Northparkes Mines
A century of mining together

1 January – 31 March 2023

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 & Farms
Approved by	Stacey Kelly
Title **Date** **Signature**	Manager – People, Safety & Environment

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 January to 31 March 2023. 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. The annual average has decreased by 5 µg/m^3 during the most recent modification update to the development consent.

24 hour average:
During the reporting period one exceedance at Hubberstone on 25 March was recorded, receiving 373.5 µg/m^3. An internal investigation was conducted to identify the source of elevated particulates, finding the result to be non-mine related and most likely to be caused by localised agricultural activities.

A fault with the PM10 collection at Hillview from 1 January through to 14 January, during the commissioning of the upgraded units, recorded no data for this period. It is unlikely that an exceedance was unidentified during this period due to low wind speeds and prevailing wind direction.

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

- 13.0 µg/m^3 at Hubberstone
- 15.2 µg/m^3 at Milpose, and
- 14.0 µg/m^3 at Hillview.

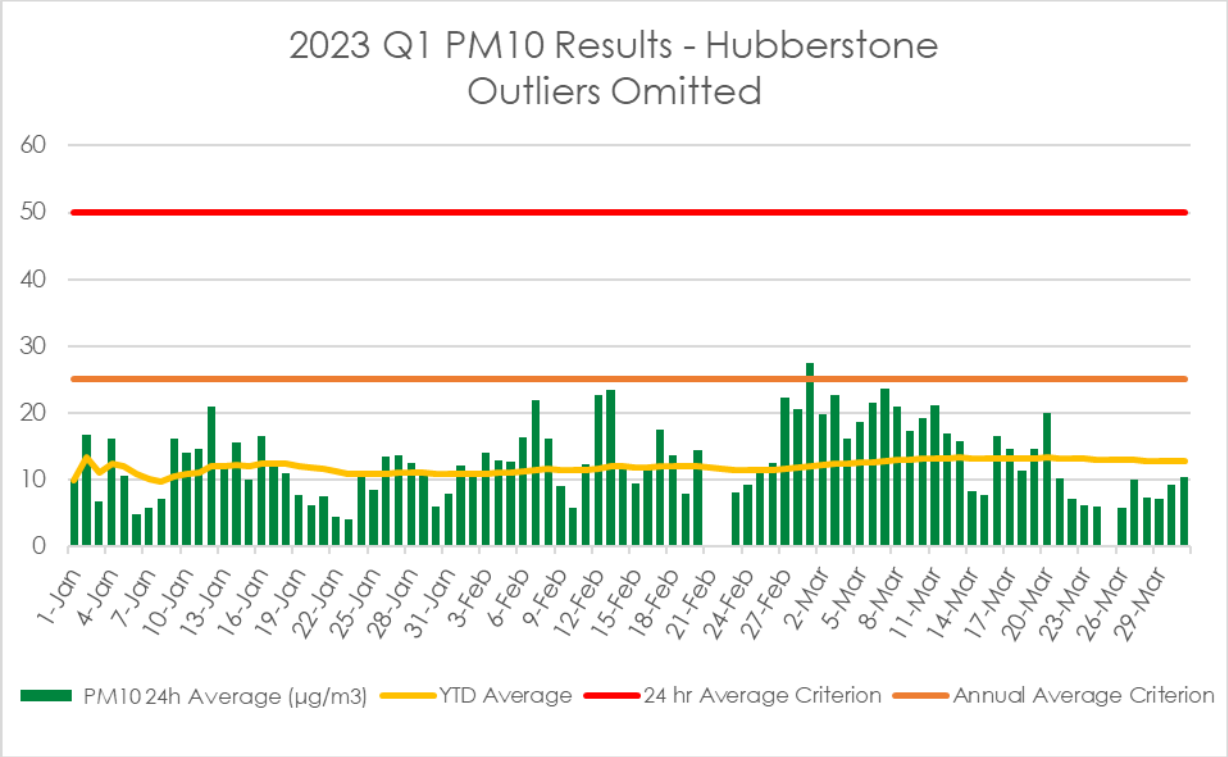


Figure 1: Hubberstone

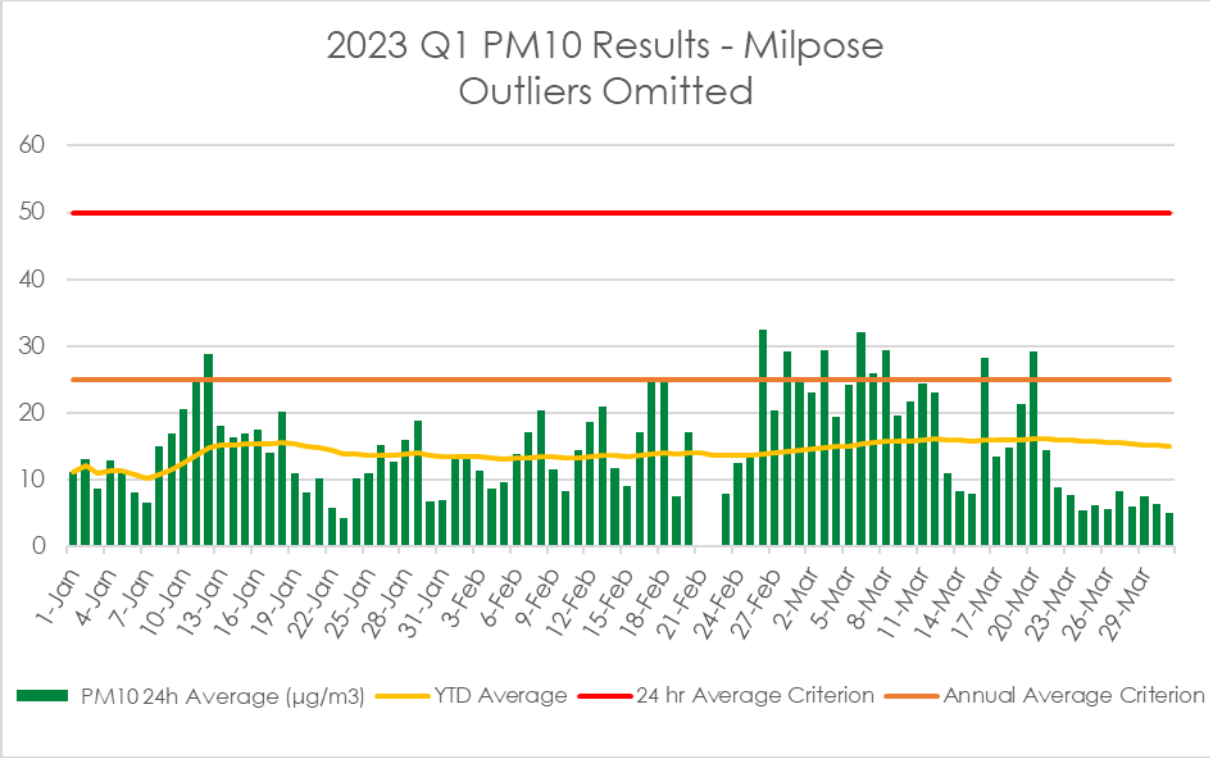


Figure 2: Milpose

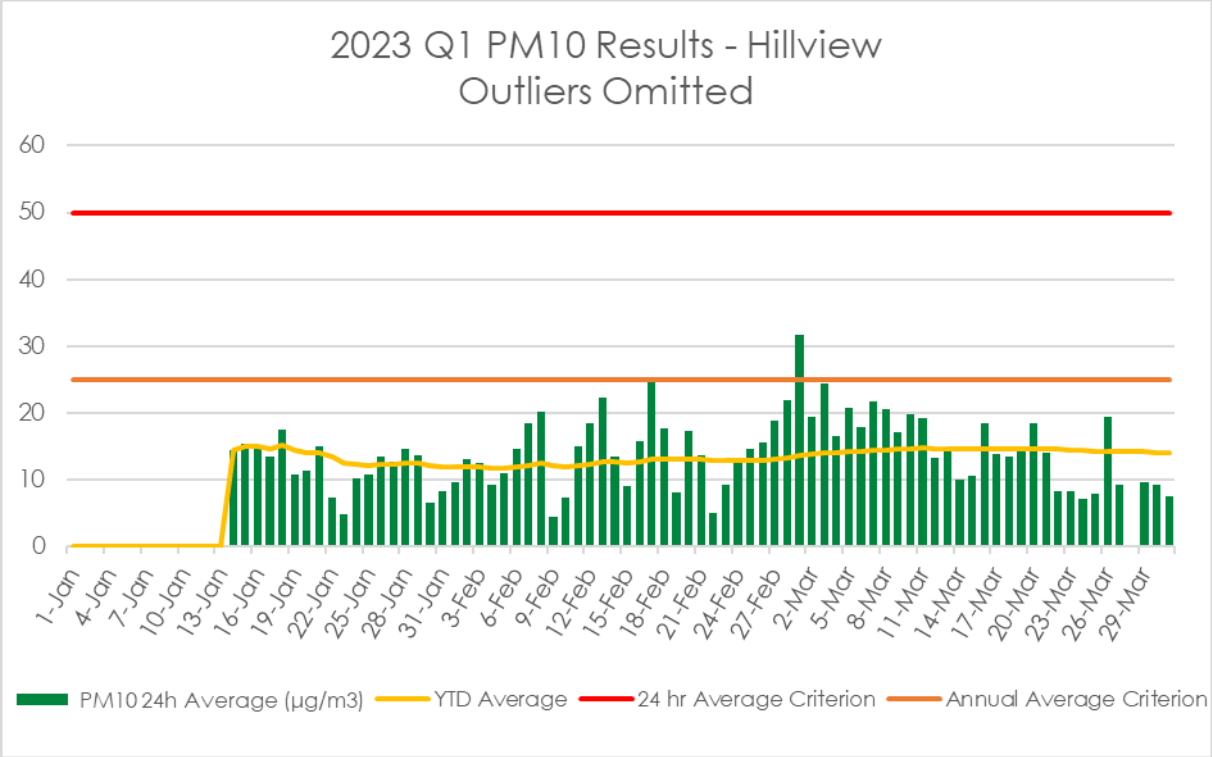


Figure 3: Hillview

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/m³ for the annual average and >25 µg/m³ for a 24-hour monitoring period.

24 hour average:
During the reporting period one exceedance at Hubberstone on 25 March was recorded, receiving 130.7 µg/m³. An internal investigation was conducted to identify the source of elevated particulates, finding the result to be non-mine related and most likely to be caused by localised agricultural activities.

A fault with the PM10 collection at Hillview from 1 January through to 14 January, during the commissioning of the upgraded units, recorded no data for this period. It is unlikely that an exceedance was unidentified during this period due to low wind speeds and prevailing wind direction.

Annual Averages:
Annual averages recorded at all monitoring locations are below the Consent criteria of 8 µg/m³:

- 4.5 µg/m³ at Hubberstone
- 5.3 µg/m³ at Milpose, and
- 4.9 µg/m³ at Hillview.

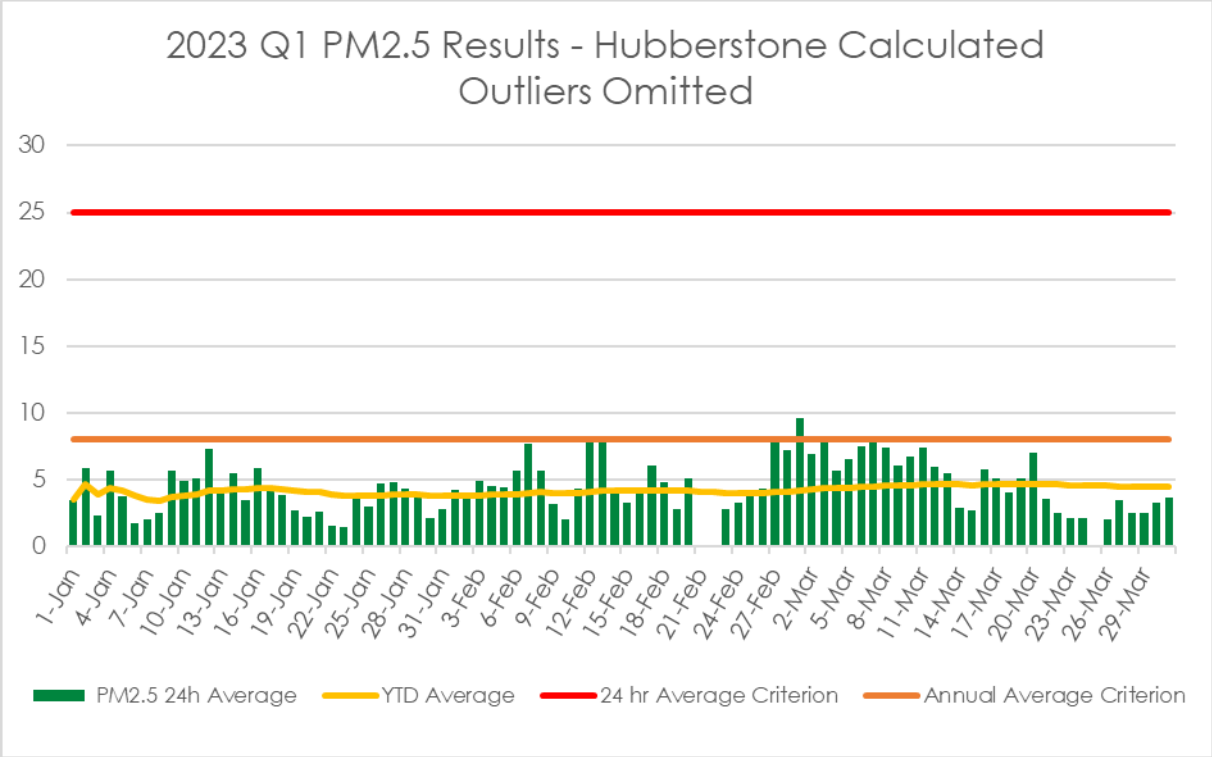


Figure 4: Hubberstone (Calculated)

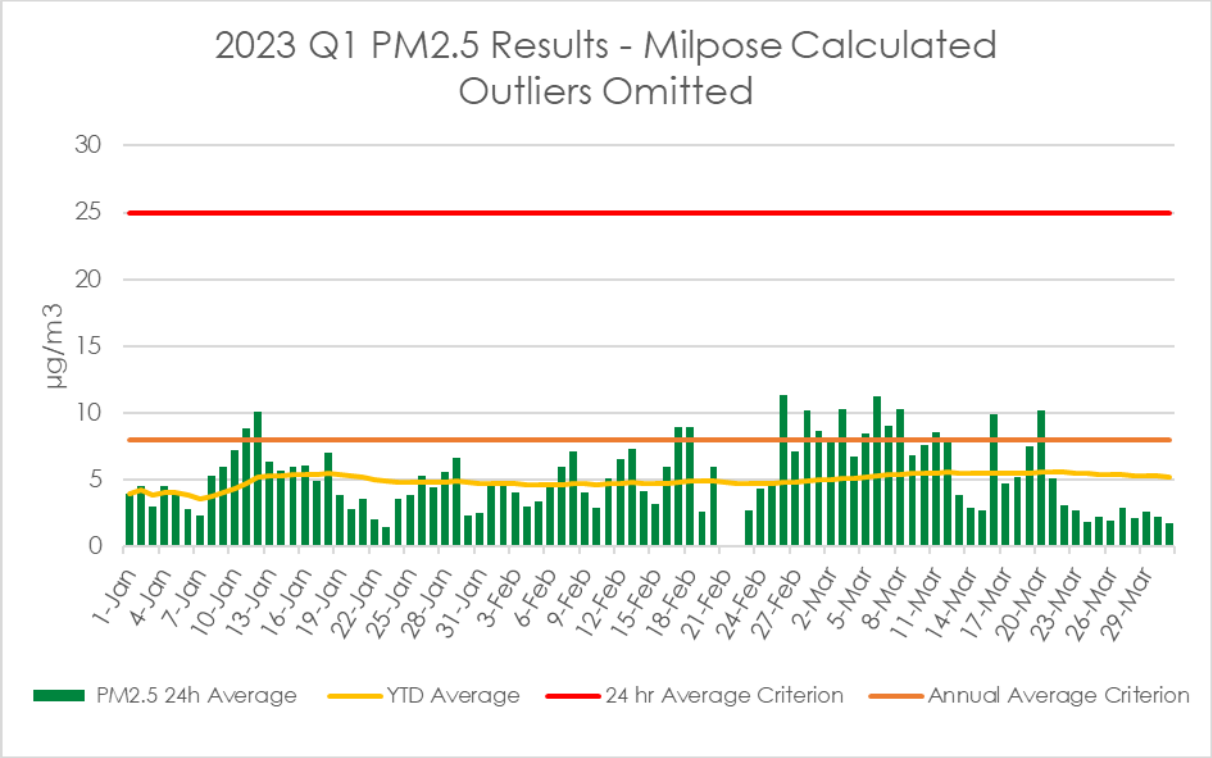


Figure 5: Milpose (Calculated)

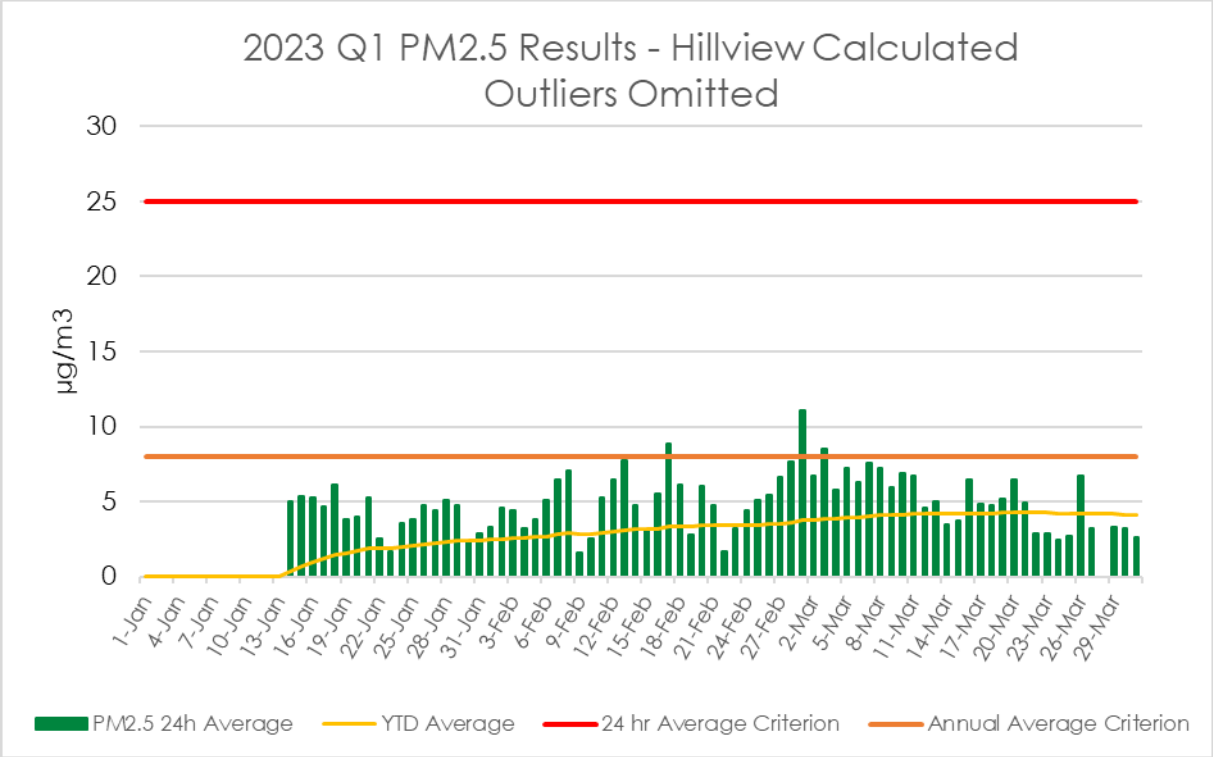


Figure 6: Hillview (Calculated)

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 1-7 below.

Table 1: Process Water System

Location	RP01	RP02	RP03	RP04	RP05	RP06	RP07	RP08	RP09	RP12	RP13	RP15	RP16	RP19	RP20
pH	7.51	7.15	8.05	7.60	7.77	7.83	8.13	7.70	8.32	8.52	7.82	6.82	7.97	7.49	7.20
EC (uS/cm)	350	1,647	2,366	2,632	524	1,814	659	1,706	4,159	273	1,189	6,099	3,727	3,566	3,974
Cu (mg/L)	0.051	0.011	0.04	0.05	0.012	0.028	0.01	0.032	0.013	0.02	0.065	0.035	0.006	0.02	0.014

Table 1 continued: Process Water System

Location	RP21	RP25	RP26	RP27	RP28	RP32	Caloola North	Caloola South	GT02	PWD
pH	7.46	7.83	8.18	8.0	7.66	9.2	6.93	7.57	8.09	7.24
EC (uS/cm)	2,312	453	507	3,687	1,908	556	2,200	3,603	1,836	6,047
Cu (mg/L)	0.006	0.025	0.02	0.03	0.014	0.037	0.006	0.006	0.104	0.024

Table 2: Sediment Ponds

Location	SP03	SP10	SP33
pH	8.49	7.97	8.18
EC (uS/cm)	3,608	170	181
Copper (mg/L)	0.008	0.032	0.01

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD16	FD18	FD25	FD26	FD27
pH	7.24	8.29	7.71	7.73	8.62	8.21	7.59	8.52	8.43	9.32
EC (uS/cm)	1,374	102	113	135	375	78	2,442	131	583	147
Copper (mg/L)	0.017	0.014	0.008	0.008	0.013	0.013	0.006	0.01	0.013	0.023

Table 4: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W26	W27	W28	W29	W30	W31	W32
pH	7.03	7.07	5.03	6.62	7.03	7.77	11.9	11.06	12.65	7.28	8.23	11.85
EC (uS/cm)	6,392	10,430	26,520	24,813	16,486	13,300	22,521	13,550	19,461	2,596	619	3,218
Copper (mg/L)	0.012	0.008	0.047	0.006	0.012	0.008	0.01	0.006	0.037	0.022	0.017	0.015

Table 5: Opencut Bores

Location	MB10	MB13	MB14	W14	W19	W20	W21	W22	W23	W24	W25
pH	7.01	6.94	7.16	7.6	7.04	6.88	7.83	7.05	7.19	7.36	7.03
EC (uS/cm)	13,921	22,750	3,346	5,250	13,543	12,532	24,112	11,106	13,555	2,600	2,234
Copper (mg/L)	0.012	0.024	0.017	0.012	0.01	0.023	0.024	0.006	0.017	0.02	0.015

Table 6: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P139	P145	P149
pH	7.79	8.97	7.44	7.54	7.16	7.13	7.05	7.24	6.62
EC (uS/cm)	812	5,959	14,552	12,471	10,148	29,102	28,079	154	28,665
Copper (mg/L)	0.008	0.024	0.004	0.022	0.002	0.01	0.01	0.003	0.012

Table 7: Regional Bores

Location	Long Paddock	Moss #1	Wright
pH	8.11	7.3	8.78
EC (uS/cm)	819.0	2,268.0	843.0
Copper (mg/L)	0.009	0.006	0.007

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.

Location	*Airblast overpressure (dB(Lin Peak))*	*Ground vibration (mm/s)*	*Allowable exceedance*
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 *(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)*	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, 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.

4.2 Quarterly Monitoring Analysis

During the reporting period, two surface blasts were undertaken. Highlighted cells are those where an exceedance was identified.

	Overpressure (dB) – 115 (dB)	
Monitor Location	**16 Feb 23**	**2 Mar 23**
Adavale	93.4	100.7
Hillview	98.6	95.4
Hubberstone	105.1	94.7
Milpose	105.7	96.7

Table 9: Overpressure

	Vibration (mm/s) – 5 mm/s	
Monitor Location	**16 Feb 23**	**2 Mar 23**
Adavale	0.03	0.03
Hillview	0.07	0.07
Hubberstone	0.03	0.04
Milpose	0.03	0.03

Table 10: Vibration

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.

Property	Day	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
All privately-owned land	35	35	35	45

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 21 to Wednesday 22 February 2023.

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					
13:41 22/02/2023	61	42	35	WD: SE WS: 2.0m/s Stab Class: C	Wind 31-61 Birds 30-51 NPM Inaudible
13:56 22/02/2023	61	41	35		
14:11 22/02/2023	57	40	34		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
20:13 22/02/2023	54	42	40	WD: E WS: 1.0m/s Stab Class: E	Insects 36-57 Birds 33-42 Aircraft 35-55 NPM Inaudible
20:28 22/02/2023	55	41	38		
20:43 22/02/2023	57	47	43		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
01:54 22/02/2023	55	44	42	WD: NE WS: 0.5m/s Stab Class: E	Insects 39-48 MAC Operator 55 NPM Inaudible
02:09 22/02/2023	48	44	42		
02:24 22/02/2023	47	43	41		
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 Lone Pine

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Date/Time (hrs) Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
14:41 22/02/2023	59	45	38	WD: E WS: 2.5m/s Stab Class: D	Wind 32-59 Traffic 32-56 NPM Inaudible
14:56 22/02/2023	58	42	37		
15:11 22/02/2023	56	41	35		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
19:18 22/02/2023	54	48	42	WD: NE WS: 1.5m/s Stab Class: D	Wind 30-45 Insects 32-56 Traffic 30-48 Livestock 30-35 NPM Inaudible
19:33 22/02/2023	55	48	44		
19:48 22/02/2023	56	49	45		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
00:58 22/02/2023	56	43	39	WD: NE WS: 0.5m/s Stab Class: E	Insects 37-60 Dogs Barking 35-48 NPM Inaudible
01:13 22/02/2023	60	46	40		
01:28 22/02/2023	60	48	38		
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 11: 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) LAmax	LAeq	LA90	Meteorology	Description and SPL, dBA
Day					
16:36 22/02/2023	58	38	29	WD: E WS: 2.0m/s Stab Class: C	Wind 25-53 Birds 25-58 Residential Noise 30-63 NPM Inaudible
16:51 22/02/2023	55	35	29		
17:06 22/02/2023	63	42	30		
Site $LA_{eq(15min)}$ Contribution					<30
Evening					
20:01 21/02/2023	53	37	31	WD: NE WS: 1.0m/s Stab Class: D	Insects 28-60 Distant Thunder 25-53 MAC Operator 69 NPM Site Hum 25-30[1] (just audible 50% measurement)
20:16 21/02/2023	69	42	32		
20:31 21/02/2023	60	46	36		
Site $LA_{eq(15min)}$ Contribution					<30 (27[1])
Night					
22:55 21/02/2023	52	44	42	WD: NE WS: 1.0m/s Stab Class: E	Insects 40-54 Aircraft 40-61 NPM Site Hum 25-38[1] (just audible throughout measurement)
23:10 21/02/2023	61	45	42		
23:25 21/02/2023	50	42	39		
Site $LA_{eq(15min)}$ Contribution					<35 (30)[1]
Site $LA_{1(1min)}$ 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 12: 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}		
12:30 22/02/2023	65	43	38	WD: SE WS: 2.0m/s Stab Class: C	Wind 35-54 Birds 32-65 Traffic 32-55 NPM Inaudible
12:45 22/02/2023	56	43	37		
13:00 22/02/2023	62	43	38		
Site $L_{Aeq(15min)}$ Contribution					<35
Evening					
18:00 22/02/2023	75	47	32	WD: E WS: 1.5m/s Stab Class: D	Wind 29-48 Birds 26-48 Traffic 30-51 Residential Noise 30-75 NPM Inaudible
18:15 22/02/2023	72	46	33		
18:30 22/02/2023	50	39	34		
Site $L_{Aeq(15min)}$ Contribution					<35
Night					
23:55 21/02/2023	50	28	26	WD: N WS: 0.5m/s Stab Class: E	Insects 25-43 MAC Operator 52 NPM Inaudible
12:10 22/02/2023	52	28	26		
12:25 22/02/2023	43	28	27		
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 13: 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)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
15:39 22/02/2023	53	39	32	WD: E WS: 2.0m/s Stab Class: D	Wind 28-54 Birds 25-40 Aircraft 35-48 MAC Operator 72 NPM Inaudible
15:54 22/02/2023	53	37	31		
16:09 22/02/2023	72	40	29		
Site $L_{Aeq(15min)}$ Contribution					<30
Evening					
21:05 21/02/2023	61	37	27	WD: NE WS: 1.5m/s Stab Class: D	Wind 25-46 Insects 25-51 Aircraft 30-52 MAC Operator 61 NPM Site Hum 20-28 (just audible throughout measurement)
21:20 21/02/2023	61	39	27		
21:35 21/02/2023	46	33	27		
Site $L_{Aeq(15min)}$ Contribution					<30
Night					
22:00 21/02/2023	55	37	30	WD: NE WS: 1.5m/s Stab Class: E	Wind 25-55 Insects 28-40 Birds 25-36 Dogs Barking 25-36 Aircraft 30-59 NPM Site Hum 20-28 (just audible throughout measurement)
22:15 21/02/2023	59	31	28		
22:30 21/02/2023	56	35	28		
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

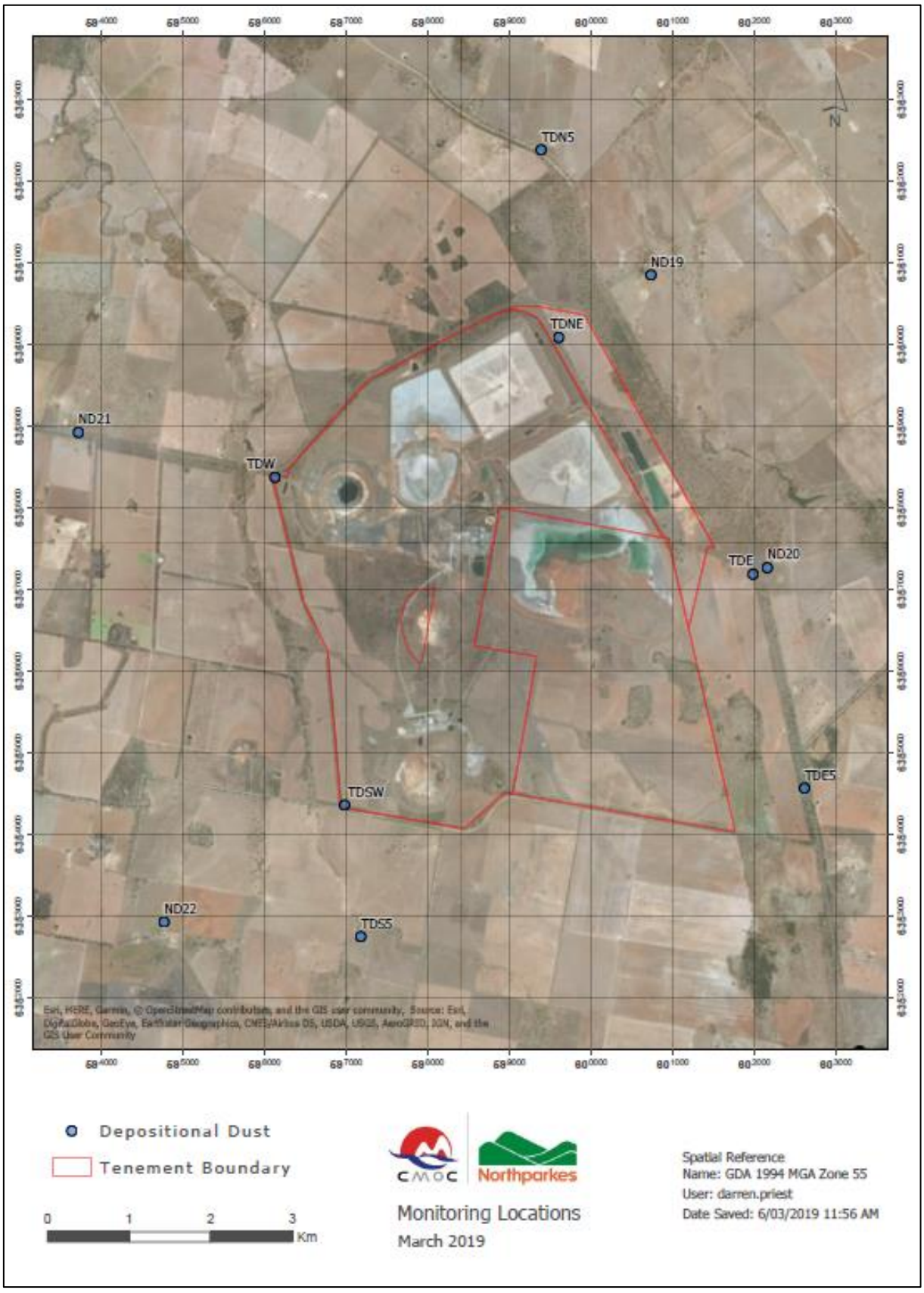
Table 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview				
Date/Time (hrs) Duration 1 hour	Measured Noise Level dB $LA_{eq(1hr)}$	Meteorology	Criteria dB $LA_{eq(1hr)}$	Description and SPL dBA
12:30 22/02/2023 (Day)	44	WD: SE WS: 2.0m/s Stab Class: C	55	Wind 35-54 Birds 32-65 Traffic 32-55 NPM Concentrate Truck (offsite) 35-55 (2 passes) (Approx. 13 vehicles Enter/Exit NPM Site)
18:00 22/02/2023 (Evening)	44	WD: E WS: 1.5m/s Stab Class: D	55	Wind 29-48 Birds 26-48 Traffic 30-51 Residential Noise 30-75 (Approx. 85 vehicles Enter/Exit NPM Site)

Note: NPM denotes Northparkes Mines.

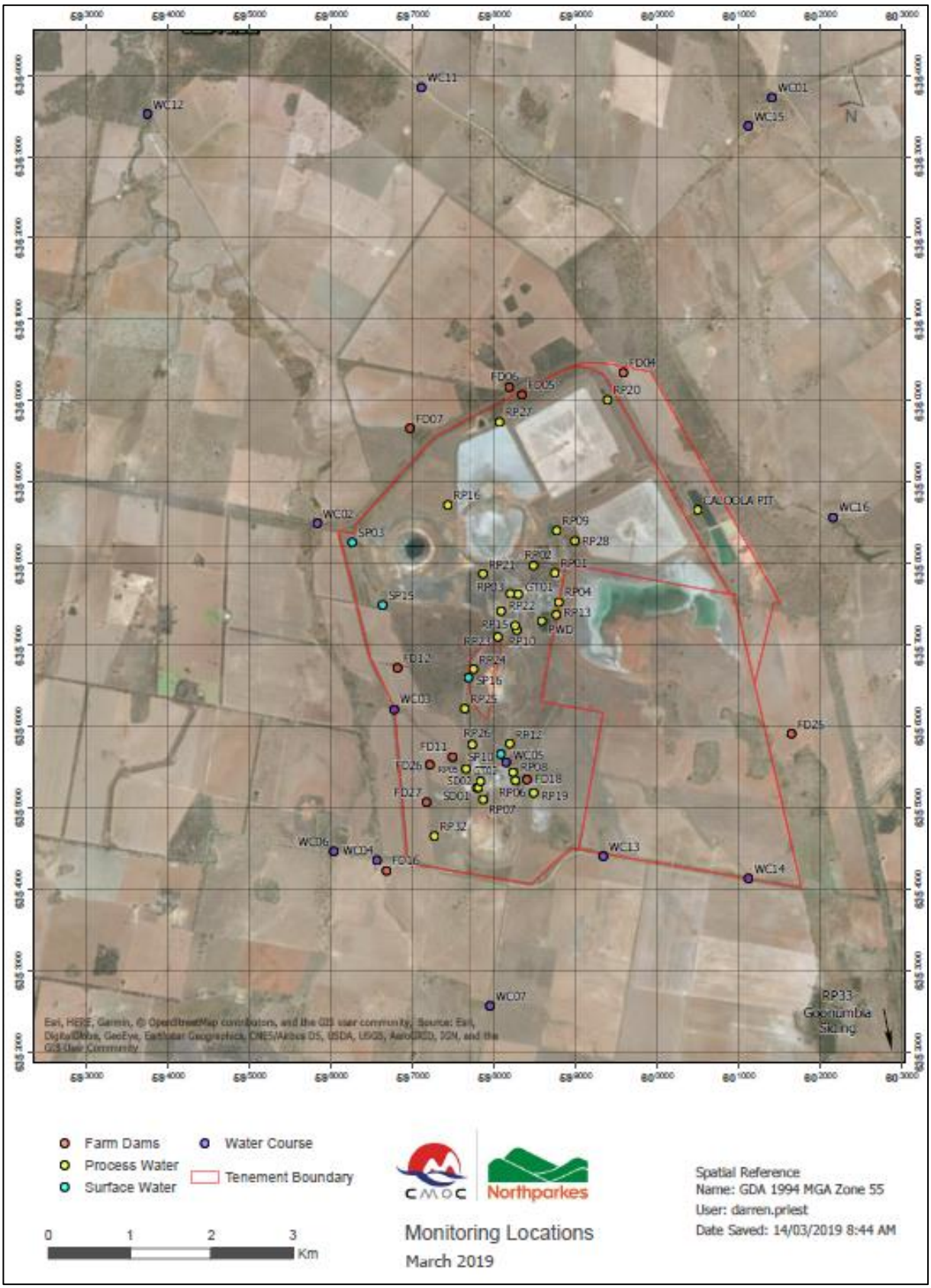
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Appendix A – PM10/TSP Monitoring Locations

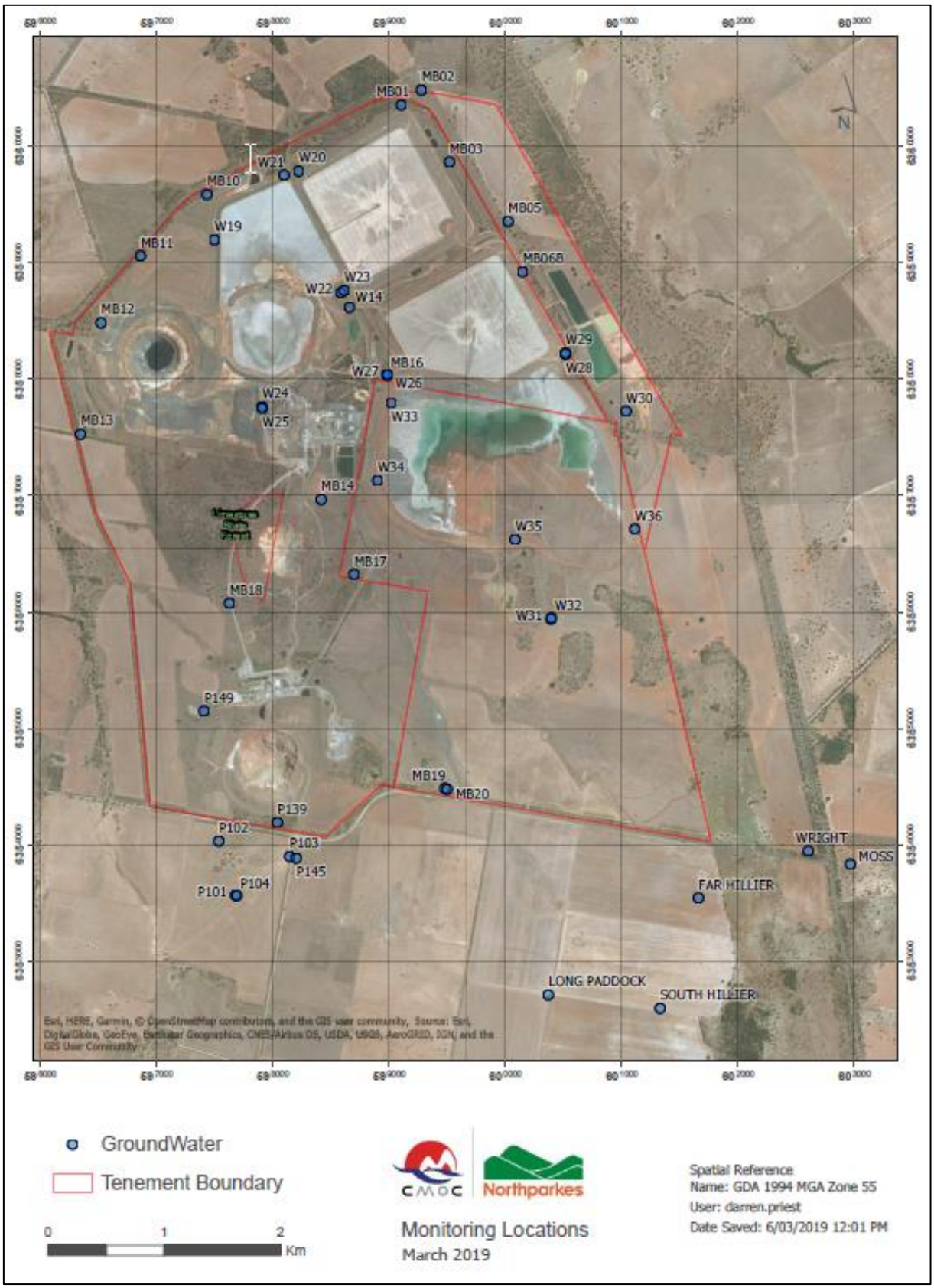
Appendix B – Depositional Dust Monitoring Locations



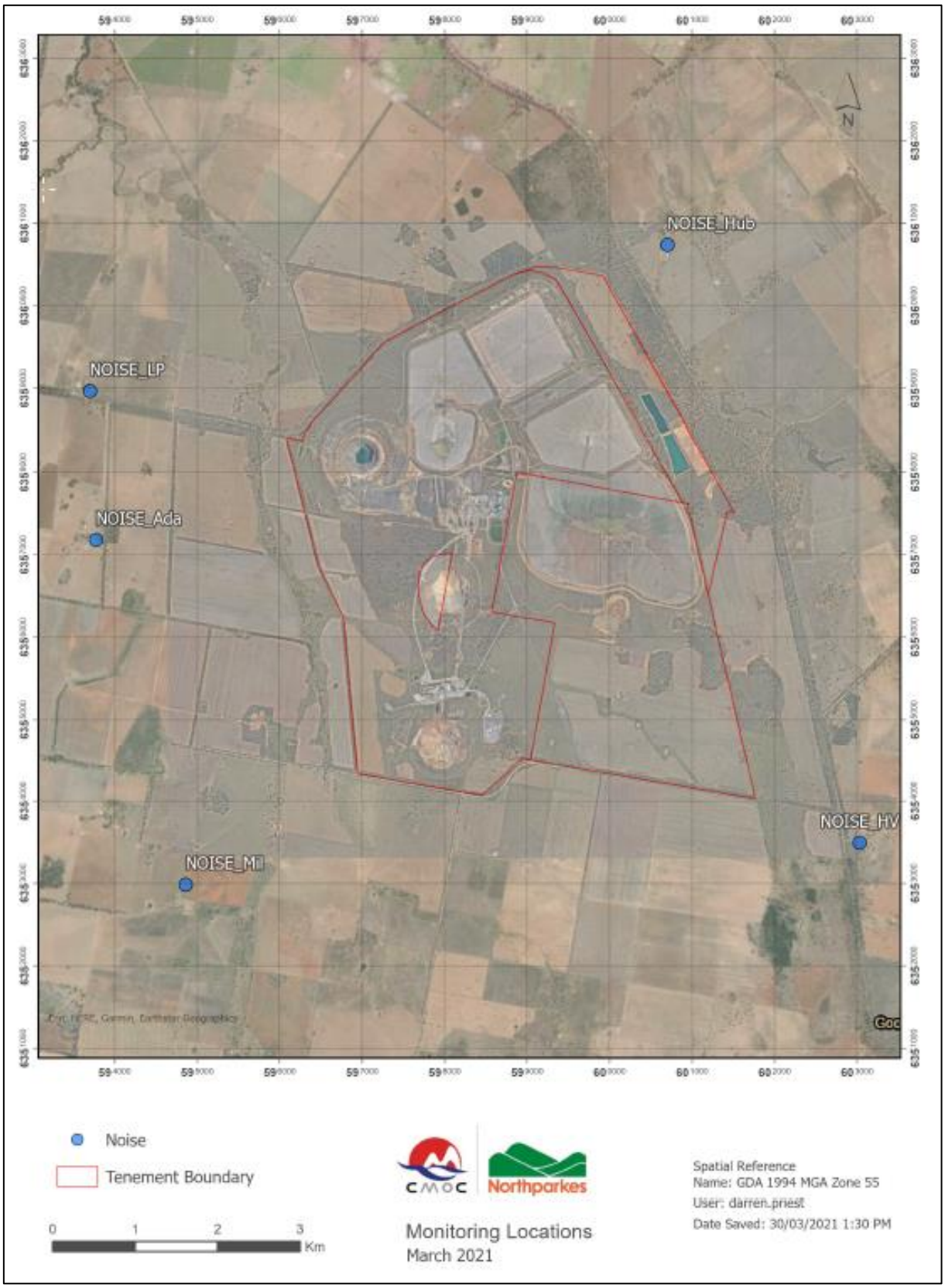
Appendix C – Surface Water Monitoring Locations



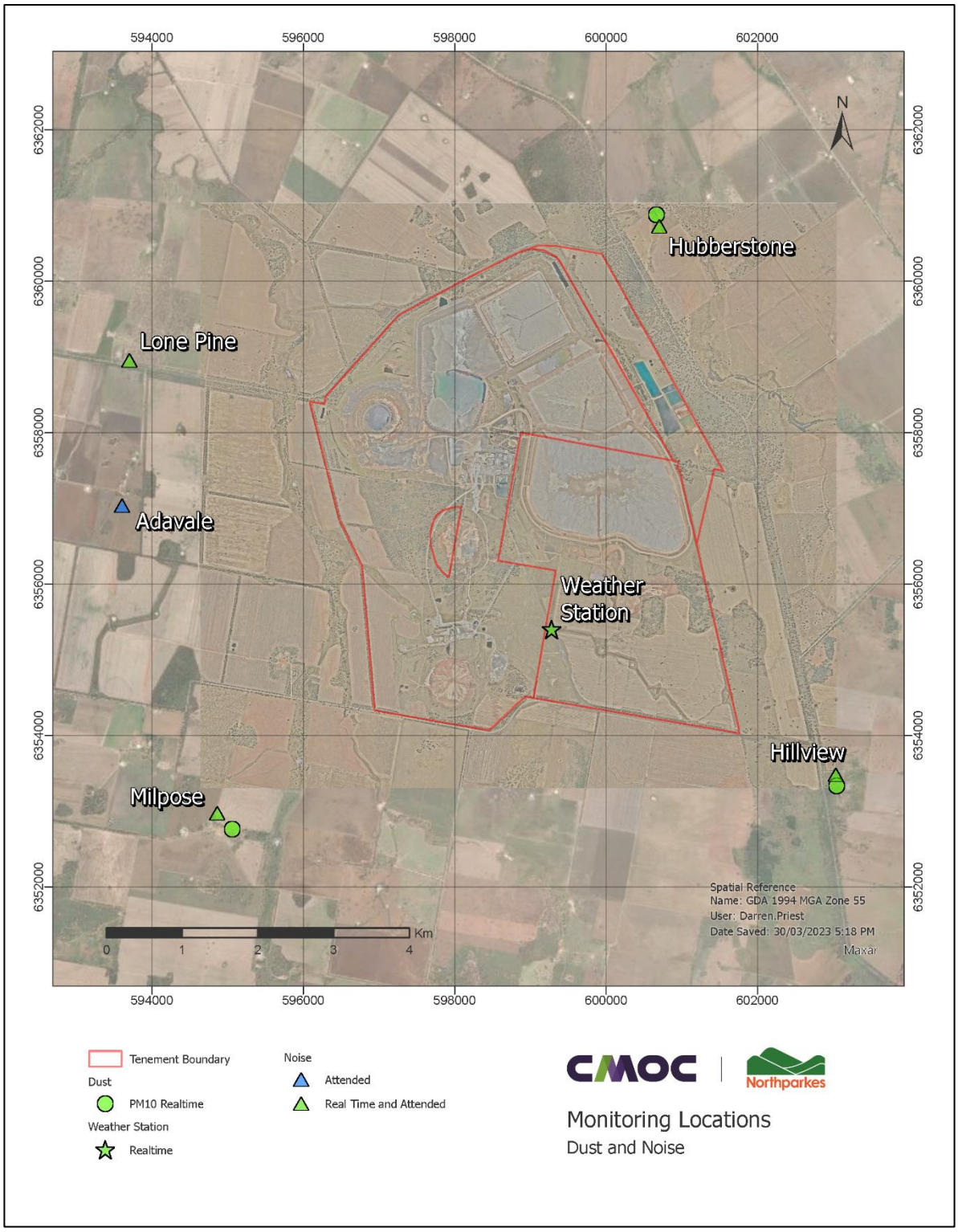
Appendix D – Groundwater Monitoring Locations

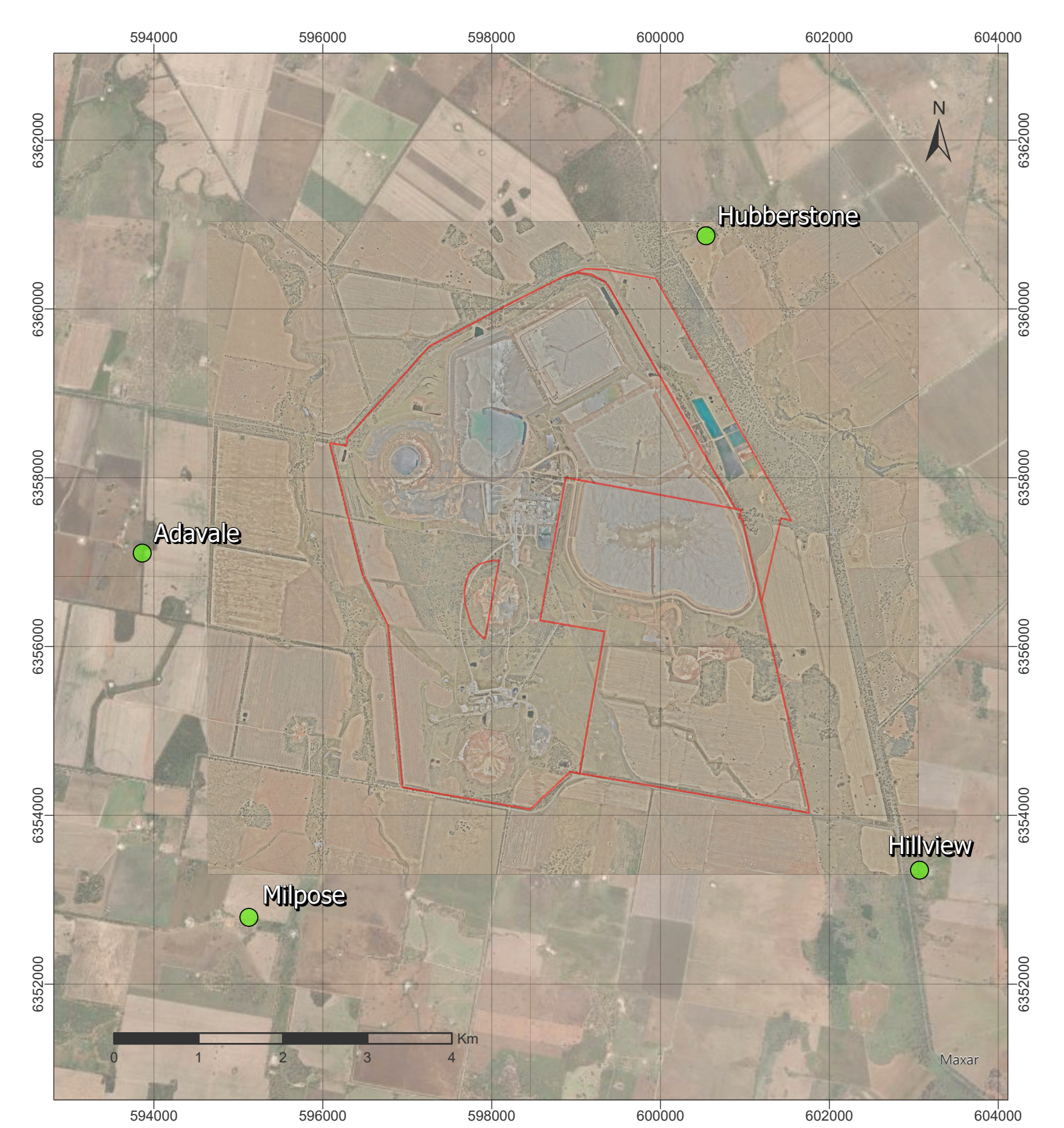


Appendix E – Attended Noise Monitoring Locations



APPENDIX 1 DUST AND NOISE MONITORING LOCATIONS





Vibration and Overpressure

Tenement Boundary

CMOC | Northparkes

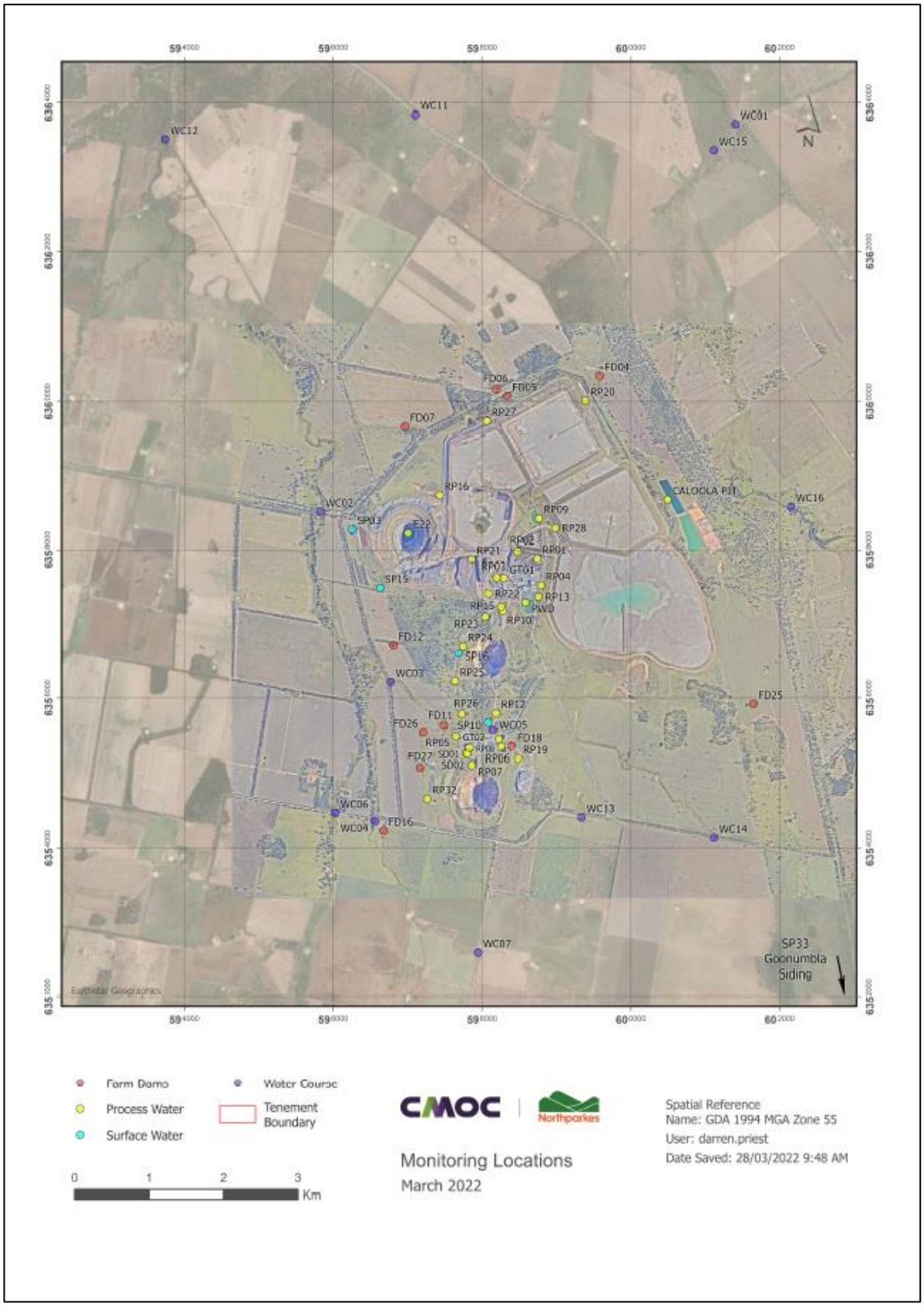
Vibration and Overpressure

Monitoring Locations - March 2023

Spatial Reference
Name: GDA2020 MGA Zone 55
User: Darren.Priest
Date Saved: 28/03/2023 8:41 AM

APPENDIX 2 WATER MONITORING

Surface water monitoring locations



Ground water monitoring locations