Monthly Noise Monitoring Assessment

Tomingley Gold Mine, August 2019

Prepared for: Tomingley Gold Operations Pty Limited
September 2019
MAC160270RP36

Muller Acoustic Consulting

Document Information

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Prepared for: Tomingley Gold Operations Pty Limited

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 262, Newcastle NSW 2300
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

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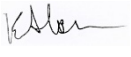
MAC160270RP36	Final	5 September 2019	Kristian Allen		Oliver Muller	

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Tomingley Gold Operations Pty Ltd (TGO) to complete a Noise Monitoring Assessment (NMA) for Tomingley Gold Mine ('the mine'), Tomingley, NSW.

The NMA involved quantifying the noise contribution of the mine by direct attended measurements to determine mining noise emissions so that effective management and controls can be implemented where required. The monitoring has been conducted in accordance with the TGO Noise Management Plan and in general accordance with Conditions L4.2 to L4.7 of the EPL at six representative receiver locations. It is noted that this assessment has been completed as part of an internal noise management initiative and does not form part of the annual noise monitoring program to address conditions of the Environmental Protection License (EPL).

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017;
- Environment Protection Licence EPL 20169 (EPL); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Environmental Protection License Noise Limits

Historic assessments for the mine categorise receivers into Noise Assessment Groups (NAGs). The NAGs were derived based on ambient noise data that controlled receiver RBLs.

Table 1 reproduces the operational and sleep disturbance noise limits for assessed receivers referenced from the EPL that have been adopted for this NMA and are consistent with historic EPL monitoring locations.

Table 1 Noise Limits, dBA

Noise Assessment Group	Receivers	Day	Evening	Night	
		$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
NAG A	R6, R4	36	36	36	45
	R5	37	37	37	45
NAG B	R2	36	36	36	45
NAG C	R3	49	40	40	45
	R29	48	40	40	45
NAG D	R23	43	39	39	46

Note: Refer to figure in Appendix 4 of Project Approval 09-0155 for noise locations. However, these criteria do not apply if the Proponent has an agreement with the relevant owner(s) of these residences / land to generate higher noise levels, and the Proponent has advised the Department of Planning and Infrastructure and EPA in writing of the terms of this agreement.

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3 Methodology

3.1 Locality

TGO is located to the south of the village of Tomingley, NSW. Receivers in the locality surrounding the mine are primarily rural/residential and for consistency the naming conventions for each receiver have been retained from historic noise assessments. The monitoring locations with respect to the mine are presented in the locality plan shown in **Figure 1**.

3.2 Assessment Methodology

The attended noise survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analyser between Tuesday 6 August 2019 and Friday 9 August 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Both evening and night measurements were of 15 minutes duration. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ mine noise contribution for comparison against the relevant EPL limit.

Prevailing meteorological conditions for the monitoring period were sourced from TGO's meteorological station and analysed in accordance with Appendix E4 of the NPI to determine the stability category present at the time of each measured sample. This was undertaken to determine applicability of results in accordance with Condition L4.3 of the EPL. Results obtained during non-prevailing meteorological conditions (ie F Class Stability in conjunction with a 2m/s drainage or G Class Stability) are considered not applicable against the EPL criteria.

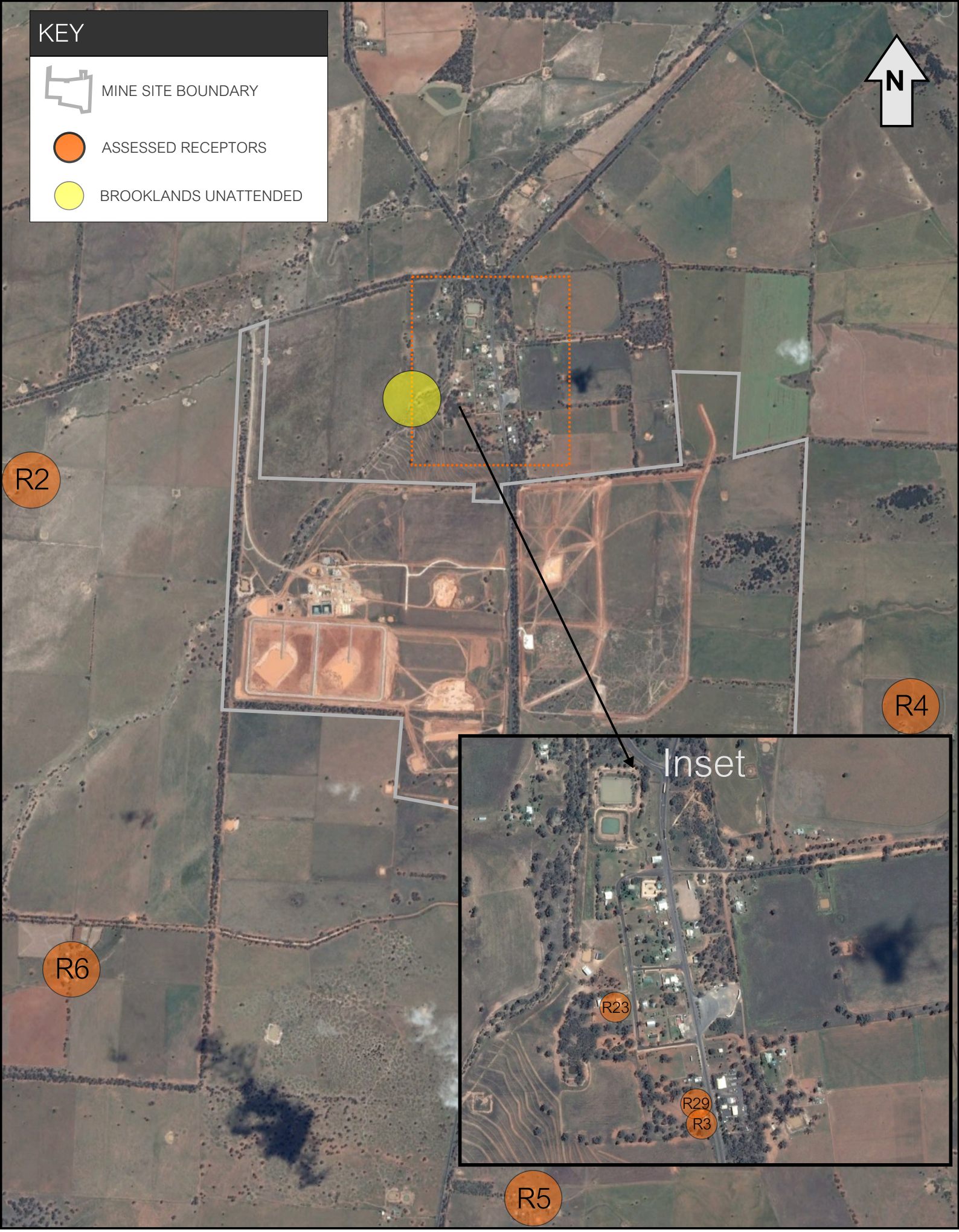

FIGURE 1 - LOCALITY PLAN AND ASSESSMENT LOCATIONS

TOMINGLEY GOLD MINE EPL NOISE MONITORING

REF: MAC160270

0 1000m

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4 Results

The monitoring and assessment results are presented in individual tables for each assessment location.

4.1 Assessment Results - Location R2

The results of the attended noise measurements at location R2 for the August 2019 survey are summarised in **Table 2** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 2 Operator-Attended Noise Survey Results – Location R2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	19:26	53	23	15	36	WD: N/A WS: Calm Stab Class: E	Livestock 16-24 Dog Barking 22-33
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
06/08/2019	22:06	70	45	15	36	WD: N/A WS: Calm Stab Class: F	Local Traffic 25-70 Livestock 18-24 Dog Barking 18-42
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
07/08/2019	19:27	68	42	24	36	WD: NW WS: 1.0m/s Stab Class: E	Local Traffic 25-68 Local Machinery 24-28 Insects 28-42
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
07/08/2019	22:03	64	39	30	36	WD: N WS: 1.5m/s Stab Class: E	Local Traffic 30-63 Wind 28-35 Livestock 21-34
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
08/08/2019	19:09	72	46	16	36	WD: NW WS: 0.5m/s Stab Class: E	Local Traffic 20-72 Dog Barking 20-29 Insects 20-27
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
08/08/2019	22:03	70	44	25	36	WD: NW WS: 1.5 Stab Class: E	Local Traffic 25-70 Wind 20-30 Livestock 20-25
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

4.2 Assessment Results - Location R3/R29

The results of the attended noise measurements at location R3/R29 for the August 2019 survey are summarised in **Table 3** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 3 Operator-Attended Noise Survey Results – Location R3/R29

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	20:13	85	66	46	40	WD: ENE WS: 2 Stab Class: F	Highway Traffic 50-85 TGO Hum 42-51 TGO Vehicles/Impacts 46-50
		TGO Site $L_{Aeq(15min)}$ Contribution					42[2]
06/08/2019	22:49	84	63	45	40	WD: ENE WS: 2 Stab Class: F	Highway Traffic 48-84 Truck Idling 46-49 TGO Hum 40-44 TGO Vehicles/Impacts 46-50
		TGO Site $L_{Aeq(15min)}$ Contribution					41[2]
07/08/2019	20:11	87	67	32	40	WD: SW WS: 0.5 Stab Class: E	Highway Traffic 26-87
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
07/08/2019	22:46	82	62	31	40	WD: NW WS: 1.0 Stab Class: D	Highway Traffic 30-81 Truck Idling 30-32 Wind 30-36
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
08/08/2019	19:53	86	65	44	40	WD: N WS: 0.5m/s Stab Class: D	Highway Traffic 45-86 Truck Idling 48-53 Dog Barking 48-56 TGO Hum <44 TGO Vehicles 42
		TGO Site $L_{Aeq(15min)}$ Contribution					<40
08/08/2019	22:47	84	62	39	40	WD: N WS: 1.0m/s Stab Class: E	Highway Traffic 42-84 Truck Idling 42-46 TGO Hum <37
		TGO Site $L_{Aeq(15min)}$ Contribution					35

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

Note 2: It is reiterated that inapplicable meteorological conditions such as rain, winds >3m/s, F Class Drainage and G Class inversions have not been included. F Class inversions in the absence of draining winds are considered applicable.

4.3 Assessment Results - Location R4

The results of the attended noise measurements at location R4 for the August 2019 survey are summarised in **Table 4** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 4 Operator-Attended Noise Survey Results – Location R4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	21:10	46	35	29	36	WD: SW WS: 0.5m/s Stab Class: F	Highway Traffic 33-42 Livestock 28-34 TGO Hum 28-34
		TGO Site $L_{Aeq(15min)}$ Contribution					27
06/08/2019	23:44	55	34	25	36	WD: SW WS: 0.5 Stab Class: G	Highway Traffic 25-44 Livestock 25-28 TGO Hum 21-30
		TGO Site $L_{Aeq(15min)}$ Contribution					23
07/08/2019	21:04	69	38	28	36	WD: NW WS: 1.5m/s Stab Class: E	Highway Traffic 31-46 Livestock 30-35 TGO Hum 25-28
		TGO Site $L_{Aeq(15min)}$ Contribution					26
07/08/2019	23:38	56	34	27	36	WD: NW WS: 1.5m/s Stab Class: D	Highway Traffic 28-46 Livestock 28-36 Birds 26-40 TGO Hum 26-32 TGO Vehicle 32-36
		TGO Site $L_{Aeq(15min)}$ Contribution					25
08/08/2019	20:46	50	35	31	36	WD: NW WS: 0.5m/s Stab Class: E	Highway Traffic 30-44 Livestock 30-34 TGO Hum 28-34
		TGO Site $L_{Aeq(15min)}$ Contribution					29
08/08/2019	23:38	51	36	31	36	WD: NW WS: 2.0m/s Stab Class: E	Highway Traffic 30-44 Livestock 30-32 TGO Hum 28-37
		TGO Site $L_{Aeq(15min)}$ Contribution					29

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

4.4 Assessment Results - Location R5

The results of the attended noise measurements at location R5 for the August 2019 survey are summarised in **Table 5** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 5 Operator-Attended Noise Survey Results – Location R5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	21:34	83	61	25	37	WD: SW WS: 0.5 Stab Class: E	Highway Traffic 30-83 Livestock 30-36 Dog Barking 25-31
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
07/08/2019	00:10	84	63	28	37	WD: SW WS: 0.5m/s Stab Class: F	Highway Traffic 25-84 Livestock 26-40 TGO Hum 26-30
		TGO Site $L_{Aeq(15min)}$ Contribution					26
07/08/2019	21:29	85	64	26	37	WD: NE WS: 0.5m/s Stab Class: F	Highway Traffic 25-85 Livestock 23-43
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
08/08/2019	00:03	86	61	30	37	WD: NE WS: 0.5 Stab Class: D	Highway Traffic 28-86 Horses 30-36 TGO Hum 28-35 TGO Vehicles/Impacts 30-34
		TGO Site $L_{Aeq(15min)}$ Contribution					28
08/08/2019	21:16	84	63	25	37	WD: N WS: 0.5m/s Stab Class: E	Highway Traffic 22-84 Livestock 24-30 Horses 25-32
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
09/08/2019	00:02	82	56	34	37	WD: N WS: 2.5 Stab Class: D	Highway Traffic 30-82 Wind 30-39 Birds 51
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

4.5 Assessment Results - Location R6

The results of the attended noise measurements at location R6 for the August 2019 survey are summarised in **Table 6** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 6 Operator-Attended Noise Survey Results – Location R6

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	20:39	42	28	24	36	WD: SW WS: 1.5m/s Stab Class: E	Highway Traffic 25-28 Livestock 25-28 TGO Hum 22-28 TGO Impacts 28-31
		TGO Site $L_{Aeq(15min)}$ Contribution					22
06/08/2019	23:15	71	34	23	36	WD: SW WS 1.0m/s Stab Class: F	Highway Traffic 21-25 Livestock 21-25 TGO Hum 21-27 TGO Impacts 24-26
		TGO Site $L_{Aeq(15min)}$ Contribution					21
07/08/2019	20:36	46	33	31	36	WD: NW WS: 1.5m/s Stab Class: E	Highway Traffic <30 Wind 30-36 Livestock 30-34 TGO Hum 30-34 TGO Vehicles/Impacts 30-35
		TGO Site $L_{Aeq(15min)}$ Contribution					29
07/08/2019	23:09	48	40	38	36	WD: N WS: 2.5m/s Stab Class: D	Wind 38-45 Livestock 38-40 TGO Hum 36-42 TGO Vehicles/Impacts 38-45
		TGO Site $L_{Aeq(15min)}$ Contribution					<36
08/08/2019	20:18	56	25	20	36	WD: N WS: 0.5 Stab Class: D	Highway Traffic 18-24 Livestock 20-24
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Not Audible
08/08/2019	23:11	43	31	29	36	WD: N WS: 1.5m/s Stab Class: E	Wind 28-35 Livestock 30-34 TGO Hum 28-30
		TGO Site $L_{Aeq(15min)}$ Contribution					27

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

4.6 Assessment Results - Location R23

The results of the attended noise measurements at location R23 for the August 2019 survey are summarised in **Table 7** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 7 Operator-Attended Noise Survey Results – Location R23

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
06/08/2019	19:53	73	46	38	39	WD: N/A WS: Calm Stab Class: F	Highway Traffic 40-55 Local Traffic 45-53 TGO Hum 36-45
TGO Site $L_{Aeq(15min)}$ Contribution							36
06/08/2019	22:29	62	49	43	39	WD: N/A WS: Calm Stab Class: F	Highway Traffic 42-56 TGO Hum 41-48
TGO Site $L_{Aeq(15min)}$ Contribution							<39
07/08/2019	19:52	72	49	28	39	WD: N/A WS: Calm Stab Class: E	Highway Traffic 30-54 Local Traffic 48-66 Dog Barking 46-50 Truck Idling 34-40
TGO Site $L_{Aeq(15min)}$ Contribution							TGO Not Audible
07/08/2019	22:26	64	45	29	39	WD: NW WS: 0.5m/s Stab Class: E	Highway Traffic 34-54 Wind 28-31 Dog Barking 28-44 Possum 28-32
TGO Site $L_{Aeq(15min)}$ Contribution							TGO Not Audible
08/08/2019	19:33	65	45	39	39	WD: N/A WS: Calm Stab Class: D	Highway Traffic 40-55 Truck Idling 38-40 Dog Barking 40-46 TGO Hum 36-44 TGO Vehicles/Impacts 40-44
TGO Site $L_{Aeq(15min)}$ Contribution							36
08/08/2019	22:26	60	41	31	39	WD: NW WS: 0.5m/s Stab Class: E	Highway Traffic 35-49 Dog Barking 24-43 Residential Noise 32-38 TGO Hum 30-36
TGO Site $L_{Aeq(15min)}$ Contribution							28

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

5 Discussion

5.1 Discussion of Results - Location R2

Monitoring between Tuesday 6 August 2019 to Thursday 8 August 2019 identified that TGO was inaudible at location R2, therefore relevant noise limits of 36dBA LAeq(15min) was satisfied. Extraneous sources such as road traffic, livestock, insects, dogs barking, local machinery and wind were audible during the survey periods.

5.2 Discussion of Results - Location R3/R29

Monitoring from Tuesday 6 August 2019 to Thursday 8 August 2019 identified that TGO was audible at location R3/R29 during the evening and night survey periods of 6 August 2019 and 8 August 2019. TGO operations were inaudible at location R3/R29 during the evening and night survey periods of 7 August 2019.

A review of noise monitoring data and operator attended observations was undertaken to determine the contribution of TGO operations to the overall noise environment during the evening and night survey periods of 6 August 2019 and 8 August 2019. TGO was audible, and contributed to noise levels above the relevant noise criteria for this location although were obtained during non-prevailing meteorological conditions (ie F Class Stability in conjunction with a 2m/s drainage or G Class Stability) hence are considered not applicable against the EPL criteria. TGO contributions during the evening and night survey periods of 8 August 2019 were observed to remain below 40dBA.

5.3 Discussion of Results - Location R4

Monitoring from Tuesday 6 August 2019 to Thursday 8 August 2019 identified that TGO was audible during all measurements at location R4 with mining contributions remaining below 29dBA, therefore the relevant noise limit of 36dB $LA_{eq(15min)}$ was satisfied. Road traffic, birds and livestock were audible during the measurements at R4.

5.4 Discussion of Results - Location R5

Monitoring from Tuesday 6 August 2019 to Friday 9 August 2019 identified that TGO was audible on two occasions at location R5 with mining contributions remaining below 28dBA. Therefore, relevant noise limits of 37dB $LA_{eq(15min)}$ were satisfied. Road traffic, birds, livestock, horses and wind were audible during the measurements at R5.

5.5 Discussion of Results - Location R6

Monitoring from Tuesday 6 August 2019 to Thursday 8 August 2019 identified that TGO was audible on five occasion at location R6 with mining contributions remaining below 36dBA, therefore the relevant noise limit of 36dB $LA_{eq(15min)}$ was satisfied. Road traffic, livestock and wind were audible during the measurements at R6.

5.6 Discussion of Results - Location R23

Monitoring between Tuesday 6 August 2019 to Thursday 8 August 2019 identified that TGO was audible on four occasions at location R23, with mining contributions remaining below 39dBA. Therefore, the relevant noise limit of 39dB $LA_{eq(15min)}$ was satisfied during this monitoring period. Extraneous sources such as road traffic, dogs barking, idling trucks, birds, possums, residential noise and wind were audible during the survey periods.

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6 Comparison of Attended and Unattended Monitoring Results

To address Condition 6 of Schedule 3 of the Project Approval, a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results has been completed. It is noted that real-time noise monitoring results were not available for the periods corresponding to the evening and night period noise surveys.

The validation compares monthly attended monitoring results against the closest assessed unattended monitoring location. Currently, TGO has an unattended real-time monitoring terminal installed at the Brooklands property (nearest to R23). Figure 1 identifies the location of the monitor with respect to the attended monitoring locations. It is noted that the Brooklands unattended monitor is situated 600m west of the attended noise monitoring location R23, therefore, background (L_{A90}) noise levels are significantly lower due to offset distance to highway traffic.

A comparison of mine noise contributions between attended and unattended noise monitoring demonstrates a general consistency between attended and unattended results. It was noted that highway traffic noise, dogs barking and domestic/residential noise influenced measured noise levels for this assessment. Furthermore, for August 2019, results remained below the relevant criteria for both attended and unattended locations.

Table 8 provides a summary comparison of results between the attended and unattended noise surveys for R23.

Table 8 Comparison of Attended and Unattended Results – R23								
Assessment Type	Time (hrs)	Descriptor (dBA re 20 µPa)			Criteria	Mine Noise Contribution	Meteorology[1]	Description and SPL, dBA
		LAmax	LAeq	LA90				
Tuesday 6 August 2019								
Attended	19:53	73	46	38	39	36	WD: N/A WS: Calm Stab Class: F	Highway Traffic 40-55 Local Traffic 45-53 TGO Hum 36-45
Unattended	20:00	53	40	28	39	<28		Highway Traffic 28-53 TGO Hum 28-40
Attended	22:29	62	49	44	39	<39	WD: N/A WS: Calm Stab Class: F	Highway Traffic 42-56 TGO Hum 41-48
Unattended	22:30	57	42	32	39	<32		Highway Traffic 32-57 TGO Hum 32-42
Wednesday 7 August 2019								
Attended	19:52	72	49	28	39	Inaudible	WD: N/A WS: Calm Stab Class: E	Highway Traffic 30-54 Local Traffic 48-66 Dog Barking 46-50 Truck Idling 34-40
Unattended	19:45	57	43	32	39	Inaudible		Highway Traffic 32-57
Attended	22:26	64	45	29	39	Inaudible	WD: NW WS: 0.5m/s Stab Class: E	Highway Traffic 34-54 Wind 28-31 Dog Barking 28-44 Possum 28-32
Unattended	22:30	56	43	28	39	Inaudible		Highway Traffic 27-56
Thursday 8 August 2019								
Attended	19:33	65	45	39	39	36	WD: N/A WS: Calm Stab Class: D	Highway Traffic 40-55 Truck Idling 38-40 Dog Barking 40-46 TGO Hum 36-44 TGO Vehicles/Impacts 40-44
Unattended	19:30	No Data Available			39	N/A		No Audio Available
Attended	22:26	60	41	31	39	28	WD: NW WS: 0.5m/s Stab Class: E	Highway Traffic 35-49 Dog Barking 24-43 Residential Noise 32-38 TGO Hum 30-36
Unattended	22:30	No Data Available			39	N/A		No Audio Available

Note 1: Meteorological data obtained from TGO's on-site weather station or by direct measurement by the operator.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment on behalf of Tomingley Gold Operations (TGO). The assessment was completed to provide monthly monitoring data so that TGO can actively quantify and manage site noise emissions.

Attended monitoring conducted from Tuesday 6 August 2019 to Friday 9 August 2019, identified that TGO mine noise was audible at each of the monitoring locations except for location R2, which was inaudible at all times. Review of monitoring data and operator attended observations determined that TGO contributions generally did not exceed relevant limits during applicable meteorological conditions.

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Appendix A - Glossary of Terms

Several technical terms have been used in this report and are explained in **Table A1**.

Table A1 Glossary of Terms

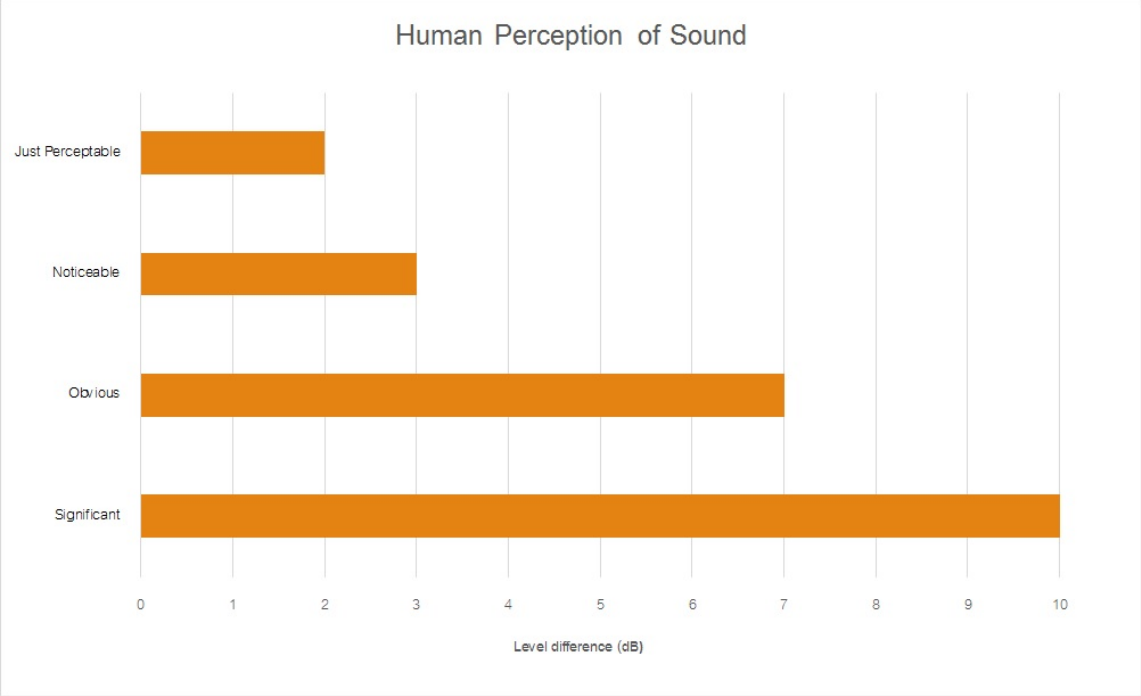
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (SWL)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



Muller Acoustic Consulting Pty Ltd
PO Box 262, Newcastle NSW 2300
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting