Heron Resources Limited
Tarago Operations Pty Limited

Woodlawn Mine

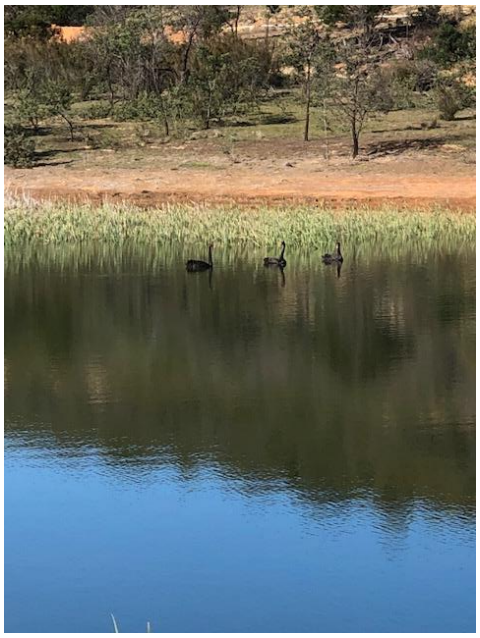
SML 20

Summary of Environmental Monitoring Data

Environmental Protection Licence Number 20821

Project Approval 07_0143MOD2

Record Update – 31 January 2020



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1. Introduction

1.1 Introduction

Tarago Operations Pty Ltd, a wholly owned subsidiary of Heron Resources Limited, holds Environment Protection Licence 20821 (EPL 20821) issued by the Environment Protection Agency (EPA) under the Protection of the Environment operations Act 1997 (the Act) and operates under the conditions of Project Approval 07_0143MOD2 granted by the NSW Department of Planning and Infrastructure for the Woodlawn Mine Project. This report has been prepared to satisfy the reporting requirements of the Act as directed by the EPA and also for Condition 11, Schedule 6 of the Project Approval. These documents can be found on the Heron Resources web site.

This report summarises environmental monitoring results for the Woodlawn Mine for the period 1 – 31 January 2020. On 25 March 2020 Woodlawn Mine suspended operations and entered a period of care and maintenance. Environmental monitoring will continue during the care and maintenance period.

A summary of the EPL information is provided in the following tables. Table 1 shows the licence information and Table 2 summarises the frequency and units for monitoring data for the reporting period. The EPL was subject to variation on 18 Jan 2019. Links to the previous version and the 18 January 2019 version are shown in Table 1.

Table 1. Licence information

Environment Protection Licence number	20821
Licensee	Tarago Operations Pty Ltd
Licensee address	Level 7, Suite 702 191 Clarence Street SYDNEY NSW 2000
Premises	Woodlawn Mine Project 507 Collector Road TARAGO NSW 2580
Link to full licence on the EPA website	http://app.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=115339&SYSUID=1&LICID=20821 https://apps.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=155570&SYSUID=1&LICID=20821
Link to Notice of Variation of EPA licence	http://app.epa.nsw.gov.au/prpoeoapp/ViewPOEONotice.aspx?DOCID=-1&SYSUID=1&LICID=20821 https://apps.epa.nsw.gov.au/prpoeoapp/ViewPOEONotice.aspx?DOCID=-1&SYSUID=1&LICID=1572566
Complaints Telephone Number	Sydney Office (02) 9119 8111 Woodlawn Office (02) 9119 8140

Table 2. Supporting information of EPL monitoring requirements

Parameter	Monitoring site	Monitoring frequency	Unit of measure
Air quality monitoring: Deposited Dust (insoluble solids)	DG 22*, DG28*, DG33* DG34	Monthly	g/m^2/month
TSP	HVAS-1	24 hours every six days	µg/m^3
PM10	HVAS-2	24 hours every six days	µg/m^3

*Monitoring undertaken by Veolia

1.2 Explanation of units of measurement

- **mg/m^3** = milligrams per cubic metre
- **g/m^2/month** = grams per square metre per month
- **µg/m^3** = micrograms per cubic metre
- **Day** = 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays
- **Evening** = 6pm to 10pm on any day
- **Night** = 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays

1.3 Abbreviations

- TOP – Tarago Operations

2. Meteorological Monitoring

Heron is required to undertake meteorological monitoring on site. Veolia operate the approved weather station (EPA licence 11436, Monitoring Point 9). The detailed February 2020 daily weather data is shown in Table 3.

Table 3. Daily Weather - January 2020

Date	Temp min @ 10m (°C)	Temp max @ 10m (°C)	Rain (mm)	Number of wet days (total)	Weather station - Hours recorded (n)	Avg wind speed (m/s)	Avg wind direction (deg)	Evapo-transpiration (mm)
1	11.0	32.0	0.0		24.0	3.7	120.0	10.71
2	9.9	30.5	0.0		24.0	3.5	81.8	5.481
3	15.0	35.1	0.0		24.0	3.1	141.8	5.129
4	20.8	39.4	0.0		24.0	5.3	223.2	6.812
5	11.9	20.2	0.0		24.0	5.7	88.2	10.01
6	11.6	18.5	2.0		24.0	4.3	79.8	2.452
7	15.5	38.3	0.0		24.0	3.5	163.7	1.402
8	21.3	33.1	0.0		24.0	3.9	95.8	5.968
9	20.8	25.7	0.0		24.0	4.4	93.7	4.546
10	21.5	38.4	0.0		24.0	3.8	218.6	2.527
11	13.2	27.0	1.0		24.0	3.2	73.7	
12	11.4	16.5	0.5		24.0	4.0	82.2	
13	10.3	23.4	0.0		24.0	3.2	72.5	1.7
14	13.6	28.5	0.0		24.0	3.3	73.7	4.118
15	14.7	29.1	0.0		24.0	3.0	175.9	5.253
16	16.4	27.0	2.0		24.0	2.8	169.7	4.666
17	13.7	20.4	0.0		24.0	4.3	106.1	3.684
18	14.2	19.0	0.0		24.0	4.2	109.1	2.226
19	14.5	26.7	1.0		24.0	3.1	71.6	2.328
20	15.6	22.6	8.0		24.0	3.1	166.1	4.757
21	13.2	23.5	0.0		24.0	4.4	254.7	4.058
22	13.1	30.9	0.0		24.0	3.7	225.0	5.331
23	17.3	31.7	0.0		24.0	8.1	272.5	7.82
24	14.9	25.7	0.5		24.0	4.1	243.8	9.24
25	17.2	31.4	0.0		24.0	3.6	144.6	6.231
26	17.6	31.9	0.0		24.0	3.7	174.0	6.34
27	15.3	33.0	0.0		24.0	3.7	140.2	7.4
28	17.7	31.8	0.0		24.0	3.5	153.1	6.313
29	14.4	32.2	0.0		24.0	2.8	113.8	6.099
30	14.9	35.9	0.0		24.0	2.0	125.0	5.73
31	16.9	39.2	0.0		24.0	2.5	183.9	5.676
Average/Total	15.1	29	15	7		3.78		154

The wind rose at Figure 1 depicts the wind speed and direction recorded at 10 m above ground level. During the period the winds were predominantly from the east.

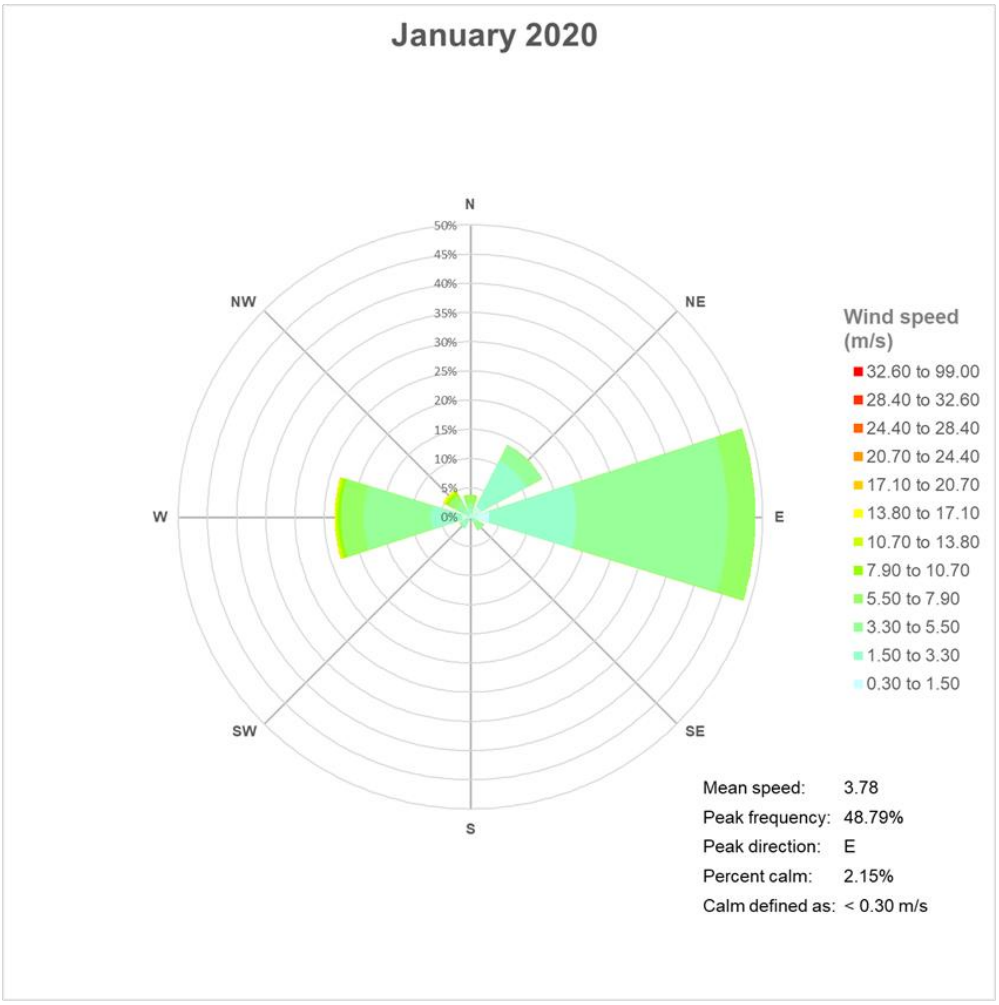

Figure 1. Wind rose data - January 2020

3. Air Quality Monitoring

The Air quality monitoring results for Woodlawn Mine are summarised in the following sections.

3.1 Depositional Dust

Depositional dust monitoring around the Woodlawn site is undertaken on a monthly basis. Four depositional dust gauges DG22, DG28, DG33 and DG34 are present to monitor the levels of depositional dust. They are located on Site as follows:

- DG22 – East side of void
- DG28 – Pylara
- DG33 – MBT plant
- DG34 – Behind core shed

The limits for deposited dust are outlined in the Project Approval. The limits are detailed in Table 4.

Table 4. Deposited dust limits

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level (Australian standard Limit)
[c]Deposited dust	Annual	[b]2 g/m^2/month	[a]4 g/m^2/month

- [a] Total impact (i.e. Incremental increase in concentrations due to the project plus background concentrations due to all other sources).
- [b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own)
- [c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.

Air quality results derived from the depositional dust gauges for February 2020 are shown in Table 5. The rolling annual average continues to be influenced by high readings obtained through off-site influences including drought, regional dust storms and bushfires impacting Site during spring 2019 and summer 2019/2020. A notable dust storm passed over site on 23 Jan 20 (see cover). Exceedances have been reported as required.

Table 5. February 2020 DDG results

DDG ID	EPL ID	Start date	End date	Insoluble solids (g/m2/month)	Rolling annual average (g/m2/month
DG22	2	3 Jan 20	3 Feb 20	15.8	4.8
DG28	1	3 Jan 20	3 Feb 20	10.5	5.7
DG33	4	3 Jan 20	3 Feb 20	6.8	2.5
DG34	25	3 Jan 20	3 Feb 20	8.8	5.9

3.2 Atmospheric dust – particulate matter

The Project Approval requires monitoring of total suspended particulate (TSP) matter and particulate matter < 10µm (PM_{10}) to ensure particulate matter emissions generated by the project do not exceed the criteria listed at any residence on privately owned land. High volume air sampling (HVAS) equipment for atmospheric monitoring was installed on 16 October 2017 at Pylara, the nearest

residence located to the east of Woodlawn Mine. Monitoring commenced on 17 October 2017 and is undertaken for a 24 hour cycle every 6 days.

The limits for TSP and PM_{10} are outlined in the Project Approval. The limits are detailed in. Table 6 and results for February are shown in Table 7.

Table 6. TSP and PM_{10} limits

Pollutant	Averaging Period	[d]Criterion
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3
Particulate matter < 10 µm	24 hour	[a] 50 µg/m^3

- [a] Total impact (i.e. Incremental increase in concentrations due to the project plus background concentrations due to all other sources).
- [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fog, fire incidents or any other activity agreed by the Director-General.

Table 7. PM_{10} and TSP results for January 2020

Date	PM10	PM10 rolling annual average[a]	TSP	TSP Rolling annual average[b]
5 Jan 20	125	23.4	136	39.6
11 Jan 20	94.8	24.9	205	43.2
17 Jan 20	39.6	24.8	69.8	43.3
23 Jan 20	2220	24.6	2010	42.8
29 Jan 20	37.8	25.1	56.9	43.5

a. Outlier removed for 23 Jan 20 (extreme regional dust storm)

b. Outliers removed for 30 Dec 19 and 23 Jan 20 (extreme regional dust storms)

Compliance summary:
The PM_{10} and TSP results for 24 hour period are within the criteria set out in the PA.

The annual average emissions are within the criteria set out in the PA.

4. Noise Monitoring

The noise criteria to be met at any residence on privately owned land is contained in the project approval and described in Table 8.

The EPL requires that the premises must not emit noise exceeding an L_{Aeq}, 15 minute noise level of 35 dB(A) at any sensitive receivers during the operational phase.
The meteorological conditions to be met during noise monitoring include:

a) Wind speeds up to 3 m/s at 10 m above ground level; or
b) Temperature inversion conditions of up to 3^{o}C/100m and wind speeds up to 2 m/s at 10m above ground level

Table 8. Noise criteria (dB(A)

Receivers	Day/Evening/Night ($L_{Aeq(15minute)}$)	Night ($L_{A1(max)}$)
All residential receivers	35	45

Attended noise surveys were unable to be carried out due to wind exceeding the speed criteria for noise monitoring.

Table 9. Monitoring locations for noise monitoring

Monitoring location	Description
NM1	Pylara - Residence owned by Veolia
NM2	Cowley Hills – Residence owned by Veolia
NM3	Woodlawn – Residence owned by Veolia

Attended noise measurements were undertaken using a calibrated Type 1, Castle Group Ltd dBAir environmental monitor. Noise monitoring is carried out using two measurement profiles as follows:

Measurement 1 – Frequency weighting A, time weighting F
Measurement 2 – Frequency weighting C, time weighting F.

Real time meteorological conditions were obtained at each location using a BL-300 Anemo-thermometer and hygrometer and validated using the authorised Woodlawn on-site weather station. Readings are routinely taken at the Pylara, Woodlawn and the Cowley Hills residences. All locations represent the nearest receptors and are owned by Veolia. The results show that operational activities have little noise impact on any of the receptor locations with operational noise emissions being generally inaudible at the Pylara monitoring location and barely perceptible at Woodlawn and Cowley Hills. The dominant extraneous noise sources are heavy and light vehicular traffic along Collector Road, wind in the trees, birds, and livestock.

Date	Location	Time	Measured LAeq15 result at point of monitoring	Calculated LAeq15 result at residence	Dominant noise sources
14/1/20	Pylara	08:35	25		Trucks on Collector Road, Birds
14/1/20	Woodlawn	07:52	25		Lots of birds
14/1/20	Cowley Hills	09:14	25.0		Trucks, birds

Compliance statement: Operational noise complies with the nominated noise guidelines.

5. Blasting

Airblast overpressure and the ground vibration level are required to be monitored for all blasts undertaken during operations. EPL and Project Approval limits at any residence on privately owned land are detailed in Table 10.

Table 10. EPL & Project Approval limits for airblast and ground vibration

Time of blasting	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any time	120	10	0%
Day	115	5	5% of the total number of blasts over a period of 12 months
Evening	-	2	5% of the total number of blasts over a period of 12 months
Night, and all day on Sundays and public holidays	-	1	0%

The timing of underground blast events during the period 1-31 Jan 2020 are shown in Table 11. During the period no off-site vibration events associated with blasting operations were recorded. The monitor was located near the Woodlawn Farm Homestead during January 2020.

Table 11. Blast monitoring Feb 2020

			Monitor ID
Date	**Time**		**UM14301**
1 Jan 20	0700	Woodlawn Farm	Not detected
2 Jan 20	0630	Woodlawn Farm	Not detected
3 Jan 20	0630	Woodlawn Farm	Not detected
3 Jan 20	1830	Woodlawn Farm	Not detected
4 Jan 20	0730	Woodlawn Farm	Not detected
4 Jan 20	1853	Woodlawn Farm	Not detected
5 Jan 20	1900	Woodlawn Farm	Not detected
6 Jan 20	0630	Woodlawn Farm	Not detected
6Jan 20	1315	Woodlawn Farm	Not detected
7 Jan 20	0715	Woodlawn Farm	Not detected
7 Jan 20	1843	Woodlawn Farm	Not detected
8 Jan 20	0730	Woodlawn Farm	Not detected
8 Jan 20	1325	Woodlawn Farm	Not detected
9 Jan 20	0030	Woodlawn Farm	Not detected
9 Jan 20	0630	Woodlawn Farm	Not detected
10 Jan 20	0630	Woodlawn Farm	Not detected
10 Jan 20	1830	Woodlawn Farm	Not detected
11 Jan 20	1830	Woodlawn Farm	Not detected

12 Jan 20	0600	Woodlawn Farm	Not detected
12 Jan 20	1830	Woodlawn Farm	Not detected
13 Jan 20	0610	Woodlawn Farm	Not detected
13 Jan 20	1830	Woodlawn Farm	Not detected
14 Jan 20	0130	Woodlawn Farm	Not detected
14 Jan 20	0630	Woodlawn Farm	Not detected
17 Jan 20	0630	Woodlawn Farm	Not detected
17 Jan 20	1839	Woodlawn Farm	Moved to Pylara
18 Jan 20	0700	Woodlawn Farm	Not detected
18 Jan 20	1315	Woodlawn Farm	Not detected
19 Jan 20	0630	Woodlawn Farm	Not detected
19 Jan 20	0800	Woodlawn Farm	Not detected
19 Jan 20	1855	Woodlawn Farm	Not detected
20 Jan 20	1245	Woodlawn Farm	Not detected
20 Jan 20	1837	Woodlawn Farm	Not detected
21 Jan 20	0530	Woodlawn Farm	Not detected
21 Jan 20	1305	Woodlawn Farm	Not detected
21 Jan 20	1905	Woodlawn Farm	Not detected
21 Jan 20	2300	Woodlawn Farm	Not detected
22 Jan 20	0600	Woodlawn Farm	Not detected
22 Jan 20	1345	Woodlawn Farm	Not detected
23 Jan 20	0636	Woodlawn Farm	Not detected
23 Jan 20	2305	Woodlawn Farm	Not detected
24 Jan 20	1830	Woodlawn Farm	Not detected
24 Jan 20	2035	Woodlawn Farm	Not detected
25 Jan 20	0215	Woodlawn Farm	Not detected
25 Jan 20	0630	Woodlawn Farm	Not detected
25 Jan 20	1300	Woodlawn Farm	Not detected
26 Jan 20	1340	Woodlawn Farm	Not detected
26 Jan 20	1900	Woodlawn Farm	Not detected
27 Jan 20	0635	Woodlawn Farm	Not detected
27 Jan 20	1830	Woodlawn Farm	Not detected
28 Jan 20	0640	Woodlawn Farm	Not detected
28 Jan 20	1845	Woodlawn Farm	Not detected
28 Jan 20	1940	Woodlawn Farm	Not detected
29 Jan 20	0545	Woodlawn Farm	Not detected
30 Jan 20	0633	Woodlawn Farm	Not detected
31 Jan 20	0215	Woodlawn Farm	Not detected
31 Jan 20	0630	Woodlawn Farm	Not detected
31 Jan 20	1730	Woodlawn Farm	Not detected

Compliance statement: Offsite airblast overpressure and ground vibration monitoring results during underground blasting operations have remained below the project limits.

6. Complaints

No s were received during the reporting period.