



Northparkes Mines

Environmental Monitoring Results Summary

01 January to 31 March, Quarter 1, 2015

Name of Mine	Northparkes Mines
Name of Leaseholder and Mine Operator	North Mining Limited
Mining Leases	ML 1247, ML 1367 and 1641
Environment Protection Licence	EPL 4784
Development Consent	PA11-0600, DC 06-0026, including Mod 1 and Mod 2

Reviewed by

Michael Priest

Title

Superintendent - Environment & Farming

Date

11/5/15

Signature

A handwritten signature in blue ink, appearing to be 'M. Priest', written over the date.

Approved by

Robert Cunningham

Title

Health, Safety, Environment and Farming Manager

Date

1ST MAY 2015

Signature

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Introduction

A summary of Northparkes mines operations, setting and localised weather conditions experienced during the reporting quarter.

1. INTRODUCTION

The Northparkes copper-gold mine (NPM) is located in central western New South Wales, approximately 27 kilometres north north-west of the town of Parkes. NPM consists of underground operations accessing several copper sulphide porphyry ore bodies. The mined rock is processed onsite using conventional crushing, semi-autogenous grinding and flotation circuits to obtain copper concentrate. The concentrate is then thickened, filtered and stockpiled ready to be transported from site by road train to nearby Goonumbla rail siding. From there, it is railed to Port Kembla for shipping to overseas customers.

1.1 Regulatory context

During October 2009, the New South Wales Minister for Planning approved NPM's proposal for an extension to the existing underground operations. This approved extension was subject to specific environmental conditions stipulated in the new Project Approval PA11_0600 and existing Development Consent (DC 06-0026) which has since undergone two Modifications. One condition of the Development Consent requires the preparation and implementation of an environmental monitoring program, to the satisfaction of the Director-General. In July 2014, NPM had its new Environmental Approval (11_0600) signed by the Director General. NPM has 12 months period to enact the conditions in the new approval, which will replace DC 06-0026.

1.2 Scope of report

This report provides a summary of monitoring results for the period from 1 January 2015 to 31 March 2015. 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. WEATHER CONDITIONS

NPM is located in a temperate weather zone. Weather conditions are recorded at an onsite weather station, as required in PA11_0600 and DC 06-0026. A summary of the weather conditions experienced during the reporting quarter are provided in Table 1 and Figures 1, 2 and 3.

Table 1 Summary of weather conditions for the reporting quarter

	January	February	March
Total rainfall (mm)	52.0	35.5	0
Long term average rainfall (mm)	64.0	66.1	53.6
Total number of wet days	9	6	0
Minimum temperature (°C)	8.1	9.9	3.8
Maximum temperature (°C)	36.5	39.2	36.0

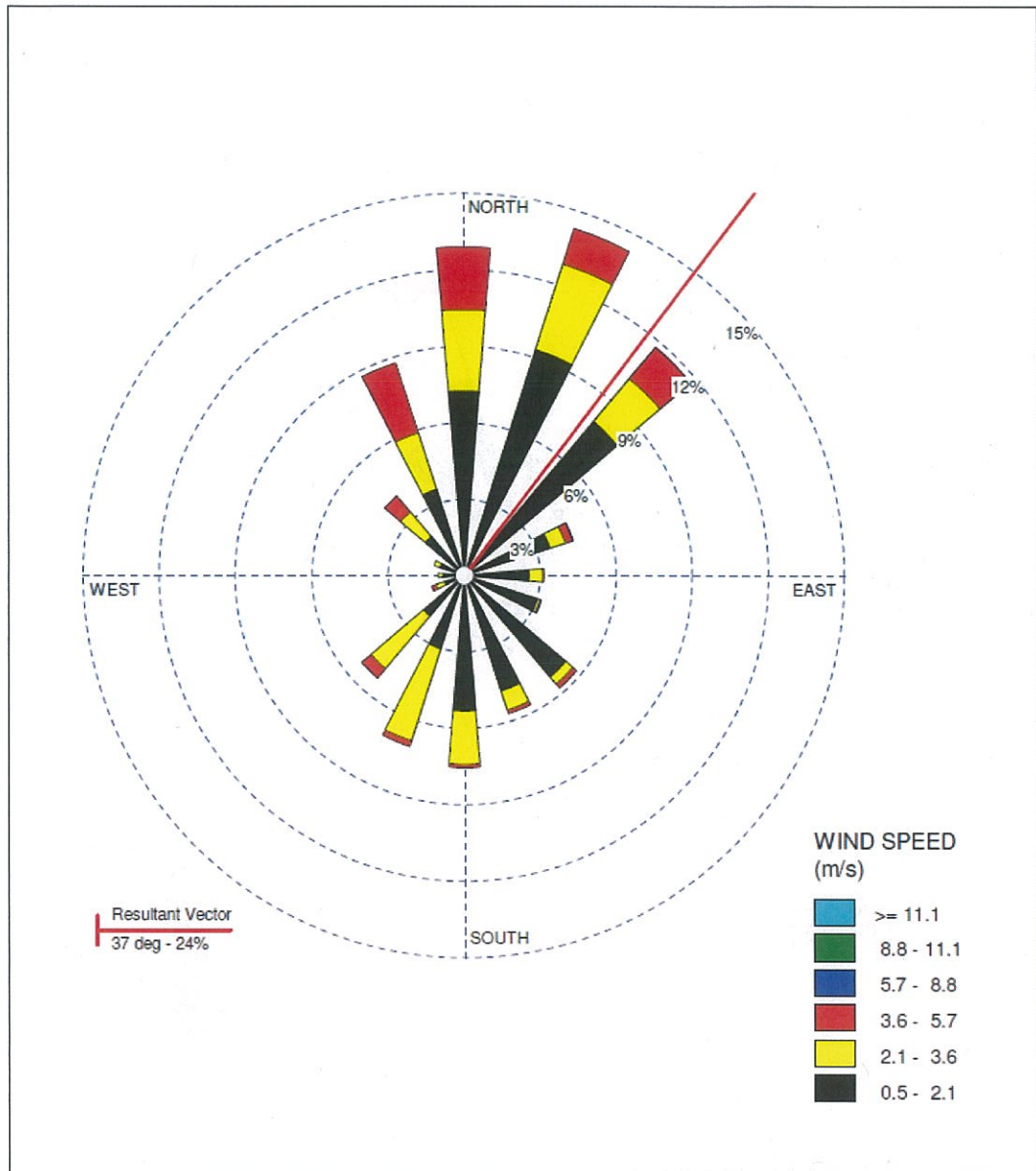


Figure 1 Wind direction and speed for the month of January 2015

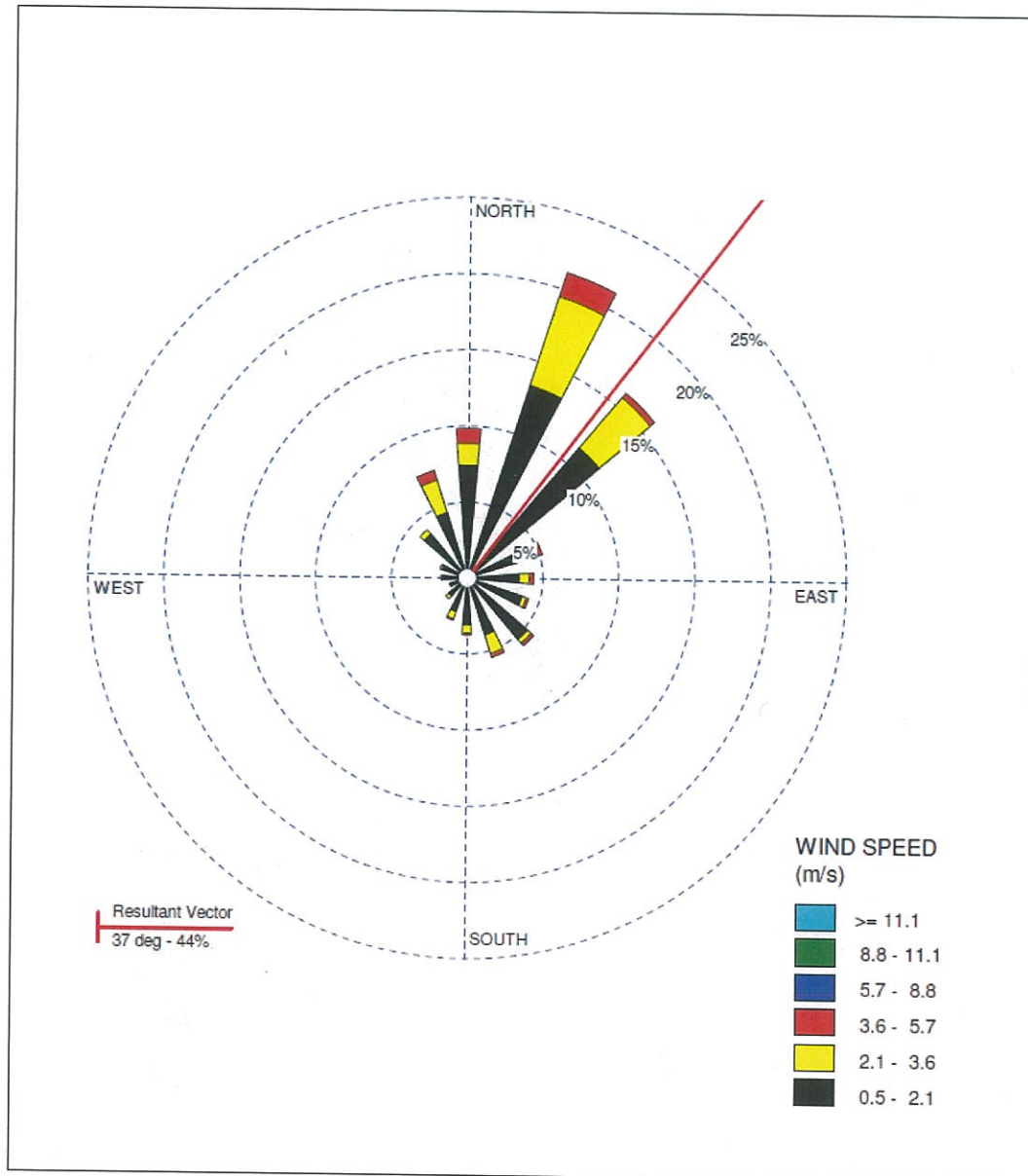


Figure 2 Wind direction and speed for the month of February 2015

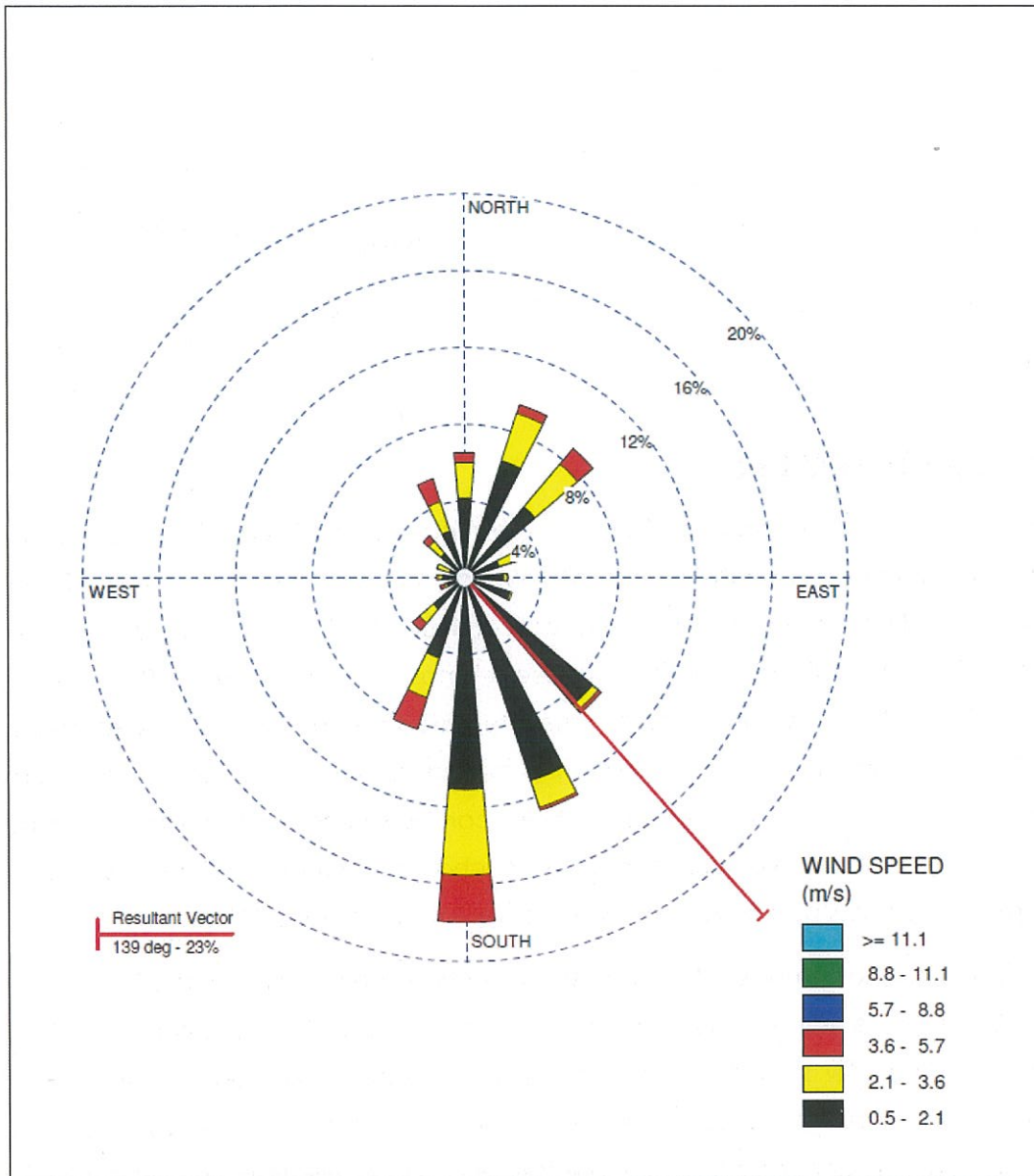


Figure 3 Wind direction and speed for the month of March 2015

Air quality

The air quality monitoring program utilises PM₁₀ high volume air samplers (HIVAS) and depositional dust gauges. Monitoring locations are strategically positioned around the mine lease and neighbouring properties.

1. PARTICULATE MATTER

Fine dust particles, up to 10 microns in diameter, are measured as PM₁₀. This particulate matter is monitored using continuous, carbon-14, beta-attenuation monitors (BAMs), which are fitted with a size selective inlet. Each BAM station operates continuously, in accordance with *Australian Standard 3580.9.11:2008, PM10 continuous direct mass method using Beta Attenuation Measurement*. This method is set to measure time-integrated mean particle concentrations for 10 min period. These measurements are subsequently averaged over a 24-hour period, to provide a 24h-average PM10 concentration. PM₁₀ dust particles can be sourced from a range of mining and non-mining activities and are typically formed by mechanical disruption with a lifetime that can range from minutes to hours and travel times varying from <1km to up to 10km.

Total suspended particulate matter (TSP), is measured using a high volume sampler (Hi-Vol), that samples for 24 hours every 6-days. Monitoring is conducted in accordance with *AS/NZS 3580.9.3:2003 – Methods for sampling and analysis of ambient air Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method*. TSP generally includes particles with an equivalent aerodynamic diameter (EAD) of less than 50 µm and can include particles generated from burning of vegetation, industrial/mining processes, combustion and natural causes.

1.1 Overview

TSP and PM₁₀ monitoring has been undertaken at three nearby farm residences, 'Hubberstone', 'Milpose' and Hillview. Results were obtained using both Hi-Volume samplers and Beta attenuated Monitors. Summaries of the monitoring results are provided below in Figure 5, Figure 6 and Figure 7.

1.2 Quarterly monitoring analysis

All PM10 results were below both the 24 hour criterion for the quarter. No exceedences were recorded at any of the locations. One monitoring cycle on the 1st of March was missed at both Hubberstone and Milpose, this was in the early stages of the transition from Hi-Volume air samplers to real-time beta-attenuation monitoring.

TSP monitoring is reported from the 7th March, to align with the commencement of the Rosedale tailings Project. Early TSP data shows that levels are well below the annual average criterion across all locations.

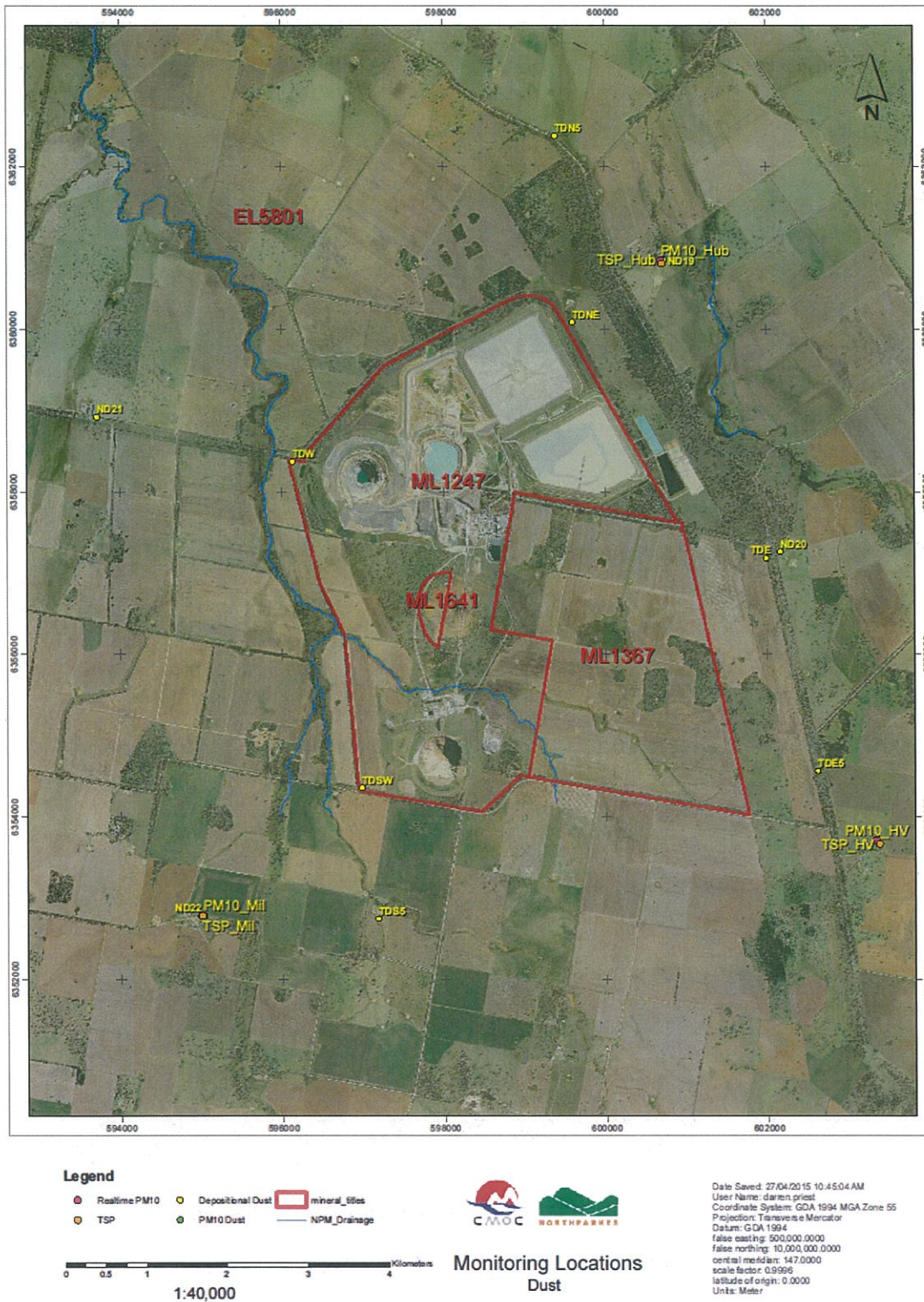


Figure 4 NPM Air Quality Monitoring Location (TSP, PM₁₀ and Depositional Dust)

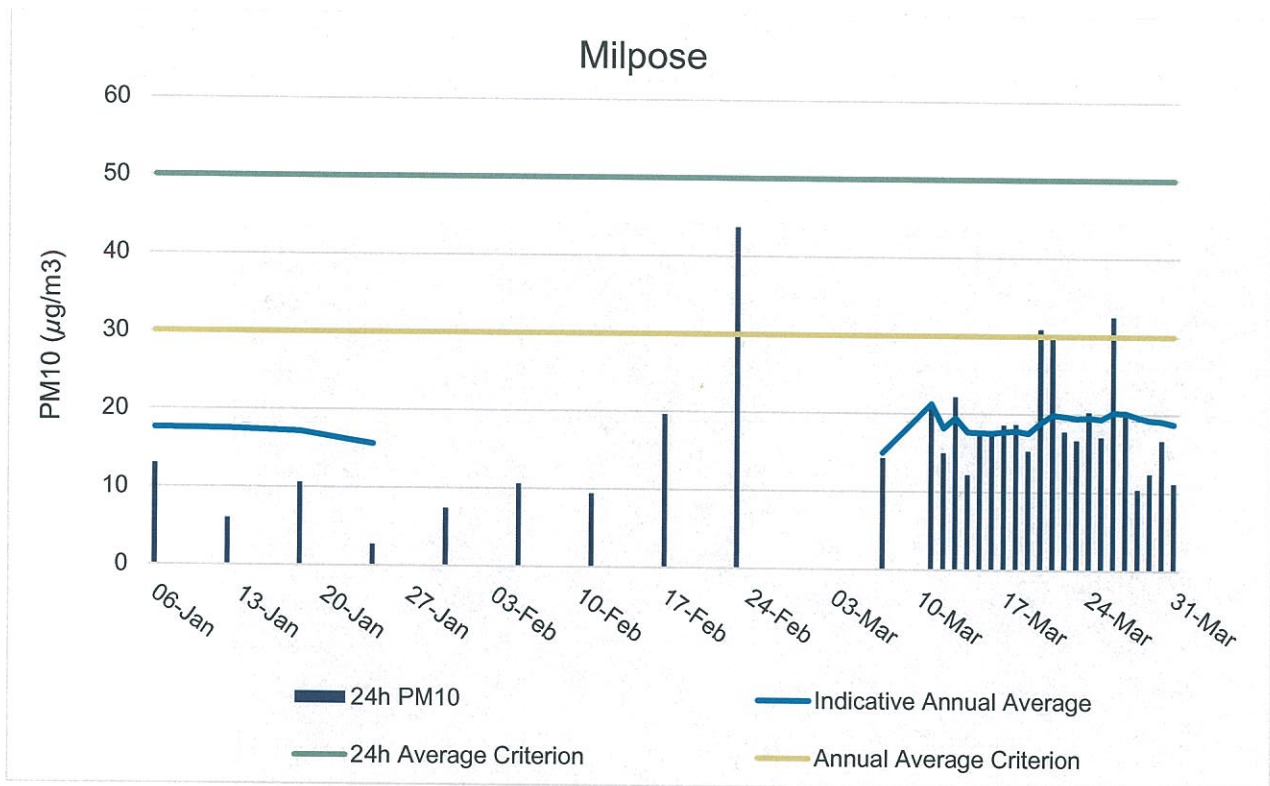


Figure 5 PM₁₀ results for 'Milpose' residence in the reporting period

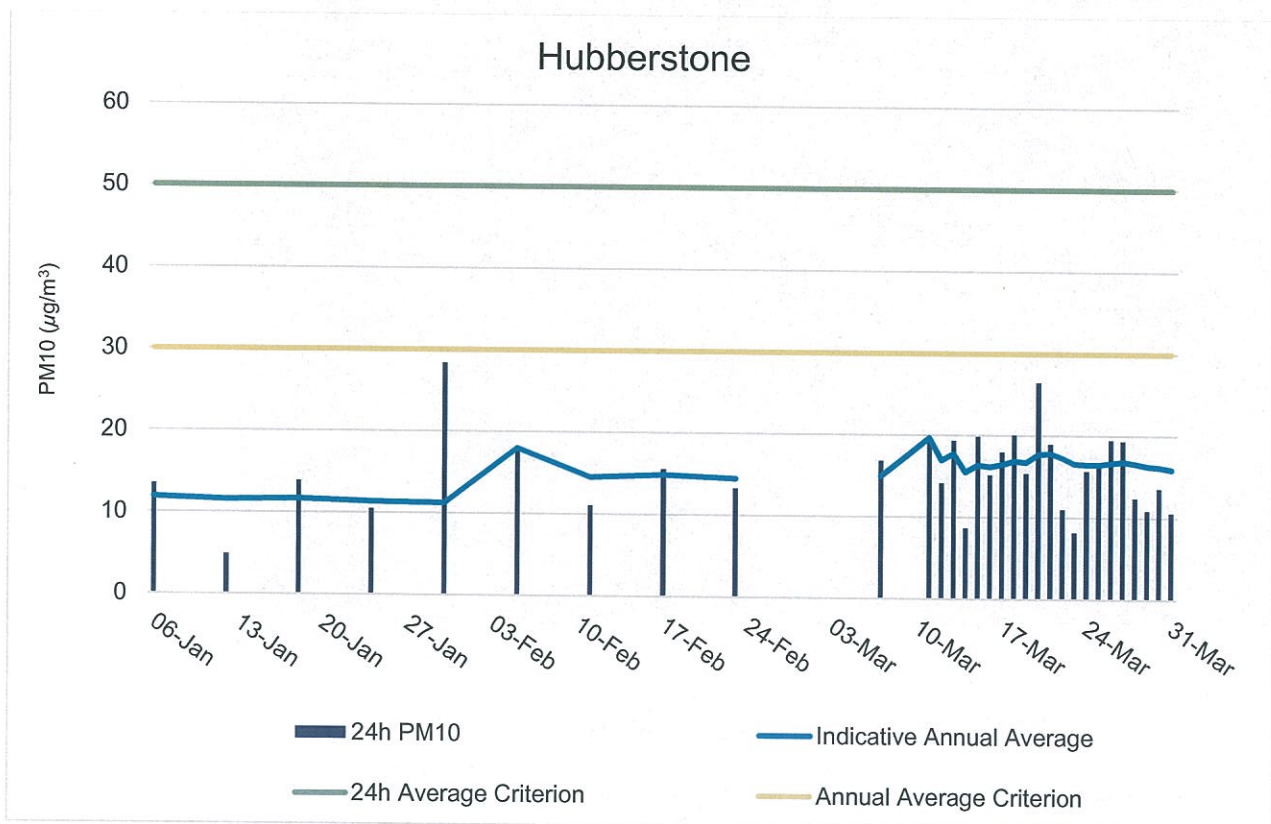


Figure 6 PM₁₀ results for 'Hubberstone' residence in the reporting period

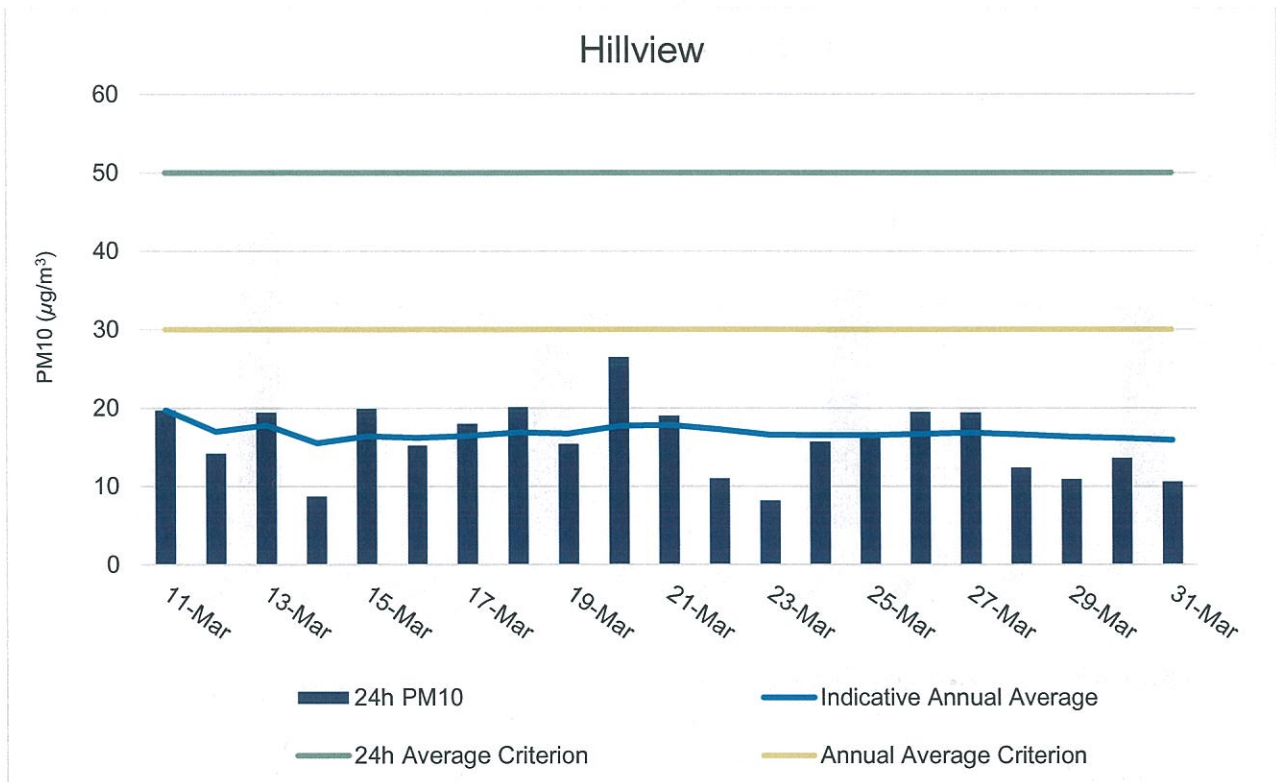


Figure 7 PM₁₀ results for 'Hillview' residence in the reporting period

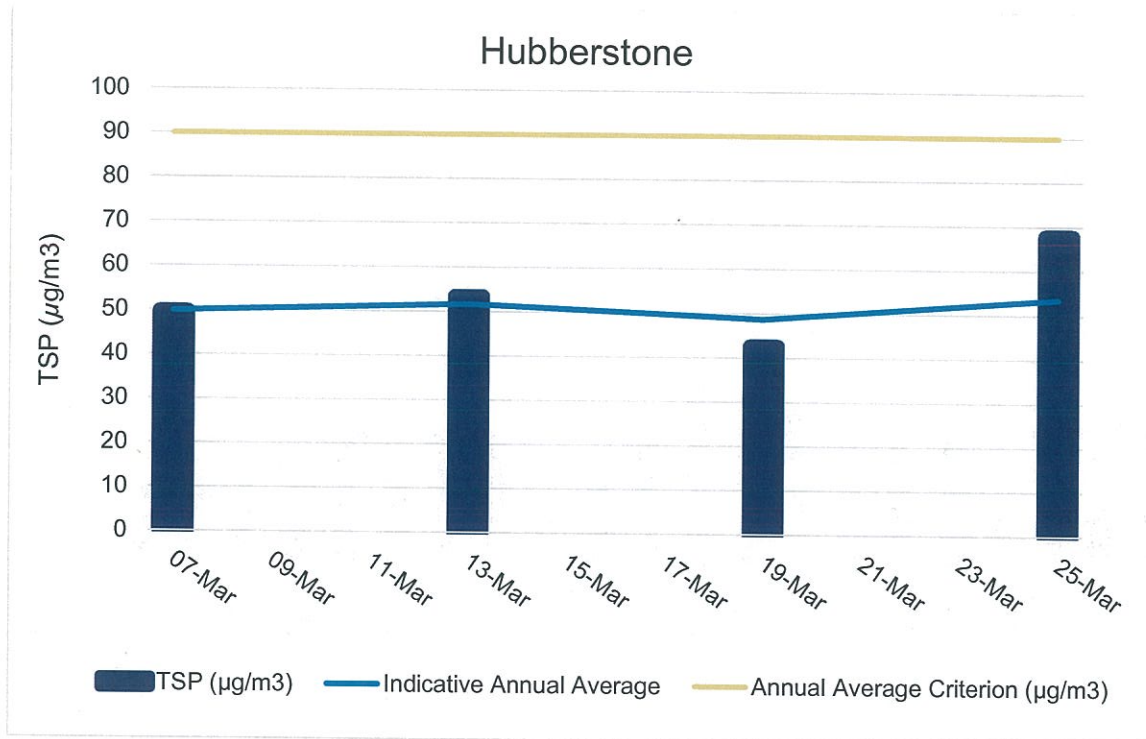


Figure 8 TSP results for 'Hubberstone' residence in the reporting period

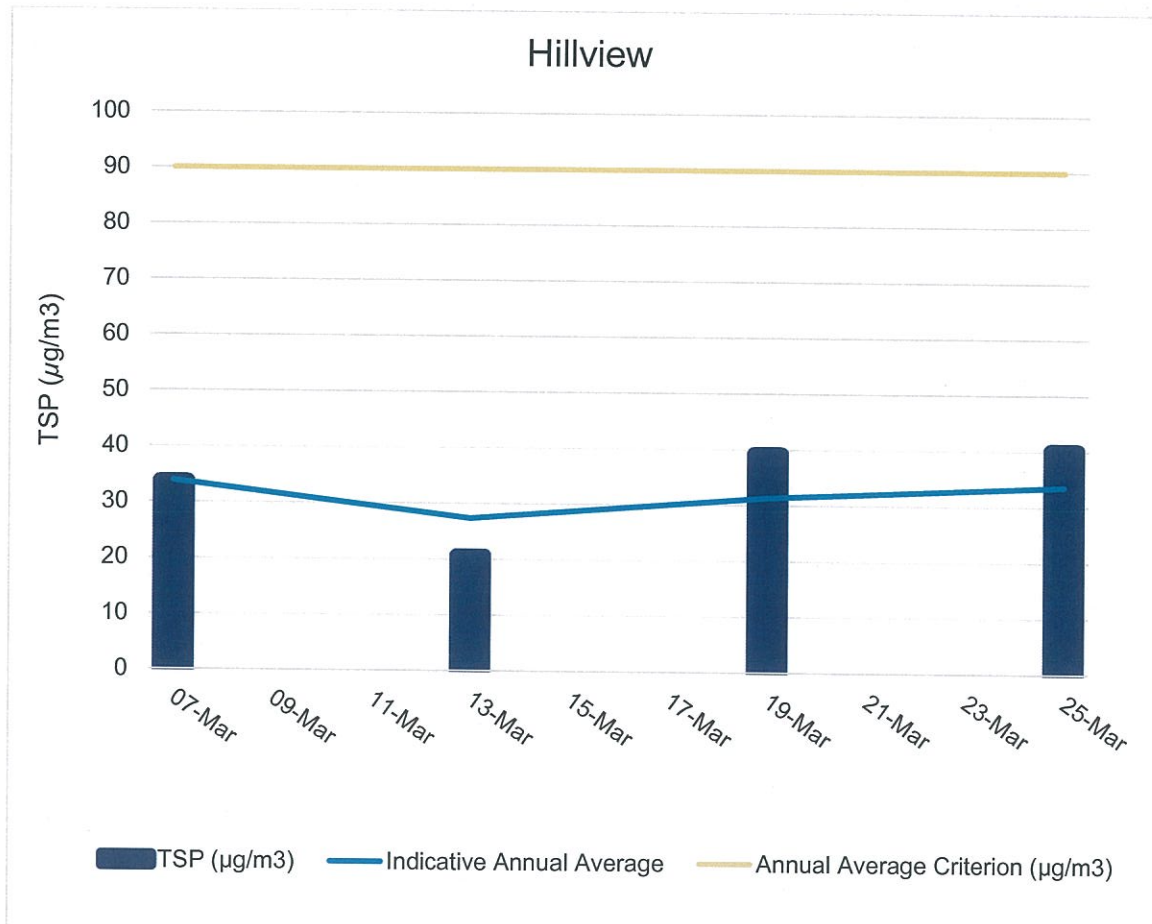


Figure 9 TSP results for 'Hillview' residence in the reporting period

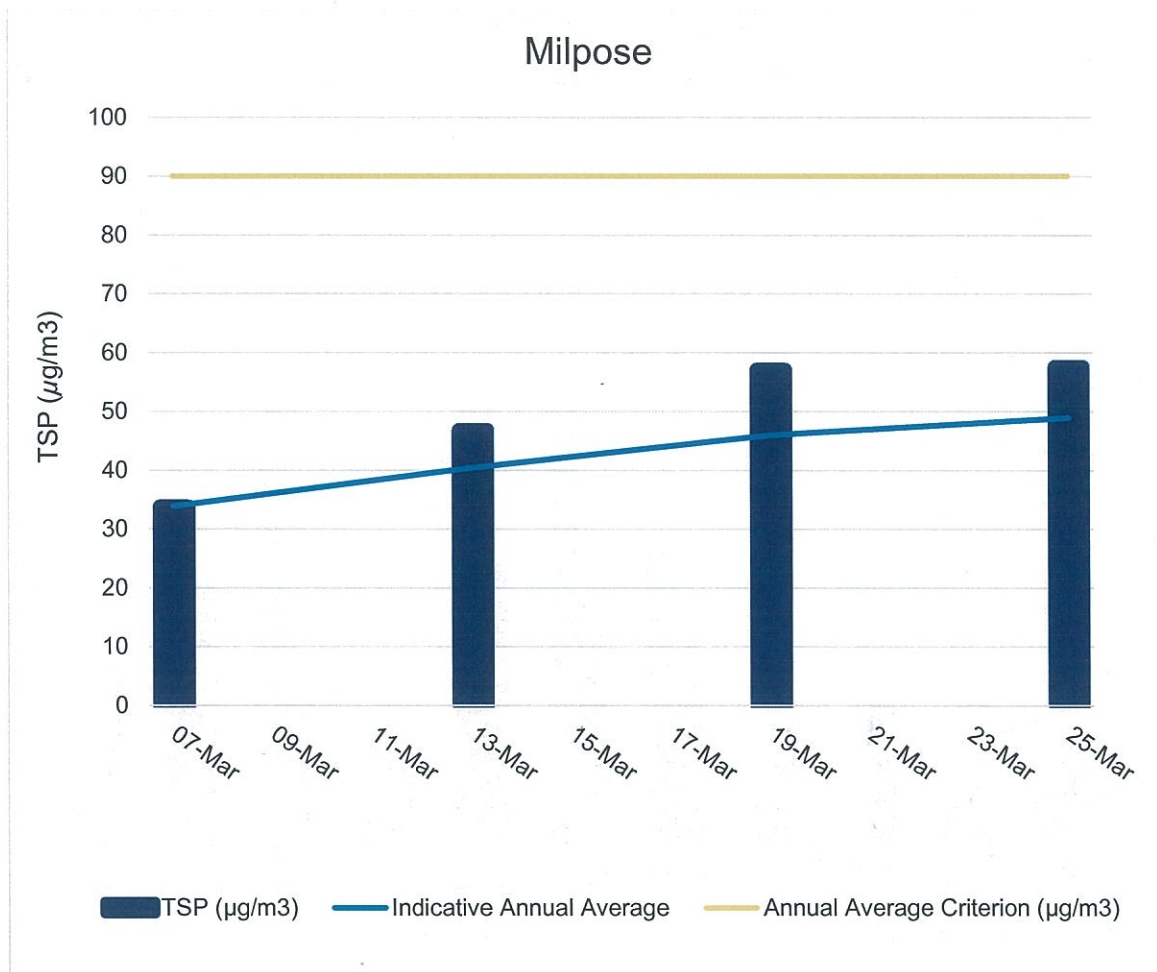


Figure 10 TSP results for 'Milpose' residence in the reporting period.

2. DEPOSITIONAL DUST

Depositional dust gauges record the total of deposited dust for a month long period and are a useful measure of broad scale changes to the local air quality. They are influenced by mining and non-mining related activities restricted to the localised area.

2.1 Overview

Eleven depositional dust gauges are located across the mining lease and neighbouring residential properties to monitor fallen dust in a monthly period. A summary of the monthly monitoring results for Q1 2015, at each monitoring location, is provided in Figure 11, Figure 12 and Figure 13.

2.2 Quarterly monitoring analysis

There were four depositional monitoring results that exceeded the trigger levels and resulted in investigations. Three of the exceedances were reported in January at ND21, ND22 and TDS5 (Figure 11) and one in February (Figure 12) at TDE, all exceedances were identified and investigated.

All depositional investigations concluded that exceedances were the result of localised farming activities and traffic on nearby dirt roads. No exceedances were attributed to NPM Mining operations for the period.

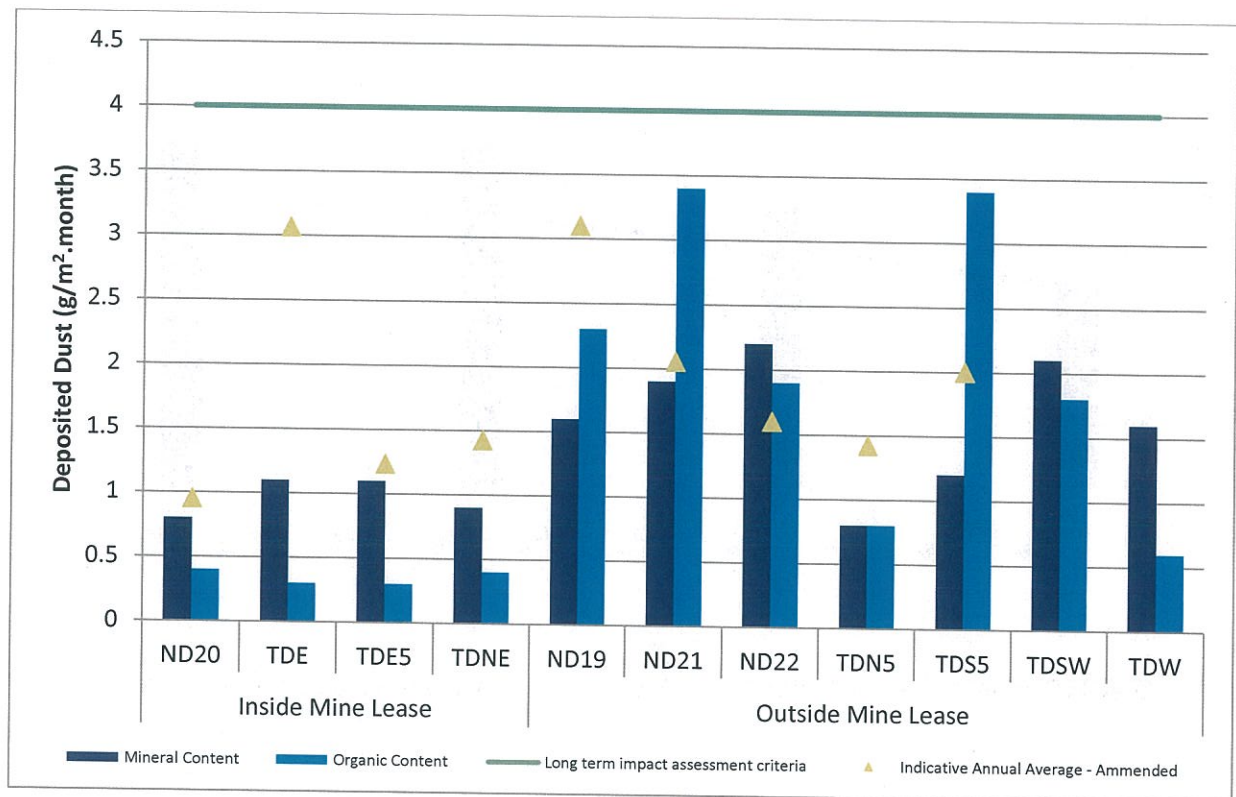


Figure 11 Depositional dust monitoring results for January 2015

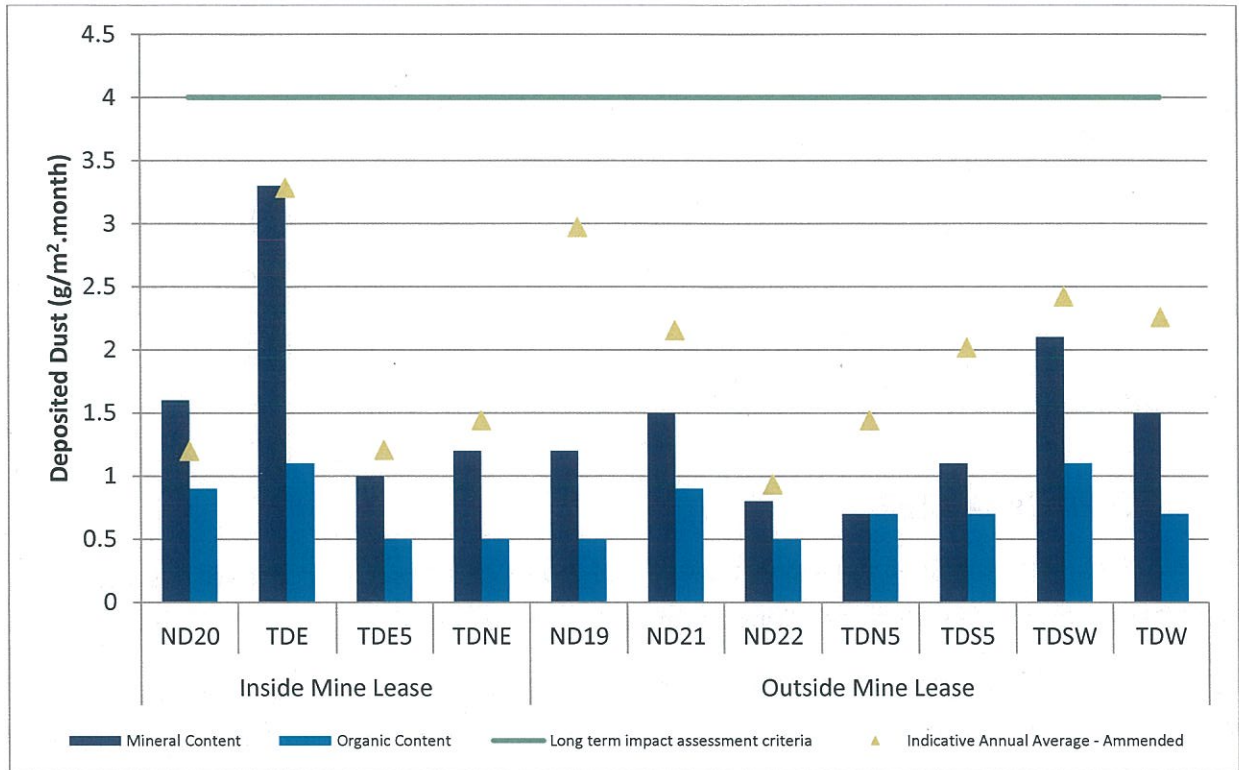


Figure 12 Depositional dust monitoring results for February 2015

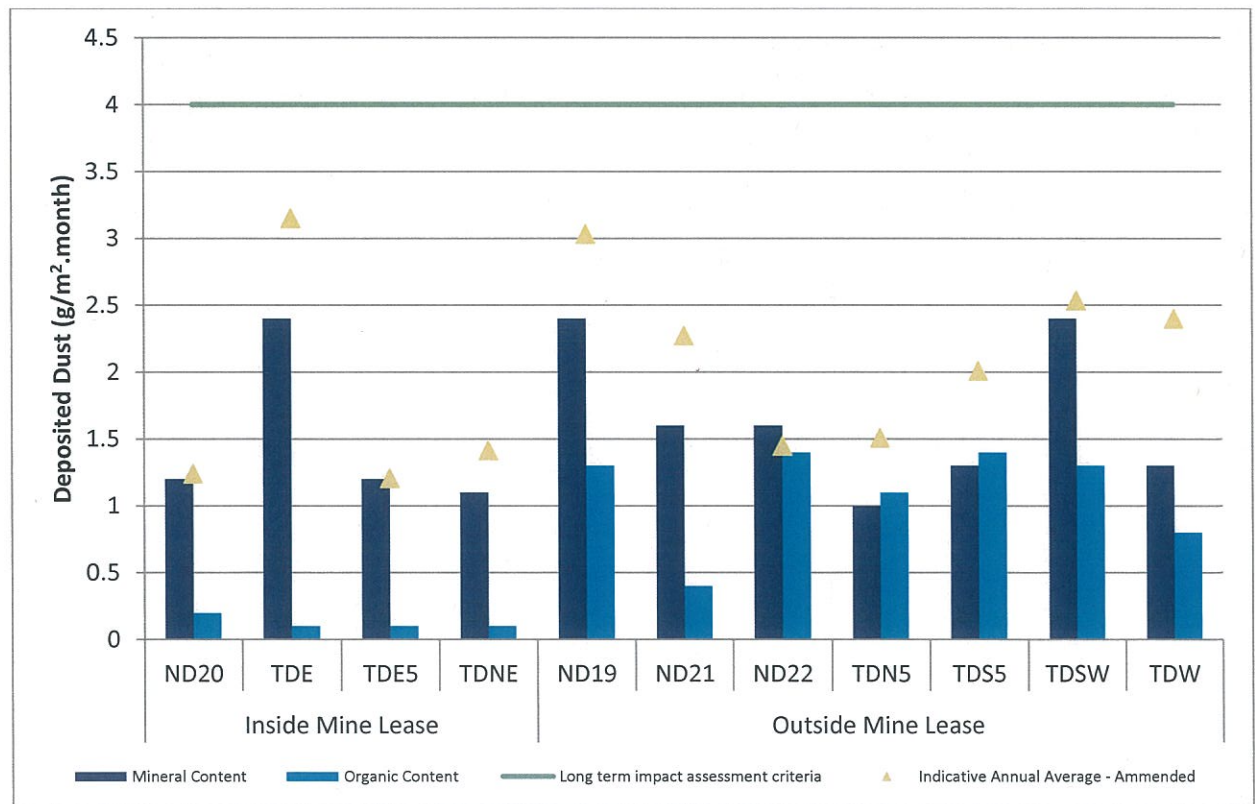


Figure 13 Depositional dust monitoring for March 2015



Water

Surface water and groundwater resources are monitored for quality and quantity. All water samples are analysed at an independent National Association of Testing Authorities (NATA) accredited laboratory.

1. SURFACE WATER

The surface water monitoring program consists of water quality sampling of various surface water courses and drainage system locations on and off the mine lease.

Water recycled from ore processing activities, in addition to surface water captured on the mine lease, forms the process water system. This is a closed system, which is monitored for internal purposes and not summarised in this report.

1.1 Overview

Water monitoring occurs routinely on a quarterly basis or after significant rainfall events that result in natural water flow through monitoring site(s). NPM is a zero process water discharge operation and impact to nearby water courses is not expected.

Monitoring results are assessed and interpreted utilising historical trend analysis and internal water quality criteria and trigger levels to identify potential changes.



Figure 14 NPM Surface Water Monitoring Locations

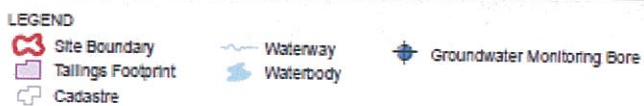


Figure 15 NPM Groundwater Monitoring Locations



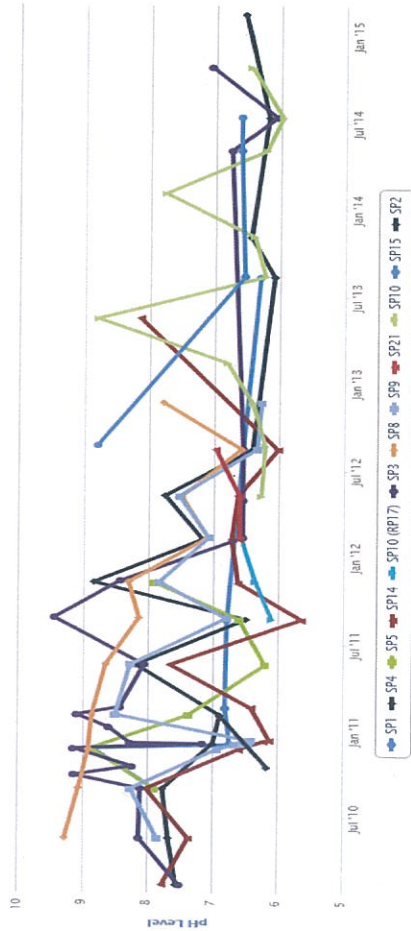
1.2 Quarterly monitoring analysis

Water quality of onsite sediment ponds are presented in Figure 16. Dry conditions during the reporting period meant the majority of the sediment ponds were dry or at levels below 10%, resultantly only SP04 was monitored for the period. All results for SP04 were generally within range of the long term average.

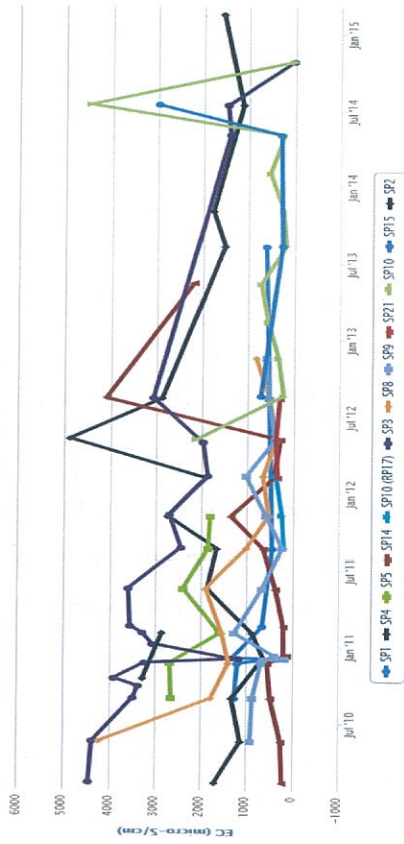
Historical trend data of Farm Dams in proximity to the mine lease is recorded in Figure 17. Results from the current reporting period for both pH and conductivity continue to follow historical background water quality. Only FD4 and FD25 had volumes that were above 10% full for the period.

There was no rainfall event resulting in flow during the reporting period. No watercourses were monitored for the reporting period. Results remain unchanged from Quarter 4, 2014, shown in Figure 18.

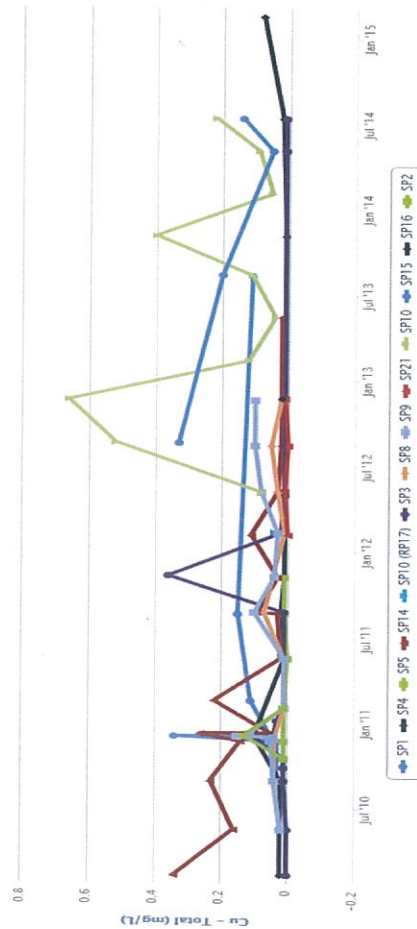
Sediment Ponds pH



Sediment Ponds EC



Sediment Ponds Cu



Sediment Ponds TSS

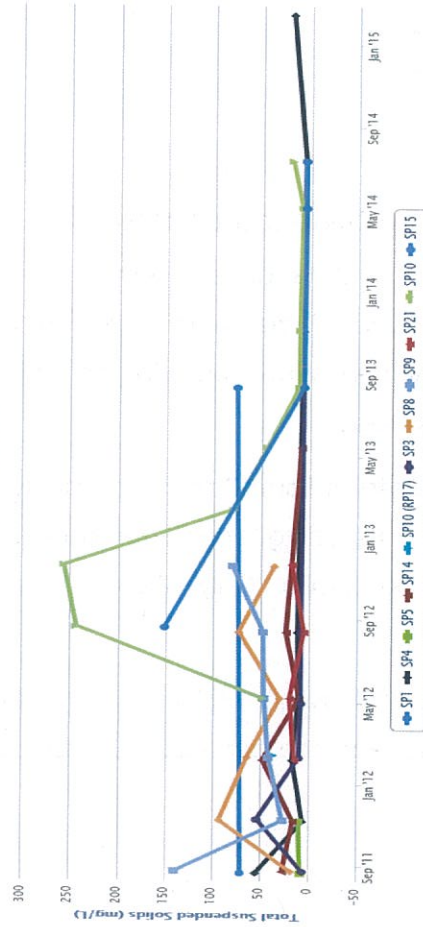
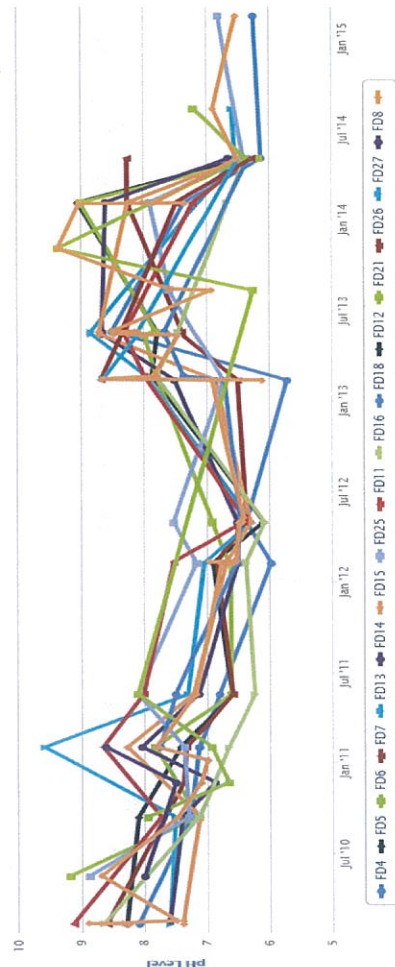
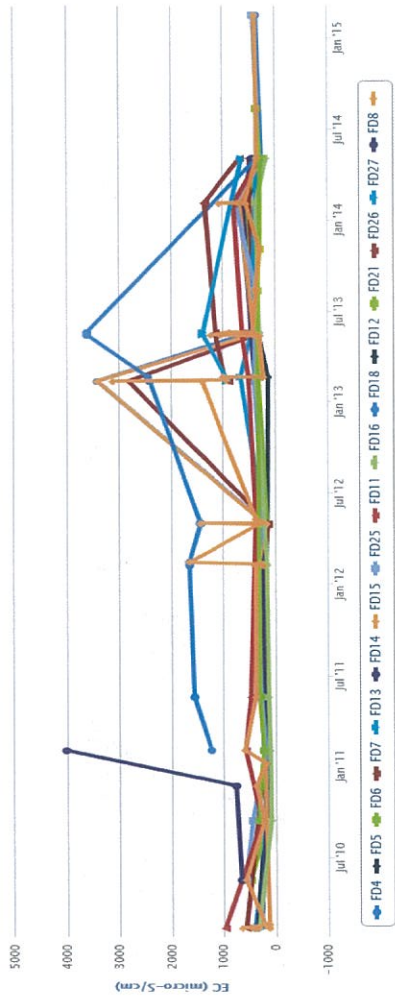


Figure 16 Surface water quality results - Sediment ponds

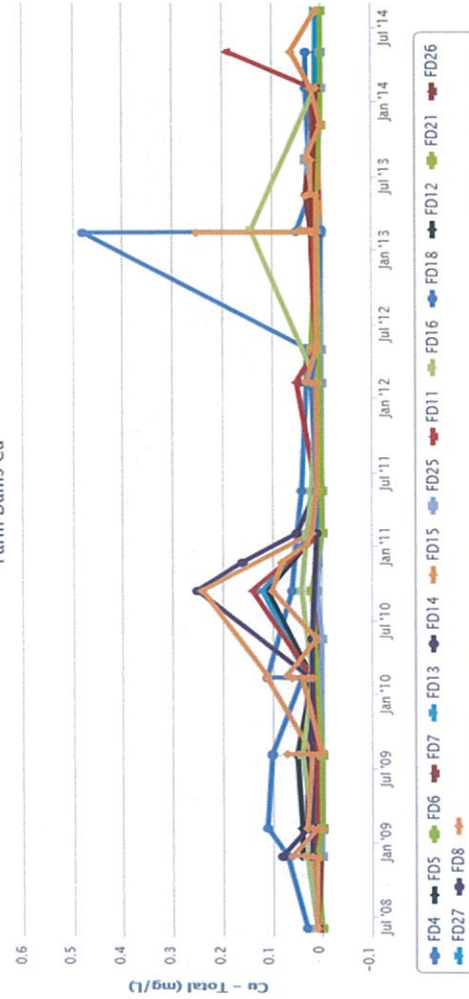
Farm Dams pH



Farm Dams EC



Farm Dams Cu



Farm Dams TSS

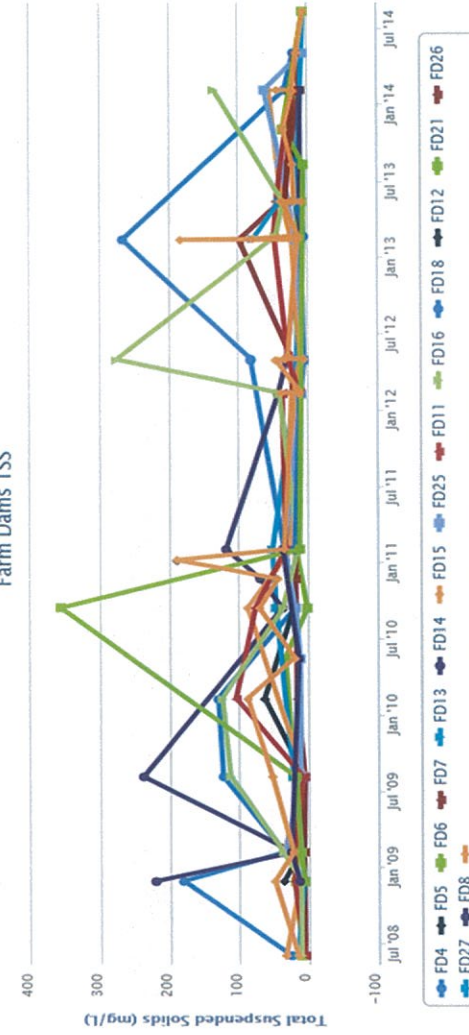
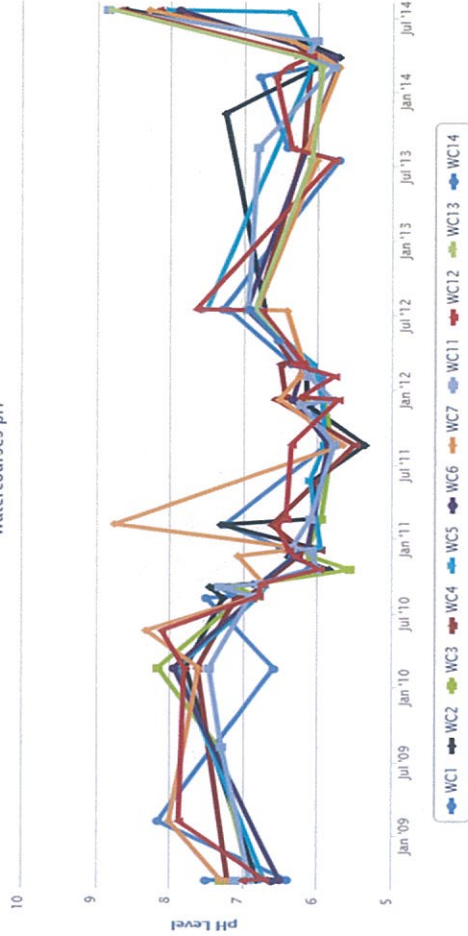


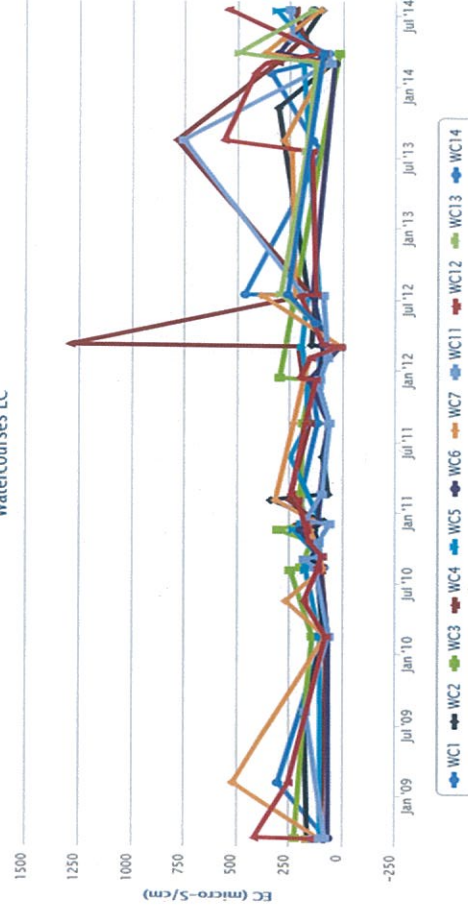
Figure 17 Surface water quality results - Farm dams



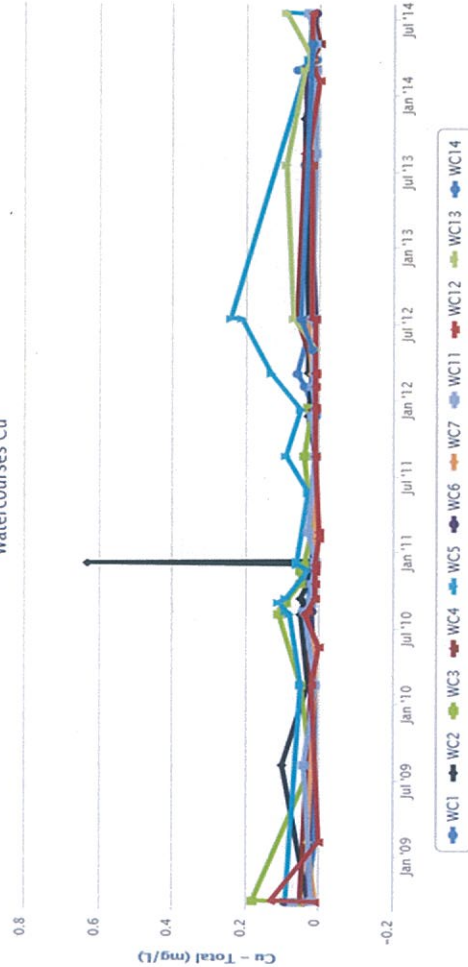
Watercourses pH



Watercourses EC



Watercourses Cu



Watercourses TSS

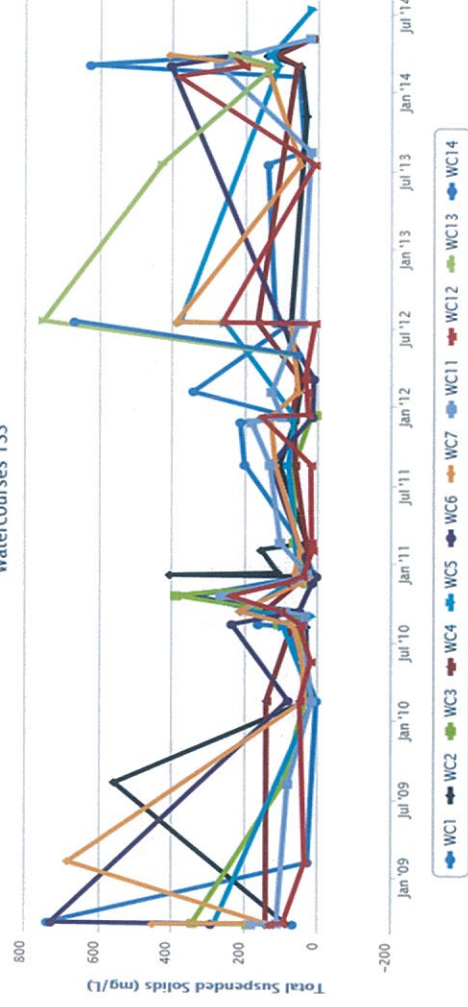


Figure 18 Surface water quality results – Water Courses

2. GROUNDWATER

2.1 Overview

The groundwater monitoring program involves the monitoring of water levels and water quality at various locations upstream and downstream of the site, to determine any potential impacts as a result of NPM activities. In the absence of regulatory defined assessment criteria all groundwater quality results are assessed against historical baseline and internally developed water quality criteria and trigger levels.

2.2 Quarterly monitoring analysis

Groundwater levels around the perimeter of the tailings storage facilities (TSF) Figure 19 remain steady. Nine new TSF bores were drilled in the period W26-W32. All other groundwater bores are in line with long term averages. There were no changes in the ground water levels which are in line with the long term averages.

Remaining TSF Bore levels for Electrical Conductivity (EC), pH and copper concentrations have remained in line with historical average this reporting period. The copper concentrations for all TSF bores showed little variation from the last monitoring period.

The pH and copper concentrations from Opencut groundwater bores are in line with historical trends (refer to Figure 20). EC AND Cu concentrations have been readily fluctuating and are exhibiting an upward trend this quarter. The results however remain in line with the historical water quality and will be closely monitored.

Groundwater quality results from the underground area (Figure 21) indicate that the water levels have remained constant. Electrical conductivity (EC) results have increased from the previous monitoring period but are in line with the historical water quality average. The copper concentrations on average have decreased.

Regional groundwater pH is variable between the bores (Figure 22) with quality being a variable of bore depth and underlying geology. EC, copper concentrations and standing water level results for the monitoring period remain in line with historical trend. There was an increase in EC in all regional bores compared to the last reporting period.

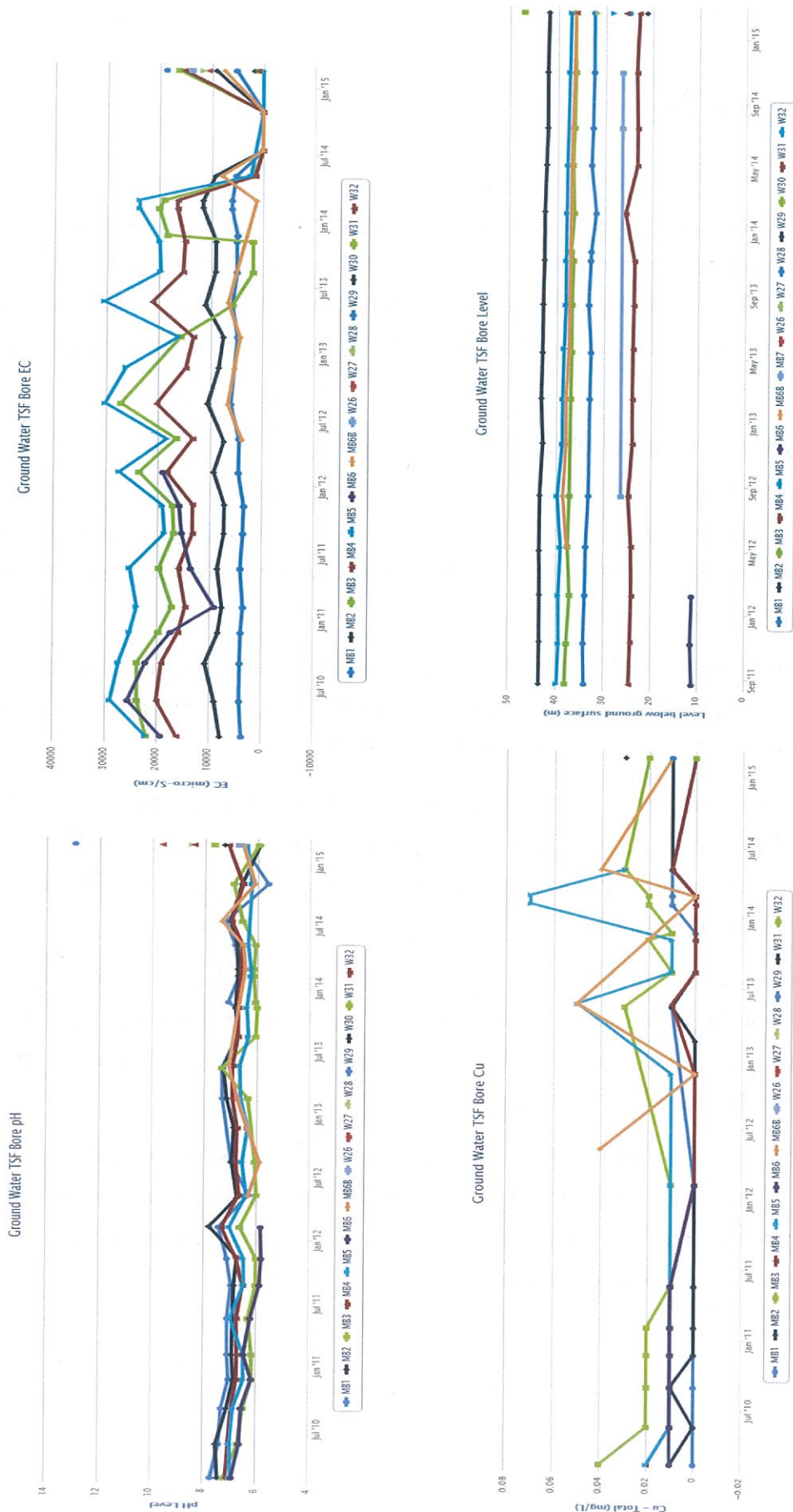
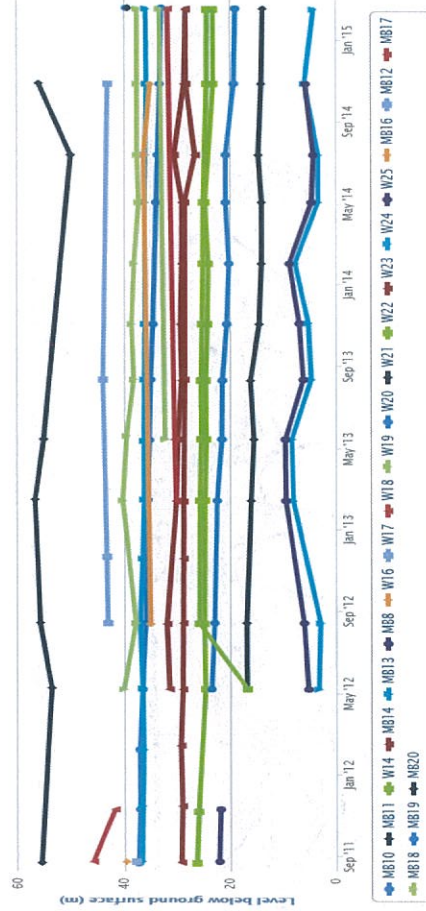
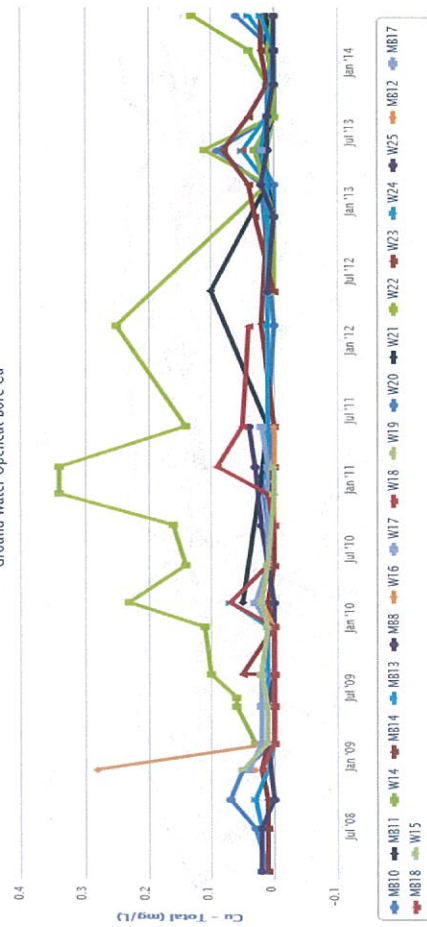
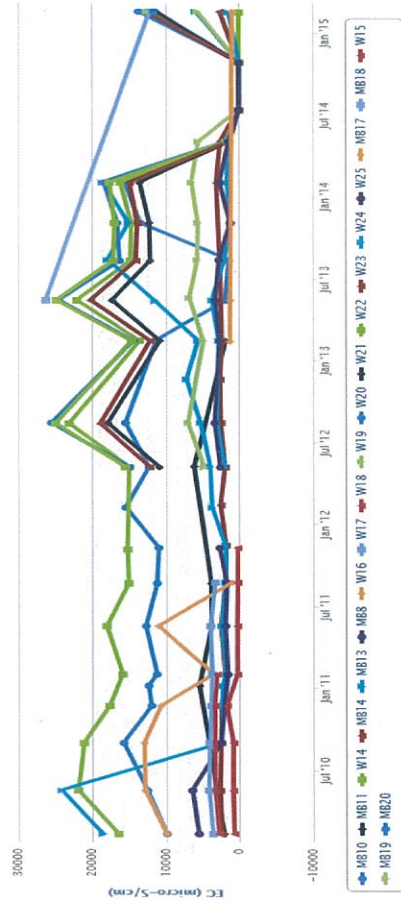
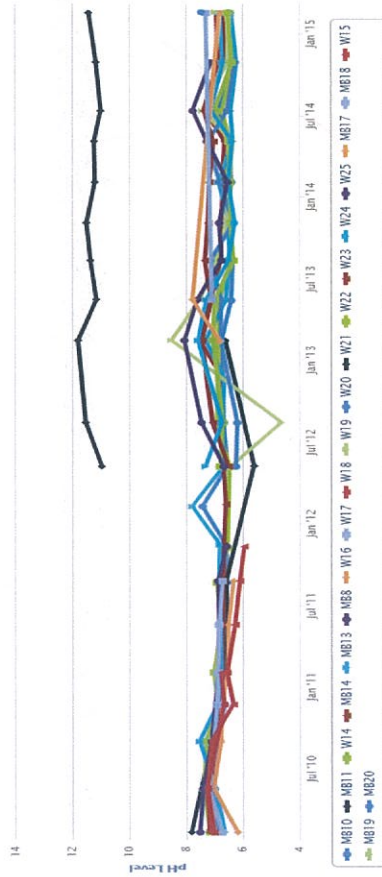
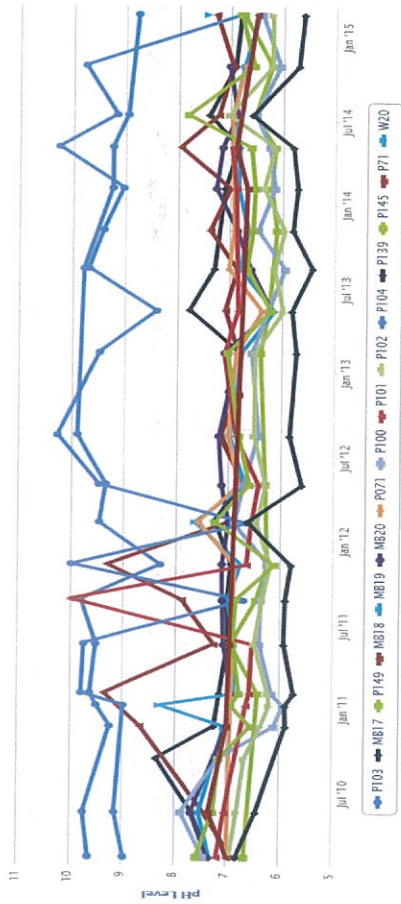


Figure 19 Groundwater quality and water levels – Tailings dam

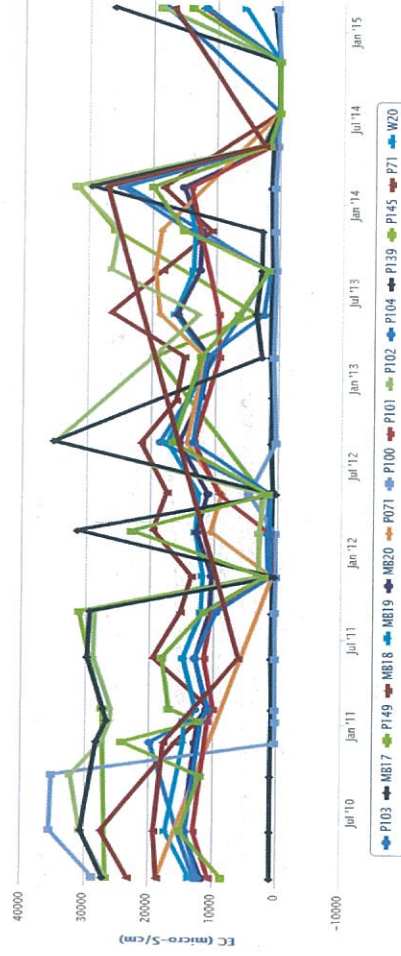


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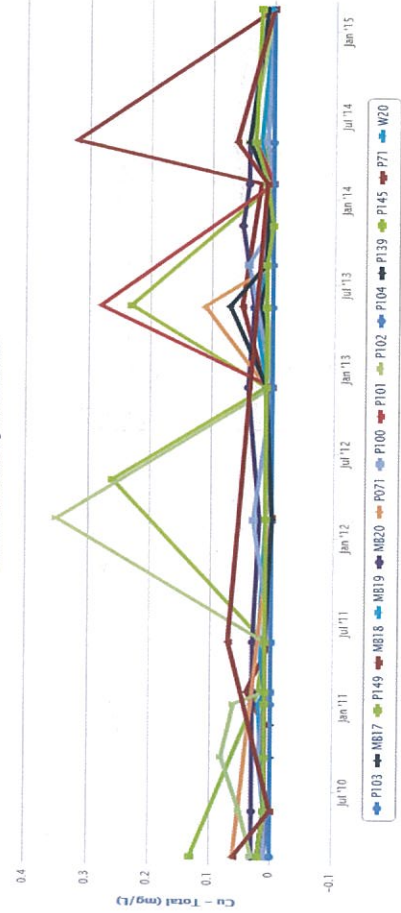
Ground Water Underground Bore pH



Ground Water Underground Bore EC



Ground Water Underground Bore Cu



Ground Water Underground Bore Level

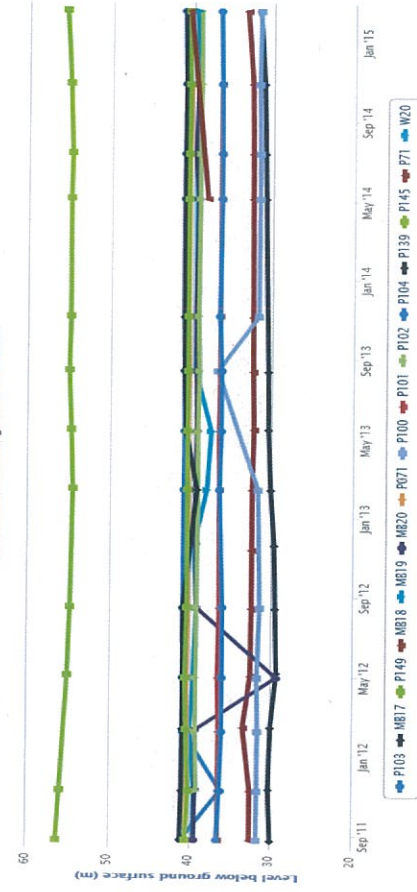


Figure 21 Groundwater quality and water levels – Underground

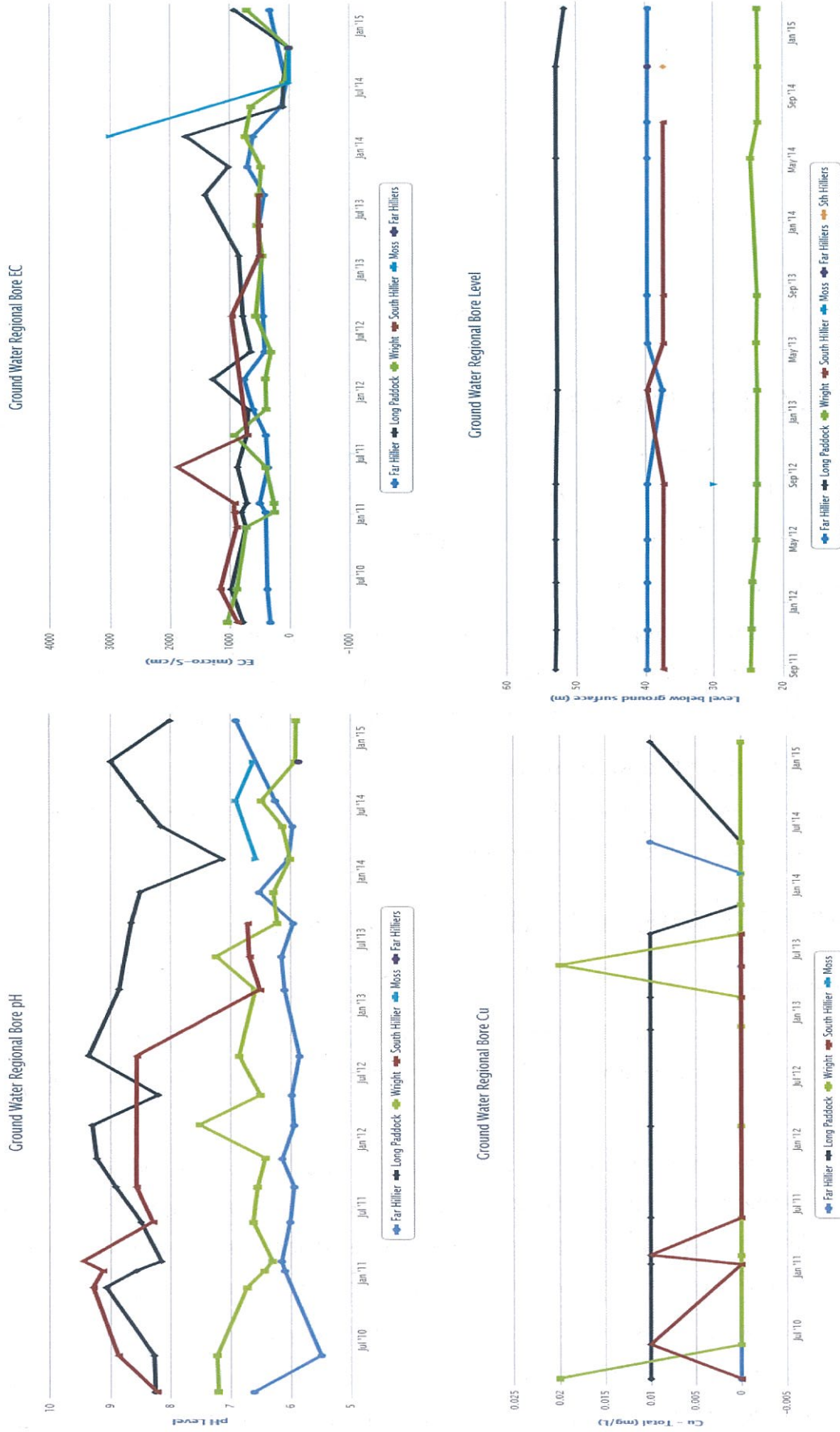


Figure 22 Groundwater quality and water levels – Regional bores



Noise and vibration

Noise and vibration monitoring is included in the NPM environmental monitoring program to assess potential impact of its operations on nearby communities and neighbours.

1. BLAST AND VIBRATION

Blasting activities are undertaken to ensure rock fragmentation for mining activities. Such practice has the potential to impact the surrounding community through vibration in the air (overpressure) and earth (ground vibration), as well as dust generation.

1.1 Overview

Vibration and air blast overpressure monitoring occurs at nearby privately owned residence. Such monitoring is only undertaken during open cut mining activities as stipulated in the existing Development Consent (06-0026 Mod 2) and new Project Approval 11_0600.

1.2 Quarterly monitoring analysis

NPM ceased operations in the E27 and E22 open cut pits in October 2010. Blast and vibration monitoring is therefore no longer undertaken or reported on.

2. OPERATOR ATTENDED NOISE MONITORING

2.1 Overview

Operator-attended noise measurements and recordings shall be conducted in order to quantify the intrusive noise emissions from construction and of general mine activity as well as the overall level of ambient noise.

Operator attended noise monitoring records a L_{A1} and L_{Aeq} measurement at each of the designated monitoring locations. L_{A1} is the noise level which is exceeded for 1 per cent of the monitoring time. L_{Aeq} is the average noise energy experience during the monitoring period. This noise monitoring was undertaken by an independent and suitably qualified noise professional.

Results include all noise sources; it should be noted that NPM generated noise cannot be differentiated from other noise within the area (e.g. air craft, wildlife, vegetation noise) and therefore, NPM may not necessarily be responsible for all measured noise levels.



Noise monitoring undertaken must comply with minimum weather condition requirements outlined in the Development Consent. Noise levels recorded when the wind speed is above 3 metres per second must be discounted as the source of noise is unable to be determined.

2.2 Quarterly monitoring analysis

For the most part, favourable conditions were encountered during the monitoring period. Attended noise monitoring during conforming wind conditions complied with the $L_{Aeq(15\text{ min})}$ 35 dB limit at each of the measurement locations. Only two measurements were impacted by non-conforming wind conditions.

Significant extraneous noise sources were encountered mainly in the form of insect and bird noise; this was particularly noticeable at Lone Pine and Milpose. A total of fourteen results were adjusted to reduce the impact of non-NPM related higher frequency noise (i.e. noise with a frequency equal to or above 2kHz such as bird and insect noise).

Measurements indicate compliance with the night limit of L_{A1} 45 dB at all locations.

The mine was audible at Milpose during all monitoring periods. The only other time that the mine could be heard was at Hubberstone during the evening monitoring.

It is understood that the mine was operating as normal during the monitoring period.

Where possible, extraneous noise sources have been excluded from attended measurements by pausing the sound level meter when non-NPM sources predominate (e.g. passing traffic or aircraft) and/or subtracting the component of the frequency spectrum that is caused by non-NPM sources (e.g. wildlife noise, livestock). Extraneous noise sources may contribute as much as 15 to 20 dB to the overall measured noise levels.

Table 2 Attended noise monitoring levels (Measured in decibels (dB)) - Day

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	18/2/2015 13:50	44	35	33	26	Yes	Mine inaudible. Frequent road traffic.
	18/2/2015 14:05	41	35	32	26	Yes	
	18/2/2015 14:20	39	30	31	26	Yes	
Hubberstone	18/2/2015 12:50	40	33	30	26	Yes	Mine inaudible. Some bird noise. Dog and aeroplane noise.
	18/2/2015 13:05	44	37	34	26	Yes	
	18/2/2015 13:20	45	36	34	26	Yes	
Lone Pine	18/2/2015 15:50	44	37	33	26	Yes	Mine inaudible. Significant bird noise. Machinery noise. Incessant bird noise during third measurement.
	18/2/2015 16:05	47	37	33	26	Yes	
	18/2/2015 16:20	53	44	34	39	Yes (Adj)	
Milpose	18/2/2015 14:50	37	29	30	26	Yes	Mine clearly audible. Aeroplane noise.
	18/2/2015 15:05	41	32	30	26	Yes	
	18/2/2015 15:20	40	33	30	26	Yes	

Table 3 Attended noise monitoring levels (measured in decibel (db)) - Evening

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	18/2/2015 19:10	55	46	34	27	Yes	Mine inaudible.
	18/2/2015 19:25	52	42	35	26	Yes	Continuous bird & livestock noise.
	18/2/2015 19:40	50	39	34	28	Yes	
Hubberstone	18/2/2015 18:00	44	33	31	26	Yes	Mine only just audible.
	18/2/2015 18:15	44	36	33	26	Yes (Adj)	Continuous bird noise during second measurement.
	18/2/2015 18:30	37	29	29	26	Yes	
Lone Pine	19/2/2015 20:15	52	51	31	49	Yes (Adj)	Mine inaudible. Continuous insect & bird noise.
	19/2/2015 20:30	50	50	29	44	Yes (Adj)	Intermittent dog barking.
	19/2/2015 20:45	52	51	28	48	Yes (Adj)	
Milpose	19/2/2015 21:10	46	44	28	38	Yes (Adj)	Mine clearly audible. Incessant insect noise.
	19/2/2015 21:25	45	43	27	38	Yes (Adj)	
	19/2/2015 21:40	45	44	29	38	Yes (Adj)	

Table 4 Attended noise monitoring levels (measured in decibel (db)) - Night

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	19/2/2015 22:55	38	36	33	29	Yes	Mine inaudible.
	19/2/2015 23:10	39	35	32	27	Yes	Livestock & foliage noise.
	19/2/2015 23:25	39	36	34	31	Yes	
Hubberstone	19/2/2015 23:50	43	42	40	37	NA	Mine inaudible.
	20/2/2015 00:05	44	43	29	39	Yes (Adj)	Gusting winds. Incessant insect noise.
	20/2/2015 00:20	45	43	41	39	NA	
Lone Pine	20/2/2015 00:50	45	44	35	40	Yes (Adj)	Mine inaudible. Continuous insect & foliage noise.
	20/2/2015 01:05	45	44	35	41	Yes (Adj)	Low continuous noise coming from opposite direction to NPM.
	20/2/2015 01:20	45	44	31	41	Yes (Adj)	
Milpose	19/2/2015 22:00	43	41	27	38	Yes (Adj)	Mine clearly audible. Incessant insect noise.
	19/2/2015 22:15	39	38	28	33	Yes (Adj)	
	19/2/2015 22:30	38	36	35	32	Yes	