





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 2018 - Quarter 4 Environmental Monitoring Results Summary

|  |                                    |
|--|------------------------------------|
| <b>Name of Mine</b>                          | Northparkes Mines                  |
| <b>Name of Leaseholder and Mine Operator</b> | CMOC Mining Pty Ltd                |
| <b>Mining Leases</b>                         | ML 1247, ML 1367, ML 1641 and 1743 |
| <b>Environment Protection Licence</b>        | EPL 4784                           |
| <b>Development Consent</b>                   | PA11-0060, (as modified)           |

|                    |  |
|--------------------|--|
| <b>Reviewed by</b> | <b>Chase Dingle</b>  |
| <b>Title</b>       | Superintendent – Environment, Community and Farms                                    |
| <b>Date</b>        | 27.03.19   |
| <b>Signature</b>   |  |
| <b>Approved by</b> | <b>Stacey Kelly</b>  |
| <b>Title</b>       | Manager – People, Safety and Environment   |
| <b>Date</b>        | 27 MARCH 2019  |
| <b>Signature</b>   |  |

## 1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 October 2018 to 31 December 2018. This monitoring is undertaken in accordance with the Environmental Monitoring Program (available at [www.northparkes.com.au](http://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<sub>10</sub> (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<sub>10</sub> monitoring has been undertaken at three nearby farm residences Hubberstone, Milpose and Hillview. A summary of the monitoring results are provided below.

### 2.1 PM<sub>10</sub>

PM<sub>10</sub> 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 Approval), are >30 µg/m<sup>3</sup> for the annual average and >50 µg/m<sup>3</sup> for a 24-hour monitoring period.

During the reporting period there were thirty-one elevated 24hr criteria readings recorded across the three monitoring locations, with the Milpose property recording 11, Hillview 10 and Hubberstone 10. 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.

The missing data for Hillview (18/10/18 – 21/10/18 and 21/11/18 – 28/11/18) was due to technical issues following recalibration activities and power supply issues following a storm.

The annual average PM<sub>10</sub> levels recorded at all PM<sub>10</sub> monitoring locations are below the predicted levels within the EA (30 µg/m<sup>3</sup>).

### Hubberstone PM10 Results for Q4 2018

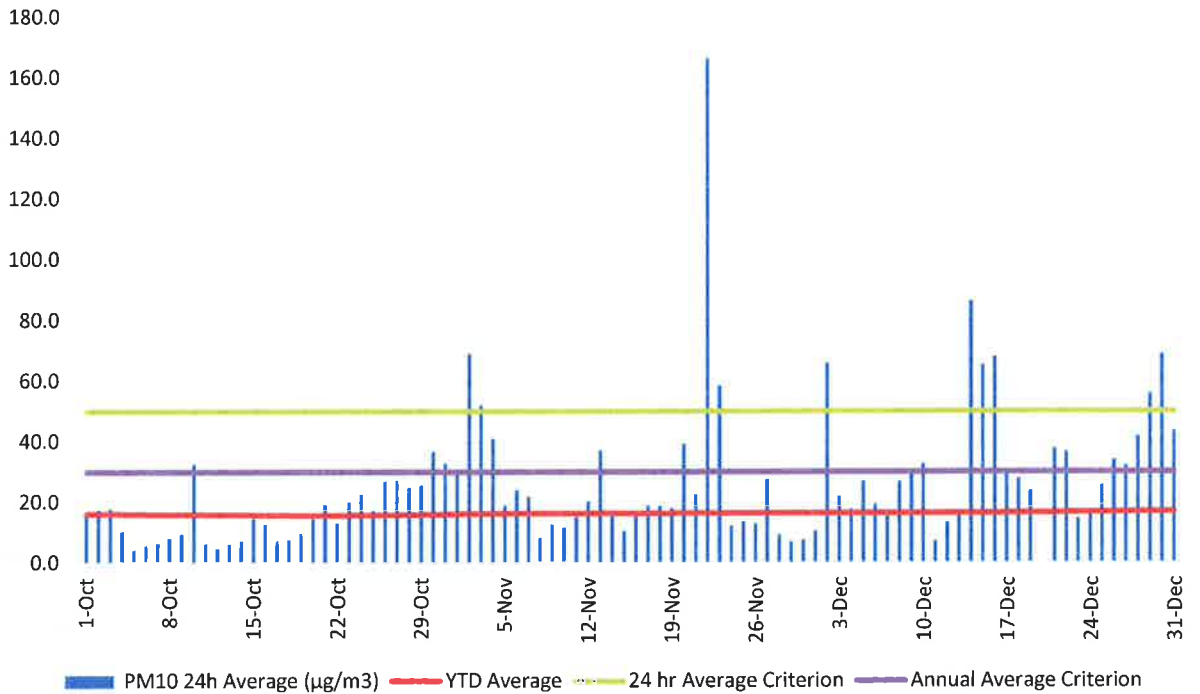


Figure 1: Hubberstone

### Milpose PM10 Results for Q4 2018

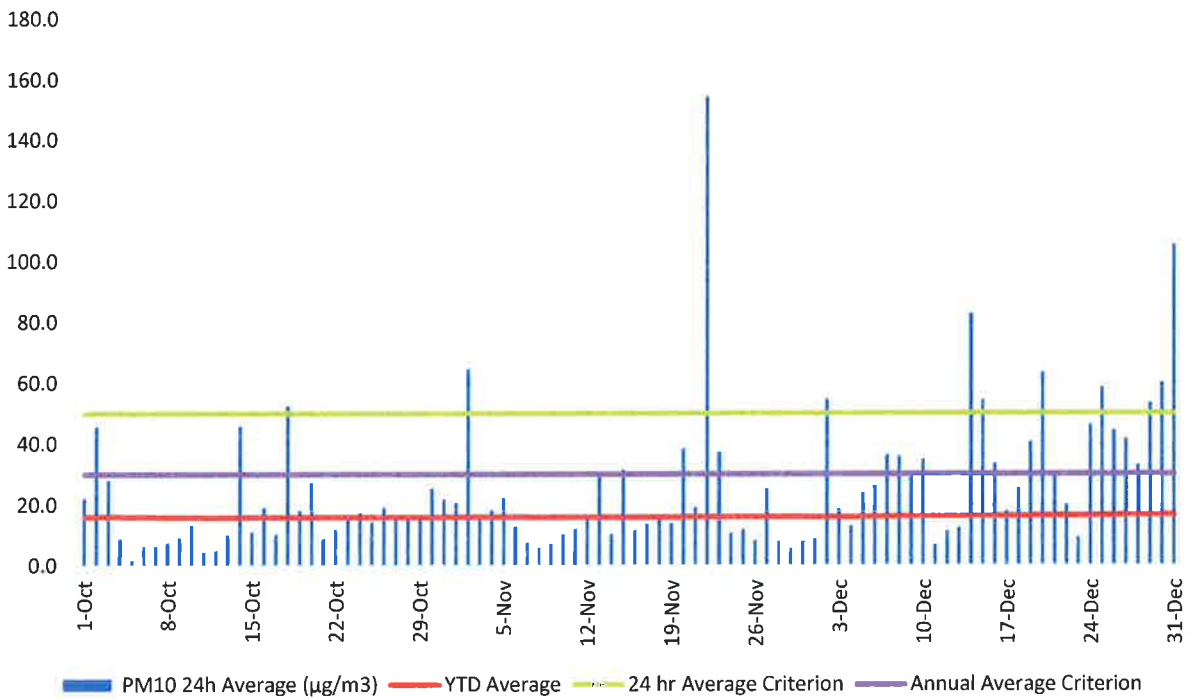
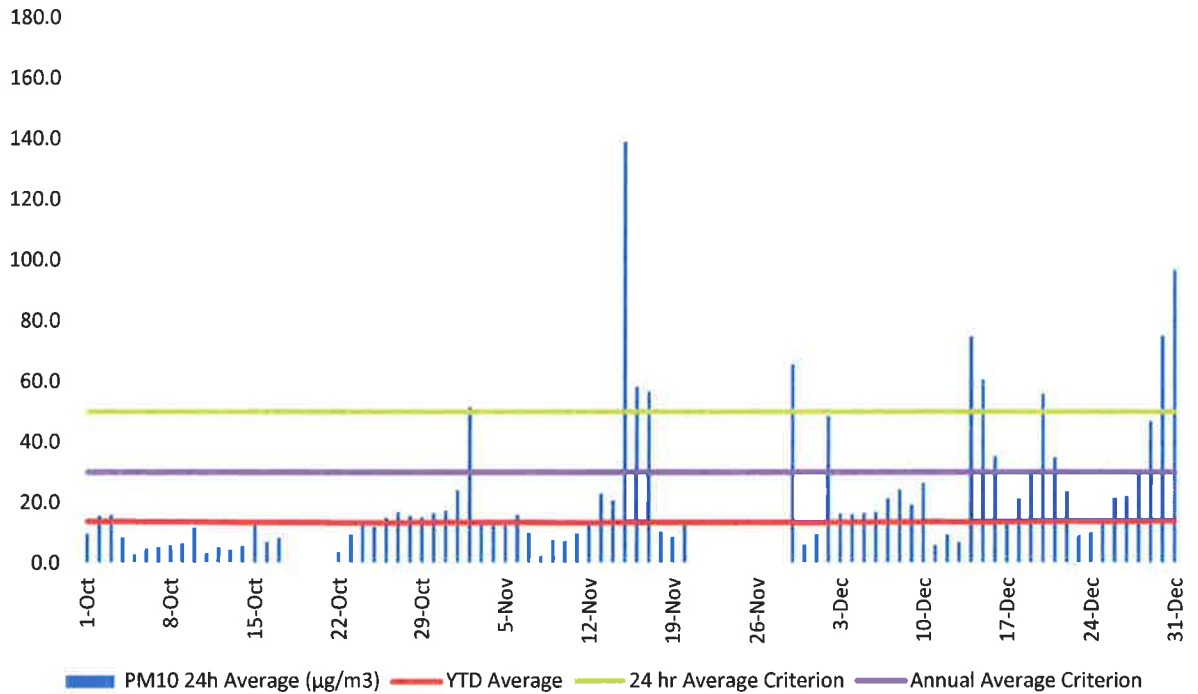


Figure 2: Milpose

### Hillview PM10 Results for Q4 2018



**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 Approval ( $90 \mu\text{g}/\text{m}^3$ ) for the Q4 2018 monitoring period. However, the elevated result for Hubberstone on the 29/10/18 was attributable to agricultural activities occurring within the vicinity of the monitoring location. The elevated result for Milpose (22/11/18) was caused by a severe dust storm occurring in the local and wider region. PM<sub>10</sub> results for the period show all three monitoring locations simultaneously recording high levels of particulate matter, determining the anomaly was non-mine related. TSP monitors at Hubberstone and Milpose locations did not run on 22 November due to instrument error. Results are presented in Figure 4, Figure 5 and Figure 6 respectively.

### Hubberstone Q4 2018 TSP results

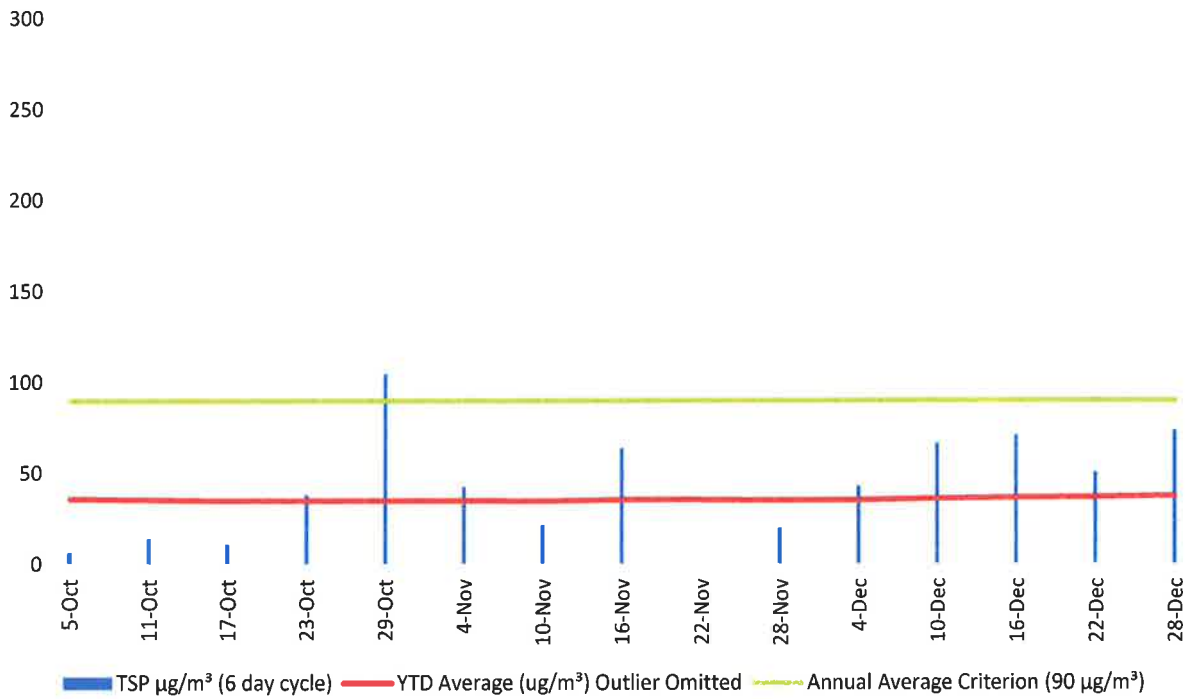


Figure 4: Hubberstone

### Milpose Q4 2018 TSP results

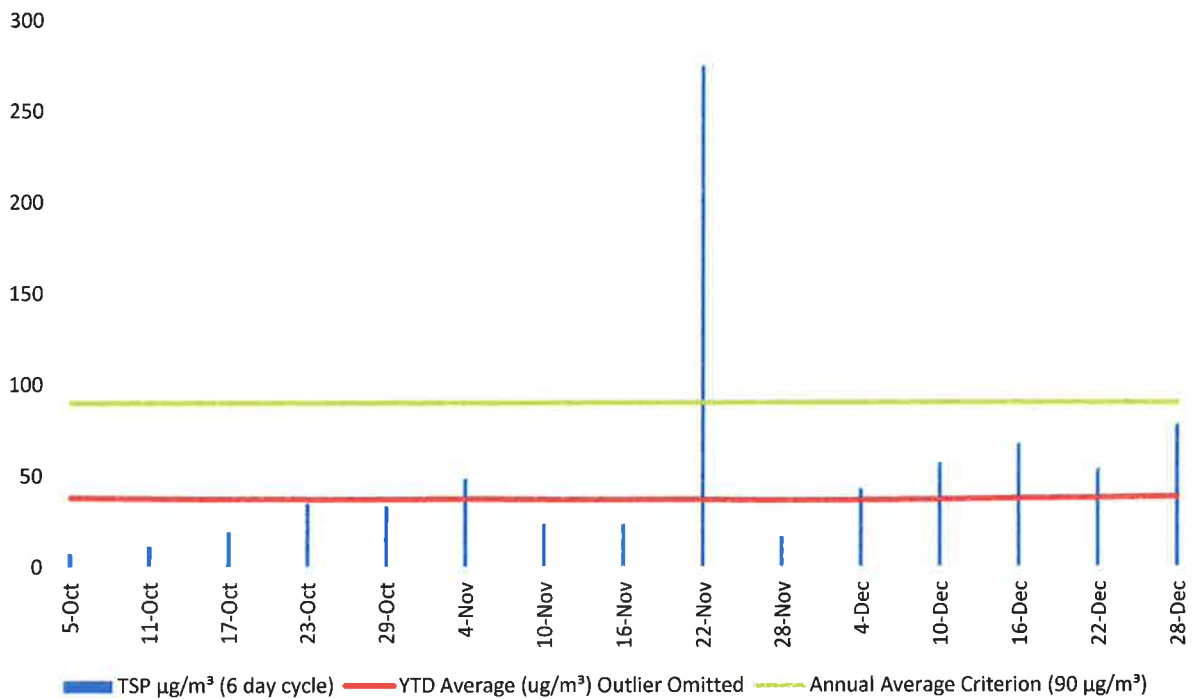


Figure 5: Milpose

### Hillview Q4 2018 TSP results

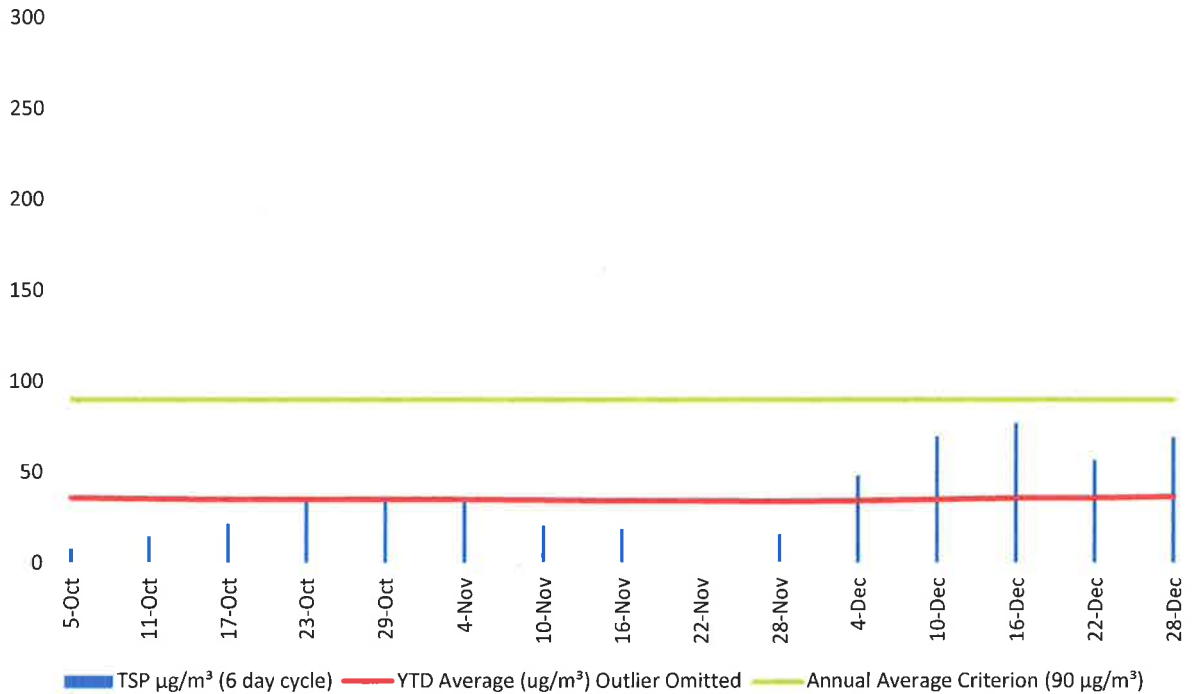


Figure 6: Hillview

### 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 in Figure 7, Figure 8 and Figure 9 respectively. Please be advised that only monitoring locations ND19, ND20, ND21 & ND22 are regulated by the criteria stated in the approval, as there 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 g/m<sup>2</sup>/month), complying with the conditions of the Approval.

The elevated readings for October at monitoring locations TDNE and TDE are most likely the result of particulate matter being generated from agricultural activities within the nearby vicinity. Seventy percent of strong winds ( $\geq 7.5$  m/s) recorded during the monitoring period prevailed between the Northerly and Easterly directions, opposite to the Project Area. Elevated reading at ND22 was also likely the result of agricultural activities observed to be undertaken surrounding the monitoring location.

The November and December monitoring periods both recorded elevated readings at nine of eleven monitoring locations as a result of increased dust storm frequency in the local and wider region. Multiple observations made by the Environment Team identified several events containing high levels of airborne particulates and are believed to be the main contributor to the high depositional results.

### Depositional Dust Results for October 2018

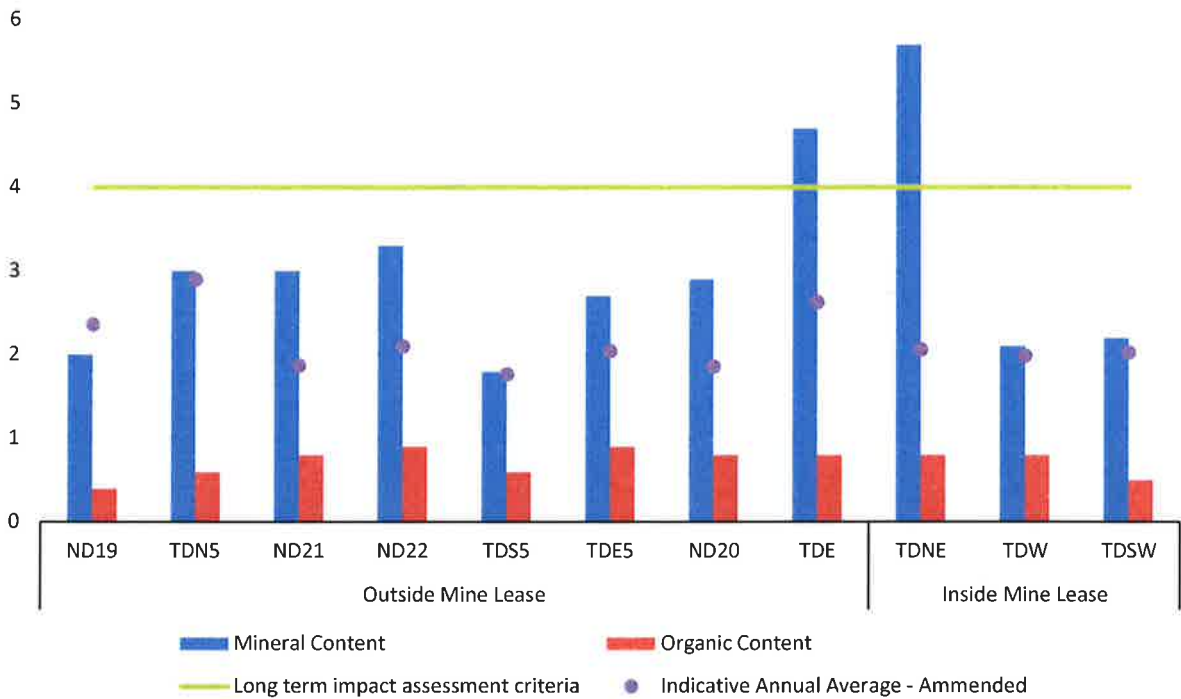


Figure 7: October depositional dust results for all locations

### Depositional Dust Results for November 2018

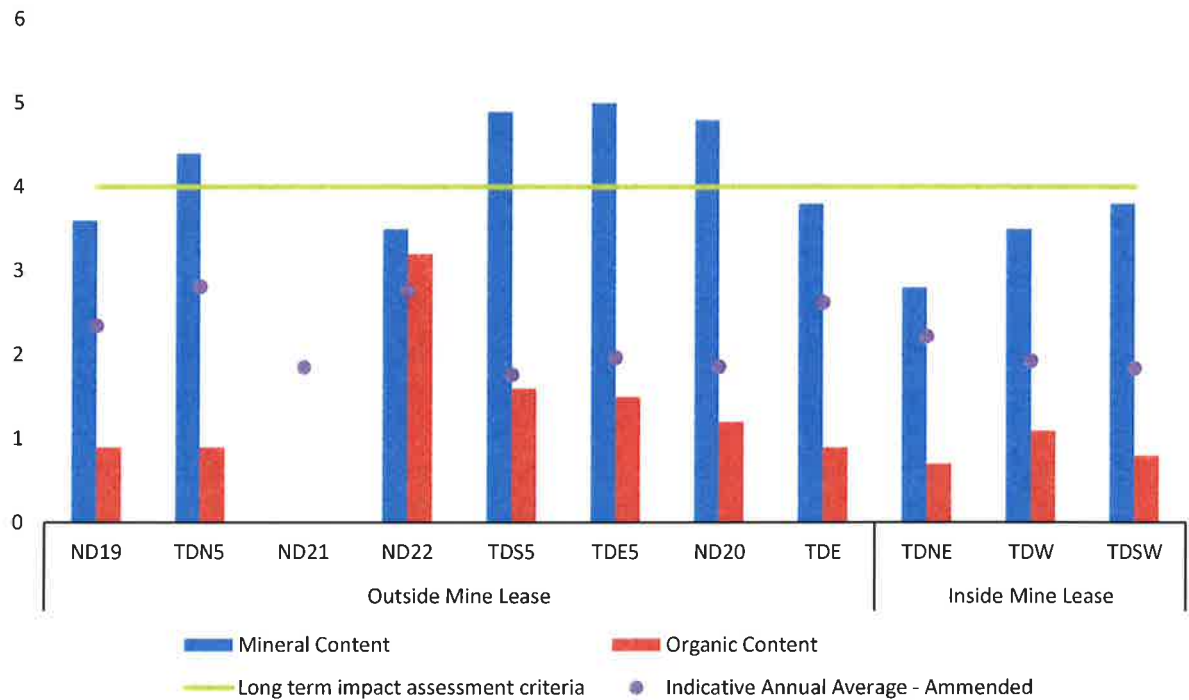


Figure 8: November depositional dust results for all locations

### Depositional Dust Results for December 2018

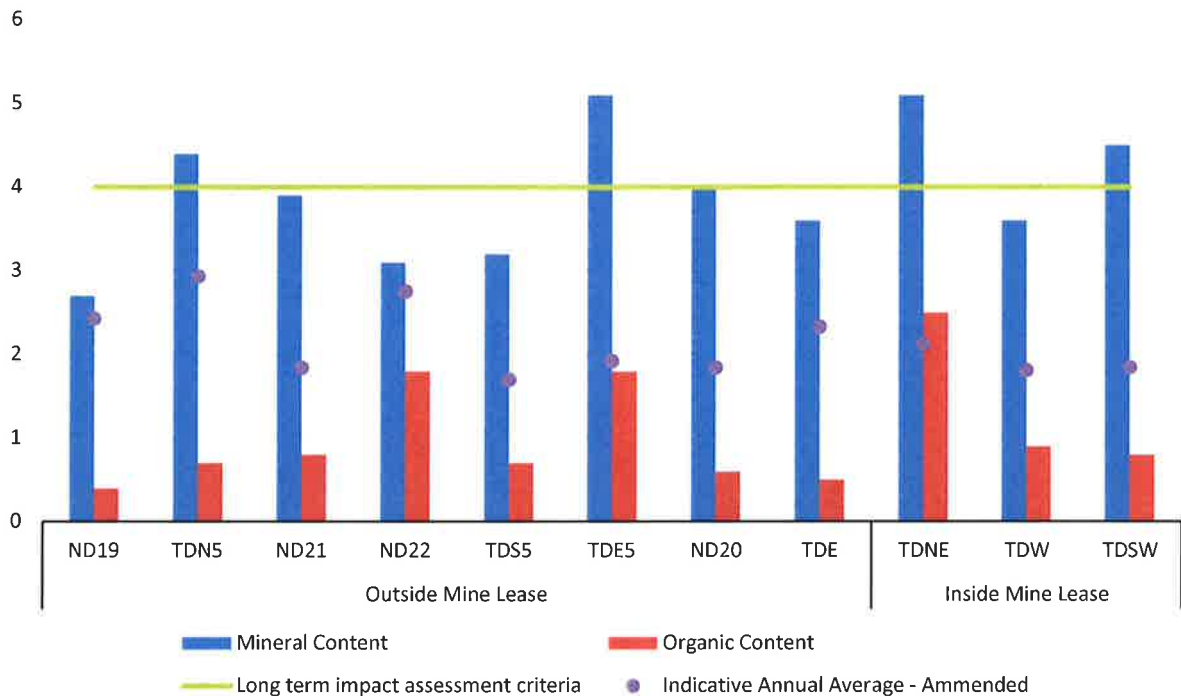


Figure 9: December depositional dust results for all locations

## 3. WATER

### 3.1 Overview

Water management at Northparkes is undertaken in accordance with approved management plans, prepared in accordance with the Approval. 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.

CMOC's groundwater monitoring program aims to identify any changes to the natural groundwater system as a result of mining operations and ensure compliance with the Approval. 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 Approval, with no significant changes to the EC or copper concentrations for all locations. Resulting from an apparent instrument fault, pH values across the majority of sampling locations recorded values above their respective long-term average. Replacement of pH probe and recalibration of the water quality meter have been undertaken by the manufacturer as to ensure accurate results during the next monitoring period. 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 1-8 below.

**Table 1: Process Water System**

|            | RP1  | RP2  | RP3   | RP4   | RP5  | RP09  | RP13  | RP15  | RP20  | RP21  | RP22  | RP25  | RP27  | RP32  | RP33  | GT1   | GT2   | PWD   | SD2   | CALLOOLA PIT |
|------------|------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
| pH         | 9.14 | 9.81 | 9.69  | 8.9   | 8.66 | 9.36  | 8.68  | 9.01  | 9.39  | 9.25  | 8.69  | 9.23  | 9.41  | 10.19 | 10.65 | 8.77  | 8.86  | 8.93  | 8.89  | 9.27         |
| EC (us/cm) | 578  | 1642 | 3329  | 898   | 811  | 6723  | 1282  | 2006  | 4247  | 2314  | 242   | 572   | 5658  | 1431  | 294   | 2731  | 2120  | 2854  | 7540  | 8357         |
| Cu (mg/l)  | 0.07 | 0.02 | 0.049 | 0.379 | 0.04 | 0.016 | 0.178 | 0.033 | 0.025 | 0.022 | 0.095 | 0.075 | 0.011 | 0.008 | 0.011 | 0.155 | 0.314 | 0.066 | 0.335 | 0.019        |

**Table 2: Sediment Ponds**

|            | SP3   | SP10  |
|------------|-------|-------|
| pH         | 9.41  | 9.9   |
| EC (us/cm) | 4131  | 591   |
| Cu (mg/l)  | 0.009 | 0.026 |

**Table 3: Watercourses**

|            | WC12 |
|------------|------|
| pH         | 8.5  |
| EC (us/cm) | 348  |
| Cu (mg/l)  | 0.02 |

**Table 4: Farm Dams**

|            | FD4   | FD5   | FD6   | FD7   | FD11 | FD16  | FD18  | FD25  | FD26  | FD27  |
|------------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| pH         | 10.14 | 9.65  | 10.3  | 9.81  | 9.61 | 10.2  | 8.9   | 9.99  | 10.37 | 11.69 |
| EC (us/cm) | 722   | 175   | 334   | 244   | 633  | 294   | 2971  | 347   | 1122  | 827   |
| Cu (mg/l)  | 0.013 | 0.036 | 0.015 | 0.009 | 0.02 | 0.026 | 0.007 | 0.018 | 0.012 | 0.014 |

**Table 5: TSF Bores**

|            | MB1   | MB2   | MB3   | MB5   | MB6B  | W26   | W27   | W28   | W29   | W30   | W31   | W32   | W33   | W34   | W35  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| pH         | 8.57  | 8.43  | 7.6   | 8.16  | 7.66  | 7.71  | 11.91 | 7.19  | 12.64 | 8.13  | 8.3   | 12.11 | 6.92  | 6.92  | 8.3  |
| EC (uS/cm) | 5224  | 10046 | 23858 | 24316 | 14293 | 15357 | 18266 | 17233 | 21348 | 2451  | 796.8 | 2238  | 8482  | 14964 | 1572 |
| Cu (mg/L)  | 0.005 | 0.004 | 0.025 | 0.01  | 0.013 | 0.012 | 0.008 | 0.016 | 0.022 | 0.011 | 0.018 | 0.01  | 0.014 | 0.009 | 0.01 |

**Table 6: Opencut Bores**

|            | MB10  | MB13  | MB14  | MB16  | W14  | W19   | W20   | W21   | W22   | W23   | W24   | W25   |
|------------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| pH         | 7.94  | 7.63  | 8.08  | 7.48  | 8.27 | 8.48  | 8.06  | 11.19 | 7.99  | 8.4   | 9.21  | 9.75  |
| EC (uS/cm) | 14196 | 23394 | 2210  | 16110 | 8987 | 5737  | 13787 | 13531 | 17162 | 17520 | 1755  | 1240  |
| Cu (mg/L)  | 0.009 | 0.016 | 0.008 | 0.014 | 0.01 | 0.014 | 0.01  | 0.012 | 0.013 | 0.237 | 0.006 | 0.022 |

**Table 7: Underground Bores**

|            | P101  | P102  | P103  | P139  | P145  | P149  | MB17  | MB18  | MB19  | MB20  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pH         | 8.85  | 8.43  | 10.67 | 7.94  | 9.57  | 7.38  | 8.75  | 9.88  | 8.91  | 9.1   |
| EC (uS/cm) | 11295 | 28356 | 25056 | 28860 | 172.2 | 28108 | 981.8 | 964   | 15091 | 12409 |
| Cu (mg/L)  | 0.002 | 0.001 | 0.007 | 0.004 | 0.018 | 0.019 | 0.009 | 0.093 | 0.005 | 0.027 |

**Table 8: Regional Bores**

|            | Far Hillier | Wright | Moss  |
|------------|-------------|--------|-------|
| pH         | 8.02        | 8.39   | 8.45  |
| EC (uS/cm) | 388         | 789    | 2402  |
| Cu (mg/L)  | 0.003       | 0.004  | 0.006 |

## 4. NOISE AND VIBRATION

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'.

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 21<sup>st</sup> and 23<sup>rd</sup> of November 2018. Weather conditions during monitoring were very windy, and at times stormy. Not all measurements could be obtained within the specified range of allowable conditions for this period. Where measurements were successful during milder weather conditions, attended noise monitoring results indicate noise emissions from the mine site comply with the Approval criteria during all monitoring periods. A summary of the monitoring results at each monitoring location are presented in Tables 10-12 below.

### 4.3 Weather

The monitoring event was conducted between the hours of 1230 and 1930 on the 21<sup>st</sup> of November, and from 2030 on the 22<sup>nd</sup> November to 0130 on the 23<sup>rd</sup> of November. During the first monitoring period wind speeds averaged 4.2 m/s from a WNW direction (287 degrees), with a maximum recorded speed of 7.4 m/s. Wind speeds during the second monitoring period averaged 6.7 m/s from a WSW direction (243 degrees) with a maximum of 9.7 m/s being recorded.

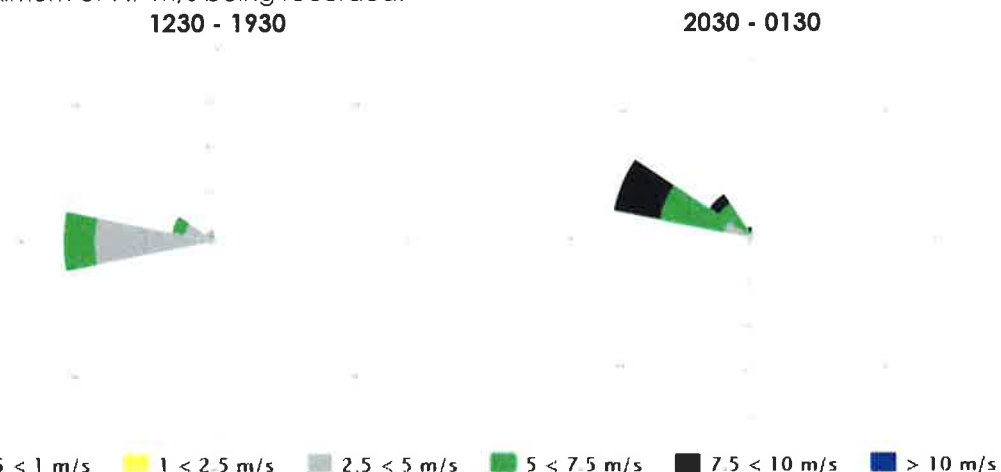


Figure 10: Wind speed and direction during the attended monitoring sessions.

**Table 9:** Attended noise monitoring results (daytime)

| <i>Location</i>    | <i>Date and Time</i> | <i>L<sub>A1</sub><br/>dB</i> | <i>L<sub>A10</sub><br/>dB</i> | <i>L<sub>Aeq</sub><br/>dB</i> | <i>L<sub>A90</sub><br/>dB</i> | <i>Compliance?</i> | <i>Notes</i>                           |
|--------------------|----------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------|--|
| <b>Hillview</b>    | 21/11/18 12:30       | 44.2                         | 40.1                          | <b>38.3</b>                   | 36                            | N/A                |  |
|                    | 21/11/18 12:45       | 40.4                         | 36.2                          | <b>34.7</b>                   | 32.6                          | Yes                | Wind noise; mine inaudible             |
|                    | 21/11/18 13:00       | 41.2                         | 36.7                          | <b>34.9</b>                   | 32.0                          | Yes                |  |
| <b>Hubberstone</b> | 21/11/18 16:00       | 39.3                         | 33.0                          | <b>31.1</b>                   | 25.5                          | Yes                |  |
|                    | 21/11/18 16:20       | 38.0                         | 34.4                          | <b>32.2</b>                   | 28.8                          | Yes                | Goat noise, wind noise; mine inaudible |
|                    | 21/11/18 16:45       | 38.3                         | 33.7                          | <b>31.9</b>                   | 29.2                          | Yes                |  |
| <b>Milpose</b>     | 21/11/18 14:00       | 41.4                         | 36.8                          | <b>34.3</b>                   | 30.6                          | Yes                |  |
|                    | 21/11/18 14:15       | 44.9                         | 35.5                          | <b>34.9</b>                   | 31.4                          | Yes                | Wind; mine inaudible                   |
|                    | 21/11/18 14:30       | 42.4                         | 35.3                          | <b>32.4</b>                   | 27.4                          | Yes                |  |
| <b>Lonepine</b>    | 21/11/18 15:00       | 39.0                         | 36.7                          | <b>34.7</b>                   | 29.8                          | Yes                |  |
|                    | 21/11/18 15:15       | 45.6                         | 34.3                          | <b>33.1</b>                   | 22.1                          | Yes                | Wind, bird noise; mine inaudible       |
|                    | 21/11/18 15:30       | 39.0                         | 35.9                          | <b>34.1</b>                   | 30.3                          | Yes                |  |

**Table 10:** Attended noise monitoring results (evening)

| <i>Location</i>    | <i>Date and Time</i> | <i>L<sub>A1</sub><br/>dB</i> | <i>L<sub>A10</sub><br/>dB</i> | <i>L<sub>Aeq</sub><br/>dB</i> | <i>L<sub>A90</sub><br/>dB</i> | <i>Compliance?</i> | <i>Notes</i>                             |
|--------------------|----------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------|--|
| <b>Hillview</b>    | 21/11/18 18:48       | 44.1                         | 39.7                          | <b>35.9</b>                   | 29.2                          | N/A                |  |
|                    | 21/11/18 19:01       | 45.2                         | 39.0                          | <b>35.3</b>                   | 25.8                          | N/A                | Constant traffic; mine inaudible         |
|                    | 21/11/18 19:17       | 44                           | 38.4                          | <b>34.9</b>                   | 28.3                          | Yes                |  |
| <b>Hubberstone</b> | 21/11/18 18:00       | 40.4                         | 33.2                          | <b>31.7</b>                   | 26.6                          | Yes                |  |
|                    | 21/11/18 18:16       | 39.4                         | 32.2                          | <b>31.5</b>                   | 25.3                          | Yes                | Thunder, crickets, sheep; mine inaudible |
|                    | 21/11/18 18:32       | 44.1                         | 36.7                          | <b>34.8</b>                   | 28.8                          | Yes                |  |
| <b>Milpose</b>     | 22/11/18 21:25       | 48.3                         | 46.3                          | <b>41.6</b>                   | 37.2                          | N/A                |  |
|                    | 22/11/18 21:40       | 45.4                         | 43.3                          | <b>41.8</b>                   | 35.5                          | N/A                | High wind; mine inaudible                |
|                    | 22/11/18 21:55       | 43.5                         | 44.9                          | <b>42.1</b>                   | 38.2                          | N/A                |  |
| <b>Lonepine</b>    | 22/11/18 20:40       | 49.5                         | 45.8                          | <b>42.7</b>                   | 37.3                          | N/A                |  |
|                    | 22/11/18 20:55       | 45.8                         | 43.4                          | <b>40.5</b>                   | 36.3                          | N/A                | High wind; mine inaudible                |
|                    | 22/11/18 21:10       | 44.1                         | 42.8                          | <b>41.2</b>                   | 39.1                          | N/A                |  |

**Table 11:** Attended noise monitoring results (night)

| <i>Location</i>    | <i>Date and Time</i> | <i>L<sub>A1</sub><br/>dB</i> | <i>L<sub>A10</sub><br/>dB</i> | <i>L<sub>Aeq</sub><br/>dB</i> | <i>L<sub>A90</sub><br/>dB</i> | <i>Compliance?</i> | <i>Notes</i>              |
|--------------------|----------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------|---------------------------|
| <b>Hillview</b>    | 23/11/18 01:00       | <b>53.1</b>                  | 49.2                          | <b>48.0</b>                   | 44.4                          | N/A                |                           |
|                    | 23/11/18 01:15       | <b>49.4</b>                  | 47.8                          | <b>46.2</b>                   | 42.6                          | N/A                | High wind; mine inaudible |
|                    | 23/11/18 01:30       | <b>53.5</b>                  | 49.4                          | <b>46.7</b>                   | 43.7                          | N/A                |                           |
| <b>Hubberstone</b> | 23/11/18 00:00       | <b>58.6</b>                  | 51.8                          | <b>48.7</b>                   | 41.4                          | N/A                |                           |
|                    | 23/11/18 00:15       | <b>54.7</b>                  | 49.1                          | <b>45.8</b>                   | 38.4                          | N/A                | High wind; mine inaudible |
|                    | 23/11/18 00:30       | <b>60.8</b>                  | 54.0                          | <b>50.7</b>                   | 42.0                          | N/A                |                           |
| <b>Milpose</b>     | 22/11/18 23:00       | <b>46.1</b>                  | 42.5                          | <b>40</b>                     | 35.9                          | N/A                |                           |
|                    | 22/11/18 23:15       | <b>47.0</b>                  | 40.9                          | <b>38.5</b>                   | 33.8                          | N/A                | High wind; mine inaudible |
|                    | 22/11/18 23:30       | <b>43.1</b>                  | 39.3                          | <b>36.7</b>                   | 32.4                          | N/A                |                           |
| <b>Lonepine</b>    | 22/11/18 22:00       | <b>48.4</b>                  | 45.9                          | <b>43.5</b>                   | 40.1                          | N/A                |                           |
|                    | 22/11/18 22:15       | <b>48.8</b>                  | 46.5                          | <b>43.1</b>                   | 38.4                          | N/A                | High wind; mine inaudible |
|                    | 22/11/18 22:30       | <b>44.9</b>                  | 43.2                          | <b>40.6</b>                   | 37.0                          | N/A                |                           |