Monthly Noise Monitoring Assessment

Tomingley Gold Mine, September 2019

Prepared for: Tomingley Gold Operations Pty Limited
September 2019
MAC160270RP37

Muller Acoustic Consulting

Document Information

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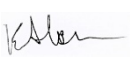
MAC160270RP37	Final	24 September 2019	Kristian Allen		Oliver Muller	

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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	R4, R5, R6	35	35	35	45
NAG B	R2	36	35	35	45
NAG C	R3, R29	45	35	35	45
NAG D	R23	43	38	36	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 3 September 2019 and Friday 6 September 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.

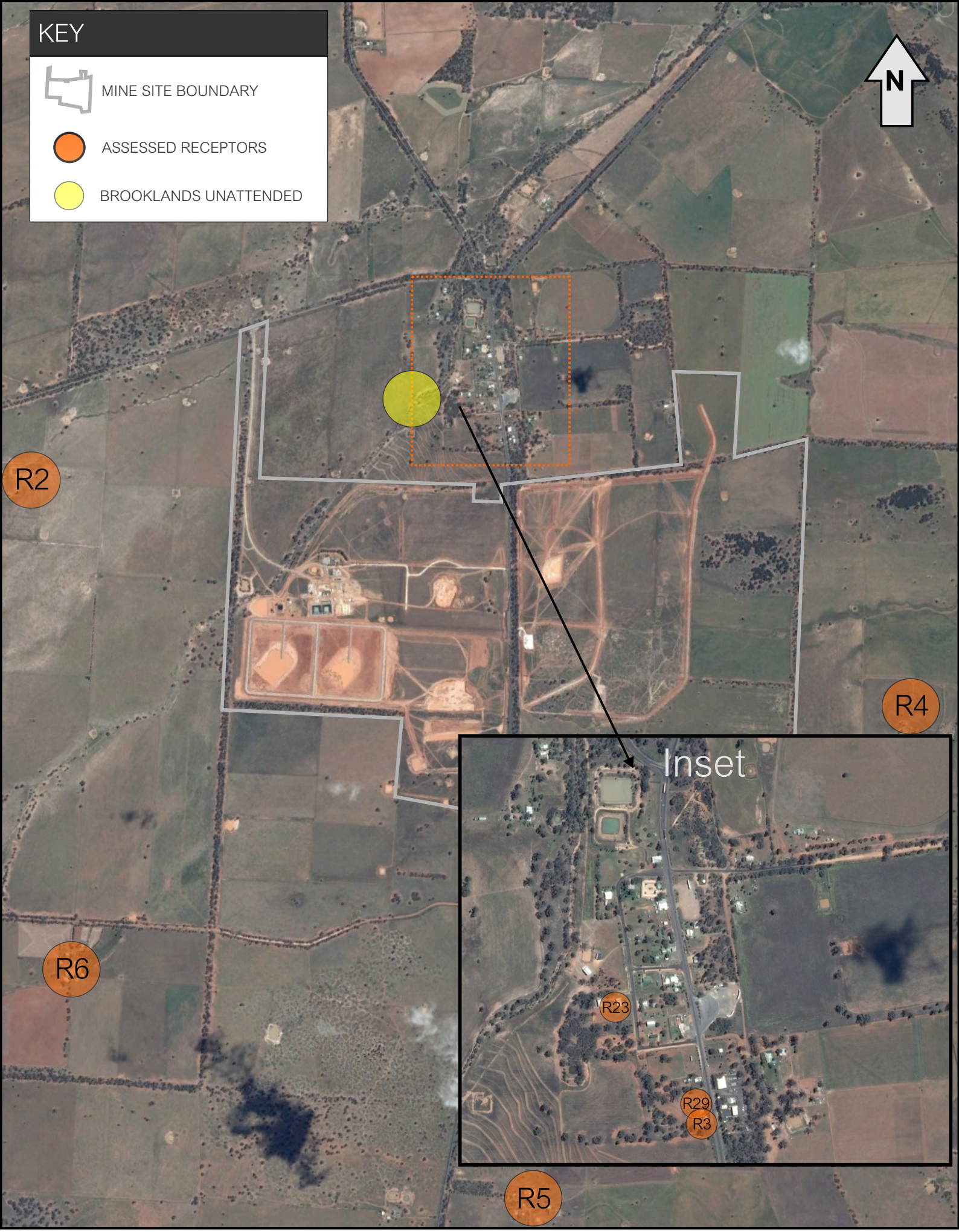

FIGURE 1 - LOCALITY PLAN AND ASSESSMENT LOCATIONS

TOMINGLEY GOLD MINE EPL NOISE MONITORING

REF: MAC160270

0 1000m

MAC
Muller Acoustic Consulting

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 September 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}			
03/09/2019	19:21	53	25	15	35	WD: SE WS: 0.1 Stab Class: D	Distant Traffic 15-20 Dogs 15-30 Livestock 15-30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
03/09/2019	22:04	55	25	15	35	WD: SE WS: 0.5m/s Stab Class: E	Wind 15-22 Livestock 15-35
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	19:20	80	54	41	35	WD: SE WS: 2m/s Stab Class: E	Wind 40-50 Local Traffic 44-80
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	22:01	52	32	29	35	WD: SE WS: 2m/s Stab Class: E	Wind 28-35 Livestock 30-33 TGO Hum 28-35 Wildlife 30-39
		TGO Site $L_{Aeq(15min)}$ Contribution					<29
05/09/2019	19:18	74	47	22	35	WD: N WS: 0.5m/s Stab Class: F	Wind 20-25 Livestock 20-25 Dogs 22-29 Local Traffic 20-74
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	22:02	51	32	29	35	WD: N WS: 2m/s Stab Class: F	Wind 27-35 Livestock 27-30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible

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 September 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}			
03/09/2019	20:04	87	67	43	35	WD: S WS: <0.5m/s Stab Class: F	Highway Traffic 38-87 Dogs 40-51 TGO Hum 30-40
		TGO Site $L_{Aeq(15min)}$ Contribution					35
03/09/2019	22:45	84	63	45	35	WD: S WS: 0.5m/s Stab Class: E	Highway traffic 44-84 Birds 44-51 TGO Hum 30-40
		TGO Site $L_{Aeq(15min)}$ Contribution					<35
04/09/2019	20:03	85	67	31	35	WD: SE WS: 1m/s Stab Class: E	Highway traffic 38-85 TGO Hum 26-34
		TGO Site $L_{Aeq(15min)}$ Contribution					30
04/09/2019	22:46	81	60	36	35	WD: SE WS: 0.5m/s Stab Class: E	Highway traffic 34-81 TGO Hum 34-40
		TGO Site $L_{Aeq(15min)}$ Contribution					30
05/09/2019	20:03	84	68	43	35	WD: NE WS: 0.5m/s Stab Class: F	Highway traffic 39-84 Local Residential Noise 36-40 Dogs 39-42
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	22:45	81	61	29	35	WD: N WS: 0.5m/s Stab Class: E	Highway traffic 34-81 Dogs 24-40 Local Residential Noise 22-31
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible

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

4.3 Assessment Results - Location R4

The results of the attended noise measurements at location R4 for the September 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}			
03/09/2019	20:58	50	34	25	35	WD: SE WS: 1m/s Stab Class: D	Distant Traffic 28-38 Offsite Drill Rig 22-43 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
03/09/2019	23:36	52	33	27	35	WD: SE WS: 1m/s Stab Class: E	Distant Traffic 28-42 Birds 28-35 Aircraft 28-34 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
04/09/2019	20:55	49	28	23	35	WD: SE WS: 2m/s Stab Class: E	Distant Traffic 27-33 Offsite Drill Rig 20-33 Livestock 24-28
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	23:36	52	27	21	35	WD: SE WS: 1m/s Stab Class: D	Distant Traffic 20-34 Offsite Drill Rig 20-34
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	20:53	47	31	25	35	WD: N WS: 1m/s Stab Class: F	Distant Traffic 20-37 Offsite Drill Rig 20-37
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	23:36	50	34	28	35	WD: N WS: 1.5m/s Stab Class: E	Distant Traffic 27-42 Offsite Drill Rig 27-38 Birds 27-35
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible

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 September 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}			
03/09/2019	21:23	84	62	47	35	WD: SE WS: 1m/s Stab Class: F	Highway Traffic 45-84 Offsite Drill Rig 45-53
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
03/09/2019	23:59	84	65	38	35	WD: E WS: 1m/s Stab Class: E	Highway Traffic 40-84 Offsite Drill Rig 37-48
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	21:20	84	63	41	35	WD:SE WS: 1m/s Stab Class: E	Highway Traffic 39-84 Offsite Drill Rig 39-50 Livestock 40-43
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	23:59	83	63	49	35	WD: SE WS: 0.5m/s Stab Class: D	Highway Traffic 50-83 Offsite Drill Rig 47-53
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	21:18	85	65	40	35	WD: NE WS: 1m/s Stab Class: E	Highway Traffic 38-85 Offsite Drill Rig 37-54
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
06/09/2019	00:00	82	59	43	35	WD: NE WS: 1m/s Stab Class: E	Highway Traffic 40-82 Offsite Drill Rig 40-52
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible

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 September 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}			
03/09/2019	20:29	51	26	19	35	WD: SE WS: 0.5m/s Stab Class: F	Distant Traffic 16-26 Offsite Drill Rig 16-30 Livestock 20-26 Birds 20-26
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
03/09/2019	23:09	57	27	19	35	WD: SE WS: 1m/s Stab Class: E	Distant Traffic 15-31 Birds 15-22 Livestock 18-24 Wildlife <45
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	20:27	50	36	31	35	WD: SE WS: 1-1.5m/s Stab Class: D	Wind 28-41 Distant Traffic 28-41 Offsite Drill Rig 28-41
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
04/09/2019	23:10	56	32	25	35	WD: SE WS: 1m/s Stab Class: E	Distant Traffic 25-41 Offsite Drill Rig 25-41 Birds 25-36
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
05/09/2019	20:26	48	32	30	35	WD: N WS: 1.5m/s Stab Class: F	Wind 28-35 Distant Traffic 28-32 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
05/09/2019	23:09	52	35	34	35	WD: N WS: 2m/s Stab Class: E	Wind 30-38 Distant Traffic 30-35 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30

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 September 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}			
03/09/2019	19:46	53	44	37	36	WD: SE WS: Calm Stab Class: F	Highway Traffic 35-53 Dogs 38-46 Local Residential Noise 38-40 TGO Hum 33-35
		TGO Site $L_{Aeq(15min)}$ Contribution					<34
03/09/2019	22:26	59	47	38	36	WD: SE WS: 0.5m/s Stab Class: D	Highway Traffic 40-59 Dogs 40-46 TGO Hum 35-40
		TGO Site $L_{Aeq(15min)}$ Contribution					<35
04/09/2019	19:44	63	45	31	36	WD: SE WS: 2m/s Stab Class: D	Highway Traffic 33-55 Local Traffic 40-63 Dogs 38-55 TGO Hum 26-30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
04/09/2019	22:26	57	45	34	36	WD: SE WS: 0.5m/s Stab Class: E	Highway Traffic 34-57 Dogs 35-40 TGO Hum 32-35
		TGO Site $L_{Aeq(15min)}$ Contribution					31
05/09/2019	19:43	58	44	30	36	WD: N WS: Calm Stab Class: F	Highway Traffic 26-50 Dogs 30-38 TGO Hum 26-30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
05/09/2019	22:26	56	44	25	36	WD: N WS: 0.5m/s Stab Class: E	Highway Traffic 35-54 Local Residential Noise <28
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible

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 3 September 2019 to Thursday 5 September 2019 identified that TGO was audible on one occasion at location R2, with mining contributions remaining below 29dBA. Therefore, relevant noise limits of 35dB LAeq(15min) were satisfied. Extraneous sources such as wind, road traffic, livestock and dogs barking were audible during the survey periods.

5.2 Discussion of Results - Location R3/R29

Monitoring from Tuesday 3 September 2019 to Thursday 5 September 2019 identified that TGO was audible on four occasions at location R3/23 with $LA_{eq(15min)}$ mining contributions remaining below 35dBA. Therefore, relevant noise limits of 35dB $LA_{eq(15min)}$ were satisfied. Extraneous sources such as road traffic, idling trucks, birds, animals, dogs barking and local residential noise were audible during the measurements.

5.3 Discussion of Results - Location R4

Monitoring from Tuesday 3 September 2019 to Thursday 5 September 2019 identified that TGO was audible on two occasions at location R4 with mining contributions remaining below 30dBA. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied. Extraneous sources such as road traffic, offsite drill, birds, aircraft and livestock were audible during the measurements.

5.4 Discussion of Results - Location R5

Monitoring from Tuesday 3 September 2019 to Friday 6 September 2019 identified that TGO was inaudible during measurements at location R5. Therefore, relevant noise limits of 35dB $LA_{eq(15min)}$ were satisfied. Extraneous sources such as road traffic, livestock, local residential noise and an offsite drill rig were audible during the measurements.

5.5 Discussion of Results - Location R6

Monitoring from Tuesday 3 September 2019 to Thursday 5 September 2019 identified that TGO was audible on two occasions at location R6 with mining contributions remaining below 30dBA. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied. Extraneous sources such as road traffic, livestock, birds, wind and an offsite drill rig were audible during the measurements.

5.6 Discussion of Results - Location R23

Monitoring between Tuesday 3 September 2019 to Thursday 5 September 2019 identified that TGO was audible on all but one occasion at location R23, with mining contributions remaining below 35dBA. Therefore, the relevant noise limit of 36dB $LA_{eq(15min)}$ was satisfied during this monitoring period. Extraneous sources such as road traffic, dogs barking, idling trucks, birds and local residential noise were audible during the survey periods.

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.

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, birds, and domestic/residential noise influenced measured noise levels for this assessment. Furthermore, for September 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
		L_{Amax}	L_{Aeq}	L_{A90}				
Tuesday 3 September 2019								
Attended	19:46	53	44	37	36	<34	WD: SE WS: 0.5m/s Stab Class: F	Highway Traffic 35-53 Dogs 38-46 Local Residential Noise 38-40 TGO Hum 33-35
Unattended	19:46	48	35	29	36	<29		Highway Traffic 30-48 TGO Inaudible
Attended	22:26	59	47	38	36	<35	WD: SE WS: 0.5m/s Stab Class: D	Highway Traffic 40-59 Dogs 40-46 TGO Hum 35-40
Unattended	22:31	49	38	31	36	<30		Highway Traffic 35-49 TGO Inaudible
Wednesday 4 September 2019								
Attended	19:44	63	45	31	36	<30	WD: SE WS: 2m/s Stab Class: D	Highway Traffic 33-55 Local Traffic 40-63 Dogs 38-55 TGO Hum 26-30
Unattended	19:47	51	40	32	36	<30		Highway Traffic 28-52 TGO Inaudible
Attended	22:26	57	45	34	36	31	WD: SE WS: 0.5m/s Stab Class: E	Highway Traffic 34-57 Dogs 35-40 TGO Hum 32-35
Unattended	22:32	54	42	37	36	<33		Highway Traffic 29-54 TGO Inaudible
Thursday 5 September 2019								
Attended	19:43	58	44	30	36	<30	WD: N WS: 0.1m/s Stab Class: F	Highway Traffic 26-50 Dogs 30-38 TGO Hum 26-30
Unattended	19:45	56	40	27	36	<30		Highway Traffic 25-57 TGO Inaudible
Attended	22:26	56	44	25	36	<30	WD: N WS: 0.5m/s Stab Class: E	Highway Traffic 35-54 Local Residential Noise <28 TGO Inaudible?
Unattended	22:30	59	40	23	36	<30		Highway Traffic 30-60 TGO Inaudible

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 3 September 2019 to Friday 6 September 2019, identified that TGO mine noise was occasionally audible at each of the monitoring locations except for location R5, which remained inaudible during the measurement period. 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

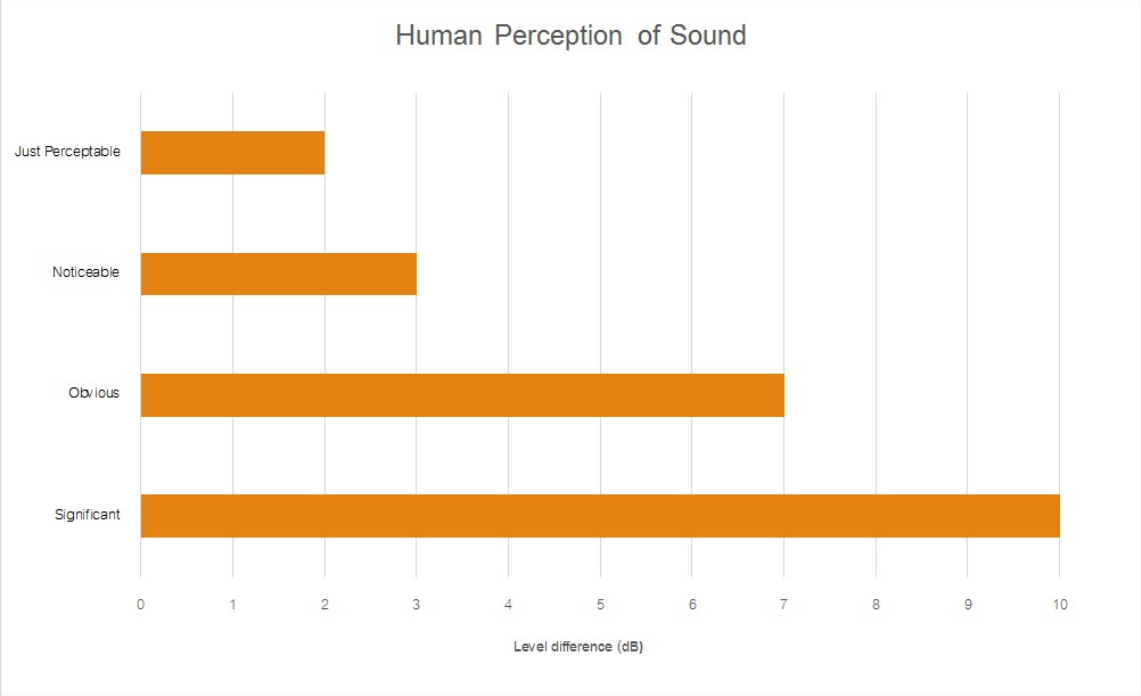
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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



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