Northparkes Mines
A century of mining together

PO Box 995 Parkes NSW 2870 Australia
T +61 (0) 2 6861 3533
ABN 17 164 997 317
www.northparkes.com

1 July to 30 September 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 **Date** **Signature**	Superintendent – Environment and Farms
Approved by	**Stacey Kelly**
Title **Date** **Signature**	Manager – People, Safety and Environment

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 July to 30 September 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.

2. AIR QUALITY

The air quality monitoring program utilises PM_{10} (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 PM_{10} 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

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 >30 µg/m^3 for the annual average and >50 µg/m^3 for a 24-hour monitoring period. Refer to Appendix A for map of all PM_{10} monitoring locations.

During the reporting period, Hillview recorded three elevated readings of 75.2, 172.6 and 128.7 µg/m^3. The elevated results triggered an internal investigation and identified the cause to be in relation to:

- 3 August: 75.2 µg/m^3 – an instrumentation error recording 5004 µg/m^3 at 03.00 am, for a 10 minute period, was the causation of the elevated reading. There were no elevated results in the periods pre or post the 5004 µg/m^3 reading. Wind speeds during the period were between 3.4 and 5.1 m/s from a westerly direction and are not considered strong enough to generate airborne particulates. The result was considered inaccurate and has been omitted from the dataset.
- 10/11 August: 172.6 and 128.7 µg/m^3 - coincided with the installation of a new heater unit by the equipment supplier. The results were considered to be artificially impacted during the activity deeming them inaccurate and have been omitted from the dataset.

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/m^3, recording:

- 9.9 µg/m^3 at Hubberstone
- 10.0 µg/m^3 at Milpose, and
- 8.2 µg/m^3 at Hillview.

Refer to Appendix A for map of all PM_{10} monitoring locations.

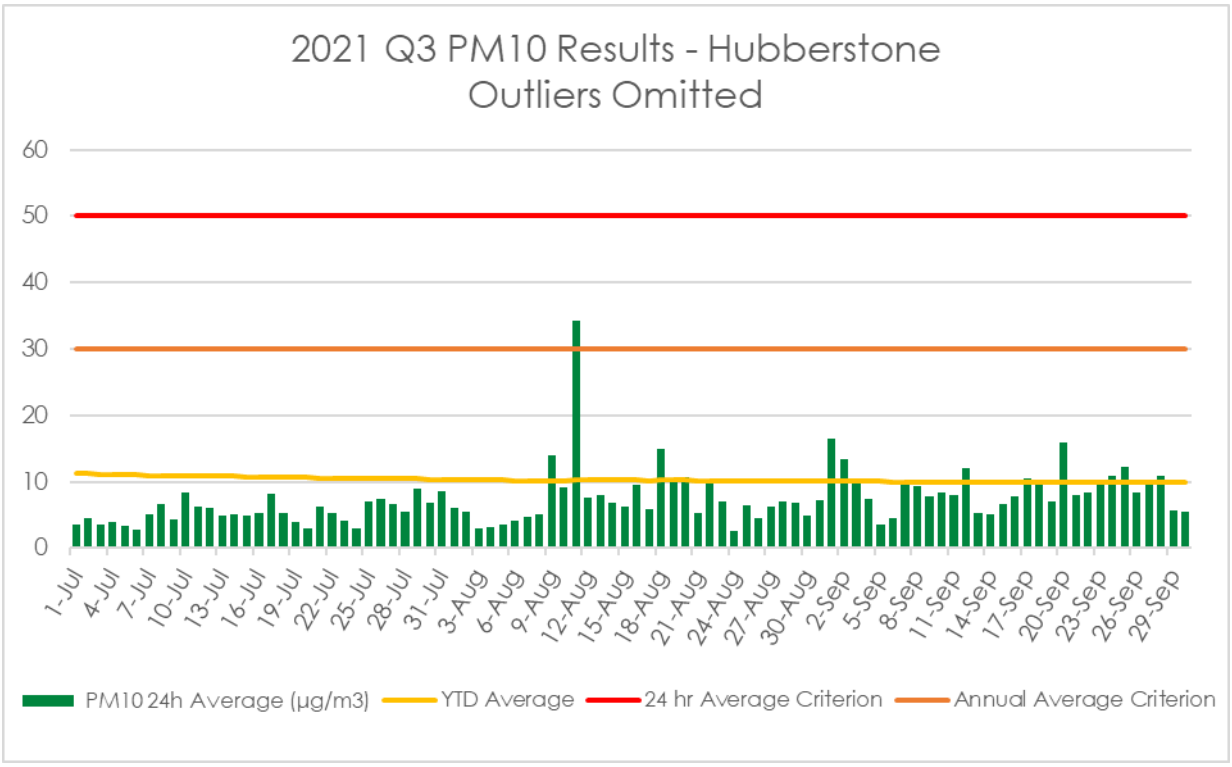


Figure 1: Hubberstone

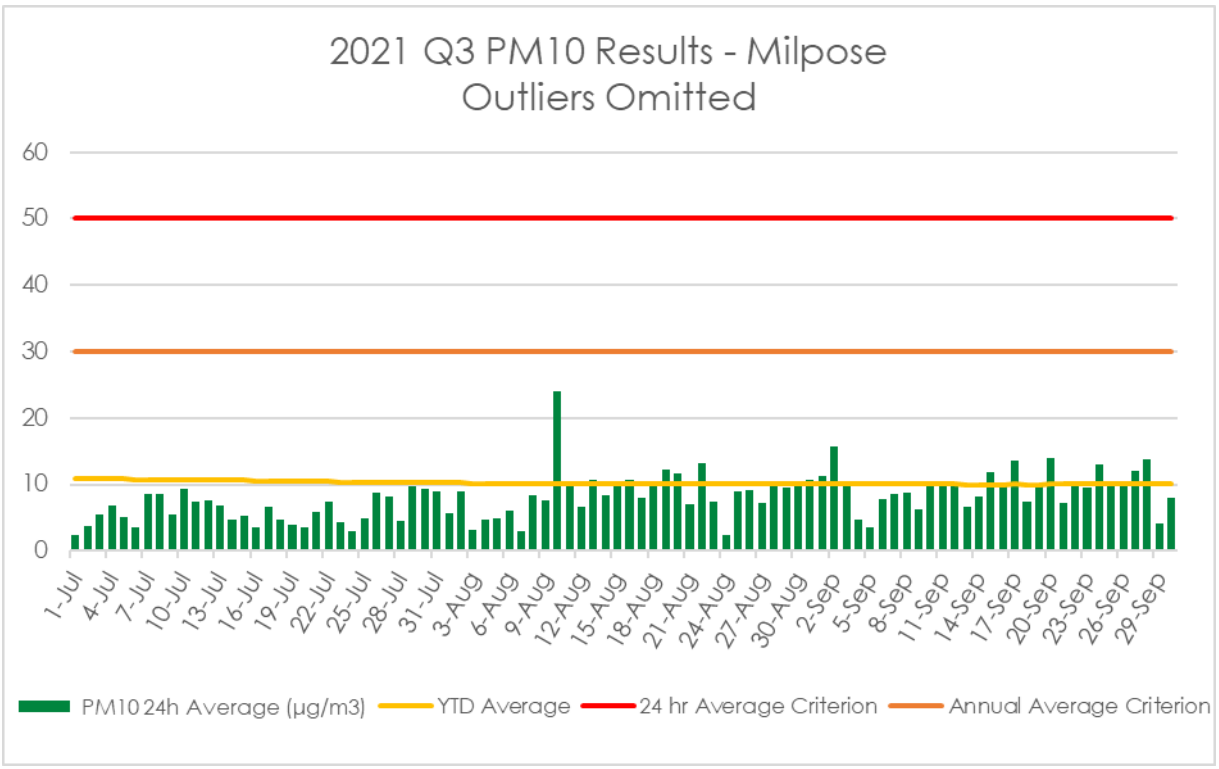


Figure 2: Milpose

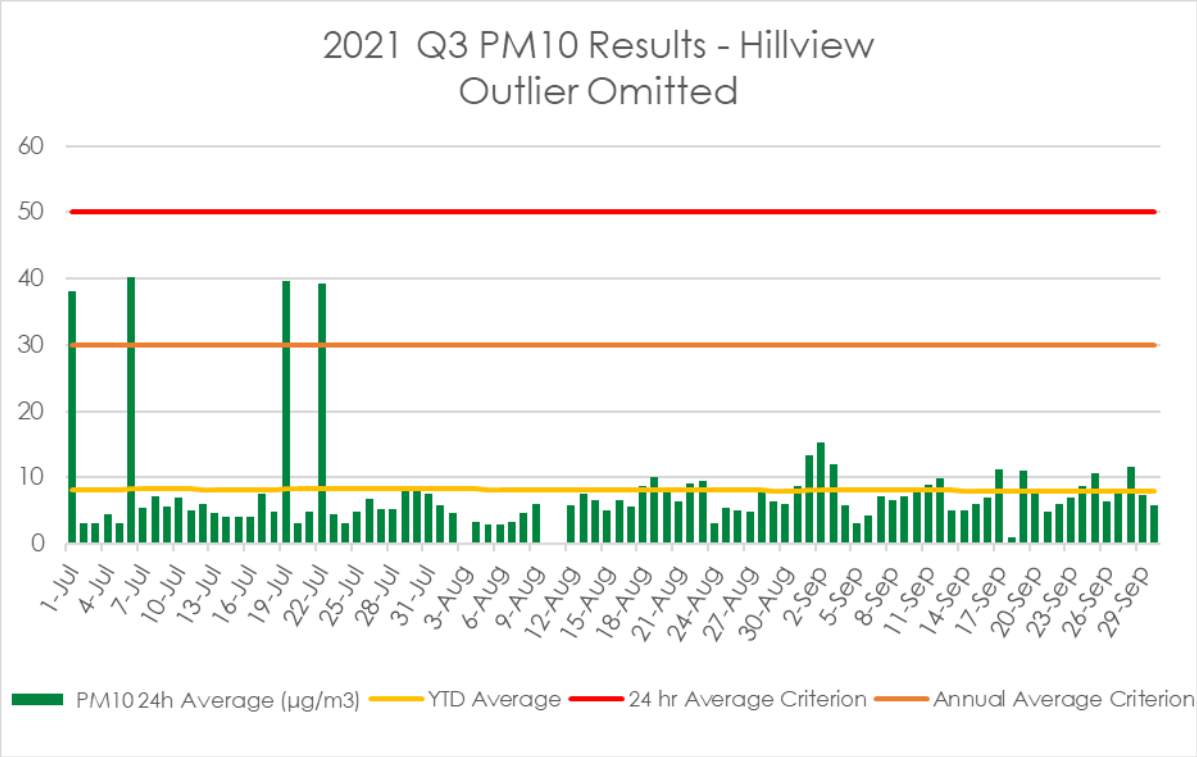


Figure 3: Hillview

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/m^3) for the quarter for the reporting period.

The missing result at Milpose on 25 September was due to a power outage 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/m^3, recording:

- 18.8 µg/m^3 at Hubberstone
- 23.3 µg/m^3 at Milpose, and
- 18.2 µg/m^3 at Hillview.

Refer to Appendix A for map of all TSP monitoring locations.

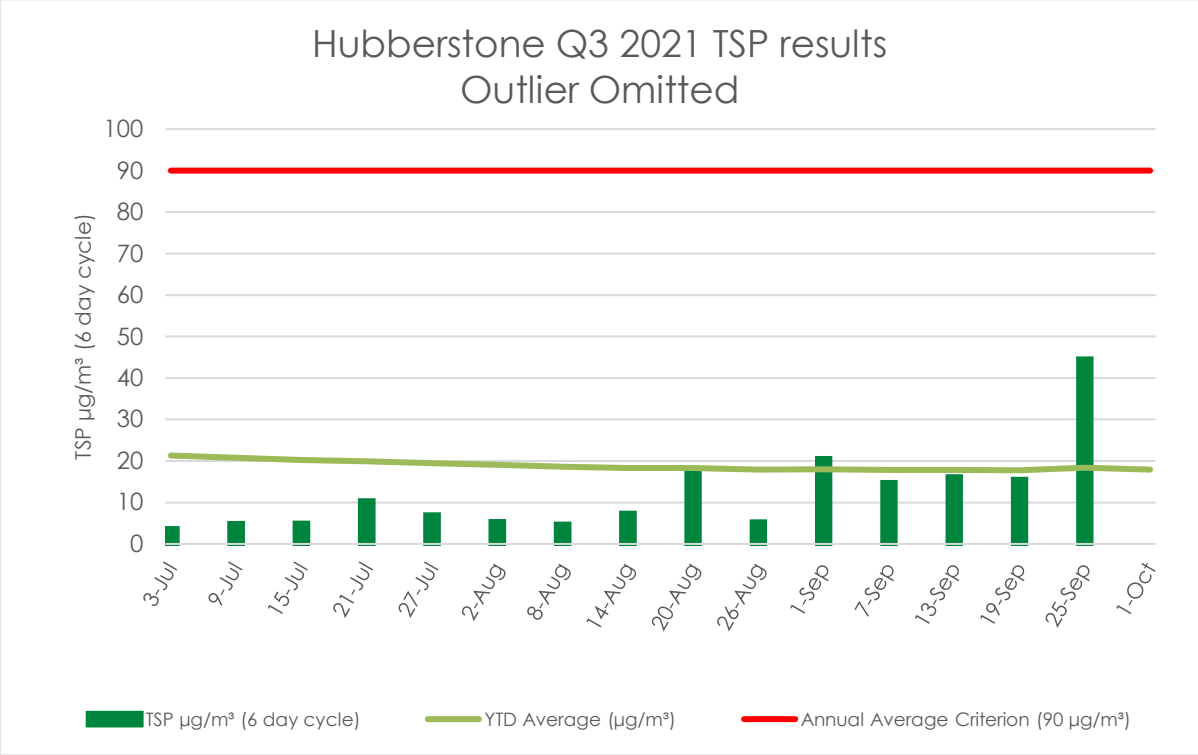


Figure 4: Hubberstone

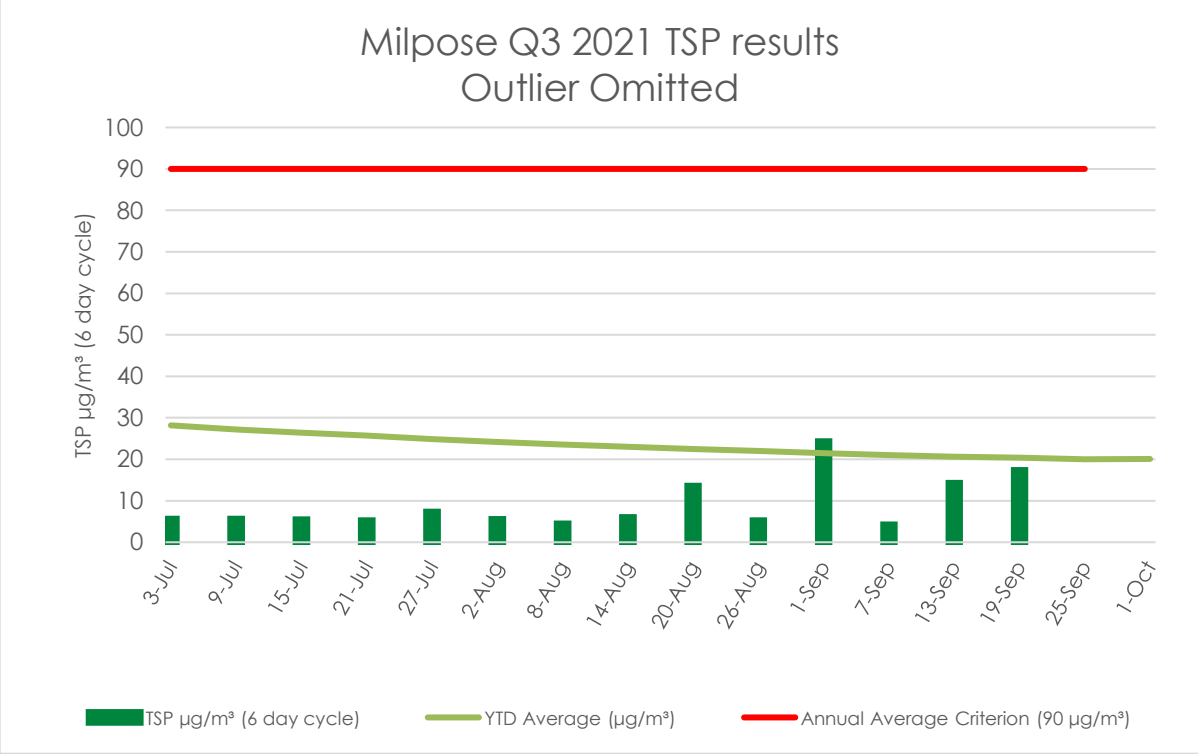


Figure 5: Milpose

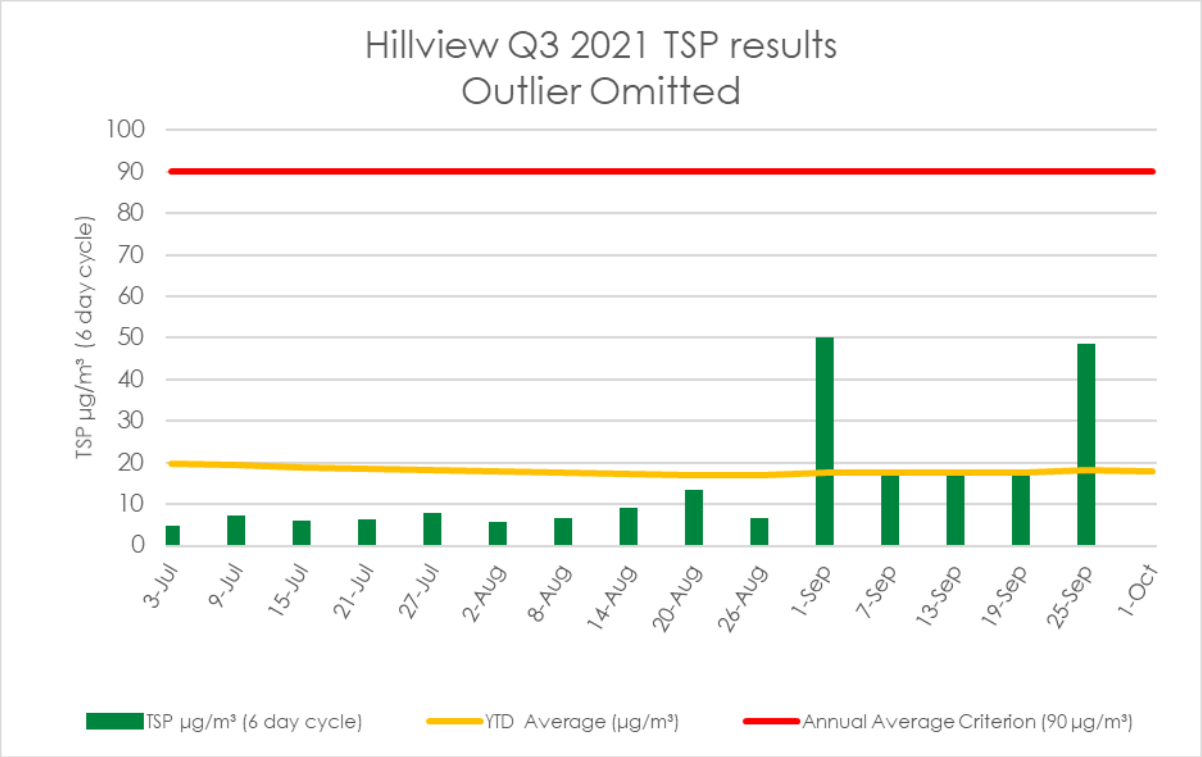


Figure 6: Hillview

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. Refer to Appendix B for map of all depositional dust monitoring locations.

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

During the reporting period, TDNE recorded a single result above the internal trigger level, recording 7.2 g/m^2/month in the month of July. An internal investigation was undertaken is detailed below.

TDNE:

- July: 7.2 g/m^2/month – the elevated result contained a majority of mineral content following the installation of the bird deterrent in the previous months. Airborne particulate generating wind speeds (considered greater than 7 m/s) contributed to only 6 percent of the months total, with only approximately 50% of that wind prevailing from the project. Although the specific source of the particulate matter cannot be identified, it remains non-reportable in accordance with the conditions of the Consent.

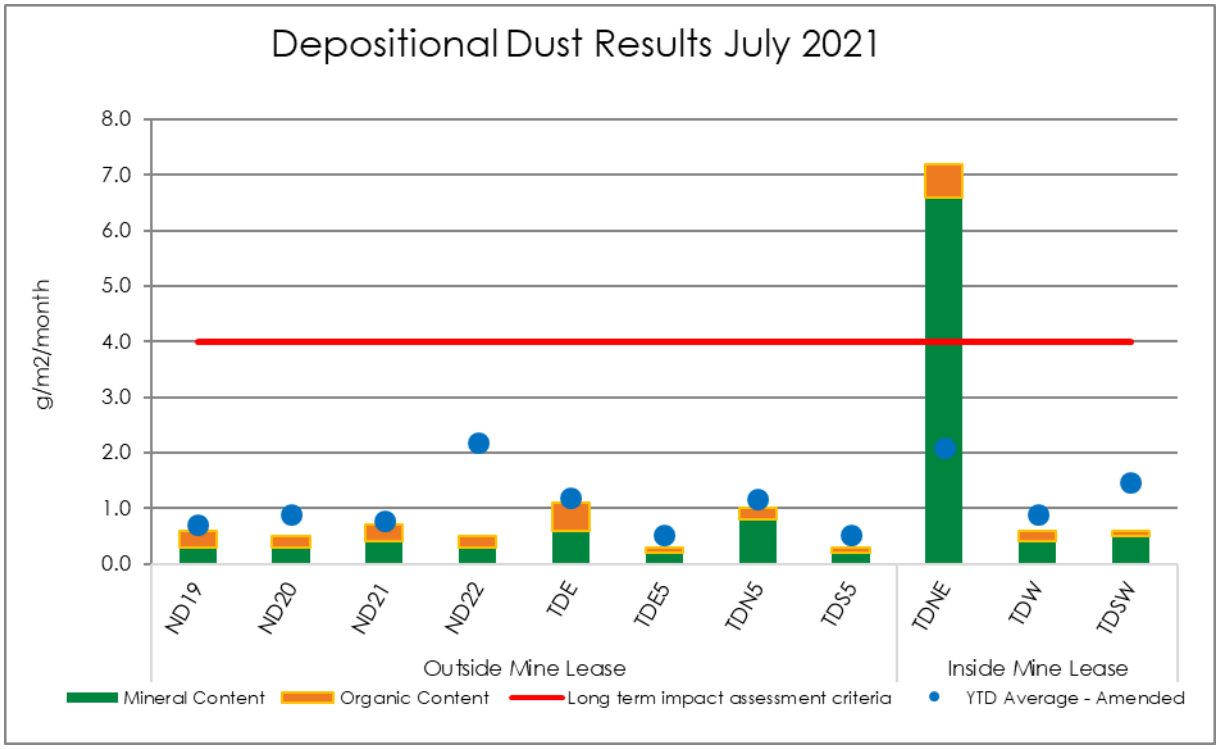


Figure 7: July depositional dust results for all locations

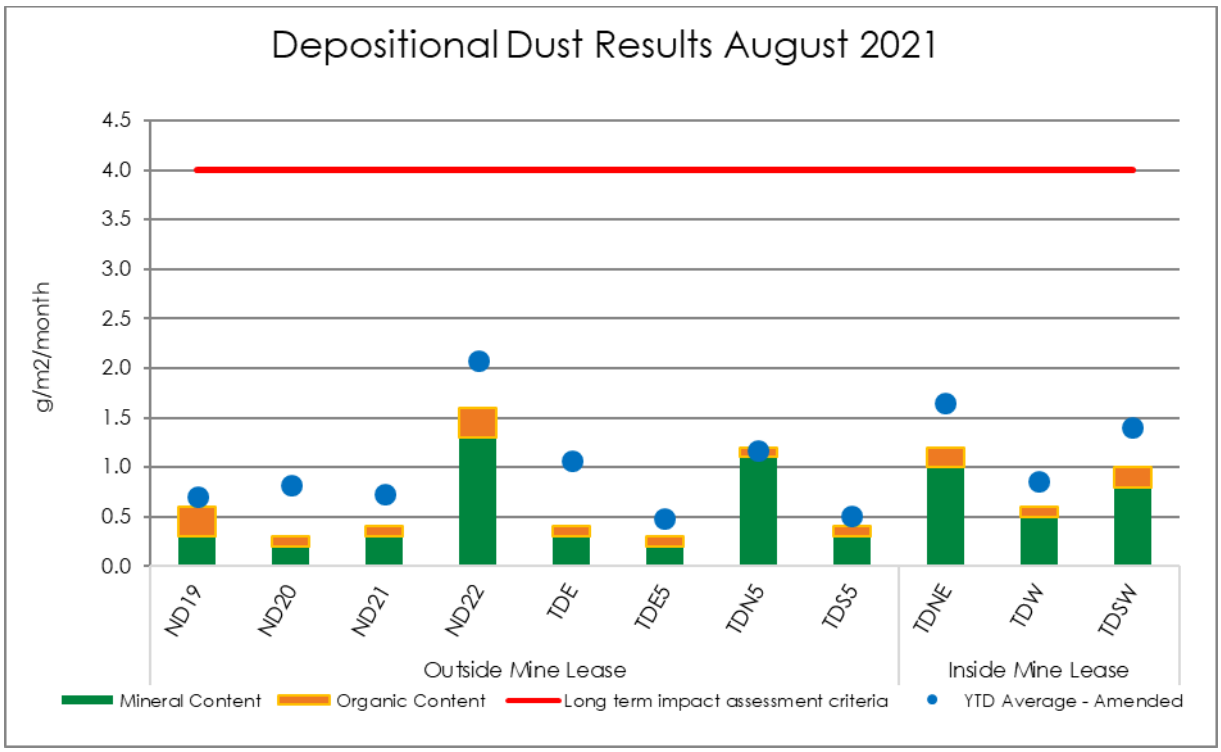


Figure 8: August depositional dust results for all locations

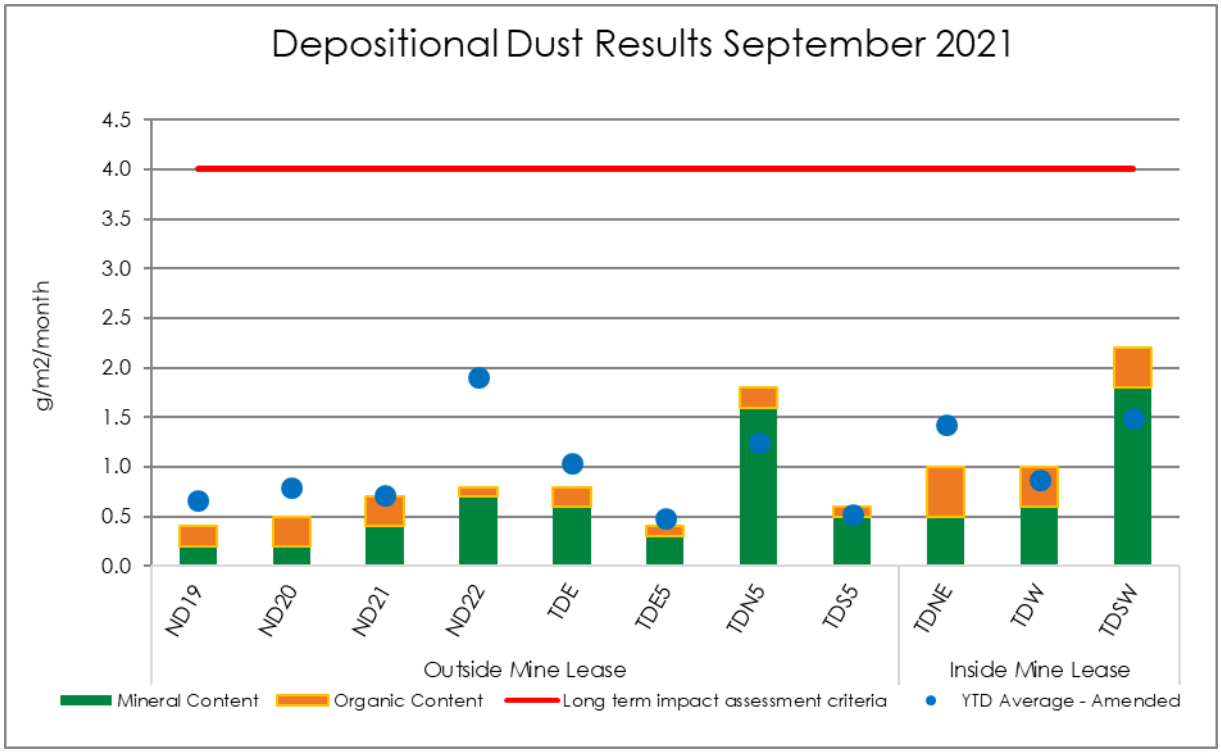


Figure 9: September depositional dust results for all locations

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 sediment 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. Refer to Appendix C & D for map of all surface and groundwater dust monitoring locations.

3.1 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	RP04	RP05	RP06	RP07	RP08	RP12	RP13	RP15	RP19	RP20	RP21
pH	8.4	7.96	7.76	7.72	8.81	8.05	8.05	7.73	8.71	7.6	7.62	7.5	8.23	8.05
EC (uS/cm)	331	1,060	2,434	534.16	453.86	680.97	680	2,012.5	301	1,174.6	3,837.3	3,377.5	2,851	2,045
Cu (mg/L)	0.038	0.046	0.048	0.544	0.022	0.034	0.016	0.038	0.034	0.106	0.042	0.008	0.028	0.027

Table 1 continued: Process Water System

Location	RP22	RP23	RP25	RP26	RP27	RP32	RP33	Caloola	PWD	GT02
pH	7.57	8.14	8.17	9.52	8.03	8.67	8.26	8.07	7.4	8.98
EC (uS/cm)	635.03	823	448	426	3,848.6	1,076.2	243.79	4,050.1	3,288.3	3,437.2
Cu (mg/L)	0.016	0.032	0.023	0.022	0.064	0.046	0.019	0.016	0.055	0.008

Table 2: Sediment Ponds

Location	SP03	SP10	SP15
pH	9.29	7.66	dry
EC (uS/cm)	997	137	dry
Copper (mg/L)	0.008	0.068	dry

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD16	FD18	FD25	FD26	FD27
pH	7.23	8.23	7.97	7.75	8.74	7.95	7.81	7.81	8.83	8.59
EC (uS/cm)	123.9	80.32	100.93	122.66	333.34	131.4	204.0	204.39	369.5	282.08
Copper (mg/L)	0.02	0.019	0.007	0.011	0.006	0.004	0.019	0.019	0.052	0.004

Table 4: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W26	W27	W28	W29	W30	W31	W32
pH	7.42	6.78	6.29	6.73	6.89	no access	no access	6.92	12.8	7.41	7.71	11.74
EC (uS/cm)	6,080.1	9,633.5	22,581	24,157	17,920	no access	no access	16,290	22,513	2,604	692	2,249
Copper (mg/L)	0.007	0.008	0.022	0.01	0.008	no access	no access	0.009	0.035	0.005	0.012	0.009

Table 5: Opencut Bores

Location	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	6.78	6.97	7.62	No access	no access	7.63	7.56	7.67	no access	no access	7.85	7.88
EC (uS/cm)	13,355	22,799	2,759	No access	no access	6,076	12,647	21,326	no access	no access	2,077	2,066
Copper (mg/L)	0.01	0.027	0.009	no access	no access	0.001	0.018	0.018	no access	no access	0.001	0.065

Table 6: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P139	P145	P149
pH	7.58	11.38	7.3	7.51	6.75	6.75	6.16	6.62	6.43
EC (uS/cm)	864	8,435	14,135	12,199	10,764	28,408	28,778	123.03	28,977
Copper (mg/L)	0.008	0.026	0.009	0.031	0.001	0.001	0.01	0.002	0.01

Table 7: Regional Bores

Location	Moss #1	Wright	Far Hilliers	Long Paddock
pH	7.21	6.94	7.03	8.04
EC (uS/cm)	2,318.0	1,143.2	737.49	701.12
Copper (mg/L)	0.002	0.005	0.002	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'. Refer to Appendix E for map of all attended noise monitoring locations.

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 31 August and 1 September 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) Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
16:33 01/09/2021	50	35	27	WD: E WS: 0.5m/s Stab Class: E	Birds 25-71 Traffic 24-53 Residential Noise 30-65 NPM Site Inaudible
16:48 01/09/2021	71	43	27		
17:03 01/09/2021	65	43	29		
Site $L_{Aeq(15min)}$ Contribution					<25
Evening					
20:16 01/09/2021	54	43	39	WD: N WS: <0.5m/s Stab Class: F	Insects 37-55 Aircraft 35-48 Traffic 32-45 Birds 32-63 Dogs Barking 33-46 NPM Site Processing <30 (barely audible <50% total measurement)
20:31 01/09/2021	55	41	37		
20:46 01/09/2021	63	44	40		
Site $L_{Aeq(15min)}$ Contribution					<30
Night					
01:05 01/09/2021	51	42	36	WD: NE WS: <0.1m/s Stab Class: G	Insects 33-52 Livestock <30 NPM Site Processing <30 (just audible >75% total measurement)
01:20 01/09/2021	51	40	35		
01:35 01/09/2021	52	43	36		
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 9: Attended noise monitoring results for Lone Pine

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Date/Time (hrs) Duration 15min	Noise Descriptor (dBA re 20 µPa) L_{Amax}	L_{Aeq}	L_{A90}	Meteorology	Description and SPL, dBA
Day					
15:36 01/09/2021	68	48	31	WD: E WS: 0.5m/s Stab Class: D	Livestock 20-45 Agricultural Noise 27-64 Traffic 25-69 Birds 25-67 NPM Site Inaudible
15:51 01/09/2021	69	51	31		
16:06 01/09/2021	66	47	30		
Site $L_{Aeq(15min)}$ Contribution					<25
Evening					
19:18 01/09/2021	48	40	36	WD: N WS: 0.5m/s Stab Class: F	Insects 32-49 Livestock <29-35 NPM Exhaust Fan <29-36 (audible throughout measurements)
19:33 01/09/2021	49	40	36		
19:48 01/09/2021	48	40	36		
Site $L_{Aeq(15min)}$ Contribution					33
Night					
00:04 01/09/2021	48	35	29	WD: NE WS: <0.1m/s Stab Class: G	Insects 25-48 Dogs Barking 25-33 Livestock 25-36 NPM Exhaust Fan <25 (barely audible throughout measurements)
00:19 01/09/2021	44	35	30		
00:34 01/09/2021	44	35	30		
Site $L_{Aeq(15min)}$ Contribution					<25
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 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					
13:26 01/09/2021	68	41	22	WD: E WS: 0.5m/s Stab Class: A	Residential Noise 25-68 Birds 20-41 NPM Site Inaudible
13:41 01/09/2021	52	31	23		
13:56 01/09/2021	58	28	23		
Site $L_{Aeq(15min)}$ Contribution					<20
Evening					
21:13 31/08/2021	45	34	24	WD: N WS: <0.1m/s Stab Class: G	Insects 25-45 Livestock 20-35 NPM Exhaust Fan 21-28 (just audible >75% total measurement)
21:28 31/08/2021	42	30	24		
21:43 31/08/2021	45	30	24		
Site $L_{Aeq(15min)}$ Contribution					<25
Night					
22:05 31/08/2021	51	34	25	WD: N WS: <0.1m/s Stab Class: G	Insects 25-43 Livestock 20-35 Dogs Barking 25-30 Aircraft 25-54 NPM Exhaust Fan 21-28 (just audible >75% total measurement)
22:20 31/08/2021	41	31	25		
22:35 31/08/2021	54	35	25		
Site $L_{Aeq(15min)}$ Contribution					<25
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 Hillview

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview					
Date/Time (hrs) Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
12:12 01/09/2021	59	39	26	WD: NE WS: <0.5m/s Stab Class: A	Residential Noise 31-59 Birds 23-48 Traffic 23-55 Agricultural Noise 25-53 Aircraft 25-45 NPM Site Inaudible
12:27 01/09/2021	55	40	25		
12:42 01/09/2021	55	35	25		
Site $L_{Aeq(15min)}$ Contribution					<25
Evening					
18:00 01/09/2021	72	52	35	WD: NW WS: <0.5m/s Stab Class: F	Traffic 23-63 Birds 20-46 Residential Noise 35-72 Insects <25 Dogs Barking 30-39 NPM Site Inaudible
18:15 01/09/2021	63	46	28		
18:30 01/09/2021	60	44	27		
Site $L_{Aeq(15min)}$ Contribution					<25
Night					
02:01 01/09/2021	47	27	23	WD: NE WS: <0.5m/s Stab Class: G	Dogs Barking 25-44 Traffic 25-57 NPM Site Processing 21-27 (just audible >75% total measurement)
02:16 01/09/2021	43	25	23		
02:31 01/09/2021	57	34	24		
Site $L_{Aeq(15min)}$ Contribution					<25
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 12: Attended noise monitoring results for Adavale

Table 7 Operator-Attended Noise Survey Results – Location NM5, Adavale					
Date/Time (hrs) Duration 15min	Noise Descriptor (dBA re 20 µPa) L_{Amax}	L_{Aeq}	L_{A90}	Meteorology	Description and SPL, dBA
Day					
14:35 01/09/2021	51	31	25	WD: E WS: 1.0m/s Stab Class: D	Wind In Tress 22-35 Birds 20-51 Aircraft 30-53 NPM Site Inaudible
14:50 01/09/2021	53	37	27		
15:05 01/09/2021	43	30	26		
Site $L_{Aeq(15min)}$ Contribution					<25
Evening					
20:21 31/08/2021	53	26	19	WD: NW WS: <0.1m/s Stab Class: G	Dogs Barking 20-39 Aircraft 25-44 Insects <20 MAC Operator 45-53 NPM Site Inaudible
20:36 31/08/2021	45	20	18		
20:51 31/08/2021	47	24	18		
Site $L_{Aeq(15min)}$ Contribution					<25
Night					
23:05 31/08/2021	43	26	22	WD: N WS: <0.1m/s Stab Class: G	Insects <20 Dogs Barking 25-46 MAC Operator 43 NPM Exhaust Fan 18-25 (just audible >75% total measurement)
23:20 31/08/2021	45	26	20		
23:35 31/08/2021	46	25	20		
Site $L_{Aeq(15min)}$ Contribution					21
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 13: Attended road noise survey results

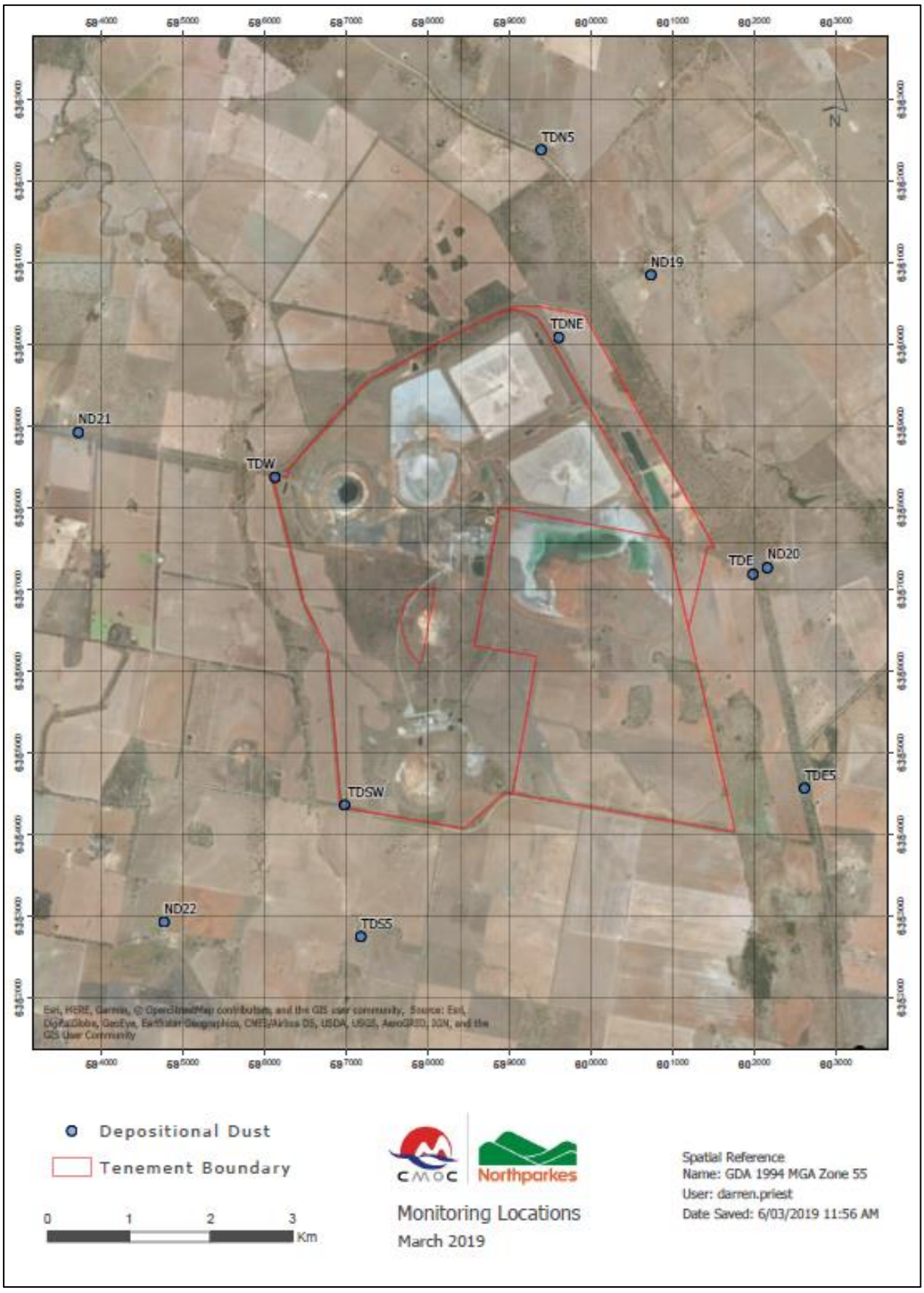
Table 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview				
Date/Time (hrs) Duration 1 hour	Measured Noise Level dB $LA_{eq(1hr)}$	Meteorology	Criteria dB $LA_{eq(1hr)}$	Description and SPL dBA
12:12 01/09/2021 (Day)	38	WD: NE WS: <0.5m/s Stab Class: A	55	Residential Noise 31-59 Birds 23-48 Traffic 23-55 Agricultural Noise 25-53 Aircraft 25-45 Approx. 10 vehicles enter/exit NPM Site
18:00 01/09/2021 (Evening)	48	WD: NW WS: <0.5m/s Stab Class: F	55	Traffic 23-63 Birds 20-46 Residential Noise 35-72 Insects <25 Dogs Barking 30-39 NPM Concentrate Truck 30-58 (2 passes – Offsite) Approx. 72 vehicles enter/exit NPM Site

Note: NPM denotes Northparkes Mines.

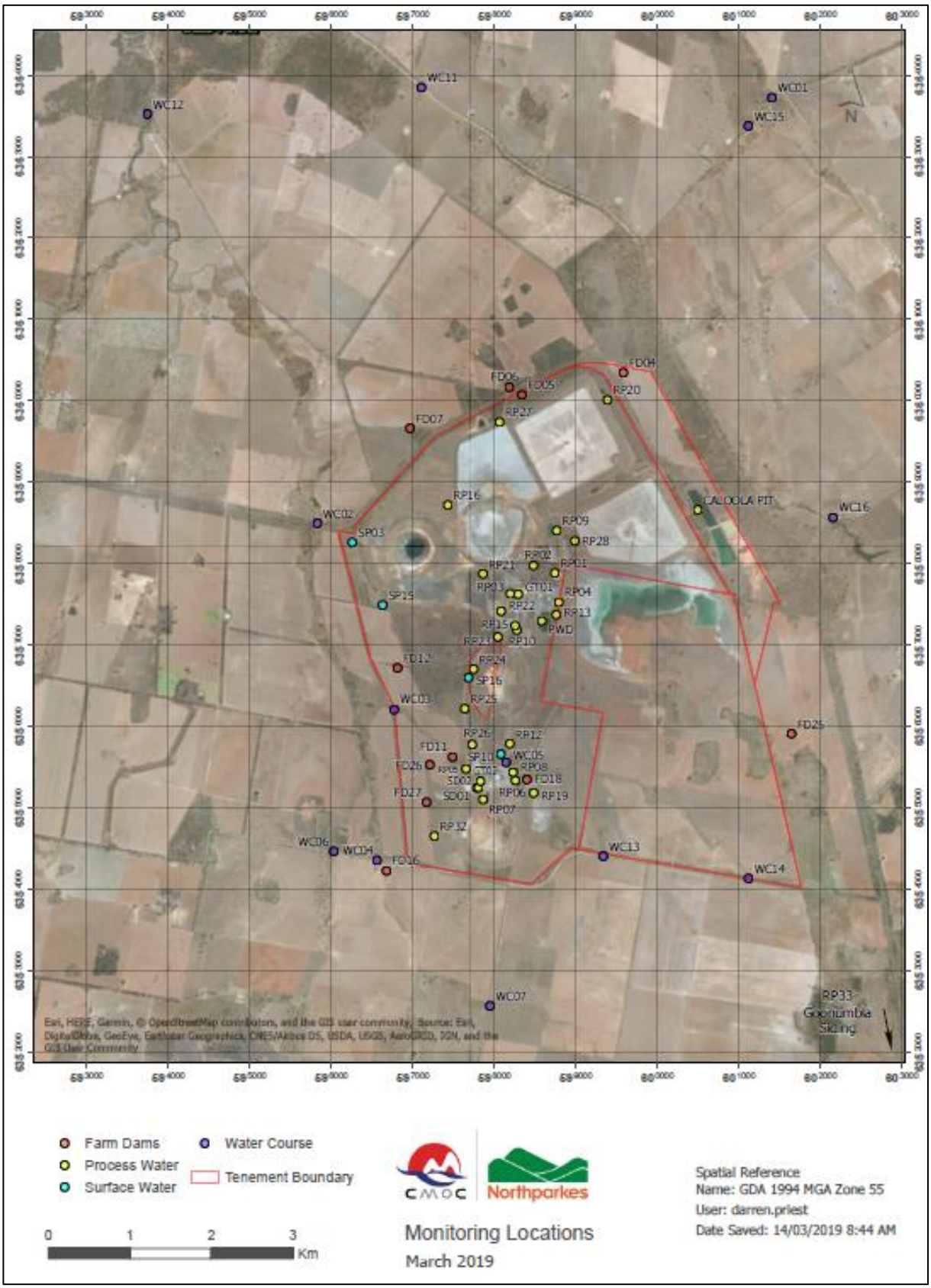
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Appendix A – PM10/TSP Monitoring Locations

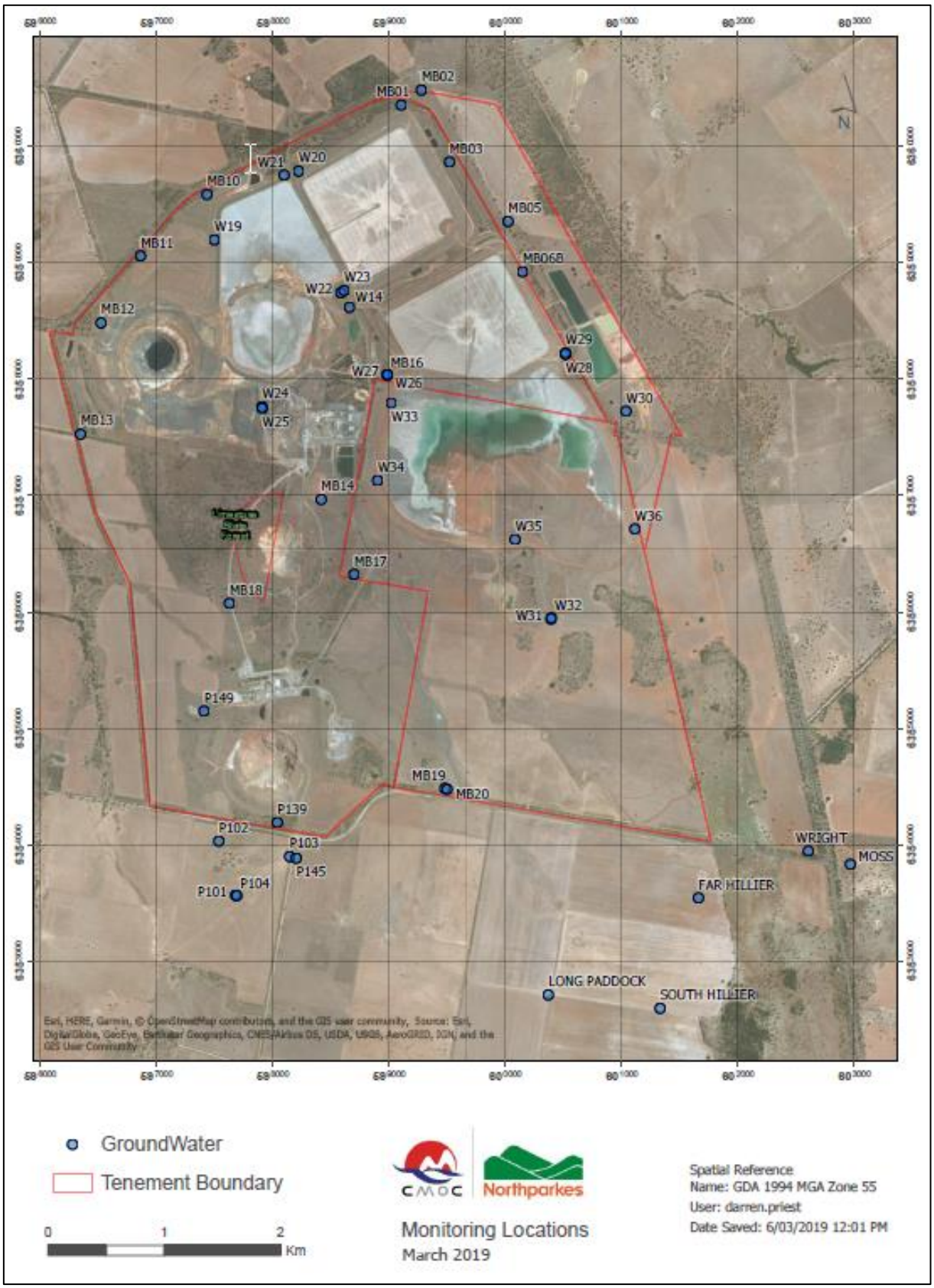
Appendix B – Depositional Dust Monitoring Locations



Appendix C – Surface Water Monitoring Locations



Appendix D – Groundwater Monitoring Locations



Appendix E – Attended Noise Monitoring Locations