Maxwell Infrastructure
Environmental Monitoring Data
Quarter 1 2020

1 INTRODUCTION

Maxwell Infrastructure (formerly Drayton Mine) is owned by Malabar Coal. This report has been compiled to present environmental monitoring data for Maxwell Infrastructure in accordance with Schedule 5, Condition 11 (b) and (c) of Project Approval 06_0202.

This report covers the reporting period 1 January to 31 March 2020. Summaries of historic environmental monitoring data (prior to 2020) can be found in the Annual Environmental Management Reports located on the Malabar Coal website.

2 MONITORING RESULTS

Deposited dust monitoring results are provided in **Table 1**.

Continuous TEOM PM_{10} monitoring results are provided in **Figure 1**.

Surface water quality monitoring results are provided in **Table 2.**

Groundwater quality results are provided in **Table 3**.

Groundwater level results are provided in **Table 4**.

Noise monitoring results are provided in **Table 5**.

Locations of monitoring sites are shown in **Appendix 1** to **4**.

Table 1: Deposited dust monitoring results for Quarter 1.

Gauge	Insoluble Solids Result (g/m^2/month)			Annual Mean Limit (g/m^2/month)	2020 Annual Mean (g/m^2/month)
	January	February	March		
2175	5.6	1.9	2.1	4.0	2.9
2230	5.3	1.2	2.6	4.0	2.9
2235	4.3	1.9	2.2	4.0	2.7
2247	7.4	1.9	1.8	4.0	3.2

Note: Elevated deposited dust results were recorded at all Maxwell Infrastructure gauges in January 2020. A number of bushfires occurred throughout NSW in January 2020 and smoke, ash and dust from these fires is likely to have contributed to elevated deposited dust levels in the region. The year-to-date mean of results recorded at all gauges remain below the annual mean limit.

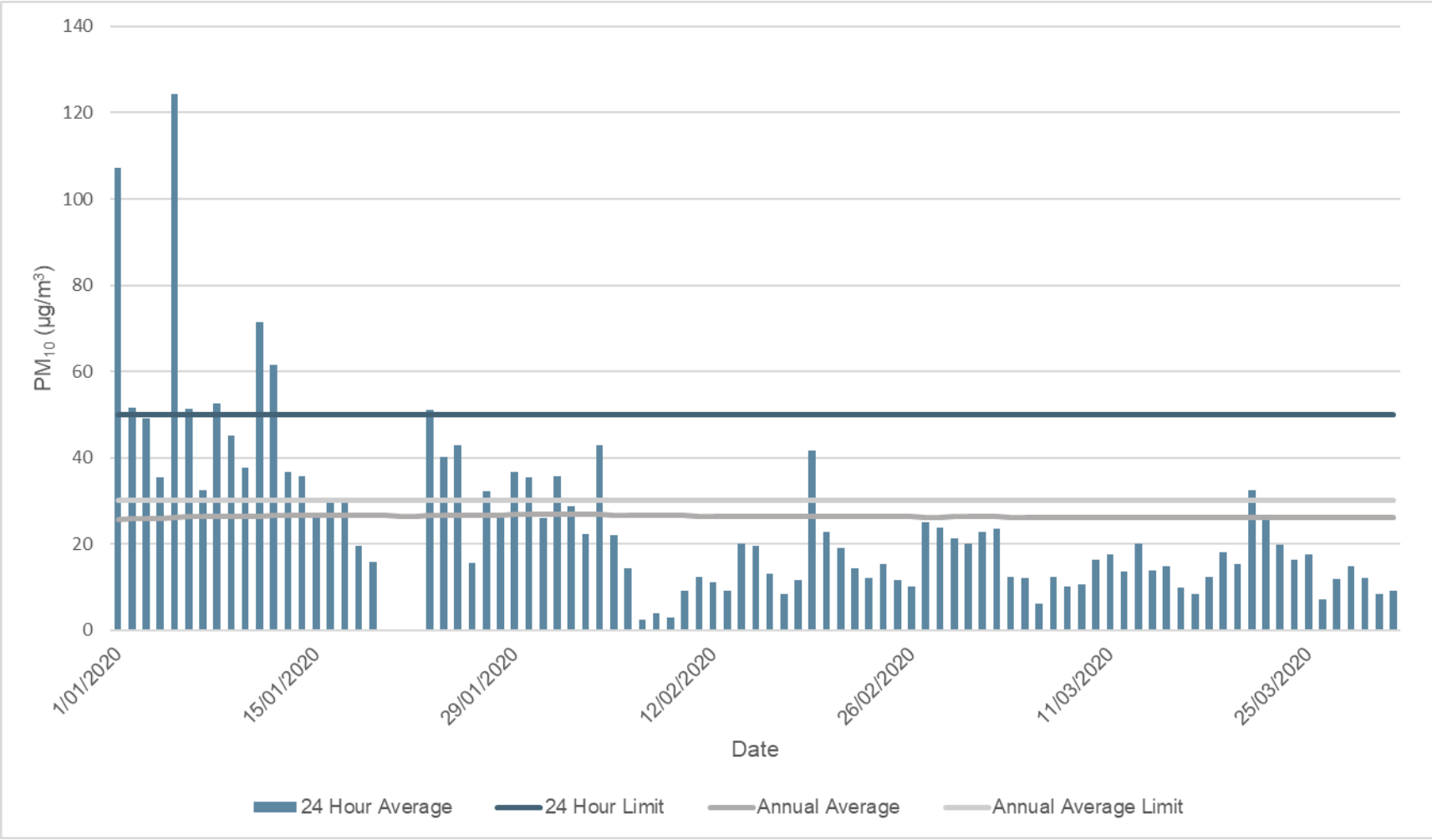

Figure 1: TEOM PM_{10} monitoring results for Quarter 1.

Notes:

- On 1 January 2020 an elevated 24-hour average PM_{10} result was recorded of 107.1 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 4% of the day. Maxwell Infrastructure made a contribution of 2.9 µg/m^3. The UHAQMN Muswellbrook unit result was 85.2 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 2 January 2020 an elevated 24-hour average PM_{10} result was recorded of 51.5 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 0% of the day. Maxwell Infrastructure made a contribution of 0 µg/m^3. The UHAQMN Muswellbrook unit result was 52.0 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 5 January 2020 an elevated 24-hour average PM_{10} result was recorded of 124.2 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 1% of the day. Maxwell Infrastructure made a contribution of 0.4 µg/m^3. The UHAQMN Muswellbrook unit result was 127.0 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 6 January 2020 an elevated 24-hour average PM_{10} result was recorded of 50.4 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 1% of the day. Maxwell Infrastructure made a contribution of 0.0 µg/m^3. The UHAQMN Muswellbrook unit result was 50.3 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 8 January 2020 an elevated 24-hour average PM_{10} result was recorded of 52.6 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 14% of the day. Maxwell Infrastructure made a contribution of 3.4 µg/m^3. The UHAQMN Muswellbrook unit result was 60.8 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 9 January 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 88 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- On 11 January 2020 an elevated 24-hour average PM_{10} result was recorded of 71.4 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 2% of the day. Maxwell Infrastructure made a contribution of 2.4 µg/m^3. The UHAQMN Muswellbrook unit result was 181.0 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 12 January 2020 an elevated 24-hour average PM_{10} result was recorded of 52.6 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 0% of the day. Maxwell Infrastructure made a contribution of 0.0 µg/m^3. The UHAQMN Muswellbrook unit result was 57.6 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 20 January 2020 an invalid 24-hour average PM_{10} result was recorded due to a power outage. PM_{10} result. Insufficient data was available to calculate a valid result for this day.

- On 21 January 2020 an invalid 24-hour average PM_{10} result was recorded due to a power outage. PM_{10} result. Insufficient data was available to calculate a valid result for this day.

- On 22 January 2020 an invalid 24-hour average PM_{10} result was recorded due to a power outage. PM_{10} result. Insufficient data was available to calculate a valid result for this day.

- On 23 January 2020 an elevated 24-hour average PM_{10} result was recorded of 51.2 µg/m^3. Wind direction was predominantly from the south east. This monitor was located downwind of Maxwell Infrastructure's operations for 14% of the day. Maxwell Infrastructure made a contribution of 11.0 µg/m^3. The UHAQMN Muswellbrook unit result was 55.5 µg/m^3, indicating elevated PM_{10} levels in the region.

- On 3 February 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 79 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- On 6 February 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 88 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- On 17 February 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 88 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- On 28 February 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 96 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- From 7 February 2020 ES02 recorded occasional spikes in mass concentration results, greater than 2000 micrograms per cubic metre. After unsuccessful attempts to rectify the issue on-site, ES02 was removed from site for repairs on 27 February 2020 at approximately 9:40am. The chamber in the unit was thoroughly cleaned and ES02 was returned and re-installed on site on 3 March 2020 at approximately 3pm.

- On 18 March 2020 an invalid 24-hour average PM_{10} result was recorded due to an instrument malfunction. Valid 1-hour average results were recorded for 96 percent of this day. These were utilised to calculate a valid 24-hour average PM_{10} result.

- An elevated 24-hour average PM_{10} result was recorded on the following dates:
  - 1 January 2020
  - 2 January 2020
  - 5 January 2020
  - 6 January 2020
  - 8 January 2020
  - 11 January 2020
  - 12 January 2020
  - 23 January 2020

Each of these results were investigated and, on each date, it was found that regional air quality was likely to be impacted by bushfires occurring throughout NSW. Investigation details will be provided in Maxwell Infrastructure's 2020 Annual Environmental Management Report.

Table 2. Surface water quality monitoring results for Quarter 1

Site	Month	Bicarbonate ($CaCO_3$) (mg/L)	Calcium (mg/L)	Chloride (mg/L)	EC (µS/cm)	Magnesium (mg/L)	pH	Potassium (mg/L)	Sodium (mg/L)	Sulphate (SO_4) (mg/L)	TSS (mg/L)	TDS (mg/L)
Antiene Dam (2221) **	Jan	-	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-	-	-
Access Rd Dam* (2081)	Jan	76	694	1320	11600	894	8.5	111	1070	5160	5	10900
	Feb	64	666	1220	10800	853	9.0	104	1060	5170	20	11200
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**89**	**616**	**1110**	**10122**	**761**	**8.2**	**99**	**939**	**4787**	**10**	**9348**
DC2 Dam* (2109)	Jan	201	230	2870	15200	625	8.5	21	2560	4370	140	12100
	Feb	50	56	389	2240	76	6.9	6	307	513	40	1550
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**243**	**166**	**1468**	**8632**	**326**	**7.9**	**14**	**1359**	**2302**	**22**	**6085**
Rail Loop Dam* (2114)	Jan	204	204	725	5520	285	8.2	29	674	2260	18	4170
	Feb	106	106	178	1850	87	7.9	9	175	603	16	1430
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**136**	**126**	**317**	**2818**	**133**	**8.1**	**14**	**300**	**882**	**9**	**2012**
Far East Tip (1895)**	Jan	-	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	-	-	-	-	-

Site	Month	Bicarbonate ($CaCO_3$) (mg/L)	Calcium (mg/L)	Chloride (mg/L)	EC (µS/cm)	Magnesium (mg/L)	pH	Potassium (mg/L)	Sodium (mg/L)	Sulphate (SO_4) (mg/L)	TSS (mg/L)	TDS (mg/L)
	Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Savoy Dam* (1609)**	Jan	357	613	10300	56600	8510	8.3	939	8500	43500	18	77700
	Feb	165	542	2870	17200	1480	8.5	214	2030	6690	7	17400
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**131**	**686**	**3551**	**23683**	**2749**	**8.5**	**340**	**2898**	**13616**	**13**	**27150**
SW 13**	Jan	-	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-	-	-
Industrial Dam* (1969)	Jan	77	445	926	8300	564	8.5	69	748	3800	10	7100
	Feb	77	445	926	8300	564	8.5	69	748	3800	10	7100
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**90**	**405**	**801**	**7351**	**504**	**8.2**	**60**	**680**	**3284**	**13**	**6293**
OPC Dam*	Jan	110	254	542	4620	291	8.7	42	385	2160	44	3680
	Feb	122	100	211	1890	83	8.5	9	186	523	16	1480
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average	**166**	**476**	**867**	**8085**	**583**	**8.4**	**73**	**747**	**3561**	**23**	**7123**
V Notch*	Jan	266	640	7360	37400	1930	8.4	50	7550	13400	12	37800
	Feb	233	522	1650	12400	491	7.9	34	1990	4550	6	11100
	Mar	-	-	-	-	-	-	-	-	-	-	-

Site	Month	Bicarbonate ($CaCO_3$) (mg/L)	Calcium (mg/L)	Chloride (mg/L)	EC (µS/cm)	Magnesium (mg/L)	pH	Potassium (mg/L)	Sodium (mg/L)	Sulphate (SO_4) (mg/L)	TSS (mg/L)	TDS (mg/L)
	Average	**391**	**543**	**3218**	**18977**	**855**	**8.0**	**29**	**3378**	**6762**	**7**	**16282**

Notes: Due to accessibility issues attributed to restrictions associated with Covid-19, surface water monitoring was not undertaken during March 2020.

Changes to surface water monitoring in the February 2020 revision of the Water Management Plan (approved 19 February 2020) included:

- A reduction in the frequency of surface water monitoring from monthly to quarterly to align with the post-closure monitoring program summary in the 2016 Mining Operations Plan (incorporating the Mine Closure and Final Void Management Plans); and
- The removal of Site 2221 (Antiene Dam), Site 1895 (Far East Tip) and SW13.

Site 2221 (Antiene Dam) was too low to sample during January and February 2020. The site was removed from the monitoring program on the 19 February and was therefore not required to be monitored during March 2020.

Site 1895 (Far East Tip) was not accessible during January and February 2020. The site was removed from the monitoring program on the 19 February and was therefore not required to be monitored during March 2020.

Site SW13 was not accessible during January and February 2020. The site was removed from the monitoring program on the 19 February and was therefore not required to be monitored during March 2020.

Average is for 2020 (January – March 2020).

* Indicates mine water storage.

** Indicates a site was removed from the monitoring program on the 19 February 2020 as detailed in the revised Water Management Plan.

Maxwell Infrastructure is a closed water management system with all water maintained on-site for use in operational activities.

Table 3: Groundwater quality monitoring results for Quarter 1

Site	Month	Bicarbonate ($CaCO_3$) (mg/L)	Calcium (mg/L)	Chloride (mg/L)	EC (µS/cm)	Magnesium (mg/L)	pH	Potassium (mg/L)	Sodium (mg/L)	Sulphate (SO_4) (mg/L)	TDS (mg/L)	TSS (mg/L)
DS1	Jan	281	508	884	7930	318	6.4	22	1030	3550	281	6490
	Feb	290	520	823	7750	317	6.6	22	1020	3420	282	7110
	Mar	-	-	-	-	-	-	-	-	-	-	-
	Average											
DS2**	-	-	-	-	-	-	-	-	-	-	-	-
	Average											
DS3**	-	-	-	-	-	-	-	-	-	-	-	-
	Average											
R4241	-	-	-	-	-	-	-	-	-	-	-	-
F1162	-	-	-	-	-	-	-	-	-	-	-	-
F1167**	-	-	-	-	-	-	-	-	-	-	-	-
F1024**	-	-	-	-	-	-	-	-	-	-	-	-
F1164	-	-	-	-	-	-	-	-	-	-	-	-
F1163**	-	-	-	-	-	-	-	-	-	-	-	-
F1168**	-	-	-	-	-	-	-	-	-	-	-	-
GW01D***	-	-	-	-	-	-	-	-	-	-	-	-
GW01S***	-	-	-	-	-	-	-	-	-	-	-	-
GW02D***	-	-	-	-	-	-	-	-	-	-	-	-
GW02S***	-	-	-	-	-	-	-	-	-	-	-	-

Table 4. Reduced standing groundwater levels (mAHD) for Quarter 1

Site	January	February	March	2020 Average
DS1	223.30	223.53	-	223.42
DS2*	235.56	235.38	-	235.47
DS3*	220.56	220.69	-	220.63
R4241	174.57	174.85	-	174.71
F1162	121.27	121.24	-	121.26
F1163**	-	-	-	-
F1164	119.30	119.27	-	119.29
F1167**	146.40	146.40	-	146.40
F1168**	-	-	-	-
F1024**	-	-	-	-
W1102**	-	-	-	-
GW01D***	199.25	197.98	-	198.62
GW01S***	197.80	197.04	-	197.42
GW02D***	187.52	137.63	-	162.58
GW02S***	187.72	188.34	-	188.03

Notes: Due to accessibility issues attributed to restrictions associated with Covid-19, groundwater monitoring was not undertaken during March 2020.

Water quality was analysed monthly at DS1 and twice annually at other monitoring sites (in March and September). However, as of the 19 February 2020 water quality is now monitored quarterly (see below).

Changes to groundwater monitoring in the February 2020 revision of the Water Management Plan included:

- The removal of non-functioning bores F1024, F1163, F1167, F1168 and W1102;
- The removal of DS2 and DS3 that were installed for a 2014 spill monitoring program that has been completed;
- The addition of GW01D, GW01S, GW02D and GW02S to provide further data to monitor groundwater surrounding the pit;
- A reduction in the frequency of standing water level monitoring from monthly to quarterly to align with the post-closure monitoring program summary in the 2016 Mining Operations Plan (incorporating the Mine Closure and Final Void Management Plans);
- An increase in the frequency of groundwater quality monitoring from 6-monthly to quarterly to provide further data on groundwater quality; and
- The addition of nutrients and total and dissolved metals to the suite parameters analysed to provide further data on groundwater quality. These included:
    - Total and dissolved metals (Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Lead, Selenium, Vanadium, Zinc, Mercury); and
    - Total nitrogen, nitrate, nitrite, ammonia, total Kjeldahl nitrogen, reactive phosphorus and total phosphorus).

Total metals and nutrients added to the revised Water Management Plan (approved on 19 February 2020) were not required to be reported on during January and February 2020. Total metals and nutrients were not monitored during March 2020 due to accessibility issues attributed to restrictions associated with Covid-19.

The following bores F1024, F1163, F1167, F1168 and W1102 were not functioning during January and February 2020 and were not functional during the previous quarter). These sites were removed from the monitoring program on the 19 February and were therefore not required to be monitored during March 2020.

Average is for 2020 (January –March 2020)

** Indicates a site was removed from the monitoring program on the 19 February 2020 as detailed in the revised Water Management Plan.

*** Indicates a site was added to the monitoring program on the 19 February 2020 as detailed in the revised Water Management Plan.

Table 5. Noise monitoring results for Quarter 1

Sampling point	Day ($L_{A\ eq\ (15\ minute)}$)		Evening ($L_{A\ eq\ (15\ minute)}$)		Night ($L_{A\ eq\ (15\ minute)}$)		Night ($L_{A1\ (1\ minute)}$)		Exceedance (yes/no)	Observations
	Criteria	Noise Level	Criteria	Noise Level	Criteria	Noise Level	Criteria	Noise Level		
R12	35	-	35	-	39	-	47	-	-	
R13	35	-	35	-	36	-	45	-	-	
R14	35	-	35	-	37	-	47	-	-	
R16*	35	-	35	-	38	-	47	-	-	
R17	35	-	35	-	38	-	47	-	-	
R18	35	-	35	-	40	-	47	-	-	
R19	35	-	35	-	41	-	47	-	-	
R20	35	-	35	-	41	-	45	-	-	
R21	35	-	36	-	41	-	45	-	-	
R22	35	-	36	-	42	-	45	-	-	
R23	35	-	37	-	40	-	47	-	-	
R25	35	-	37	-	41	-	47	-	-	
R26	36	-	36	-	35	-	47	-	-	
R27	36	-	36	-	36	-	47	-	-	
R28	36	-	37	-	37	-	47	-	-	
R29	36	-	37	-	38	-	47	-	-	
R31	36	-	37	-	39	-	47	-	-	
R32	36	-	37	-	42	-	47	-	-	
R33	37	-	38	-	36	-	45	-	-	
R34	38	-	38	-	38	-	45	-	-	
R35	38	-	38	-	38	-	45	-	-	

R37	38	-	39	-	38	-	45	-	-	
R42	39	-	40	-	39	-	45	-	-	
R61*	39	-	40	-	39	-	45	-	-	
R69	40	-	39	-	39	-	47	-	-	
R70	40	-	40	-	39	-	47	-	-	
R71	41	-	41	-	39	-	47	-	-	
R72*	35	-	35	-	35	-	47	-	-	
R75*	35	-	35	-	35	-	47	-	-	
R76*	35	-	35	-	35	-	47	-	-	
R86	35	-	35	-	35	-	45	-	-	
All Other Privately-Owned Land	35	-	35	-	35	-	45	-	-	

Additional Information	
Date of Final Report	-17 March 2020
Date Sampled	-16 March 2020
Weather Conditions	-
Notes	Noise monitoring is conducted 6-monthly in March and September * Measured: R16 (Doherty), R35 (Wilson), R61 (Skinner), R72 (Robertson), R75 (Shaman), and R76 (Holder). The noise levels at all other locations are determined by noise modelling or extrapolation.

APPENDIX 1 – AIR QUALITY LOCATIONS

APPENDIX 2 – BLAST LOCATIONS

APPENDIX 3 – SURFACE AND GROUNDWATER LOCATIONS

APPENDIX 4 – NOISE LOCATIONS