perilya

Perilya Broken Hill Limited

ABN: 46 099 761 289

Broken Hill North Mine

2019/2020 Annual Review

September 2020

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Table 1 - Annual Review Title Block

Name of operation	Broken Hill North Mine
Name of operator	Perilya Broken Hill Limited
Development consent / project approval #	Development Consent SDD7583
Name of holder of development consent / project approval	Perilya Broken Hill Limited
Mining lease #	Consolidated Mining Leases 4 and 5
Name of holder of mining lease	Perilya Broken Hill Limited
Water licence #	Water Access Licence WAL40959 Water Supply Approval 60WA583325
Name of holder of water licence	Perilya Broken Hill Limited
MOP start date	1st March 2018
MOP end date	28th February 2021
Annual Review start date	1st August 2019
Annual Review end date	31st July 2020

I, Bruce Byrne, certify that this audit report is a true and accurate record of the compliance status of Broken Hill North Mine for the period 1st August 2019 to 31st July 2020 and that I am authorised to make this statement on behalf of Perilya Broken Hill Limited.

Note.

a) *The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading ina material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*

Name of authorised reporting officer	Bruce Byrne
Title of authorised reporting officer	General Manager, Perilya Broken Hill Ltd.
Signature of authorised reporting officer	
Date	16.09.2020

Revision	Comments	Date
0	Submitted for approval	18 September 2020

1 STATEMENT OF COMPLIANCE

A statement of compliance with project approvals and mining leases for Broken Hill North Mine is presented in Table 2. 10 non-compliances were indentified during the reporting period.

Table 2 - Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes/No
SSD 7538	No
EPL2683	No
CML4	No
CML5	No

Non-compliances during the reporting period are discussed in Table 4 and ranked according to the compliance status key in Table 3.

Table 3 - Compliance Status Key

Risk level	Colour code	Description
High	Non-compliant (H)	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant (M)	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant (L)	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-compliant (A)	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 4 - Non-Compliances during the period

Relevant approval	Condition	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
SSD 7538	Sch 2 – Cond 9	Unless the Secretary agrees otherwise, the Applicant must comply with the operating hours in Table 1	Non-compliant (Low Risk)	A production blast registering above 0.75 mm/s at closest residential receiver (North 3 blast monitor) was outside operating hours of Table 1.	Section 6.5
SSD 7538	Sch 3 – Cond 3	Apply a chemical dust suppressant (in accordance with an approved program) to all 'free areas' identified in the figure in Appendix 2 to achieve an emission control factor of 99.3% or better;	Non-compliant (Low Risk)	Fugitive dust emissions after the application of dust suppressant product were determined using the portable dust monitor referred to in EPL 2683	Section 6.1 and Section 10.1 Action Plan
SSD 7538	Sch 3 – Cond 24	The Applicant must ensure that ore laden trucks use the designated haulage route	Non-compliant (Low Risk)	One event during reporting period where driver entered North Mine via front gate.	Section 6.6
SSD 7538	Sch 3 – Cond 34	The Applicant must implement the approved Water Management Plan for the development.	Non-compliant (Low Risk)	Water storage management not implemented per Water Management Plan; water records not available on PBHL website, unsealed road over clean water diversion.	Section 10.1 Action Plan
SSD 7538	Sch 3 – Cond 44	The Applicant must rehabilitate the site progressively	Non-compliant (Low Risk)	State and site-based biosecurity restrictions have postponed completion of progressive rehabilitation targets	Section 8.1
SSD 7538	Sch 4 – Cond 6	Within 3 months – the applicant must review and if necessary revise, the strategies, plans and programs required under this consent	Non-compliant (Low Risk)	Key plans were reviewed and revised however not all plans were reviewed per Condition 6	Section 11
EPL 2683	L4.5	The air blast overpressure level from blasting must not exceed 95 dB (Lin Peak) for the period 19:15 pm to 6:45 am.	Non-compliant (Low Risk)	On multiple occasions monitoring location, 56 North, exceeded this condition. Exceeds caused by elevated wind speeds during the time of the blast event.	Section 6.5

Relevant approval	Condition	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
EPL 2683	M2.2	Each monitoring point must be sampled at the required frequency.	Non-compliant (Low Risk)	Due to site power loss and manufacturer software error HVAS sampling events did not occur as required. Due to access issues and scheduling error dust deposition sample occurred outside the standard exposure days	Section 6.1

2 INTRODUCTION

Broken Hill North Mine (North Mine) Operation is located on the eastern edge of Broken Hill in the Far West region of New South Wales (Figure 1) and lies within a 162 ha area covered by Consolidated Mining Lease (CML) 4 and CML 5 (Figure 2). The current Development Consent (SSD 7538) Modification 2 authorises the operation until 18th August 2043. The Mining Operation Plan (MOP 2018) amendment 1 November 2018 issued for a 3 year period from 1st March 2018 to 28th February 2021. Figure 3 includes the approved mine layout for SDD 7538 and Figure 4 shows the approved limit of mining areas.

This Annual Review covers the period 1st August 2019 to 31st July 2020.

A request to align Annual Review (AR) SSD 7583 reporting with Annual Environmental Management Report (AEMR) was endorsed on 11th March 2020 for the AR reporting period to be for the 12 months to 31 July each year and submitted prior to 30 of September each year.

This document has been prepared in accordance with the *Integrated Mining Policy - Annual Review Guidelines issued in October 2015.*

Contact details for key personnel responsible for the environmental management of the North Mine operation are provided in Table 5.

Table 5 - North Mine management contact details

Name	Position	Contact
Bruce Byrne	General Manager	(08) 8088 8582
Geoff Hender	Deputy General Manager – Broken Hill Operations	(08) 8088 8649
Chris Chindanya	Mining Manager – Northern Operations	(08) 8088 6577
Adam Forster	Health Safety Environment and Training Manager	(08) 8088 8616
Brett Bussell	Environmental Superintendent	(08) 8088 8920

Figure 1 - Project Locality

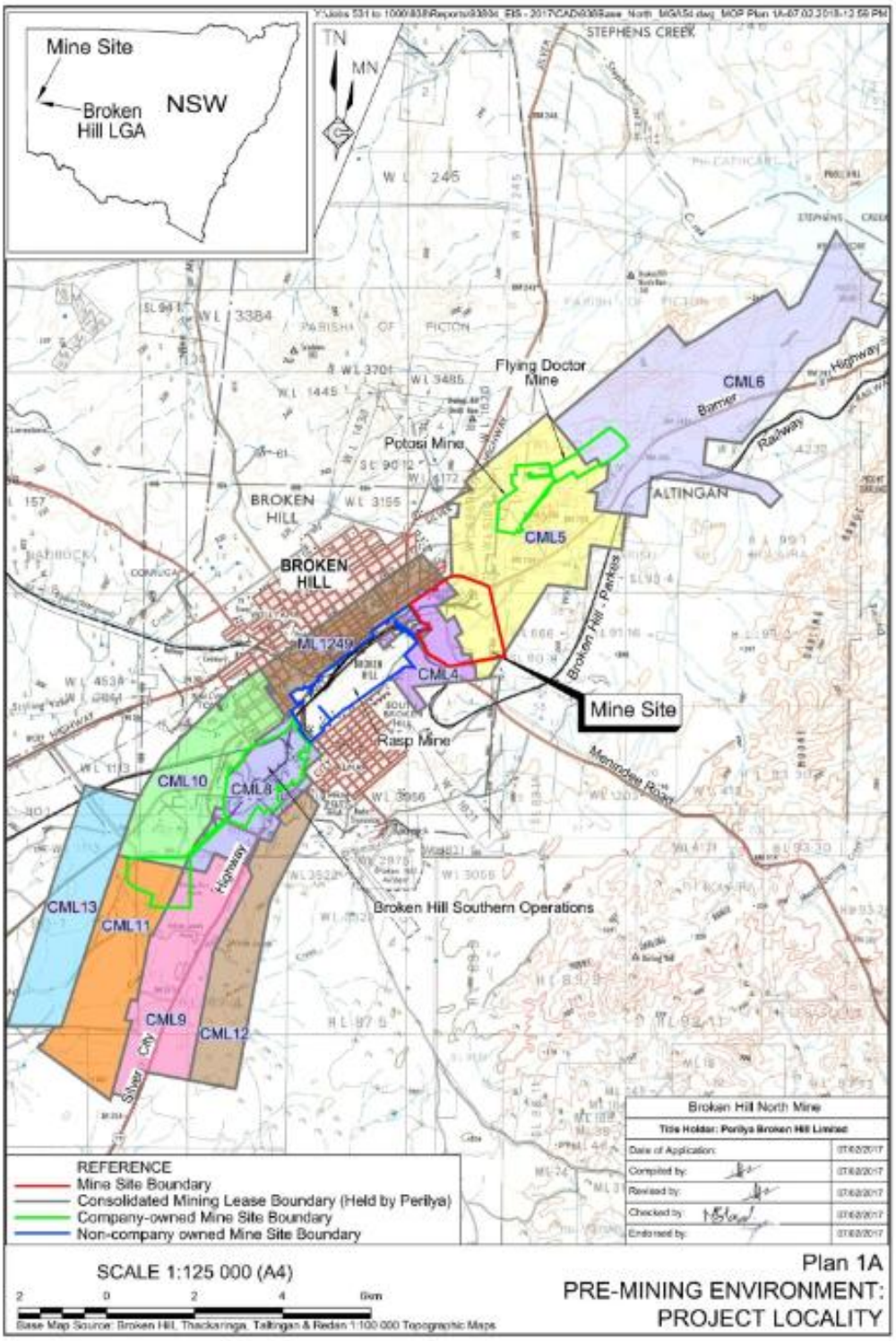


Figure 2 - Perilya North Mine Boundary

Figure 3 - SDD 7538 Approved North Mine Layout

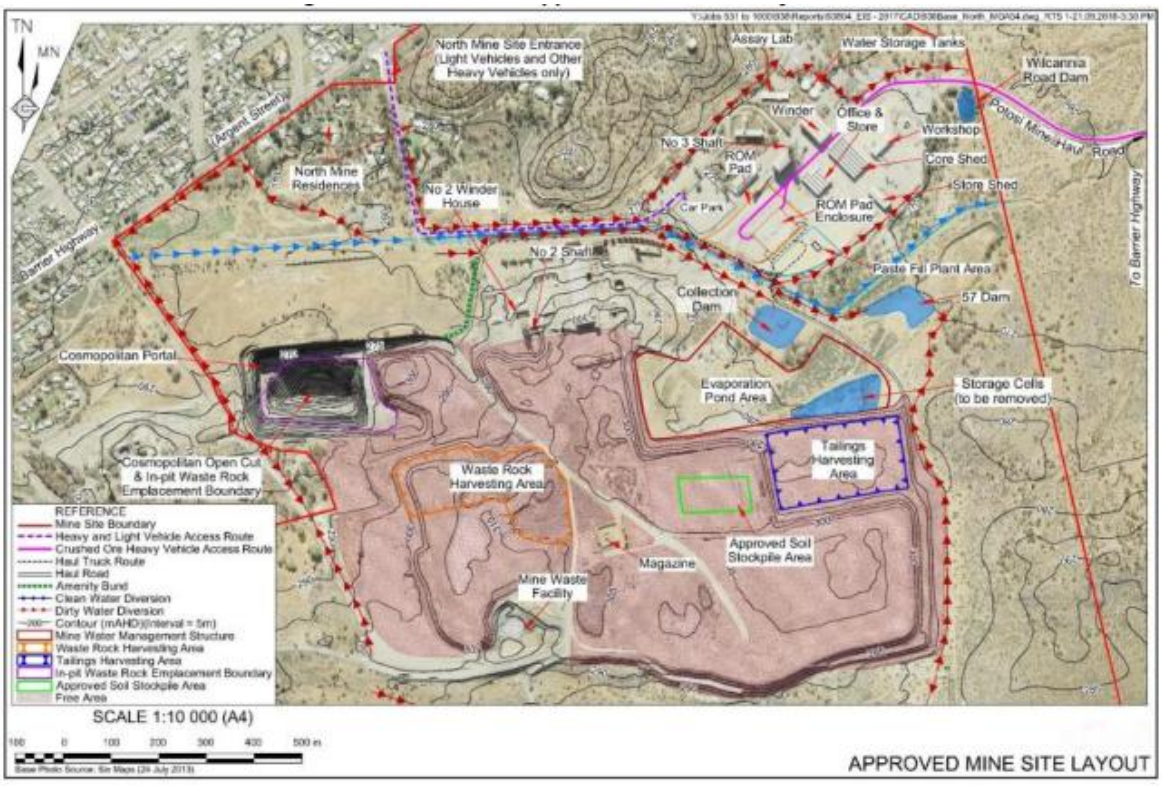
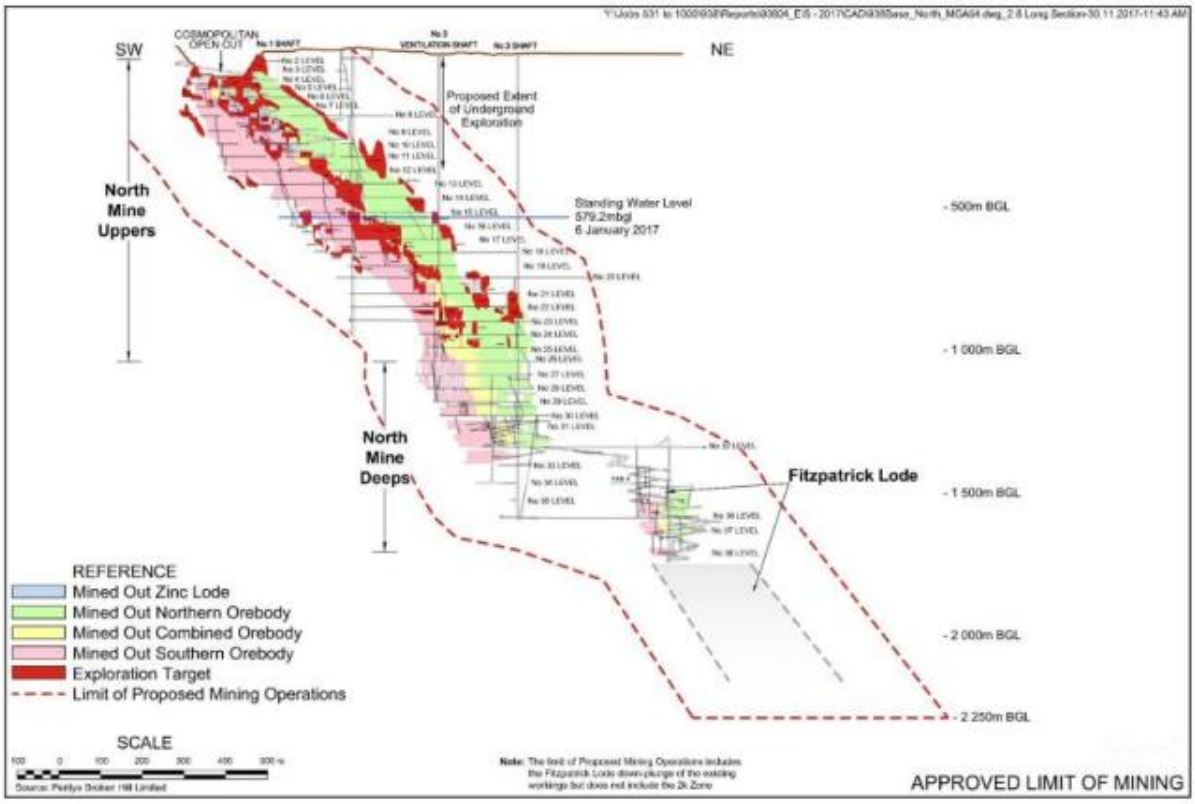


Figure 4 - Approved North Mine Limit of Mining



3 APPROVALS

North Mine has a number of statutory approvals, leases and licenses that regulate activities on site. During the reporting period, the following approval modifications occurred:

- EPL 2683 was varied on 11th March 2020 to amended wording to reflect the updated blast monitoring unit locations
- EPL 2683 was varied on 11th June 2020 to extended the overpressure limit time for conditions L4.3 and L4.4

Table 6 provides North Mine's existing approvals as at 31st July 2020.

Table 6 - North Mine's existing statutory approvals

Authority	Approval	Number	Expiry date
Department of Planning Industry and Environment (DPIE)	Development Consent	SDD 7538	25 years from date of construction (18th August 2018)
	Mining Operations Plan	None	28 February 2021
	Consolidated Mining Lease	CML 4	23 June 2024
	Consolidated Mining Lease	CML 5	17 June 2021
Environment Protection Authority	Environment Protection Licence	EPL 2683	Current
SafeWork NSW	Licence to Store Explosives	XSTR100008	11 March 2023
NSW Office of Water	Water Access Licence	WAL40959	Current
	Water Supply Works Approval	60WA583325	Current

4 OPERATIONS SUMMARY

4.1 MINING OPERATIONS

During the period mining activities at North Mine continued per approved operations under SSD7538 as defined in Section 2 of MOP 2018.

- Underground diamond drilling rigs targeting the upper section of mine area for exploration and blasting activities.
- Transportation of ore and mullock to the surface using portal and decline via underground haul trucks,
- Mullock placement occurred within existing Cosmopolitan open cut
- Extracted ore transported on sealed haulage route to surface ROM pad enclosure, a sealed, negative pressure building equipped with dust collection system.

Production figures during the reporting period are provided in Table 7.

Table 7 - Production Summary

Material	Unit	Approved limit (Max)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (estimate)
Waste Rock	Tonnes	-	-	218,661	266,000
Ore [a]	Tonnes	300,000	177,433	291,875	256,000

a- Ore extracted, crushed and transported by road to South Mine

4.2 OTHER OPERATIONS

4.2.1 ORE EXTRACTION AND TRANSPORT

Ore crushed within the ROM pad enclosure using mobile crusher and crushed ore loaded onto A-double road trains for transport to Southern Operations via the approved transport route, namely the Potosi Mine Haul Road, Barrier Highway, Iodide Street, Crystal Street and Gypsum Street.

Per Schedule 2, Conditions 6-8 of the Development Consent ore transport movements were conducted between the hours of 8 am and 6 pm with a maximum of 4 loaded movements an hour and 32 loaded movements per day. (http://www.perilya.com.au/our-business/operations/broken-hill-north-mine/ore-movement)

4.2.2 HOURS OF OPERATION

Mining operations activities are permitted 24 hours a day, 7 days a week, except for:

- Construction
  - 7 am to 6 pm, Monday to Friday
  - 8 am to 1 pm, Saturday
  - No activities on Sundays or public holidays
- Crushing, tailings harvesting , waste rock harvesting, ore transport (ROM pad to South Mine)
  - 8 am to 6 pm, 7 days a week
- Ore Transportation (mine portal to ROM pad)

- 7 am to 6 pm and 7 pm to 6 am, 7 days a week
- Production blasting, rehabilitation
  - 6:45 am to 7:15 pm, 7 days a week

4.3 NEXT REPORTING PERIOD

4.3.1 EXPLORATION

Underground exploration drilling will be undertaken to further define remnant ore and identify additional ore lenses and lodes. No surface drilling has been planned, however may be undertaken if required.

4.3.2 CONSTRUCTION

Construction of the paste fill plant and paste fill stockpile area is planned to progress during the next reporting period.

4.3.3 MINING OPERATIONS

Mine production is planned to continue at similar levels as the current reporting period and within the maximum approved limit. The actual production during the next reporting period will remain subject to ongoing operational parameters and performance.

4.3.4 DECOMMISIONING AND DEMOLITION ACTIVITIES

No infrastructure will be decommissioned or demolished during the next reporting period.

4.3.5 PROGRESSIVE REHABILITATION AND COMPLETION

Per MOP 2018 performance indicators and completion criteria progression towards rehabilitation targets as per Table 27 will continue and hydro-seeding trials describe in Section 8.2 shall be undertaken as soon as State border restrictions that are in place due to COVID-19 pandemic are lifted.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The Planning and Assessment and Compliance divisions of the NSW Resource Regulator (Regulator)conducted a site inspection on 12th September 2019 and the Planning and Assessment division notified Perilya via letter on 11th March 2020 that the 2018/2019 Annual Review generally satisfied Schedule 4 Condition 5 of SSD 7538 consent.

Regulator feedback of the 2018/2019 Annual Review per letter provided on 11th March 2020 is outlined in Table 8.

Table 8 - Actions required from 2018/2019 Annual Review

Action required	Action taken by Perilya	Annual Review Section
Address all components of Schedule 4 Condition 5 Sections b), d), e) and f) were not adequately addressed.	Reporting format reviewed and updated to be in accordance with Annual Review Guideline (2015) Second year of annual review reporting provides limited trend analysis of current operation	Section 6 Environmental Performance
Include in future Annual Reviews 1. Health Management; 2. Transport and Truck movements; 3. Water Management 4. Waste Management and Updates on any actions resulting from 5. the independent audit of air quality and health management and 6. the Independent Environmental Audit	1. Health management section included under environmental performance 2. Included in operation summary including link to website which provides monthly movement information 3. Water management section incorporated in to AR document 4. Waste management section included under environmental performance 5. Per Annual Review Guideline (2015) independent audit section included 6. Per Annual Review Guideline (2015) independent audit section included	Section 6.2 Section 4.2.1 & Section 6.6 Section 7 Section 6.11 Section 10.1 Section 10.2
In accordance with Schedule 4, Condition 14, make copy of Annual Review available on company website.	2019/2020 Annual Review will be made available on company website	Section 10.2 Independent Audit action plan

6 ENVIRONMENTAL PERFORMANCE

6.1 AIR QUAILTY

Environmental Management

Air quality management at North Mine is managed in accordance with:

- H02S02PLN0011 North Mine Air Quality Management Plan. Revision I.2 dated April 2020 approved by Department Planning Industry & Environment (DPIE) on 7th April 2020.

The document describes the management of air quality associated with the operational phase of the North Mine and addresses the requirements of Condition 5 of Schedule 3 of SSD7538 and Environmental Protection Licence (EPL) 2683.

The air quality monitoring plan comprises eight components:

- Real-time meteorological monitoring program capable of detecting adverse meteorological conditions;
- Real-time PM_{10} monitoring program capable of facilitating adaptive management of particulate emissions within the Mine Site;
- Total suspended particles (TSP) monitoring program;
- Deposited dust monitoring program;
- Stack monitoring program
- Paved road silt loading monitoring program;
- Free areas control level monitoring program; and
- Targeted monitoring programs to determine efficacy of mitigation measures.

North mine operates an air quality monitoring network consisting of:

- Five dust deposition gauges
- Two high volume air samplers (HVAS)
- Fixed real- time BAM (PM_{10}, $PM_{2.5}$ and wind)
- Real-time meteorological station
- Portable nephelometer (PM_{10})

Air quality monitoring locations are shown in Figure 7.

Environmental Performance

Pacific Environment (PE) consultants prepared an Air Quality and Greenhouse Gas Assessment Update (PE 2017b) for the North Mine Environmental Impact Statement (EIS 2017). PEL (2017b) modelling presented in the assessment has been used to evaluate monitoring results for the reporting period.

Depositional Dust Gauges

Depositional dust monitoring results are summarised in Table 9. Modelled annual average dust deposition at privately -owned receptors were not predicted to exceed the annual average dust deposition incremental criteria of 2 g/m^2/month as a result of the proposal alone or the cumulative criteria of 4 g/m^2/month. Modelling predicted the highest cumulative annual average as 2.71 g/m^2/month.

Table 9 - Comparison of annual average deposited dust results

Monitoring Point	Annual Criteria	Annual Criteria	Annual average depositional dust (g/m^2/month)		
	Increment g/m^2/month	Cumulative g/m^2/month	2017/2018	2018/2019	2019/2020
MP17 Caravan Park	<2	<4	2.0	2.2	2.3
MP22 Argent Street	<2	<4	2.4	3.9	2.1
MP23 Common Dam	<2	<4	0.9	6.7	1.8
MP24 Proprietary Square	<2	<4	1.9	2.9	3.1
MP25 Rasp Ridge	<2	<4	1.5	2.1	2.3

Depositional dust monitoring lead results are summarised in Table 10.

Table 10 - Comparison of annual average deposited dust (lead) results

Monitoring Point	Annual average lead (2010 - 2016) g/m^2/month	Annual average lead (g/m^2/month)		
		2017/2018	2018/2019	2019/2020
MP17 Caravan Park	0.004	0.010	0.007	0.007
MP22 Argent Street	0.005	0.009	0.008	0.009
MP23 Common Dam	0.003	0.012	0.004	0.003
MP24 Proprietary Square	0.011	0.038	0.024	0.024
MP25 Rasp Ridge	0.003	0.010	0.007	0.005

No depositional dust gauges exceeded the incremental criteria or the cumulative annual average for depositional dust for the reporting period. All sites within the boundary of the North Mine operation are consistent with modelled predictions and the result of regional weather events (predominantly dust storms). In Appendix A an air quality data review for the Human Health Risk Assessment details the extraordinary weather events during 2018 and 2019 and the impact of these events on the data.

During the reporting period monitoring validation of nickel and mercury emissions, per SDD 27538 Schedule 3 Condition 5 (e), were completed. From December 2018 to December 2019 monthly deposited dust analysis included nickel and mercury, all results were below the limit of reporting. Monitoring indicates no additional mitigation measures are required as no elevated results were recorded during the validation period.

Dust depositional sampling for the month of January occurred outside the standard exposure period of 30 days +/- 2 days, collection occurred after 33 days due to staff error. Annual schedule for sampling developed each year to ensure compliance with standard, process communicated to relevant staff.

High Volume Air Samplers

HVAS-TSP results for the reporting period are summarised in Table 11. Modelled annual average TSP concentrations at privately-owned receptors were not predicted to exceed the annual average criteria of 90 µg/m^3 ,as a result of the proposal alone, or cumulatively. Modelling predicted a maximum increase of 0.42 µg/m^3 , at privately-owned receptors on existing background concentrations.

HVAS TSP-Lead results for the reporting period are summarised in Table 12. The maximum predicted annual average lead concentration due to the proposed mine site compared with the contribution from the existing Mine site is less than 0.005 µg/m^3 (1% of the annual criteria). The model predicted an annual average lead concentration maximum at the Mine boundary of 0.224 µg/m^3.

Table 11 - Summary of HVAS TSP results

Monitoring Point	TSP Annual Criteria	Total suspended particulate matter (µg/m^3)					
		2017/2018		2018/2019		2019/2020	
		Max 24 hr result	Annual Average	Max 24 hr result	Annual Average	Max 24 hr result	Annual Average
MP26 North Mine	90 µg/m^3	155.6	52.0	608.3	102.6	427.4	70.7
MP30 Argent Street		^	^	391.4	64.8	408.6	59.1

^Argent Street monitoring point installed in July 2018

Table 12 - Summary of HVAS TSP-Lead results

Monitoring Point	TSP-Lead Annual Criteria	Annual Average lead (µg/m^3)					
		2017/2018		2018/2019		2019/2020	
		Max 24 hr result	Annual Average	Max 24 hr result	Annual Average	Max 24 hr result	Annual Average
MP26 North Mine	<0.5 µg/m^3	1.033	0.196	2.211	0.238	0.538	0.139
MP30 Argent Street		^	^	0.273	0.091	0.500	0.099

^Argent Street monitoring point installed in July 2018

Annual average TSP results did not exceed the annual average criteria for TSP or total lead for the reporting period. Due to extraordinary weather events (refer Appendix A) no trends have been concluded.

During the reporting period, monitoring to validate nickel and mercury emissions, per SDD 27538 Schedule 3 Condition 5 (e), were completed. From December 2018 to December 2019 TSP analysis included nickel and mercury, all mercury results were below the limit of reporting (LOR) and two sampling events at MP 26 recorded nickel at 0.002 µg/m^3 (nickel LOR <0.002 µg/m^3). Monitoring indicates no additional mitigation measures are required as no elevated results were recorded during the validation period.

HVAS sampling did not occur at the required frequency during the reporting period due to software and power loss during 24 hour sampling events. HVAS vendor communications on a systemic software fault were not provided to the company until after the missed event (2nd January 2020), temporary correction of fault has been completed and chip replacement to repair issue will be planned when travel restrictions allow. Upgrade to high voltage infrastructure caused a temporary power failure during sampling event on 21st March 2020; samples were voided as HVAS did not operate for required number of hours.

Real-Time PM_{10} Monitoring

Modelled maximum 24-hour average concentrations of particulate matter <10µm (PM_{10}) at privately-owned receptors were not predicted to exceed the daily average of 50 µg/m^3. Annual average concentrations of PM_{10} were not predicted to exceed criteria of 25 µg/m^3. During the reporting period regional weather events (refer Appendix A) resulted in exceedances and are summarised in Table 13.

Table 13 - Annual PM_{10} Results

Annual	Argent Street PM_{10} µg/m³	Menindee Road PM_{10} µg/m³
*Exceedances**	47	46
Minimum	16	13
Maximum	1016	1077
Average	31	36
Num	361	361
Data[%]	98	98
STD	105	77
** Includes any event where the 24 hour average dust concentration is >50 µg/m³ for PM_{10}. No events were attributable to North Mine operations.*		

Continuous PM_{10} results for the reporting period at MP29 Argent Street and MP31 Menindee Road including running annual average for the reporting period are provide in Figure 5 and Figure 6.

Figure 5 - Argent Street (MP29) PM_{10} summary for August 2019 - July 2020

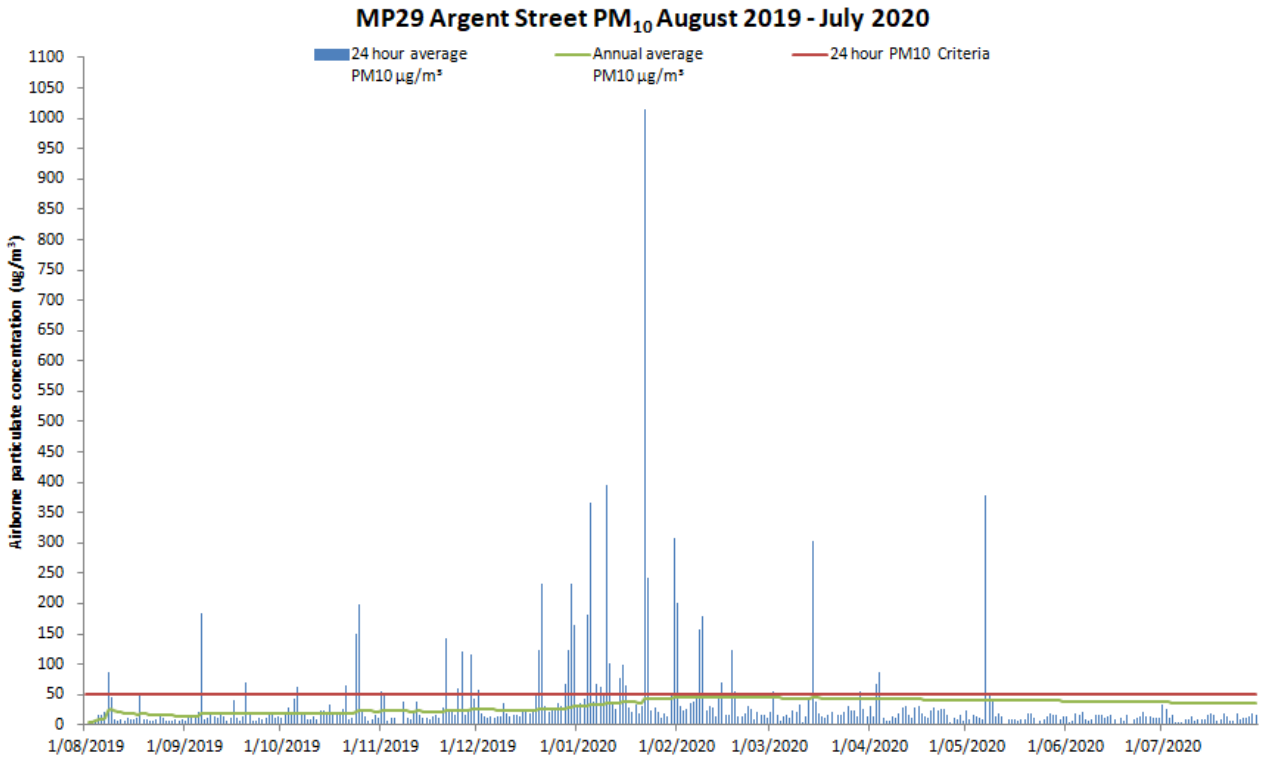


Figure 6 - Menindee Road (MP31) PM_{10} summary for August 2019 - July 2020

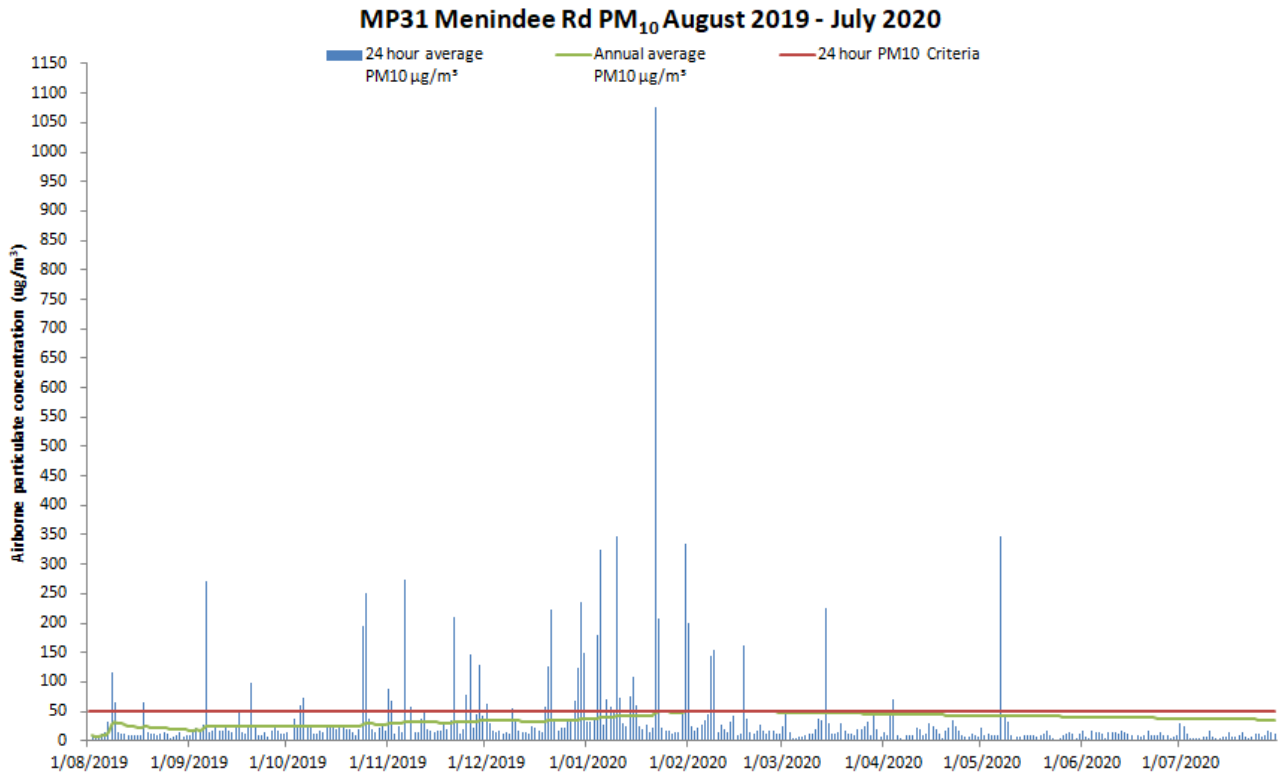


Figure 7 - Air Quality Monitoring Locations

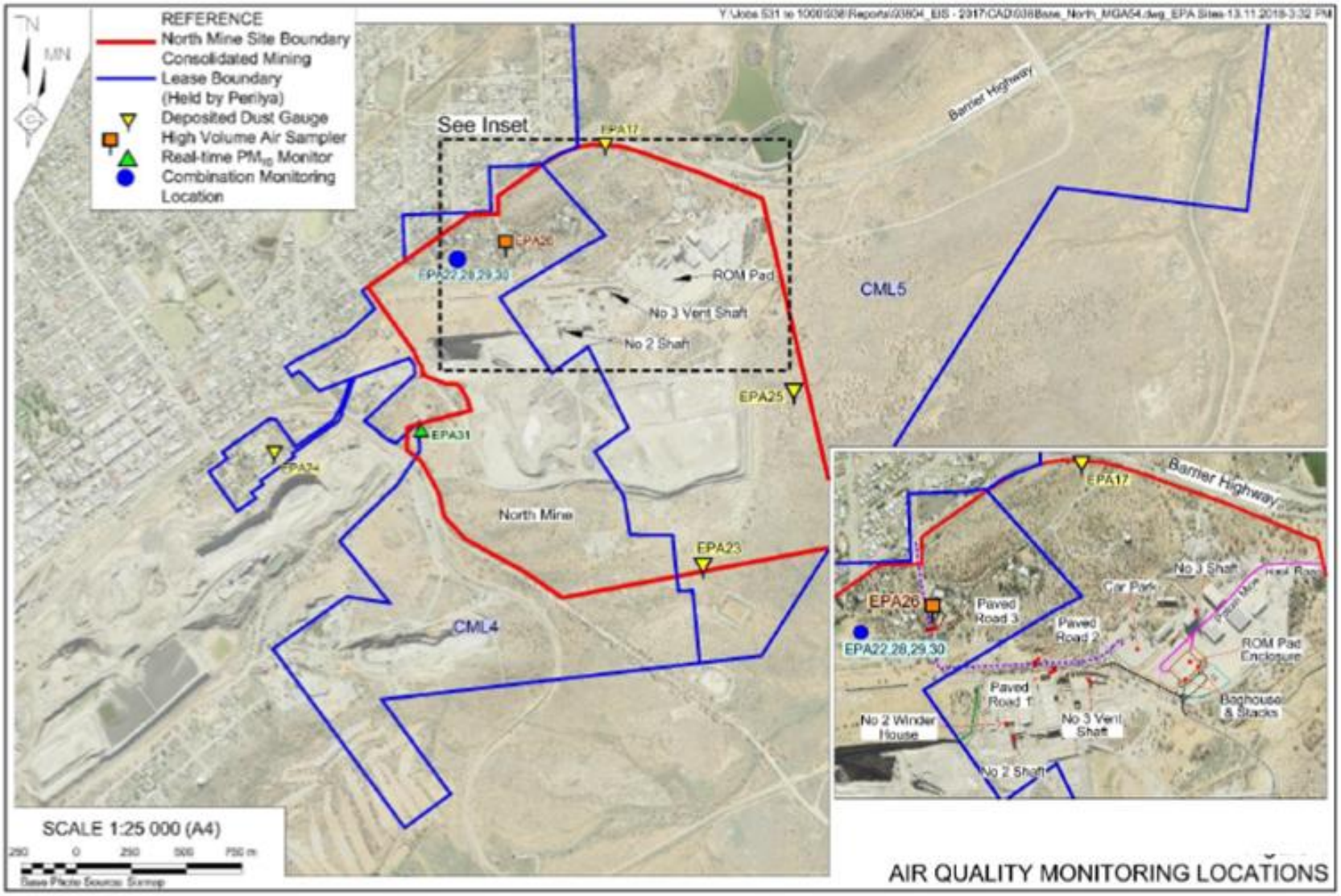
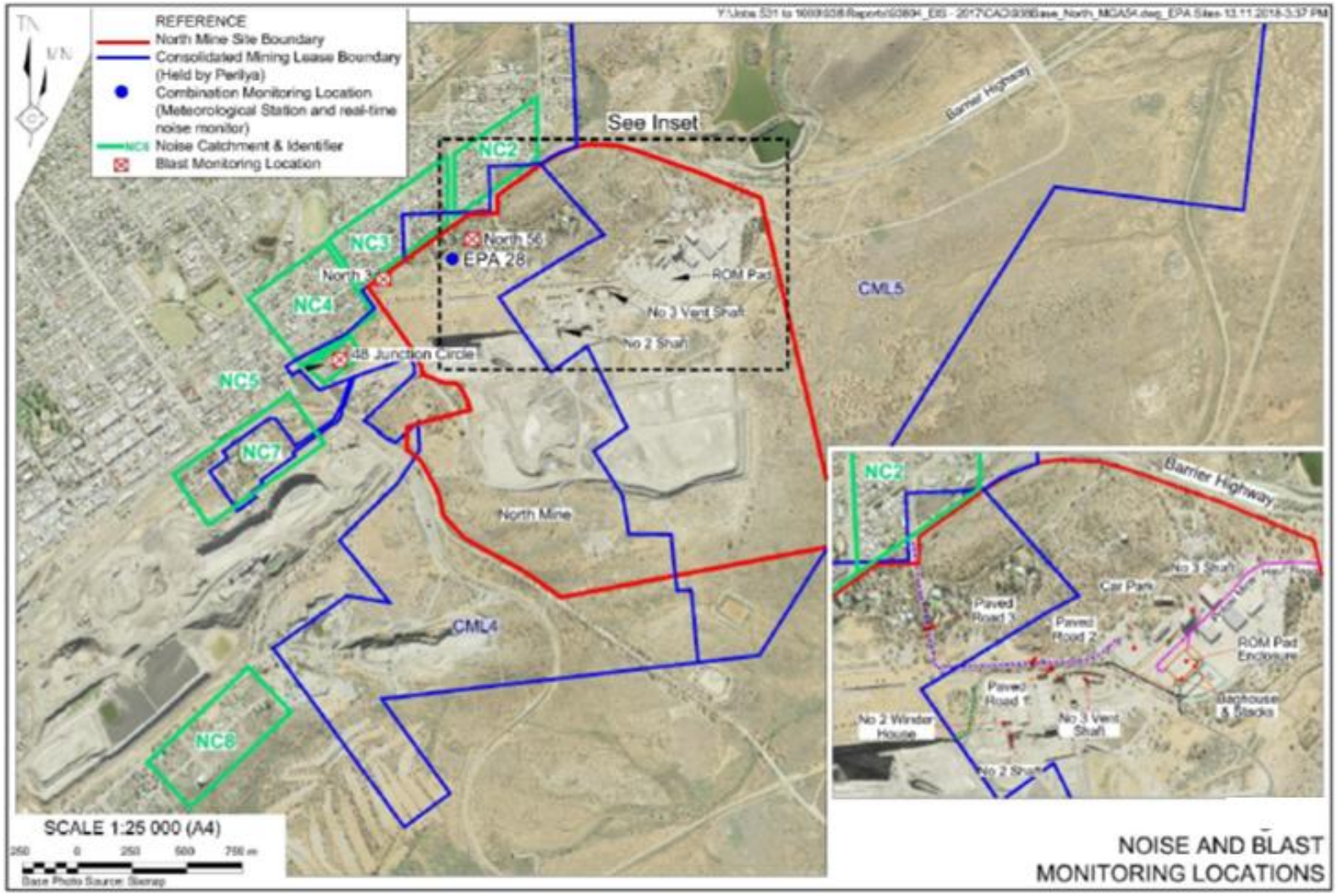


Figure 8 - Noise and Blast Monitoring Locations



Stack Monitoring Program

In addition to the diffuse emissions monitoring program, point source emissions are also monitored from the upcast vent shaft (#3 Vent) and dust collection system stacks installed on the negative pressure ROM building. Modelling for the North Mine EIS of parameters for stack emissions were premised upon upcast vent data from Perilya's South Mine and extraction stacks from Rasp Mine air quality assessment.

Vent shaft testing results for the reporting period are summarised in Table 14. Developed modelling criteria are significantly higher than the actual observed emissions.

Table 14 - Vent shaft sampling summary

Parameter	Units	Assumed Air Quality Modelling Criteria	*Actual No. 3 Vent Shaft*
Stack Monitoring (Vent Rise)			
Flow Rate	m^3/s	350	330
TSP	g/min	126	37
TSP - Lead	g/min	0.066	0.035
PM_{10}	g/min	63	33
$PM_{2.5}$	g/min	42 (@350 m^3/s)	24
		28.2 (@235 m^3/s)	
Type 1 substances [1]	g/min	N/A	≤0.069
Type 2 substances [2]	g/min	N/A	≤0.24
Note 1: Type 1 substances include antimony, arsenic, cadmium, lead and mercury or any compound containing one or more of those elements			
Note 2: Type 2 substances include beryllium, chromium, cobalt, manganese, nickel, selenium, tin and vanadium or any compound containing one or more of those elements			

Dust extraction stack testing results for the reporting period are summarised in Table 15. The assumptions used in the development of the model are not consistent with the final installed dust extraction systems and direct comparison is not possible.

During the next review of the air quality model use of actual rather than assumed criteria should provide greater certain on site emissions from the vent and stacks, sampling from this reporting period would suggest it may be a factor lower than current predictions.

Table 15 - Extraction stack sampling summary

Parameter	Units	Assumed Air Quality Modelling Criteria	*Actual Dust Extraction Stack 1*	*Actual Dust Extraction Stack 2*
Stack Monitoring (Dust Extraction Stacks)				
Flow Rate	m^3/s	19.7	41	42
TSP	g/min	0.24	3.3	3
TSP - Lead	%	8.5	0.2	0.2
PM_{10}	g/min	0.24	<6	<6
$PM_{2.5}$	g/min	0.06	<4	<4
Type 1 substances [1]	g/min	N/A	≤0.012	≤0.012
Type 2 substances [2]	g/min	N/A	≤0.018	≤0.012
Note 1: Type 1 substances include antimony, arsenic, cadmium, lead and mercury or any compound containing one or more of those elements				
Note 2: Type 2 substances include beryllium, chromium, cobalt, manganese, nickel, selenium, tin and vanadium or any compound containing one or more of those elements				

Targeted monitoring (Free areas, paved roads)

- Free areas – Due to site COVID-19 related biosecurity restrictions during the reporting period annual surveying of free areas has been postponed and will be completed when site access restrictions are lifted.

- Paved roads – Silt loading survey for the haul road was undertaken subsequent to the Independent North Mine Audit. Three locations along the length of the haul road were sampled with all sampling locations having less than 1 g/m2 and compliant with the stated criteria <2 g/m2. However significant safety concerns were raised by operators and management during the execution of this sampling directly as a result of the proximity and frequency of heavy vehicles along the single lane haul road.

  A safer method with the same intent was incorporated into the latest version of the North Mine AQMP and approved by DPIE (07 April 2020). It incorporates the use of the portable air quality unit referred to in the North Mine EPL2683. This unit is placed as near as practicable to the haul road for a 24 hour period. If the 24 hour average PM_{10} value is greater than one half of the current NEPM value of 50 µg/m^3 (i.e. 25 µg/m^3) then the event is recorded via the site incident management system and TARP AQ8 is triggered.

  The portable air quality unit was placed adjacent to the haul road during the period for 36 days and recorded an average 24 hour value of 13.7 µg/m^3. Two 24 hour periods exceeded 25 µg/m^3 and investigations determined one related to a regional dust event and the second event was influenced by elevated wind speeds from wind sectors not related to the haul road.

6.2 COMMUNITY HEALTH

Environmental Health Management

Community Health management at North Mine is managed in accordance with:

- North Mine Lead Monitoring and Education Program. Revision E dated November 2019 approved by Department Planning Industry & Environment (DPIE) on 5th November 2019.

This document describes the management of blood lead monitoring and education to be implemented at the request of a resident of District 5A. This document specifically addresses the requirements of Condition 8 of Schedule 3 of SSD7538.

Environmental Health Performance

A *Human Health Risk Assessment* was prepared by ToxConsult (ToxConsult, 2017) to support the application for Development Consent. That assessment determined that the risk associated with emissions of lead from the Mine Site would be negligible. That assessment was based upon particulate emissions determined by the *Air Quality Assessment* (PEL 2017b). The results and conclusions of the Human Health Risk Assessment, therefore, are predicated on the assumption that the particulate matter concentrations and lead deposition levels determined by Pacific Environment (PEL 2017b) are complied with (refer to section 6.1 Air Quality).

In May 2019, the Health Protection Public Health Unit released the *Lead Report 2018: Broken Hill children less than 5 years old*. The document presents the results of blood lead levels monitoring 637 children aged under the age of 5 residing in Broken Hill. The results may be summarised as follows.

- The geometric lead mean level (age-sex standardised) for all children under 5 years was 4.7 µg/dL in 2018, a drop of 1 µg/dL from 2017.

Lead Education Program

Following approval of North Mine Lead Monitoring and Education Program Revision E on 5th November 2019, Newsletter information packages were arranged for delivered by 22nd December to District 5a residence. The lead awareness packages included a copy of program and living with lead pamphlets from LeadSmart Broken Hill as per Figure 9.

Figure 9 - Lead awareness package mail out

Monitoring and Assistance Program

During the reporting period no residences from District 5a have approached PBHL requesting assistance.

6.3 NOISE

Environmental Management

Noise management at North Mine is managed in accordance with:

- H02S02PLN0012 North Mine Noise Management Plan. Revision D

This document describes the management of noise associated with the operational phase of the North Mine.

The Noise Monitoring Plan comprises three components:

• Predictive meteorological monitoring program capable of forecasting adverse meteorological conditions;

• Real-time noise monitoring program capable of facilitating adaptive management of noise within the Mine Site; and

• Attended monitoring program capable of demonstrating compliance with the criteria.

Noise monitoring locations are shown in Figure 8

Noise compliance criteria for the North Mine are set out in Condition 15 of Schedule 3 of SSD7538.

Table 16 reproduces the identified criteria. Figure 8 presents the location of Noise Catchments (NC) NC1 to NC9.

Table 16 - Noise compliance criteria

Location	Day	Evening	Night	
	LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
NC1, NC2	38	38	35	45
NC3, NC4, NC5	36	36	35	45
All other residential receivers	35	35	35	45

Environmental Performance

As part of the development consent a *Noise Impact Assessment (MAC 2017)* was prepared. Background noise conditions are summarised in Table 17 at three locations surrounding the Mine Site.

Table 17 - Background monitoring noise levels

Location	Measured Rating Background Level (dBA)			Measured Equivalent Continuous Level (dBA)		
	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
L1	30 (29)[2]	31	30 (22)[2]	43	43	38
L2	33	35	30 (26)[2]	50	50	46
L3	31	31	30 (25)[2]	48	47	45
Note 1: Day period is from 7:00am to 6:00pm. Evening period is from 6:00pm to 10:00pm. Night period is from 10:00pm to 7:00am						
Note 2: Where the measured rating background level is lower than 30dBA a level of 30dBA is applied and the measured level is shown in brackets						
Source: MAC (2017) after Table 5						

Real-time Noise Monitoring (NMT1)

Table 18 presents the Noise Monitoring Trigger Levels, the trigger levels have been determined via modelling to calculate the All Pass and Low Pass levels at NMT1 equivalent to the noise criteria identified in

Table 16 at the closest residential receiver NC3 (Figure 8). Hence, for a noise event from the North Mine to cause an alert from the noise monitoring terminal, both the All Pass and Low Pass triggers must be exceeded simultaneously at NMT1.

Table 18 - Real-time noise monitoring trigger levels

Period	Units	Noise Criteria at NC3	All Pass Trigger Level dB LAeq(15min)[1,2]	Low Pass Trigger at dB LAeq(15min)[1,2]
Day	LAeq(15min)	36	44	41
Evening	LAeq(15min)	36	44	41
Night	LAeq(15min)	35	43	40
	LA1(1min)	45	53	50
Note 1: To be updated progressively throughout the life of the North Mine				
Note 2: Adopts a 5dB adjustment to account for the distance between NMT1 and NC3.				

Noise monitoring triggers for the reporting period are summarised in Table 19. Mine operational noise contributions did not require TARP response.

Table 19 - Noise trigger summary

Extraneous and non-mining noise sources		North Mine generated noise sources		Contributions above Criteria
Weather (Wind, Rain)	22	Mine Vehicles	6	No
Wildlife (Birds, Insects)	3	Alarms	1	No
External Roads	3	Air quality equipment	13	No

Attended Monitoring Program

Four attended monitoring events occurred in the reporting period against noise criteria defined in Table 20.

- Q1, ending October 2019
- Q2, ending January 2020
- Q3, ending April 2020

- Q4, ending July 2020

Table 20 - Quarterly attended noise monitoring results in comparison to previous years

Monitoring Site	Period	Criteria	Prediction (Neutral)	Prediction (Temperature inversion)	2018/2019		2019/2020	
					min	max	min	max
$L_{Aeq(15min)}$ dB								
NC1	Day	38	37	-	NI	<37	30	<38
	Evening	38	37	-	NI	NI	30	<35
	Night	35	<30	34	NI	NI	NI	<35
NC2	Day	38	36	-	NI	<37	30	<38
	Evening	38	36	-	NI	NI	30	<35
	Night	35	<30	34	NI	NI	NI	<35
NC3	Day	36	30	-	NI	<36	NI	<33
	Evening	36	30	-	NI	NI	<30	<35
	Night	35	<30	30	NI	NI	<30	<35
NC4	Day	36	31	-	NI	<36	NI	<33
	Evening	36	31	-	NI	NI	<30	<35
	Night	35	<30	33	NI	NI	<30	<35
NC5	Day	36	<30	-	NI	<30	NI	NI
	Evening	36	<30	-	NI	NI	NI	NI
	Night	35	<30	<30	NI	NI	<30	30
NC6	Day	35	<30	-	NI	<28	NI	NI
	Evening	35	<30	-	NI	NI	NI	NI
	Night	35	<30	<30	NI	NI	NI	NI
NC7	Day	35	<30	-	NI	<30	NI	NI
	Evening	35	<30	-	NI	NI	NI	NI
	Night	35	<30	<30	NI	NI	<30	30
NC8	Day	35	<30	-	NI	NI	NI	NI
	Evening	35	<30	-	NI	NI	NI	NI
	Night	35	<30	<30	NI	NI	NI	NI
NC9	Day	35	<30	-	NI	NI	NI	NI
	Evening	35	<30	-	NI	NI	NI	NI
	Night	35	<30	<30	NI	NI	NI	NI

NI – North Mine noise inaudible during measurement periods

There were no exceedances of noise criteria during the monitoring events resulting from North Mine activities, which is consistent with predicted noise modelling. Further details of the results obtained are included on PBHL publically available monthly environment reports (http://www.perilya.com.au/health--safety--environment/environment/reports)

6.4 METEOROLOGICAL DATA

Environmental Management

Meteorological data monitoring at North Mine is managed in accordance with:

- H02S02PLN0012 North Mine Noise Management Plan. Revision D

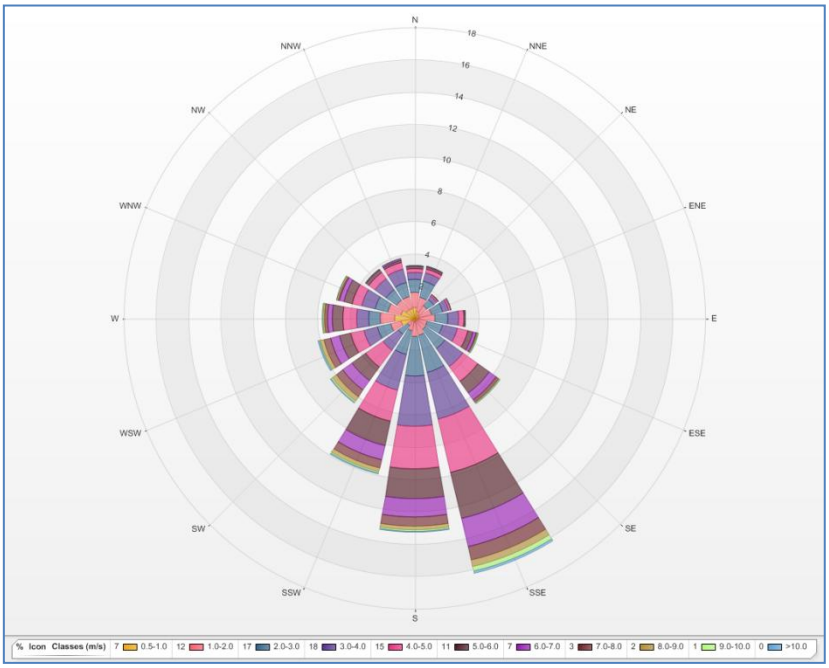
The North Mine meteorological station located at EPA28 per Figure 8 provides real-time adverse meteorological conditions for the implementation of noise and air quality adaptive management of on-site activities, the station records temperature at 2m and 10m, rainfall, wind speed and direction.

Environmental Performance

Meteorological data capture for the reporting period was 94%.

Wind direction during the period was predominantly from the south-southeast and wind speeds were greater than 3 m/s for 62% of the period. An annual wind rose for the period is provided in Figure 10

Figure 10 – Annual Wind Rose



6.5 BLASTING AND VIBRATION

Environmental Management

Blast management at North Mine is managed in accordance with:

- H02S02PLN0013 North Mine Blast Management Plan. Revision E

This document describes the management of blasting and blasting-related impacts associated with the operational phase of the North Mine. This document specifically addresses the requirements of Condition 22 of Schedule 3 of SSD7538.

North mine EPL 2683 requires monitoring of all blasts as summarised in Table 21 at two locations as per Figure 8:

- 56 North
- Junction Circle

Table 21 - Summary of EPL 2683 conditions for blasting (excluding Potosi)

Blasting EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Points	56 North Mine, Junction Circle
Pollutant/s	Ground Vibration

	Overpressure
Unit of measure	Millimetres per second (mm/s), Decibels (dB)
Sampling method	AS 2187.2-2006
Monitoring frequency	All blasts
Data Reporting	All blasts
Date results received	Immediately following each blast
Limits	
Ground Vibration – 95% of blasts	Five (5) millimetres per second (mm/s)
Ground Vibration – Upper limit	Ten (10) millimetres per second (mm/s)
Overpressure – 95% of blasts between 0645 h -1915 h	115 decibels (dB)
Overpressure – upper limit between 0645 h -1915 h	120 decibels (dB)
Overpressure – upper limit between 1915 h - 0645 h	95 decibels (dB)

In addition a third fixed monitoring location adjacent to the closest residence to blasting operations has been established per Condition 19 and 20 of Schedule 3 of SSD7538 North 3 indicates levels at the closest privately owned residence. Table 22 summarises the blasting compliance criteria defined in development consent SSD7538.

Table 22 - Blasting compliance criteria

Blasting Impacts			
Location	Airblast Overpressure1 (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance2
Residence on privately owned land	115	5	5% of the total number of blasts over a 12-month period
	120	10	0%
Blasting Frequency			
Production blasts	1 per day or 6 per week (averaged over a calendar month)		
Other blasts[3]	No limit		

Note 1: The monitoring of airblast overpressure is only required until such time that the EPA is satisfied that it is no longer required
Note 2: The allowable exceedance must be calculated separately for production blasts, development blasts and cut and fill blasts.
Note 3: "Other blasts" are defined as production blasts that generate ground vibration of 0.75mm/s or less at any residence on privately-owned land, blast misfires or blasts required to ensure the safety of the mine or its workers.

Environmental Performance

Blast monitoring results are summarised in Table 23. During the reporting period a total of 1291 blasts were undertaken, 75 production blasts and 1216 development blasts. During the period, 3 blasts were not captured by all 3 units. This was due to software setup errors (twice failed at Junction Circle and once at North 56). On all these occasions the remaining monitors captured the blast event. One production blast on 26/01/2020 that generated a ground vibration above 0.75 mm/s, at North 3, occurred outside of the operating hours defined in Schedule 2 Condition 9. The record triggered at 6:44:55 am, 5 seconds early.

No blasting ground vibrations results above the maximum 10 mm/s or 5/mms were recorded at any blast monitor during the reporting period. A maximum of 3.00 mm/s was recorded at 56 North. No overpressure results exceeded the 0645 to 1915 maximum of 120 dB or 115 dB limits during the reporting period with the maximum overpressure recorded 104.4 dB.

Monitoring location 56 North recorded 20 overpressure results above 95 dB for the 1915 to 0645 limit; these events were caused by elevated wind speeds during the time of the blast event, inversion conditions and inappropriate (historical) siting of the monitoring unit influencing results.

During the period a relocation (triggered by the historical siting) of 56 North monitor occurred and adjustment of EPL 2683 limit time periods was made. Both changes were made in consultation with the NSW Environmental Protection Authority, no exceedances have occurred since the above changes were implemented.

Table 23 - Blast monitoring results

	No. Blasts	No. times measured	Min. Value	Mean Value	Median Value	Max. Value
Overpressure (dB)						
56 North Mine	1291	181	87.9	92.9	89.4	103.3
Junction Circle		46	80.0	89.1	88.0	104.4
North 3		118	76.9	89.1	88.0	100.4
Peak Vector Sum (mm/s)						
56 North Mine	1291	180	0.30	0.74	0.50	3.00
Junction Circle		46	0.00	0.45	0.40	1.12
North 3		119	0.31	0.65	0.49	2.25

Production Blasts	75	Development Blasts	1216	Total Blasts	1291
Blasts >95 dB	81	Blasts >115 dB	0	Blasts >120 dB	0
Blasts >0.75 mm/s	47	Blast >5 mm/s	0	Blast >10mm/s	0

Calculations are based on blasts registering above 0.3 mm/s PVS

6.6 TRANSPORT

Environmental Management

Transport management at North Mine is managed in accordance with:

- H02S02PLN0014 North Mine Transport Management Plan. Revision D

This document describes the management of transportation-related impacts associated with the North Mine. This document specifically addresses the requirements of Condition 27 of Schedule 3 of SSD7538. For the purposed of this document “ore haulage” related to transportation of ore in road-registered vehicles.

Transportation levels – the following maximum transportation rates are permissible.

- Up to 300 000 tpa of ore.
- Up to 32 ore laden truck movements per day.
- Up to 4 ore laden truck movements per hour.

Up to 16 ore laden truck movements per day when averaged over a calendar year.

Environmental Performance

Loaded vehicle movements during the reporting period did not exceed the maximum 32 loads per day, truck movements averaged over the calendar year was 14.96. Transport related incidents reported during the period which are currently under investigation are summarised below

- 29th May 2020 two wheels came off CMC haulage truck on Argent Street, making contact with North Mine residence fence and a private vehicle.
- 22nd July 2020 CMC Road Train entered North Mine through front gates and not by back/rear gate as per drivers Code of Conduct. Immediate action taken included: Contact CMC Supervisor.

6.7 HERITAGE

6.7.1 ABORIGINAL CULTURAL HERITAGE

Environmental Management

Aboriginal cultural heritage management at North Mine is managed in accordance with:

- H02S02PLN0016 North Mine Aboriginal Cultural Heritage Protocol. Revision 0

The protocol is implemented in the event that a suspected Aboriginal artefact is identified within the North Mine site. If an object is identified then the area is barricaded and made safe and immediate communication with the relative authorities, as defined in the protocol, will occur.

Environmental Performance

During the reporting period no chance finds have occurred and the Aboriginal Cultural Heritage Protocol has not been activated.

6.7.2 HISTRORIC HERITAGE MANAGEMENT

Environmental Management

Historic heritage management at North Mine is managed in accordance with:

- H02S02PLN0017 North Mine Historic Heritage Management Plan. Revision D

This document describes the management of Historic Heritage associated with the operational phase of the North Mine. The *Broken Hill Local Environment Plan (2013)* identifies 32 items of local heritage significance within the Mine Site.

Environmental Performance

An assessment of the condition of the heritage sites at the North Mine was undertaken in March 2019 by OzArk consultants. The prepared report (*Historic Heritage Condition Assessment: Broken Hill North Mine*) lists the assessed condition as of 2019 alongside previous assessments (ref.

Table 24**)**.

Table 24 - Condition of all heritage items at the North Mine

Name of Item	Item no.	Assessed Condition 2006	Assessed condition 2019	Comment
No. 1 Mill Foundations	PN-61	Not assessed	Structural ruin	Highly damaged exposed foundations. No recognisable sections of original building remain, and structure may be at risk of subsiding.
No. 1 Mill Tunnel	PN-62	Not assessed	Structural ruin	All timber components have rotted away, and many metal chute fixtures are missing. Concrete failing.
Ambulance Station	PN-63	Fair	Fair	External structure largely intact but interior roofing collapsed and in poor condition.
No. 2 Shaft Headframe and Crushers	PN-64	Fair	Fair	Headframe structure in good condition with little rust. Timber decking missing but crusher still in good condition, primary crusher machinery in poor condition. Windows broken

Name of Item	Item no.	Assessed Condition 2006	Assessed condition 2019	Comment
				throughout.
No. 2 Shaft Winderhouse	PN-65	Poor	Fair	Intact frame, peeling paint with some rust present on corrugated galvanised iron sheets. Some windows still intact.
No. 2 Changehouse	PN-66	Average	Fair	Intact, some rust on corrugated galvanised iron sheets. Stairs at entrance in poor condition.
No. 2 Mill	PN-67	Average	Fair	Missing some corrugated galvanised iron sheets and has a large amount of surface rust. Windows mostly intact, both concrete bins and building structure are in good condition at rear of building.
No. 2 Residue Pumphouse, No.12 Conveyer and Hopper	PN-68	Very poor	Very poor	Sheeting intact but all windows broken. Both hopper and conveyer in very poor condition.
No. 2 Reagent Shed	PN-69	Poor	Poor	Roof sheets missing, broken and missing windows, corrugated galvanised iron sheets very rusted.
No. 2 Thickener Vats	PN-70	Very poor	Very poor	All metal rusted, concrete failing and many pipes missing. Pumphouse in good condition, with concrete intact and minimal rust to corrugated galvanised iron panels.
No. 2 Lead Bin	PN-71	Very poor	Poor	Bin concrete failing and all metal surfaces rusted. Concrete base and rails leading from bin intact.
No. 2 Filterhouse and loading station	PN-72	Average	Poor	High level of rust on corrugated galvanised iron sheets with some panels missing. Windows broken.
No. 3 Vent fan	PN-74	Average	Fair	Some surface rust to horizontal section, but generally good condition. Vertical fan structure in poor condition with high levels of rust.
Weighbridge station	PN-75	Average	Poor	Structurally intact, but corrugated galvanised iron sheets rusty and windows broken. Interior in poor condition.
Water Tank (Lords Hill)	PN-96	Not assessed	Good	
Archaeological Potential - Amalgamated Zinc	PN-99	Not assessed	Not applicable	Area demolished, cleared and levelled. Archaeological potential limited to concrete slabs, no archaeological significance.
Loading Station	PN-76	Average	Good	Structural trusses intact, rusted but sound corrugated galvanised iron sheeting. Some timber fencing missing but generally good condition.
No. 3 Crusher house	PN-77	Fair	Fair	Some broken windows and rust to corrugated galvanised iron sheeting but intact and in fair condition.
No. 3 Shaft headframe	PN-78	Fair	Good	Structure intact with no missing trusses and minimal surface rust.
No. 3 Winderhouse	PN-79	Average	Fair	All windows intact, some rust present. Some shade panelling broken but machinery remains intact.
No. 3 Changehouse and subsurface platform	PN-80	Average	Fair	The areas of the building still in use are in good condition, but large amount of rust on roof and gutters. Many broken windows and concrete cancer are visible in places.
North Mine General Offices	PN-81	Fair	Poor	Roof and veranda in poor condition. Windows largely intact but window seals lifting and deteriorating.
North Mine Assay Office	PN-82	Fair	Fair	Steel frame rusted, some broken windows and failing window seals. Exterior roofing sheets lifting off.
No. 3 Tanks and shed	PN-83	Good	Good	Tank still functioning with some evidence of surface deterioration including salt scale at base and rust. Shed demolished.
No. 3 Transformers	PN-84	Very poor	Very poor	Evaporation tower in very poor condition with many blades rusted through and concrete flaking. Transformers have

Name of Item	Item no.	Assessed Condition 2006	Assessed condition 2019	Comment
and cooling tower				surface rust, vegetation around structures.
No. 3 Shed (former saw mill)	PN-85	Average	Structural ruin	Building demolished prior to 2016, slab concrete remains and evidence of timber offcuts.
Houses 17, 18, 19, 19B and 20	PN-86	Good	Very Good	Some minor works required: repainting, some roofing lifting, gutters full.
12 houses at Junction Circle	PN-89	Good	Good	All paintwork on timber lifting including facias.
North Mine Residences	PN-87	Good	Good	Exterior paint lifting in places.
North Broken Hill Entrance Gates	PN-88	Fair	Fair	Structurally sound brickwork but roof facia and gutters in poor condition.
Drainage Channel I314	PN-73	Not assessed	Good	"Possible originally stone lined in entirety. Some sections now concrete lined to replace missing or damaged stonework. Concrete base has cracked and beginning to fail in places where stonework missing. Eastern section concrete changes to stone at the weighbridge. Western end buried and contains a pipe. An integrity assessment completed by Perilya in 2018.
Standard Gauge Railway Siding	PN-97	Not assessed	Poor	35 metres remaining at far-eastern end of line. Several railcars remaining on line.
Compressed Air and Power Line	PN-98	Not assessed	Poor	Many sections missing, line is incomplete.

6.8 WASTE MANAGEMENT

Environmental Management

Perilya Broken Hill Ltd engages a licensed waste management provider for the offsite management of both recycled and non-recycled waste including:

- Hydrocarbons on a monthly basis
- Hazardous waste including sewerage

Onsite waste disposal includes, overburden waste is disposed within the Cosmopolitan pit and benign wastes are disposed within the onsite landfill and covered with overburden material.

Environmental Performance

During the reporting period North Mine generated 29,300 Litres of waste oil compared to 35,200 Litres generated last period.

Collection of hydrocarbon products commenced during this reporting period with approximately 45 tonnes (including backlog) of IBC-size containers sent off site for appropriate disposal.

Waste management has increased in this reporting period, a result of an incremental increase in onsite activities from the continued ramp up of the restarted mine. Significant waste streams requiring licensed contractors include; hydraulic hoses, oil filters, oily rags, empty IBC's from concrete services, obsolete chemicals and recyclables.

6.9 CONTAMINATED LAND AND HYDROCARBON CONTAMINATION

Areas of contamination arising as a result of historical mining are scheduled to be addressed during site rehabilitation and prior to the mine closure phase.

Hydrocarbon waste management requirements (AS 1940) are in place and hydrocarbon waste is disposed of by a licensed waste contractor.

6.10 LAND MANAGEMENT

The Mine is located in a historically disturbed area (since 1883). An ecological assessment undertaken as part of the EIS for the re-start of North Mine determined that the mine would not result in disturbance to native vegetation.

An ecological assessment undertaken in 2017 determined that the mine re-start would not result in impact to any threatened species (OzArk 2017.)

Weeds and pests are controlled on a campaign basis with no activities undertaken during the period. Woody weeds on the CML's include sporadic Tamarisk. Feral animals include goats and rabbits. There were no required programs associated with weed or feral animal control during the period.

6.11 VISUAL AMENITY

The Mine site is operational. The only areas with night (surface) lighting are the maintenance workshops and administration / crib areas. Outdoor lighting fixtures constructed in accordance with *AS4282 (INT) – Control of Obtrusive Effects of Outdoor Lighting.*

6.12 BUSHFIRE

Bushfire risk at North Mine is considered to be low due to:

- Vegetation surrounding North Mine is open arid shrubland sparsely vegetated and has as a result inherently low fuel loads

The Mine site contains perimeter and internal fire breaks.

6.13 PUBLIC SAFETY

North Mine is considered to present low risk to public safety due to:

- Site possessing full-perimeter security fencing;
- Mine site is patrolled on a regular basis by Security;

Video surveillance is used at all Perilya mines in Broken Hill.

Security related incidents reported during the period are summarised below

- 23rd October 2019 - Unauthorised member of the public on site. Security notified.
- 10th February 2020 - Unauthorised vehicle on site. Security notified.

7 WATER MANAGEMENT

7.1 WATER ACCESS LICENCE

PBHL holds a water supply works approval (60WA583325) for the underground workings of the North Mine as well as a water access licence (WAL40959) that allows for the extraction of up 1.466 Gl of groundwater per annum from the North Mine workings, as well as:

• Southern Operations (WA60582773, WA60582777 and WA60582779); and

• Potosi Mine (85WA753477).

Table 25 - North Mine extraction August 2019 to July 2020

Water access licence #	Annual extraction limit (GL)	No. 3 Shaft Annual extraction (GL)
WAL40959	1.466	0.510

North mine extracted approximately one third of the total allocation across the third mine sites during the reporting period per Table 25.

7.2 SURFACE WATER

Environmental Management

Surface management at North Mine is managed in accordance with:

- H02S02PLN0017 North Mine Water Management Plan. Revision F

This document describes the management of water associated with the operational phase of the North Mine.

External Catchments Zone

Runoff generated in the External Catchments Zone enters the Mine Site catchments and is directed either around or through the Mine Site via clean water diversion drainage infrastructure (open drain or pipe) without mixing with other (site generated) classes of water.

Internal (Mine-Site) Catchments Zones

All surface water runoff is contained via a serious of lined and unlined dams with pump and pipe connectivity.

Sediment and Erosion Control

Inspections of sediment and erosion control structures following 25 mm of rain in 24-hours, in the event that evidence of erosion or sedimentation is observed, a defined set of management and mitigation measures are implemented in accordance with the above plan.

Environmental Performance

For the reporting period Broken Hill recorded 57.8 mm of rainfall with 26 days registering greater 0.1 mm, the highest 24 hour rainfall event recorded was 13.6 mm which occurred in November 2019.

During the reporting period due to low rainfall no surface water monitoring was required or able to be undertaken.

7.3 GROUNDWATER

Environmental Management

Groundwater management at North Mine is managed in accordance with:

- H02S02PLN0017 North Mine Water Management Plan. Revision F

Groundwater recharge occurs via direct rainfall in sub-crop areas or via leakage from the overlying regolith or alluvial deposits associated with ephemeral water courses.

There are no known groundwater dependant ecosystems in the vicinity of the North Mine (OzArk 2017). In the vicinity of North Mine, the aquifer has been the subject of extensive dewatering since the commencement of mining operations in 1883. PBHL installed a submersible pump in the No. 3 Shaft on 2 March 2018 to recommence dewatering operations.

Extracted water is stored in lined evaporation ponds or piped to South Mine for use in the mineral processing circuit. Three piezometers were established downstream of the Evaporation Ponds to measure presence of leakage with a Trigger Action Response Plan (TARP) to be implemented should water be intersected.

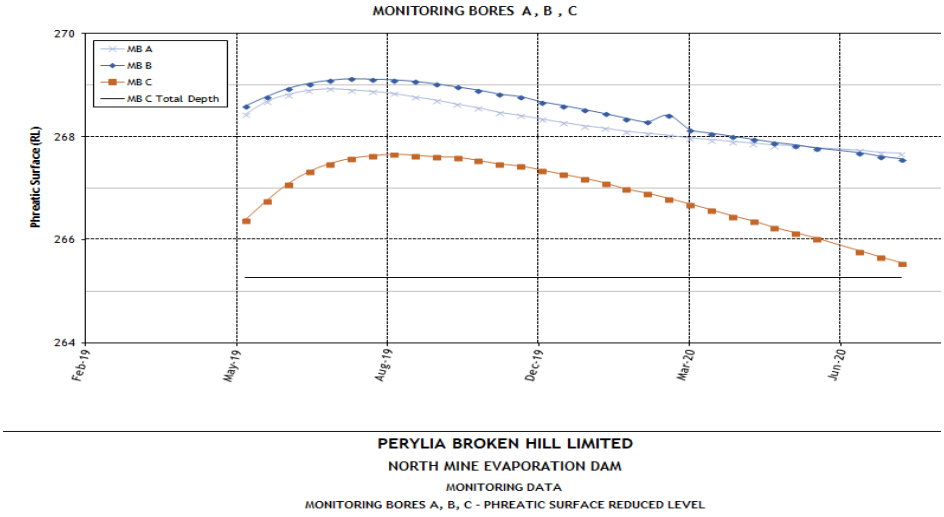
Environmental Performance

The standing water level within the No. 3 Shaft in August 2018 was 584.5 (m BGL) and the standing water level recorded during reporting period 902.5 (m BGL).

Monitoring of the three downstream piezometers commenced in May 2019, the first monitoring event indicated the presence of water and the frequency of monitoring was increased to fortnightly to observe trends. Due to the low volumes of water present an in-situ water probe was used to determine water quality parameters of the monitoring bores. Monitoring recorded increasing conductivity from monitoring bore A (MB A) to monitoring bore C (MB C) indicating the source entered the system at MB A before flowing to MB C.

Figure 11 provides the fortnightly monitoring of downstream monitoring bores, observed water levels have declined since August 2019. Water levels in evaporation dams have been maintained during this period however water has been removed from adjacent dam 57 which has been dry since December 2019.

Figure 11 - Monitoring Bores A, B, C Pheratic surface level



8 REHABILITATION

The rehabilitation planning and management of North Mine is located in sections 5 to 8 of the MOP (2018). In accordance with Schedule 3, Condition 45 within one year of commencing mining operations a draft Rehabilitation Strategy was prepared and provided to members of the Broken Hill Rehabilitation Steering Committee for consultation. Outcomes of consultation with the committee are still pending and are linked to the Historic Heritage management plan consultation. Approval of the rehabilitation strategy will initiate the development of the North Mine Rehabilitation Plan.

The post mining land use goals identified in the for North Mine strategy are to create a landform that:

1. is safe, stable, secure and non-polluting;
2. provides for a range of beneficial land uses that will support the post-mining economy of Broken Hill;
3. retains and preserves key heritage items in a manner that allows subsequent custodians to manage those items into the future, while allowing for the archival recording and removal or ruination of other items;
4. provides for a visual landscape that is in keeping with Broken Hill's unique visual character;
5. preserves relevant surface infrastructure for future beneficial land use;
6. does not exacerbate existing lead levels in soils surrounding the Mine Site;
7. does not result in discharge of sediment, salt or chemical-laden water, including leachate, from the Mine Site; and
8. is designed and managed in manner that is consistent with reasonable community and government agency expectations and desires.

8.1 REHABILITATION DURING REPORTING PERIOD

Table 26 presents a summary of the disturbance areas for the previous reporting period, the current reporting period and a forecast of the next reporting period. Figure 13 indicates site disturbance at end of annual review reporting period.

Table 26 - Rehabilitation Status

Mine Area Type	Previous reporting period	This reporting period	Next reporting period
	2018/2019 (ha)	2019/2020 (ha)	2020/2021 (ha)
A. Total mine footprint	162.1	162.1	162.1
B. Total active disturbance	153.8	153.8	143.7
C. Land being prepared for rehabilitation	0	0	10
D. Land under active rehabilitation	0	0	8
E. Completed rehabilitation	0	0	0

Rehabilitation activities during the reporting period have been influenced by COVID related State border and Site Health & Safety restrictions, which resulted in postponement of planned rehabilitation and trials (Section 8.2).

Collection and storage of 37 kg of seed mix for rehabilitation of Domain 4 area were undertaken during the reporting period; however the aforementioned delays have postponed the preparation of the landform area. Table 27 provides a summary of the status of rehabilitation at the end of the reporting period.

Table 27 - Rehabilitation Progression (Year 2/Year 3)

Objective	Performance Indicator	Progress at start of MOP	Expected Completion	TARP	Current Status
Phase 1 – Decommissioning					
Domain 5 – Mining Disturbance Area					
All infrastructure not suitable for lawful final land use will be removed.	Infrastructure not required for final land use to be removed.	Not Commenced	End Year 1		Complete. Not required mine infrastructure has been removed. Historical Heritage and Rehabilitation Management plans requiring sanction from the Broken Hill Rehabilitation Steering Committee(pending) have not been finalised, thus lawful final land use has not been confirmed.
Domain is free from hazardous materials and contaminants.	Contaminated land identified and remediated.	Not Commenced	End Year 1		Existing contaminated land assessment information consulted for primary remediation undertaken in early 2019.
		Not Commenced	End Year 2	1 – trigger relates to not meeting remediation – this assessment has been COVID delayed	Site access due to Perilya COVID-19 policies during current reporting period has limited options for assessment of primary remediation, alternative method of XRF grid and sampling by site personnel planned during next reporting period.
Phase 2 – Landform Establishment					
Domain 5 – Mining Disturbance Area					
Free draining, stable and non-polluting landform established.	Landform suitable for growth medium development.	Not commenced	In progress (4ha/year from Year 2)		Yet to commence as contaminated land assessment and final landform have not be confirmed to progress to phase 2
Phase 3 – Growth Medium Development					
Domain K – Rehabilitation Area – Open Shrubland *Domain M – Heritage Conservation Area (sections not required to support heritage/commercial final land use)*					
Growth medium suitable for establishment of vegetation communities present.	Compacted surfaces deep ripped along contour.	Not Commenced	In progress (4ha/year from Year 2)		Domain 4 of Domain K only area non operational with per established (prior to MOP 2018) phase 1 and 2 areas available. Rip and contour development postponed due to COVID-19 State boarder closures. No work in Domain M per previously discussed delays in Historical and Rehabilitation strategy approvals
	Minimum growth medium depth determined during rehabilitation trials (see Section 8.2) spread over	Not Commenced	In progress (4ha/year from Year 2)	5, 6 & 7 Not triggered - work delayed	Growth medium spreading of Domain 4 linked to above delay. No work in Domain M per previously

Objective	Performance Indicator	Progress at start of MOP	Expected Completion	TARP	Current Status
	domain.				discussed delays in Historical and Rehabilitation strategy approvals
Phase 4 – Ecosystem and Land Use Establishment					
Domain K – Rehabilitation Area – Open Shrubland *Domain M – Heritage Conservation Area (sections not required to support heritage/commercial final land use)*					
Establish vegetation communities with a similar species composition to the surrounding native vegetation communities and consistent with the proposed final land use.	Species determined through rehabilitation trials planted using methodology and timing determined based in rehabilitation trials (see Section 8.2).	Not Commenced	In progress (4ha/year from Year 2)	9 Not triggered – work delayed	Vegetation establishment of Domain 4 linked to above delay. No work in Domain M per previously discussed delays in Historical and Rehabilitation strategy approvals
Phase 5 – Ecosystem and Land Use Sustainability					
No ecosystem and land use sustainability activities apply to domains during current MOP period.					

8.2 REHABILTATION TRIALS

During the reporting period two rehabilitation trials employing hydro-seeding were planned:

1. 1000 m^2 area on the haul road noise bund slope per Figure 12 and
2. 5000 m^2 area on the McCullough St Flat.

Plant species were selected based on general soil, angle of soil surface slope and observed particle size distribution conditions, salinity, portions of topsoil and metals probability of occurrence. Additionally plant species (chenopods) that are not highly palatable to feral animals have been selected.

Prior to the postponement the hydro seeding mix was collected per Table 28, the seed has been individually bagged, labelled and is currently being stored under controlled conditions in Adelaide.

Figure 12 - Proposed noise bund trial area

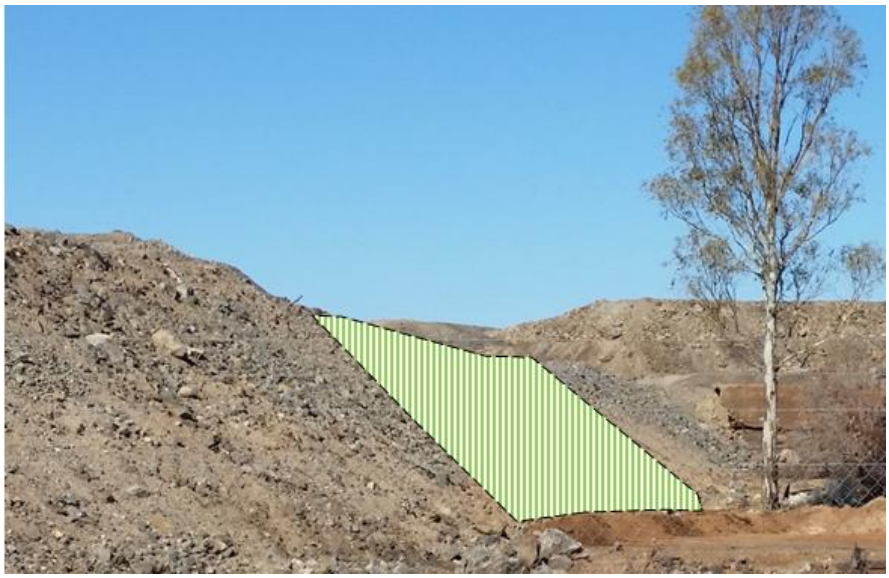
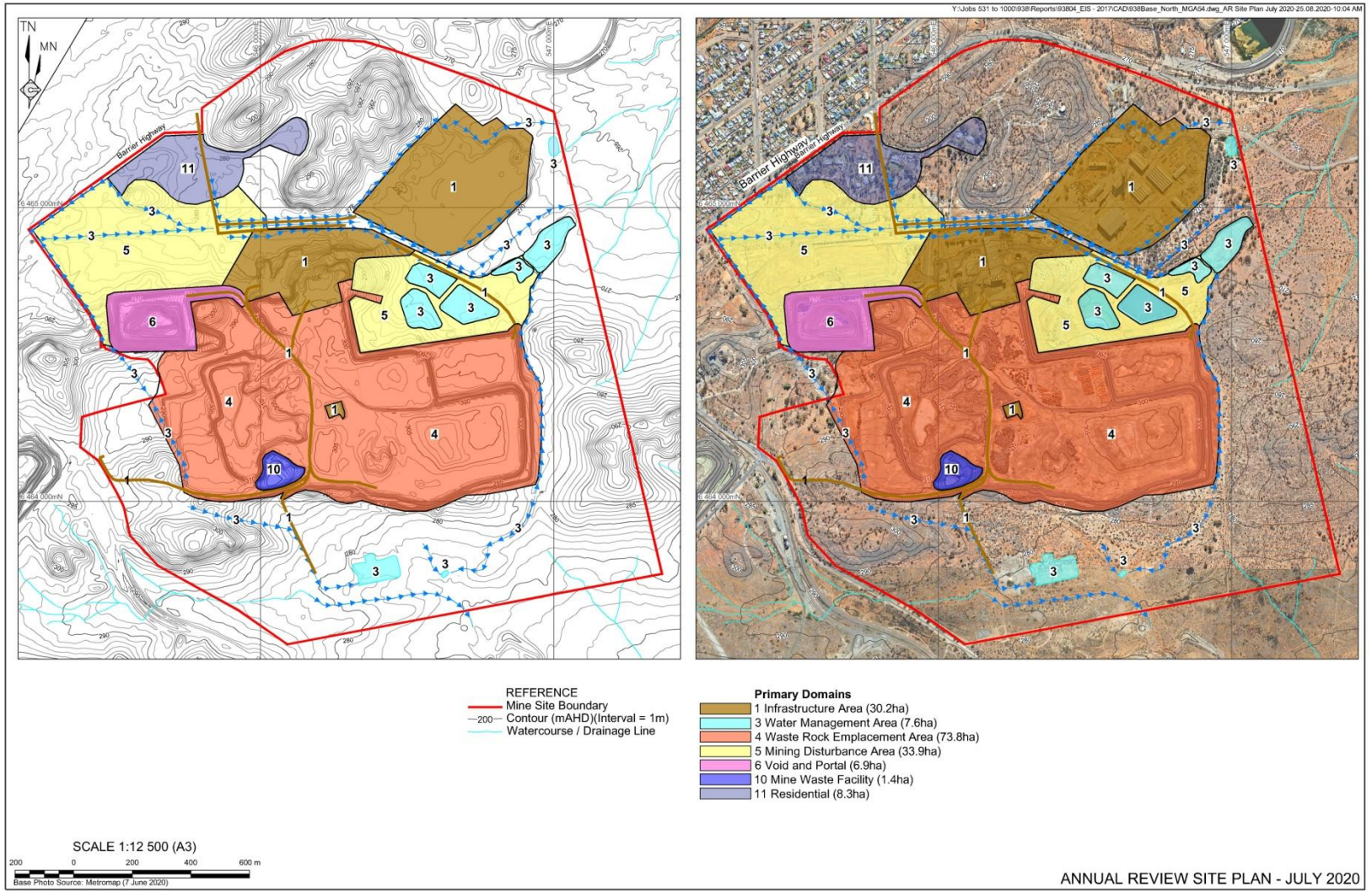


Table 28 - Hydroseeding trial seed mix

Hydroseeding mix	Quantity in Kg	Hydroseeding mix	Quantity in Kg
Atriplex nummularia	2.55	Maireana aphylla	1.00
Atriplex semibaccata	2.00	Maireana sedifolia	0.75
Atriplex holocarpa	2.00	Myoporum montanum	0.50
Atriplex lindleyi	2.00	Senna artemisioides ssp artemisioides	1.00
Atriplex vesicaria	1.00	Tecticornia sp	5.00
Enchylaena tomentosa	2.00	Nitraria billardierei	2.00
Maireana aphylla	1.00	Cymbopogon ambigus	0.55
Maireana appressa	1.95	Dactyloctenium radulans	0.50
Maireana brevifolia	2.00	Enneapogon nigricans or sp	0.20

Figure 13 - Annual Review Site Plan - July 2020



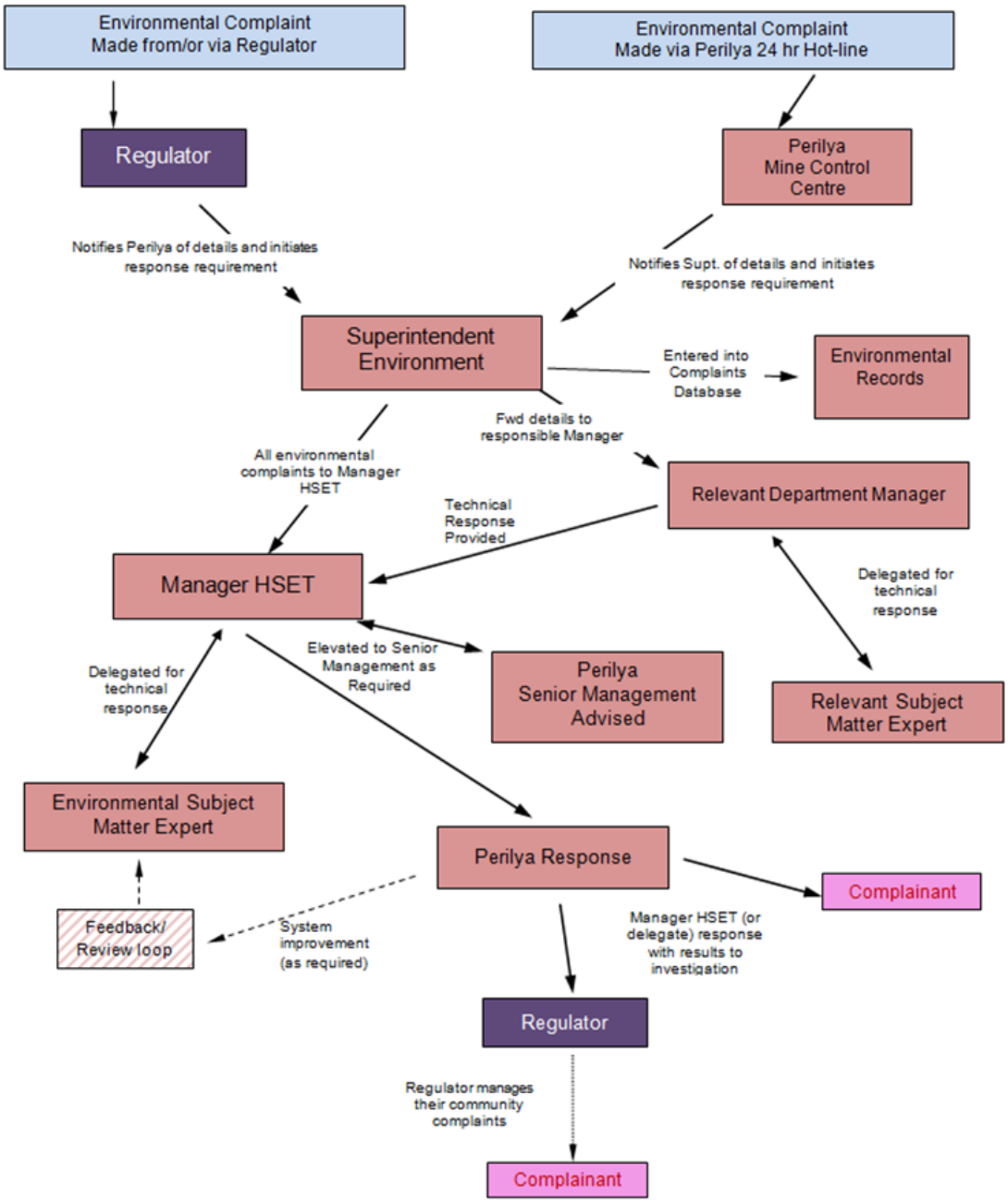
9 COMMUNITY

Environmental Complaints Management

Environmental Complaints management at North Mine is managed in accordance with:

- H05S14SOP0001: Management of Environmental Complaints
- Record of Environmental Complaints Form

Response to environmental complaints follows the chart below.



Community Complaints

During the reporting period there were no complaints registered for North Mine. Table 29 summaries the issues registered over the last three reporting periods.

Table 29 - Registered North Mine Complaints

Issue	Aug-17 to Jul -18	Aug-18 to Jul-19	Aug-19 to Jul-20
Noise	4	0	0
Blasting and vibration	2	1	0

Community Consultative Committee

As the re-commissioning of the North Mine is designated a State Significant Project, establishing a Community Consultative Committee (CCC) for the project is one of the conditions of the Development Consent.

The Broken Hill North Mine Community Consultative Committee is an advisory committee chaired by an independent chairperson. The CCC provides a forum for discussion between Perilya and representatives of the Broken Hill community, stakeholder groups and the Broken Hill City Council on issues relating the state significant project, North Mine.

The CCC seeks to:

- Promote good working relationships and information sharing between committee members.
- Allow Perilya to keep the community informed about projects, seek community views on the North Mine, and respond to matters raised by the community.
- Allow community members and the local council to seek information from Perilya on the development and implementation of the North Mine project, and facilitate the delivery of balanced social, environmental and economic outcomes.

Minutes of Meetings held between the CCC and Perilya can be found at http://www.perilya.com.au/health--safety--environment/community/bhnmccc

10 INDEPENDENT ADUIT

10.1 INDEPENDENT ENVIRONMETAL AUDIT

An independent environmental audit was undertaken at North Mine in August 2019, the period covered by the audit was from 18 August 2018 to 16 August 2019. The audit was conducted by Environmental Engineering & Energy (3E) with lead auditor John Hanrahan, The Secretary of the DPE endorsed the appointment of the audit team by letter on 3 May 2019.

The scope of the independent environmental audit included all relevant conditions specified below:

- State Significant Development Consent Number 7538 (MOD 1) as approved on 7 September 2018 by the delegate of the NSW Minister for Planning ('SSD Consent');
- Environment Protection Licence Number 2683 as at 6 July 2018, issued by the NSW Environment Protection Authority ('EPL');
- Consolidated Mining Lease Number 4 as renewed on 8 July 1987 ('CML4');
- Consolidated Mining Lease Number 5 as renewed on 8 July 1987 ('CML5'); and
- The sighting of environmental and operational documentation, records, monitoring data, operating and field conditions relating to the operation of the Broken Hill North Mine and related activities and conducting a number of interviews with relevant Perilya environmental and operational personnel.

Following is a summary of the audit report which is available on the company website including PBHL response to audit conditions resulting in non-compliance.

- *A total of 213 conditions across the SSD Consent, EPL, CML4 and CML5 were audited. The audit identified 135 'compliant' findings, 9 'not verified' findings, 25 'non-compliant' findings (consisting of 25 'low' risk level, 0 'medium' risk level,' 0 high' risk level), 14 'administrative non-compliance' findings, 16 'not triggered' findings, and 14 'notes'.*
- *Perilya was compliant with 135 of the 197 applicable conditions (i.e. all conditions except those which were 'not triggered').*
- *Perilya's level of compliance with the applicable conditions (i.e. all conditions except those which were 'not triggered') in each instrument was as follows:*
  - *Perilya was compliant with 43 of the 69 applicable SSD Consent conditions;*
  - *Perilya was compliant with 47 of the 70 applicable EPL conditions;*
  - *Perilya was compliant with 22 of the 28 applicable CML4 conditions;*
  - *Perilya was compliant with 23 of the 30 applicable CML5 conditions.*

Table 30 provides the completed status of the action plan to address non-compliances as of the end of the reporting period. Table 31 details the remaining action to be completed.

Table 30 - Completed 2019 Independent Audit Actions

Condition	Audit Findings		Status
SSD 7538 Sch 2 – Cond 11	During this August 2019 audit Perilya was unable to provide documented evidence of compliance with this condition in relation to the ROM shed or other relevant buildings and structures.	Administrative Non-compliant	**Completed** Final occupancy certificate for ROM shed from the registered development certifier obtained 6 April 2020.
SSD 7538 Sch 3 – Cond 8	Perilya's letter of 5 August 2019 to the Secretary, which attached the Lead Monitoring and Education Program for approval, states that the LMEP was not submitted by the Secretary's approved extended deadline of 7 March 2019) due to Perilya only having received acceptance of the LMEP from the EPA on 7 June 2019 and NSW Health on 30 July 2019.	Administrative Non-compliant	**Completed** Lead Monitoring and Education Program (Revision E) submitted to the Department on 14 November 2019. Document approved by Department on 15 November 2019
SSD 7538 Sch 4 – Cond 14	The following documents which this condition requires to be on Perilya's website, were not on the website as at the end of the audit period (16 August 2019): · the Annual Review for the period from 18 August 2018 to 31 December 2018 (SSD Consent Schedule 5 condition 4) – the Annual Review had not been prepared as at the end of the audit period; · the Lead Monitoring and Education Program (SSD Consent Schedule 3 condition 8); · monthly summary reports of monitoring results under the Water Management Plan (SSD Consent Schedule 4 condition 10); and · the "Independent Audit of Air Quality and Health Management" report (Northstar Air Quality Pty Ltd, report reference: 19.1053.FR1V1) of 19 March 2019 (SSD Consent Schedule 3 condition 12).	Administrative Non-compliant	**Completed** Current annual review will be uploaded following approval, links to remaining documents provide below http://www.perilya.com.au/health--safety--environment/environment/reports http://www.perilya.com.au/our-business/operations/broken-hill-north-mine/operational-docs
EPL2683 M1.3	The quarterly Muller Acoustic Consulting Noise Monitoring Assessment reports do not identify the name of the person who collected the attended noise monitoring data.	Administrative Non-compliant	**Completed** Field officer undertaking sampling included on title page of reports since January 2020

Condition	Audit Findings		Status
EPL2683 R1.7	The copy of the 2017-2018 Annual Return provided during this August 2019 audit had the seven sections completed but was unsigned and undated.	Administrative Non-compliant	**Completed** PBHL maintained hard copy of submissions prior to electronic signature process. Annual Returns completed via EPA electronic submission process. PBHL maintains this is a valid document as accepted via the NSW EPA
EPL2683 R1.8	In respect of the 2017-2018 Annual Return, Perilya had not supplied the data report required under this condition.	Administrative Non-compliant	**Completed** PBHL to action on future Annual Returns 2018-2019 Annual Return submission included report
EPL2683 R1.9	Perilya has submitted at least two of the quarterly blast monitoring reports a few days after the six week timeframe specified in this condition.	Administrative Non-compliant	**Completed** PBHL to action on future quarterly reports but maintains that this finding results in no environmental risk or harm. All EPL 2683 quarterly reports submitted for current reporting period comply with this condition.
EPL2683 G1.2	In field inspections during this August 2019 audit, a selection of monitoring points were observed not to be marked with a point identification number. These unmarked points included monitoring points 29, 31 and 32.	Administrative Non-compliant	**Completed** New monitoring signage associated with monitoring equipment installed. Annual audit of monitoring locations to ensure ongoing compliance
EPL2683 E2.1	During this August 2019 audit Perilya was unable to provide evidence that the 'approved' Environmental Management Plans and Environmental Management Strategy identified in this condition had been provided to the EPA.	Administrative Non-compliant	**Completed** Provision of the documents to the NSW EPA via email during this period.
CML 4/5 1	During this August 2019 audit Perilya was unable to provide evidence that it had notified affected landholders in writing of the grant/renewal of CML4 either by service of a notice on each landholder, or service by means of publication in a newspaper circulating in the lease area.	Administrative Non-compliant	**Completed** PBHL notes Auditors comments *The Auditors note as evidence of potential future compliance with this condition (i.e. on the next renewal of CML5) that Perilya was able to provide evidence of written notification (via Hetherington Exploration and Mining Title Services Pty Ltd) of affected landholders for the renewal of Consolidated Mining Lease No. 9 (1973) on 13 August 2018.*

Condition	Audit Findings		Status
SSD 7538 Sch 2 – Cond 14	In field inspections during this August 2019 audit, the Auditors observed several examples of plant and equipment not being maintained in a proper and efficient condition (paragraph (a)) or operated in a proper and efficient manner (paragraph (b)) including: · At around 9:45 am on 15 August 2019 the Auditors observed that the wheel wash station on the approach to the Gypsum Street exit gate at Southern Operations was not operational. Refer to SSD Consent Schedule 3 condition 26. · A road had been constructed across a clean water diversion drain. Refer to SSD Consent Schedule 3 conditions 32 and 34. · The Auditors observed the following lapses in housekeeping in and around the North Mine workshop: o 20 litre drums of lubricants were not stored in bunded containers and there was evidence of prior leaks on the workshop floor (see photo below); o there were lumps of grease around the refuelling station at the workshop (see photo below); and o a diesel fuel bowser fitting near the North Mine workshop was leaking.	Non-compliant (Low Risk)	**Completed** PBHL notes that non-compliances observed have no potential to result in material or serious environmental harm. Since the audit the following has been progressed: • The fuel leak at the fuel farm has been rectified. • The wheel wash failure at the South Mine during the audit has been also been rectified. • 57 Dam pipe infrastructure is now connected to the lined evaporation ponds. • The unsealed track across the clean water diversion drain has been cleared to re-establish the drainage line. • A waste management staging area has been established at the mechanical workshop.
SSD 7538 Sch 3 – Cond 4	In relation to paragraph (b) of this condition, during this August 2019 audit Perilya was unable to provide evidence of measures to reduce the release of greenhouse gas emissions from the site.	Non-compliant (Low Risk)	**Completed** PBHL maintains that electricity supply from the grid used by PBHL uses a combination of solar and wind powered energy sources located within the region Further a gas turbine generator is also in operation at the South Mine which provides a lower carbon emission source As a result of it's activities PBHL is a minor contributor of GHG emissions with NGERS reporting primary sources of emissions resulting from diesel emissions and electricity usage. A study to assess electric remotely operated vehicles (underground) is being assessed which potentially will decrease diesel source emissions. Discussions are being held with regard to using a compressed air energy storage system (A-CAES) after decommissioning of the adjacent Potosi Mine. This technology may also be applicable to North Mine following decommissioning to further renewable energy metrics.

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 5	Non-compliant (low risk) – During this August 2019 audit the following non-compliances under this condition were identified: · In relation to the fifth dot point in paragraph (e) of this condition, the Air Quality Management Plan does not include information regarding validation of nickel and mercury emissions through post commissioning monitoring and does not propose additional mitigation measures if elevated mercury or nickel occurs. Section 10.8 (in part) of the AQMP states: "During the air quality assessment for the development application, a number of assumptions were made in relation to both the concentration and composition of the particulate matter entrained within the exhaust air. These assumptions were made based on monitoring results from the Southern Operations ventilation rises. Of the three samples collected, one sample had elevated mercury (Hg) and nickel (Ni) concentrations. As neither Hg nor Ni form a component of the ore within the Line of Lode, the significance of these results could not be determined. As a result, PBHL committed to undertake monitoring of exhaust air from the ventilation rises to ensure consistency with the assumed air quality modelling criteria identified in Section 8.2." · In relation to the sixth dot point in paragraph (e) of this condition, the Air Quality Management Plan does not state 'how' (e.g. by conducting a review) Perilya will evaluate the effectiveness of the air quality management system or compliance with the air quality criteria and operating conditions in this consent. Section 12.3 of the AQMP only refers to annual reporting as follows: Annual Return (NSW EPA); Annual Environmental Management Report for each calendar year (NSW DRG); NGERS annual report for greenhouse gas emissions attributable to the North Mine; and National Pollutant Inventory annual report attributable to the North Mine.	Non-compliant (Low Risk)	**Completed** PBHL has performed analyses for Hg and Ni (and other metals) from dust deposition gauges and high-volume air samplers associated with North Mine for 6 months by ICP/AES analysis. There were no detections of Hg in any sample and levels of Ni were insufficient to warrant further mitigation. Further validation occurred in the stack and vent emissions testing during November 2019 and March 2020 which demonstrated the same. The Annual Review (this document) required under Schedule 4 Condition 5 of the Development Consent, and specifically sub-condition (b) is already referenced in Section 12.3 of the AQMP. It requires Perilya to "include a comprehensive review of the monitoring results and complaints records for the development over the past year". Perilya regards this requirement as being sufficient to test the efficacy of the air quality management system.

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 6	During this August 2019 audit Perilya was unable to provide evidence that it has implemented the following aspects of the Air Quality Management Plan: · stack monitoring of the vent rise (section 10.8) within 3 months of commissioning as required in Table 15, or (given that the variable speed drive fan has been removed – refer to observation for SSD Consent Schedule 3 condition 3) stack monitoring at the No. 2 Shaft within 3 months of the commencement of mining operations (section 10.8); · stack monitoring of the baghouse stacks (section 10.8) within 3 months of commissioning as required in Table 15; · monitoring of the silt loading on paved roads (section 10.9) on a quarterly frequency as required in Table 15; and · validation of nickel and mercury emissions through post commissioning monitoring of exhaust air from the ventilation rises and proposed additional mitigation measures if elevated mercury or nickel occurred (a consequence of the 'non-compliant' finding in respect of the fifth dot point in paragraph (e) of SSD Consent Schedule 3 condition 5).	Non-compliant (Low Risk)	**Completed** Stack emissions testing have been undertaken by the vendor of the dust extraction system on the ROM shed and was within specification. The delay was attributable to the delayed commissioning of the extraction system. Emission testing of stacks was completed in November 2019 according to the Australian Standards referenced in the AQMP and additional vent testing was completed in March 2020 and scheduled for November 2020. Monitoring of the silt on North Mine roads has been conducted since the completion of the audit and is consistent with achieving a silt load of less than 2 g/m2. PBHL does note that this metric is an unsafe activity given the volume of heavy vehicle traffic on the sealed haul roads. Revision H of the approved AQMP replaces the monitoring method for this determination from a simple gravimetric one to the use of a portable air quality unit. Validation of Ni and Hg emissions has also been completed with ICP/AES analysis of both dust deposition gauges and HVAS samplers associated with the North Mine development and identified incorrect assumption in the EIS stage modelling..
SSD 7538 Sch 3 – Cond 7	As at August 2019 (i.e. more than one year after the original SSD Consent of 22 December 2017) Perilya had not yet made any monetary contribution under this condition. Refer to supporting evidence/comments for SSD Consent Schedule 3 condition 8.	Non-compliant (Low Risk)	**Completed** PBHL provided to NSW Health.

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 9	During this August 2019 audit Perilya was unable to provide evidence of implementation of the Lead Monitoring and Education Program. For example, Perilya has not published an online newsletter (section 7.3 of the LMEP) or paid an amount of $50,000 per year to NSW Health for public health monitoring and education campaigns (section 7.4 of the LMEP).	Non-compliant (Low Risk)	**Completed** PBHL has requested an invoice to process the payment but have yet to receive a response from NSW Health (Broken Hill). Lead Monitoring and Education Program (Revision E) submitted to the Department on 14 November 2019. Document approved by Department on 15 November 2019 Following approval PBHL distributed Lead information packages to residents of District 5A in December 2019 (per section 6.6 of LMEP)
SSD 7538 Sch 3 – Cond 21	As at August 2019 Perilya does not operate a suitable system (e.g. information posted on Perilya's website or on roadside signs) to enable the public to get up-to-date information on the proposed blasting schedule on site. Section 6.1 of Perilya's Environmental Management Strategy lists "standard blasting schedule/times" as information that is included on Perilya's website.	Non-compliant (Low Risk)	**Completed** PBHL production blasting is scheduled between set periods of the day Perilya website updated to provide notification of significant production blasting

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 26	During the audit period Perilya did not fully comply with the second dot point in paragraph (a) of this condition as follows: · On 27/28 June 2019 Perilya's North Mine Manager issued a Manager's Specific Instruction (Doc No: H02S04MSI0099) in response to the following: "Unfortunately, it has been reported that the covers for the ore haulage trailers were not fully sealing these trailers at all times." The Specific Instruction then states: "On discussion with CMC Management, it was agreed that the CMC Loader Operator will provide positive communication to the Haul Truck Operator confirming the covers are secured prior to the truck leaving either the North ROM shed or the Potosi ROM." It was stated that the Specific Instruction was in response to the chance detection of a truck's cover not being fully closed, after the truck left the ROM shed but before the truck left the North Mine site.	Non-compliant (Low Risk)	**Completed** The MSI was issued in response to a single event where an employee identified incomplete closure of the hydraulic canopy. Since then implementation of the authority to proceed requirement has not resulted in a subsequent incident.
SSD 7538 Sch 3 – Cond 28	During this August 2019 audit it was identified that Perilya's implementation of the Transport Management Plan was inadequate in the following respects: · Apart from the CMC North Mine Crush & Haul Monthly Reports, Perilya was unable to provide any CMC-generated records (e.g. maintenance records) as evidence of CMC's performance under the Transport Management Plan (e.g. compliance with relevant management and mitigation measures in Table 7 of the TMP). · At around 9:45am on 15 August 2019 on the approach to the Gypsum Street exit gate at Southern Operations, the wheel wash station was observed to be non-operational. A CMC driver did not comply with section 10 (Departure Procedures) in the Driver's Code of Conduct (Appendix 1 of the Transport Management Plan), which requires all trucks "to go through the wheel wash systems at either end of the haulage route before entering onto established road ways. If either of these facilities are inoperable drivers must report this and use hoses provided to wash down their truck and trailer wheels." Refer to supporting evidence/comments for SSD Consent Schedule 3 condition 26.	Non-compliant (Low Risk)	**Completed** PBHL has formally advised CMC of their responsibilities under the TMP (email 1 November 2019).

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 32	During this August 2019 audit the following non-compliances under this condition were identified: · Perilya was unable to provide evidence that it had conducted regular inspections (e.g. by means of a completed inspection checklist) of water storages and diversions and pumping infrastructure as described in sections 12.5.1 and 12.5.2 of the Water Management Plan. · There was evidence that dirty water is possibly mixing with diverted clean water in the southern zone of the North Mine site catchments. A road from the waste rock area appears to have been constructed across Creek A (Figure 3 of the Water Management Plan) which has completely blocked the clean water diversion and could compromise the integrity of the catchments system which is intended to separate dirty water from clean water (see photo below). · Waste hydrocarbons in 200 litre drums were observed in the landfill area, awaiting collection. These drums were not suitably stored in a bunded area. Small spills/leaks were observed (see photo below).	Non-compliant (Low Risk)	**Completed** To improve efficacy the next revision of the water management plan will incorporate a requirement for inspection of diversions and storage facilities to be initiated by rainfall events greater than 25 mm in 24 hours. Investigation revealed that a temporary ford was created over the dry creek line in order to access a stockpile of aggregate during the construction phase. The Creek A diversion has been reinstated. Connection of the 57 Dam to evaporation ponds storage facilities has occurred during the period. A waste management staging area has been established at the mechanical workshop. .
SSD 7538 Sch 3 – Cond 34	During this August 2019 audit there was evidence of inadequate implementation of several aspects of the Water Management Plan in relation to the following: · Section 9.2 of the Water Management Plan – Perilya holds WAL40959 (1,466 ML) which is attached to a water supply works approval at North Mine as well as four other approvals at company owned mines. At the time of this August 2019 audit it was stated that in the year to date, 263 ML had been extracted from the underground workings at North Mine. However, it could not be verified that the cumulative annual (Water Year: I July-30 June) extraction does not exceed the licensed volume. · Section 12.5 of the Water Management Plan – There was no evidence during this August 2019 audit that Perilya is maintaining a program of regular inspections (monthly) and maintenance as a control to mitigate negative impacts on downstream watercourses as demonstrated by the breach of the clean water diversion of Creek A (refer to SSD Consent Schedule 3 condition 32).	Non-compliant (Low Risk)	**Completed** Inventory of ground water extraction volumes in the reporting period across all operations below 1.46 GL month extraction register maintained. Refer to PBHL comments in SSD 7538 Sch 3 – Cond. 32 responses above

Condition	Audit Findings		Status
SSD 7538 Sch 4 – Cond 5	As at the end of the audit period (16 August 2019) the first Annual Review for the period from 18 August 2018 to 31 December 2018 was overdue (it was required at the end of March 2019 unless the Secretary agreed otherwise).	Non-compliant (Low Risk)	**Completed** Correspondence was submitted by PBHL to the Secretary to request integrating the Annual Review required by the Development Consent with the AEMR reporting commitments as allowed by the Post Approval Requirements for State Significant Developments - Annual Review Guideline 2015. The combined report was submitted in August 2019. The current document also aligns with the approved AEMR submission date.
SSD 7538 Sch 4 – Cond 10	As at August 2019 Perilya has not reported on monitoring under Perilya's Water Management Plan. Section 13.3 of the WMP states that the results of the 'above monitoring' (i.e. automatically generated data, laboratory-generated data, and observational data) will be provided as a monthly summary report for publication on the Perilya website.	Non-compliant (Low Risk)	**Completed** Monthly reporting system includes dewatering volumes from the #3 shaft at North Mine and any laboratory generated data or observational data, available on website.
EPL2683 O2.1	In field inspections during this August 2019 audit, the Auditors observed several examples of plant and equipment not being maintained in a proper and efficient condition (paragraph (a)) or operated in a proper and efficient manner (paragraph (b)). These examples are described in the supporting evidence/comments for SSD Consent Schedule 2 condition 14.	Non-compliant (Low Risk)	**Completed** Refer to PBHL comments in SSD Consent Schedule 2 condition 14 responses above.
CML 4/5 4	In relation to paragraph (b) of this condition, the 2017/18 AEMR does not: · report against compliance with the Mining Exploration Operations Plan; or · state that it has regard to relevant guidelines adopted by the Director-General (e.g. the NSW Government's Post-approval requirements for State significant mining developments - Annual Review Guideline, October 2015). It was stated that during the audit period the Resources Regulator (or its predecessor) has not directed Perilya to provide additional environmental reports.	Non-compliant (Low Risk)	**Completed** PBHL to action, in all AEMR's reference to compliance with the MOP and that it has regard to relevant guidelines adopted by the Director-General, as per current submission

Condition	Audit Findings		Status
CML 4/5 18	During this August 2019 audit the following examples of unauthorised air pollution and water pollution were identified: · Perilya was unable to provide evidence that it had conducted regular inspections (e.g. by means of a completed inspection checklist) of water storages and diversions and pumping infrastructure as described in sections 12.5.1 and 12.5.2 of the Water Management Plan (refer to SSD Consent Schedule 3 condition 32); · There was evidence that dirty water is possibly mixing with diverted clean water in the southern zone of the North Mine site catchments. A road from the waste rock area appears to have been constructed across Creek A (Figure 3 of the Water Management Plan) which has completely blocked the clean water diversion and could compromise the integrity of the catchments system which is intended to separate dirty water from clean water (refer to SSD Consent Schedule 3 condition 32); and · Waste hydrocarbons in 200 litre drums were observed in the landfill area, awaiting collection. These drums were not suitably stored in a bunded area. Small spills/leaks were observed (refer to SSD Consent Schedule 3 condition 32).	Non-compliant (Low Risk)	**Completed** Refer to PBHL comments in SSD 7538 Sch 3 – Cond. 32 responses above
CML 4/5 21	During this August 2019 audit a road from the waste rock area appears to have been constructed across Creek A (Figure 3 of the Water Management Plan) which has completely blocked the clean water diversion and could compromise the integrity of the catchments system which is intended to separate dirty water from clean water (refer to SSD Consent Schedule 3 condition 32).	Non-compliant (Low Risk)	**Completed** Refer to PBHL comments in SSD 7538 Sch 3 – Cond. 32 responses above.
SSD 7538 Sch 3 – Cond 25	As at August 2019 only the road upgrades in the first row of Table 5 in this condition had been completed within the relevant timeframe (i.e. prior to commencing ore haulage for the works in the first row of Table 5, or 30 June 2019 for the works in the second and third rows of Table 5). It was stated that: · completion of the Argent / Iodide / Crystal Street works is the responsibility of RMS with Perilya Broken Hill Limited providing pro-rata costs only; and · the South Road and Gypsum Street works are not able to proceed until registration of the Voluntary Planning Agreement has occurred (refer to SDD Schedule 2 condition 15)	Administrative Non-compliant	**No Further Action - Pending approvals (Responsibility of non PBHL-parties)** PBHL notes that the road works associated with the second and third row of Table 5 have not been completed. Completion of the Argent/ Iodide/ Crystal St works is the responsibility of RMS with PBHL providing pro rata costs only. Completion of the South Rd and Gypsum St works is not able to proceed until registration of the VPA with Crown Lands occurred. The documentation is with that department.

Condition	Audit Findings		Status
CML 4/5 3	In relation to paragraphs (a) and (b) of this condition: (a) During this August 2019 audit Perilya was unable to provide evidence of the Resources Regulator's approval of the current "Amendment 1" version (i.e. dated 10 December 2018) of the MOP (though it is noted the current MOP is on Perilya's website); and (b) The current MOP does not identify how the mine will be specifically managed to allow mine closure, due to ongoing uncertainty regarding an agreed end land use. The current MOP notes (in section 4.1) that the NSW Government has established an inter-agency Broken Hill Rehabilitation Steering Committee to identify the "final land use strategy for the Line of Lode as a whole" and that the closure strategy will be "further refined and developed in consultation with the Broken Hill Rehabilitation Steering Committee and the community". The Steering Committee met for the first time in Broken Hill during this August 2019 audit. Section 4.1 of the current MOP also notes that: "As a result, the term of this MOP has been limited to 3 years. However, in the event that there are delays in determining a final land use strategy or in approval of the Rehabilitation Strategy or Rehabilitation Management Plan, the Company will apply to extend the term of this MOP accordingly."	Administrative Non-compliant	**No Further Action - Pending approvals (Responsibility of non PBHL-parties)** PBHL to indicate the approval status of the MOP on the cover page of the MOP (i.e. 'draft', 'submitted' or 'approved'). PBHL contends that the path to mine closure is inextricably linked to the workings and resolutions of the inter-agency Broken Hill Rehabilitation Steering Committee. In the interim a rehabilitation strategy is required within 12 months of commencement of mining and a rehabilitation plan is required to be submitted to the Secretary for approval subsequent to that. Revisions of the MOP will incorporate reference to the approved strategy and plan. Rehabilitation strategy document submitted to DPIE for approval on 10 December 2019.

Condition	Audit Findings		Status
SSD 7538 Sch 3 – Cond 33	The WMP was approved by the Secretary on 21 December 2018 (letter of approval is on Perilya's website) subject to the following: · further information is provided to the Department regarding the proposed use of Dam 57A; · a contemporary site water balance, prepared by a suitably experienced water specialist, approved by the Secretary, be completed, to the satisfaction of the Department by 30 February [sic]; and · submission of a revised WMP, prepared by a suitably experienced water specialist, approved by the Secretary and in consultation with the relevant agencies by 30 April 2019. Notwithstanding that Perilya's Water Management Plan satisfies the requirements of this condition, there was no evidence during this August 2019 audit that Perilya had actioned the conditions of approval within the required timeframes as noted in the Secretary's letter of 21 December 2018.	Non-compliant (Low Risk)	**No Further Action - Pending approvals (Responsibility of non PBHL-parties)** Revision F of the WMP was approved in December 2018 and subject to a number of conditions, These conditions were addressed and the updated WMP (Rev G) was submitted on 4 March 2019. There has been no response on this document to PBHL.
SSD 7538 Sch 3 – Cond 37	Perilya had not submitted the Historic Heritage Condition Assessment or held a meeting with the Department and OEH by the respective due dates of 28 February 2019 and 14 March 2019, and there was no evidence that Perilya had submitted the revised Historic Heritage Management Plan by the applicable further extension due date in the Secretary's letter of 1 May 2019.	Non-compliant (Low Risk)	**No Further Action** PBHL acknowledges that specific dates referenced in the conditional approval of the HHMP were not met. However, it contends that the later submission of the heritage condition report , the revised OHHMP and the required meetings occurred with full knowledge of the stakeholders. The Strategic Historic Heritage management Plan was submitted to DPIE on 9 January 2020.
SSD 7538 Sch 3 – Cond 43	In relation to paragraph (a) of this condition, during this August 2019 audit there was no evidence that Perilya has implemented a program to minimise waste generated by the development.	Non-compliant (Low Risk)	**No Further Action** North Mine operations are subjected to monthly waste removal by a licensed waste management contractor as are other PBHL operations. PBHL provides information in site inductions that the management of waste associated with the land fill facility and workshop areas require waste segregation areas to facilitate removal of the same.

Condition	Audit Findings		Status
SSD 7538 Sch 4 – Cond 4	In relation to paragraphs (b), (f) and (h) of this condition, the EMPs do not adequately include: (b) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (f) information relating to programs to investigate and implement ways to improve the environmental performance of the development over time; or (h) a protocol for periodic review of the plans as distinct from reviews triggered by SSD Consent Schedule 4 condition 6.	Non-compliant (Low Risk)	**No Further Action** PBHL contends that specific performance indicators are detailed in the management plans and are recognised and approved approved by a variety of regulatory agencies for individual plans. During the construction and operations of the development none of these specific performance indicators have been exceeded. Further, trigger events which prompt the review of the plans are documented and include the Management of Change process as well as the results of incident/exceedance investigations. PBHL considers that the review triggers detailed in Schedule 4 Condition 6 are also adequate to trigger any EMP review.

Table 31 - Ongoing 2019 Independent Audit Actions

Condition	Audit Findings		Additional Work Required
SSD 7538 Sch 3 – Cond 3	In relation to paragraph (e) of this condition, chemical dust suppressant had been applied on the North Mine site on several dates starting on 10 November 2018 and ending on 18 December 2019. Consolidated Mining & Civil (CMC) provided an email to Perilya on 14 January 2019 to confirm details of dates of application "as per diagrams supplied", showing the roads and areas which were treated. However, during this August 2019 audit Perilya was unable to provide evidence that the application of chemical dust suppressant achieved an emission control factor of 99.3% or better. Refer to table entry "Ref 55" in the Northstar "Independent Audit of Air Quality and Health Management" report of 19 March 2019.	Non-compliant (Low Risk)	Fugitive dust emissions, after the application of dust suppressant product were determined using the portable dust monitor referred to in EPL 2683. Ongoing performance via above method to be discussed in annual review reporting.
SSD 7538 Sch 3 – Cond 26	During the audit period Perilya did not fully comply with the second dot point in paragraph (a) of this condition as follows: · On 27/28 June 2019 Perilya's North Mine Manager issued a Manager's Specific Instruction (Doc No: H02S04MSI0099) in response to the following:	Non-compliant (Low Risk)	PBHL will include review of incident in future reviews of Traffic Management Plan

Condition	Audit Findings		Additional Work Required
SSD 7538 Sch 3 – Cond 34	During this August 2019 audit there was evidence of inadequate implementation of several aspects of the Water Management Plan in relation to the following: · Section 9.1 of the Water Management Plan – There was evidence that dirty water is possibly mixing with diverted clean water in the southern zone of the North Mine site catchments. Refer to supporting evidence/comments in SSD Consent Schedule 3 condition 32. · Section 9.3.2 of the Water Management Plan – This section states that the Wilcannia Road Dam and 57 Dam will be maintained such that each storage will be empty within 5 days of a rainfall event greater than 25mm in a 24-hour period. However, at the time of this August 2019 audit, these dams were not empty and infrastructure was not in place to transfer water to the Evaporation Pond as per Figure 5 of the WMP. · Section 11.3 of the Water Management Plan (Level 3 TARP) – There is a risk that Perilya cannot implement responses to every high rainfall event in a timely manner because there is no automated recording of freeboard levels in the water storage facilities.	Non-compliant (Low Risk)	PBHL to undertake a review of the extent of potential contamination to the diversion drain system, noting that Line 2 of Table 6 in the Development Consent requires PBHL to "maximize" the diversion of clean water around disturbed areas on site. Wilcannia Dam and 57 Dam had not received 25 mm of rainfall in a 24 hr period. Observed waters were generated by the truck wheel wash facility which drains to Wilcannia Dam and is then pumped to 57 Dam or the evaporation ponds. Wilcannia Dam operates on a float valve system to trigger pumping of waters to 57 Dam in order to prevent over topping. 57 Dam has pump and pipe connectivity to the evaporation ponds. Visual markers are installed to indicate freeboard levels in the evaporation ponds.
CML 4/5 18	During this August 2019 audit the following examples of unauthorised air pollution and water pollution were identified: · Perilya was unable to provide evidence that the application of chemical dust suppressant achieved an emission control factor of 99.3% or better (refer to SSD Consent Schedule 3 condition 3); .	Non-compliant (Low Risk)	Fugitive dust emissions, after the application of dust suppressant product were determined using the portable dust monitor referred to in EPL 2683. Ongoing performance via above method to be discussed in annual review reporting

10.2 INDEPENDENT AUDIT OF AIR QUAILTY AND HEALTH MANAGEMENT

In accordance with Consent SSS 7538 Schedule 3 Conditions 12 and 13, one month following commencement of mining operations an audit of the air quality and health management systems was undertaken. The audit was performed on 22nd January 2019 by Gary Graham of Northstar Air Quality, Table 32 provides a summary of compliance.

In April 2019 PBHL submitted the audit report including company responses (available on Perilya website) and action plan to address identified non-compliant issues to the Department. A response to the submissions from the Department received on 31st October 2019 requested an update to the implementation of actions, an updated Air Quality Management Plan and confirmation on the distribution of newsletter per Schedule 3, Condition 8 (addressed in Section 6.2). The implementation status as of 9th

November 2019 submitted to the department noted the 10 of the 13 identified non-compliance would be completed following approval of updated Air Quality Management Plan submitted on the 13th November 2019. At the end of the reporting period one ongoing action requires further work per Table 33.

Table 32 - Summary of Air Quality and Health Audit

Compliance Status	Number
Compliant	54
Non-compliant	13
Not triggered	21
Blank	0
Total	**88**

Table 33 - Ongoing Actions for Air Quality and Health Audit

Requirement	Audit Findings	Recommendations / Actions	Perilya Actions Status
Free areas are non-operational areas identified on Figure 1. A testing program is required to determine the level of fugitive dust control achieved and to identify any areas that are not meeting the 99.3% control criteria identified in Section 8.1 [AQMP]. All free areas will be surveyed annually using the Confined Air Burst Chamber (CABC) method.	ERM (Aug 2018) PBHL, North Mine Wind Erosion Field Testing provides a report on the control efficiency of 'free areas' by CABC. The conclusion of that report states: "The results of the above field analysis indicate that natural crusting of unsealed surfaces observed within the uncontrolled free areas provides a reduction of more than 80% in wind erosion potential relative to freshly disturbed material at the majority of the sample locations. In terms of the results for the controlled exposed surface areas indicate that covering the exposed areas with waste rock (rock armouring) provides an effective reduction in wind erosion potential relative to uncontrolled, disturbed materials within the area. The results for this location / control technique presented the highest control efficiency during the testing exercise. Nevertheless, none of the results obtained during the testing campaign were observed to exceed the 99.3% control efficiency stated in the Construction Air Quality Management Plan (CAQMP). On that basis, further surface treatment is recommended to demonstrate compliance." TARP AQ7 states: "Apply Lignosulfonate dust suppression at the rates identified by the manufacturer and retest until all free areas achieve 99.3% control. If required, reapply Lignosulfonate dust suppression until required control level achieved. File results and report as described in Section 12.3". The site visit witnessed the application of lignosulphonate, but evidence of achieving the 99.3% control has yet to be provided.	Additional CABC testing is required to demonstrate a 99.3% control efficiency. If the test results do not demonstrate compliance additional actions will be required.	Initial works from the "Free Areas" CABC requires a follow up survey to determine if the criteria have been met by the application of Lignosulphonate product after the CABC survey (see Ref 30). However we have been advised by our AirQ specialist to await feedback on the approved use of the method via regulators.

11 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities to be completed in the next reporting period to improve the environmental and community performance of the North Mine are summarised in Table 34.

Table 34 - Proposed activities to be completed in the next reporting period

Activity	Timeframe
Completion of review and, if necessary, revision of Environmental Management Plans	In accordance with SSD7538 Schedule 4 Condition 6
Progression of remaining actions from Independent Environmental Audit	Ongoing
Progression of remaining action from Independent Air Quality and Health Audit	Ongoing
Independent Air Quality and Health Audit	January 2021
Continued engagement with local stakeholders	Ongoing

APPENDIX A

Air Quality data review for the Human Health Risk Assessment

18 May 2020

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Perilya Broken Hill Limited
C/o RW Corkery & Co Pty Limited
Level 1, 12 Dangar Road
BROOKLYN NSW 2083
mitchell@rwcorkery.com

Attention: Mitchell Bland

Dear Mitch

Perilya North Mine AQ Data Review – Response to EPA comments

1 Introduction

On 30 March 2020, SLR Consulting (SLR), engaged by Perilya Broken Hill Ltd (Perilya), via R.W Corkery & Co Pty Ltd, provided a review of Perilya's Broken Hill monitoring data and concluded that the recommencement of mining at North Mine in late December 2018 had not adversely affected local air quality, specifically with reference to lead (Pb).

The works completed for the review included:

- 10-year analysis (January 2010 to December 2019) of data for dust deposition and lead (Pb) in deposited dust from 18 dust deposition gauges.
- 10-year analysis (January 2010 to December 2019) of data for Total Suspended Particulates (TSP) and Pb content of TSP from one high volume air sampler (HVAS) monitor.
- 10-year analysis (January 2010 to December 2019) of meteorological conditions including rainfall, windspeed, dust haze, and dust storms.

NSW Environment Protection Authority (NSW EPA) has subsequently requested the following additional analysis be presented:

- Provide a monthly comparison of the total rainfall and average windspeed in 2018 and 2019 (see **Section 3.1**).
- Provide a detailed 2018-2019 comparison of the monthly average and median of the deposited dust and lead in deposited dust (see **Section 3.2**).
- Include the other HVAS data to provide supporting evidence for the SLR conclusion that the recommencement of the Perilya North Mine is not the primary cause of the increase in HVAS readings (see **Section 3.3**).

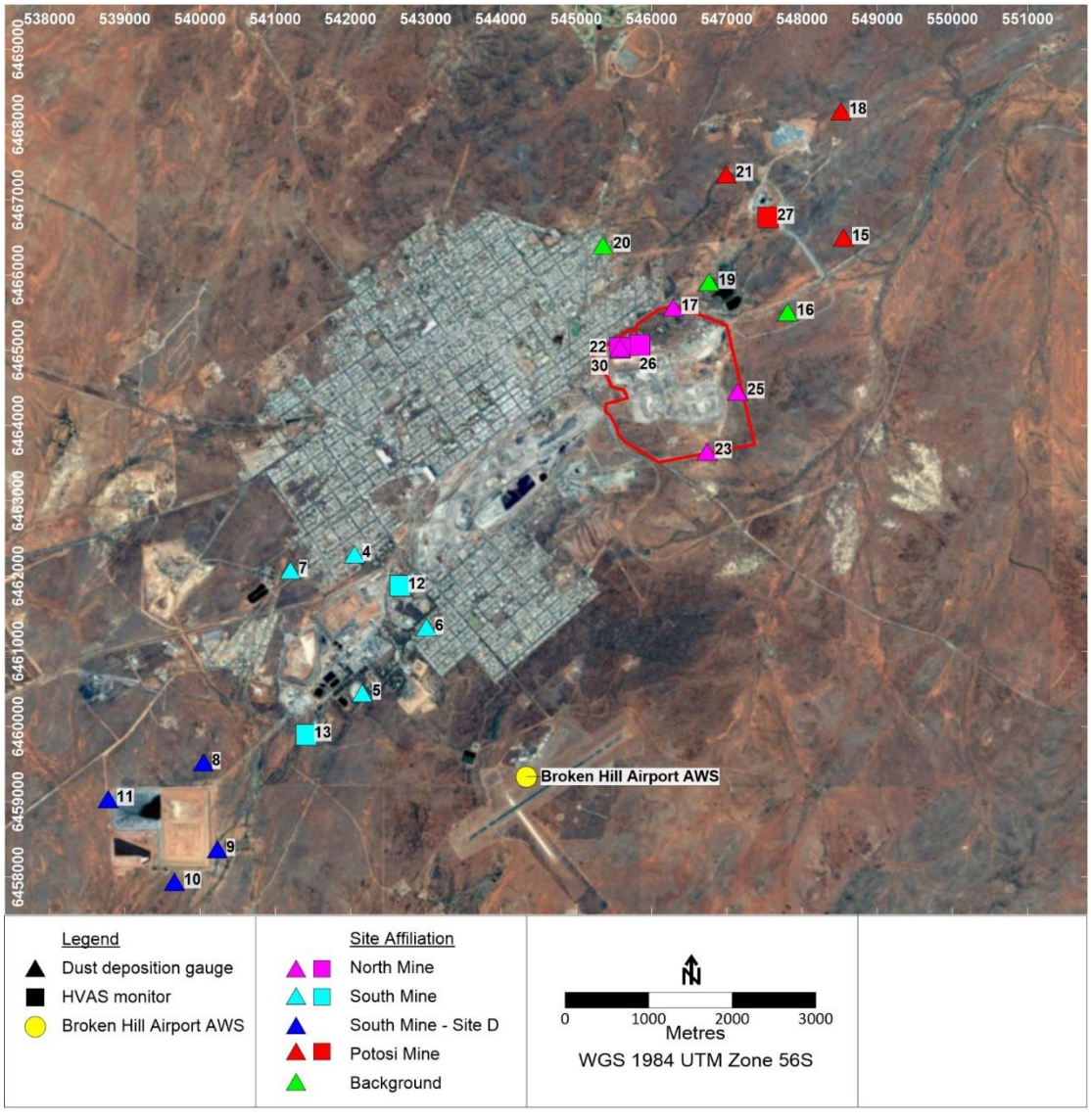
- Include the data used in the analysis in the appendices of the report, including the sampling frequency of deposited dust and HVAS (see **Section 3.4**).

2 Monitoring Locations and Data Summary

Figure 1 shows the location of the Perilya-owned dust deposition gauges and HVAS monitors in Broken Hill. A summary of the monitoring sites and data availability for 2018 and 2019 are presented in **Table 1**.

The only HVAS data not analysed as part of this or the 30 March 2020 review are those from Argent St (MP30) as monitoring did not commence until 27 July 2018.

Figure 1 Location of Perilya-owned dust deposition gauges and HVAS monitors in Broken Hill



Source: ERM, 2019

Table 1 Monitor Details

Data Review Group	EPA Monitoring Point (MP)	Monitor Location	Monitor Type	Raw Data Availability (%)[1,2]	
				2018	2019
North Mine	MP17	Caravan Park	Dust Gauge	100	100
	MP22	Argent St	Dust Gauge	100	100
	MP23	Common Dam	Dust Gauge	100	100
	MP25	Rasp Ridge	Dust Gauge	100	100
	MP26	North	HVAS	100	100
	MP30	Argent St	HVAS	N/A	
Potosi Mine	MP15	Round Hill	Dust Gauge	100	100
	MP18	Silver Peak	Dust Gauge	100	100
	MP21	Whiterocks 2	Dust Gauge	100	100
	MP27	Potosi	HVAS	100	100
South Mine	MP4	110 Gaffney	Dust Gauge	100	100
	MP5	NBHC Oval	Dust Gauge	100	100
	MP6	Rainbow Ave	Dust Gauge	100	100
	MP7	Sewage Farm	Dust Gauge	92	100
	MP12	Westside	HVAS	100	100
	MP13	Polo	HVAS	93	97
South Mine – Site D	MP8	Site D N1	Dust Gauge	100	100
	MP9	Site D E	Dust Gauge	100	100
	MP10	Site D S	Dust Gauge	100	100
	MP11	Site D W	Dust Gauge	100	100
Background	MP16	Barrier Highway	Dust Gauge	100	100
	MP19	Imperial Lake	Dust Gauge	100	100
	MP20	Hall St	Dust Gauge	100	100

N/A: Not Applicable

1. Dust gauges: data are collected monthly, 100% for one year = 12 data points
2. HVAS: data are collected every six days, 100% for the period 2018 = 60 data points, 100% for the period 2019 = 61 data points

3 Response to EPA Comments

3.1 Meteorological Data

As requested by NSW EPA, **Table 2**, **Figure 2** and **Figure 3** provide a monthly comparison of the total rainfall and average windspeed in 2018 and 2019.

With respect to rainfall (refer to **Table 2** and **Figure 2**), 2019 recorded approximately 30% less total rain over the year when compared with 2018. However, on a monthly basis, more rain was recorded during January, February, March, May, July and September 2019 when compared with 2018.

Annual average windspeeds (refer to **Table 2** and **Figure 3**) were the same for both 2018 and 2019. On a monthly basis, higher monthly average windspeeds were recorded during January, February, May, June, September and November 2019 when compared with 2018.

As the number of dust storms recorded by NSW Department of Planning, Industry and Environment (NSW DPIE) Community DustWatch program are considered relevant to this assessment, **Table 3** and **Figure 4** compares the total number of hours of dust haze recorded each month during 2018 and 2019. During 2018, a total of 128 dust haze hours were recorded, with the majority of these being deemed Moderate or Severe Dust Haze. During 2019 the total hours increased to 831 hours – approximately 10% of the year. With the exception of April, July and August 2019 recorded more dust haze hours each month compared with 2018. There was also a large increase in both Moderate and Severe Dust Storms compared with 2018. There were no Severe Dust Storms recorded between 2018 whereas in 2019 there were 12 hours observed.

The relationship between the monthly meteorological conditions and the measured dust deposition/Pb in deposited dust and TSP/Pb in TSP are discussed in detail in **Section 3.2** and **Section 3.3**, respectively.

Table 2 Monthly Rainfall (mm) and Monthly Average Windspeed (km/h) – 2018 and 2019

	Total Rainfall (mm)		Average Windspeed (km/h)	
Month/Year	2018	2019	2018	2019
January	4.8	15.4	20.5	20.9
February	0.6	1.4	18.7	20.2
March	0.0	19.2	19.1	16.6
April	1.2	0.0	15.5	15.5
May	5.2	8.0	16.2	16.6
June	6.4	5.0	13.7	15.1
July	0.4	1.2	16.6	16.2
August	6.0	0.2	19.4	18.0
September	0.0	1.0	16.6	18.4
October	37.4	0.6	19.8	18.7
November	24.8	16.0	18.4	21.2
December	9.6	0.0	21.2	20.2
Annual	***96.4***	***68.0***	***18.0***	***18.0***

Figure 2 Broken Hill Automatic Weather Station - Total Monthly Rainfall 2018 and 2019

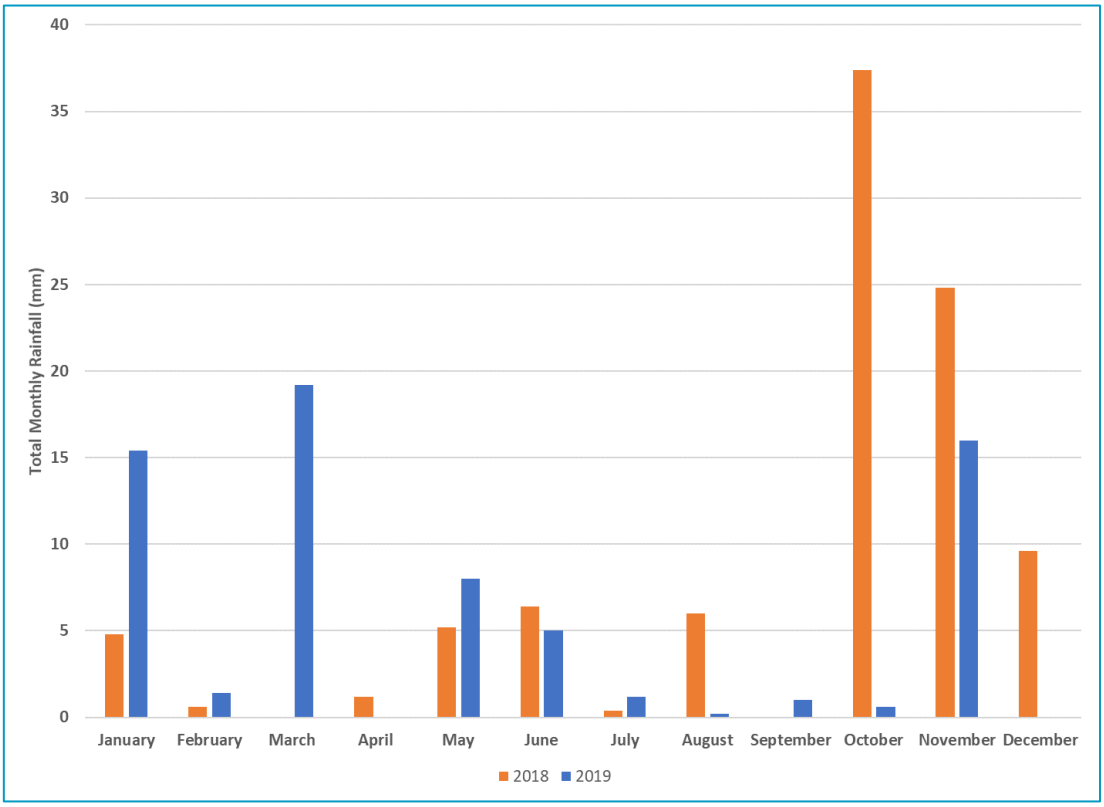


Figure 3 Broken Hill Automatic Weather Station - Monthly Average Windspeed 2018 and 2019

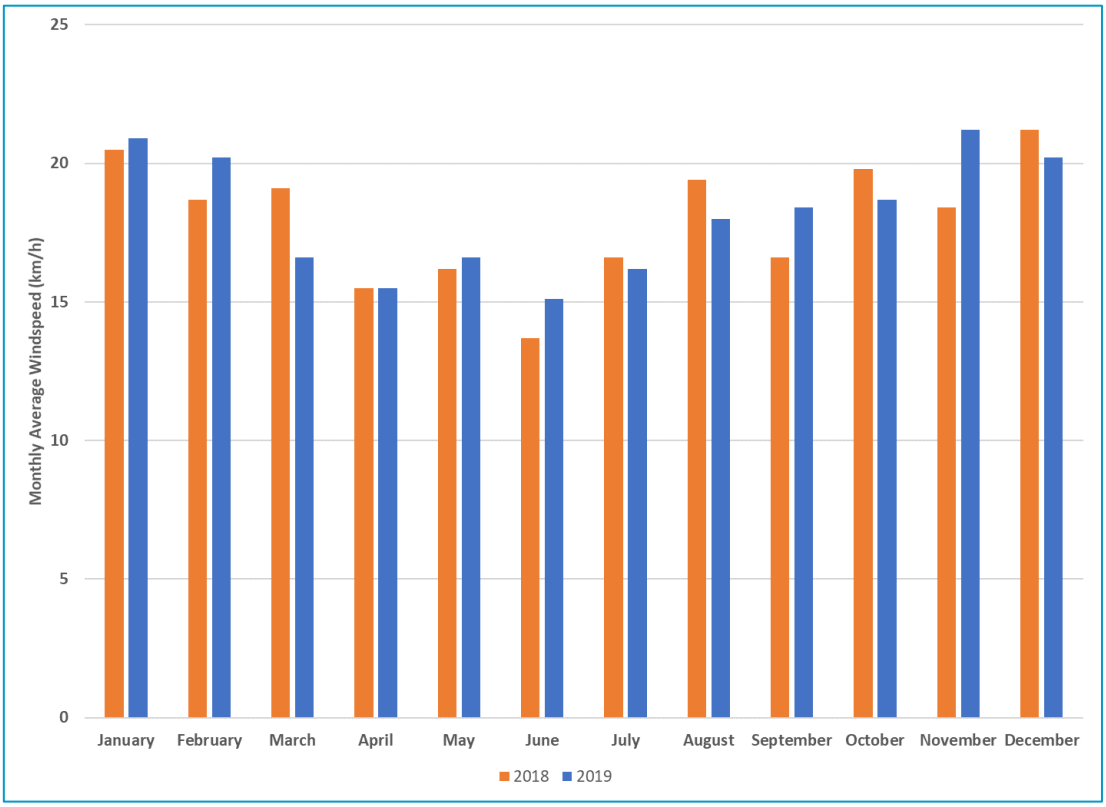
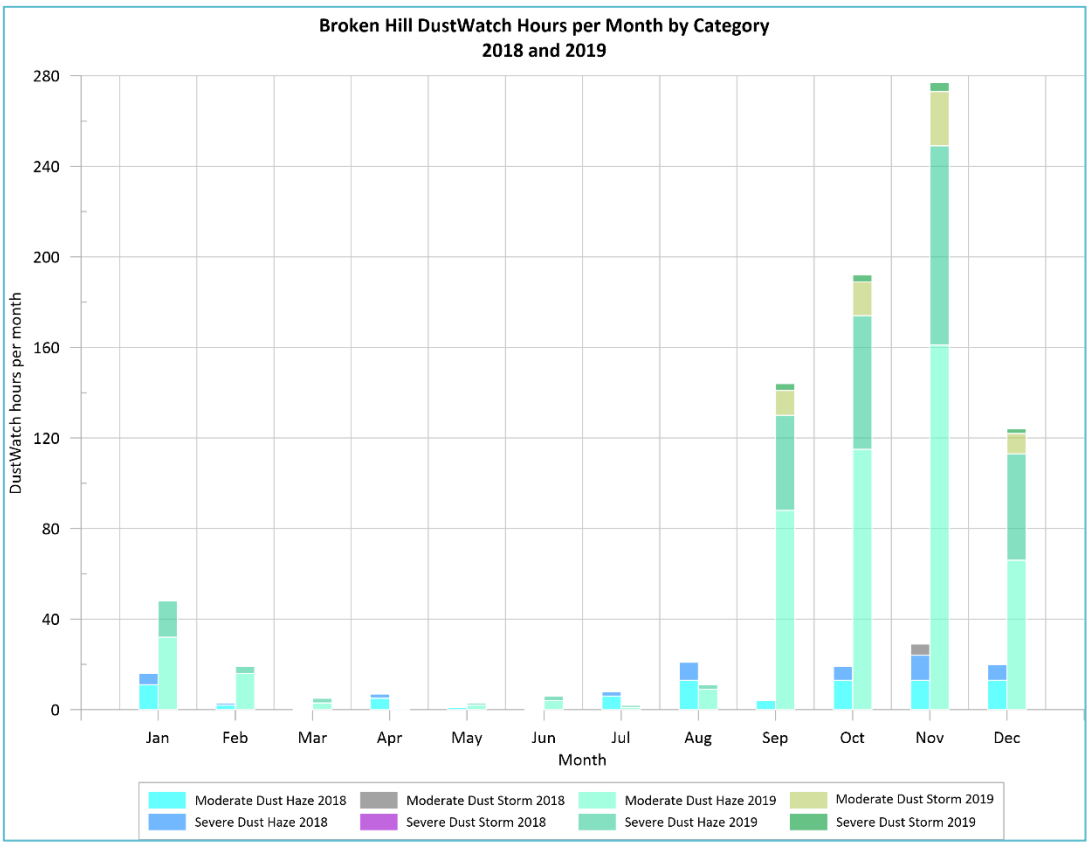


Table 3 Broken Hill DustWatch Hours by Month and Category: 2018 and 2019

Month/Year	DustWatch category									
	Moderate Dust Haze		Severe Dust Haze		Moderate Dust Storm		Severe Dust Storm		Total	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
January	11	32	5	16	0	0	0	0	16	48
February	2	16	1	3	0	0	0	0	3	19
March	0	3	0	2	0	0	0	0	0	5
April	5	0	2	0	0	0	0	0	7	0
May	1	2	0	1	0	0	0	0	1	3
June	0	4	0	2	0	0	0	0	0	6
July	6	1	2	1	0	0	0	0	8	2
August	13	9	8	2	0	0	0	0	21	11
September	4	88	0	42	0	11	0	3	4	144
October	13	115	6	59	0	15	0	3	19	192
November	13	161	11	88	5	24	0	4	29	277
December	13	66	7	47	0	9	0	2	20	124
TOTAL	***81***	***497***	***42***	***263***	***5***	***59***	***0***	***12***	***128***	***831***

Figure 4 Broken Hill DustWatch Hours by Month and Category: 2018 and 2019



3.2 Dust Deposition Data

3.2.1 Introduction

As requested by NSW EPA, **Table 4** and **Table 5** provide a comparison of the monthly average and median of deposited dust and Pb in deposited dust for 2018 and 2019.

Table 6 presents a summary of the calculated percentage change during 2019 when compared with 2018. The red shaded cells show an increase, the green shaded cells show a decrease.

The average and median percentage change for each month during 2019 compared with 2018 in deposited dust/Pb in deposited dust levels has been plotted against the number of dust hours, the monthly total rainfall and the monthly average windspeed (see **Figure 5** to **Figure 8**). Due to the amount of information being presented on each figure, the following detail is provided to assist with interpretation presented in **Section 3.2.2** (deposited dust) and **Section 3.2.3** (Pb in deposited dust):

- The percentage change in measured levels are shown as vertical bars and are plotted against the left-hand side y-axis.
- The number of hours of dust haze/dust storms in 2018 and 2019 are shown as stacked columns and are plotted against the first right-hand side y-axis.
- The monthly total rainfall data are shown as filled circles and are plotted against the second right-hand side y-axis.
- The monthly average windspeed data are shown as dotted lines and are plotted against the second right-hand side y-axis.
- Note that each y-axis on the figures have a different scale to each other to accommodate the range of data being plotted.

Table 4 Monthly Average and Median Deposited Dust (g/m²/month) – 2018 and 2019

Location	North Mine				Background				South Mine				Potosi				Site D			
Parameter	Average		Median		Average		Median		Average		Median		Average		Median		Average		Median	
Year	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
January	3.1	17.1	3.0	3.1	2.5	5.2	2.1	5.6	2.7	5.2	2.1	4.8	3.9	10.4	3.8	7.6	2.3	1.5	2.3	1.4
February	0.5	0.9	0.4	0.9	1.7	1.0	2.2	1.0	0.6	1.2	0.7	0.1	1.6	1.3	1.5	1.4	2.3	0.4	2.8	0.2
March	0.6	2.2	0.5	2.3	1.7	2.0	2.2	1.8	2.4	2.7	2.9	2.7	1.6	1.9	1.5	1.7	1.8	2.4	1.7	2.3
April	1.2	0.6	0.5	0.1	2.6	0.3	1.0	0.1	3.9	1.3	2.2	1.2	1.8	0.4	1.6	0.5	1.0	0.1	0.6	0.1
May	3.9	0.9	3.1	0.8	3.2	0.7	2.3	1.0	6.1	1.7	4.8	1.8	4.4	0.9	3.7	0.9	2.9	2.8	2.9	3.1
June	0.8	0.2	0.7	0.1	1.4	2.7	1.9	0.1	1.2	0.4	1.2	0.3	0.7	0.5	0.6	0.4	2.5	0.6	2.3	0.1
July	0.1	0.3	0.1	0.3	0.1	0.5	0.1	0.5	1.4	0.6	0.6	0.4	0.3	0.3	0.1	0.3	0.1	1.0	0.1	1.2
August	0.6	1.7	0.1	1.5	7.2	1.8	2.1	2.0	1.4	1.6	1.2	1.9	0.7	1.3	1.0	1.3	0.1	1.4	0.1	1.0
September	1.1	0.1	1.1	0.1	2.0	0.1	2.1	0.1	1.8	0.1	1.7	0.1	1.6	0.3	1.7	0.1	2.8	0.2	3.2	0.2
October	5.8	0.4	2.3	0.3	0.9	2.7	0.4	1.5	3.7	7.4	2.8	7.8	2.2	1.9	2.1	1.6	2.1	2.3	2.0	1.7
November	3.9	3.2	3.7	3.2	12.3	4.6	8.2	3.0	5.4	4.8	5.5	4.7	3.5	5.1	2.5	5.5	9.3	2.1	6.6	2.5
December	0.4	4.3	0.4	4.5	0.8	4.7	0.7	4.6	0.9	3.2	0.8	3.8	0.9	3.3	0.8	3.2	0.5	1.8	0.2	1.7
Annual	***1.8***	***2.7***	***0.8***	***0.7***	***3.0***	***2.2***	***1.9***	***1.2***	***2.6***	***2.5***	***1.8***	***1.5***	***1.9***	***2.3***	***1.5***	***1.4***	***2.3***	***1.4***	***1.8***	***1.1***

Table 5 Monthly Average and Median Pb in deposited dust (g/m^2/month) – 2018 and 2019

Location	North Mine				Background				South Mine				Potosi				Site D			
Parameter	Average		Median		Average		Median		Average		Median		Average		Median		Average		Median	
Year	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
January	0.005	0.031	0.005	0.031	0.003	0.008	0.004	0.007	0.006	0.047	0.006	0.051	0.004	0.021	0.005	0.027	0.004	0.013	0.004	0.016
February	0.005	0.011	0.003	0.009	0.005	0.006	0.004	0.008	0.012	0.010	0.011	0.007	0.006	0.003	0.006	0.001	0.014	0.008	0.013	0.008
March	0.002	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.005	0.006	0.005	0.006	0.002	0.002	0.002	0.002	0.004	0.003	0.002	0.003
April	0.004	0.009	0.004	0.009	0.004	0.005	0.004	0.006	0.010	0.015	0.006	0.015	0.005	0.003	0.004	0.003	0.004	0.005	0.004	0.005
May	0.005	0.004	0.004	0.004	0.005	0.003	0.002	0.003	0.007	0.006	0.007	0.006	0.003	0.002	0.003	0.002	0.004	0.003	0.005	0.002
June	0.002	0.004	0.002	0.003	0.001	0.003	0.002	0.003	0.005	0.011	0.005	0.011	0.002	0.003	0.001	0.003	0.006	0.005	0.003	0.003
July	0.003	0.003	0.004	0.003	0.002	0.004	0.002	0.003	0.005	0.004	0.004	0.004	0.004	0.002	0.003	0.002	0.003	0.002	0.003	0.001
August	0.006	0.004	0.006	0.004	0.003	0.004	0.003	0.004	0.013	0.005	0.009	0.004	0.001	0.002	0.001	0.002	0.017	0.002	0.012	0.002
September	0.002	0.008	0.002	0.007	0.001	0.010	0.001	0.008	0.004	0.020	0.003	0.021	0.002	0.005	0.002	0.004	0.002	0.009	0.002	0.008
October	0.016	0.002	0.010	0.002	0.006	0.007	0.004	0.003	0.011	0.004	0.010	0.004	0.004	0.002	0.004	0.002	0.006	0.003	0.006	0.002
November	0.005	0.007	0.004	0.005	0.005	0.005	0.005	0.005	0.011	0.007	0.009	0.006	0.005	0.003	0.006	0.003	0.007	0.003	0.006	0.003
December	0.003	0.014	0.003	0.004	0.004	0.003	0.002	0.003	0.002	0.006	0.003	0.005	0.002	0.005	0.002	0.002	0.003	0.006	0.002	0.004
Annual	***0.005***	***0.008***	***0.004***	***0.004***	***0.003***	***0.005***	***0.003***	***0.004***	***0.008***	***0.012***	***0.007***	***0.007***	***0.003***	***0.004***	***0.003***	***0.002***	***0.006***	***0.005***	***0.005***	***0.004***

Table 6 Percentage change in deposited dust and Pb in deposited dust: 2019 compared with 2018

	North Mine		Background		South Mine		Potosi		Site D	
	Dust Deposition % change 2019 compared with 2018									
Month	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
January	450	3	109	167	92	126	166	100	-34	-41
February	83	157	-43	-55	96	-82	-17	-7	-81	-93
March	271	338	16	-18	13	-7	23	13	35	35
April	-47	-90	-89	-95	-67	-47	-77	-69	-95	-91
May	-76	-73	-78	-57	-71	-63	-81	-76	-3	9
June	-71	-81	86	-97	-65	-75	-35	-33	-78	-98
July	450	450	867	900	-61	-35	0	500	1975	2200
August	193	2900	-75	-5	18	65	86	30	2675	1900
September	-96	-95	-98	-98	-97	-97	-85	-94	-92	-94
October	-93	-86	212	275	102	182	-14	-24	8	-18
November	-18	-12	-62	-63	-11	-14	43	120	-78	-62
December	915	947	460	557	279	400	267	300	289	886
Annual	***46***	***-19***	***-28***	***-38***	***-5***	***-19***	***19***	***-10***	***-40***	***-42***
	Pb in Deposited Dust % change 2019 compared with 2018									
Month	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
January	531	529	135	97	669	784	374	400	215	277
February	115	200	36	83	-16	-39	-48	-76	-44	-42
March	35	49	31	34	22	8	34	2	-36	7
April	125	134	30	65	50	138	-39	-31	35	43
May	-36	-5	-29	41	-22	-25	-50	-40	-44	-61
June	85	54	82	66	144	133	99	129	-20	3
July	2	-15	65	30	-20	-22	-37	-37	-40	-66
August	-34	-31	1	15	-64	-56	58	35	-87	-87
September	300	312	694	633	414	605	92	120	343	257
October	-88	-81	9	-23	-62	-66	-56	-43	-61	-69
November	44	14	-1	7	-39	-28	-41	-50	-59	-57
December	454	77	-12	122	124	79	216	-23	139	118
Annual	***70***	***10***	***43***	***36***	***53***	***4***	***34***	***-12***	***-19***	***-25***

3.2.2 Deposited Dust

The average and median percentage change in deposited dust levels are presented with the meteorological data (monthly DustWatch hours, monthly total rainfall and monthly average windspeed) in **Figure 5** and **Figure 6**.

When considering the average percentage change (**Figure 5**) and median percentage change (**Figure 6**) in deposited dust, the following observations are made:

- Monthly average windspeeds during 2019 were similar to 2018 and are not considered to have had a direct impact on measured deposited dust levels.
- The largest average and median percentage changes between 2018 and 2019 were observed at Site D (July and August) and North Mine (August), respectively.
    - These calculated increases are considered to be the result of the data collected during 2018 being reported as less than the Limit of Reporting (LOR). These data were set to be equal to 50% of the reported LOR[1] (typically this was equal to 0.05 g/m^2/month) for the analysis, whereas the 2019 data reported levels above LOR.
    - As an example, for the North Mine sites in August 2018, three of the four monitoring locations (MP22, MP23 and M25) reported deposited dust levels below the LOR, resulting in a median deposited dust level of 0.05 g/m^2/month. By contrast, in August 2019, the North Mine sites recorded deposited dust levels at all four monitoring locations ranging between 0.7 g/m^2/month and 2.9 g/m^2/month, resulting in a median deposited dust level of 1.5 g/m^2/month. As a result, the apparent change between August 2018 and August 2019 median deposited dust levels is an increase of 2900%. Had the data reported as below the LOR in August 2018 been excluded from the analysis, the resultant median for 2018 would have been 2.1 g/m^2/month, and a **decrease** in average deposited dust levels of approximately 30% would have been shown.
- Average and median deposited dust levels in January and December 2019 were higher at all sites in 2019 than in 2018[2], but lower in 2019 at all sites in April, May[3], June and September, with other months recording higher 2019 deposited dust levels at some sites and others lower, compared with 2018 results.
- In January, March and December 2019, the North Mine sites recorded the largest increase in deposited dust levels of all locations when compared with the same month in 2018. In the other nine months, however, the increase in deposited dust levels at North Mine was less than (or the decrease was greater than) that experienced at other sites.
- During January 2019, DustWatch data recorded an additional 21 hours of moderate dust haze and an additional 16 hours of severe dust haze compared with January 2018 and all sites recorded an increase in deposited dust levels.
- During February 2019, whilst an increase in DustWatch hours was observed compared with 2018, all other sites (with the exception of South Mine) recorded a decrease in deposited dust levels, suggesting that activities at North Mine may have contributed to the observed increase in deposited dust levels surrounding the North Mine.
- During March 2019, an increase in DustWatch hours was observed compared with 2018, and all sites recorded an increase in deposited dust levels.

[1] https://www.epa.gov/sites/production/files/2015-06/documents/g9-final.pdf

[2] With the exception of Site D in January.

[3] With the exception of the median at Site D in May.

- In July 2019, with the exception of South Mine, the increase in deposited dust levels was larger at all sites compared with the increase at North Mine, suggesting that activities at North Mine were not the dominant reason for the observed increase.
- As discussed above, the August 2019 apparent increase in deposited dust levels is considered to be the result of how data collected during 2018 reported as less than the LOR were set to be equal to 50% of the reported LOR for the analysis, whereas the 2019 data reported levels above LOR.
- In December 2019, no rainfall was recorded compared with 10 mm measured in 2018. Deposited dust increases of over 200% were observed at all locations, suggesting that activities at North Mine were not the dominant cause for the increase. Over 248 hours of dust activity were recorded by DustWatch during December 2019 (compared with 29 hours in December 2018) suggesting regional events were the dominant cause.

Overall, there is no clear evidence that the commencement of mining operations at North Mine during late December 2018 has resulted in an increase in deposited dust levels at surrounding monitoring locations. Indeed, it is concluded that the largest influence on the deposited dust data is related to regional dust events as indicated by the increase in measured dust activity reported by DustWatch.

Figure 5 Average Percentage Change in Deposited Dust by Area Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018

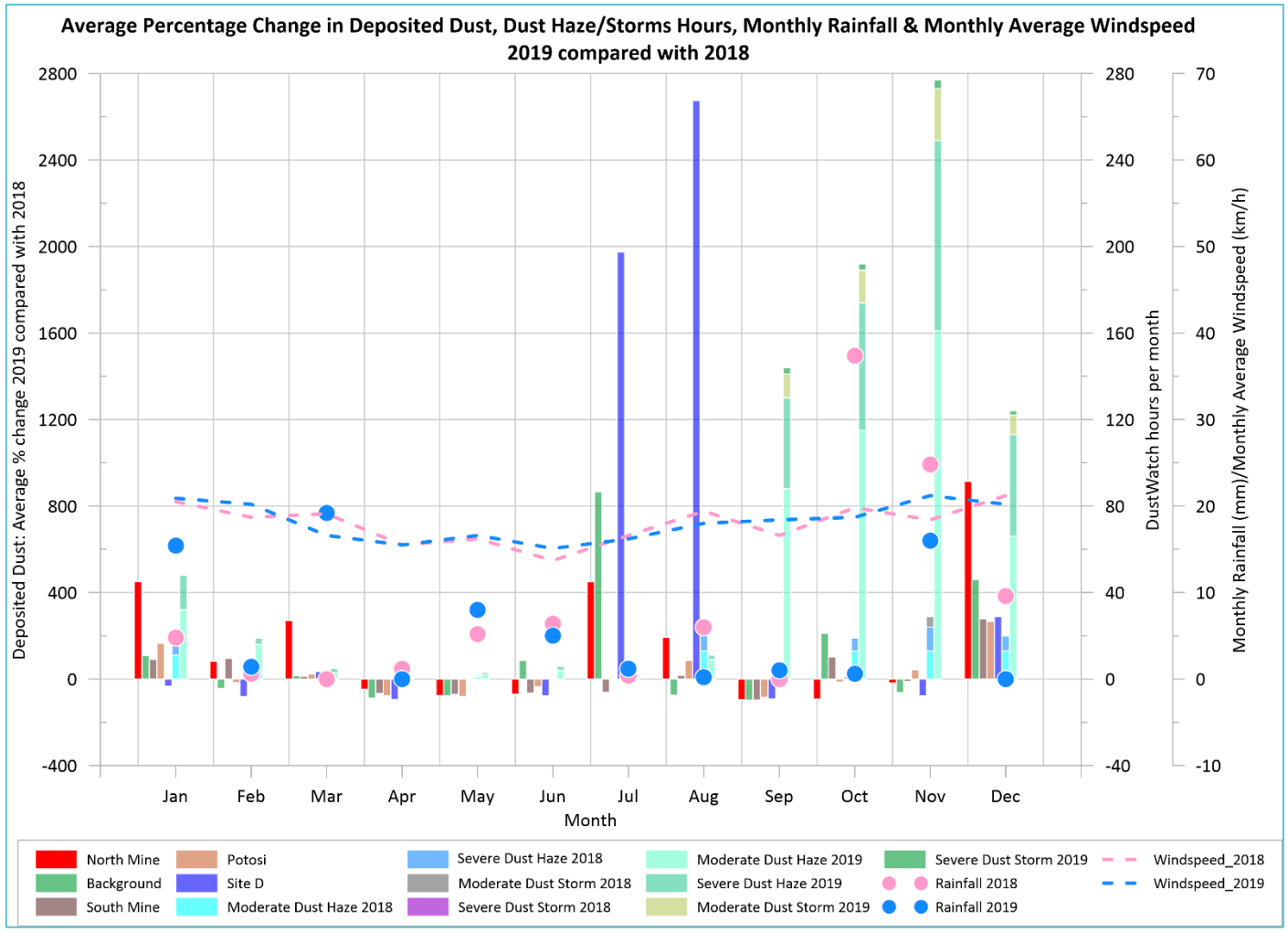
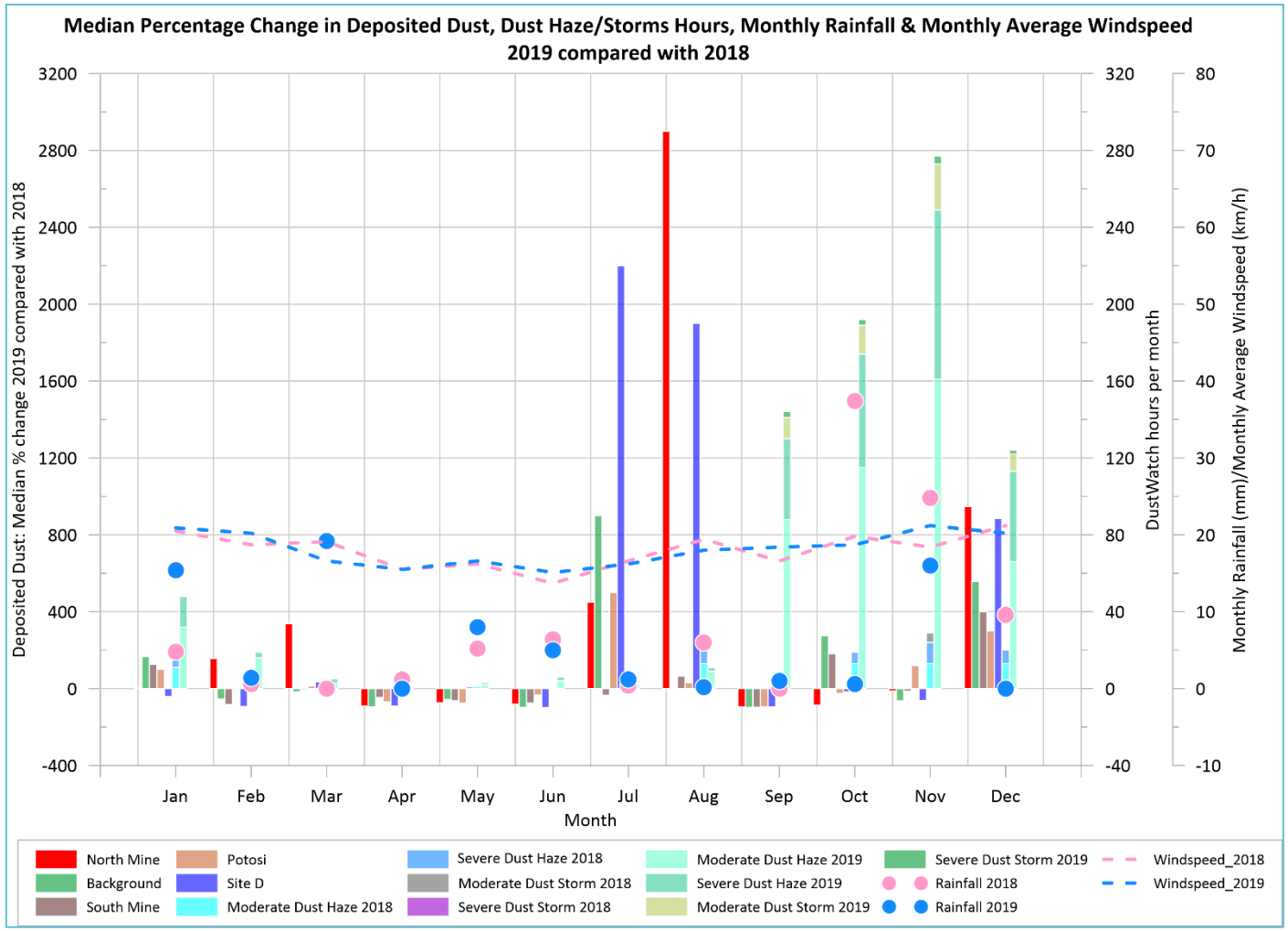


Figure 6 Median Percentage Change in Deposited Dust by Area Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018



3.2.3 Pb in Deposited Dust

The average and median percentage change in the Pb in deposited dust levels are presented with the meteorological data (monthly DustWatch hours, monthly total rainfall and monthly average windspeed) in **Figure 7** and **Figure 8**.

When considering the average percentage change (**Figure 7**) and median percentage change (**Figure 8**) in the Pb in deposited dust, the following observations are made:

- Monthly average windspeeds during 2019 were similar to 2018 and are not considered to have had a direct impact on measured levels.
- The largest average percentage changes between 2018 and 2019 were observed at the South Mine (January), Background Sites (September), and North Mine (December).
- The largest median percentage changes between 2018 and 2019 were observed at North and South Mine (January), Background and Potosi (September).
- Average and median Pb in deposited dust levels in January, March[4], April[5], June[5], September, December[6] were higher at all sites in 2019 than in 2018, but lower at all sites in May[7] and October[8] in 2019 than in 2018, with other months recording higher 2019 Pb in deposited dust levels at some sites and others lower, compared with 2018 results.
- In February, March, April and December 2019, the North Mine sites recorded the largest increase in Pb in deposited dust levels of all locations compared with the same month in 2018. In the other eight months, however, the increase at North Mine was less than (or the decrease was greater than) that experienced at other sites.
- During February 2019, whilst an increase in DustWatch hours was observed compared with 2018, all other sites (with the exception of South Mine) recorded a decrease in Pb in deposited dust, suggesting that activities at North Mine may have contributed to the observed increase in Pb in deposited dust surrounding that site.
- During March, an increase in DustWatch hours was observed in 2019 compared with 2018, and all sites also recorded an increase in Pb in deposited dust (with the exception of the average at Site D).
- In April, increases in Pb in deposited dust were observed at all locations, excluding Potosi, and whilst there were no DustWatch hours recorded during 2019 (compared with seven hours of dust haze during 2018), the increase at the Background sites suggests that activities at North Mine were not the dominant reason for the observed increase.
- No rainfall was recorded during December 2019 (compared with 10 mm measured in 2018). An increase in Pb in deposited dust were observed at most locations, suggesting that activities at North Mine were not the dominant cause for the increase. Over 248 hours of dust activity were recorded by DustWatch during December 2019 (compared with 29 hours in December 2018) suggesting regional events were the dominant cause.

[4] With the exception of the average at Site D.

[5] With the exception of the average and median at Potosi.

[6] With the exception of the average Background and median at Potosi.

[7] With the exception of the median Background.

[8] With the exception of the average Background.

Overall, there is no clear evidence that the commencement of mining operations at North Mine during late December 2018 has resulted in an increase in Pb in deposited dust levels at surrounding monitoring locations. Indeed, it is concluded that the largest influence on the Pb in deposited dust data is related to regional dust events as indicated by the increase in measured dust activity reported by DustWatch.

Figure 7 Average Percentage Change in Pb in Deposited Dust by Area Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018

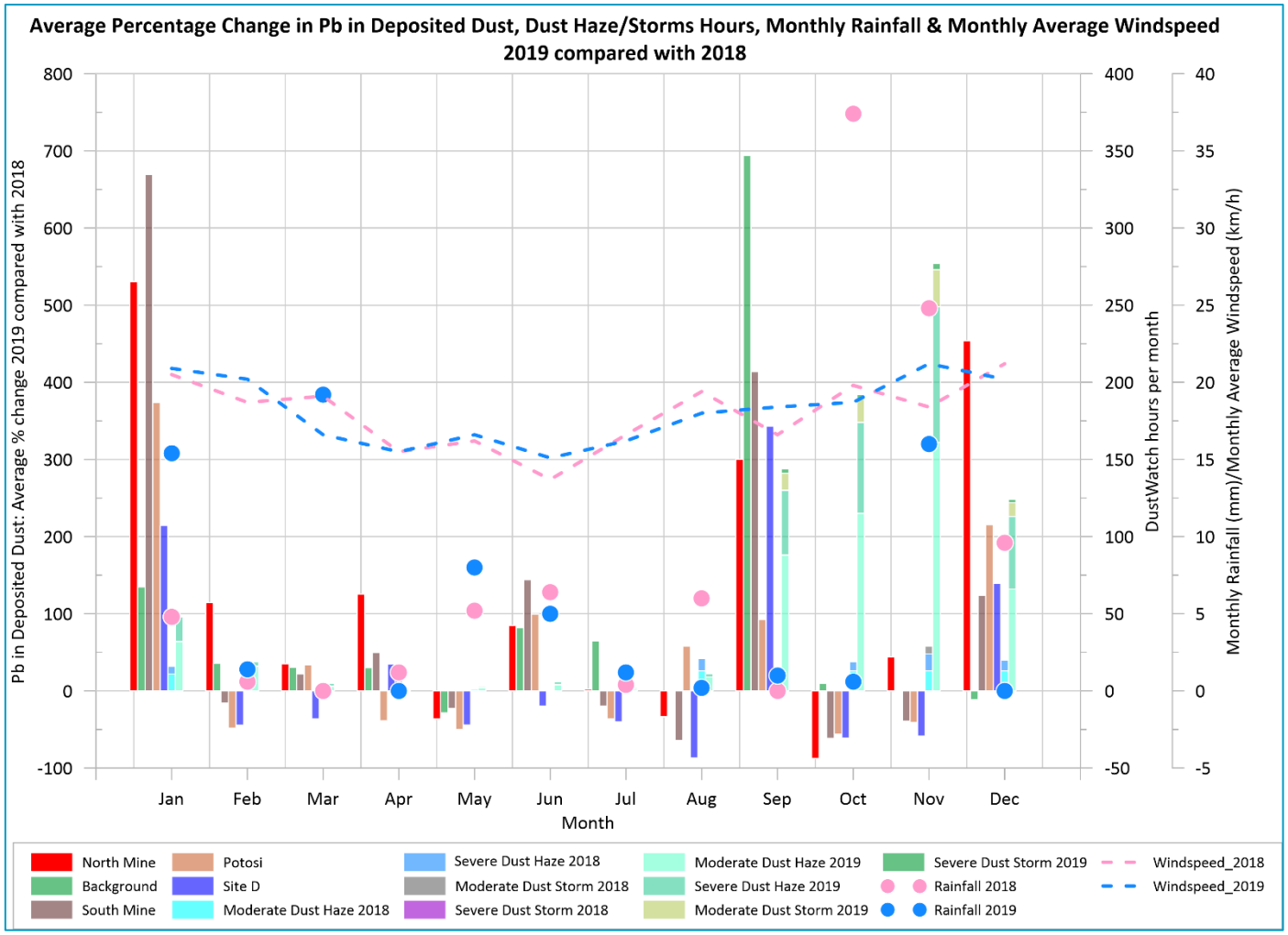
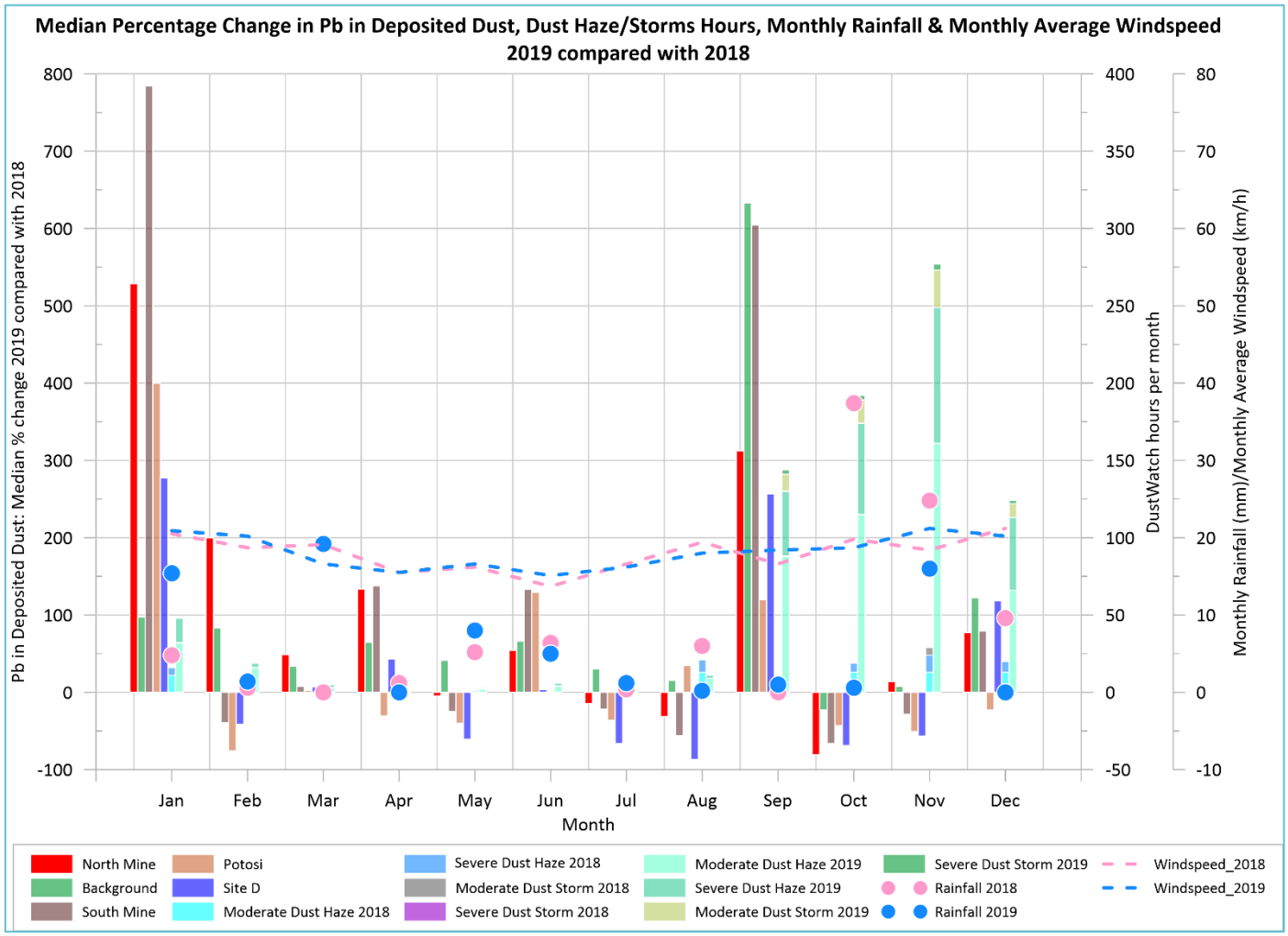


Figure 8 Median Percentage Change in Pb in Deposited Dust by Area Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018



3.3 TSP and Pb in TSP

3.3.1 Introduction

As requested by NSW EPA **Table 7** and **Table 8** provide a comparison of the monthly average and median of TSP and Pb in TSP for 2018 and 2019. It is noted there are no TSP or Pb in TSP data that can be classed as background.

Table 9 presents a summary of the calculated percentage change during 2019 when compared with 2018. The red shaded cells show an increase, the green shaded cells show a decrease.

The average and median percentage change for each month during 2019 compared with 2018 in the TSP/Pb in TSP concentration has been plotted against the number of dust hours, the monthly total rainfall and the monthly average windspeed (see **Figure 9** to **Figure 12**).

The reader is referred to **Section 3.2.1** for an explanation of how the figures are arranged and what each axis represents.

Table 7 Monthly Average and Median TSP (µg/m³) – 2018 and 2019

Location	North Mine (MP26)				South Mine (Westside MP12)				South Mine (Polo MP13)				Potosi (MP27)			
Parameter	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
Year	2018		2019		2018		2019		2018		2019		2018		2019	
January	73.1	64.9	241.6	227.7	52.2	47.3	153.8	173.5	79.7	53.6	189.2	185.0	110.8	102.3	207.5	182.7
February	54.8	52.8	245.4	230.3	39.6	39.9	127.4	124.3	45.2	37.6	169.6	152.9	76.1	71.2	171.7	161.2
March	58.4	56.3	128.3	63.6	43.8	43.1	55.1	61.5	50.1	49.6	81.4	94.0	85.3	68.2	101.8	79.8
April	62.3	60.6	42.6	41.2	48.7	47.1	37.6	34.1	74.2	64.6	55.3	36.3	78.9	77.5	40.2	27.0
May	40.2	35.3	53.3	32.9	26.9	25.0	41.9	26.5	245.7	125.9	48.9	43.3	54.9	37.5	56.4	31.7
June	20.3	19.1	35.5	27.0	16.2	15.5	25.9	23.8	26.1	23.9	68.5	20.4	16.5	15.5	28.3	23.9
July	90.3	82.6	29.1	18.5	77.5	63.0	24.3	20.4	219.1	170.7	46.6	24.1	102.9	96.3	24.2	19.9
August	51.6	34.6	37.9	28.1	49.5	35.7	35.3	24.3	97.0	49.6	28.8	30.9	90.6	66.0	40.5	30.1
September	86.5	38.6	68.1	43.8	53.7	31.4	53.1	42.3	128.3	91.1	67.3	50.4	110.6	106.5	83.9	70.0
October	175.9	71.4	49.6	51.8	115.3	37.9	41.0	42.5	206.7	65.4	46.4	38.9	142.4	57.2	71.9	64.2
November	72.4	49.0	118.9	62.9	56.6	31.1	106.6	59.9	95.3	45.1	154.8	66.9	84.0	46.6	166.4	70.5
December	79.5	72.6	115.9	91.5	56.0	48.0	117.0	78.6	85.3	77.7	153.5	110.9	99.2	67.9	184.2	138.3
Annual	***72.2***	***53.2***	***96.4***	***53.8***	***53.1***	***36.4***	***68.3***	***43.8***	***108.9***	***57.6***	***93.6***	***57.0***	***87.8***	***64.9***	***98.0***	***65.4***

Table 8 Monthly Average and Median Pb in TSP (µg/m³) – 2018 and 2019

Location	North Mine (MP26)				South Mine (Westside MP12)				South Mine (Polo MP13)				Potosi (MP27)			
Parameter	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
Year	2018		2019		2018		2019		2018		2019		2018		2019	
January	0.225	0.233	0.239	0.152	0.201	0.192	0.085	0.053	0.590	0.510	0.159	0.066	0.811	0.798	0.103	0.072
February	0.233	0.226	0.640	0.603	0.153	0.144	0.642	0.212	0.175	0.039	0.241	0.263	0.275	0.230	0.289	0.272
March	0.194	0.199	0.432	0.105	0.164	0.103	0.113	0.107	0.096	0.070	0.233	0.142	0.676	0.245	0.244	0.159
April	0.153	0.156	0.113	0.129	0.120	0.082	0.095	0.108	0.243	0.247	0.201	0.115	0.270	0.301	0.092	0.089
May	0.186	0.127	0.047	0.044	0.130	0.142	0.085	0.090	0.748	0.278	0.162	0.125	0.267	0.201	0.040	0.022
June	0.056	0.060	0.080	0.082	0.090	0.052	0.141	0.110	0.083	0.074	0.396	0.077	0.049	0.026	0.054	0.038
July	0.100	0.094	0.059	0.076	0.121	0.101	0.065	0.028	1.110	0.860	0.059	0.046	0.166	0.112	0.015	0.015
August	0.083	0.084	0.116	0.096	0.127	0.100	0.167	0.110	0.499	0.091	0.213	0.235	0.334	0.363	0.154	0.090
September	0.529	0.090	0.204	0.140	0.243	0.176	0.154	0.120	0.342	0.250	0.141	0.180	0.373	0.252	0.137	0.088
October	0.198	0.187	0.113	0.099	0.127	0.128	0.096	0.046	0.232	0.139	0.065	0.062	0.152	0.159	0.236	0.220
November	0.169	0.133	0.164	0.103	0.104	0.088	0.221	0.146	0.213	0.048	0.403	0.084	0.198	0.077	0.173	0.151
December	0.392	0.379	0.184	0.216	0.159	0.152	0.180	0.105	0.163	0.046	0.176	0.114	0.291	0.114	0.834	0.203
Annual	***0.208***	***0.135***	***0.190***	***0.099***	***0.145***	***0.124***	***0.160***	***0.108***	***0.355***	***0.122***	***0.199***	***0.096***	***0.329***	***0.169***	***0.192***	***0.088***

Table 9 Percentage change in TSP and Pb in TSP: 2019 compared with 2018

	North Mine (MP26)		South Mine (MP12)		South Mine (MP13)		Potosi (MP27)	
	TSP % change 2019 compared with 2018							
Month	Average	Median	Average	Median	Average	Median	Average	Median
January	230.6	250.9	194.7	267.0	137.5	244.9	87.3	78.5
February	348.2	336.6	221.5	211.4	274.9	306.1	125.6	126.2
March	119.5	12.9	25.9	42.9	62.5	89.4	19.2	17.0
April	-31.6	-32.0	-22.8	-27.7	-25.5	-43.8	-49.1	-65.2
May	32.6	-7.0	55.6	5.9	-80.1	-65.6	2.8	-15.5
June	74.7	41.0	59.9	53.2	162.3	-14.4	71.4	54.1
July	-67.8	-77.6	-68.6	-67.6	-78.7	-85.9	-76.5	-79.4
August	-26.6	-18.9	-28.6	-31.9	-70.3	-37.8	-55.3	-54.4
September	-21.3	13.7	-1.1	34.4	-47.5	-44.7	-24.1	-34.3
October	-71.8	-27.5	-64.4	12.1	-77.6	-40.6	-49.5	12.2
November	64.2	28.5	88.4	92.4	62.5	48.2	98.0	51.4
December	45.7	26.0	109.0	63.9	80.1	42.8	85.7	103.6
Annual	33.6	1.2	28.6	20.1	-14.0	-0.9	11.5	0.7
	Pb in TSP Deposited Dust % change 2019 compared with 2018							
Month	Average	Median	Average	Median	Average	Median	Average	Median
January	6.3	-34.8	-57.4	-72.1	-73.1	-87.1	-87.3	-91.0
February	175.4	166.3	319.0	47.4	37.8	582.9	5.2	18.5
March	122.2	-47.3	-30.8	4.0	141.9	102.9	-63.8	-35.3
April	-25.9	-17.3	-20.9	32.8	-17.2	-53.7	-66.0	-70.3
May	-75.0	-65.5	-34.2	-36.9	-78.3	-55.0	-84.9	-89.3
June	43.5	36.0	56.8	109.8	375.3	3.9	10.0	48.5
July	-40.9	-18.8	-46.1	-72.3	-94.7	-94.6	-90.7	-86.7
August	39.3	14.0	32.0	10.1	-57.3	157.3	-54.0	-75.2
September	-61.3	56.1	-36.6	-32.0	-58.8	-27.9	-63.4	-65.1
October	-43.1	-47.1	-25.0	-64.0	-72.0	-55.4	54.8	38.7
November	-2.6	-22.8	112.4	67.2	89.2	75.8	-12.4	95.9
December	-53.0	-42.9	13.7	-30.9	8.0	147.9	186.3	78.5
Annual	-9.0	-26.6	10.3	-12.9	-44.0	-21.4	-41.6	-47.8

3.3.2 TSP Data

The average and median percentage change in TSP concentrations are presented along with the meteorological data (monthly DustWatch hours, monthly total rainfall and monthly average windspeed) in **Figure 9** and **Figure 10**.

When considering the average percentage change (**Figure 9**) and median percentage change (**Figure 10**) in TSP concentrations, the following observations are made:

- Monthly average windspeeds during 2019 were similar to 2018 and are not considered to have had a direct impact on measured levels.
- The largest average and median percentage changes between 2018 and 2019 were observed at North Mine during February.
- Average and median TSP dust levels were higher at all sites in 2019 than in 2018 in January, February, March, November and December 2019 but lower in 2019 at all sites in April, June[9], July, August and September, with other months recording higher 2019 deposited dust levels at some sites and others lower, compared with 2018 results.
- In January, February and March 2019, the North Mine sites recorded the largest increase in average TSP levels of all locations when compared with the same month in 2018. In the other nine months, however, the increase in deposited dust levels at North Mine was less than (or the decrease was greater than) that experienced at other sites.
- During January 2019, DustWatch data recorded an additional 21 hours of moderate dust haze and an additional 16 hours of severe dust haze compared with January 2018 and all sites recorded an increase in deposited dust levels.
- During February 2019, an increase in DustWatch hours was observed compared with 2018, and all sites recorded an increase in TSP levels, suggesting that activities at North Mine were not the primary cause of the observed increase in TSP levels surrounding the North Mine.
- During March 2019, an increase in DustWatch hours was observed compared with 2018, and all sites recorded an increase in deposited dust levels.
- Of particular note is the measured decrease during October when rainfall was substantially lower than 2018 (0.6 mm compared with 37.4 mm) and the recorded DustWatch hours substantially higher (102 hours more rated as moderate dust haze; 53 hours more rated as severe dust haze; 15 hours more rated as moderate dust storm and 3 hours more rated as severe dust storm). It is unclear what caused this decrease.
- Between January and March, all sites measured increases in the median percentage change despite higher rainfall than 2018. Lower rainfall and an increase in DustWatch hours were observed in 2019 during these months and all other sites recorded a larger relative increase compared with North Mine, suggesting that activities at North Mine were not the primary cause.

Overall, there is no clear evidence that the commencement of mining operations at North Mine during late December 2018 resulted in an increase in TSP levels at surrounding monitoring locations. Some months show an increase and others a decrease in TSP from 2018, and similar changes were observed at other locations. This suggests influence of a more regional event rather than activities at the North Mine per se.

[9] With the exception of the median South Mine (Polo - MP13).

Figure 9 Average Percentage Change in TSP Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018

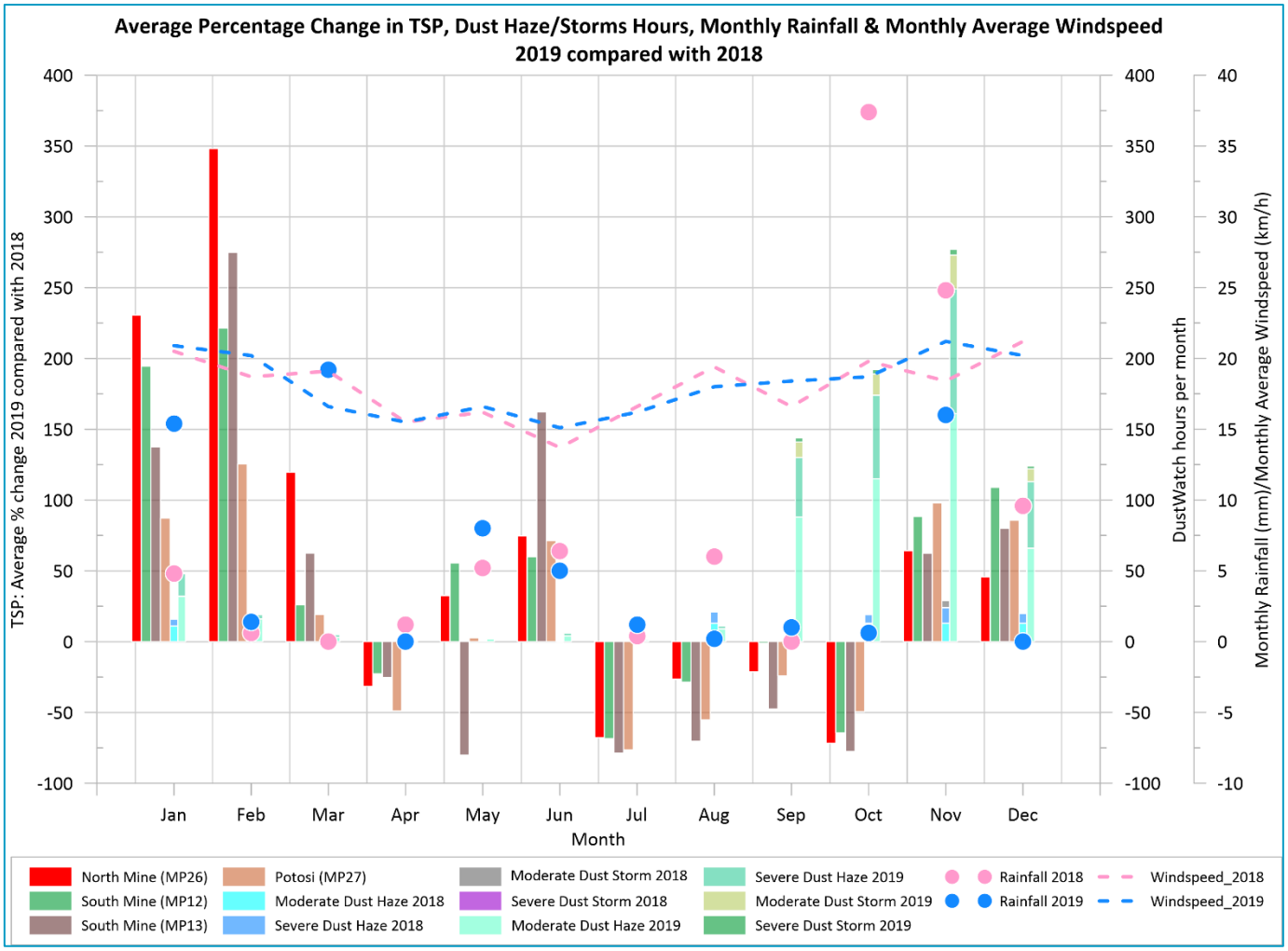
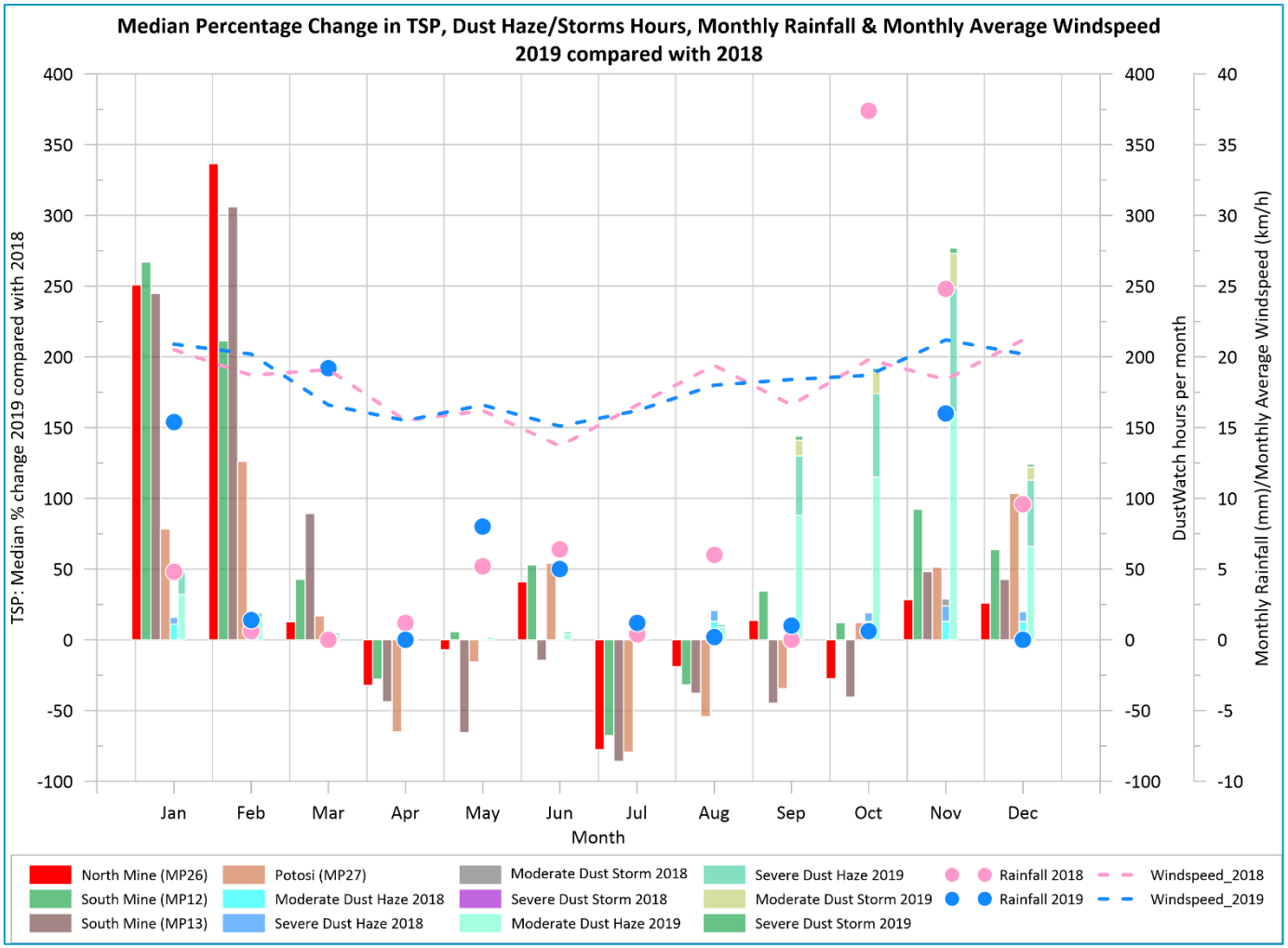


Figure 10 Median Percentage Change in TSP Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018



3.3.3 Pb in TSP

The average and median percentage change in the Pb in TSP levels are presented along with the meteorological data (monthly DustWatch hours, monthly total rainfall and monthly average windspeed) in **Figure 11** and **Figure 12**.

When considering the average percentage change (**Figure 11**) and median percentage change (**Figure 12**) in Pb in TSP concentrations, the following observations are made:

- Monthly average windspeeds during 2019 were similar to 2018 and are not considered to have had a direct impact on measured levels.
- The largest average and median percentage changes in Pb in TSP between 2018 and 2019 were observed at South Mine (Westside - MP12) during June and South Mine (Polo – MP13) during February.
- Average and median Pb in TSP dust levels were higher at all sites in 2019 than in 2018 in February and June but lower in 2019 at all sites in January[10], April[11] May, July, September[12]and October[13], with other months recording higher 2019 Pb in TSP levels at some sites and others lower, compared with 2018 results.
- In January, the North Mine site recorded the largest increase in average Pb in TSP levels of all locations when compared with the same month in 2018. Nevertheless, the increase was still very small (only 7%). All other sites recorded a decrease, despite higher DustWatch hours during 2019, suggesting that activities at North Mine may have contributed to the observed increase. However, relative to absolute concentrations such a small percentage increase may be considered to be within analytical variability. In the other months, the increase in Pb in TSP levels at North Mine was less than (or the decrease was equal to or greater than) that experienced at other sites.
- There was an increase in DustWatch hours observed in February 2019 compared with 2018 and all other sites recorded an increase in Pb in TSP, suggesting that activities at North Mine were not the dominant reason for the observed increase.
- Of particular note is the measured decreases between September and December when rainfall was typically substantially lower than 2018, and the recorded DustWatch hours substantially higher. It is also noted that other locations recorded increases during October to December. The reason for these decreases is unknown.

Overall, there is no clear evidence that the commencement of mining operations at North Mine during late December 2018 resulted in an increase in Pb TSP levels at surrounding monitoring locations.

[10] With the exception of the average North Mine (MP26).
[11] With the exception of the median South Mine (Westside – MP12).
[12] With the exception of the median North Mine (MP26).
[13] With the exception of Potosi (MP27).

Figure 11 Average Percentage Change in Pb in TSP Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018

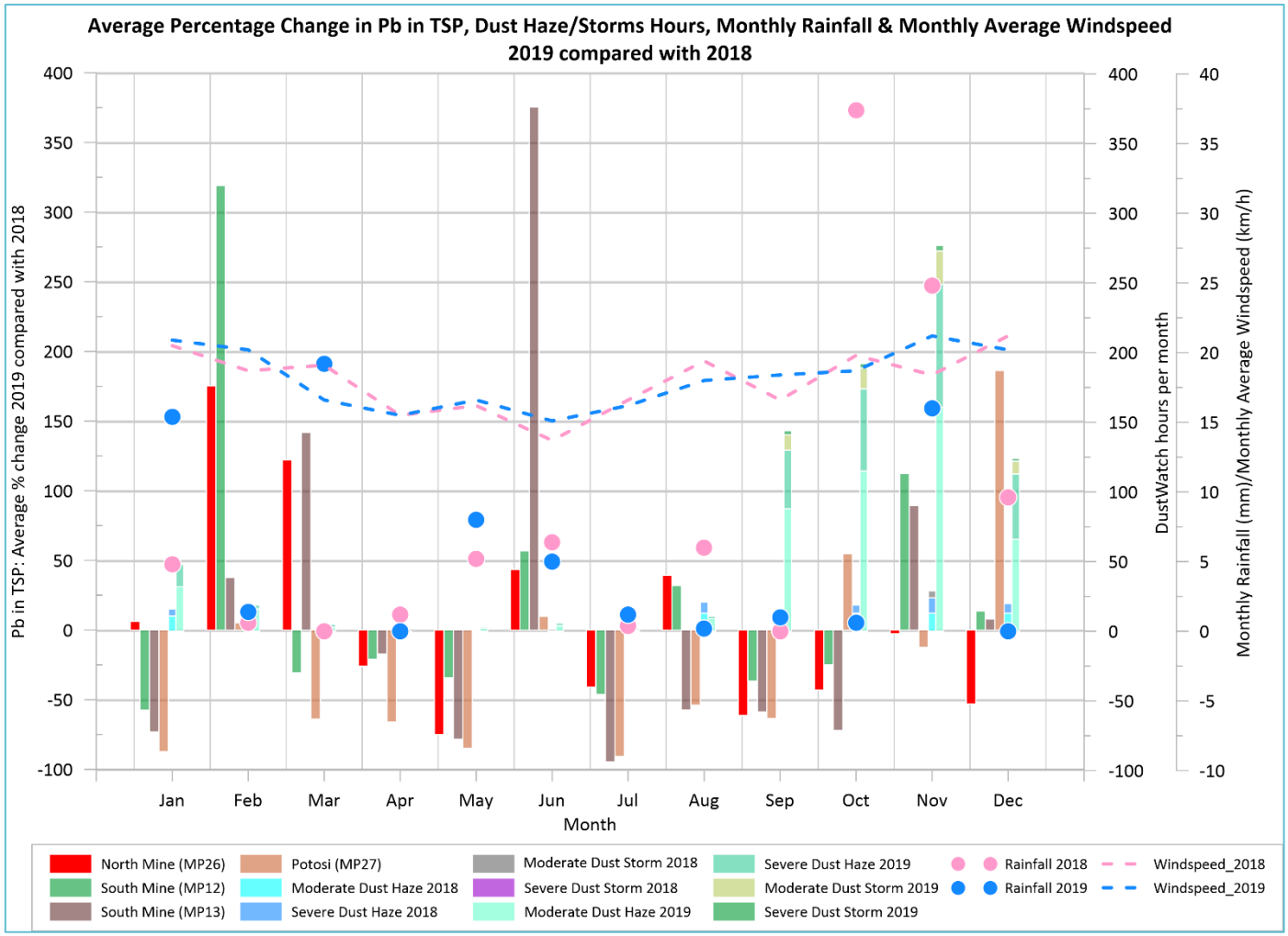
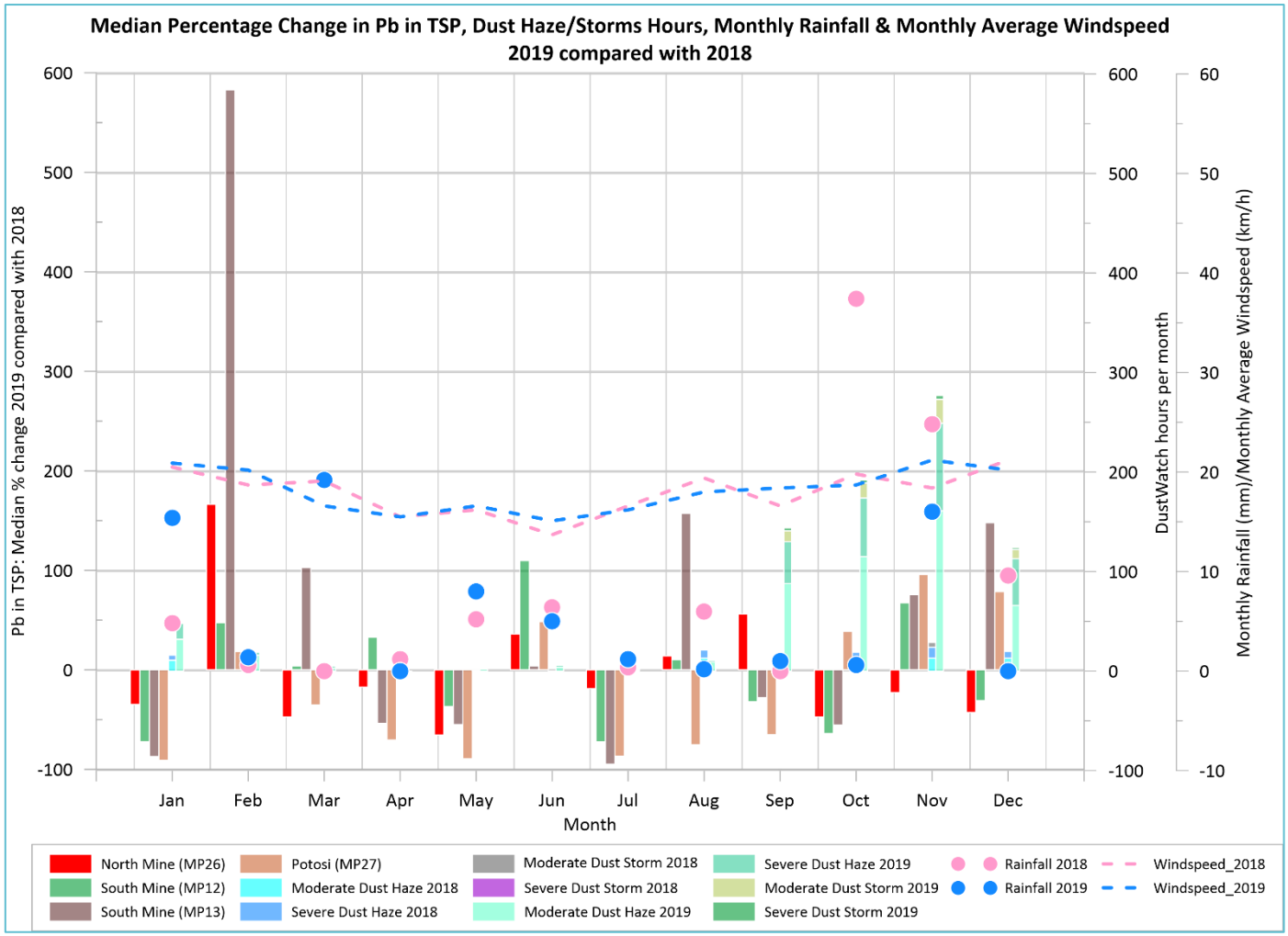


Figure 12 Median Percentage Change in Pb in TSP Compared with DustWatch hours, Monthly Rainfall and Monthly Average Windspeed: 2019 compared with 2018



3.4 Provision of data

NSW EPA requested that the data used in the analysis be included in the appendices of the report, including the sampling frequency of deposited dust and HVAS.

Due to the size of the data set it is not considered practical to include as an appendix. The data are included in Excel spreadsheets as an attachment to the email submitting this letter.

The sampling frequencies were provided as a footnote to Table 1 of the 30 March 2020 letter that is provided as **Table 1** above. To summarise, the sampling frequencies are as follows:

1. Dust gauges: data are collected monthly, 100% for one year = 12 data points.
2. HVAS: data are collected every six days, 100% for the period 2018 = 60 data points, 100% for the period 2019 = 61 data points.

4 Conclusions

The monitoring data analysis has shown that there have been measured increases in the average Pb in deposited dust and Pb in TSP in the vicinity of North Mine in some months during 2019 when compared with the monthly averages for 2018. However, the data also indicate reductions in in the vicinity of North Mine of Pb in deposited dust and in TSP in some months. When compared with data from the other sites within Perilya's Broken Hill monitoring network between 2019 and 2018, including Background sites, North Mine sites measured the greatest increase in Pb in deposited dust for four months of the year, and the greatest increase in Pb in TSP for two months of the year, with other sites recording greater increases (or smaller decreases) than North Mine in all other months.

If the commencement of mining operations in 2019 at North Mine had resulted in an increase in Pb in deposited dust and in TSP, it would be expected that the data would show a clear pattern of North Mine recording greater increases (or smaller decreases) than all other sites. The data do not support this hypothesis and, as a result, there is no evidence that the commencement of mining operations at North Mine have resulted in a relative increase in Pb in deposited dust and in TSP in 2019 compared to 2018.

Furthermore, it has also been shown that 2019 experienced lower rainfall and a marked increase in dust haze and dust storms compared with 2018 which are considered to have contributed to the generally higher 2019 readings across the region.

Yours sincerely

JUDITH COX
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Checked/
Authorised by: GS