



1 October to 31 December 2021 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
Date	11 May 2022
Signature	

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 October to 31 December 2021. This monitoring is undertaken in accordance with the Environmental Monitoring Program (available at www.northparkes.com.au). Details of air quality, noise and water 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.

Missing data during the period at Hillview monitoring location was the result of power supply issues.

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

Annual Averages:

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

- 9.9 µg/m³ at Hubberstone
- 10.0 µg/m³ at Milpose, and
- 8.4 µg/m³ at Hillview.

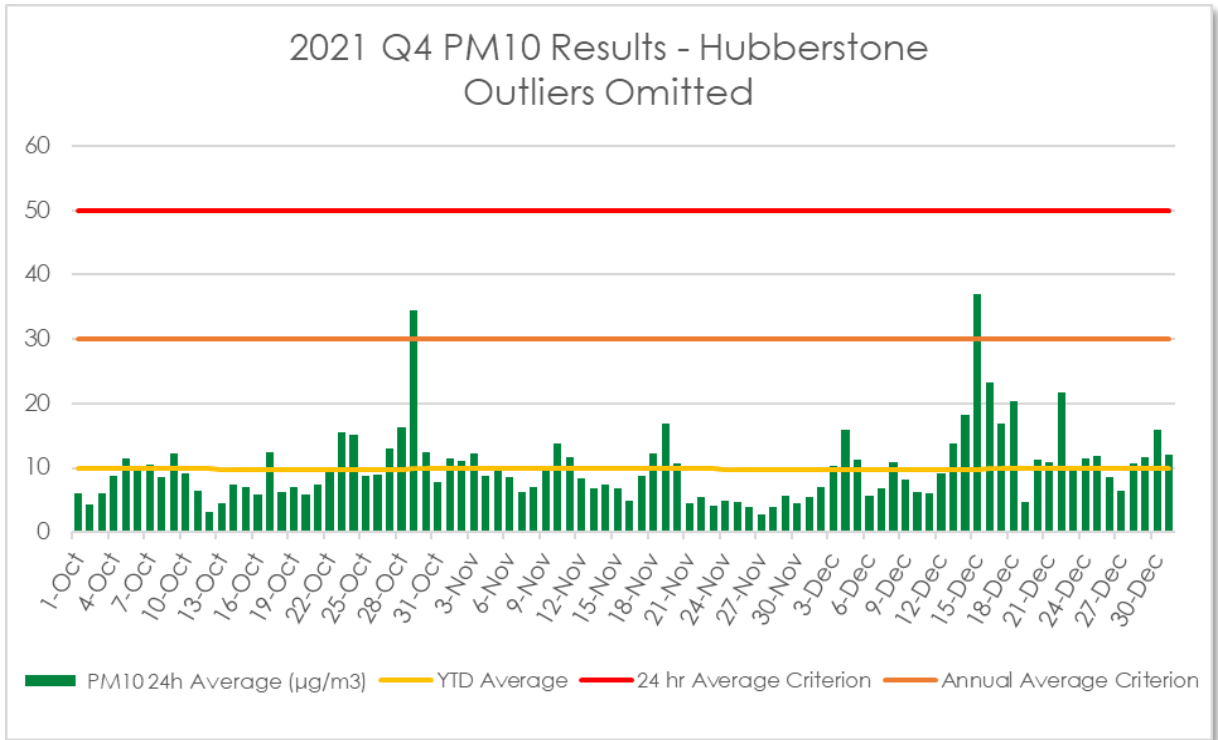


Figure 1: Hubberstone

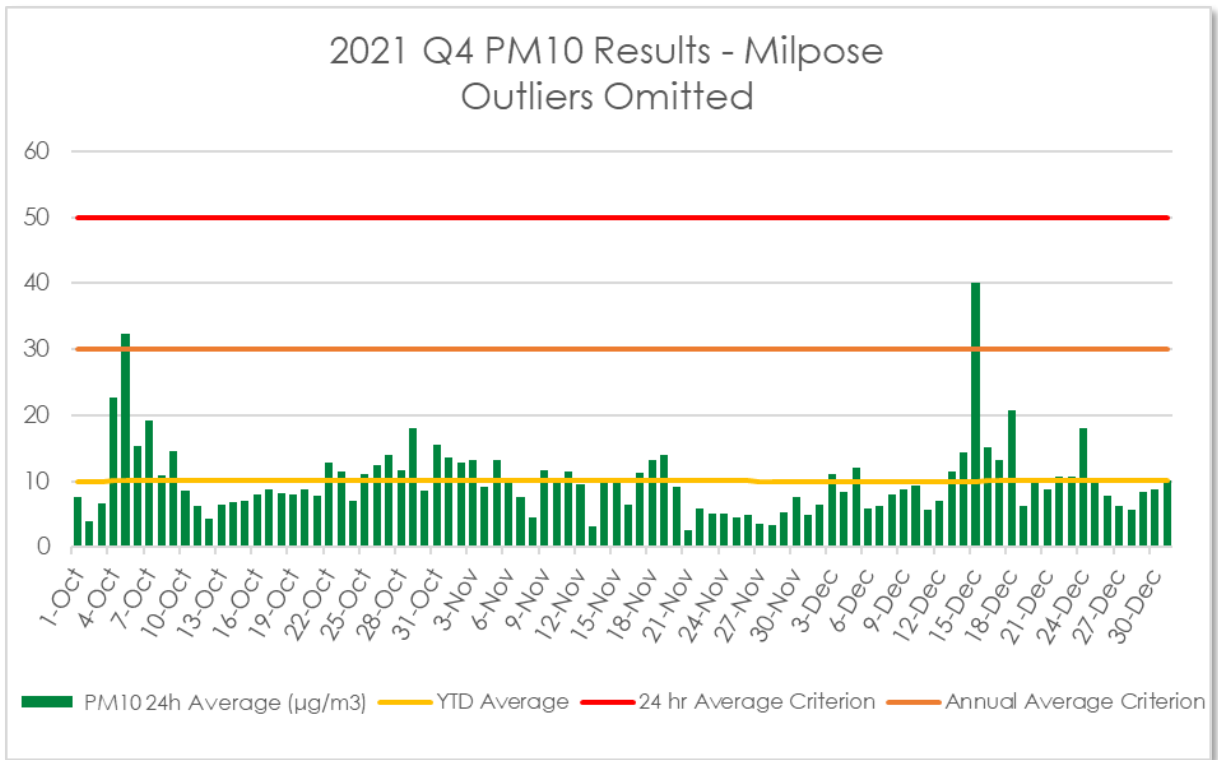


Figure 2: Milpose

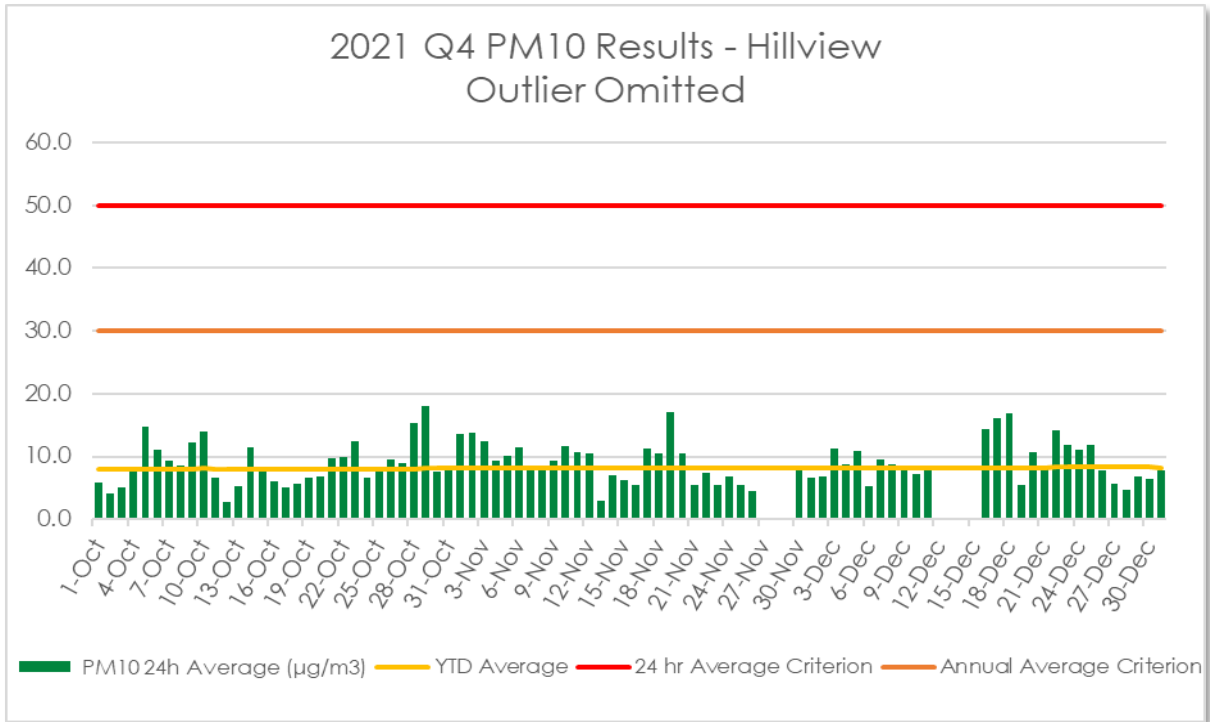


Figure 3: Hillview

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 results at Hubberstone and Milpose during the months of November and December are a result of instrumentation malfunction. With ongoing pandemic concerns, a qualified person was unable to inspect and resolve the issues with the monitoring equipment until the following month. The issues are being progressively resolved. The missing result on 12 December at Hillview was due to a power surge at the property.

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:

- 18.6 µg/m³ at Hubberstone
- 20.5 µg/m³ at Milpose, and
- 19.1 µg/m³ at Hillview.

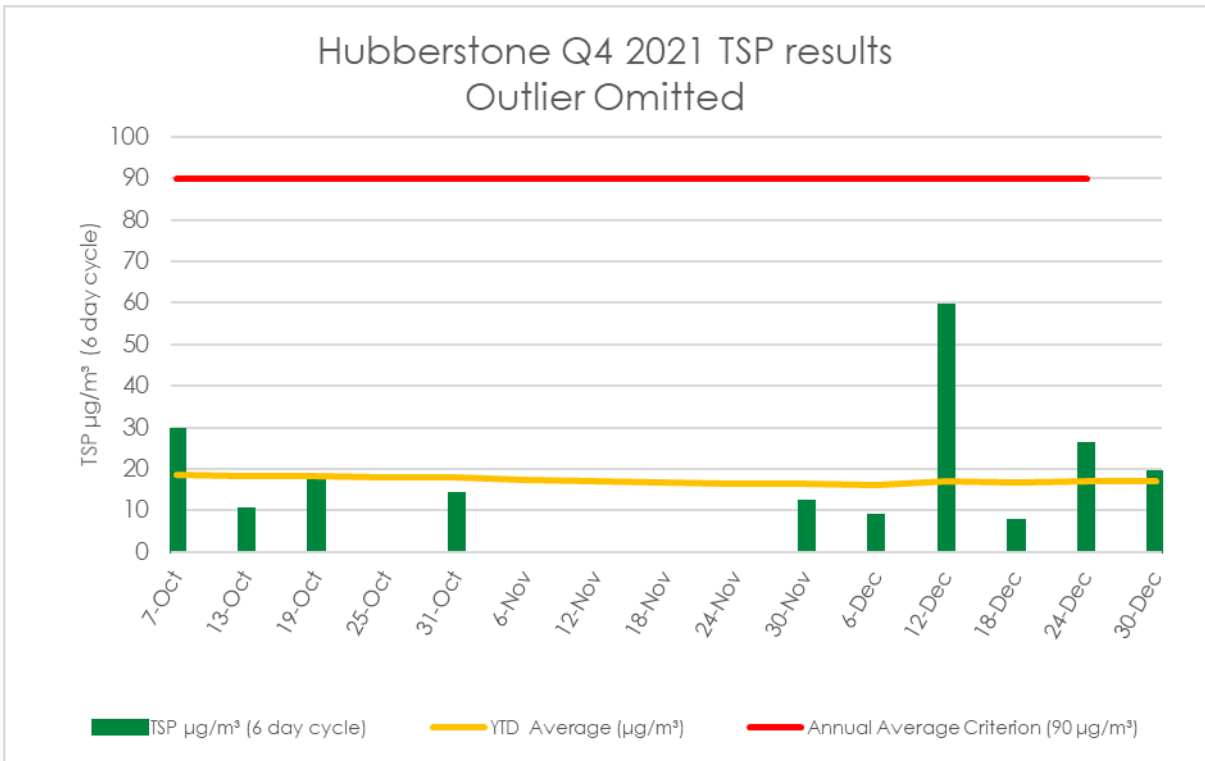


Figure 4: Hubberstone

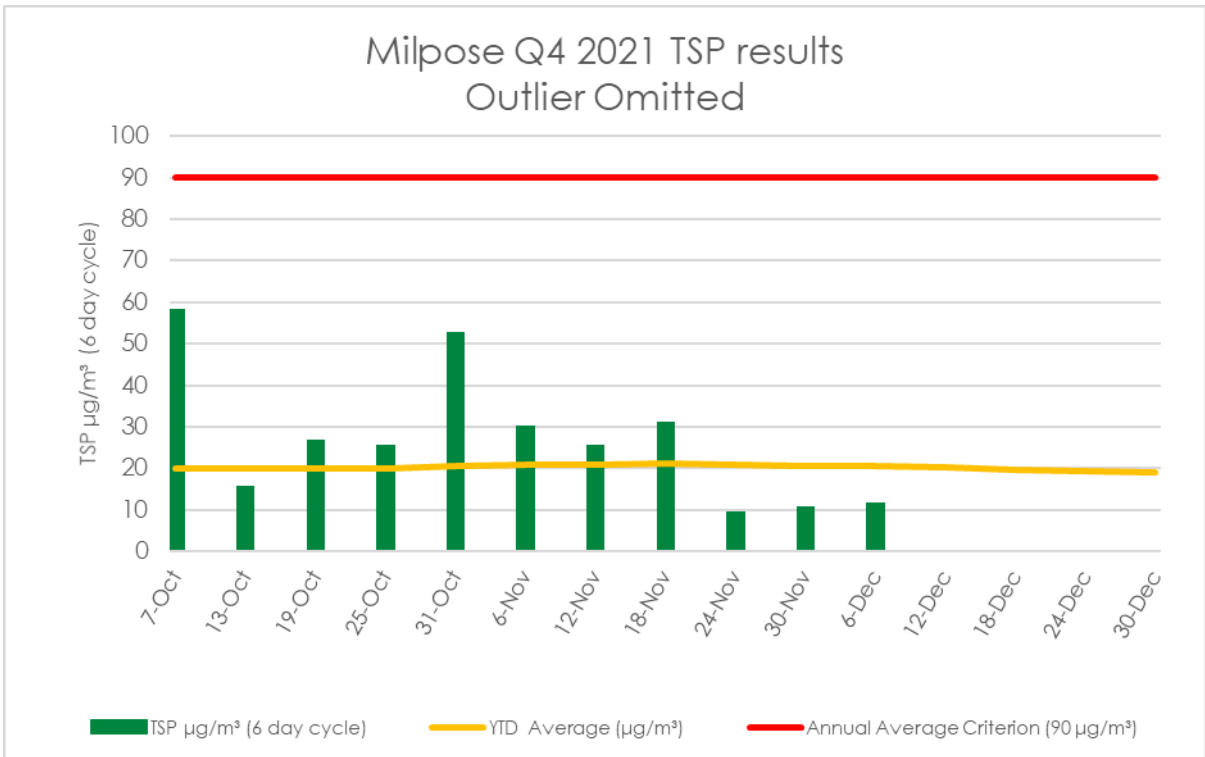


Figure 5: Milpose

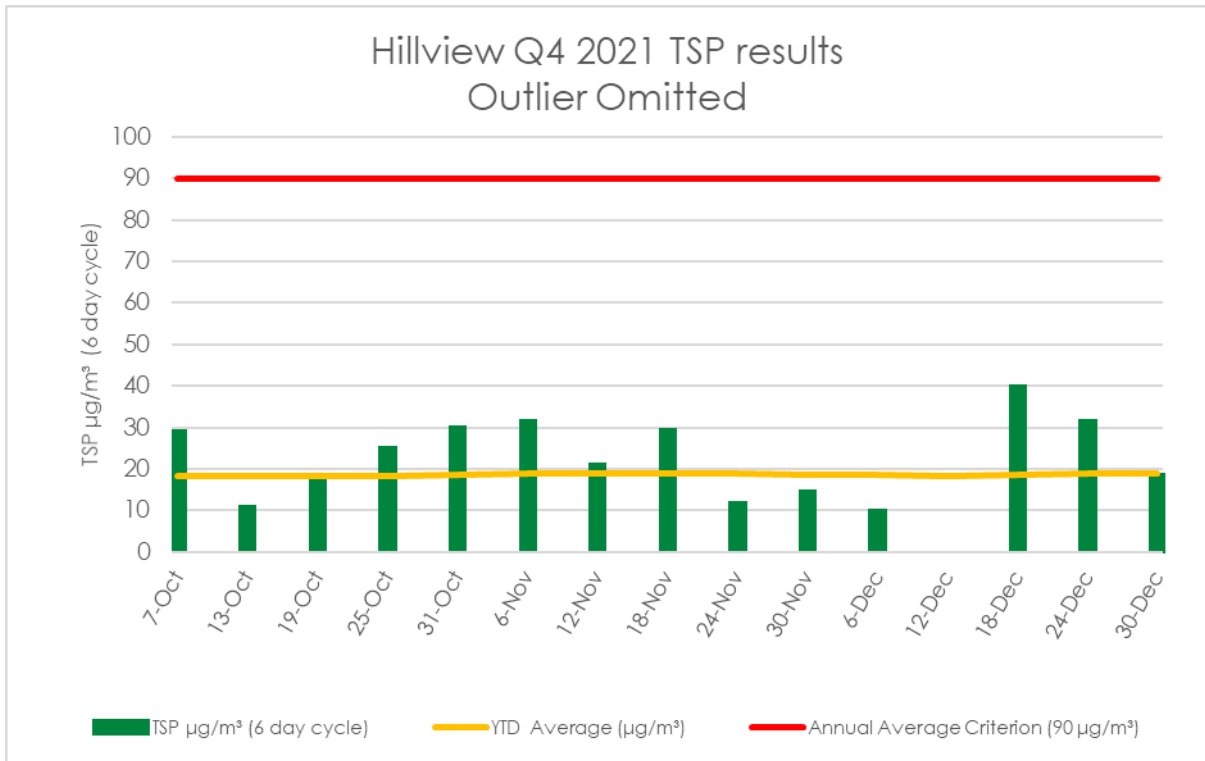


Figure 6: Hillview

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 quarter, ND21, TDE and TDN5 recorded results above the internal trigger level of $4.0 \text{ g}/\text{m}^2/\text{month}$. An internal investigation was undertaken for each of these results and is detailed below.

ND21 (Lone Pine):

- November: $4.3 \text{ g}/\text{m}^2/\text{month}$ – Wind direction was predominately from the ENE during the month. Airborne particulate generating wind speeds (considered greater than $7 \text{ m}/\text{s}$) contributed to only 5.3 percent of the months total, with 0% of that wind prevailing from the project area. It was determined that the elevated result was not due to the operations at Northparkes.
- December: $4.2 \text{ g}/\text{m}^2/\text{month}$ – Wind direction was predominately from the ENE during the month. Airborne particulate generating wind speeds (considered greater than $7 \text{ m}/\text{s}$) contributed to only 4.1 percent of the months total, with only approximately 0.6% of that wind prevailing from the project area. It was determined that the elevated results was not due to the operations at Northparkes.

TDE (Paddock opposite Avondale)

- December: 6.8 g/m²/month – Wind direction was predominately from the ENE during the month. Harvest activities were observed to be occurring in the adjacent farming paddocks during the monitoring period and are the likely source of particulates that caused the elevated reading. It was determined that the elevated results were not due to the operations at Northparkes.

TDN5 (Bogan Road (dirt road))

- December: 6.5 g/m²/month – Wind direction was predominately from the ENE during the month. With harvest activities occurring around the district, increased heavy vehicle movements were observed along the unsealed road next to the monitoring location, being the likely source of particulates that caused the elevated reading. It was therefore determined that the elevated results were not due to the operations at Northparkes.

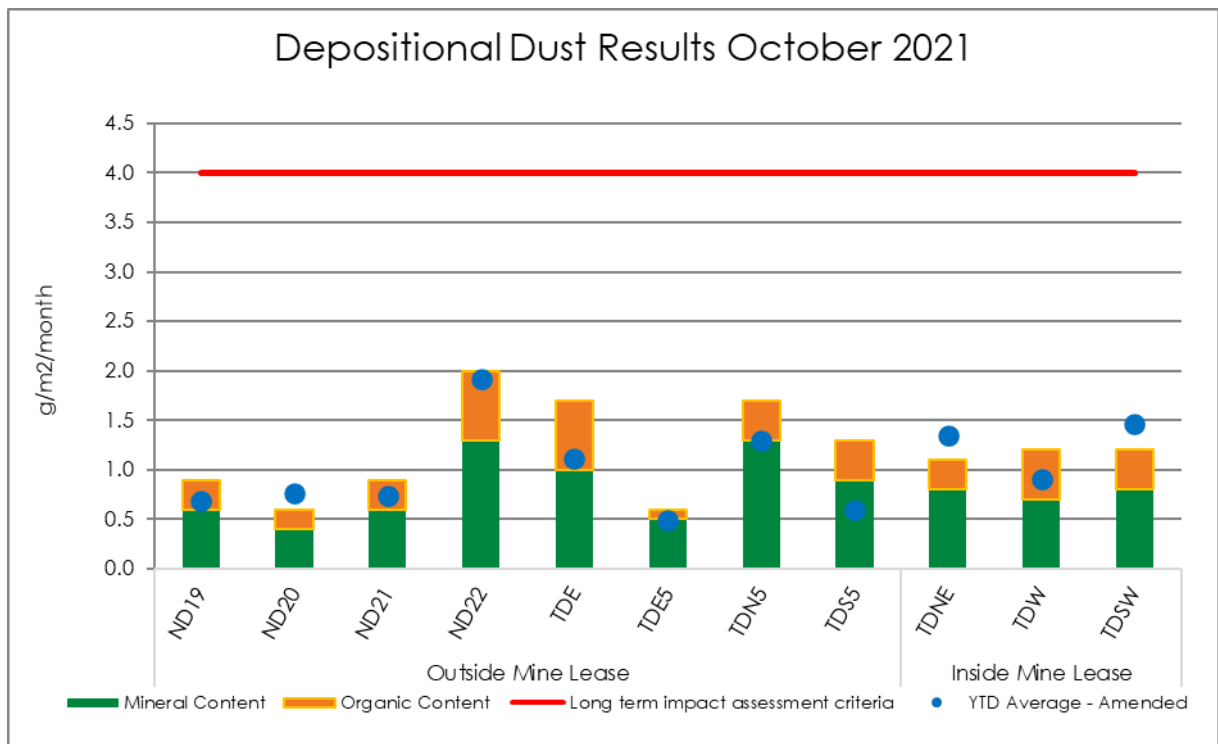


Figure 7: October depositional dust results for all locations

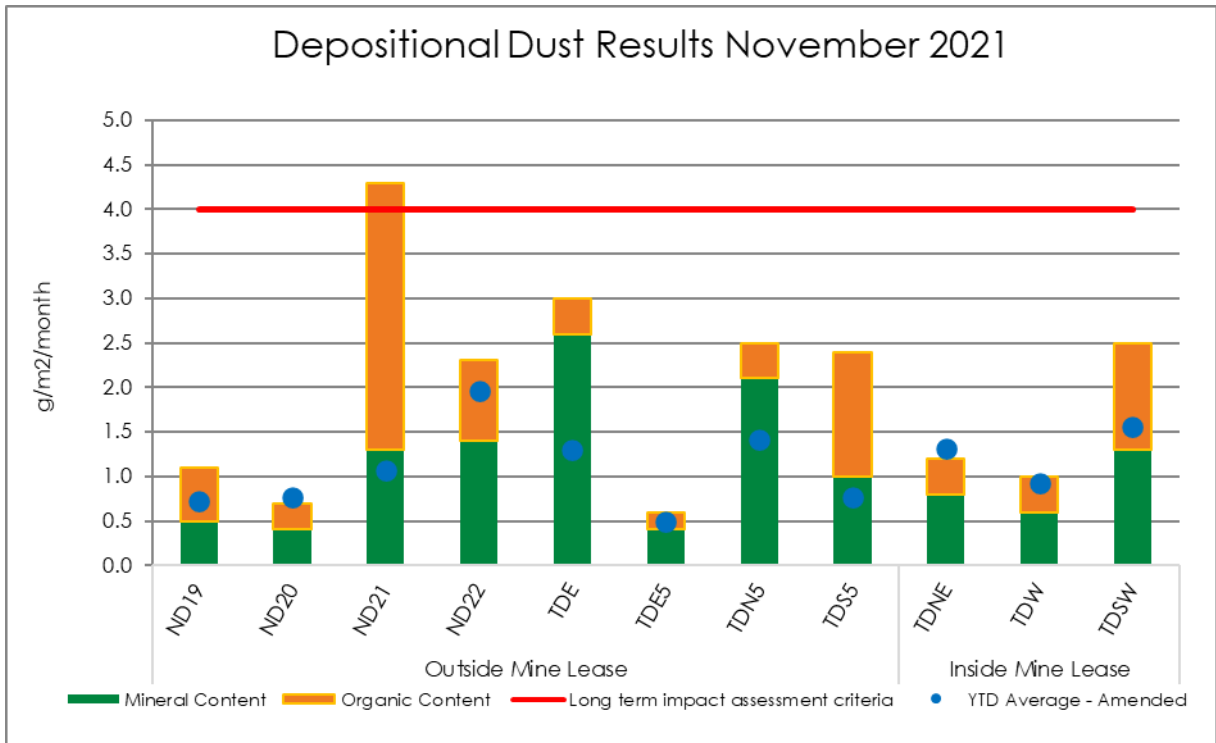


Figure 8: November depositional dust results for all locations

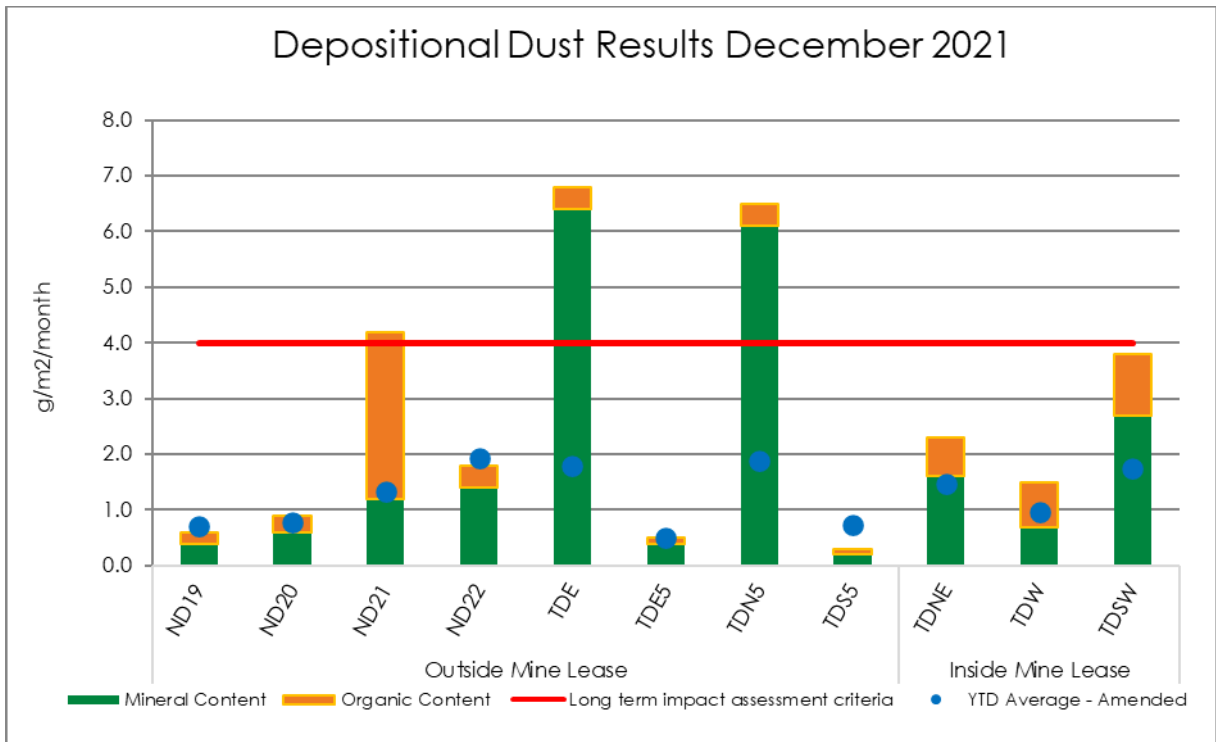


Figure 9: December depositional dust results for all locations

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, EC or copper concentrations for all locations. A summary of the monitoring results at each location sampled are presented in Tables 1-7 below.

Monitoring of W26, W27, MB16, W14, W22, W23, RP09 and RP28 was not able to be undertaken during the reporting period as a result of a regulatory imposed exclusion area, following concerns with TSF2. The EPA have been regularly consulted on the issue, including the restricted access to the monitoring locations, and have been advised that monitoring will recommence following the removal of the exclusion area.

Table 1: Process Water System

Location	RP01	RP02	RP03	RP05	RP06	RP07	RP08	RP09	RP12	RP15	RP19	RP20	RP21
pH	7.53	8.23	8.34	8.23	8.39	8.12	7.91	No access	9.48	8.16	8.26	7.92	8.14
EC (uS/cm)	358.6	2,364.0	2,245.0	518.0	748.0	870.2	2,440.0	No access	309.0	4,335.0	4,188.0	993.0	2,493.0
Cu (mg/L)	0.035	0.035	0.041	0.014	0.01	0.011	0.033	No access	0.02	0.045	0.007	0.024	0.025

Table 1 continued: Process Water System

Location	RP23	RP25	RP26	RP27	RP28	RP32	RP33	Caloola	PWD	GT02
pH	8.01	8.22	8.35	7.71	no access	8.38	8.39	8.13	7.89	8.85
EC (uS/cm)	904.0	454.0	478.0	2,872.0	no access	1,356.0	278.0	3,220.0	4,891.0	1,500.0
Cu (mg/L)	0.036	0.02	0.02	0.038	no access	0.037	0.019	0.017	0.038	0.037

Table 2: Sediment Ponds

Location	SP03	SP10	SP15
pH	8.63	8.52	dry
EC (uS/cm)	1,513	185	dry
Copper (mg/L)	0.004	0.069	dry

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD16	FD25	FD26	FD27
pH	8.62	7.27	7.2	8.2	8.45	7.81	8.63	7.99	7.59
EC (uS/cm)	190.0	79.57	119.74	188.0	244.0	87.0	272.0	316.0	295.0
Copper (mg/L)	0.019	0.018	0.014	0.02	0.062	0.01	0.008	0.017	0.011

Table 4: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W26	W27	W28	W29	W30	W31	W32
pH	7.15	7.21	6.17	6.73	7.05	no access	no access	6.76	7.25	7.25	7.7	11.7
EC (uS/cm)	6,031.0	9,880.0	22,256.0	24,193.0	17,496.0	no access	no access	16,366.0	22,948.0	2,588.0	702.0	2,294.0
Copper (mg/L)	0.008	0.004	0.022	0.006	0.006	no access	no access	0.011	0.048	0.014	0.017	0.014

Table 5: Opencut Bores

Location	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	6.89	7.05	7.52	no access	no access	7.61	7.08	7.01	no access	no access	7.81	7.75
EC (uS/cm)	13,710.0	23,157.0	2,693.0	no access	no access	5,794.0	12,051.0	20,817.0	no access	no access	2,219.0	2,144.0
Copper (mg/L)	0.005	0.012	0.014	no access	no access	0.002	0.018	0.017	no access	no access	0.006	0.051

Table 6: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P139	P145	P149
pH	7.79	8.66	7.34	7.57	7.29	7.26	6.21	7.03	6.74
EC (uS/cm)	892.0	9,365.0	14,979.0	12,391.0	1,008.0	27,584.0	28,289.0	136.0	27,245.0
Copper (mg/L)	0.004	0.003	0.016	0.047	0.003	0.01	0.011	0.006	0.01

Table 7: Regional Bores

Location	Moss #1	Wright	Far Hilliers	Long Paddock
pH	7.36	6.96	7.34	8.68
EC (uS/cm)	1,716.5	1,127.0	631.0	736.0
Copper (mg/L)	0.011	0.007	0.004	0.008

4. 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.

4.1 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.

4.2 Quarterly Monitoring Analysis

Attended noise monitoring was undertaken between Wednesday 8 and Thursday 9 December 2021.

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 NPM 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 8-13 below.

Table 8: 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					
16:51 09/12/2021	59	40	33	WD: W WS: 2.0m/s Stab Class: C	Wind 26-51 Insects 29-41 Traffic 26-58
17:06 09/12/2021	55	40	34		Birds 26-59 Residential Noise 30-51
17:21 09/12/2021	58	45	36		NPM Site Processing <30 (barely audible <50% total measurement)
Site L _{Aeq} (15min) Contribution					<30
Evening					
20:10 09/12/2021	55	46	40	WD: NW WS: 0.5m/s Stab Class: E	Agricultural Noise 35-56 Insects 33-46 Birds 30-47
20:25 09/12/2021	67	47	39		Livestock 30-67 Traffic 30-53
20:40 09/12/2021	57	44	37		NPM Site Processing <35 (barely audible <25% total measurement)
Site L _{Aeq} (15min) Contribution					<30
Night					
2:00 09/12/2021	65	39	32	WD: SW WS: 1.0m/s Stab Class: D	Insects 30-57 Birds 35-65 Traffic 27-44
2:18 09/12/2021	57	37	33		Livestock 28-46
2:33 09/12/2021	46	36	33		NPM Site Processing <27-38 (audible throughout measurement)
Site L _{Aeq} (15min) Contribution					30
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 9: 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					
15:54 09/12/2021	60	46	36		Birds 20-57
16:09 09/12/2021	61	50	30	WD: W WS: 1.5m/s Stab Class: C	Wind 23-48 Traffic 25-60 Residential Noise 25-61
16:24 09/12/2021	59	47	35		NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
19:13 09/12/2021	58	48	42		Wind 33-50 Birds 30-63
19:28 09/12/2021	63	45	36	WD: SW WS: 1.5m/s Stab Class: D	Insects 30-44 Dogs Barking <30-35 Aircraft 35-44
19:43 09/12/2021	69	48	36		Traffic 35-69 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Night					
01:00 09/12/2021	55	45	41		Wind 31-55
01:15 09/12/2021	57	45	38	WD: SW WS: 2.0m/s Stab Class: D	Insects 35-60 NPM Inaudible
01:30 09/12/2021	60	45	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.

Table 10: Attended noise monitoring results for Milpose

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose					
Date/Time (hrs) Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
14:02 09/12/2021	58	39	27		Wind 23-44
14:17 09/12/2021	69	47	29	WD: SW WS: 1.5m/s	Birds 20-58 Insects 20-54
14:32 09/12/2021	54	38	30	Stab Class: B	Residential Noise 30-69 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
20:09 08/12/2021	52	38	34		Insects 31-43 Dogs Barking 28-51
20:24 08/12/2021	53	40	35	WD: SE WS: <0.5m/s	Birds 28-67 Residential Noise 30-45
20:39 08/12/2021	67	43	37	Stab Class: E	Aircraft 32-48 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Night					
23:01 08/12/2021	48	38	35		Insects 30-41 Dogs Barking 27-48
23:16 08/12/2021	44	38	37	WD: SE WS: <0.5m/s	Aircraft <35 Birds 32-41
23:31 08/12/2021	48	38	36	Stab Class: E	NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
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 3: 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}		
12:50 09/12/2021	72	45	31	WD: W WS: 1.0m/s Stab Class: A	Wind 27-41 Birds 25-46
13:05 09/12/2021	61	41	30		Traffic 25-63 Aircraft 30-44
13:20 09/12/2021	63	45	31		Residential Noise 35-72 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
18:00 09/12/2021	61	48	41	WD: W WS: 2.0m/s Stab Class: D	Wind 36-51 Traffic 33-66 Birds 33-54
18:15 09/12/2021	65	51	39		NPM Inaudible
18:30 09/12/2021	66	49	41		
Site L _{Aeq} (15min) Contribution					<35
Night					
23:58 08/12/2021	66	44	28	WD: S WS: 1.5m/s Stab Class: E	Insects 26-54 Wind 23-58 Traffic 30-69
0:13 09/12/2021	56	43	31		NPM Hum <25
0:28 09/12/2021	69	49	43		(barely audible 50% measurement first 2 periods only)
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 4: 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					
14:59 09/12/2021	57	39	27	WD: SW WS: 2.0m/s Stab Class: B	Wind 25-48
15:14 09/12/2021	50	39	29		Insects 22-36
15:29 09/12/2021	52	39	30		Birds 22-57 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
21:08 08/12/2021	49	38	35	WD: S WS: 1.0m/s Stab Class: D	Wind 30-43
21:23 08/12/2021	42	37	35		Insects 33-48
21:38 08/12/2021	43	36	34		Birds 30-49 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Night					
22:00 08/12/2021	49	36	33	WD: S WS: 1.0m/s Stab Class: E	Wind 25-41
22:15 08/12/2021	48	33	30		Insects 25-36
22:30 08/12/2021	46	29	27		MAC Operator 46-49 NPM Inaudible
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 5: 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
12:50 09/12/2021 (Day)	44	WD: W WS: 1.0m/s Stab Class: A	55	Wind 27-41
				Birds 25-46
				Traffic 25-63
				Aircraft 30-44
				Residential Noise 35-72
				NPM Concentrate Truck 30-56 (1 pass, Offsite)
				Approx. 17 vehicles enter/exit NPM Site
18:00 09/12/2021 (Evening)	49	WD: W WS: 2.0m/s Stab Class: D	55	Wind 36-51
				Traffic 33-66
				Birds 33-54
				NPM Concentrate Truck 30-61 (2 passes, Offsite)
				Approx. 83 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.