

# Monthly Noise Monitoring Assessment

Tomingley Gold Mine, December 2016

Prepared for : Tomingley Gold Operations Pty Limited

December 2016



# Document Information

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### Tomingley Gold Mine, December 2016

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APPENDIX A - GLOSSARY OF TERMS

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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').

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 to minimise noise levels within the surrounding community. 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 not been completed as 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), Industrial Noise Policy (INP), 2000;
- Environment Protection Licence EPL 20169 (EPL); and
- Standards Australia AS 1055.1:1997 - 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	
		LAeq(15-min)	LAeq(15-min)	LAeq(15-min)	LA1(1-min)
NAG A	R1, R6	36	36	36	45
	R5	37	37	37	45
	R4	36	36	36	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 has been retained from historic noise assessments. The monitoring location with respect to the mine is 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 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. The measurements were carried out using Svantek Type 1, 971 noise analyser from Monday 12 December 2016 to Wednesday 14 December 2016. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed  $\pm 0.5$  dBA.

Both evening and night measurements were of 15 minutes in duration at each location over three consecutive dates. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis as to calculate the LAeq(15-min) 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 INP 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 wind or a G Class Stability) are considered not applicable against the EPL criteria.

KEY



MINE SITE BOUNDARY



ASSESSED RECEPTORS



BROOKLANDS UNATTENDED



ELLERSLIE UNATTENDED

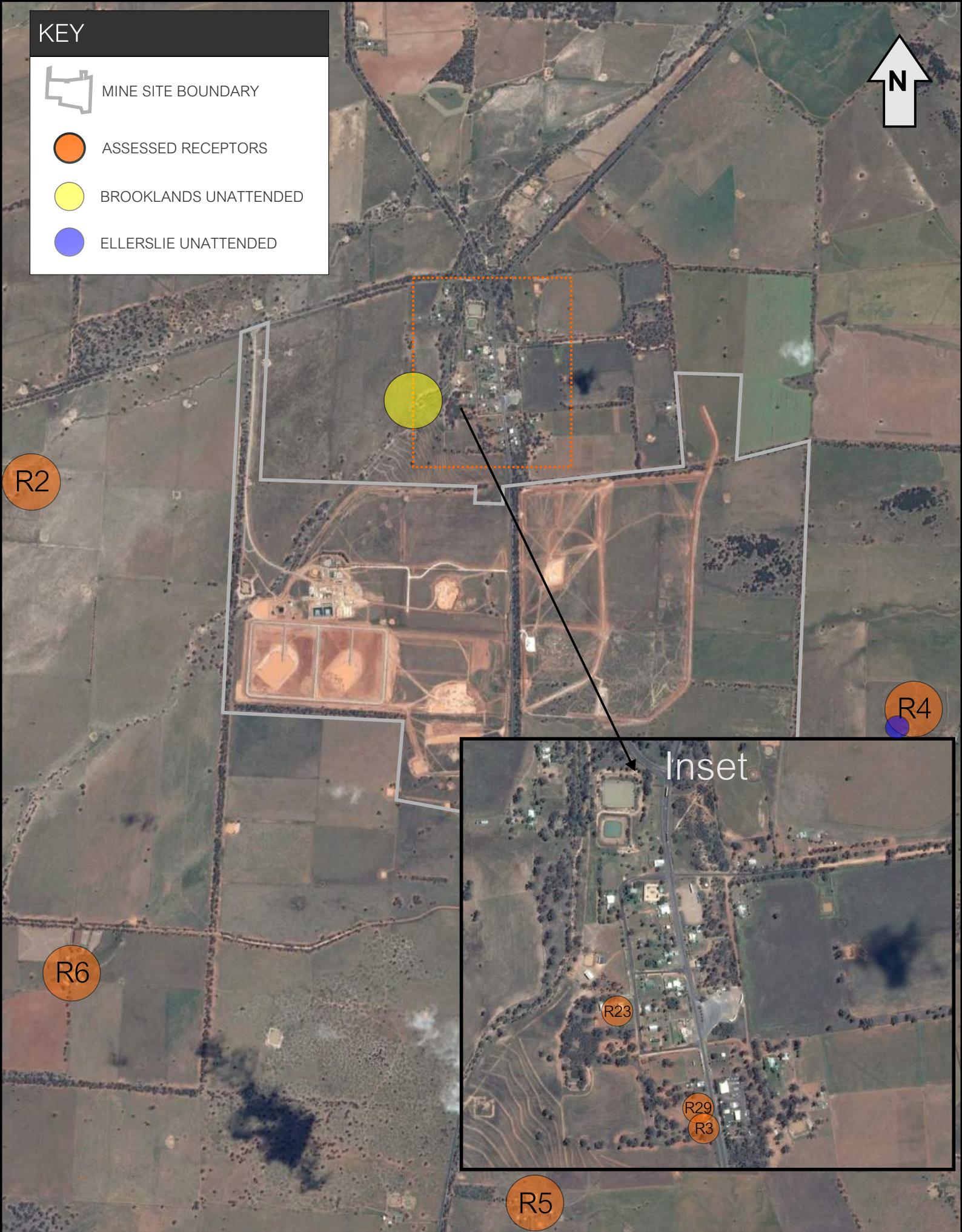


FIGURE 1 - LOCALITY PLAN AND ASSESSMENT LOCATIONS

TOMINGLEY GOLD MINE NOISE MONITORING

REF: MAC160270

## 4 Results

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

### 4.1 Assessment Results - Location R2

The results of the attended noise measurements at location R2 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 2** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution.

Table 2 Operator-Attended Noise Survey Results – Location R2							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	21:57	64	33	28	36	Dir: N	Livestock
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							26
12/12/2016	22:12	39	27	26	36	Dir: N	Livestock
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	21:44	68	40	34	36	Dir: NW	Livestock
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							Highway traffic
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	22:00	58	32	29	36	Dir: NW	Livestock
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							Wind in trees
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
14/12/2016	21:25	93	54	35	36	Dir: SW	Livestock
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							Wind
TGO Site L <sub>Aeq</sub> (15-min) Contribution							Highway traffic
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible

Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.

Note 1: Meteorological data obtained from TGO's on-site weather station.

## 4.2 Assessment Results - Location R3/R29

The results of the attended noise measurements at location R3/R29 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 3** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution. It is noted that both locations R3 and R29 are within 10m of each other and therefore have been assessed simultaneously.

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

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	21:13	84	63	60	40	Dir: N 4 m/s Stab Class: E	Highway traffic Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
12/12/2016	22:57	86	66	64	40	Dir: N 3 m/s Stab Class: D	Highway traffic Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	21:00	89	66	64	40	Dir: NW 2 m/s Stab Class: E	Highway traffic Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	22:53	89	66	63	40	Dir: NW 3 m/s Stab Class: E	Highway traffic Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
14/12/2016	20:36	88	67	65	40	Dir: SW 4 m/s Stab Class: D	Highway traffic Wind in trees Mine hum Insects Birds
TGO Site L <sub>Aeq</sub> (15-min) Contribution							36
Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.							

Note 1: Meteorological data obtained from TGO's on-site weather station.

### 4.3 Assessment Results - Location R4

The results of the attended noise measurements at location R4 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 4** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution.

Table 4 Operator-Attended Noise Survey Results – Location R4							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	20:21	74	46	43	36	Dir: N	Livestock
						3 m/s	Insects
						Stab Class: E	Mine trucks
TGO Site L <sub>Aeq</sub> (15-min) Contribution							31
12/12/2016	23:50	53	50	49	36	Dir: N	Insects
						2 m/s	Mine hum
						Stab Class: D	
TGO Site L <sub>Aeq</sub> (15-min) Contribution							35
13/12/2016	20:09	54	37	36	36	Dir: NW	Mine hum
						2 m/s	Wind in trees
						Stab Class: E	Dog
TGO Site L <sub>Aeq</sub> (15-min) Contribution							35
13/12/2016	23:42	46	39	38	36	Dir: NW	Mine hum
						3 m/s	Insects
						Stab Class: D	Wind in trees
TGO Site L <sub>Aeq</sub> (15-min) Contribution							36
14/12/2016	19:46	53	36	34	36	Dir: SW	Wind in trees
						4 m/s	Birds
						Stab Class: D	
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.							

Note 1: Meteorological data obtained from TGO's on-site weather station.

#### 4.4 Assessment Results - Location R5

The results of the attended noise measurements at location R5 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 5** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution.

**Table 5 Operator-Attended Noise Survey Results – Location R5**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	19:53	78	62	60	37	Dir: N	Highway traffic
						2 m/s	Insects
						Stab Class: E	Birds
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	00:18	75	56	55	37	Dir: N	Highway traffic
						2 m/s	Insects
						Stab Class: E	
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	19:43	76	55	54	37	Dir: NW	Highway traffic
						3 m/s	Insects
						Stab Class: D	Dog Birds
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
14/12/2016	00:05	76	54	53	37	Dir: NW	Highway traffic
						3 m/s	Insects
						Stab Class: D	Dog Birds
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
14/12/2016	19:22	78	61	60	37	Dir: SW	Highway traffic
						4 m/s	Birds
						Stab Class: D	Insects Wind
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible

Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.

Note 1: Meteorological data obtained from TGO's on-site weather station.

#### 4.5 Assessment Results - Location R6

The results of the attended noise measurements at location R6 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 6** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution.

Table 6 Operator-Attended Noise Survey Results – Location R6							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	20:48	49	35	34	36	Dir: N	Insects
						4 m/s	Mine hum
						Stab Class: E	Tipping
						TGO Site L <sub>Aeq</sub> (15-min) Contribution	
12/12/2016	23:19	41	36	34	36	Dir: N	Mine hum
						2 m/s	Crushing plant
						Stab Class: E	Insects
						TGO Site L <sub>Aeq</sub> (15-min) Contribution	
13/12/2016	20:38	56	35	32	36	Dir: NW	Mine hum
						3 m/s	Insects
						Stab Class: E	Tipping
							Birds
TGO Site L <sub>Aeq</sub> (15-min) Contribution						34	
13/12/2016	23:16	41	35	35	36	Dir: NW	Mine hum
						3 m/s	Insects
						Stab Class: D	Wind in trees
							Crushing plant
TGO Site L <sub>Aeq</sub> (15-min) Contribution						32	
14/12/2016	20:13	54	40	38	36	Dir: SW	Highway traffic
						6 m/s	Insects
						Stab Class: D	Birds
							Wind in trees
TGO Site L <sub>Aeq</sub> (15-min) Contribution						TGO Inaudible	
Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.							

Note 1: Meteorological data obtained from TGO's on-site weather station.

#### 4.6 Assessment Results - Location R23

The results of the attended noise measurements at location R23 for Monday 12 December 2016 to Wednesday 14 December 2016 are summarised in **Table 7** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the mining noise contribution.

Table 7 Operator-Attended Noise Survey Results – Location R23							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>			
12/12/2016	21:32	58	46	43	39	Dir: N	Highway traffic
						2 m/s	Insects
							Dog
							Aircraft
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
12/12/2016	22:38	62	45	43	39	Dir: N	Highway traffic
						4 m/s	Dog
							Insects
							Highway traffic
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	21:19	53	43	42	39	Dir: NW	Highway traffic
						3 m/s	Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
13/12/2016	22:32	56	43	42	39	Dir: NW	Highway traffic
						3 m/s	Wind in trees
							Insects
							Aircraft
TGO Site L <sub>Aeq</sub> (15-min) Contribution							TGO Inaudible
14/12/2016	20:58	54	45	44	39	Dir: SW	Highway traffic
						3 m/s	Wind in trees
							Insects
TGO Site L <sub>Aeq</sub> (15-min) Contribution							38

Night measurements on 14/12/16 were unable to be obtained due to unsuitable meteorological conditions as per AS1055.

Note 1: Meteorological data obtained from TGO's on-site weather station.



## 5 Discussion

### 5.1 Discussion of Results – Location R2

Monitoring between the Monday 12 December 2016 to Wednesday 14 December 2016, identified that TGO noise was audible on only one occasion during the evening period on the 12 December 2016. Notwithstanding, the noise contribution from TGO when audible was measured at 26dBA and satisfied the relevant evening and night noise limits of 36dBA LAeq(15min) for all measurements.

### 5.2 Discussion of Results – Location R3/R29

Monitoring results for R3/R29 were dominated by highway traffic that was constantly audible during all measurements. TGO emissions were inaudible on all but one occasion. This occurred during the evening period on Wednesday the 14 December 2016 with the contribution of 36dBA although remained below the relevant criteria of 40dBA LAeq(15min). Extraneous sources were also dominant during the three dates with wind, birds and insects all audible.

### 5.3 Discussion of Results – Location R4

Mine noise was audible during all but one attended survey at R4. The LAeq(15-min) mine noise contribution ranged between 31dBA to 35dBA. All results satisfied the EPL criteria during the attended measurements throughout the December 2016 survey period. Non-mining noise sources included wind in trees, insects, a dog and livestock.

### 5.4 Discussion of Results – Location R5

Mining noise emissions were inaudible during all attended noise monitoring surveys at this location during the December period. Highway traffic noise was the dominant source at this receiver during the December 2016 assessment period. Other non-mining sources include birds, insects and dogs.

### 5.5 Discussion of Results – Location R6

TGO were audible on four of the five occasions throughout the December 2016 monitoring period at R6. When audible, LAeq(15-min) mine noise contribution ranged between 32dBA and 34dBA which satisfied the relevant EPL noise limit of 36dBA LAeq (15- min). Non-mining sources included Insects, birds and wind in trees.

## 5.6 Discussion of Results – Location R23

Mining noise was audible on only one occasion at this location during the December 2016 monitoring period, with no exceedances. The one occasion where TGO was audible was during the evening period of the 14 December 2016 where the  $L_{Aeq}(15\text{-min})$  mine noise contribution was 38dBA. Non-mining sources included highway traffic, insects, a dog, wind in trees and aircraft.

## 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 methodology adopted to achieve this has compared monthly attended monitoring results for the closest assessed unattended monitoring location. Currently, TGO have two unattended real time monitoring terminals installed within the community surrounding the project site and includes unattended monitors at Ellerslie (R4) and the Brooklands property (nearest to R23). The **Figure 1** locality plan identifies the location of each monitor with respect to the attended monitoring locations. It is noted that the Brooklands unattended monitoring is situated 600m east of the attended noise monitoring location R23, therefore, background (LA90) noise levels are significantly lower due to offset distance to highway traffic. Notwithstanding, the TGO mine noise contribution has been the key indicator in validating noise levels for this assessment.

A comparison of mine noise contributions between attended and unattended noise monitoring demonstrates a general consistency between attended and unattended results, although it was noted that wind and insect noise influenced measured noise levels for this assessment period. The average difference between attended and unattended mining noise contribution results at R4 is 1dB, which is reasonable considering the distance between the attended and unattended monitoring positions and the varying timing metrics of each 15-minute interval. Therefore, the unattended monitoring systems are considered an appropriate tool for managing noise emissions from TGO.

Furthermore, results identify that for the December 2016, results remained below the relevant criteria for both locations. **Table 8** and **Table 9** provide a summary of comparisons or results between the attended and unattended noise surveys for R4 and R23 respectively.

**Table 8 Comparison of Attended and Unattended Results – R4**

Assessment Type	Time (hrs)	Descriptor (dBA re 20 µPa)			Criteria	Mine Noise Contribution	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>				
12 December 2016								
Attended	20:21	74	46	43	36	31	Livestock Insects Mine hum	
Unattended	20:20	67	38	31	36	30	Mine hum Insects Reversing noise	
Attended	23:50	53	50	49	36	35	Insects Mine hum	
Unattended	23:50	54	45	36	36	36	Insects Mine hum	
13 December 2016								
Attended	20:09	54	37	36	36	35	Mine hum Wind in trees Dog	
Unattended	20:05	76	45	36	36	35	Insects Mine hum Birds Livestock	
Attended	23:42	46	39	38	36	36	Mine hum Insects Wind in trees	

**Table 8 Comparison of Attended and Unattended Results – R4**

Assessment Type	Time (hrs)	Descriptor (dBA re 20 µPa)			Criteria	Mine Noise Contribution	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>				
Unattended	23:35	54	47	38	36	36	Insects Reversing noise Mine hum	
14 December 2016								
Attended	19:46	97	73	71	36	TGO Inaudible Dir: SW 4 m/s	Wind in trees Birds	
Unattended	19:32	72	44	34	36	35 Stab Class: D	Birds Wind	

**Table 9 Comparison of Attended and Unattended Results – R23**

Assessment Type	Time (hrs)	Descriptor (dBA re 20 µPa)			Criteria	Mine Noise Contribution	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>				
12 December 2016								
Attended	21:32	58	46	43	39	TGO Inaudible	Highway traffic Insects Dog Aircraft	
Unattended	21:30	53	40	29	39	31	Mine hum Insects Birds	
Attended	22:38	62	45	43	39	TGO Inaudible	Highway traffic Dog Insects Highway traffic	
Unattended	22:30	56	40	28	39	30	Mine hum Insects	
13 December 2016								
Attended	21:19	53	43	42	39	TGO Inaudible	Highway traffic Insects	
Unattended	21:15	58	42	30	39	32	Mine hum Insects Birds	

**Table 9 Comparison of Attended and Unattended Results – R23**

Assessment Type	Time (hrs)	Descriptor (dBA re 20 µPa)			Criteria	Mine Noise Contribution	Meteorology <sup>1</sup>	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>				
Attended	22:32	56	43	42	39	TGO Inaudible	Dir: NW 3 m/s Stab Class: E	Highway traffic Wind in trees Insects Aircraft
Unattended	22:30	52	40	28	39	30		Mine hum Highway traffic Insects
14 December 2016								
Attended	20:58	54	45	44	39	38	Dir: SW 3 m/s Stab Class: D	Highway traffic Wind in trees Insects Mine hum
Unattended	20:45	52	40	37	39	34		Insects Birds Highway traffic





## 7 Conclusion

MAC has completed a noise monitoring assessment on behalf of Tomingley Gold Operations. The assessment was completed to provide monthly monitoring data so that TGO can actively quantify and manage site noise emissions.

Attended monitoring for three consecutive days, from 12 December to 14 December 2016, has identified that noise emissions generated by TGO comply with relevant statutory noise limits specified in EPL conditions at all assessed locations.

A comparison of mine noise contributions between attended and unattended noise monitoring demonstrates a general consistency between attended and unattended results. The average difference between attended and unattended mining noise contribution results is 1dB, which is reasonable considering the distance between the attended and unattended monitoring positions and the varying timing metrics of each 15-minute interval. Therefore, the unattended monitoring systems are considered an appropriate tool for managing noise emissions from TGO.

Furthermore, results identify that for the December 2016, results remained below the relevant criteria for both locations. **Table 8** and **Table 9** provide a summary of comparisons or results between the attended and unattended noise surveys for R4 and R23 respectively.

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# Appendix A - Glossary of Terms

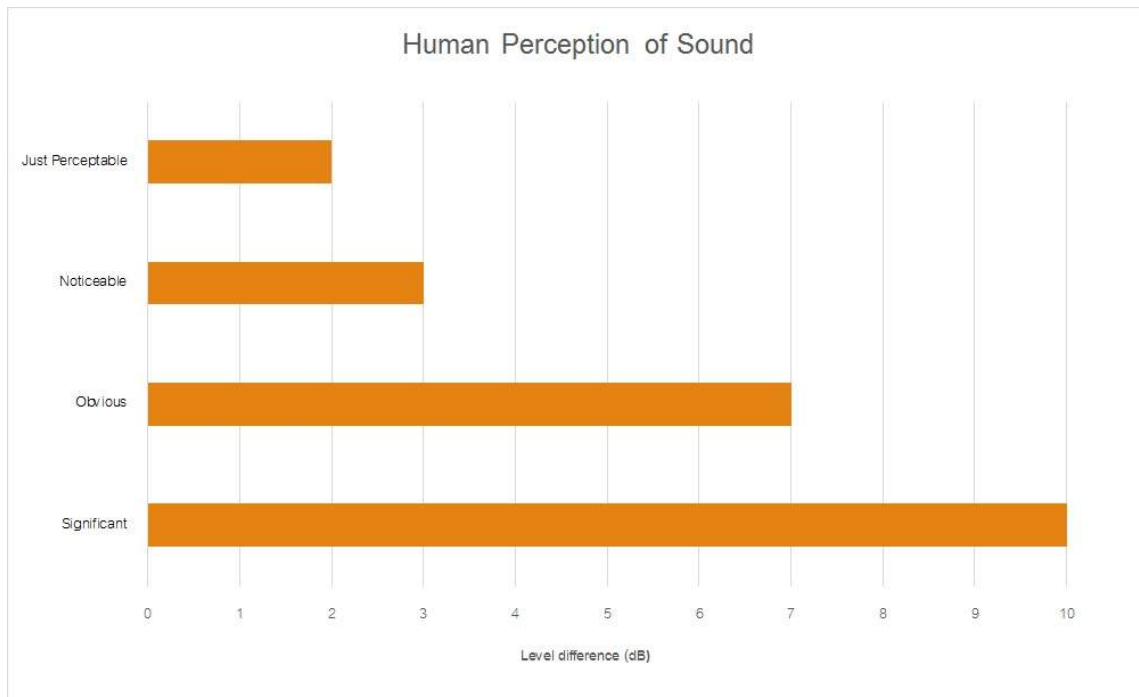
Several technical terms have been used in this report and are explained in **Table A1**.

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 INP 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.
LAm <sub>ax</sub>	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W <sub>0</sub> 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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