Northparkes Mines
PO Box 995 Parkes NSW 2870 Australia
T +61 2 6861 3000 F +61 2 6861 3101
www.northparkes.com

1 October to 31 December 2019 - Quarter 4

Environmental Monitoring Results Summary

Name of Mine	Northparkes Mines
Name of Leaseholder and Mine Operator	CMOC Mining Pty Ltd
Mining Leases	ML 1247, ML 1367, ML 1641 and 1743
Environment Protection Licence	EPL 4784
Development Consent	DC11_0060, (as modified)

Reviewed by	**Chris Higgins**
Title	Superintendent – Environment and Farms
Date	12 Feb 2020
Signature	
Approved by	**Stacey Kelly**
Title	Manager – People, Safety and Environment
Date	
Signature	

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 October to 31 December 2019. 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 has 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/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 PM10 monitoring locations.

During the reporting period there were 127 elevated 24hr criteria readings recorded across the three monitoring locations, with the Milpose property recording 42, Hillview 23 and Hubberstone 62. All recordings triggered the internal investigation process and were found to be caused by external factors and deemed non-mine related. The investigations identified that all elevated readings were found to be caused by either increased particulate matter from regional dust events or smoke from the bushfires. During the reporting period multiple observations were made by the Environment Team identifying high levels of smoke within local district and wider region. Data not detailed in Figures 1-3 was found to be impacted on by non-mining related activities and removed as outliers.

Annual averages recorded at all monitoring locations are below the Consent criteria of 30 µg/m^3, recording 23.9 µg/m^3 at Hubberstone, 20.0 µg/m^3 at Milpose, and 15.1 at Hillview.

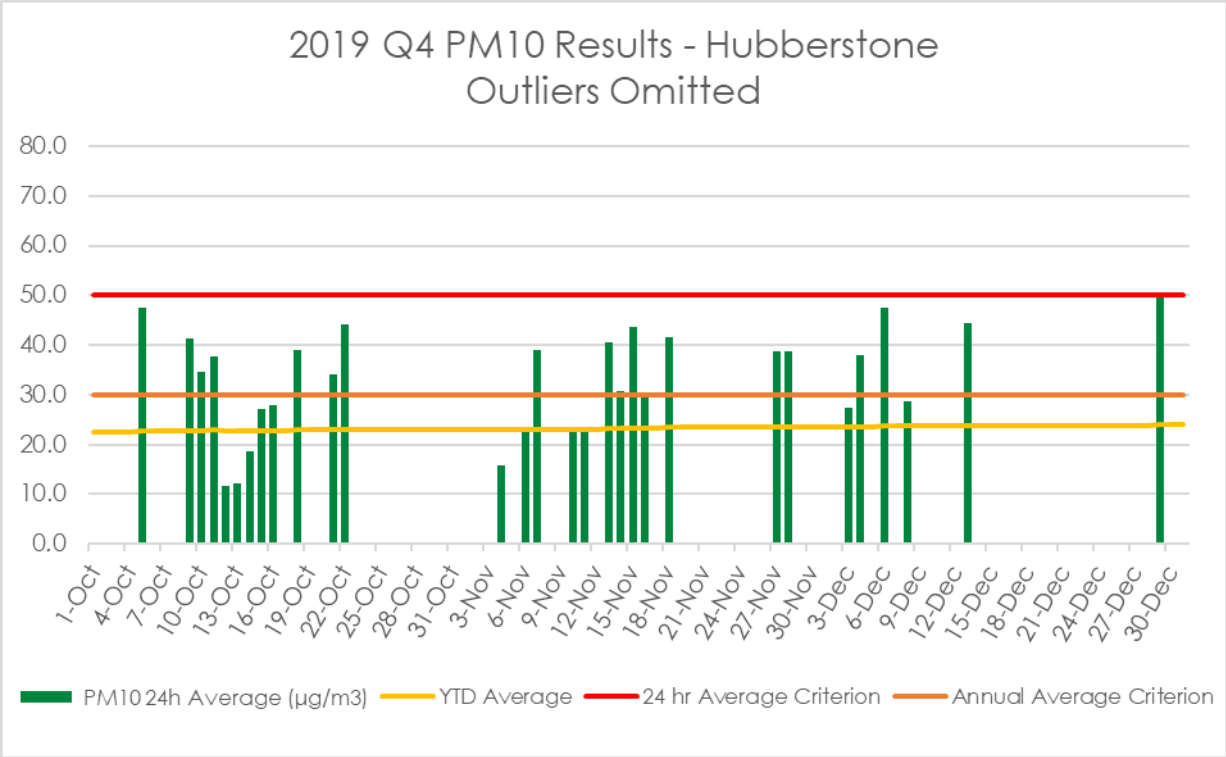


Figure 1: Hubberstone

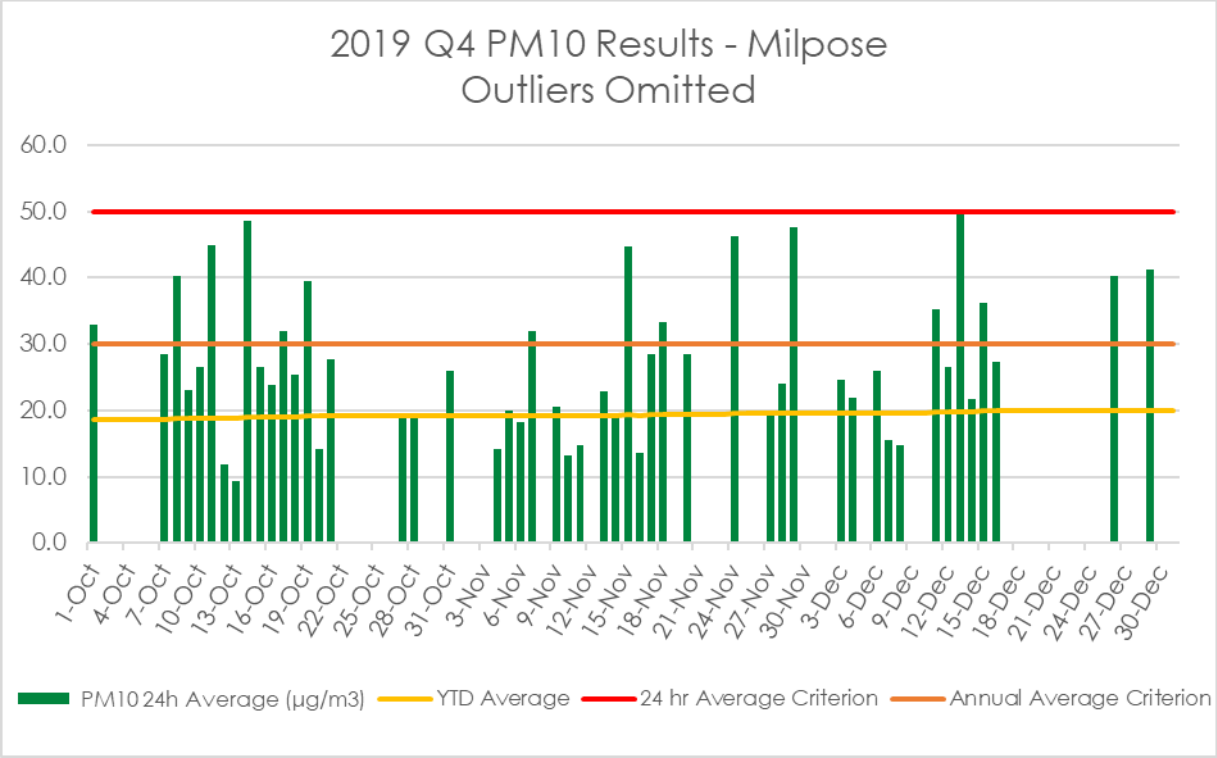


Figure 2: Milpose

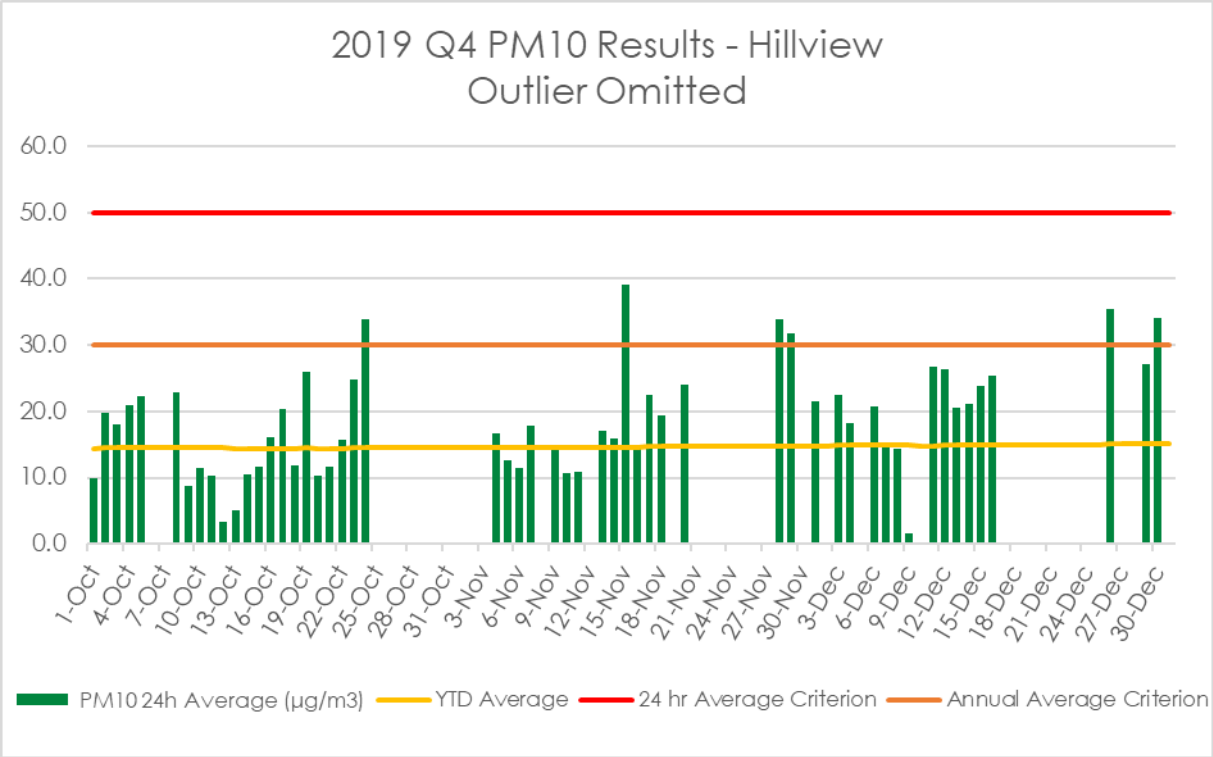


Figure 3: Hillview

2.2 TSP

All recorded dust levels at all TSP monitoring locations were under the required average annual criteria set by the Consent (90 µg/m^3) for the Q4 2019 monitoring period. Refer to Appendix A for map of all TSP monitoring locations.

During the reporting period there were 21 elevated results recorded across the three monitoring locations with Hubberstone recording 8, Milpose 8 and Hillview recording 5. All recordings triggered the internal investigation process and were found to be caused by external factors and deemed non-mine related. The increased frequency of dust storms and bushfire smoke was found to be the main contributors to the increased level of airborne particulates.

The missing data for Milpose on December 29 was due to power supply issues. All other data not detailed in Figures 4-6 was found to be impacted on by non-mining related activities and removed as outliers.

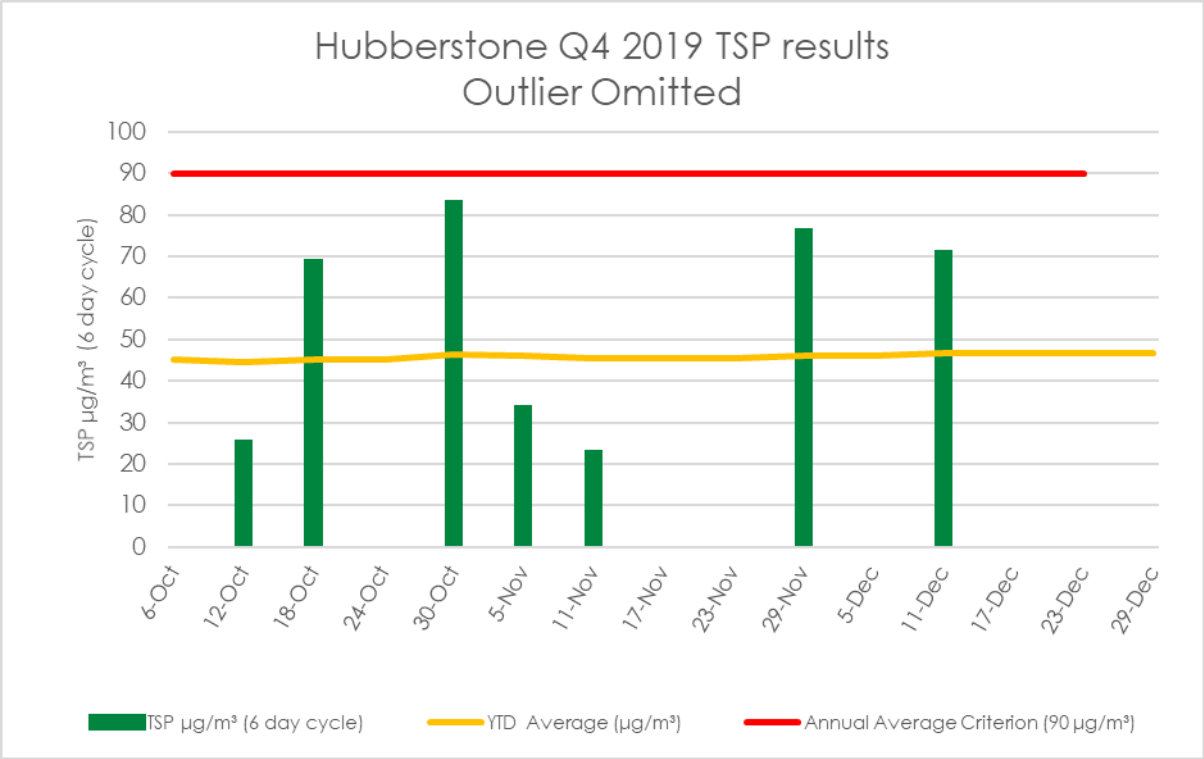


Figure 4: Hubberstone

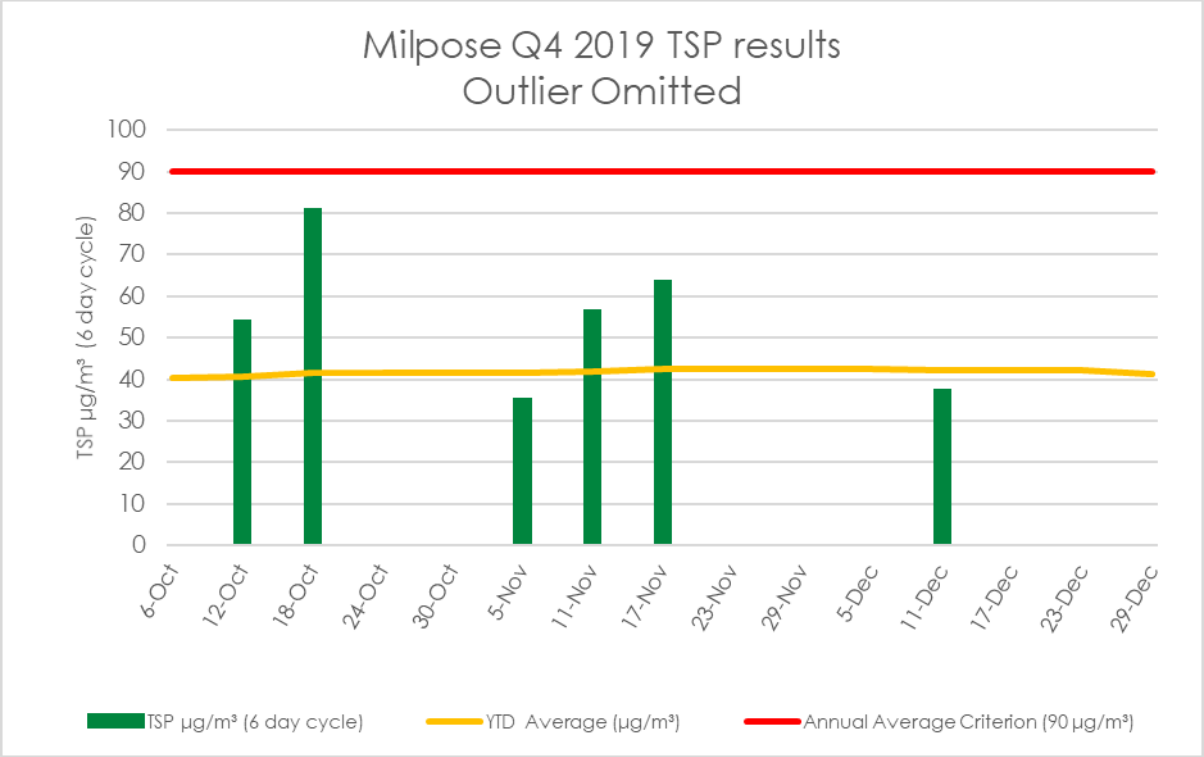


Figure 5: Milpose

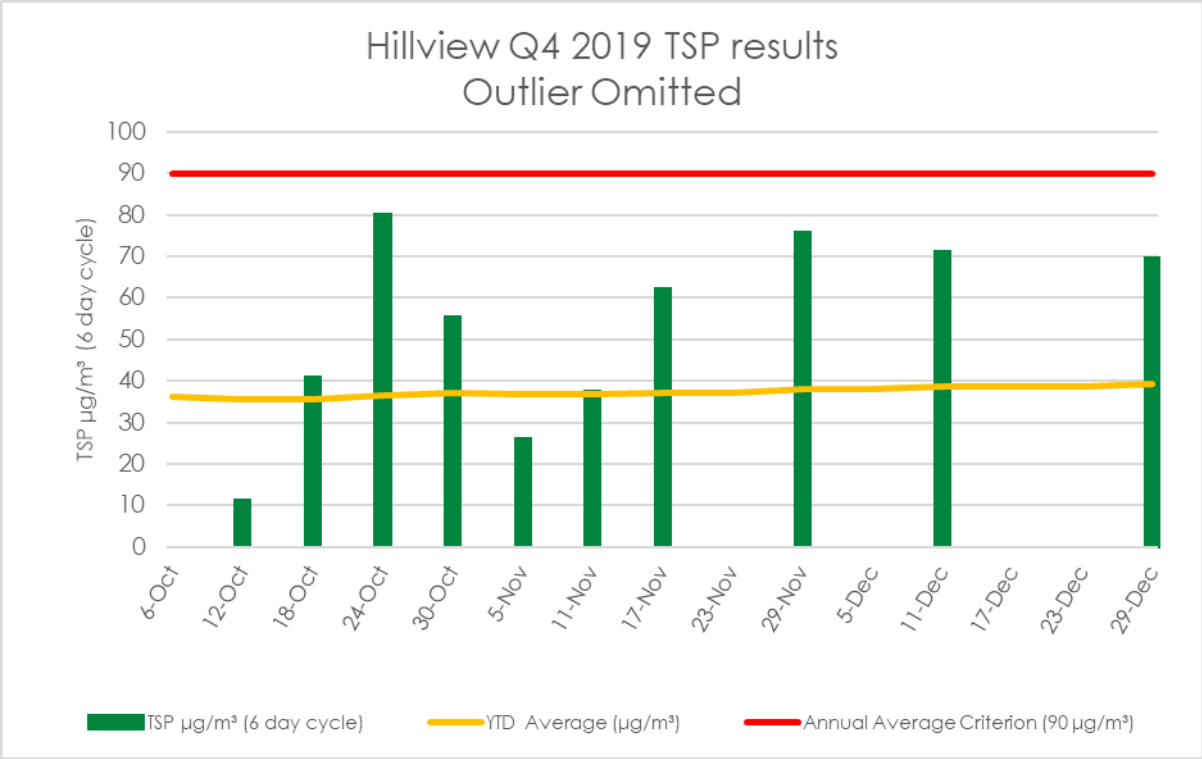


Figure 6: Hillview

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 month of October ten depositional dust gauges (all except for ND22) exceeded the criteria of the Consent, indicating a broad scale change to the local air quality. During the reporting period multiple observations were made by the Environment Team identifying high levels of airborne particulates within local district and wider region. The increased frequency of dust storms can be attributed to lack of groundcover and above average wind strength, determining that the elevated readings were the cause of prolonged drought conditions and not mine related. The results of TDN5 exceeded the criteria in the months of November and December. TDSW also recorded elevated results in November, similarly, ND22 in December. The regional location of these monitoring locations would suggest the elevated readings are most likely the result of agricultural activities being undertaken in the nearby vicinity.

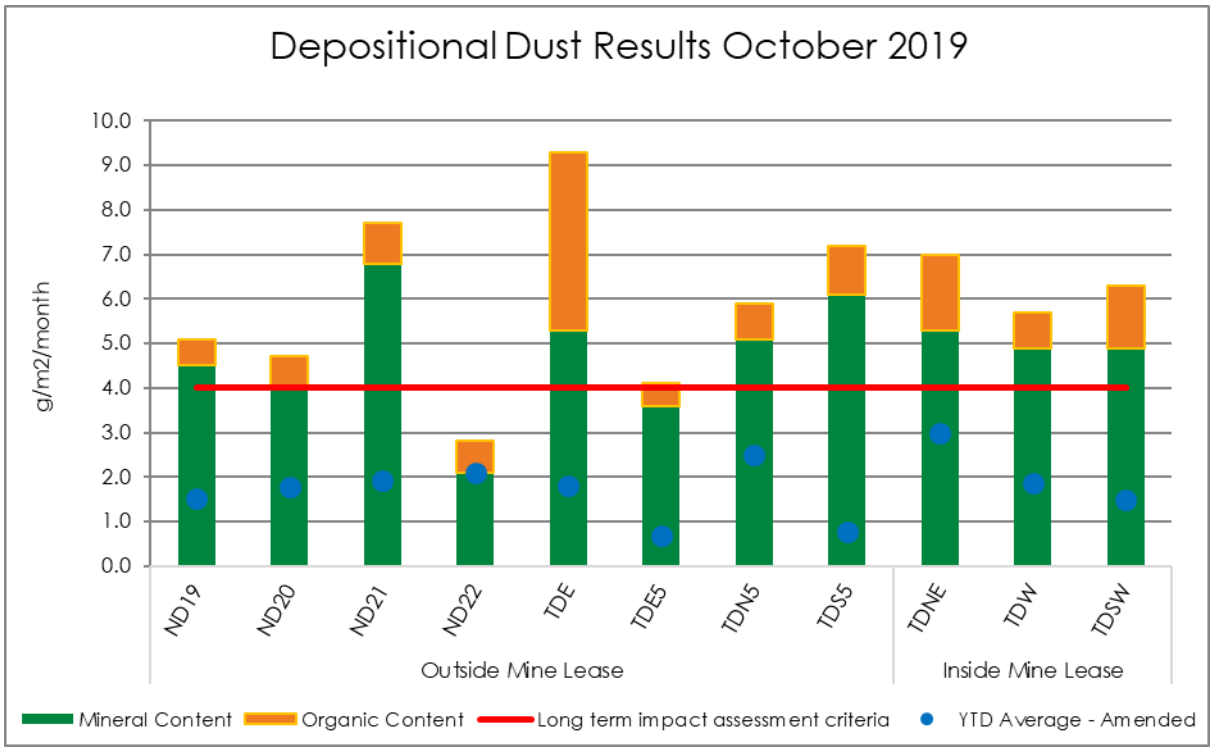


Figure 2: October depositional dust results for all locations

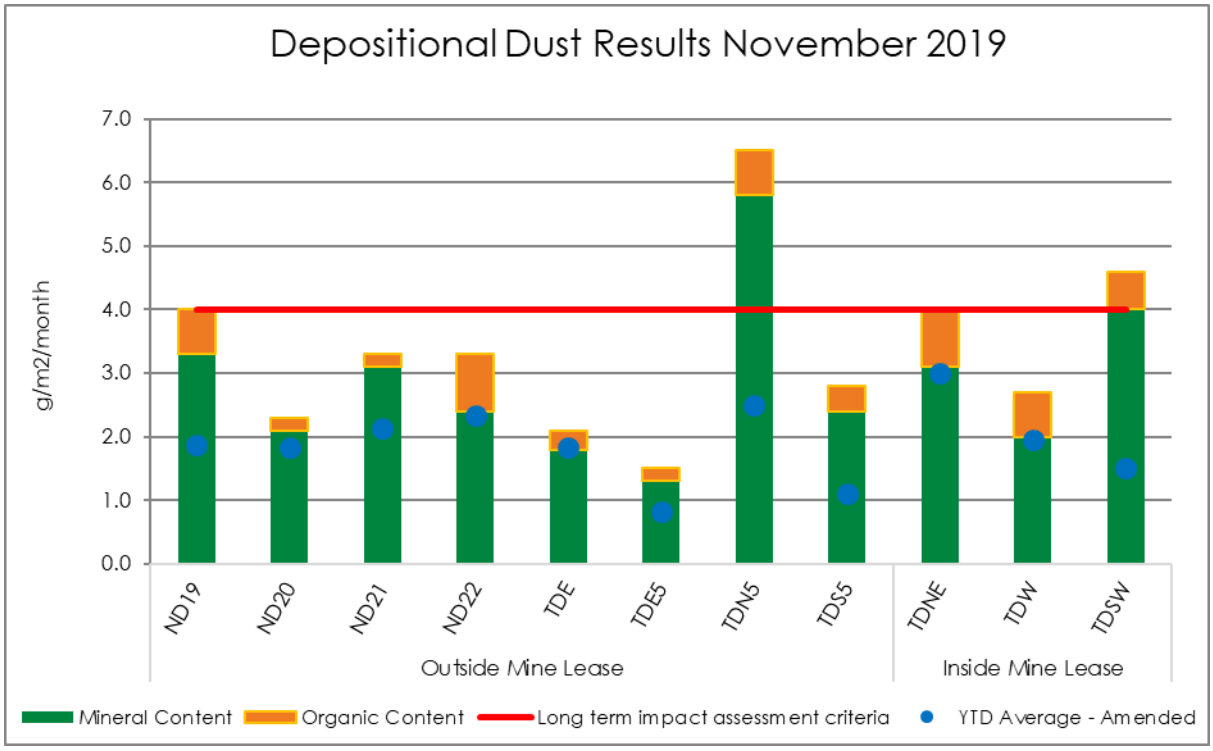


Figure 8: November depositional dust results for all locations

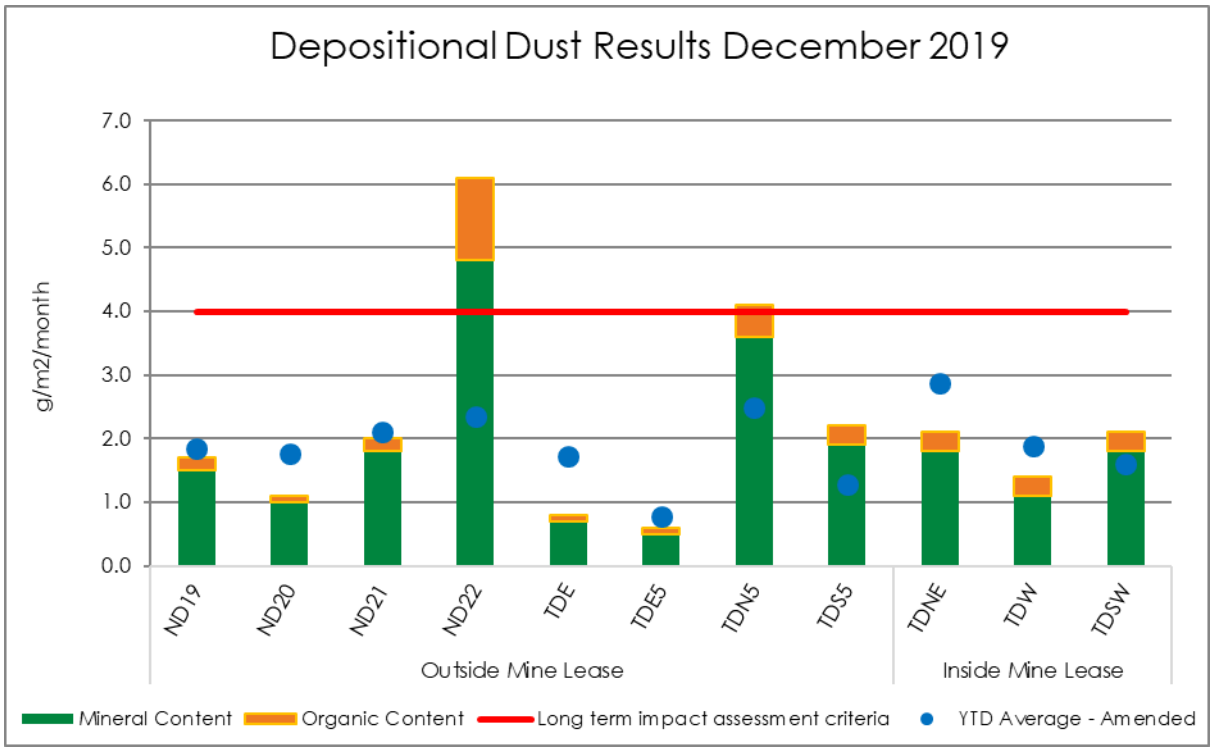


Figure 9: December depositional dust results for all locations

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

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. Due to below average rainfall prior to monitoring, many locations were deemed dry and unable to be sampled. A summary of the monitoring results at each location sampled are presented in Tables 1-6 below.

Table 1: Process Water System

	RP1	RP2	RP3	RP09	RP13	RP15	RP20	RP21	RP22	RP27	RP32	RP33	GT1	GT2	PWD	SD1
pH	8.8	9.8	8.5	8.5	8.3	8.3	8.5	8.1	9.4	9.6	9.4	9.7	8.5	8.8	8.1	8.4
EC (uS/cm)	1236	5203	7394	5497	905	4134	7511	5174	572	6469	6763	499	3724	2105	3667	11913
Cu (mg/L)	0.037	0.014	0.122	0.016	0.074	0.056	0.045	0.019	0.095	0.02	0.02	0.017	0.068	0.123	0.054	0.341

Table 2: Farm Dams

	FD4	FD6	FD7	FD16	FD25
pH	9.0	8.6	8.1	8.3	8.8
EC (uS/cm)	1998	409	538	680	812
Cu (mg/L)	0.016	0.011	0.008	0.004	0.018

Table 3: TSF Bores

	MB1	MB2	MB3	MB5	MB6B	W26	W27	W28	W29	W30	W31	W32
pH	7.3	7.2	6.1	6.8	6.9	6.8	11.3	6.7	13.1	7.3	7.7	12.0
EC (uS/cm)	5526	9693	23143	24307	15330	14322	16587	16558	21143	2232	860	2031
Cu (mg/L)	0.011	0.006	0.031	0.012	0.012	0.009	0.003	0.011	0.033	0.019	0.034	0.01

Table 4: Opencut Bores

	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	7.0	6.9	7.1	6.4	7.4	7.6	7.1	11.0	6.9	7.0	8.0	8.2
EC (uS/cm)	14297	23977	2470	16895	7755	5799	13483	13746	16653	18516	1769	1369
Cu (mg/L)	0.008	0.029	0.016	0.009	0.003	0.012	0.005	0.004	0.007	0.013	0.004	0.011

Table 5: Underground Bores

	P101	P102	P139	P145	P149	MB17	MB18	MB19	MB20
pH	7.4	6.8	6.2	7.7	7.4	9.4	7.4	7.7	7.4
EC (uS/cm)	11602	28360	28557	100	870	5654	15187	12752	11602
Cu (mg/L)	0.003	0.005	0.02	0.013	0.007	0.018	0.009	0.046	0.003

Table 6: Regional Bores

	Far Hillier	Wright	Moss	Long Paddock
pH	7.4	7.5	7.3	8.7
EC (uS/cm)	809	885	2302	1038
Cu (mg/L)	0.005	0.004	0.006	0.016

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 four nearest occupied residences 'Hubberstone', 'Milpose', 'Lone Pine' and 'Hillview'. 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 5th and 6th of November 2019. The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to NPM 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 concentrate trucks and light vehicle movements associated with shift change generate 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 statutory noise criteria at all monitoring locations for all assessment periods. Furthermore, project related noise emissions generally remain inaudible at monitoring locations. Extraneous non-mine sources such as traffic, wind in trees, livestock, birds, aircraft, dog bark, insects and local residential noise were audible during the monitoring period. A summary of the monitoring results at each monitoring location are presented in Tables 7-11 below.

Table 7: Attended noise monitoring results for Hubberstone

Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
06/11/2019 13:52	57	40	31	WS: 2.5m/s WD: NW Stability Class: C	Livestock 34-55 Aircraft 35-39 Birds 32-46 Traffic 36-45 Dog Bark 35-38 Wind 34-42 NPM Inaudible
06/11/2019 14:07	63	46	32		
06/11/2019 14:22	57	40	32		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Evening					
06/11/2019 18:56	70	44	34	WS: 2.5m/s WD: NW Stability Class: D	Wind 28-40 Livestock 32-43 Birds 32-51 Traffic 34-44 Dog Bark <36 Aircraft 32-36 NPM Inaudible
06/11/2019 19:11	60	39	33		
06/11/2019 19:26	55	37	28		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Night					
06/11/2019 00:08	51	30	22	WS: Calm Stability Class: F	Livestock 22-34 Birds 22-28 Insects <22 Traffic 22-43 Gunshot 44-51 NPM Hum 20-26
06/11/2019 00:23	69	34	23		
06/11/2019 00:38	45	29	24		
Site $L_{Aeq(15min)}$ Contribution					23
Site $L_{A1(1min)}$ Contribution					<35

Table 8: Attended noise monitoring results for Lone Pine

Date/Time (hrs	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
06/11/2019 14:52	64	46	35	WS: 2.5m/s WD: NW Stability Class: B	Wind 36-52 Birds 36-58 Local Residential Noise 36-62 Aircraft 28-42 Traffic 34-71 Insects 34-36 NPM Inaudible
06/11/2019 15:07	58	46	35		
06/11/2019 15:22	72	49	35		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Evening					
06/11/2019 19:55	65	53	39	WS: 0.5m/s WD: NW Stability Class: B	Dog Bark 34-56 Birds 34-54 Insects 34-38 Aircraft 34-42 NPM Inaudible
06/11/2019 20:10	53	38	33		
06/11/2019 20:25	54	37	29		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Night					
05/11/2019 23:06	46	26	18	WS: Calm Stability Class: D	Dog Bark 16-36 Birds 18-36 Insects 16-20 Gunshot 36-50 NPM Hum <20
05/11/2019 23:21	45	30	15		
05/11/2019 23:36	50	20	14		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<40

Table 9: Attended noise monitoring results for Milpose

Date/Time (hrs	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	LAmax	LAeq	LA90		
Day					
06/11/2019 15:54	76	50	28	WS: 2.5m/s WD: NW Stability Class: C	Local Residential Noise <34 Birds 34-38 Wind 36-59 Aircraft 34-41 NPM Inaudible
06/11/2019 16:16	65	47	29		
06/11/2019 16:31	71	51	32		
Site $LA_{eq(15min)}$ Contribution					<30
Site $LA_{1(1min)}$ Contribution					<40
Evening					
06/11/2019 20:59	58	30	26	WS: 1m/s WD: NW Stability Class: E	Insects 23-28 Dog Bark 32-44 Birds 22-28 Wind <26 NPM Hum <24
06/11/2019 21:14	32	26	21		
06/11/2019 21:29	51	27	22		
Site $LA_{eq(15min)}$ Contribution					<30
Site $LA_{1(1min)}$ Contribution					<30
Night					
05/11/2019 22:00	44	15	13	WS: Calm Stability Class: E	Livestock 13-24 Insects <13 Birds 13-26 Dog Bark 13-18 Aircraft 13-39 NPM Inaudible
05/11/2019 22:15	45	25	13		
05/11/2019 22:30	46	28	13		
Site $LA_{eq(15min)}$ Contribution					<30
Site $LA_{1(1min)}$ Contribution					<40

Table 10: Attended noise monitoring results for Hillview

Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
06/11/2019 12:28	68	42	29	WS: 2.5m/s WD: NW Stability Class: A	Wind 26-42 Traffic 32-80 Birds 34-53 Aircraft 32-53 Insects 35-46 NPM Inaudible
06/11/2019 12:43	55	41	30		
06/11/2019 12:58	81	57	30		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Evening					
06/11/2019 18:00	55	43	35	WS: 2.5m/s WD: NW Stability Class: D	Traffic 34-64 Wind 32-47 Birds 36-53 Aircraft 36-46 NPM Inaudible
06/11/2019 18:15	66	50	37		
06/11/2019 18:30	59	44	35		
Site $L_{Aeq(15min)}$ Contribution					<30
Site $L_{A1(1min)}$ Contribution					<40
Night					
06/11/2019 01:08	64	45	16	WS: Calm Stability Class: F	Insects 17-25 Birds 32-38 Traffic 24-55 Wind 17-24 NPM Inaudible
06/11/2019 01:23	40	18	13		
06/11/2019 01:38	43	17	13		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<35

Table 11: Attended road noise survey results

Time (hrs)	Noise Descriptor (re 20 µPa) dB L_{Aeq}	Meteorology	Criteria dB $L_{Aeq(1hr)}$	Description and SPL dBA
(Day) 06/11/2019 12:28	51	WS: 2.5m/s WD: NW Stability Class: A	55	Wind 26-42 Traffic 32-80 Birds 34-53 Aircraft 32-53 Insects 35-46 NPM Container Truck 30-64
(Evening) 06/11/2019 17:45	47	WS: 2.5m/s WD: NW Stability Class: D	55	Traffic 34-59 Wind 32-47 Birds 36-53 Aircraft 36-46 NPM Container Truck 38-64

Appendix A - PM10/TSP Monitoring Locations

Dust,PM10 Realtime

Dust,TSP

Tenement Boundary

0 1 2 3 Km

CMOC Northparkes

Monitoring Locations

March 2019

Spatial Reference
Name: GDA 1994 MGA Zone 55
User: darren.priest
Date Saved: 6/03/2019 11:57 AM

Appendix B – Depositional Dust Monitoring Locations

Depositional Dust

Tenement Boundary

0 1 2 3 Km

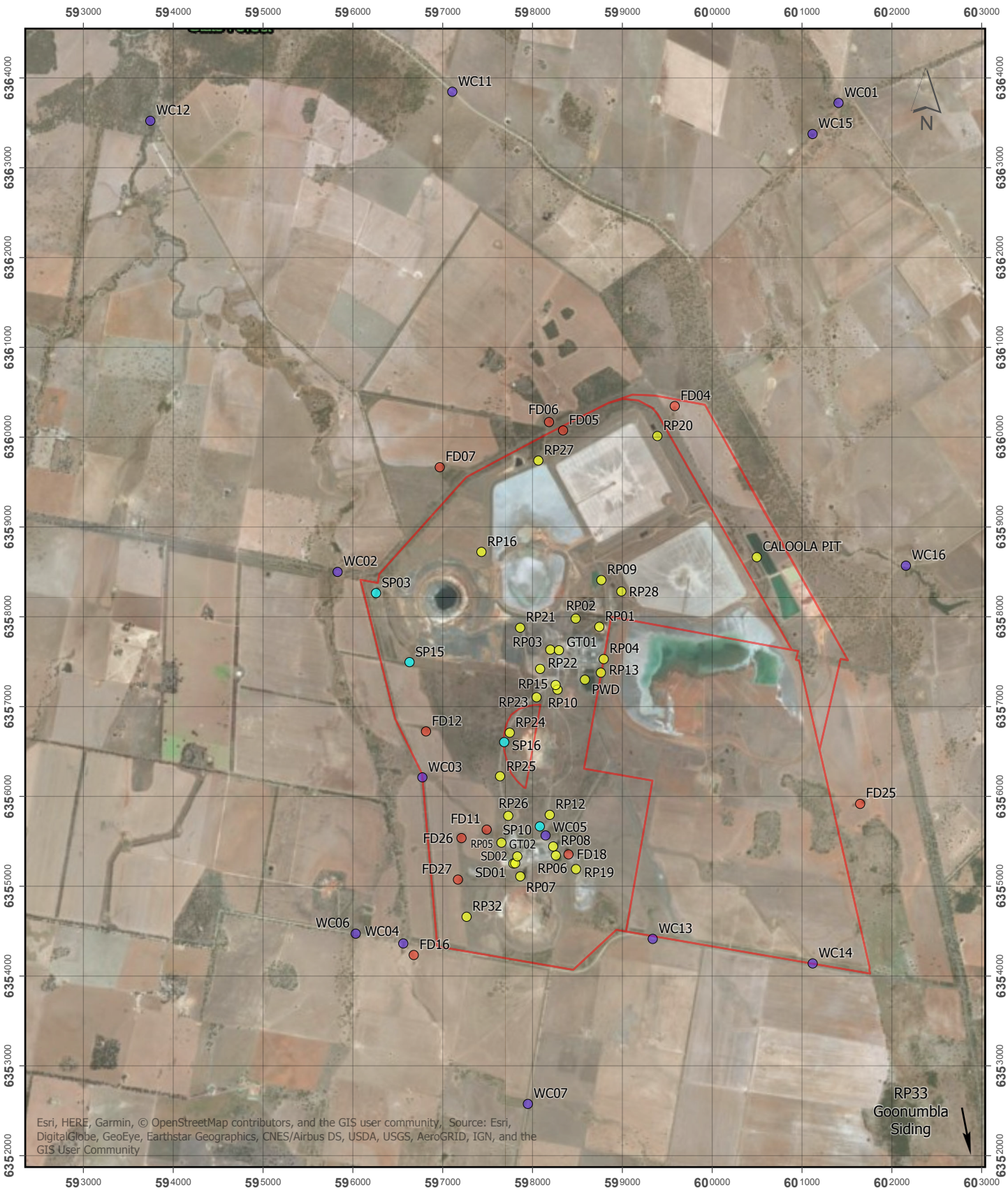
CMOC Northparkes

Monitoring Locations

March 2019

Spatial Reference
Name: GDA 1994 MGA Zone 55
User: darren.priest
Date Saved: 6/03/2019 11:56 AM

Appendix C – Surface Water Monitoring Locations



Farm Dams
Process Water
Surface Water
Water Course
Tenement Boundary

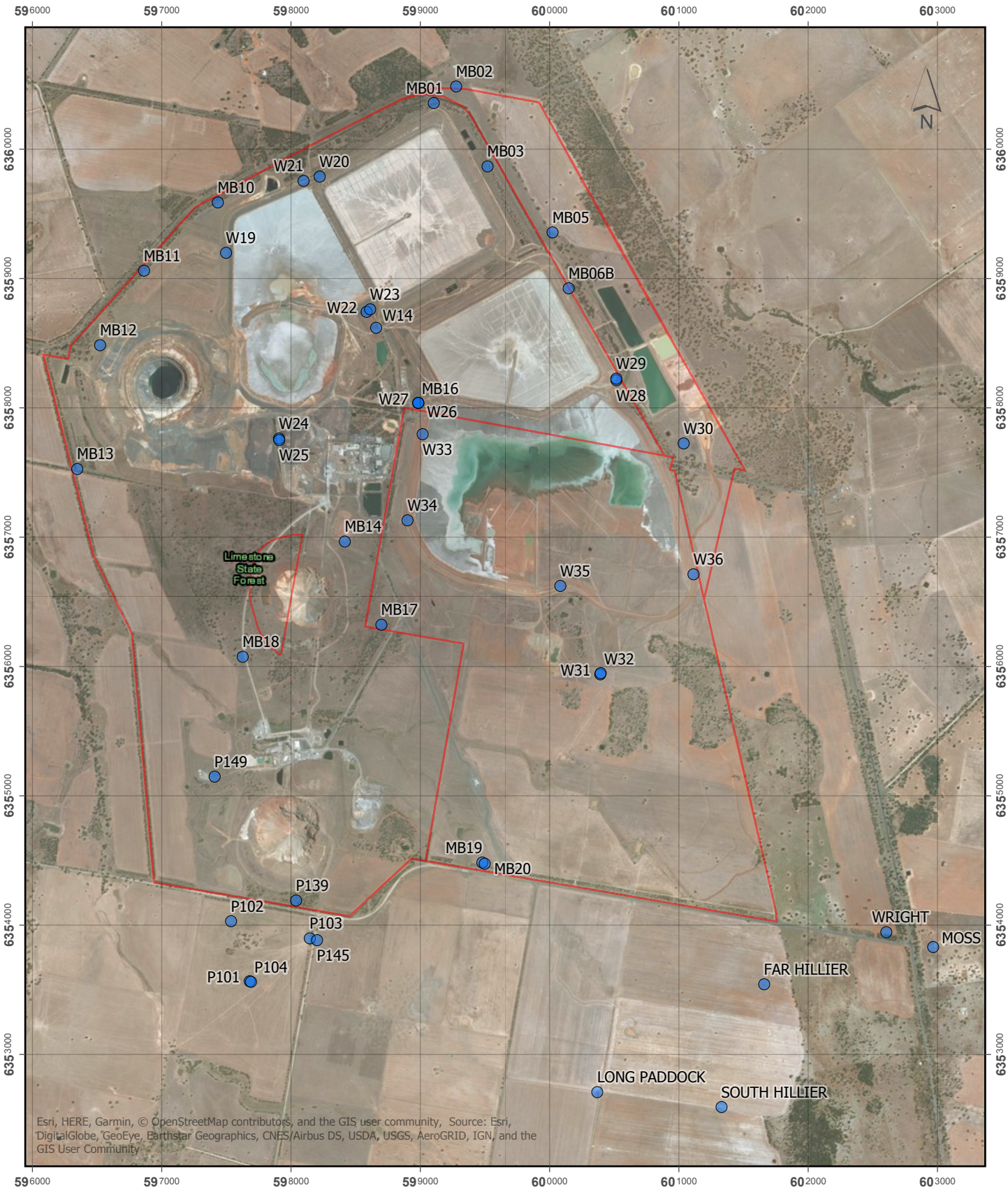
0 1 2 3 Km

CMOC Northparkes

Monitoring Locations
March 2019

Spatial Reference
Name: GDA 1994 MGA Zone 55
User: darren.priest
Date Saved: 14/03/2019 8:44 AM

Appendix D - Groundwater Monitoring Locations



GroundWater

Tenement Boundary

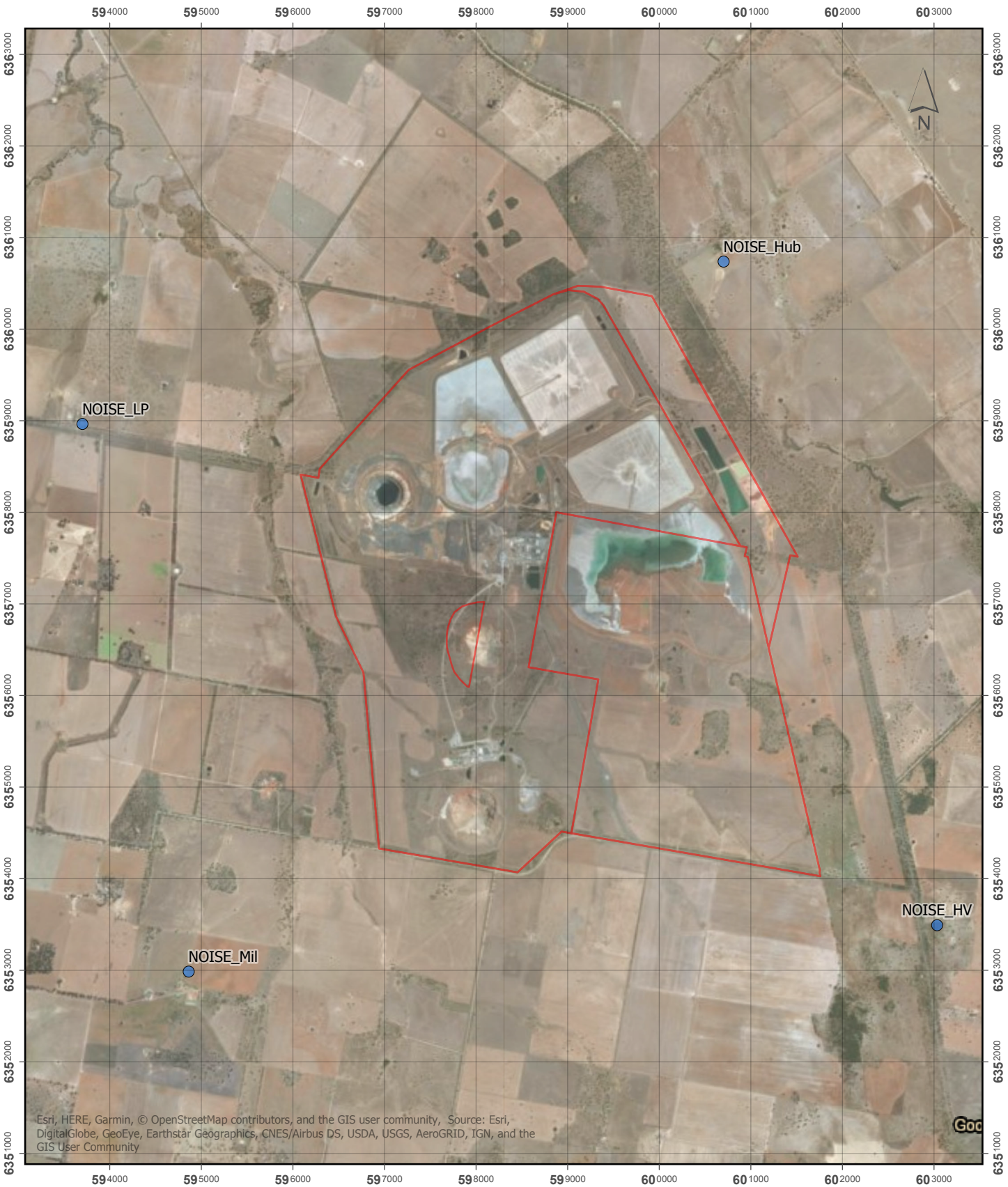
0 1 2 Km

CMOC Northparkes

Monitoring Locations
March 2019

Spatial Reference
Name: GDA 1994 MGA Zone 55
User: darren.priest
Date Saved: 6/03/2019 12:01 PM

Appendix E – Attended Noise Monitoring Locations



Noise

Tenement Boundary

0 1 2 3 Km

CMOC Northparkes

Monitoring Locations
March 2019

Spatial Reference
Name: GDA 1994 MGA Zone 55
User: darren.priest
Date Saved: 6/03/2019 11:57 AM