1 April to 30 June 2024

Northparkes Operations

Environmental Monitoring Results Summary

Name of Mine	Northparkes Mine
Name of Leaseholder and Mine Operator	Evolution Mining (Northparkes) Pty Limited
Mining Leases	ML1247, ML1367, ML1641 AND ML1743
Environment Protection Licence	EPL 4784
Development Consent	DC11_0060 (as modified)

Reviewed by	Chris Higgins
Title **Date** **Signature**	Superintendent – Environment & Farms C Higgins
Approved by	~~Rachael Whiting~~ Chris Higgins
Title **Date** **Signature**	Manager – Sustainability C Higgins

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 April to 30 June 2024. This monitoring is undertaken in accordance with the Environmental Monitoring Program (available at www.northparkes.com.au). Details of air quality, noise, water and vibration monitoring locations are available in the Environmental Monitoring Program. Refer to appendix A for all monitoring location maps.

2. AIR QUALITY

During the quarter, the air quality monitoring program utilised PM_{10} (beta attenuated monitors). Monitoring locations are strategically positioned around the mine lease and neighbouring properties. PM_{10} monitoring is undertaken at three nearby farm residences Hubberstone, Milpose and Hillview. A summary of the monitoring results are provided below.

2.1 PM10

PM_{10} monitoring results for the Hubberstone, Milpose and Hillview monitoring locations, for the reporting period, are displayed in Figure 1, Figure 2 and Figure 3 respectively. The criteria for exceedances (as nominated in the Development Consent DC11_0060, known as the Consent), are >25 µg/m^3 for the annual average and >50 µg/m^3 for a 24-hour monitoring period.

24-hour average:
During the reporting period none of the monitoring locations recorded elevated results. Missing data is the result of instrumentation issues which have since been rectified or power outages.

Annual Averages:
Annual averages, recorded year to date, at all monitoring locations are below the Consent criteria of 25 µg/m^3:

- 11.1 µg/m^3 at Hubberstone
- 9.8 µg/m^3 at Milpose, and
- 12.3 µg/m^3 at Hillview.

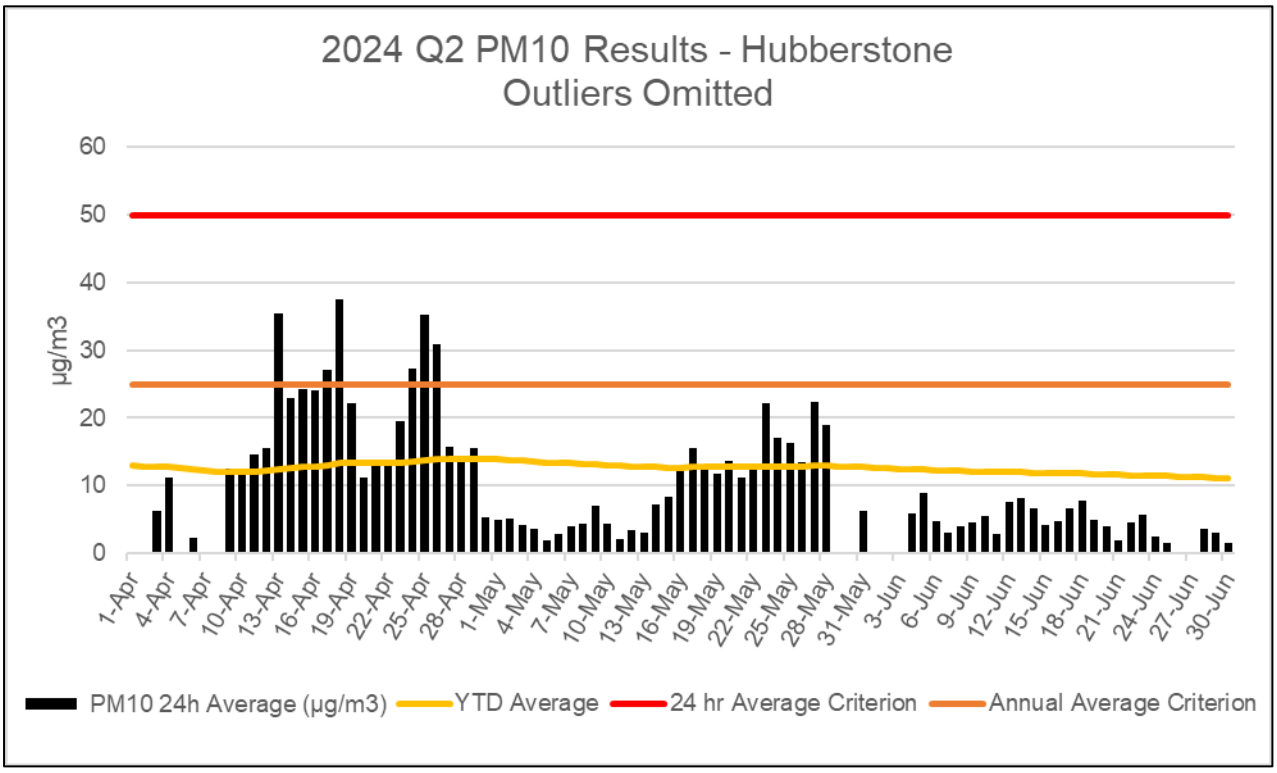

Figure 1: Hubberstone

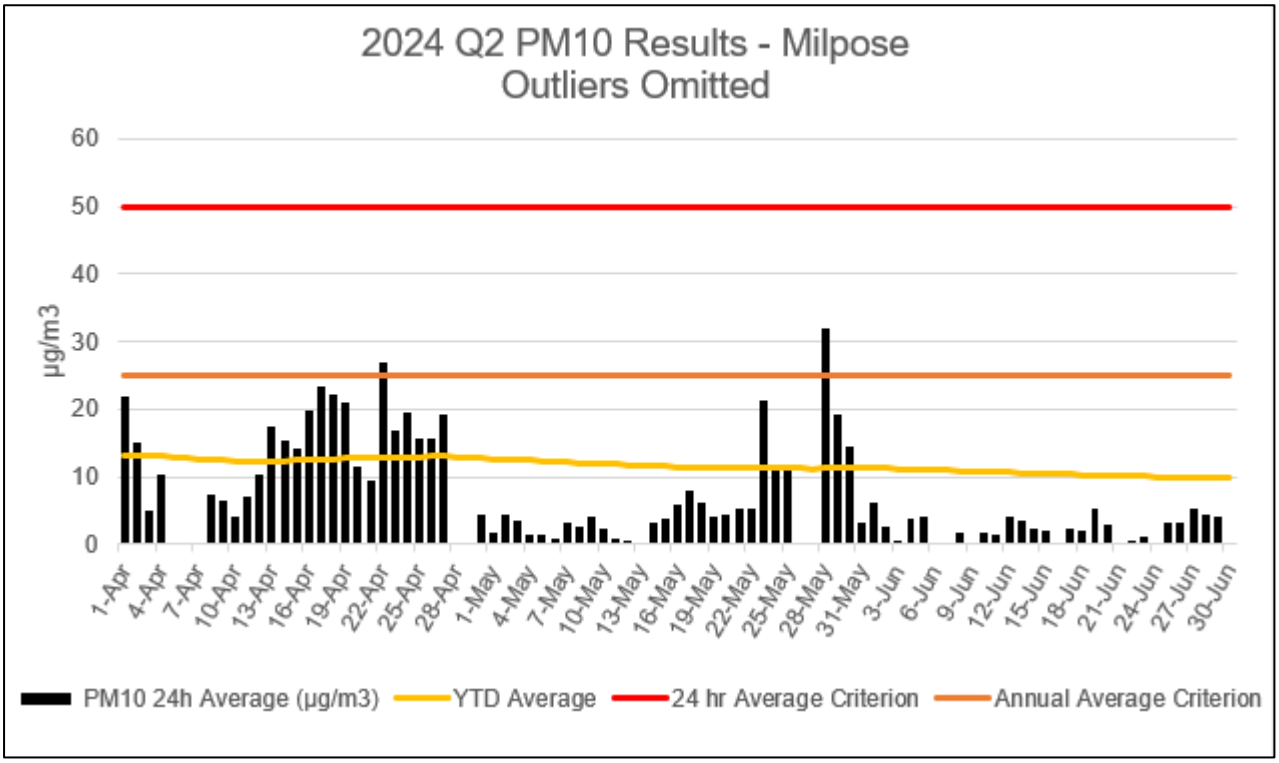

Figure 2: Milpose

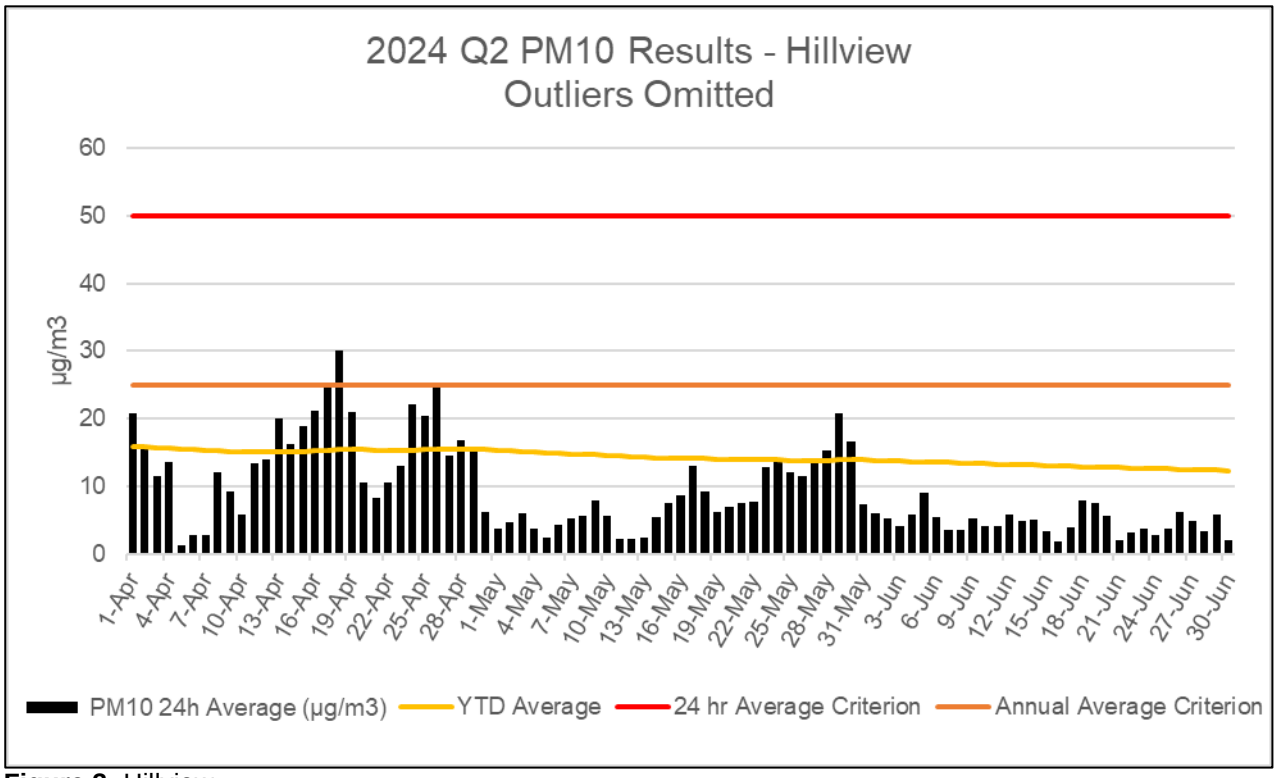

Figure 3: Hillview

2.2 PM2.5

$PM_{2.5}$ monitoring results for the same three properties are displayed in Figures 4, 5 and 6 respectively. The development consent states that compliance with the assessment criteria for $PM_{2.5}$ may be calculated as a ratio of PM_{10}. This ratio is calculated as 0.35.

The criteria for exceedances are >8 µg/m^3 for the annual average and >25 µg/m^3 for a 24-hour monitoring period.

24 hour average:
During the reporting period no elevated results were recorded. Missing data is the result of instrumentation issues which have since been rectified or power outages.

Annual Averages:
Annual averages recorded at all monitoring locations are below the Consent criteria of 8 µg/m^3:

- 3.3 µg/m^3 at Hubberstone
- 3.5 µg/m^3 at Milpose, and
- 3.9 µg/m^3 at Hillview.

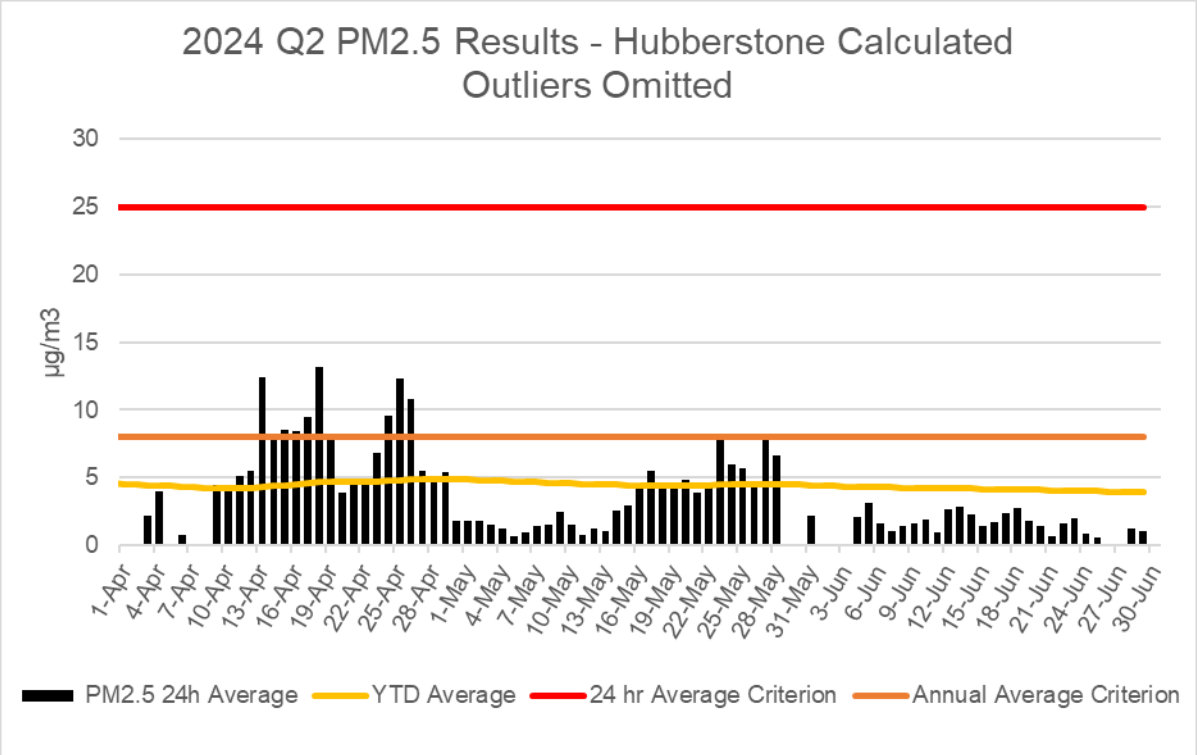

Figure 4: Hubberstone (calculated)

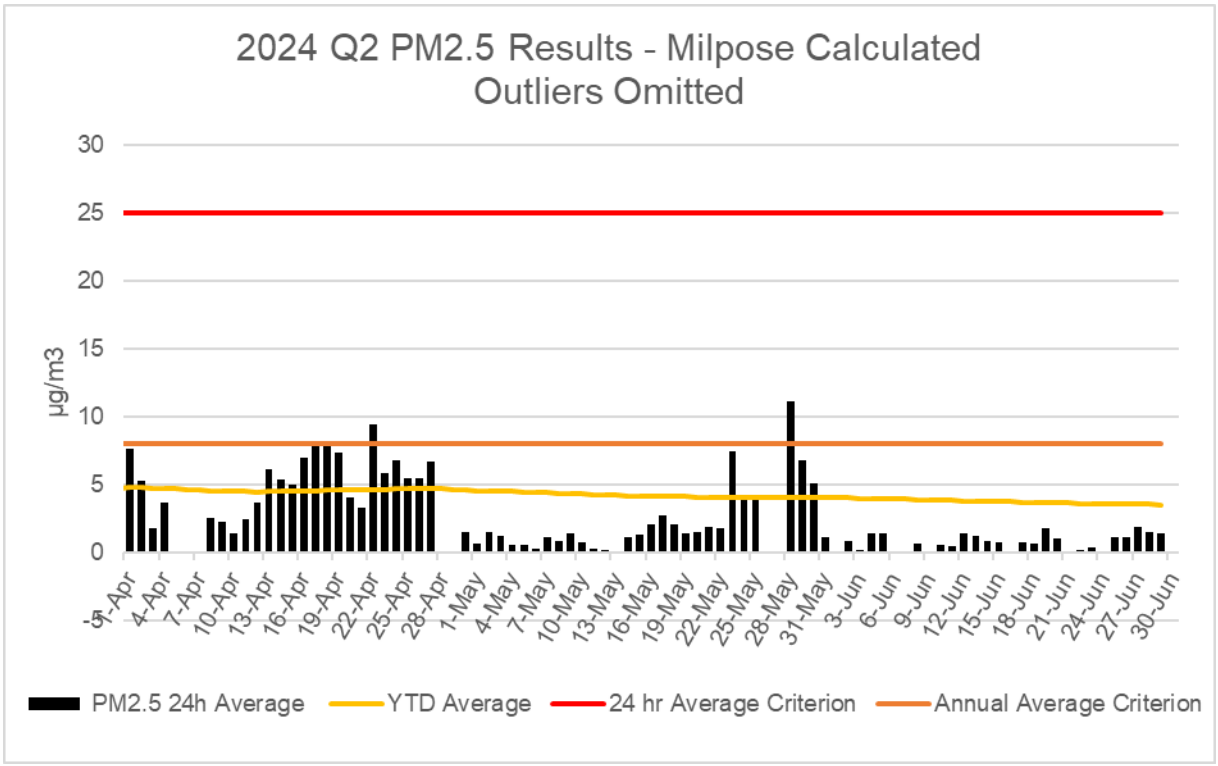

Figure 5: Milpose (calculated)

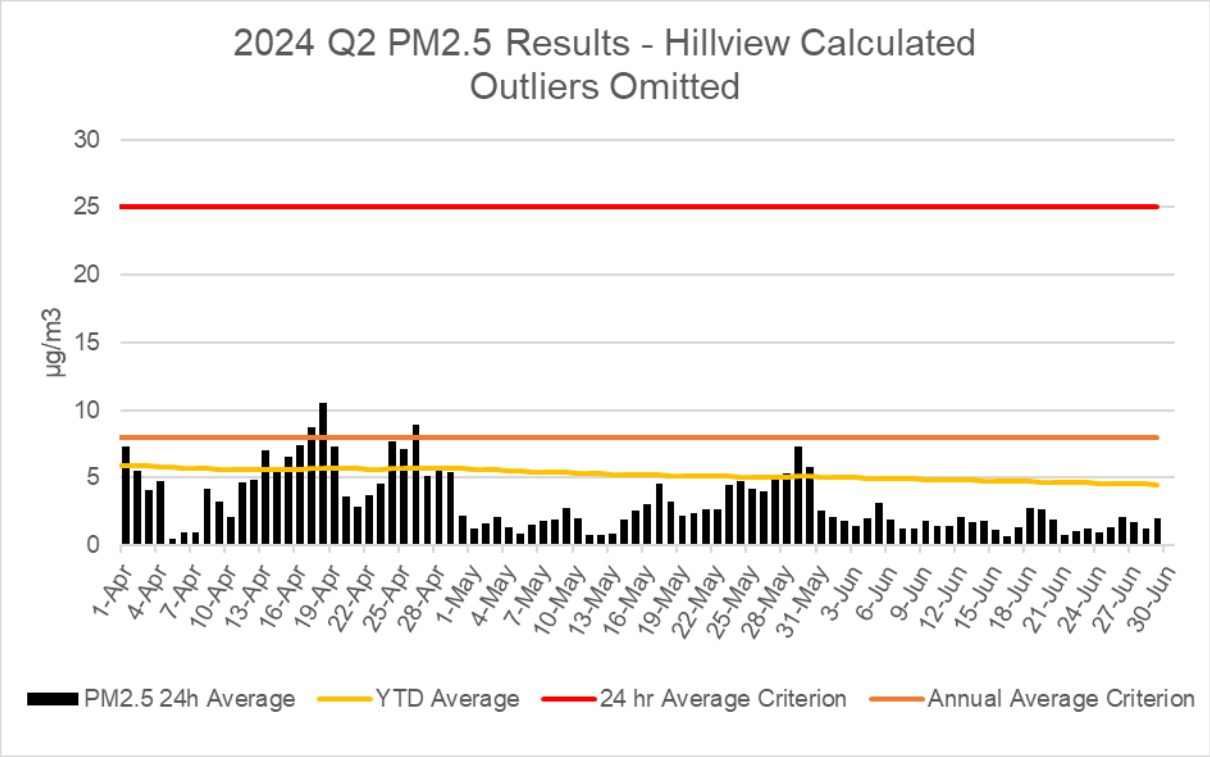

Figure 6: Hillview (calculated)

3. WATER

3.1 Overview

Water management at Northparkes is undertaken in accordance with approved management plans, prepared in accordance with the Consent. All water samples are analysed at an independent National Association of Testing Authorities (NATA) accredited laboratory.

Surface water quality monitoring is undertaken at Northparkes specifically within the three defined water management systems of;

- Clean water management system, which includes farm dams and watercourses;
- Dirty water management system, which includes settlement ponds; and
- Contaminated water management system, which includes all aspects of ore processing, and retention ponds.

The groundwater monitoring program at Northparkes aims to identify any changes to the natural groundwater system as a result of mining operations and ensure compliance with the Consent. It focuses on potential impacts to environmental assets and groundwater users in the area surrounding Northparkes.

Monitoring results are assessed and interpreted utilising historical trend analysis and internal water quality criteria and trigger levels to identify potential changes.

3.2 Quarterly Monitoring Analysis

Water quality monitoring was carried out generally in accordance with the Consent, with no significant changes to the pH or EC for all locations. Copper concentrations increased at several locations, although results are still consistent with long term data. These locations will be closely monitored during the future reporting periods. A summary of the monitoring results at each location sampled are presented in Tables 1-8 below.

Bores W14, W22 and W23 are planned to be impacted during future operations and have been replaced with W33 and W34. These changes were approved in consultation with the Environment Protection Authority (EPA).

Table 1: Process Water System

Location	RP01	RP02	RP03	RP04	RP05	RP06	RP07	RP08	RP09	RP12	RP13	RP15	RP16	RP19	RP20	RP21
EC (uS/cm)	720	1179	2004	1808	908	1828	643	2504	No sample	241	679	No sample	12164	4615	No sample	1771
Cu (mg/L)	0.107	0.026	0.052	2.37	0.013	0.022	0.059	0.016	No sample	0.022	0.044	No sample	0.014	0.01	No sample	0.008
pH	8.23	8.39	8.14	7.76	7.77	9.1	9.32	9.34	No sample	9.89	8.15	No sample	8.66	8.51	No sample	8.1

Table 1 continued: Process Water System

Location	RP22	RP23	RP24	RP25	RP26	RP27	RP28	RP32	PWD	Caloola North	Caloola South	GT02	SD1	SD2
EC (uS/cm)	705	No sample	No sample	685	636	2936	No sample	1000	4050	2815	3769	1144	No sample	No sample
Cu (mg/L)	0.027	No sample	No sample	0.017	0.02	0.021	No sample	0.031	0.038	0.012	0.013	0.065	No sample	No sample
pH	8.79	No sample	No sample	8.48	8.86	8.54	No sample	8.82	7.40	7.98	7.91	7.79	No sample	No sample

Table 2: Sediment Ponds

Location	SP03	SP10	SP15	SP33
EC (uS/cm)	1250	231	245	336
Cu (mg/L)	0.006	0.076	0.039	0.003
pH	9.47	8.9	9.15	9.05

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD12	FD16	FD18	FD25	FD26	FD27
EC (uS/cm)	1543	102	164	126	234	Dry	138	3619	164	354	218
Cu (mg/L)	0.026	0.016	0.02	0.014	0.031	Dry	0.056	0.007	0.014	0.023	0.016
pH	8.883	7.95	7.49	7.74	8.18	Dry	8.33	8.29	8.95	8.28	8.19

*No sample – insufficient water to collect sample or no access to obtain sample

Table 4: Water Courses

Location	WC01	WC02	WC03	WC04	WC05	WC06	WC07	WC11	WC12	WC13	WC14	WC15	WC16
EC (uS/cm)	Dry	Dry	229	Dry	Dry	Dry	230	69	180	Dry	Dry	Dry	908
Cu (mg/L)	Dry	Dry	0.032	Dry	Dry	Dry	0.036	0.027	0.011	Dry	Dry	Dry	0.009
pH	Dry	Dry	8.01	Dry	Dry	Dry	7.83	7.62	7.66	Dry	Dry	Dry	7.76

Table 5: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W28	W29	W30	W31	W32	W33	W34
EC (uS/cm)	5918	9850	24333	23940	17891	14713	18686	2332	613	2641	8144	12967
Cu (mg/L)	0.006	0.013	0.036	0.004	0.017	0.007	0.051	0.005	0.027	0.02	0.019	0.067
pH	6.73	6.99	5.31	6.36	6.67	9.35	11.97	7.22	8.72	11.26	7.36	6.73
SWL	248.3	239.6	245.4	247.1	250.7	261.2	257.8	246.8	266.4	262.3	260.2	259.5

Table 6: Opencut Bores

Location	MB10	MB11 (dry)	MB12	MB13	MB14	W19	W20	W21	W24	W25
EC (uS/cm)	No sample	No sample	No sample	22874	3250	11982	11077	24601	2276	2247
Cu (mg/L)	No sample	No sample	No sample	0.012	0.018	0.007	0.025	0.007	0.004	0.018
pH	No sample	No sample	No sample	6.54	6.85	7.18	7.53	7.73	8.02	8.08
SWL	253.0	225.5	235.7	244.0	262.7	256.3	269.5	271.0	284.4	284.3

Table 7: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P103	P104	P139	P145	P149
EC (uS/cm)	828	15689	14405	12104	9594	No sample	No sample	No sample	28584	263	27820
Cu (mg/L)	0.001	0.011	0.001	0.032	0.001	No sample	No sample	No sample	0.01	0.001	0.01
pH	7.92	7.29	7.23	7.40	6.96	No sample	No sample	No sample	6.1	7.37	6.51
SWL	263.0	250.0	246.4	246.3	255.4	254.4	252.3	255.0	253.1	252.2	238.8

Table 8: Regional Bores

Location	Far Hilliers	Long Paddock	Moss #1	South Hilliers	Wright
EC (uS/cm)	779	1044	2188	No sample	908
Cu (mg/L)	0.012	0.013	0.009	No sample	0.009
pH	7.36	9.27	7.38	No sample	7.76
SWL	265.5	240.3	286.2	267.4	288.0

*No sample – insufficient water to collect sample or no access to obtain sample

4. VIBRATION

4.1 Overview

The assessment criteria for blast impacts at Northparkes are based on the ANZECC Guideline, aimed to minimise annoyance to human comfort levels.

The blast monitoring program uses blast units which measure ground vibration and air overpressure at the residences of the four closest privately owned properties, Adavale, Hillview, Hubberstone and Milpose. The program is designed to measure the effectiveness of control measures and ensure compliance with consent and licence conditions, relevant standards and corporate requirements. A summary of the monitoring results are provided below.

The criteria for exceedances are:

Overpressure:	115 dB(Lin Peak)
Ground vibration	5 mm/s

4.2 Quarterly Monitoring Analysis

During the reporting period, 14 surface blasts were undertaken with no exceedances of vibration and overpressure recorded.

Table 9: Overpressure results at monitoring locations.

	Overpressure (dB) – 115 (dB)											
Monitor Location	4 Ap 24	11-Apr-24	19-Apr-24	24-Apr-24	2-May-24	9-May-24	15-May-24	23-May-24	29-May-24	6-Jun-24	14-Jun-24	19-Jun-24
	E31N	E31S	E31N	E31S	E31S	E31N	E31S	E31N	E31N	E31S	E31N	E31S
Adavale	99.4	86.8	88.3	101.7	109.2	106.1	84.1	99	83.9	93.1	83.9	85.2
Hillview	94.1	96	87.2	100.8	100.6	100.4	98.4	91.4	97.3	100.8	96.7	103.9
Hubberstone	98.1	92.4	100.4	98	89.2	86.9	87.3	96	80.1	97.2	84.5	84.7
Milpose	100.6	91.1	84.8	102.8	99.8	101.3	89	89	86.2	96.6	89.5	91.1

Overpressure (dB) – 115 (dB)		
Monitor Location	25-Jun-24	28-Jun-24
	E31S	E31N
Adavale	84.1	91.8
Hillview	96.5	94
Hubberstone	83	99.6
Milpose	92.3	92.4

Table 10: Vibration results at monitoring locations

	Vibration (mm/s) – 5 mm/s											
Monitor Location	4 Ap 24	11-Apr-24	19-Apr-24	24-Apr-24	2-May-24	9-May-24	15-May-24	23-May-24	29-May-24	6-Jun-24	14-Jun-24	19-Jun-24
	E31N	E31S	E31N	E31S	E31S	E31N	E31S	E31N	E31N	E31S	E31N	E31S
Adavale	0.05	0.11	0.05	0.06	0.06	0.11	0.06	0.09	0.05	0.1	0.11	0.12
Hillview	0.06	0.15	0.05	0.20	0.11	0.27	0.15	0.1	0.05	0.27	0.06	0.14
Hubberstone	0.07	0.1	0.07	0.08	0.05	0.1	0.06	0.07	0.1	0.11	0.09	0.09
Milpose	0.03	0.04	0.04	0.04	0.04	0.06	0.04	0.05	0.03	0.08	0.07	0.06

Vibration (mm/s) – 5 mm/s		
Monitor Location	25-Jun-24	28-Jun-24
	E31S	E31N
Adavale	0.08	0.05
Hillview	0.12	0.08
Hubberstone	0.08	0.05
Milpose	0.04	0.05

5. NOISE

Operational noise is managed in accordance with the approved Noise Management Plan (NMP). The NMP covers all operational activities with the potential to generate noise at Northparkes. It details specific noise management and mitigation measures, outlines monitoring and reporting requirements and provides clear definitions of the roles and responsibilities for noise management.

5.1 Overview

Northparkes undertakes a noise monitoring program that consists of both operator-attended and unattended surveys. This program includes four real time monitors at the nearest occupied residences of Hubberstone, Milpose, Hillview and Adavale. Lone Pine is included in the attended monitoring program along with the four listed previously.

Operator-attended noise measurements and recordings are undertaken outside the mining leases in order to quantify the intrusive noise emissions from construction and of general mine activity as well as the overall level of ambient noise. This noise monitoring was undertaken by an independent and suitably qualified noise professional.

5.2 Quarterly Monitoring Analysis

Attended noise monitoring was undertaken between Tuesday 14 May to Wednesday 15 May 2024.

The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to Northparkes operations in accordance with Conditions 1 to 5 of Schedule 3 of the NSW Development Consent Conditions (DC11_110060), Northparkes Noise Management Plan (NMP, 2019) and Traffic Management Plan (TMP, 2019).

Road noise monitoring identified that vehicle movements associated with shift change generated levels below the relevant road noise criteria specified in the TMP and NMP.

Attended monitoring has identified that operational emissions generated by Northparkes comply with relevant noise criteria at all monitoring locations for all assessment periods. Furthermore, project related noise emissions are generally barely audible at monitoring locations. Extraneous non-mining sources such as traffic, insects, wind in trees, birds, aircraft, residential and agricultural noise were audible during the monitoring period. A summary of the monitoring results at each monitoring location are presented in Tables 11-16 below.

Table 11: Attended noise monitoring results for Hubberstone

Table 3 Operator-Attended Noise Survey Results – Location NM1, Hubberstone					
Time(hrs)/Date	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
13:58 15/05/2024	59	35	26	WD: N WS: 0.5m/s Stab Class: C	Traffic 25-54 Birds 25-59 NPM Inaudible
14:13 15/05/2024	58	38	26		
14:28 15/05/2024	58	36	22		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
20:05 14/05/2024	46	35	34	WD: E WS: 0.1m/s Stab Class: F	Insects 32-41 Traffic 30-59 NPM – Production <30-41 (barely audible to audible throughout) NPM – Impacts 38-46 (infrequent, 1-2 second durations)
20:20 14/05/2024	59	41	34		
20:35 14/05/2024	41	36	34		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
01:14 15/05/2024	58	34	32	WD: SE WS: 0.1m/s Stab Class: F	Insects 28-38 MAC Operator 53-58 NPM – Production 25-40 (barely audible to audible throughout)
01:29 15/05/2024	38	32	30		
01:44 15/05/2024	53	31	29		
Site $L_{Aeq(15min)}$ Contribution					<35
Site $L_{A1(1min)}$ Contribution					<45

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Table 12: Attended noise monitoring results for Lone Pine

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Time(hrs)/Date	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
14:55 15/05/2024	59	38	27	WD: NW WS: 0.5m/s Stab Class: A	Birds 25-64 Insects 25-30 Residential Noise 30-40 Traffic 30-75 NPM Inaudible
15:10 15/05/2024	68	42	28		
15:25 15/05/2024	75	47	28		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
21:06 14/05/2024	50	44	41	WD: E WS: 0.1m/s Stab Class: F	Insects 39-51 NPM – Exhaust Fan/Site Hum <35[1] (barely audible throughout)
21:21 14/05/2024	50	44	41		
21:36 14/05/2024	51	44	41		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
22:02 14/05/2024	52	43	41	WD: E WS: 0.1m/s Stab Class: E	Insects 37-48 Traffic 35-52 Aircraft 35-44 NPM – Exhaust Fan/Site Hum <35[1] (barely audible throughout)
22:17 14/05/2024	47	43	41		
22:32 14/05/2024	48	43	40		
Site $L_{Aeq(15min)}$ Contribution					<35
Site $L_{A1(1min)}$ Contribution					<45

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: NPM Contribution derived from further analysis.

Table 13: Attended noise monitoring results for Milpose

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose					
Time(hrs)/Date	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
16:48 15/05/2024	54	38	34	WD: N WS: 0.1m/s Stab Class: E	Insects 26-51 Birds 25-54 Livestock 25-30 Traffic 30-44 NPM Inaudible
17:03 15/05/2024	52	39	35		
17:18 15/05/2024	51	43	37		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
20:19 15/05/2024	50	44	39	WD: N WS: 0.1m/s Stab Class: F	Insects 35-51 Traffic <35 NPM Inaudible
20:34 15/05/2024	51	44	39		
20:49 15/05/2024	50	44	39		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
00:03 15/05/2024	49	43	38	WD: SE WS: 0.1 Stab Class: E	Insects 34-49 Birds 30-42 Dogs Barking 30-35 NPM - Exhaust Fan/Site Hum <30[1] (barely audible throughout)
00:18 15/05/2024	47	41	37		
00:33 15/05/2024	48	42	37		
Site $L_{Aeq(15min)}$ Contribution					<35
Site $L_{A1(1min)}$ Contribution					<45

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: NPM Contribution derived from further analysis.

Table 14: Attended noise monitoring results for Hillview

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview					
Time(hrs)/Date	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
12:48 15/05/2024	52	38	34	WD: N WS: 1.0m/s Stab Class: D	Traffic 30-58 Birds 30-66 Wind In Trees 31-44 Construction 30-38 Aircraft 35-50 NPM Inaudible
13:03 15/05/2024	66	44	35		
13:18 15/05/2024	66	38	32		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
18:00 15/05/2024	68	49	34	WD: N WS: 0.1m/s Stab Class: E	Traffic 25-68 Birds 22-30 Residential Noise 30-77 Dogs Barking 22-31 NPM Inaudible
18:15 15/05/2024	77	51	35		
18:30 15/05/2024	62	47	32		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
02:12 15/05/2024	63	44	14	WD: SE WS: 0.1m/s Stab Class: E	Traffic 20-63 MAC Operator 72 NPM Inaudible
02:27 15/05/2024	72	37	14		
02:42 15/05/2024	57	36	14		
Site $L_{Aeq(15min)}$ Contribution					<35
Site $L_{A1(1min)}$ Contribution					<45

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Table 15: Attended noise monitoring results for Adavale

Table 7 Operator-Attended Noise Survey Results – Location NM5, Adavale					
Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa) L_{Amax}	 L_{Aeq}	 L_{A90}	Meteorology	Description and SPL, dBA
Day					
15:48 15/05/2024	52	36	34	WD: NW WS: 1.0m/s Stab Class: C	Insects 32-38 Wind In Trees 30-50 Birds 30-63 NPM Inaudible
16:03 15/05/2024	45	36	34		
16:18 15/05/2024	63	38	34		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
19:20 15/05/2024	49	41	36	WD: N WS: 0.1m/s Stab Class: F	Insects 33-49 NPM -Exhaust Fan/Site Hum <30[1] (barely audible throughout)
19:35 15/05/2024	49	40	36		
19:50 15/05/2024	49	39	36		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
23:01 14/05/2024	60	41	39	WD: SE WS: 0.1m/s Stab Class: F	Insects 37-47 MAC Operator 60 NPM -Exhaust Fan/Site Hum <35[1] (barely to just audible throughout)
23:16 14/05/2024	45	41	39		
23:31 14/05/2024	47	42	39		
Site $L_{Aeq(15min)}$ Contribution					<35
Site $L_{A1(1min)}$ Contribution					<45

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: NPM Contribution derived from further analysis.

Table 16: Attended road noise survey results

Table 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview				
Time(hrs)/Date Duration 1 hour	Measured Noise Level dB $LA_{eq(1hr)}$	Meteorology	Criteria dB $LA_{eq(1hr)}$	Description and SPL dBA
12:48 15/05/2024 (Day)	41	WD: N WS: 1.0m/s Stab Class: D	55	Traffic 30-58 Birds 30-66 Wind In Trees 31-44 Construction 30-38 Aircraft 35-50 NPM Concentrate Truck (offsite) 30-57 (2 Passes) (Approx. 16 vehicles Enter/Exit NPM Site)
18:00 15/05/2024 (Evening)	48	WD: N WS: 0.1m/s Stab Class: E	55	Traffic 25-68 Birds 22-30 Residential Noise 30-77 Dogs Barking 22-31 NPM Concentrate Truck (offsite) 30-62 (3 Passes) (Approx. 93 vehicles Enter/Exit NPM Site)

Note: NPM denotes Northparkes Mines.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.