



1 April 2022 – 30 June 2022 Environmental Monitoring Results Summary

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

Reviewed by	Chris Higgins
Title	Superintendent – Environment & Farms
Date	
Signature	
Approved by	Stacey Kelly
Title	Manager – People, Safety & Environment 19 August 2022
Date	
Signature	

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 April to 30 June 2022. 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

The air quality monitoring program utilises PM₁₀ (beta attenuated monitors), TSP's (high volume air samplers (HVAS)) and depositional dust gauges. Monitoring locations are strategically positioned around the mine lease and neighbouring properties. TSP and PM₁₀ monitoring have been undertaken at three nearby farm residences Hubberstone, Milpose and Hillview. A summary of the monitoring results are provided below.

2.1 PM10

PM₁₀ 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 >30 µg/m³ for the annual average and >50 µg/m³ for a 24-hour monitoring period.

During the reporting period no exceedances of the Consent criteria were recorded.

Milpose and Hubberstone units incurred instrumentation issues during the months of April and May, respectively. The issues have since been rectified.

Annual Averages:

Annual averages recorded at all monitoring locations are below the Consent criteria of 30 µg/m³, recording:

- 8.5 µg/m³ at Hubberstone
- 9.3 µg/m³ at Milpose, and
- 7.9 µg/m³ at Hillview.

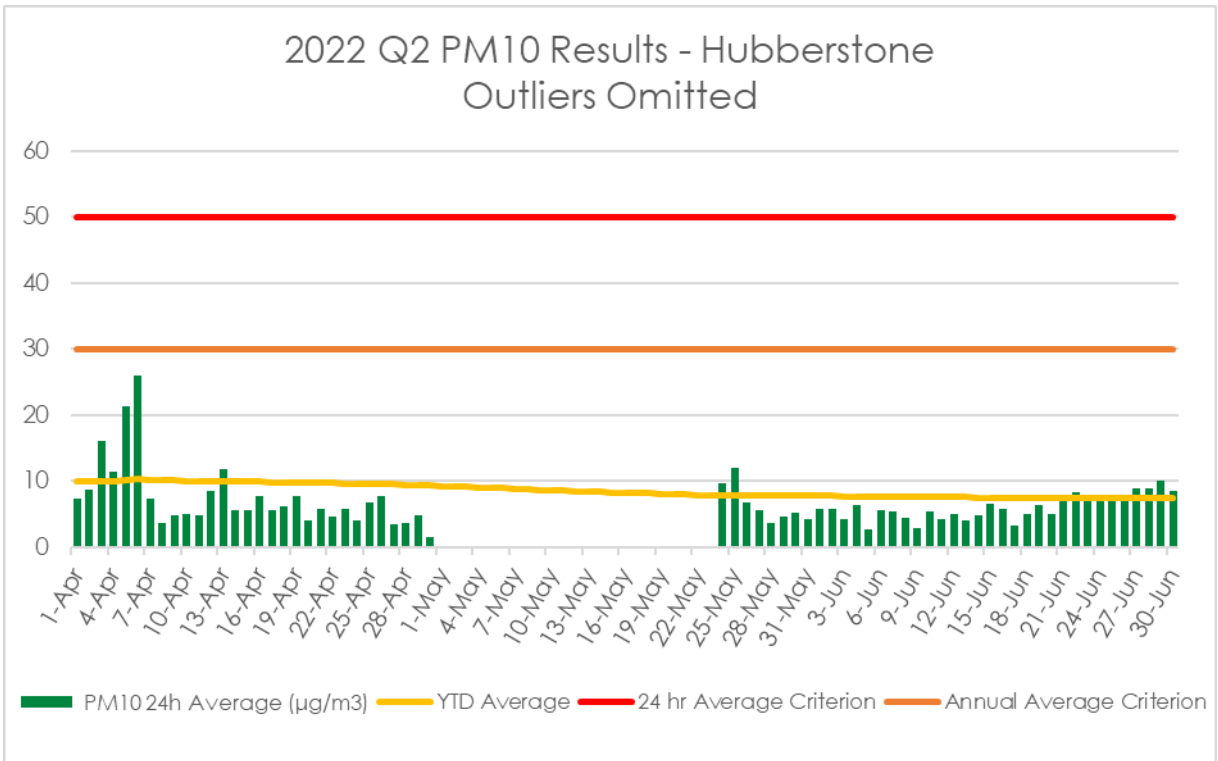


Figure 1: Hubberstone

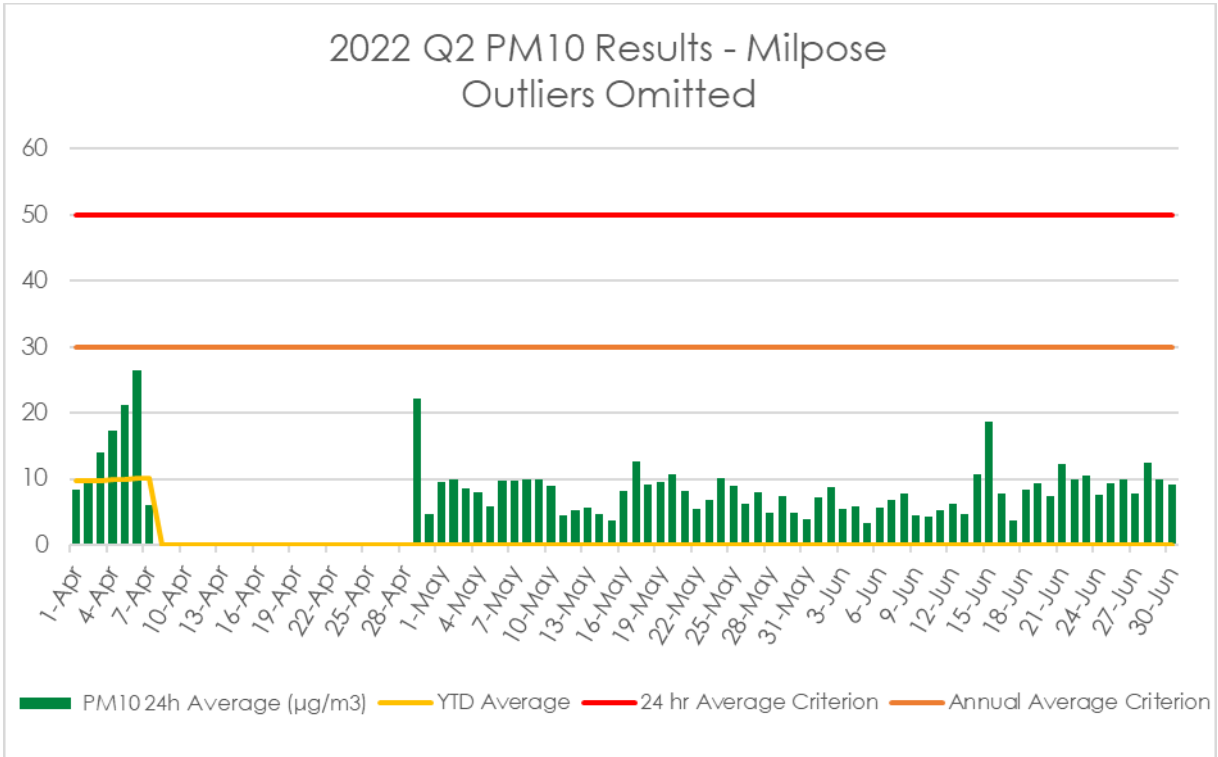


Figure 2: Milpose

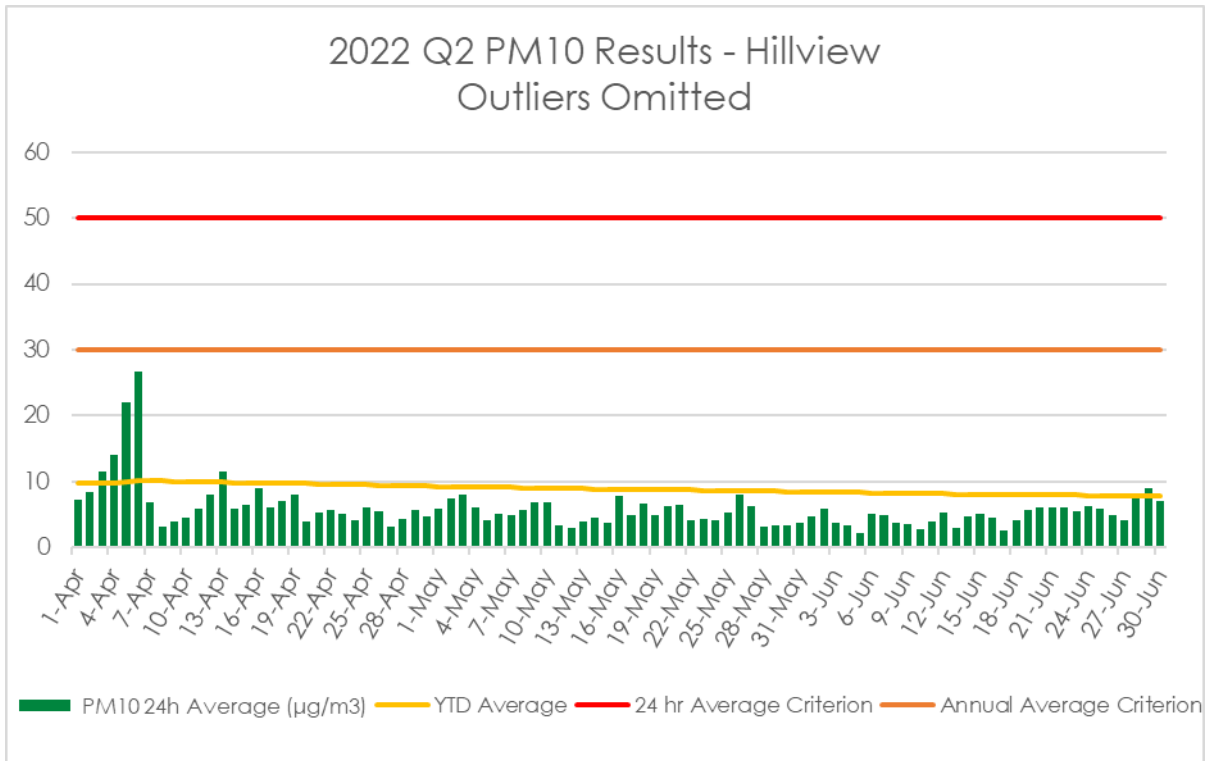


Figure 3: Hillview

2.2 TSP

Hubberstone, Milpose and Hillview all recorded dust levels at the TSP monitoring locations under the required average annual criteria set by the Consent (90 µg/m³) for the quarter for the reporting period.

Missing data during the period at Hubberstone and Milpose locations was the result of instrumentation malfunction. As part of Modification 6 to remove TSP and depositional dust from the monitoring program, a conversion factor can be applied to calculate TSP concentrations and demonstrate compliance with the conditions of Consent. This conversion factor has been applied to Milpose location, estimating the TSP concentrations for the period 5 May – 28 June.

During the reporting period no exceedances of the Consent criteria were recorded.

Annual Averages:

Annual averages recorded at all monitoring locations are significantly below the Consent criteria of 90 µg/m³, recording:

- 15.7 µg/m³ at Hubberstone
- 14.7 µg/m³ at Milpose, and
- 15.3 µg/m³ at Hillview.

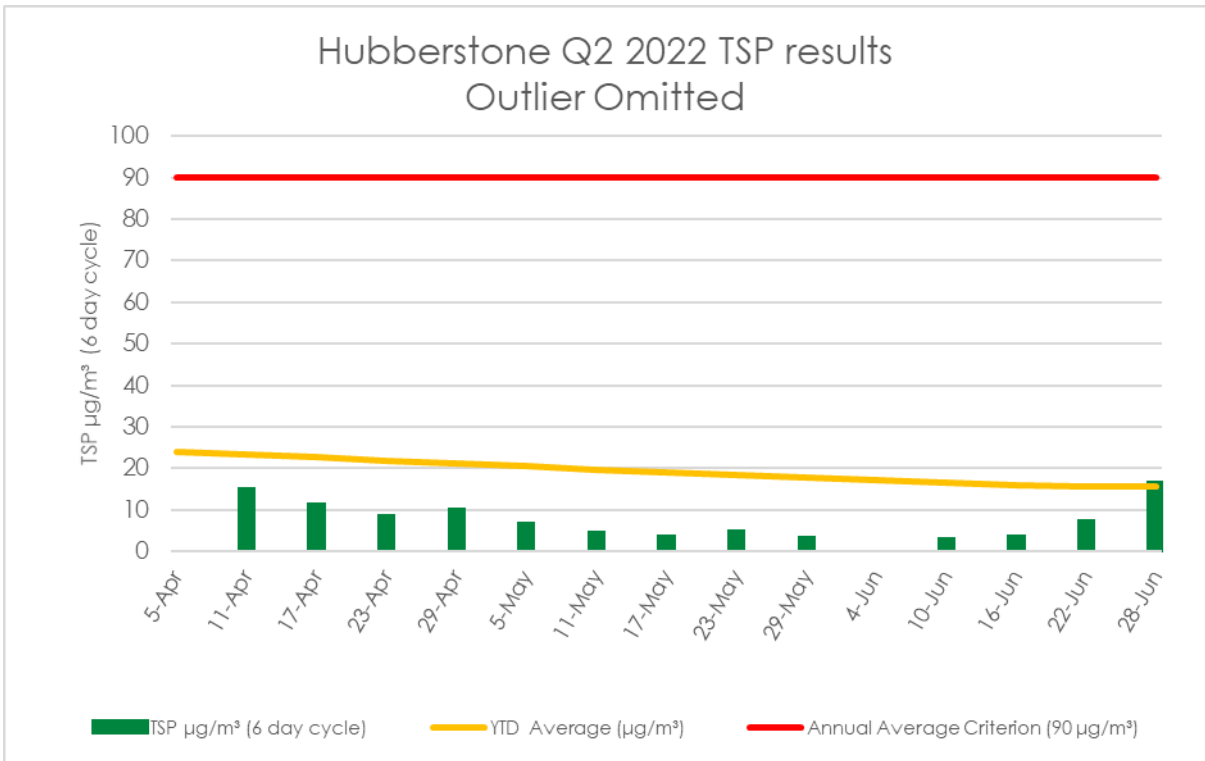


Figure 4: Hubberstone

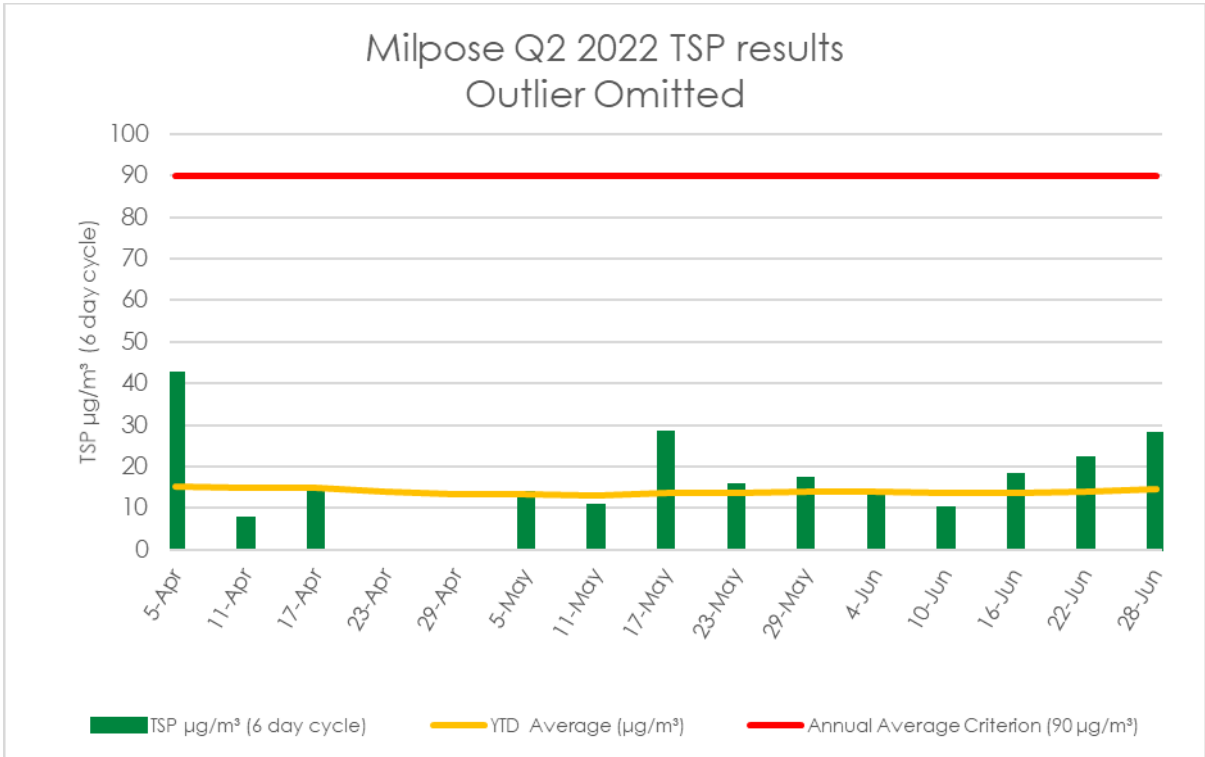


Figure 5: Milpose

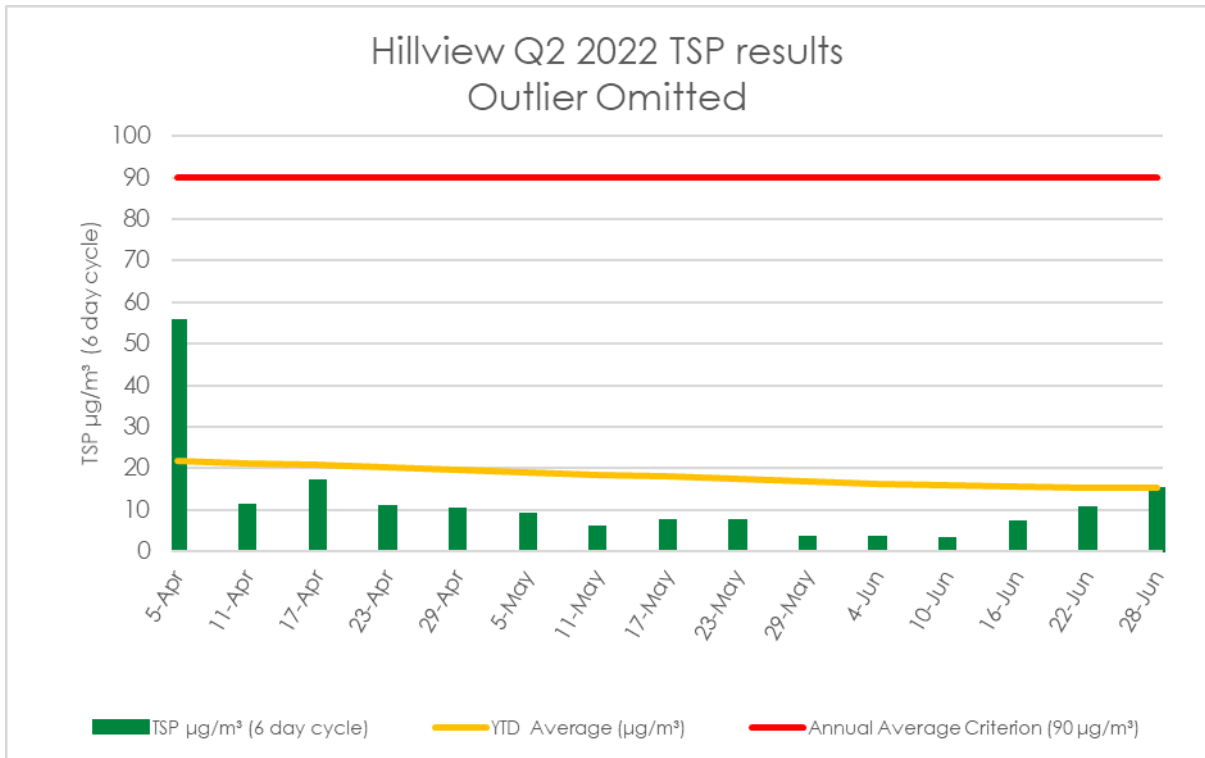


Figure 6: Hillview

2.3 Depositional Dust

Depositional dust gauges record the total of deposited dust for a month-long period and are a measure of broad scale changes to the local air quality.

Eleven depositional dust gauges are located across the mining lease and neighbouring residential properties to monitor atmospheric dust. A summary of the monthly monitoring results at each monitoring location are presented the figures below. Please be advised that only monitoring locations ND19, ND20, ND21 & ND22 are regulated by the criteria stated in the Consent, as they are the only depositional dust gauges that are at a residence on privately-owned land. All other depositional dust gauges are used to inform operational activities.

The indicative annual average for all locations are below the long-term impact assessment criteria ($4 \text{ g}/\text{m}^2/\text{month}$), complying with the conditions of the Consent.

During the monitoring period, TDE and ND22 recorded results above the internal trigger value of $4 \text{ g}/\text{m}^2/\text{month}$, recording $13.2 \text{ g}/\text{m}^2/\text{month}$ in April and $4.8 \text{ g}/\text{m}^2/\text{month}$ in June, respectively. An internal investigation was undertaken for this result and is detailed below.

TDE

- April $13.2 \text{ g}/\text{m}^2/\text{month}$: Observations noted that agricultural spraying activities had occurred in the adjacent farming paddock throughout the month, suggesting the result may have been impacted on by these practices. Winds during the month predominantly prevailed between a north easterly and south south-easterly direction, further supporting that the source of the particulate matter to be non-mine related.

ND22

- June $4.8 \text{ g}/\text{m}^2/\text{month}$: Observations noted that agricultural activities had occurred in the adjacent farming paddock throughout the month including burning windrows, suggesting the result may have been impacted on by these practices. Winds during the month predominantly prevailed from a south westerly direction, further supporting that the source of the particulate matter to be non-mine related.

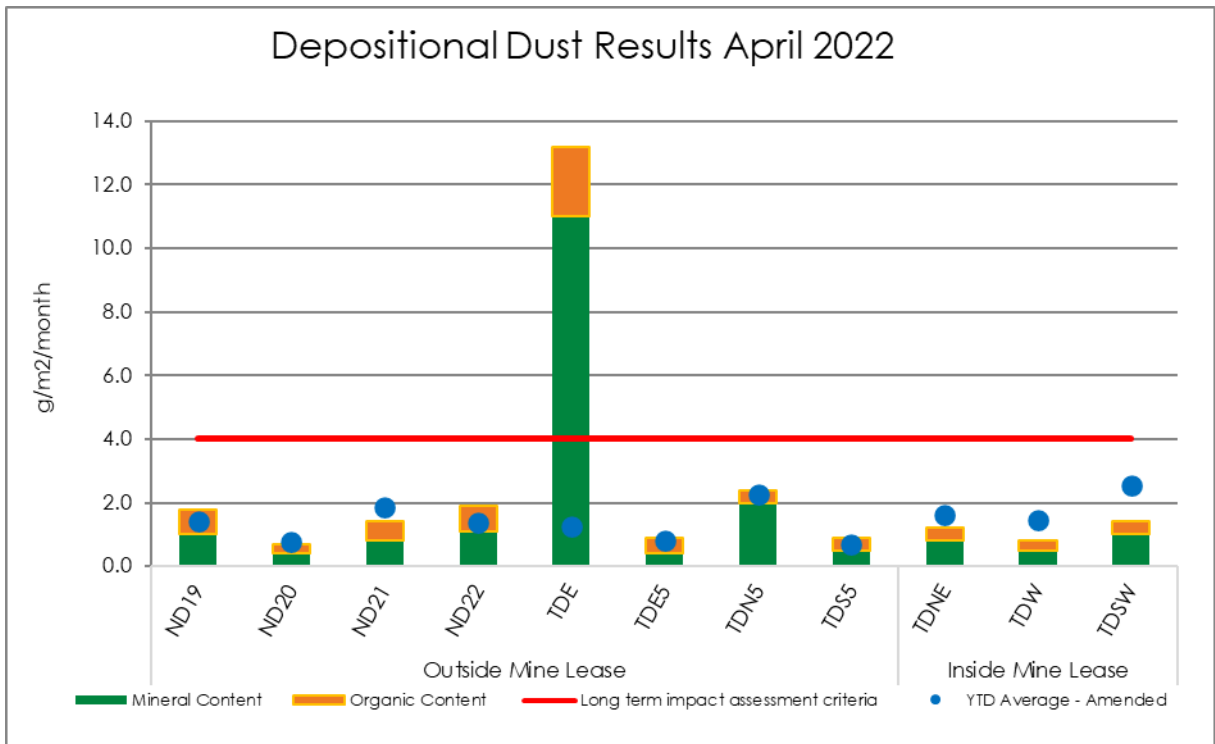


Figure 7: April depositional dust results for all locations

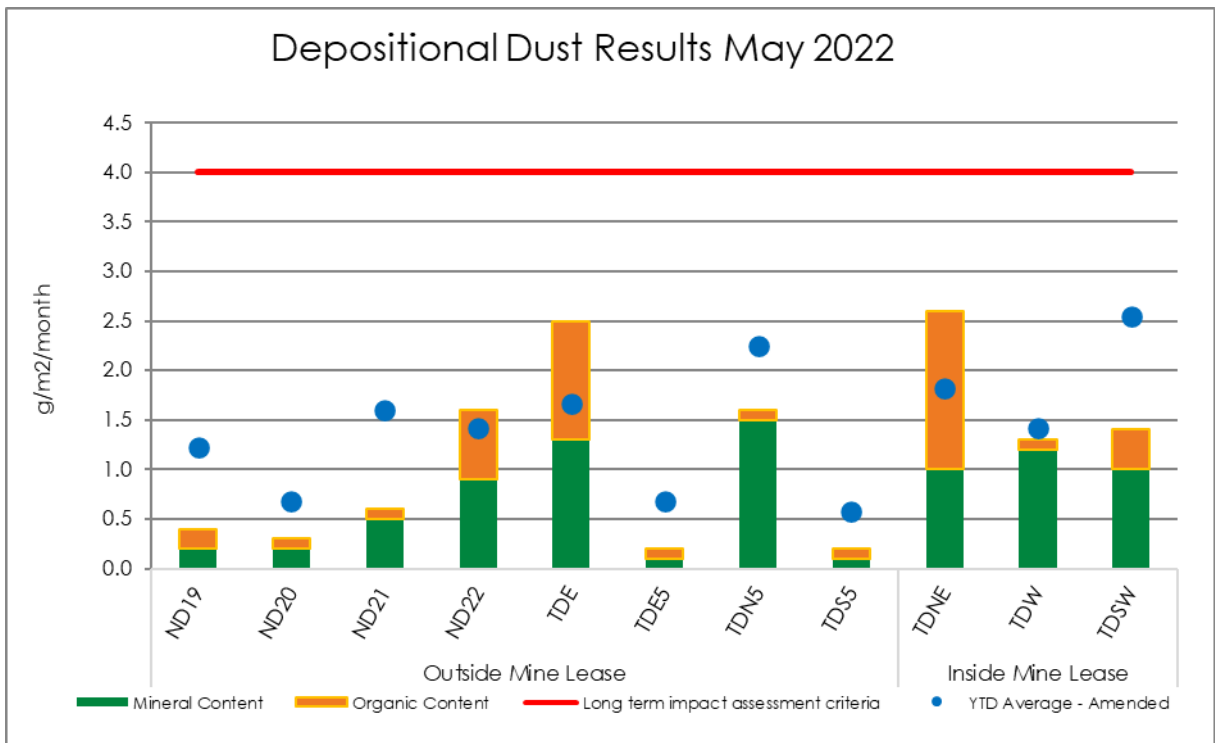


Figure 8: May depositional dust results for all locations

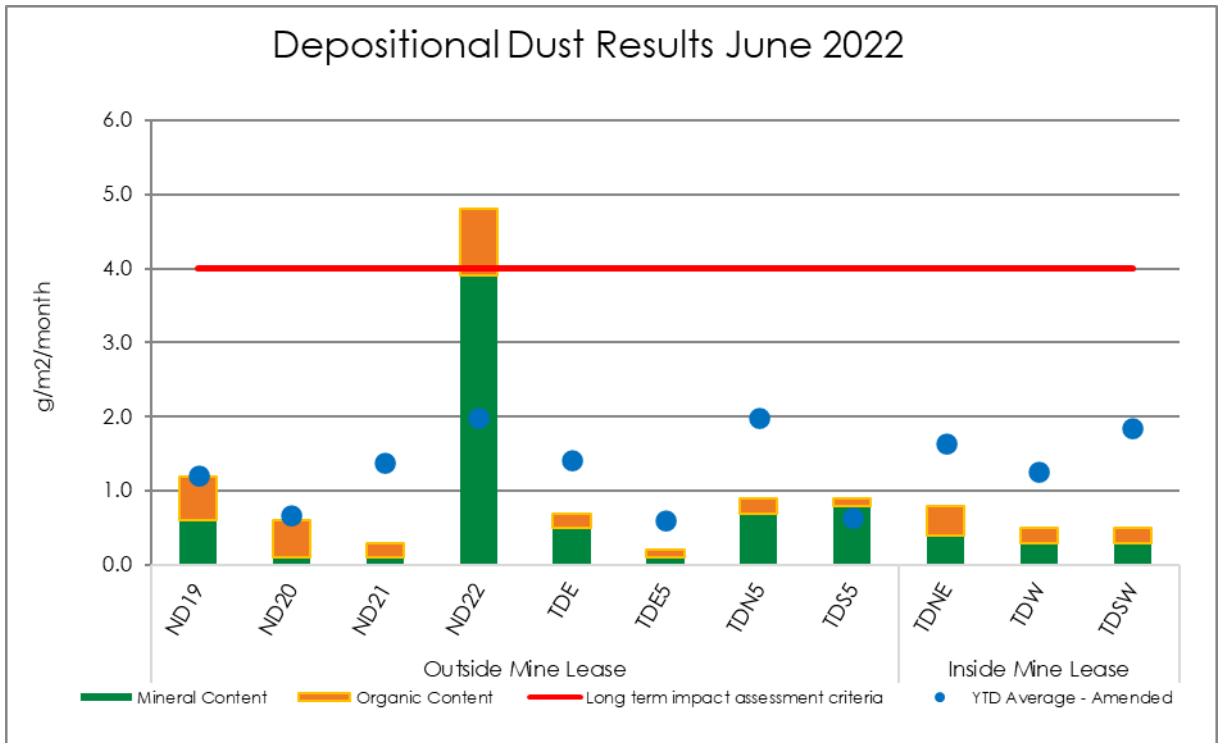


Figure 9: June depositional dust results for all locations

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 in 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 1-7 below.

Monitoring resumed within the western side of TSF2 following removal of the exclusion zone. Access to W28, W29 and MB06B was restricted during the quarter due to construction on the eastern wall of TSF2.

Table 1: Process Water System

Location	RP01	RP02	RP03	RP04	RP05	RP06	RP07	RP08	RP09	RP12	RP13	RP15	RP16	RP19	RP20
pH	insufficient water	7.32	8.01	insufficient water	7.89	insufficient water	8.83	7.39	6.95	7.5	7.17	7.1	7.98	7.0	7.97
EC (uS/cm)	insufficient water	942.1	1,615.0	insufficient water	380.7	insufficient water	526.0	1,577.0	3,481.0	179.0	830.0	3,495.0	2,307.0	2,898.0	2,447.0
Cu (mg/L)		0.063	0.064		0.029		0.017	0.038	0.023	0.037	0.089	0.026	0.016	0.012	0.025

Table 1 continued: Process Water System

Location	RP21	RP22	RP23	RP24	RP25	RP26	RP27	RP28	RP32	Caloola	GT02
pH	7.59	7.67	7.66	insufficient water	7.77	7.77	7.72	6.84	9.09	7.59	insufficient water
EC (uS/cm)	2,023.0	435.0	439.25	insufficient water	336.9	350.8	2,221.0	3,137.0	605.0	3,288.0	insufficient water
Cu (mg/L)	0.039	0.03	0.028		0.024	0.033	0.046	0.01	0.164	0.016	

Table 2: Sediment Ponds

Location	SP03	SP10	SP15	SP33
pH	9.19	7.18	9.51	7.0
EC (uS/cm)	1,546.0	116.0	204.0	145.1
Copper (mg/L)	0.008	0.069	0.051	

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD16	FD18	FD25	FD26	FD27
pH	6.91	7.68	7.11	6.95	8.94	6.56	7.5	8.24	8.17	7.94
EC (uS/cm)	106.9	86.3	99.6	84.3	162.0	81.0	2,040.0	114.0	186.0	146.0
Copper (mg/L)	0.019	0.022	0.016	0.017	0.078	0.014	0.023	0.02	0.04	0.024

Table 4: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W26	W27	W28	W29	W30	W31	W32
pH	7.11	7.04	6.35	6.6	no access	7.14	11.86	no access	no access	7.8	8.28	11.35
EC (uS/cm)	5,932.0	9,437.0	21,442.0	22,984.0	no access	12,497.0	21,172.0	no access	no access	2,449.0	625.0	2,523.0
Copper (mg/L)	0.003	0.007	0.025	0.009		0.011	0.01			0.022	0.018	0.027

Table 5: Opencut Bores

Location	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	7.06	7.32	7.42	no access	7.32	7.68	6.84	7.52	7.64	7.05	7.7	7.13
EC (uS/cm)	12,277.0	22,014.0	2,854.0	no access	5,870.0	5,802.0	11,697.0	20,505.0	4,772.0	3,560.0	2,136.0	2,052.0
Copper (mg/L)	0.01	0.011	0.014		0.006	0.001	0.023	0.01	0.018	0.017	0.02	0.045

Table 6: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P139	P145	P149
pH	7.4	9.4	7.58	7.48	7.44	6.93	6.55	8.18	7.24
EC (uS/cm)	786.6	14,614.0	12,376.0	11,311.0	9,813.0	26,505.0	26,848.0	105.0	25,938.0
Copper (mg/L)	0.025	0.009	0.005	0.032	0.001	0.01	0.012	0.004	0.01

Table 7: Regional Bores

Location	Moss #1	Wright	Far Hilliers	Long Paddock
pH	7.56	7.82	8.26	7.64
EC (uS/cm)	1,944.0	868.0	456.0	620.0
Copper (mg/L)	0.009	0.006	0.004	0.008

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. Table 8 below shows the blast impact criteria as set out in the Schedule 3 Conditions 6-13 of the Consent.

Table 8: Vibration and overpressure criteria of DC11_0060.

<i>Location</i>	<i>Airblast overpressure (dB(Lin Peak))</i>	<i>Ground vibration (mm/s)</i>	<i>Allowable exceedance</i>
Residence on privately owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
All public infrastructure	-	50 <i>(or a limit determined by the structural design methodology in AS 2187.2-2006, or its latest version, or other alternative limit for public infrastructure, to the satisfaction of the Secretary)</i>	0%

The blast monitoring program uses blast units which measure ground vibration and air overpressure at the residences of the four closest privately owned properties, "Hubberstone", "Hillview", "Milpose", and "Adavale". 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.

4.2 Quarterly Monitoring Analysis

During the reporting period, no surface blasting was undertaken during the monitoring period..

5. NOISE

Operational noise is managed by CMOC 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

CMOC undertakes a noise monitoring program that consists of both operator-attended and unattended surveys at the five nearest occupied residences 'Hubberstone', 'Milpose', 'Lone Pine', 'Hillview' and 'Adavale'.

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 3 to Wednesday 4 May 2022.

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 9-14 below.

Table 9: Attended noise monitoring results for Hubberstone

Table 3 Operator-Attended Noise Survey Results – Location NM1, Hubberstone					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
04/05/2022 16:30	73	48	36		
				WD: N	Wind 31-40
04/05/2022 16:45	74	50	39	WS: 1.0m/s	Birds 31-74
				Stab Class: D	Insects 34-51
04/05/2022 17:00	56	46	40		NPM inaudible
Site L _{Aeq} (15min) Contribution					<35
Evening					
04/05/2022 20:46	51	45	41		
				WD: N	Insects 32-53
04/05/2022 21:01	54	43	38	WS: 1.5m/s	Wind 30-56
				Stab Class: D	Traffic 30-42
04/05/2022 21:16	56	40	35		NPM inaudible
Site L _{Aeq} (15min) Contribution					<35
Night					
04/05/2022 01:23	53	46	42		
				WD: N	
04/05/2022 01:38	53	46	43	WS: 0.1m/s	Insects 38-53
				Stab Class: F	NPM inaudible
04/05/2022 01:53	53	46	43		
Site L _{Aeq} (15min) Contribution					<35
Site L _{A1} (1min) Contribution					<40

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 10: Attended noise monitoring results for Lone Pine

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
04/05/2022 15:31	72	47	38	WD: N WS: 1.5m/s Stab Class: A	Wind 35-46
04/05/2022 15:46	77	55	37		Birds 32-77
04/05/2022 16:01	71	50	42		Insects <35 NPM inaudible
Site L _{Aeq} (15min) Contribution					<35
Evening					
04/05/2022 19:49	60	47	42	WD: NW WS: 0.5m/s Stab Class: E	Insects 39-62 NPM inaudible
04/05/2022 20:04	62	48	42		
04/05/2022 20:19	62	50	41		
Site L _{Aeq} (15min) Contribution					<35
Night					
04/05/2022 00:27	67	55	42	WD: N WS: 0.1m/s Stab Class: F	Insects 40-67 NPM inaudible
04/05/2022 00:42	66	54	41		
04/05/2022 00:57	66	54	41		
Site L _{Aeq} (15min) Contribution					<35
Site L _{A1} (1min) Contribution					<40

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 11: Attended noise monitoring results for Milpose

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
04/05/2022					
13:35	64	48	36		Wind 29-59
04/05/2022				WD: NE	Insects 26-64
13:50	61	39	32	WS: 1.5m/s	Residential noise 30-55
04/05/2022				Stab Class: A	NPM inaudible
14:05	58	37	31		
Site L _{Aeq} (15min) Contribution					<35
Evening					
03/05/2022					Insects 30-39
21:16	45	34	33		Dogs barking 30-35
03/05/2022				WD: N	Aircraft <35
21:31	39	35	33	WS: 0.1m/s	MAC operator noise 45
03/05/2022				Stab Class: E	NPM production hum <30-33
21:46	38	35	33		(just audible throughout)
Site L _{Aeq} (15min) Contribution					30
Night					
03/05/2022					Insects 31-46
22:15	57	35	32		Aircraft 30-45
03/05/2022				WD: N	MAC operator noise 57
22:30	46	34	33	WS: 0.1m/s	NPM production hum <30-33
03/05/2022				Stab Class: E	(just audible to audible throughout)
22:45	45	34	32		
Site L _{Aeq} (15min) Contribution					<30
Site L _{A1} (1min) Contribution					<40

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 32: Attended noise monitoring results for Hillview

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	Duration 15min	L _{Amax}	L _{Aeq}		
04/05/2022					
12:21	76	50	37		Wind 32-42
04/05/2022				WD: NE	Traffic 30-61
12:36	55	39	35	WS: 1.5m/s	Birds 30-54
04/05/2022				Stab Class: A	Residential noise 35-76
12:51	61	44	38		NPM inaudible
Site L _{Aeq} (15min) Contribution					<35
Evening					
04/05/2022					Rain Drops 35-77
18:45	77	53	42		Traffic 35-61
04/05/2022				WD: NW	Livestock 25-30
19:00	67	41	31	WS: 0.5m/s	Insects 25-34
04/05/2022				Stab Class: E	NPM production hum <27-36
19:15	61	43	29		(just audible to audible throughout)
Site L _{Aeq} (15min) Contribution					30
Night					
04/05/2022					
02:19	62	42	30		Traffic 26-62
04/05/2022				WD: NE	Insects 25-38
02:34	39	32	30	WS: <0.5m/s	NPM production hum <28-37
04/05/2022				Stab Class: F	(audible throughout)
02:49	41	33	32		
Site L _{Aeq} (15min) Contribution					31
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 13: Attended noise monitoring results for Adavale

Table 7 Operator-Attended Noise Survey Results – Location NM5, Adavale					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
04/05/2022					
14:34	60	42	35		
				WD: N	Wind 25-56
04/05/2022				WS: 2.0m/s	Birds 25-60
14:49	54	37	31	Stab Class: A	NPM inaudible
04/05/2022					
15:04	57	33	27		
Site L _{Aeq} (15min) Contribution					<35
Evening					
03/05/2022					
20:16	50	30	29		Insects 25-43
				WD: N	Wildlife 25-43
03/05/2022				WS: 0.1m/s	MAC operator noise 50
20:31	43	30	29	Stab Class: E	NPM production hum <25
03/05/2022					(barely audible throughout)
20:46	50	31	29		
Site L _{Aeq} (15min) Contribution					<30
Night					
03/05/2022					
23:21	52	31	29		Insects 29-43
				WD: N	MAC operator noise 52
03/05/2022				WS: 0.1m/s	NPM production hum <26-30
23:21	43	30	29	Stab Class: E	(barely to just audible throughout)
03/05/2022					
23:21	41	31	30		
Site L _{Aeq} (15min) Contribution					<30
Site L _{A1} (1min) Contribution					<40

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 14: Attended road noise survey results

Table 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview				
Date/Time (hrs) Duration 1 hour	Measured Noise Level dB LAeq(1hr)	Meteorology	Criteria dB LAeq(1hr)	Description and SPL dBA
04/05/2022 12:21 (Day)	50	WD: NE WS: 1.5m/s Stab Class: A	55	Wind 36-42 Traffic 30-61 Birds 30-54 Residential noise 33-76 NPM concentrate truck 35-61 (1 pass, offsite) Approx. 13 vehicles enter/exit NPM site
04/05/2022 18:00 (Evening)	<55	WD: N WS: 0.5m/s Stab Class: E	55	Rain Drops 35-79 Traffic 35-60 Insects 38-61 NPM concentrate truck 35-62 (2 passes, offsite) Approx. 61 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.