Monthly Noise Monitoring Assessment

Tomingley Gold Mine, October 2019

Prepared for: Tomingley Gold Operations Pty Limited
November 2019
MAC160270RP38

Muller Acoustic Consulting

Document Information

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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 **seven** 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 22 October 2019 and Friday 25 October 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.

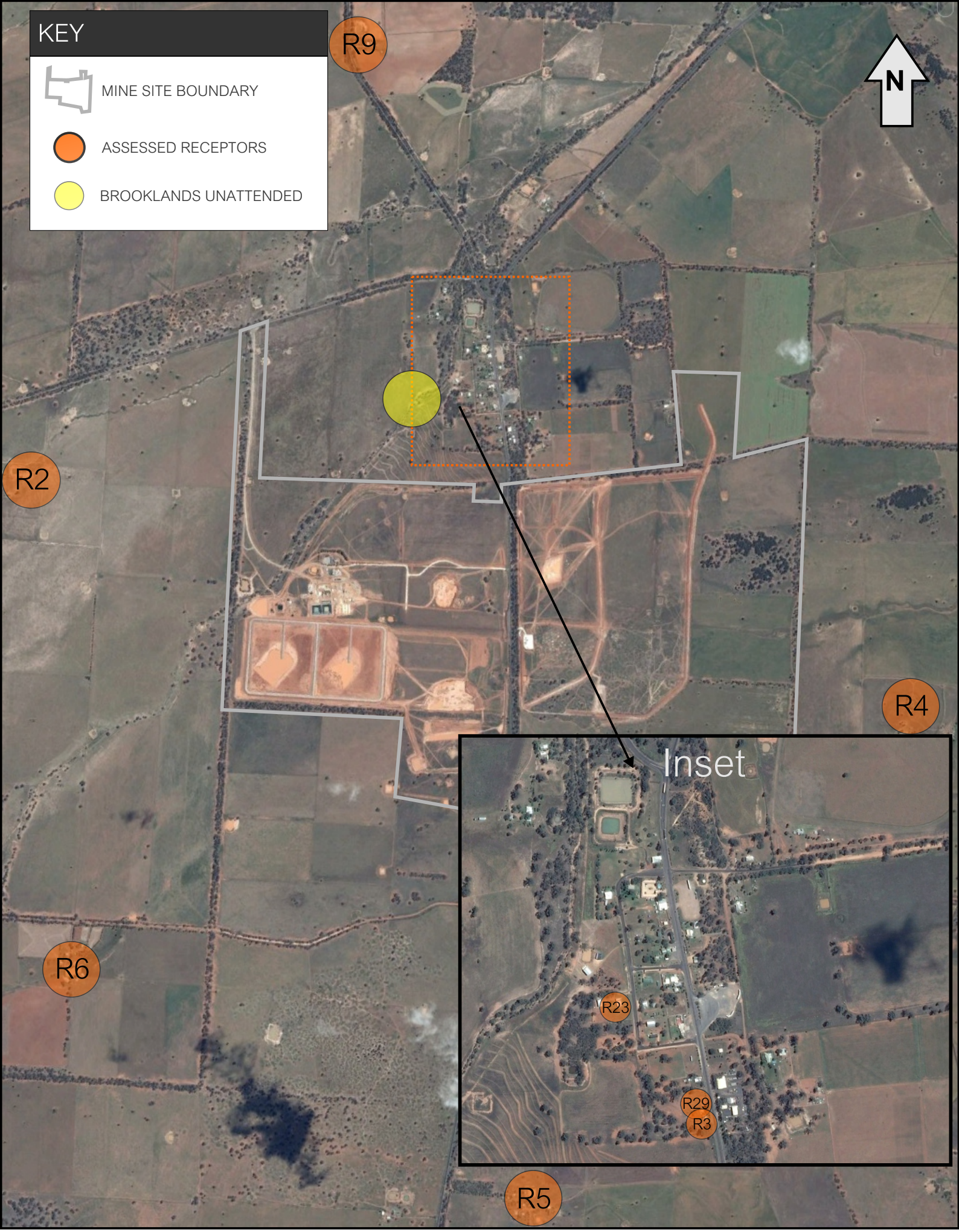

FIGURE 1 - LOCALITY PLAN AND ASSESSMENT LOCATIONS

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 October 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}			
22/10/2019	19:31	60	38	27	35	WD: N/A WS: Calm Stab Class: E	Birds <48-56 Dogs Barking <30-36 Livestock <30 Insects <30-31
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
22/10/2019	22:22	53	26	16	35	WD: N/A WS: Calm Stab Class: F	Insects <30-35 Livestock <30 Distant Traffic <30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	19:26	66	41	22	35	WD: W WS: <0.5m/s Stab Class: E	Insects <30-38 Birds 32-52 Dogs Barking <30 Local Traffic 40-66
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	22:23	50	22	19	35	WD: N WS: <0.5m/s Stab Class: F	Insects <30 Livestock <30 Distant Traffic <30 Dogs Barking <30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
24/10/2019	19:24	68	41	22	35	WD: N WS: 1.1m/s Stab Class: E	Insects <30 Distant Traffic <30 Birds <30-63 Dogs Barking <30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
24/10/2019	22:25	51	42	39	35	WD: N WS: 3.5m/s Stab Class: E	Wind 35-48 Livestock <30 Residential Noise 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.

4.2 Assessment Results - Location R3/R29

The results of the attended noise measurements at location R3/R29 for the October 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}			
22/10/2019	20:12	85	65	45	35	WD: N/A WS: Calm Stab Class: F	Insects 35-37 Local Traffic 45-82 Truck Idle 45-60
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
22/10/2019	23:02	81	61	45	35	WD: NE WS: 0.5m/s Stab Class: E	Truck Idle 45-46 Distant Traffic 45-55 Local Traffic 55-81 TGO Hum <35
		TGO Site $L_{Aeq(15min)}$ Contribution					<35
23/10/2019	20:06	87	63	32	35	WD: N/A WS: Calm Stab Class: E	Generator <30 Insects <30-32 Dogs Barking <30 Local Traffic 35-81
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	23:09	88	63	40	35	WD: N WS: 0.5m/s Stab Class: F	Local Traffic 42-82 Insects <40 TGO Hum 35-40
		TGO Site $L_{Aeq(15min)}$ Contribution					37[2]
24/10/2019	20:05	85	65	38	35	WD: N WS: <0.5m/s Stab Class: E	Local Traffic 35-83 Insects 33-34 Truck Idle 34-35
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
24/10/2019	23:07	86	64	35	35	WD: N WS: 1m/s Stab Class: D	Truck Idle 34-36 Insects <30 Local Traffic 40-84 Dogs Barking 37-44
		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.

Note 2: Deemed in compliance as data recorded during non-applicable meteorological conditions as per the EPL.

4.3 Assessment Results - Location R4

The results of the attended noise measurements at location R4 for the October 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}			
22/10/2019	21:02	54	36	33	35	WD: E WS: 0.8m/s Stab Class: E	Insects 30-34 Distant Traffic 30-41 Offsite Drill Rig 30-32
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
22/10/2019	23:51	54	27	19	35	WD: NE WS: 0.7m/s Stab Class: E	Distant Traffic <30 Operator 34 Offsite Drill Rig <30 Residential Noise 41
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	20:53	49	41	40	35	WD: E WS: 0.7m/s Stab Class: D	Insets 39-42 Distant Traffic 38-46 TGO Hum <25
		TGO Site $L_{Aeq(15min)}$ Contribution					<25
24/10/2019	00:12	51	32	28	35	WD: NE WS: 1.1m/s Stab Class: F	Insects <30-34 Offsite Drill Rig <30 Distant Traffic <30-36 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
24/10/2019	20:55	51	40	37	35	WD: N WS: 1.3m/s Stab Class: E	Insects 34-40 Distant Traffic 35-42 Wildlife 39-42 TGO Hum <25
		TGO Site $L_{Aeq(15min)}$ Contribution					<25
24/10/2019	23:58	62	38	35	35	WD: N WS: 2m/s Stab Class: E	Insects 34-36 Distant Traffic 33-38 Operator 49 TGO Hum 30-33
		TGO Site $L_{Aeq(15min)}$ Contribution					33

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 October 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}			
22/10/2019	21:26	85	65	48	35	WD: E WS: 0.5m/s Stab Class: F	Offsite Drill Rig 50-51 Insects<50 Traffic 50-81
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	00:13	83	59	41	35	WD: NE WS: 0.7m/s Stab Class: E	Traffic 44-81 Offsite Drill Rig 40-52 Insects <40
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
23/10/2019	21:16	83	62	36	35	WD: N/A WS: Calm Stab Class: F	Traffic 35-81 Offsite Drill Rig 35-39 Insects <35
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
24/10/2019	00:36	81	62	41	35	WD: NE WS: 0.5m/s Stab Class: E	Offsite Drill Rig 40-42 Insects <40 Traffic 42-80
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
24/10/2019	21:21	82	58	38	35	WD: N WS: 1.1m/s Stab Class: E	Traffic 45-82 Offsite Drill Rig 40-41 Insects 40 Livestock <40 TGO Hum <28
		TGO Site $L_{Aeq(15min)}$ Contribution					<28
25/10/2019	00:25	81	59	37	35	WD: N WS: 2m/s Stab Class: D	Offsite Drill Rig 38-42 Wind <40 Insects <40 Traffic 40-79 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.

4.5 Assessment Results - Location R6

The results of the attended noise measurements at location R6 for the October 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}			
22/10/2019	20:35	48	21	16	35	WD: N/A WS: Calm Stab Class: F	Insects <30 Operator 35 Livestock <30 Birds <30 Dogs Barking <30
		TGO Site $L_{Aeq(15min)}$ Contribution					TGO Inaudible
22/10/2019	23:25	51	35	24	35	WD: NE WS: 1.5m/s Stab Class: F	Insects <30 Wind <30 Birds <30 Livestock <30 TGO Hum 30-37
		TGO Site $L_{Aeq(15min)}$ Contribution					<35
23/10/2019	20:28	50	27	24	35	WD: SE WS: <0.5m/s Stab Class: G	Livestock <30 Traffic <30 TGO Hum <30
		TGO Site $L_{Aeq(15min)}$ Contribution					<30
23/10/2019	23:45	53	31	29	35	WD: NE WS: 1.5m/s Stab Class: F	Insects <30 Livestock <30 Birds <30 Operator 46 TGO Hum <30-33
		TGO Site $L_{Aeq(15min)}$ Contribution					31
24/10/2019	20:28	50	35	32	35	WD: N WS: 2m/s Stab Class: E	Insects 30-31 Livestock <30 Operator 44 TGO Hum 30-33
		TGO Site $L_{Aeq(15min)}$ Contribution					31
24/10/2019	23:30	57	41	39	35	WD: N WS: 4m/s Stab Class: E	Wind 38-41 Traffic <35 TGO <35
		TGO Site $L_{Aeq(15min)}$ Contribution					<33

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 October 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}			
22/10/2019	19:54	65	51	43	36	WD: N/A WS: Calm Stab Class: E	Truck Idle 38-48 Birds 45-48 Insects 45 Traffic 45-64 Dogs Barking 50-56
TGO Site LAeq(15min) Contribution							TGO Inaudible
22/10/2019	22:44	67	44	36	36	WD: N WS: 0.7m/s Stab Class: E	Traffic 38-46 Truck Idle 35-36 Birds 48 TGO Hum <32
TGO Site LAeq(15min) Contribution							<32
23/10/2019	19:48	63	45	36	36	WD: N/A WS: Calm Stab Class: D	Traffic 35-48 Birds 35-36 Dogs Barking 38-39 Truck Idle 43-44
TGO Site LAeq(15min) Contribution							TGO Inaudible
23/10/2019	22:47	53	43	31	36	WD: N WS: 0.7m/s Stab Class: E	Traffic 35-52 Birds 32-34 Truck Idle 35
TGO Site LAeq(15min) Contribution							TGO Inaudible
24/10/2019	19:47	62	44	35	36	WD: N WS: 0.5m/s Stab Class: E	Insects 30-35 Dogs Barking 55 Traffic 35-60 Truck Idle 35-38
TGO Site LAeq(15min) Contribution							TGO Inaudible
24/10/2019	22:47	58	43	39	36	WD: N WS: >2m/s Stab Class: E	Traffic 40-52 Truck Idle 39-40 Insects <40 Wind <40
TGO Site LAeq(15min) Contribution							TGO Inaudible

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

4.7 Assessment Results - Location R9

The results of the attended noise measurements at location R23 for the October 2019 survey are summarised in **Table 8** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 8 Operator-Attended Noise Survey Results – Location R9

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}			
22/10/2019	19:09	88	64	37	35	WD: W WS: 0.7m/s Stab Class: F	Insects 36-38 Birds 37-65 Distant Traffic 40-48 Local Traffic 40-88
TGO Site LAeq(15min) Contribution							TGO Inaudible
22/10/2019	22:00	89	65	23	35	WD: E WS: 0.4m/s Stab Class: E	Insects <30 Distant Traffic <30-34 Local Traffic 40-89
TGO Site LAeq(15min) Contribution							TGO Inaudible
23/10/2019	19:04	89	62	36	35	WD: W WS: 0.8m/s Stab Class: D	Insects 35-37 Birds 50 Distant Traffic 38-50 Local Traffic 51-89 Residential Noise 39-40
TGO Site LAeq(15min) Contribution							TGO Inaudible
23/10/2019	22:00	88	65	27	35	WD: NE WS: 0.6m/s Stab Class: E	Local Traffic 35-87 Insects <30-32 Distant Traffic <30-35
TGO Site LAeq(15min) Contribution							TGO Inaudible
24/10/2019	19:03	89	65	38	35	WD: E WS: <0.5m/s Stab Class: D	Insects 38-40 Birds 40-51 Local Traffic 40-82 Dog Barking <40
TGO Site LAeq(15min) Contribution							TGO Inaudible
24/10/2019	22:00	88	60	38	35	WD: N WS: 2.7m/s Stab Class: E	Insects 32-34 Distant Traffic 35-42 Local Traffic 50-87 Wind <41
TGO Site LAeq(15min) Contribution							TGO Inaudible

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

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5 Discussion

5.1 Discussion of Results - Location R2

Monitoring between Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was inaudible during measurements at location R2. Therefore, relevant noise limits of 35dB $LA_{eq(15min)}$ were satisfied. Extraneous sources such as birds, livestock, road traffic, residential noise and dogs barking were audible during the survey periods.

5.2 Discussion of Results - Location R3/R29

Monitoring from Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was audible on two occasions at location R3/29 with mining contributions above the 35dB $LA_{eq(15min)}$ noise limit on one occasion during the night period of 23 October 2019 (37dB $LA_{eq(15min)}$). Meteorological conditions measured at TGO's on-site weather station at the time of this measurement indicated that temperature inversion conditions were present, and in accordance with EPL20169, noise limits at the time of this measurement do not apply.

During all other measurements at R3/29, mining operations were inaudible or below the relevant noise limits. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied. Extraneous sources such as road traffic, idling trucks, generators, insects, and dogs barking were audible during the measurements.

5.3 Discussion of Results - Location R4

Monitoring from Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was audible on four occasions at location R4 with mining contributions remaining below 33dBA. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied. Extraneous sources such as road traffic, offsite drill, wildlife and insects were audible during the measurements.

5.4 Discussion of Results - Location R5

Monitoring from Tuesday 22 October 2019 to Friday 25 October 2019 identified that TGO was audible on two occasions at location R5 with mining contributions remaining below 35dBA. Therefore, relevant noise limits of 35dB $LA_{eq(15min)}$ were satisfied. Extraneous sources such as road traffic, livestock, insects and an offsite drill rig were audible during the measurements.

5.5 Discussion of Results - Location R6

Monitoring from Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was audible on five occasions at location R6 with mining contributions remaining below 35dBA. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied. Extraneous sources such as road traffic, livestock, birds, insects, dogs barking and wind were audible during the measurements.

5.6 Discussion of Results - Location R23

Monitoring between Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was inaudible 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.

5.7 Discussion of Results - Location R9

Monitoring between Tuesday 22 October 2019 to Thursday 24 October 2019 identified that TGO was inaudible during all measurements at location R9. Therefore, the relevant noise limit of 35dB $LA_{eq(15min)}$ was satisfied during this monitoring period. Extraneous sources such as road traffic, dogs barking, wind, insects, 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 October 2019, results remained below the relevant criteria for both attended and unattended locations.

Table 9 provides a summary comparison of results between the attended and unattended noise surveys for R23.

Table 9 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 22 October 2019								
Attended	19:54	65	51	43	36	TGO Inaudible	WD: N/A WS: Calm Stab Class: E	Truck Idle 38-48 Birds 45-48 Traffic 45-64 Dogs Barking 50-56
Unattended	20:00	48	33	23	36	TGO Inaudible		Traffic 27-45 Dog Barking 48
Attended	22:44	67	44	36	36	<32	WD: N WS: 0.7m/s Stab Class: E	Traffic 38-46 Truck Idle 35-36 Birds 48 TGO Hum <32
Unattended	22:45	64	43	31	36	TGO Inaudible		Traffic 35- 64
Wednesday 23 October 2019								
Attended	19:48	63	45	36	36	TGO Inaudible	WD: N/A WS: Calm Stab Class: D	Traffic 35-48 Birds 35-36 Dogs Barking 38-39 Truck 43-44
Unattended	19:45	54	38	26	36	TGO Inaudible		Birds 29-54 Traffic 27-47
Attended	22:47	53	43	31	36	TGO Inaudible	WD: N WS: 0.7m/s Stab Class: E	Traffic 35-52 Birds 32-34 Truck Idle 35
Unattended	22:45	55	45	31	36	TGO Inaudible		Traffic 32-55
Thursday 24 October 2019								
Attended	19:47	62	44	35	36	TGO Inaudible	WD: N WS: 0.5m/s Stab Class: E	Insects 30-35 Dogs Barking55 Traffic 35-60 Truck Idle 35-38
Unattended	19:45	50	38	28	36	TGO Inaudible		Traffic 37-50
Attended	22:47	58	43	39	36	TGO Inaudible	WD: N WS: >2m/s Stab Class: E	Traffic 40-52 Truck Idle 39-40 Wind <40
Unattended	22:45	53	39	31	36	TGO Inaudible		Traffic 37-53

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 22 October 2019 to Friday 25 October 2019, identified that TGO mine noise was occasionally audible at each of the monitoring locations except for location R2 and R9, 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

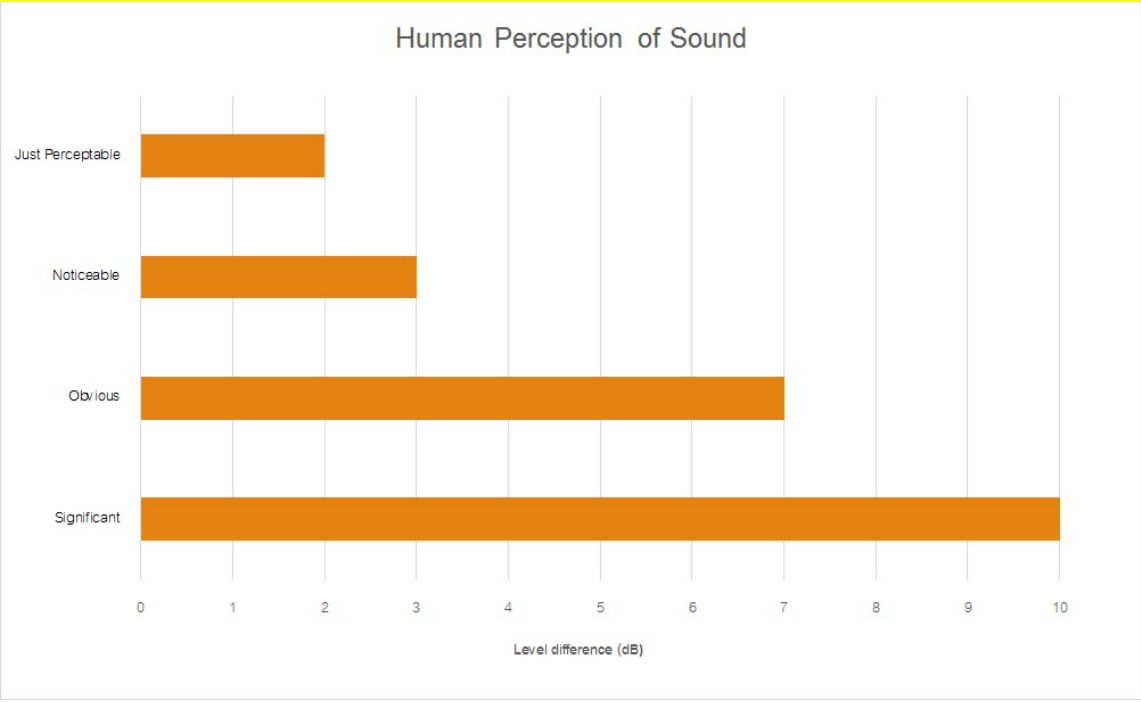
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for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