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

1 April to 30 June 2019 - Quarter 2
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 ML 1743
Environment Protection Licence	EPL 4784
Development Consent	DC11_0060, (as modified)

Reviewed by	**Chase Dingle**
Title **Date** **Signature**	Superintendent – Community, Environment and Farms 29/08/19
Approved by	**Stacey Kelly**
Title **Date** **Signature**	Manager – People, Safety and Environment 29 August 2019

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 April 2019 to 30 June 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 thirteen elevated 24hr criteria readings recorded two of the three monitoring locations, with the Milpose property recording 4 and Hubberstone 9. 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 generated by agricultural activities. 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 prolonged drought conditions.

Annual averages recorded at all monitoring locations are currently below the Consent criteria, of 30 µg/m^3, recording 25.9 µg/m^3 at Hubberstone, 20.6 µg/m^3 at Milpose, and 16.9 at Hillview.

The missing data for Hubberstone on May 4 and 5 was due to power supply issues. All other data not detailed in Figures 1-3 was found to be impacted on by non-mining related activities and removed as outliers.

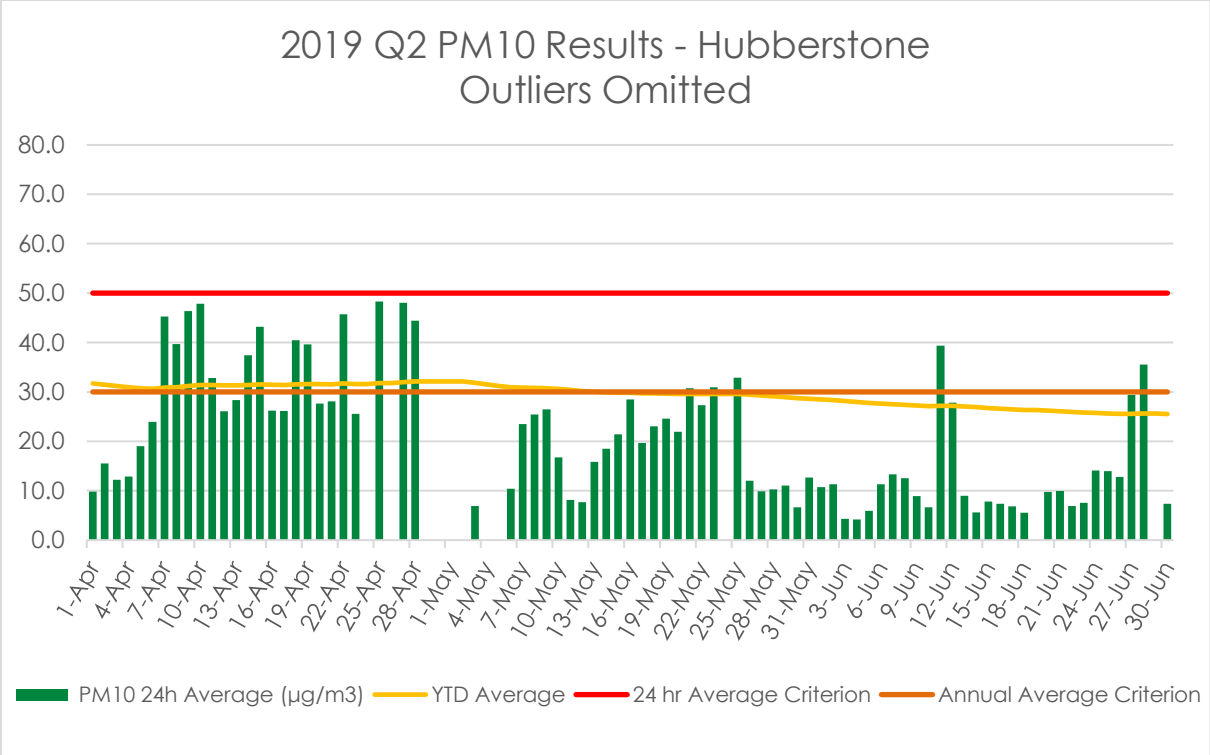


Figure 1: Hubberstone

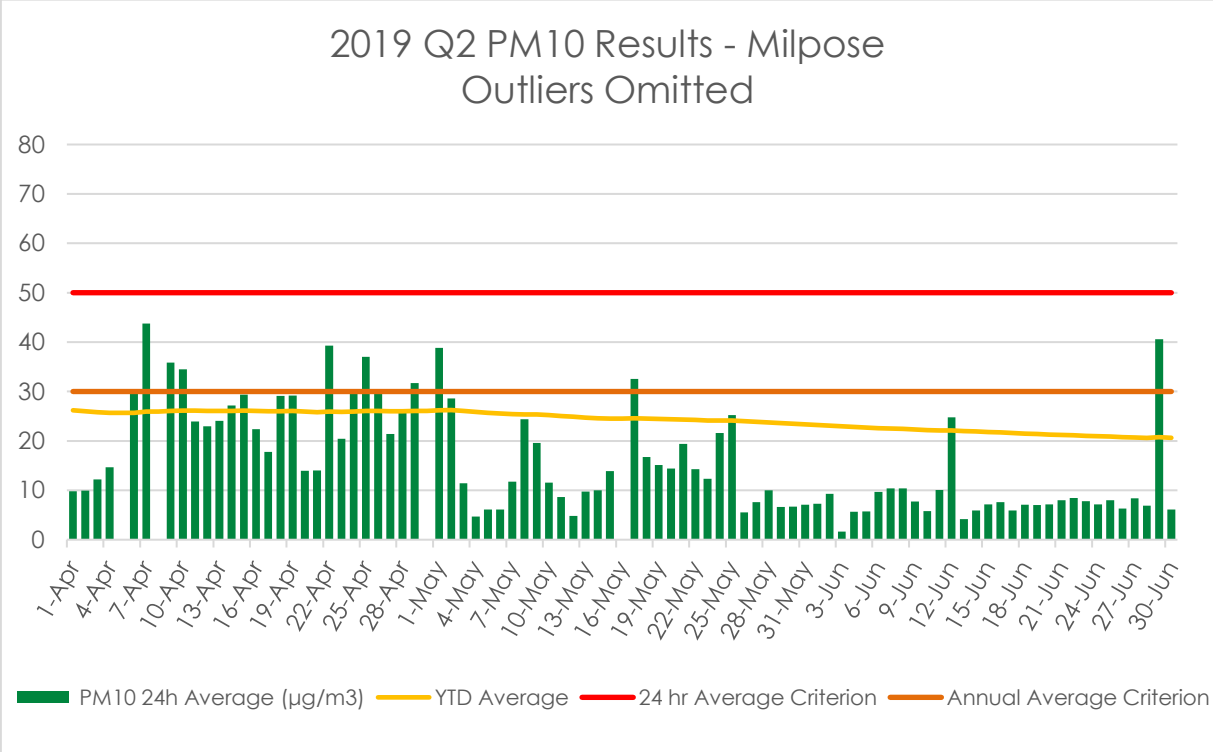


Figure 2: Milpose

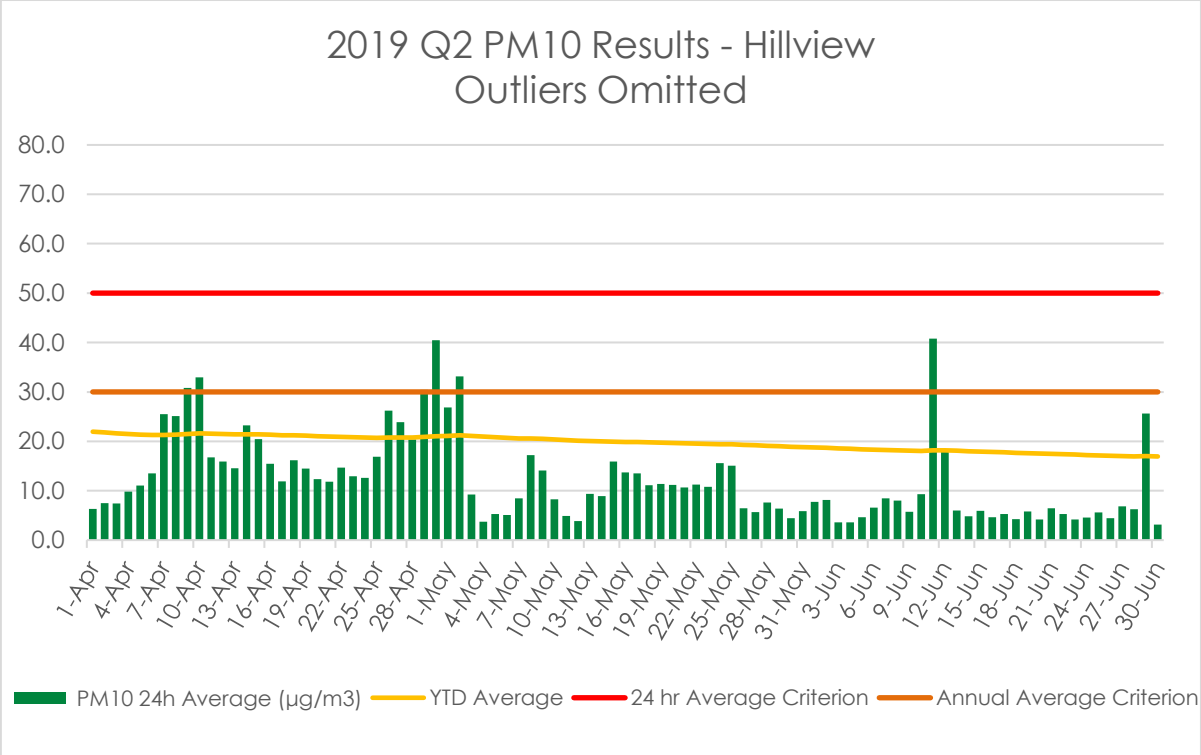


Figure 3: Hillview

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 Q2 2019 monitoring period. Refer to Appendix A for map of all TSP monitoring locations.

The elevated result for all locations on 9 April was the result of a severe dust storm occurring in the local and wider region. PM_{10} results for the period show all three monitoring locations simultaneously recorded high levels of particulate matter, determining the elevated readings were non-mine related. Hubberstone recorded additional elevated results on 15 April, 27 April and 27 May. Following an internal investigation, it was determined the results were due to a combination of localised dust storms and animal husbandry activities, deeming them non-mine related.

The missing data for Hubberstone on May 3 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.

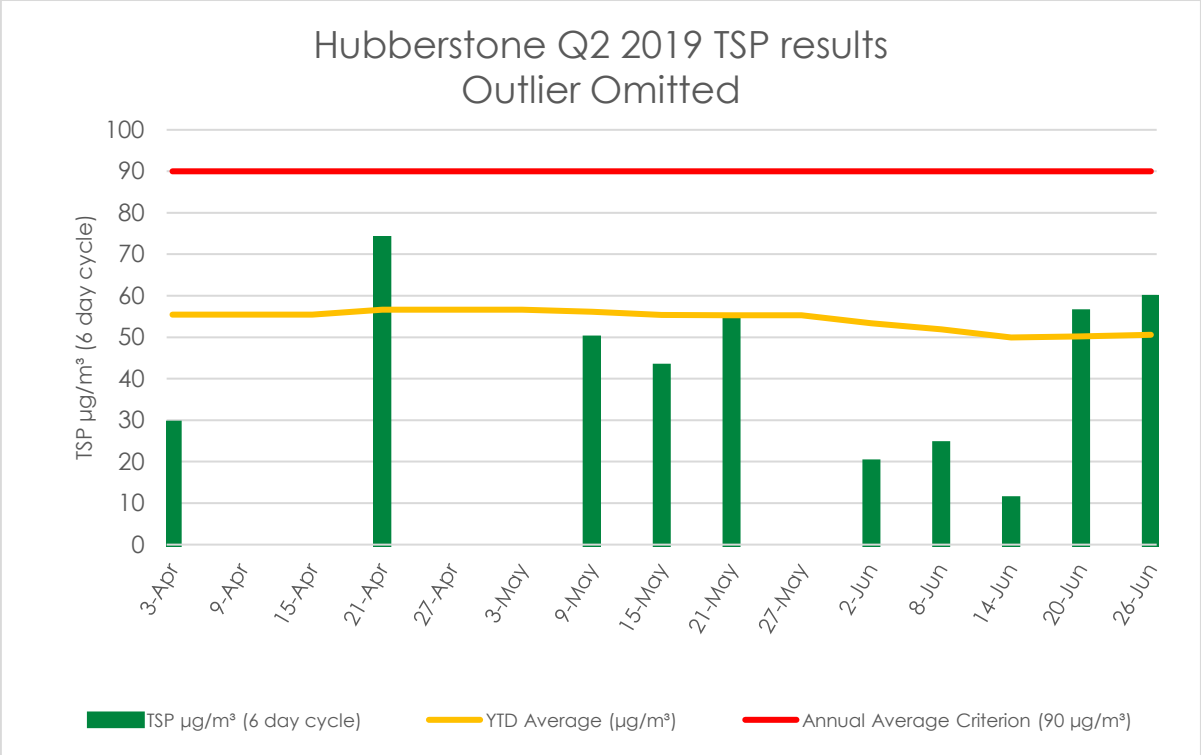


Figure 4: Hubberstone

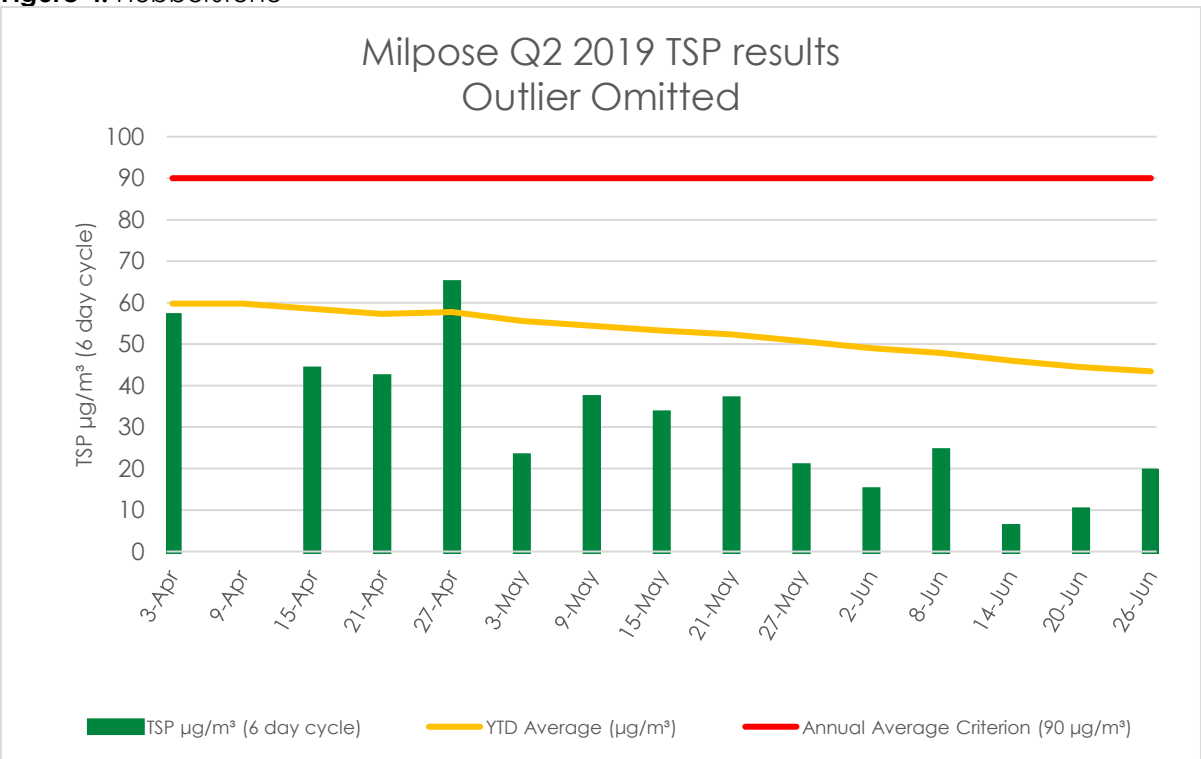


Figure 5: Milpose

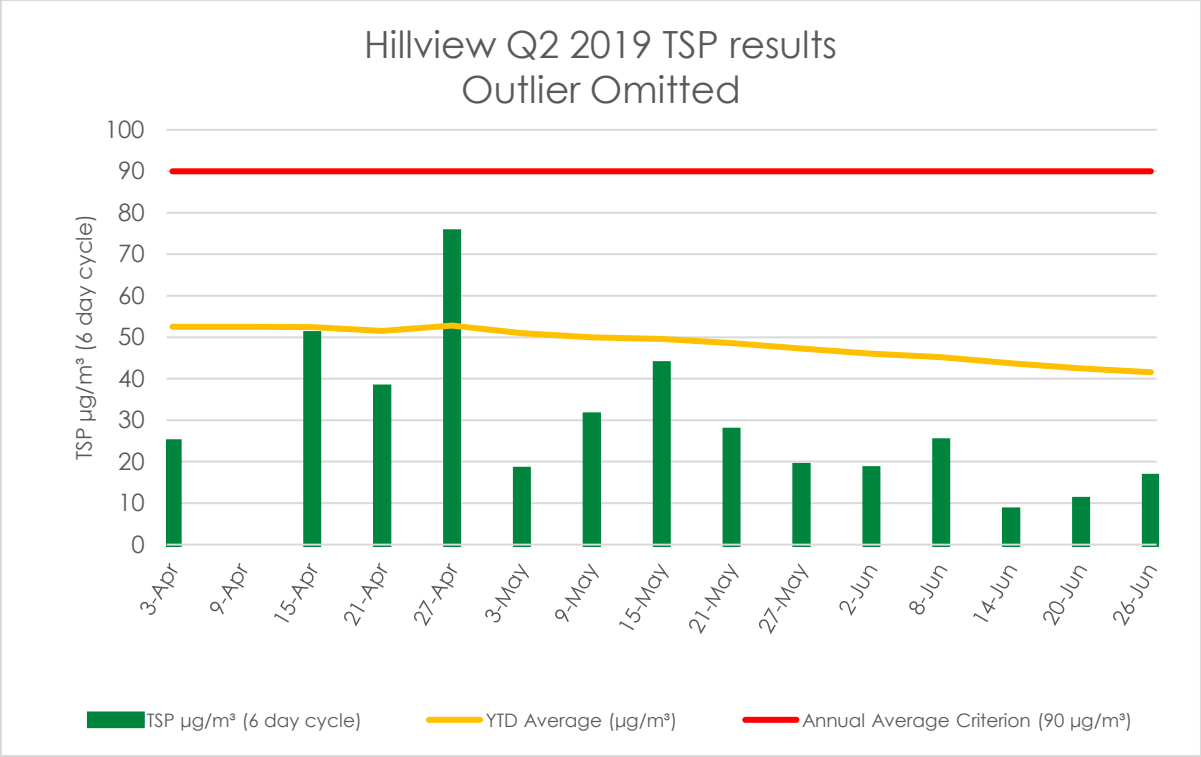


Figure 6: Hillview

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.

Four elevated results were recorded over the May and June monitoring periods as a result of farming activities in the nearby vicinity of the monitoring location. Observations made by the Environment Team identified increased agricultural activities related to winter cropping preparation and are believed to be the main contributers to the high depositional dust results. Depositional monitors situated between the Project Area and the triggered locations did not exceed the criteria at all locations determining that the cause of the elevated results to be non-mine related.

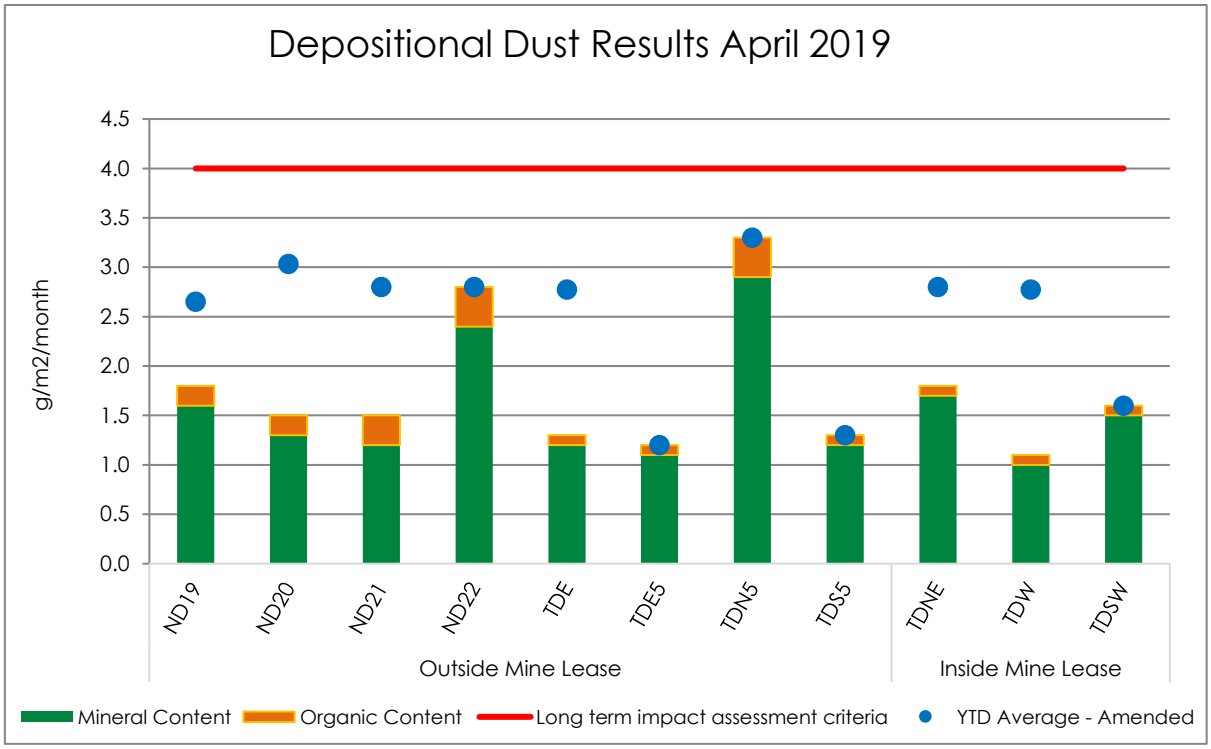


Figure 2: April depositional dust results for all locations

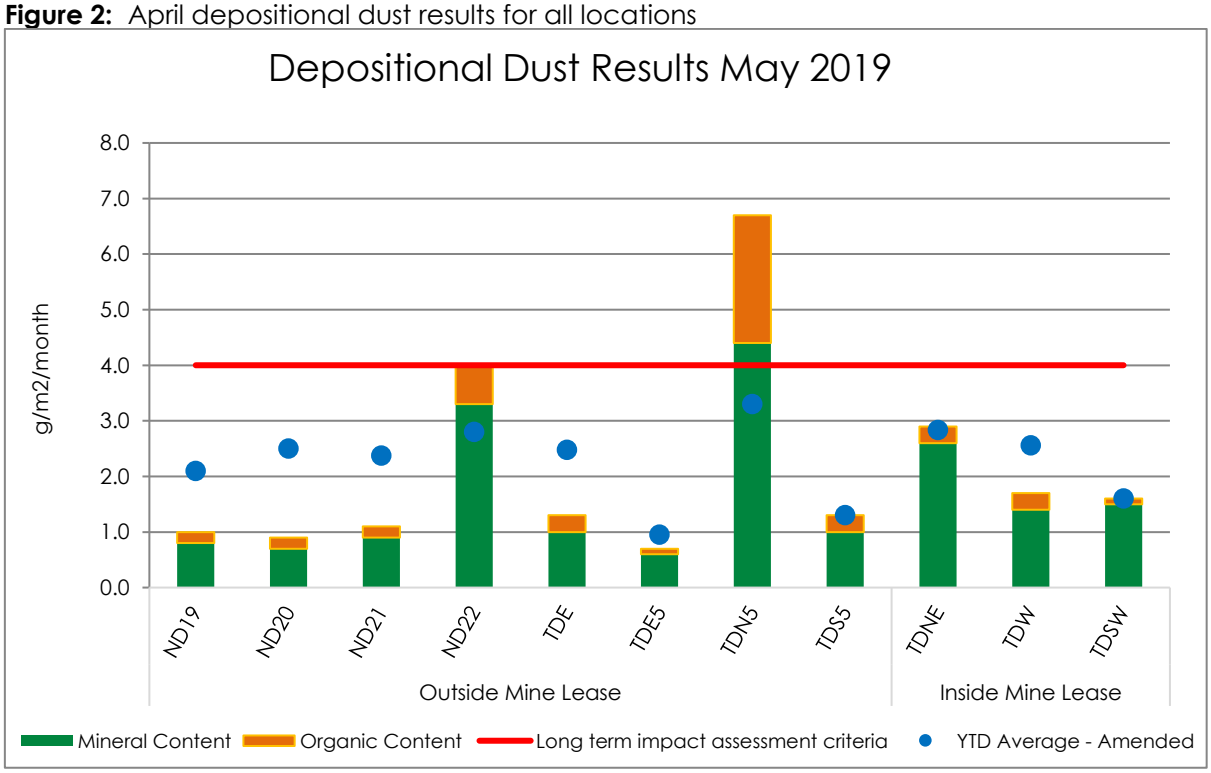


Figure 8: May depositional dust results for all locations

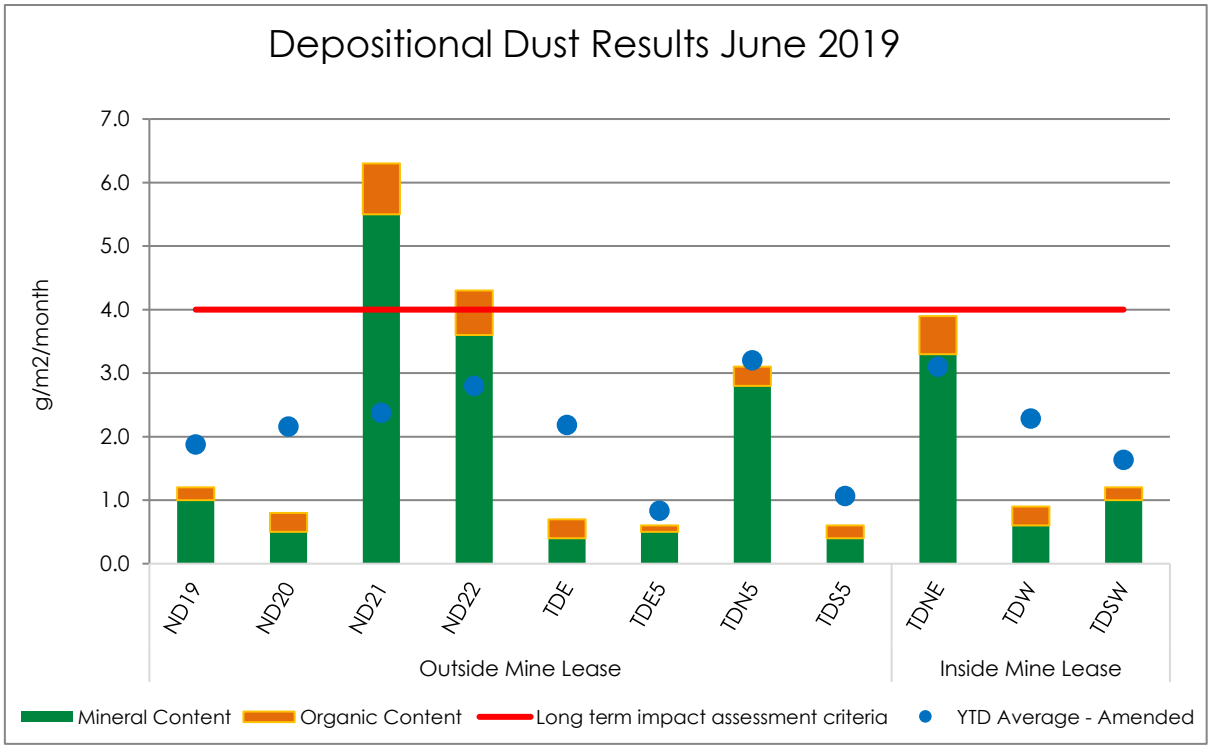


Figure 9: June depositional dust results for all locations

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. 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

	RP2	RP3	RP4	RP09	RP15	RP21	RP33	GT2	PWD	SD2	CALOOLA PIT
pH	8.44	7.98	8.00	8.17	8.28	7.95	9.25	8.93	7.77	8.37	9.15
EC (uS/cm)	3527	5922	707	5608	2290	2112	383	2478	2036	3728	10292
Cu (mg/L)	0.018	0.099	0.367	0.024	0.055	0.019	0.015	0.169	0.060	0.215	0.010

Table 2: Farm Dams

	FD4	FD6	FD7	FD16	FD25
pH	8.50	8.75	8.07	8.85	9.03
EC (uS/cm)	1200	286	438	327	535
Cu (mg/L)	0.014	0.022	0.025	0.026	0.019

Table 3: TSF Bores

	MB1	MB2	MB3	MB5	MB6B	W26	W27	W28	W29	W30	W31	W32
pH	7.07	6.90	5.70	6.63	6.69	6.77	11.43	6.71	12.81	7.12	7.34	11.74
EC (uS/cm)	5801	10785	26399	26900	16483	16391	18624	18889	23863	2356	863	2240
Cu (mg/L)	0.012	0.01	0.036	0.782	0.006	0.009	0.005	0.005	0.017	0.017	0.107	0.033

Table 4: Opencut Bores

	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	6.8	6.6	7.0	6.4	7.4	7.5	6.9	10.9	6.8	6.9	7.9	8.1
EC (uS/cm)	15427	25789	2673	18711	9044	6390	14746	14611	18638	20581	2158	1520
Cu (mg/L)	0.014	0.021	0.014	0.011	0.01	0.011	0.01	0.01	0.005	0.049	0.021	0.019

Table 5: Underground Bores

	P101	P102	P139	P145	P149	MB17	MB18	MB19	MB20
pH	7.0	6.7	5.9	6.8	6.6	7.7	9.7	7.3	7.5
EC (uS/cm)	12109	31580	31645	160	30767	1003	1713	16021	14309
Cu (mg/L)	0.003	0.002	0.011	0.01	0.023	0.013	0.034	0.029	0.047

Table 6: Regional Bores

	Far Hillier	Wright	Moss	Long Paddock
pH	6.72	6.92	7.04	7.44
EC (uS/cm)	611	949	2604	964
Cu (mg/L)	0.009	0.004	0.006	0.01

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 8th and 9th of May 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 and are masked by dominant extraneous non-mine sources such as traffic and localised noise sources such as agriculture and livestock. 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

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 13:49 15 min duration	67	41	30	WS: 2m/s WD: W Rain: Nil	Wind 33-36 Birds 32-40 Livestock 35 Mine inaudible
09/05/2019 14:04 15 min duration	66	41	32		
09/05/2019 14:19 15 min duration	73	44	31		
Site $LA_{eq(15min)}$ Contribution					<20
Site $LA_{1(1min)}$ Contribution					<20
Evening					
09/05/2019 19:06 15 min duration	64	37	23	WS: <0.5m/s WD: NW Rain: Nil	Ambient background Dogs to 36 Mine inaudible
09/05/2019 19:21 15 min duration	60	36	22		
09/05/2019 19:36 15 min duration	65	38	22		
Site $LA_{eq(15min)}$ Contribution					<20
Site $LA_{1(1min)}$ Contribution					<20
Night					
09/05/2019 01:52 15 min duration	69	41	25	WS: <0.5m/s WD: SSE Rain: Nil	Survey vehicle to 70 Mine hum ~<25
09/05/2019 02:07 15 min duration	62	38	23		
09/05/2019 02:22 15 min duration	70	37	24		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25

Table 8: Attended noise monitoring results for Lone Pine

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 14:43 15 min duration	77	48	31	WS: 1m/s WD: WNW Rain: Nil	Road traffic 42-58 Wind 32-38 Birds 36-70 Agriculture 40-44 Mine inaudible
09/05/2019 14:58 15 min duration	69	45	32		
09/05/2019 15:13 15 min duration	70	47	33		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Evening					
09/05/2019 20:06 15 min duration	69	42	28	WS: 1m/s WD: NW Rain: Nil	Wind in trees Mine inaudible
09/05/2019 20:21 15 min duration	77	42	27		
09/05/2019 20:36 15 min duration	64	39	31		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Night					
08/05/2019 23:07 15 min duration	67	41	35	WS: <0.5m/s WD: ESE Rain: Nil	Survey vehicle to 70 Aircraft 30-36 Insects to 36 Dogs 35-40 Livestock 32-34 Mine hum ~<25
08/05/2019 23:22 15 min duration	70	42	35		
08/05/2019 23:37 15 min duration	89	66	21		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25

Table 9: Attended noise monitoring results for Milpose

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 15:49 15 min duration	67	41	29	WS: <0.5m/s WD: NE Rain: Nil	Livestock 20-40 Survey vehicle to 67 Agriculture 20-24 Dogs 20-28 Mine inaudible
09/05/2019 16:04 15 min duration	67	40	29		
09/05/2019 16:19 15 min duration	64	38	28		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Evening					
09/05/2019 21:16 15 min duration	68	40	23	WS: 1.5m/s WD: NE Rain: Nil	Livestock to 23 Mine hum<25
09/05/2019 21:31 15 min duration	60	36	23		
09/05/2019 21:46 15 min duration	69	43	25		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Night					
09/05/2019 00:34 15 min duration	82	51	28	WS: <0.5m/s WD: NE Rain: Nil	Survey vehicle to 80 Livestock 32-36 Agriculture 20-24 Dogs 20-28 Mine inaudible
09/05/2019 00:49 15 min duration	79	44	17		
09/05/2019 01:04 15 min duration	62	36	17		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25

Table 10: Attended noise monitoring results for Hillview

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 12:36 15 min duration	73	45	30	WS: 1.5m/s WD: NNW Rain: Nil	Traffic 36-58 Birds 30-38 Wind 30-40 Residential vehicle 36-46 Mine inaudible
09/05/2019 12:51 15 min duration	34	45	33		
09/05/2019 13:06 15 min duration	60	43	31		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Evening					
09/05/2019 18:05 15 min duration	64	46	32	WS: 1m/s WD: N Rain: Nil	Road traffic 36-50 Mine hum<25
09/05/2019 18:20 15 min duration	71	46	29		
09/05/2019 18:35 15 min duration	73	47	32		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Night					
09/05/2019 02:55 15 min duration	62	36	17	WS: <0.5m/s WD: SSW Rain: Nil	Survey vehicle to 62 Insects 21-24 Road traffic 25-46 Mine inaudible
09/05/2019 03:10 15 min duration	53	35	17		
09/05/2019 03:25 15 min duration	59	38	17		
Site $LA_{eq(15min)}$ Contribution					<20
Site $LA_{1(1min)}$ Contribution					<20

Table 11: Attended road noise survey results

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa) LA_{eq}	Meteorology	Criteria, $LA_{eq(1hr)}$	Description and SPL, dBA
Day				
09/05/2019 12:36 60 min duration	44	WS: 1.5m/s WD: NNW Rain: Nil	55	Residential vehicle 36-46 Mine inaudible
09/05/2019 17:50 15 min duration	46	WS: 1.5m/s WD: NNW Rain: Nil	55	Road traffic 36-50 Mine hum<25

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

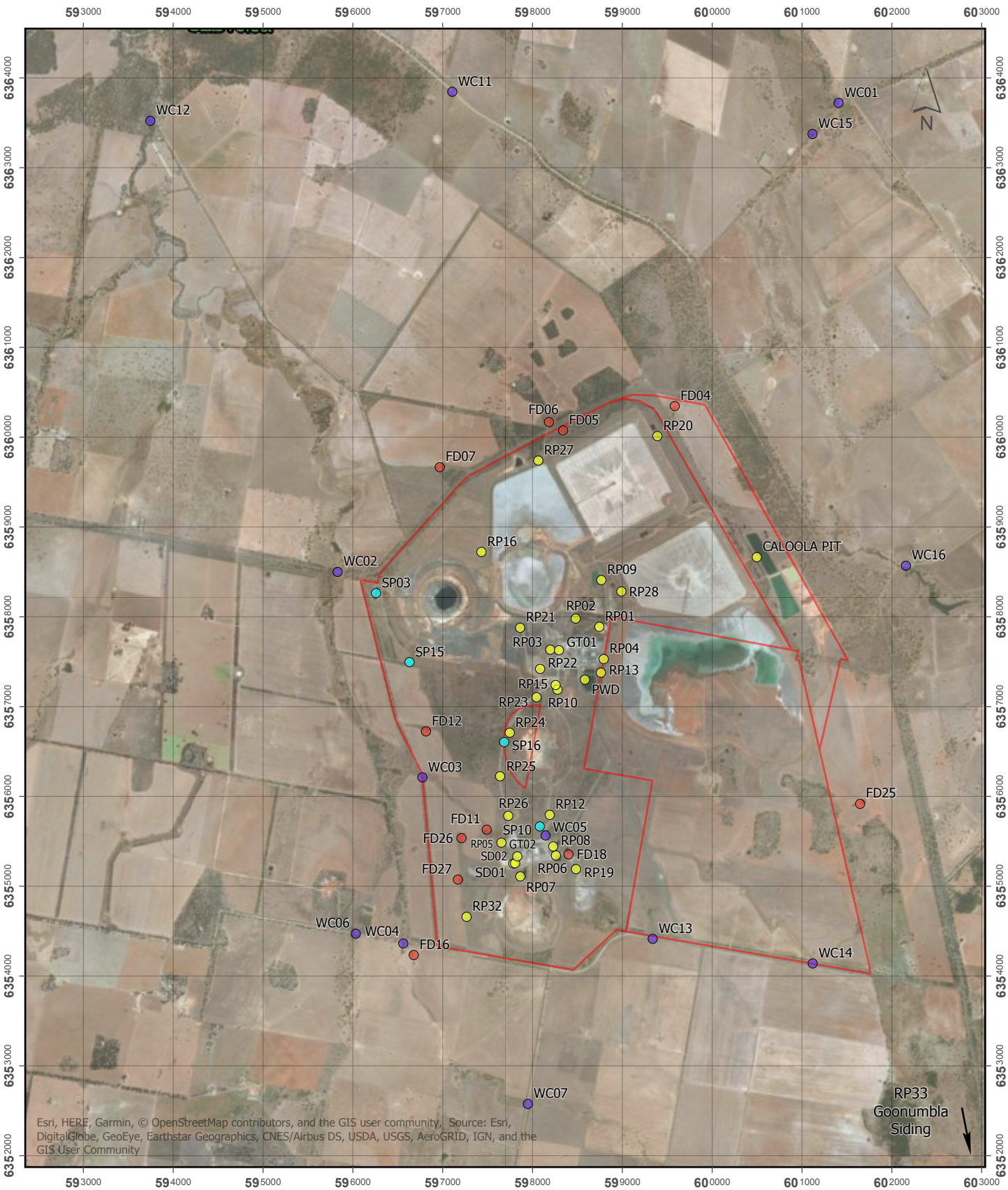
CMOC Northparkes

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

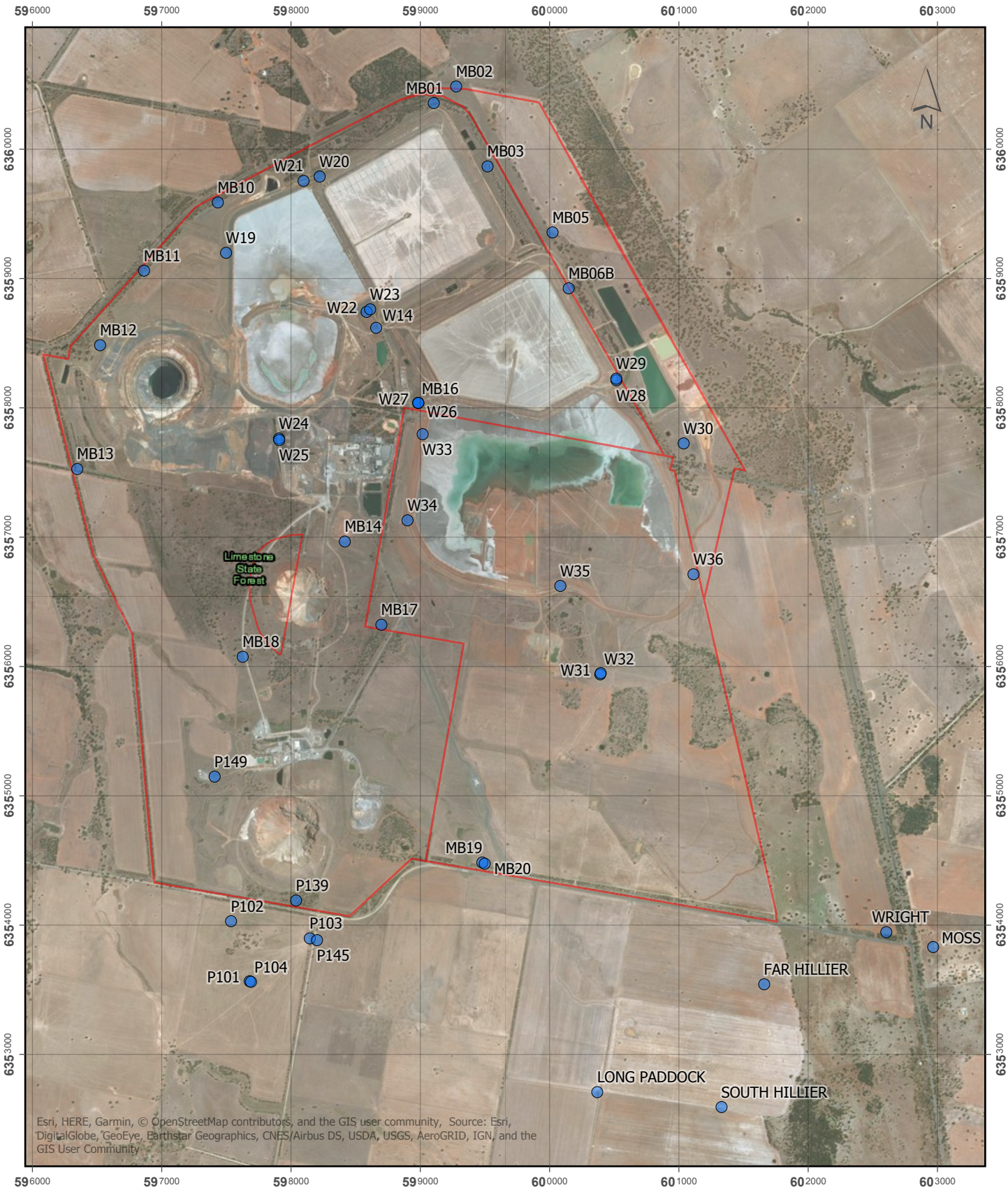
0 1 2 3 Km

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
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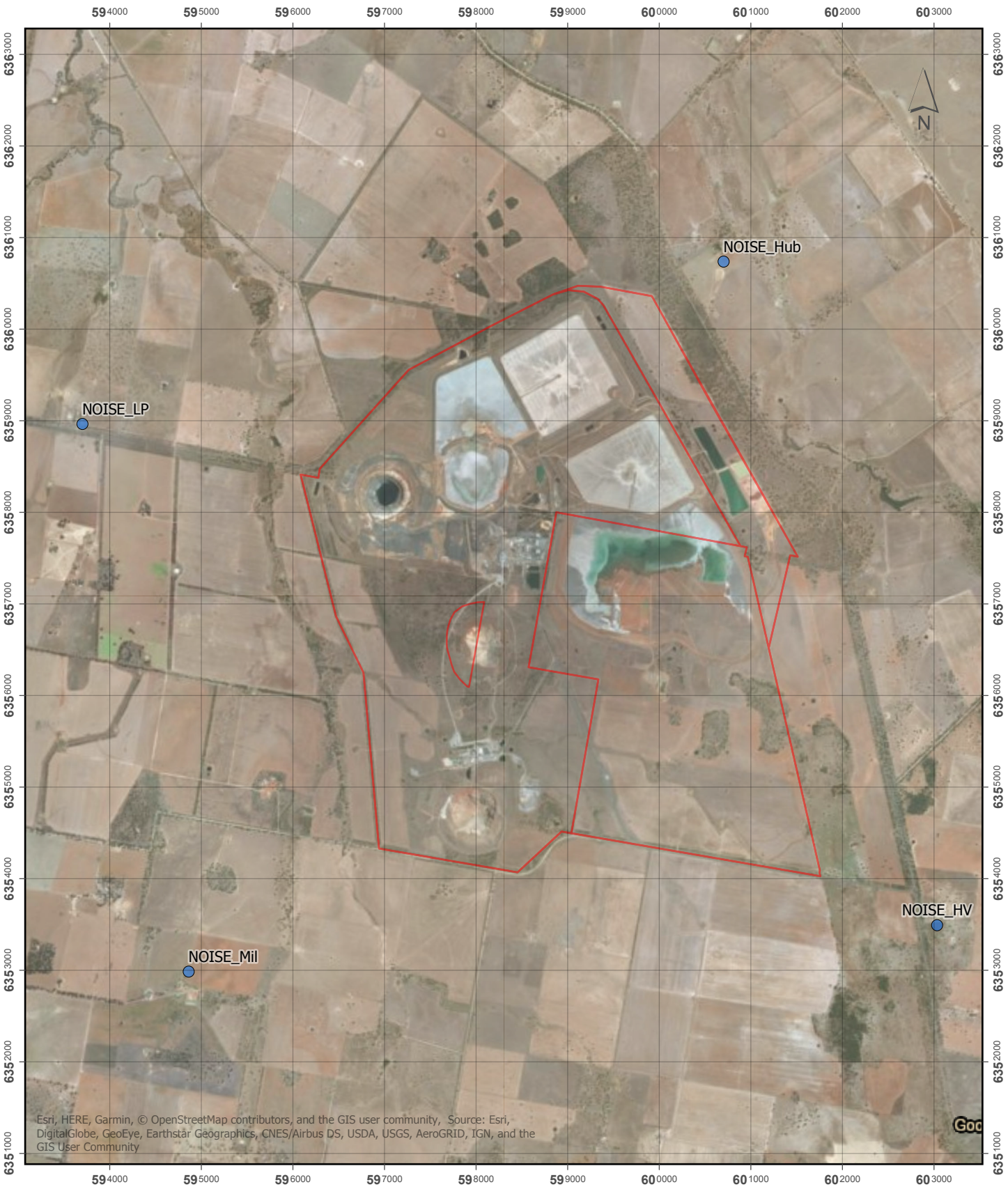
User: darren.priest
Date Saved: 6/03/2019 12:01 PM

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