Licensee	Perilya Broken Hill Limited (PBHL)
Address	Argent St, Broken Hill, NSW 2880
Environmental Protection Licence	**2683** (North Mine and Potosi Operations)
Link to Environmental Protection Licence	http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31559&SYSUID=1&LICID=2683

Environmental Protection Licence 2683

Deposited Particulates Monitoring

Perilya Broken Hill Limited (PBHL) has eleven (11) deposited particulates monitoring points located around the North Mine and Potosi Operations (Figure 1). Licence point 20 is located on a private residence on Hall Street. A summary of Environmental Protection Licence (EPL) 2683 conditions is shown in Table 1.

Figure 1 Location of the deposited particulates monitoring points associated with EPL 2683

Table 1 Summary of EPL 2683 conditions for dust monitoring points

Dust Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	15,16,17,18,19,20,21,22,23,24,25
Pollutant/s	Total Deposited Particulates (TDP)
	Pb in Deposited Particulates (TDP-Pb)
Unit of measure	Grams per square meter per month (g/m^2/month)
Sampling Method	AM-19
Monitoring frequency	Every 30 days ± two (2) days

Deposited Particulates Monitoring Results

January 2020 TDP and TDP-Pb are presented in Table 2. Results of laboratory analyses were received by Perilya on 03/03/2020.

Table 2 January 2020 dust monitoring point results

Licence Point	Particulates – deposited matter (g/m^2/month)	Total Lead (g/m^2/month)
15	2.6	0.002
16	3.6	0.002
17	6.2	0.005
18	2.6	0.002
19	3.0	0.004
20	6.0	0.004
21	2.3	0.003
22	< 0.1	0.009
23	4.1	0.005
24	8.9	0.028
25	4.9	0.006

Ambient Air Monitoring

EPL 2683 requires three (3) ambient air monitoring sites, one located at the Potosi Operations and the other two at the North Mine (Figure 2). PBHL currently uses high volume air samplers (HVAS) for the ambient air monitoring program. The HVAS operate (sample) for 24 hours every six (6) days.

Figure 2 Locations of the ambient air monitoring points associated with EPL 2683

Table 3 provides a summary of EPL 2683 conditions.

Table 3 Summary of EPL 2683 conditions for ambient air monitoring points

Ambient Air Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	26 and 27
Pollutant/s	Total Suspended Particles
	Total Lead
Unit of measure	Micrograms per cubic meter (µg/m^3)
Sampling Method	AS 3580.9.15:2014
	AS/NZS 3580.9.3:2015
Monitoring frequency	Every 6 days for 24 hours

HVAS Results

TSP and TSP-Pb results are presented in Table 4. Monthly averages for TSP and TSP-Pb for the previous 12 months are shown in Figure 3 and Figure 4 respectively. The final set of results for January ambient air monitoring, were received on 24/02/2020.

Table 4 January HVAS total lead and TSP results

Licence Point	**Pollutant**	**No. times measured during the month**	**Min. Value**	**Mean Value**	**Median Value**	**Max. Value**
26	TSP (µg/m3)	4*	79.4	134.5	117.3	223.8
	Total Lead (µg/m3)	4*	0.119	0.211	0.223	0.280
27	TSP (µg/m3)	4*	91.14	151.7	141.185	233.1
	Total Lead (µg/m3)	4*	0.053	0.158	0.179	0.218
30	TSP (µg/m3)	4*	70.14	118.7	88.839	226.9
	Total Lead (µg/m3)	4*	0.087	0.216	0.138	0.500

*Ecotech software error caused missed monthly sample per schedule on 2/01/2020

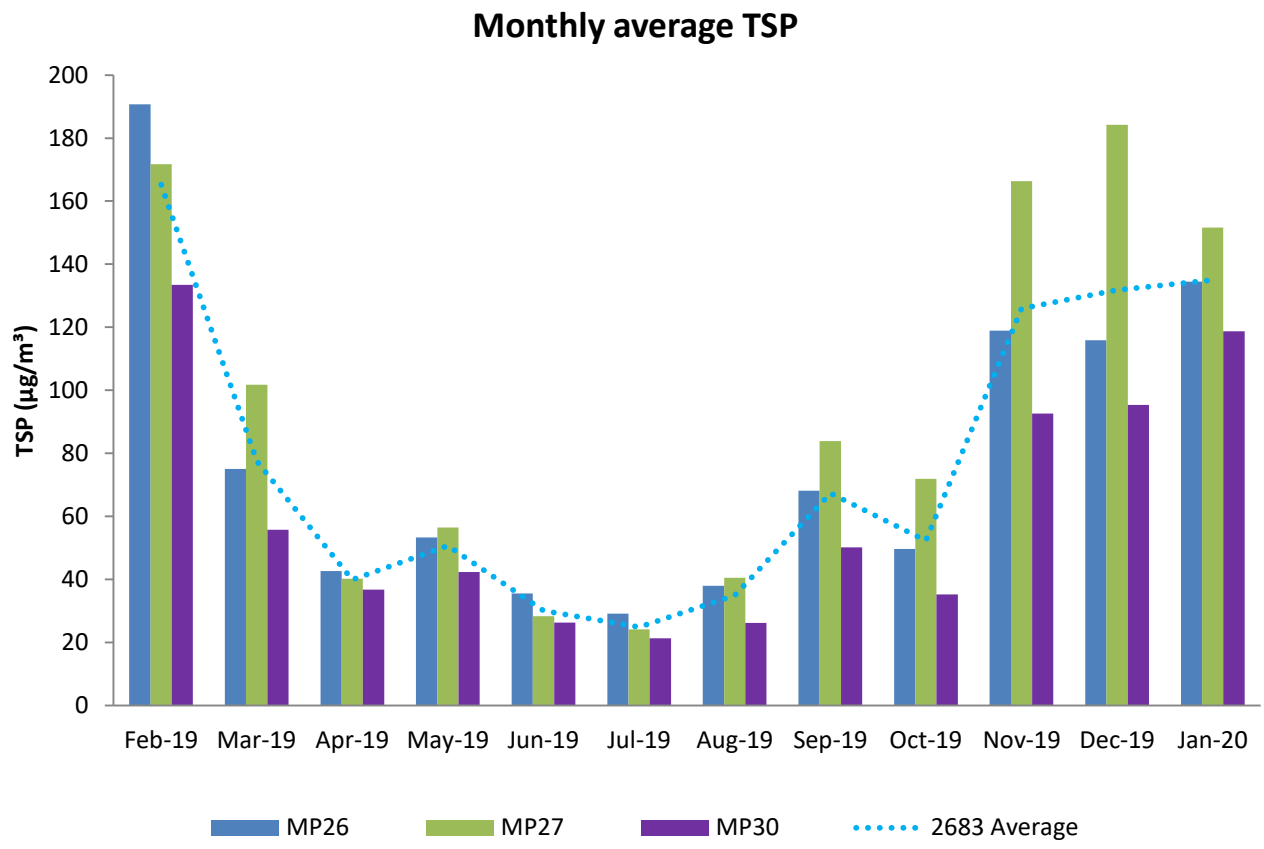


Figure 3 Average TSP results for the 12 months up to and including January 2020

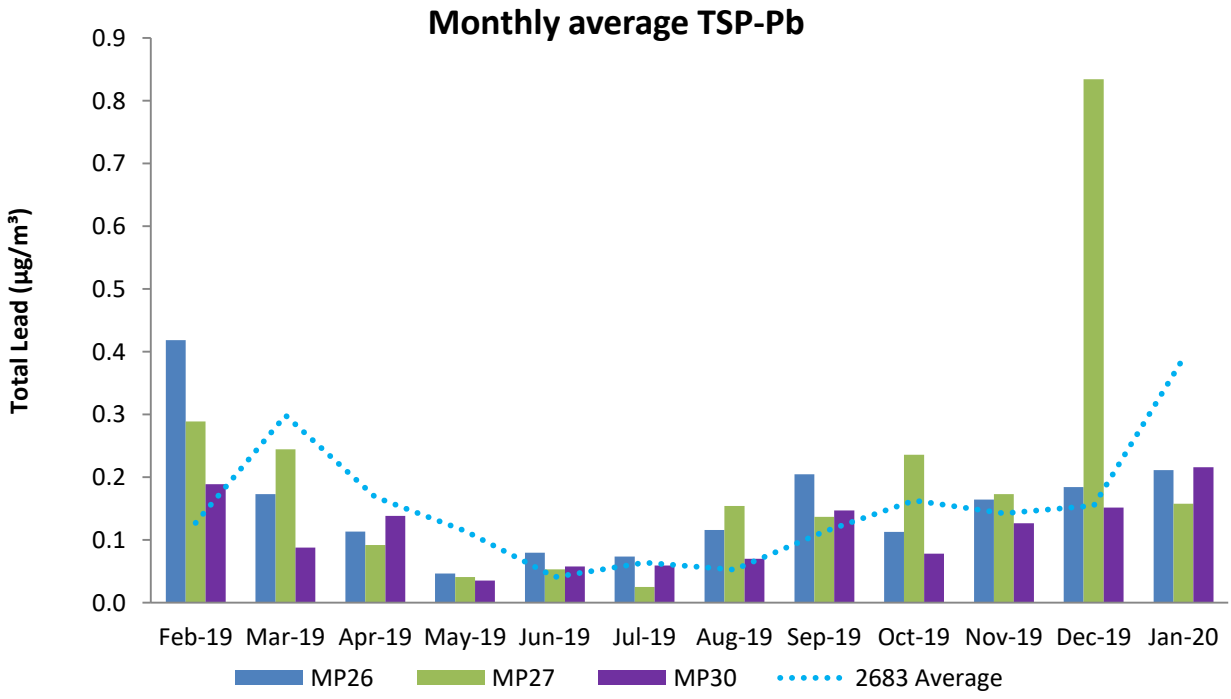


Figure 4 Average total lead results for the 12 months up to and including January 2020

Real Time Air Quality Monitoring

EPL 2683 requires two (2) real time air quality monitoring sites, one located on the Argent St side of the North Mine and the other located on the Menindee Rd side of the North Mine (Figure 5). PBHL currently uses Beta Attenuation Monitors (BAM) for the real time air monitoring program. The BAM operate (sample) for 24 hours every day.

Figure 5 Locations of the real time air monitoring points associated with EPL 2683

Table 5 provides a summary of EPL 2683 relevant conditions.

Table 5 Summary of EPL 2683 conditions for real time air monitoring points

Real Time Air Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	29 and 31
Pollutant	PM10
Unit of measure	Micrograms per cubic meter (µg/m^3)
Sampling Method	AS 3580.9.11 – 2008
Monitoring frequency	Continuous

BAM Results

PM10 results for the BAM (LP 29 and LP 31) are presented in Figure 6 and Figure 7 below. Wind pollution rose for events on the 4/01, 5/01, 7/01, 8/01, 9/01, 10/01, 11/01, 14/01, 15/01, 16/01, 22/01, 23/01, 30/01 and 31/01 are presented in Figures 8 to 21.

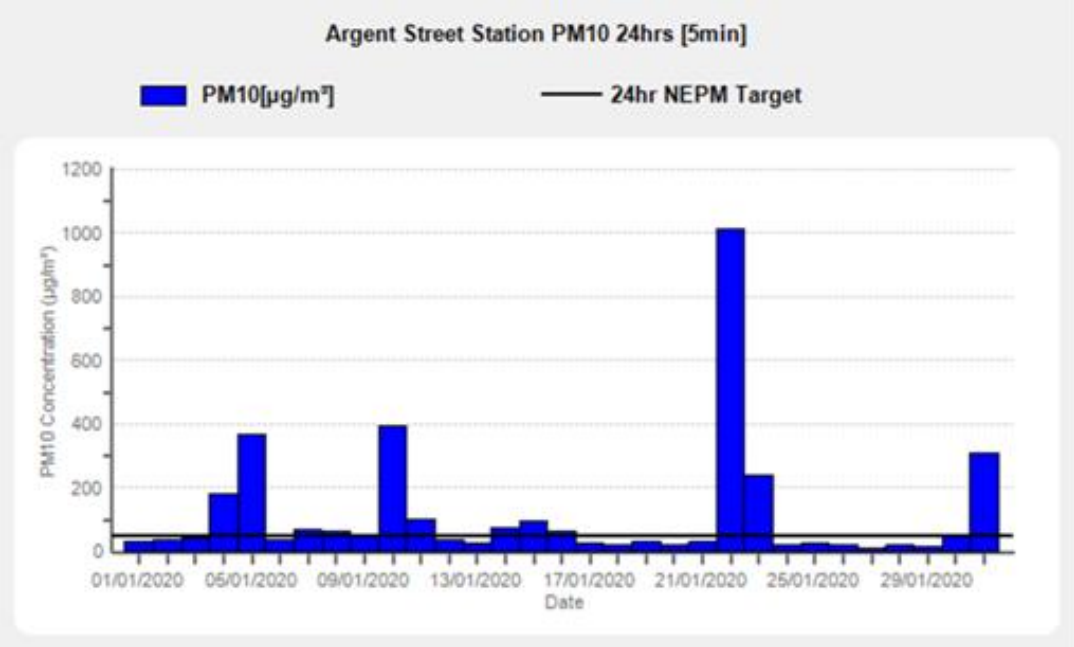


Figure 6 24 hr average PM10 BAM results (Argent St)

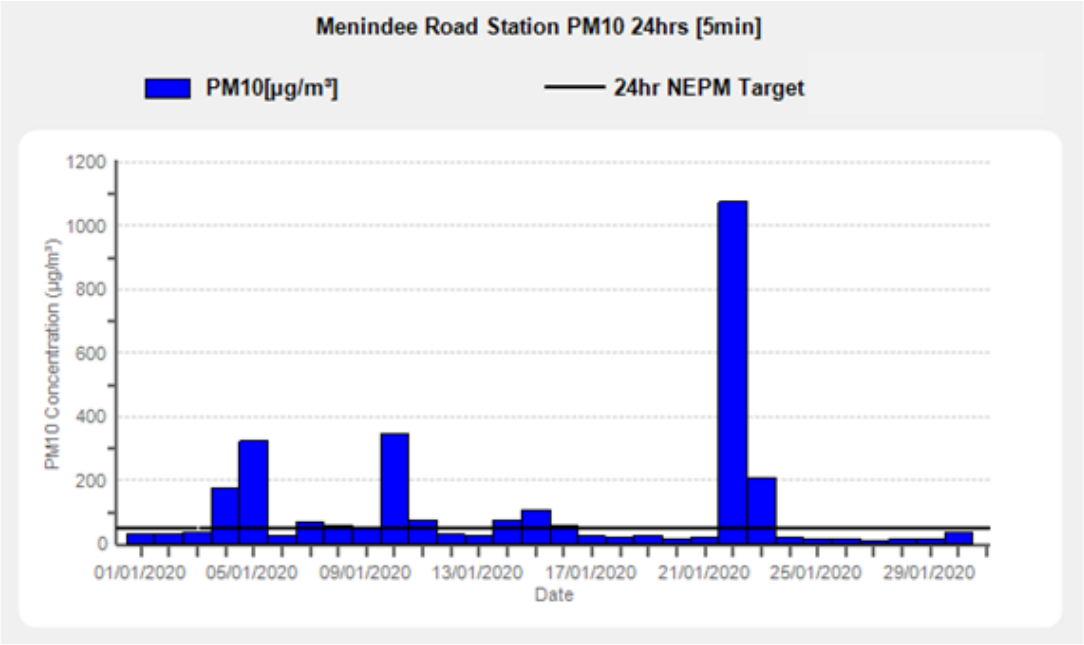
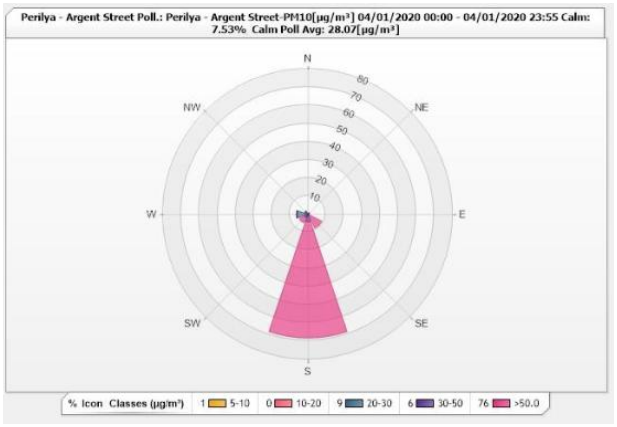


Figure 7 24 hr average PM10 BAM results (Menindee Rd)



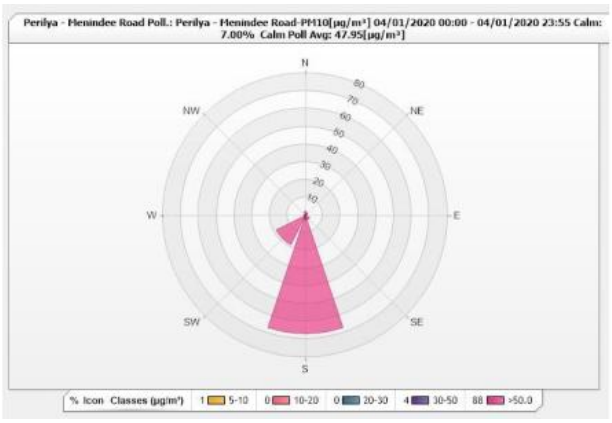
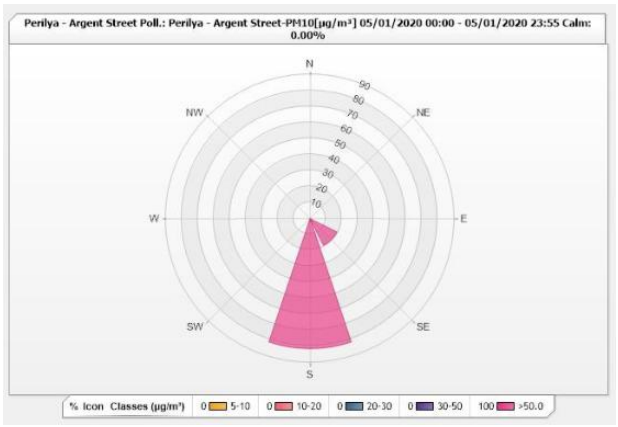


Figure 8 Pollution rose for 04 January 2020 (Left Argent St) (Right Menindee Road)



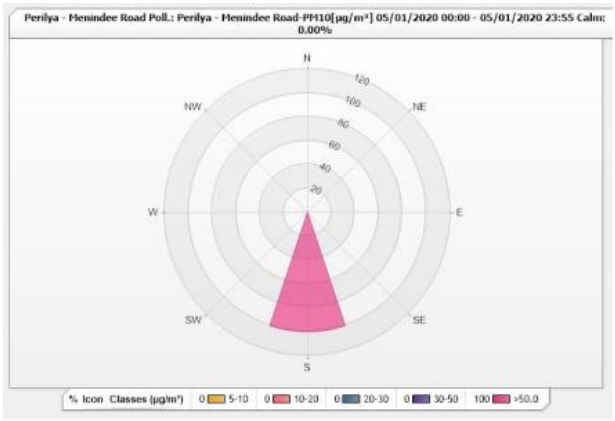
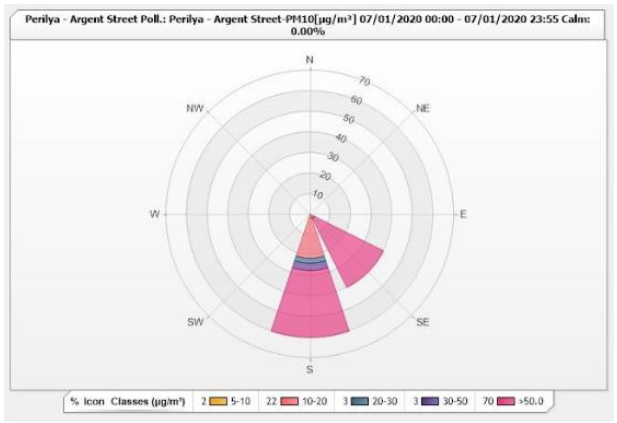


Figure 9 Pollution rose for 05 January 2020 (Left Argent St) (Right Menindee Road)



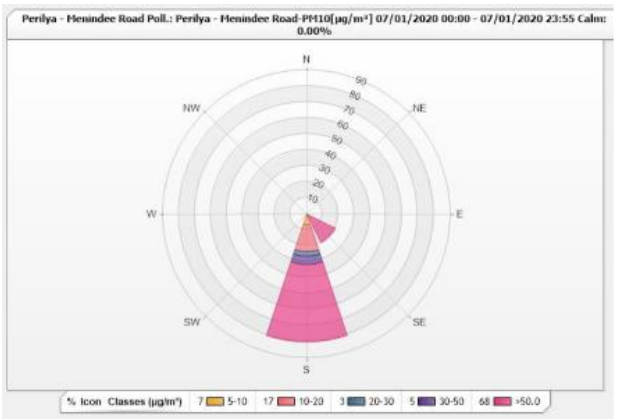
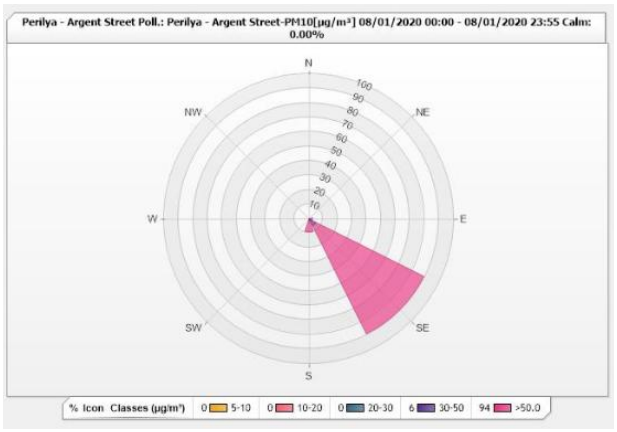


Figure 10 Pollution rose for 07 January 2020 (Left Argent St) (Right Menindee Road)



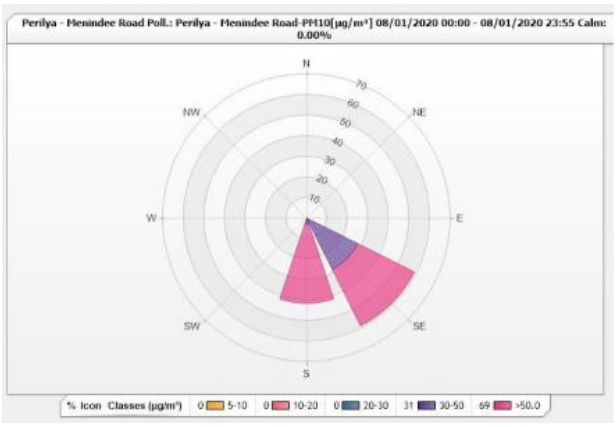


Figure 11 Pollution rose for 08 January 2020 (Left Argent St) (Right Menindee Road)

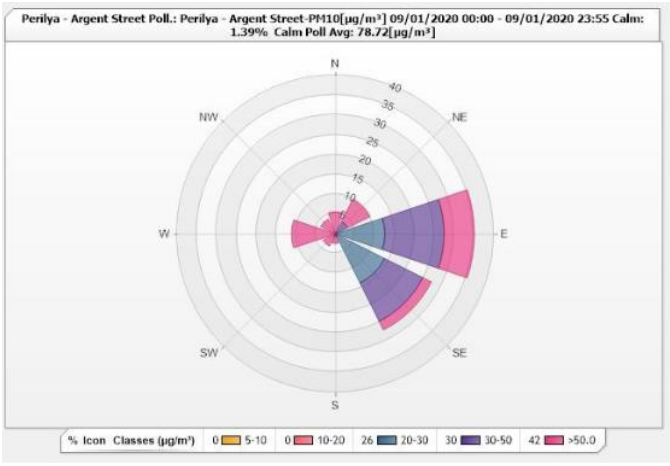
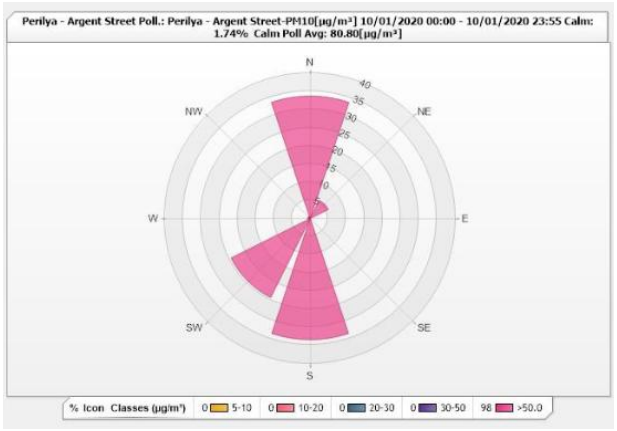


Figure 12 Pollution rose for 09 January 2020 (Argent St)



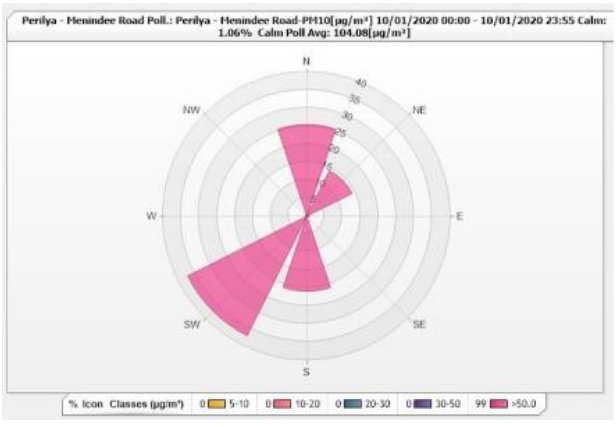
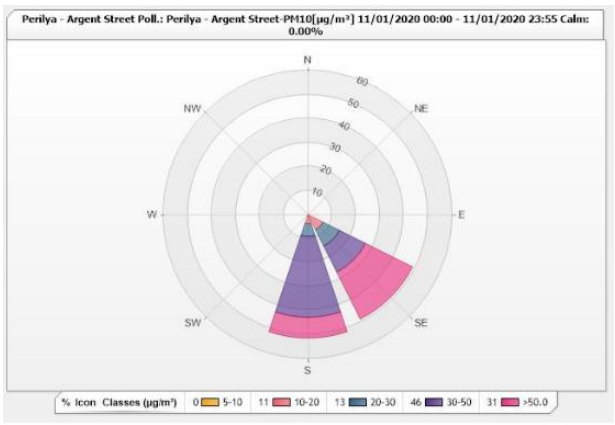


Figure 13 Pollution rose for 10 January 2020 (Left Argent St) (Right Menindee Road)



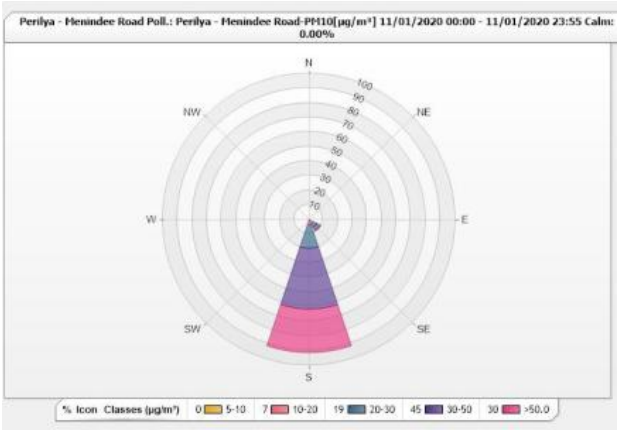
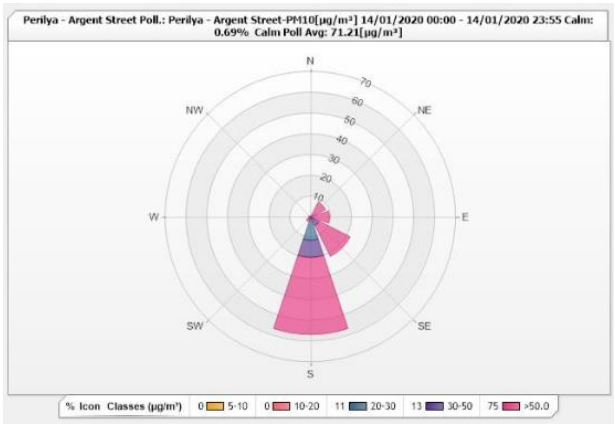


Figure 14 Pollution rose for 11 January 2020 (Left Argent St) (Right Menindee Road)



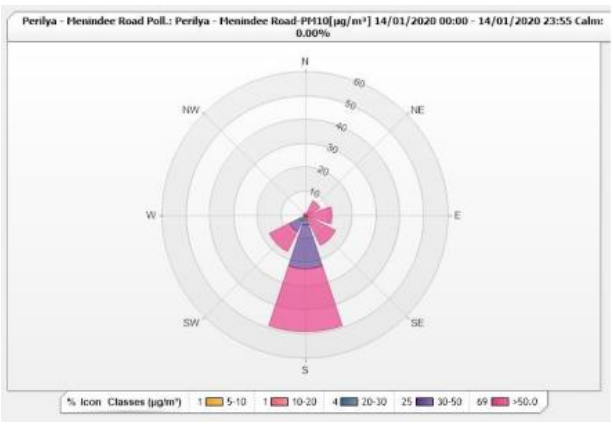
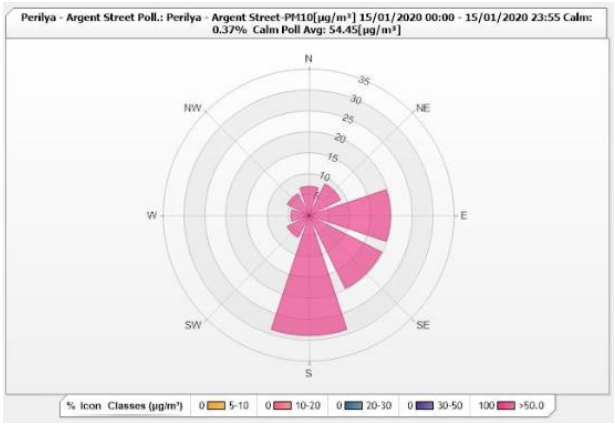


Figure 15 Pollution rose for 14 January 2020 (Left Argent St) (Right Menindee Road)



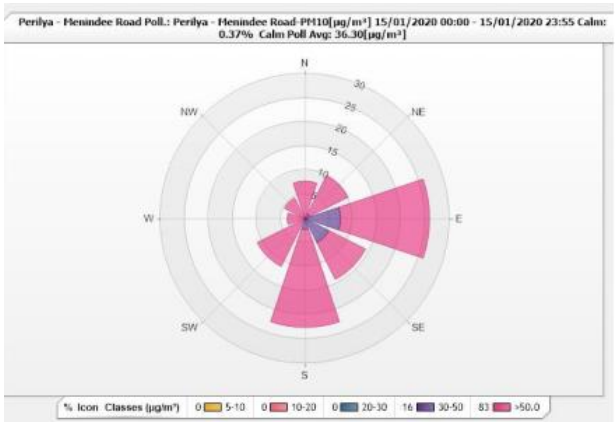
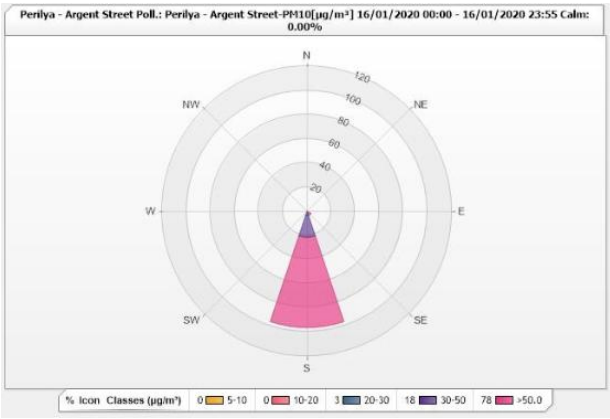


Figure 16 Pollution rose for 15 January 2020 (Left Argent St) (Right Menindee Road)



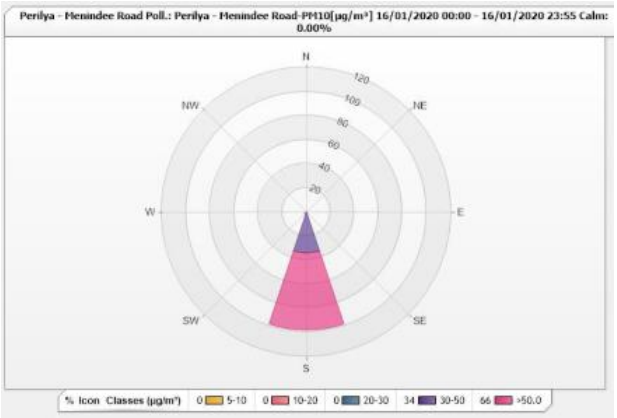
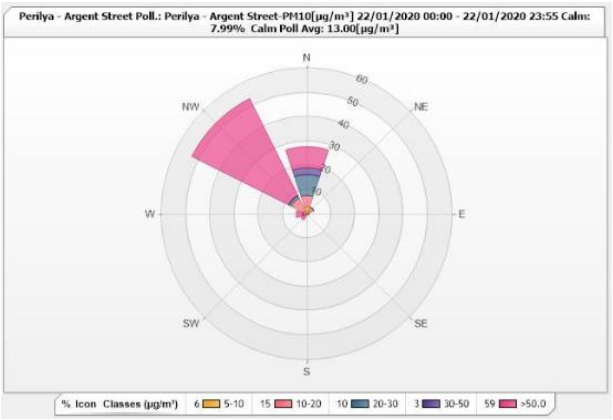


Figure 17 Pollution rose for 16 January 2020 (Left Argent St) (Right Menindee Road)



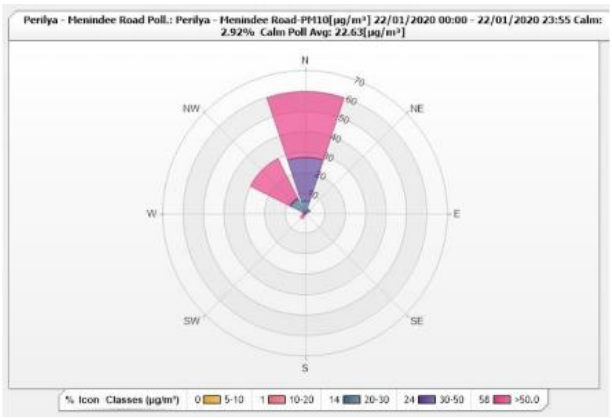
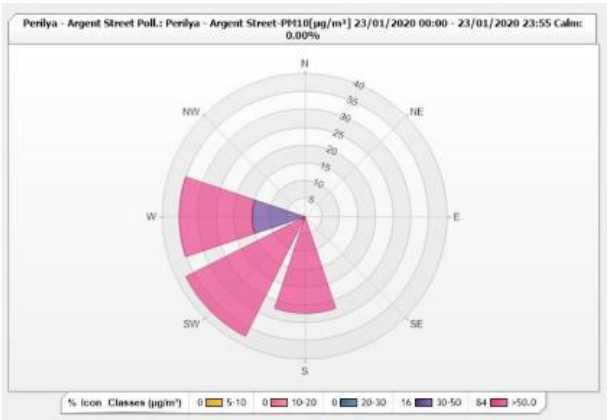


Figure 18 Pollution rose for 22 January 2020 (Left Argent St) (Right Menindee Road)



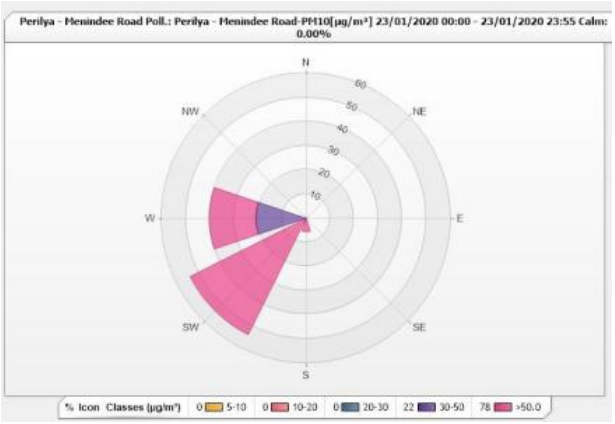


Figure 19 Pollution rose for 23 January 2020 (Left Argent St) (Right Menindee Road)

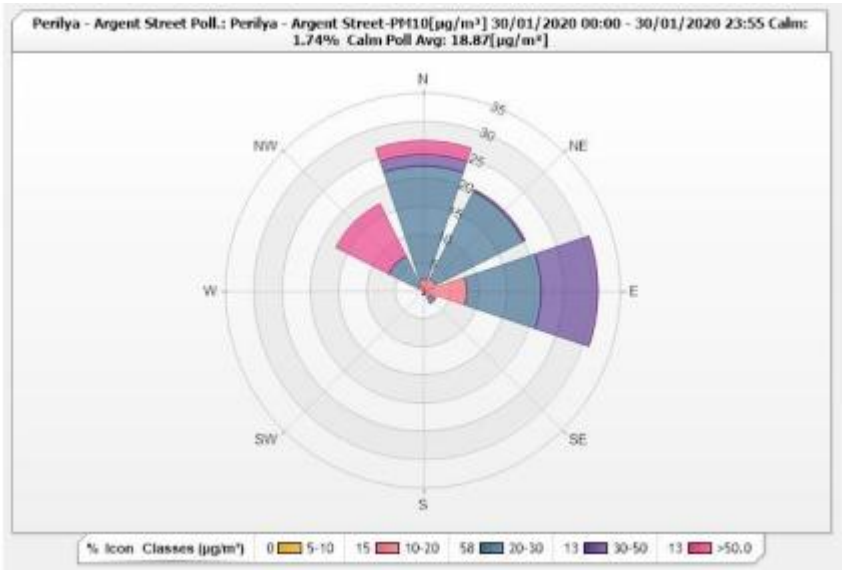
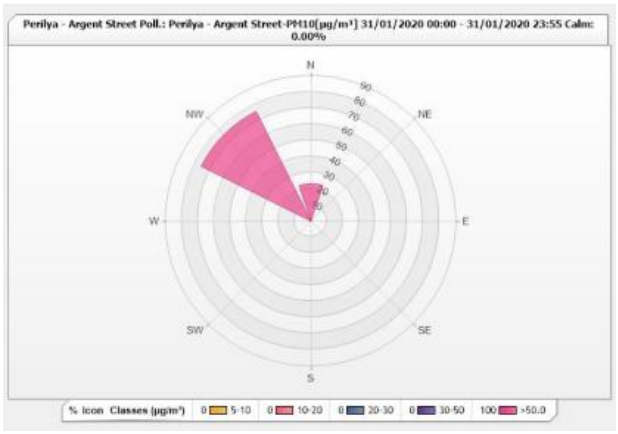


Figure 20 Pollution rose for 30 January 2020 (Argent St)



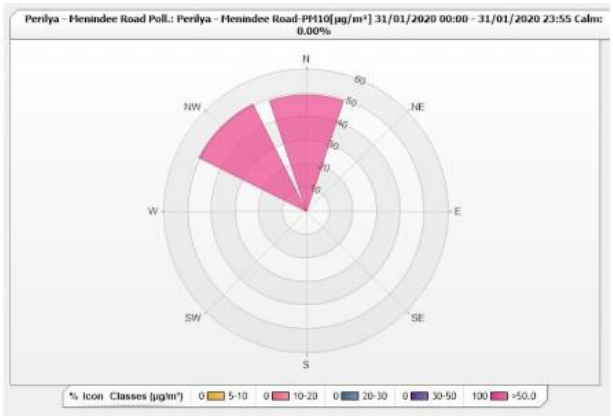


Figure 21 Pollution rose for 31 January 2020 (Left Argent St) (Right Menindee Road)

Groundwater Monitoring

Perilya 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 gigalitres of groundwater per annum from Perilya operations.

A summary of the approval requirements for North Mine is shown in Table 6.

Table 6 Summary of relevant Water Licence conditions

Water Licence conditions	
Condition	**Licence Requirement**
Volume of use	Groundwater
Unit of measure	Gigalitres (GL)
Net Volume of Groundwater Produced	
Volume extracted (in combination with Potosi Mine, Southern Operations and While Leeds)	<1.466

North Mine pumping

	January (GL)
No 3 Shaft Dewatering	0.052
Transfer to Southern Operations	0.042
Transfer to Evaporation Dams	0

Noise Monitoring

Potosi Mine and North Mine have different conditions for noise monitoring under EPL2683.

Potosi

A summary of the EPL requirements for Potosi noise monitoring is shown in Table 7.

Table 7 Summary of the EPL 2683 conditions for Potosi noise monitoring

Noise EPL 2683 Conditions for Potosi	
Condition	**Licence Requirement**
Pollutant	Noise
Unit of measure	Decibels (dB)
Limits	
Monday to Friday - 0700 hours (h) to 1800 h	An *Leq (15 minute) of 40 decibels (A weighted)
Monday to Friday - 1800 h to 2200 h	An Leq (15 minute) of 39 decibels (A weighted)
All other times	An Leq (15 minute) of 35 decibels (A weighted)

*Leq is the equivalent continuous noise level – the level equivalent to the energy average of noise levels emitted by the premises over the stated measurement period (Source: Environmental Protection Licence 2683).

The location of the Potosi noise monitoring is shown in Figure 22.

Figure 22 The location of the noise monitoring associated with EPL 2683

Noise results

Perilya conducts noise monitoring for its Potosi Operations on average every six days. This monitoring consists of one (1) 15-minute interval conducted between 0730 hours and 1900 hours. During the monitoring interval, noise identified by the operator as coming from the Potosi Operation is noted. Results of noise monitoring for the month of January 2020 are provided in Table 8.

Table 8 Summary of the noise monitoring results for January 2020

Date Noise Monitoring Undertaken	**Time** (24 hour)	**LAeq (15 min)** (dB)	**Non-mine noise**		**Potosi Operations (mine contribution)**		
			Observed sources*	**Duration** (min)	**Observed Mine Source**	**Duration** (min)	**Adj. LAeq** (dB)
9/01/2020	7:30-7:45	40.6	Various	15	0	0.00	N/A
17/01/2020	^	N/A	N/A	N/A	N/A	N/A	N/A
23/01/2020	^	N/A	N/A	N/A	N/A	N/A	N/A
31/01/2020	^	N/A	N/A	N/A	N/A	N/A	N/A

* Typically, 'various' includes commonly occurring non-mine noise such as wind interference, birds, pedestrians, dogs, aircraft and vehicles (4WDs and motorbikes).

^Unable to monitor due to wind speed greater than 3 m/second at 10m AGL

n/a – Wind speed greater than 3 m/second at 10m AGL

North Mine

A summary of the EPL requirements for North Mine noise monitoring is shown in Table 9

Table 9 Summary of the EPL 2683 conditions for North Mine noise monitoring

Noise EPL 2683 Conditions for North Mine										
Condition	**Licence Requirement**									
Pollutant	Noise									
Measurement frequency	Quarterly									
Unit of measure	Decibels (dB)									
Time Period	**Monitoring Point Limits (LAeq (15 minute))**									
	33	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42 (All others)**
Day	38	38	36	36	36	35	35	35	35	35
Evening	38	38	36	36	36	35	35	35	35	35
Night	35	35	35	35	35	35	35	35	35	35

*Leq is the equivalent continuous noise level – the level equivalent to the energy average of noise levels emitted by the premises over the stated measurement period (Source: Environmental Protection Licence 2683).

The locations of North Mine noise monitoring are shown in Figure 23.

Figure 23 Location of the North Mine noise monitoring associated with EPL 2683

Noise results

Attended monitoring was not conducted in January. The next quarterly monitoring is scheduled on March 2020.

The quarterly noise monitoring of North Mine was last carried out by Muller Acoustic Consulting on Wednesday 11/12/2019. The noise monitoring consisted of daytime, evening and night measurements at the locations identified in the above map (Figure 23). Sites MP37, MP38, MP39, MP40 and MP41 had no audible noise generated from the North Mine. MP33, MP34, MP35 and MP36 detected noise from the North Mine.

Blasting

The North Mine blast monitors are located on properties adjacent to the North Mine. Location of these monitors are shown in Figure and labeled as 'North 56' and 'Junction Circle'. The Potosi blast monitor is located onsite and adjacent to the Potosi Offices and is shown in Figure 24 as 'Potosi'.

Figure 24 Location of the blast monitors associated with EPL 2683

A summary of Licence conditions for blasting is provided in Table 10.

Table 10 Summary of EPL 2683 conditions for blasting

Blasting EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Points	56 North Mine, 48 Junction Circle, Potosi
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 (not including Potosi) between 0700 h -1900 h	115 decibels (dB)
Overpressure – upper limit (not including Potosi) between 0700 h -1900 h	120 decibels (dB)
Overpressure – upper limit (not including Potosi) between 1900 h -0700 h	95 decibels (dB)
Overpressure - 95% of blasts (Potosi) between 0700 h – 1900 h	130 decibels (dB)
Overpressure – upper limit (Potosi) between 0700 h – 1900 h	135 decibels (dB)
Overpressure – upper limit (Potosi) between 1900 h – 0700 h	110 decibels (dB)

Blasting Results

A total of 47 blasts were conducted at Potosi and a total of 110 blasts were conducted at North Mine during January 2020 (Table 11).

Table 11 January 2020 blast results for EPL 2683

Licence Point	Parameter	No. times measured in the month	Minimum Value	Mean Value	Median Value	Maximum Value
Potosi	Overpressure	47	79.4	86.1	84.4	96.1
North 56	Overpressure	110	80	90.2	92.1	95.9
Junction Circle	Overpressure	110	96.7	98.5	99.1	99.6
North 56	Ground Vibration (mm/s)	110	0.320	0.359	0.360	0.460
Junction Circle	Ground Vibration (mm/s)	110	0.410	1.549	1.820	2.700

*Calculations are based on blasts registering above 0.3 mm/s PVS. The number of times measured is based on actual number of blasts.

It is significant that over-pressure is not a useful indicator of impacts on sensitive receptors from underground mining activities (compared to open pit mining), as any pressure gradients are rapidly attenuated in the underground environment.

Complaints

There were no complaints received for EPL 2683 during January 2020.