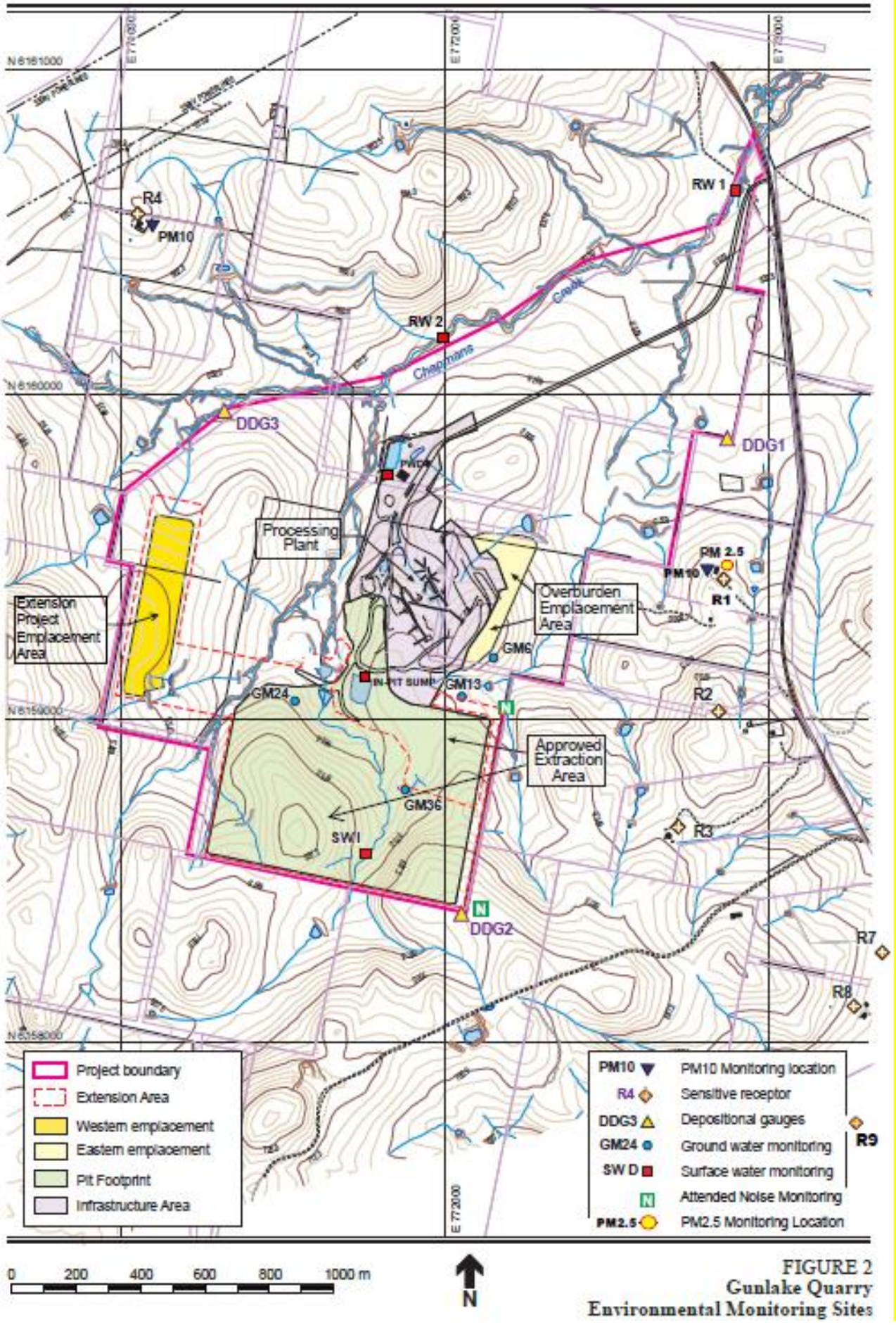
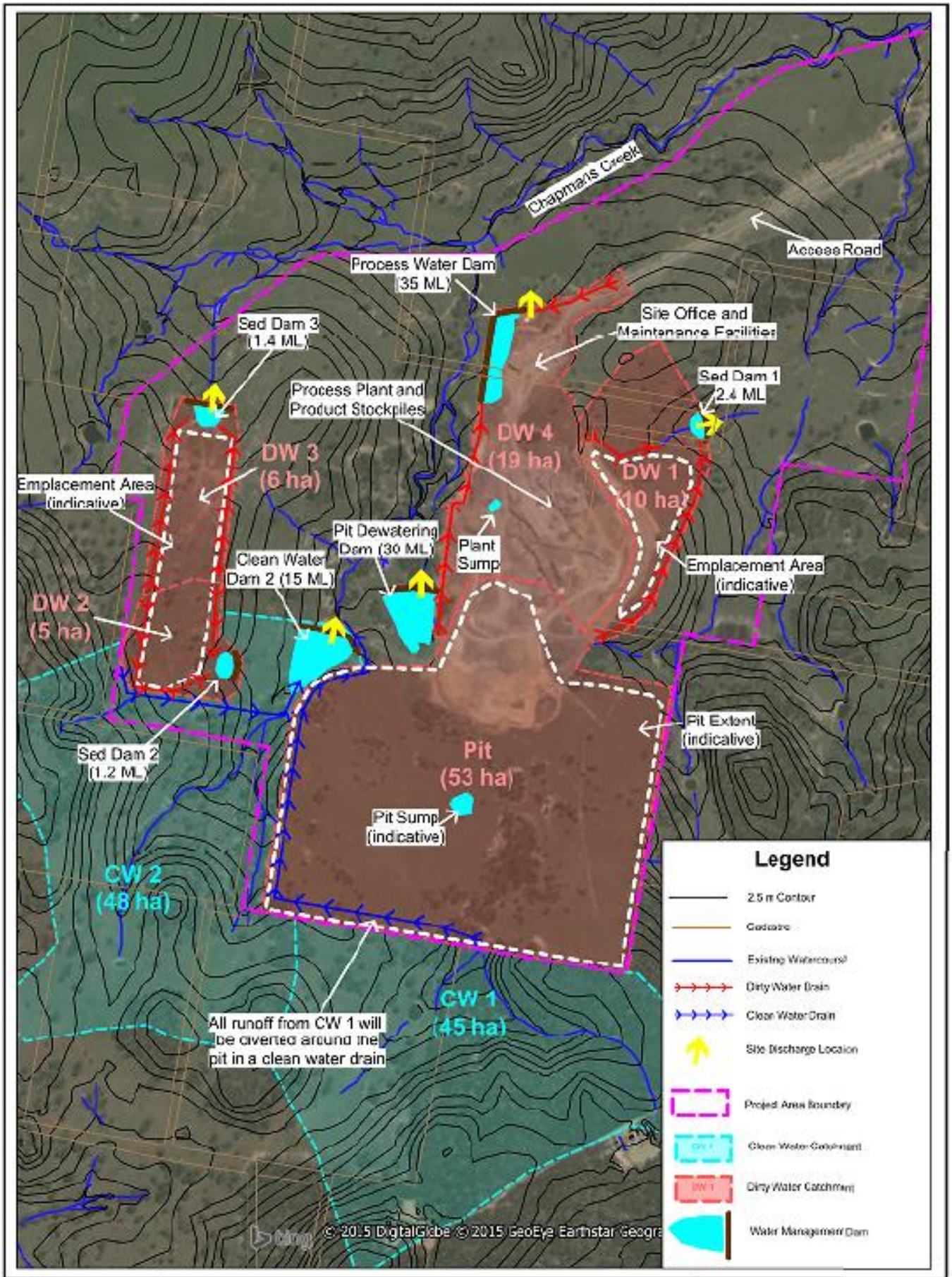


FIGURE 2
Gunlake Quarry
Environmental Monitoring Sites



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Delivering Society Together
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Figure 4 Quarry Years 10 to 30: Surface Water Management Plan

NORTH

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Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains information from a number of sources - no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be the sole risk of the user. Prospectively, the accuracy of all information prior to using it. This map is not a design document.

FILEPATH: I:\Projects\PA1053 - Gunlake Quarry-EISE - Technical Data\E1\ GIS