# Monthly Noise Monitoring Assessment

## Tomingley Gold Mine, September 2018

Prepared for: Tomingley Gold Operations Pty Limited
October 2018
MAC160270RP26

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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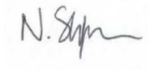
| MAC160270RP26 | Final | 3 October 2018 | Nicholas Shipman |  | Oliver Muller |  |

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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').

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
- 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 | |
|---|---|---|---|---|---|
| | | $L_{Aeq(15min)}$ | $L_{Aeq(15min)}$ | $L_{Aeq(15min)}$ | $L_{A1(1min)}$ |
| 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 has 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 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analyser from Tuesday 18 September 2018 to Thursday 20 September 2018. 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 ±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 wind or a G Class Stability) are considered not applicable against the EPL criteria.

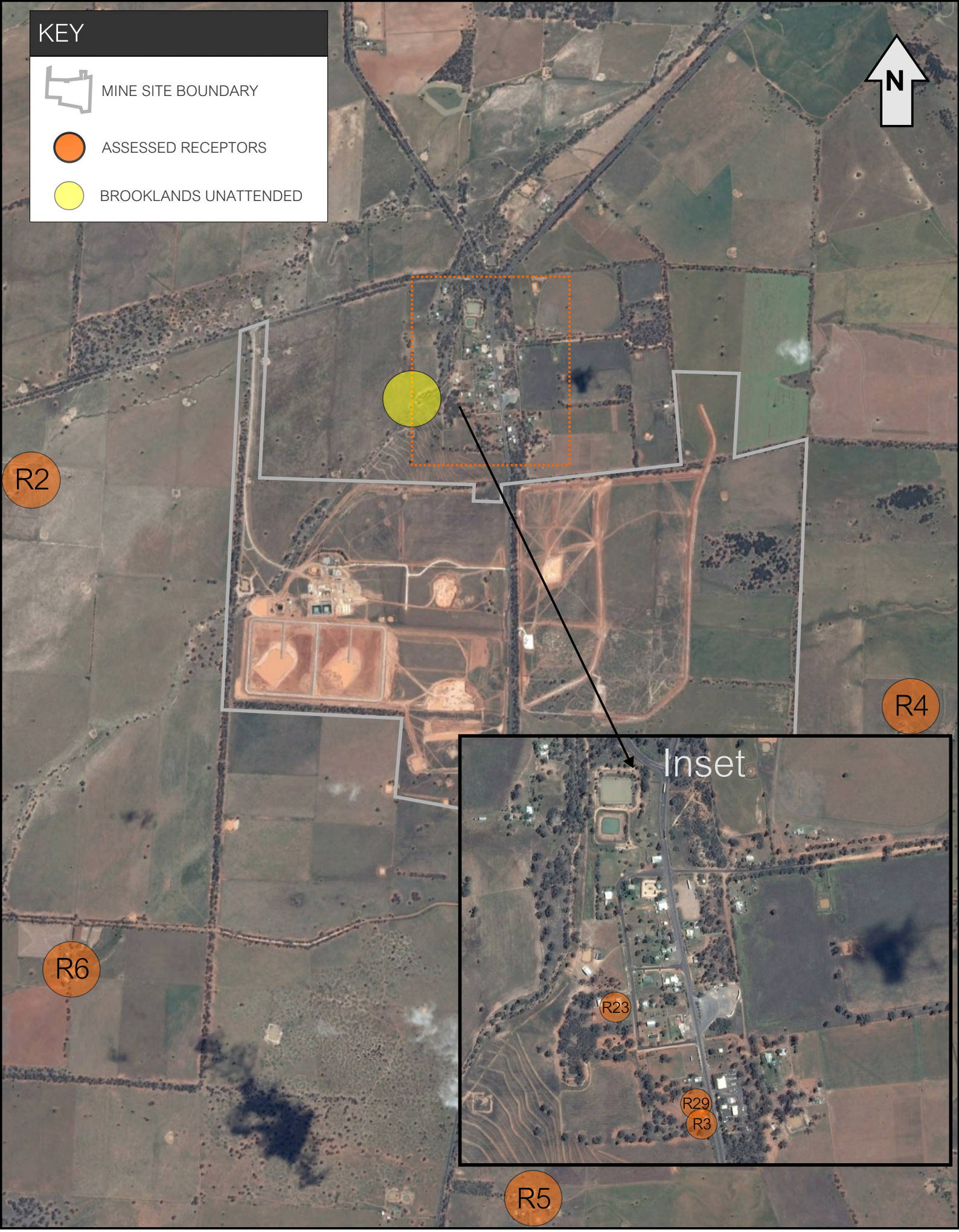


FIGURE 1 - LOCALITY PLAN AND ASSESSMENT LOCATIONS

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 Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 21:42 | 48 | 26 | 20 | 36 | Dir: E<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 18-24<br>Livestock 24-48<br>Wind in trees 22-29 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 18/09/2018 | 22:00 | 82 | 53 | 21 | 36 | Dir: E<br>0.5 m/s<br>Stab Class: F | Livestock 23-31<br>Distant highway traffic 19-23<br>Local traffic 26-81 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 21:45 | 50 | 26 | 20 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 22-32<br>Livestock 29-50 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 22:00 | 41 | 23 | 19 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 19-26<br>Livestock 20-41 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 21:43 | 50 | 27 | 22 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Dog bark 34-50<br>Distant highway traffic 18-24<br>Livestock 19-35 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 22:00 | 36 | 30 | 27 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: F | Distant highway traffic 28-34<br>Livestock 32-36 |
| | | 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 Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 21:03 | 81 | 62 | 35 | 40 | Dir: E<br>0.1 m/s<br>Stab Class: F | Idling highway traffic 49-53<br>Highway traffic 42-80<br>Crushing plant 36-38 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | 37 |
| 18/09/2018 | 22:38 | 86 | 68 | 43 | 40 | Dir: E<br>0.1 m/s<br>Stab Class: E | Highway traffic 39-85<br>Idling highway traffic 39-42 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 20:52 | 82 | 67 | 45 | 40 | Dir: S<br>0.5 m/s<br>Stab Class: D | Highway traffic 39-82<br>Idling highway traffic 41-44 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 22:40 | 98 | 71 | 47 | 40 | Dir: S<br>0.1 m/s<br>Stab Class: E | Highway traffic 42-98<br>Idling highway traffic 42-52 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 21:05 | 79 | 61 | 40 | 40 | Dir: S<br>0.1 m/s<br>Stab Class: F | Highway traffic 28-78<br>Idling highway traffic 38-44 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 22:48 | 88 | 68 | 41 | 40 | Dir: S<br>0.1 m/s<br>Stab Class: F | Highway traffic 38-87<br>Idling highway traffic 36-44 |
| | | 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.

## 4.3 Assessment Results - Location R4

The results of the attended noise measurements at location R4 for Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 20:18 | 47 | 32 | 23 | 36 | Dir: E<br>0.1 m/s<br>Stab Class: F | Crushing plant 28-33<br>Highway traffic 32-38 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | 30 |
| 18/09/2018 | 23:31 | 51 | 35 | 23 | 36 | Dir: E<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 26-38<br>Livestock 32-50 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 20:06 | 69 | 46 | 22 | 36 | Dir: S<br>0.5 m/s<br>Stab Class: D | Distant highway traffic 24-39<br>Local traffic 36-63 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 23:26 | 48 | 29 | 18 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: D | Distant highway traffic 16-28<br>Livestock 22-29 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 20:18 | 56 | 29 | 13 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 13-56 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 23:33 | 50 | 24 | 14 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: F | Distant highway traffic 13-50 |
| | | 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 Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 19:55 | 85 | 66 | 21 | 37 | Dir: E<br>0.1 m/s<br>Stab Class: F | Highway traffic 18-84 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 18/09/2018 | 23:54 | 82 | 61 | 22 | 37 | Dir: E<br>0.5 m/s<br>Stab Class: F | Highway traffic 23-82<br>Livestock 23-36 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 19:43 | 85 | 66 | 28 | 37 | Dir: S<br>0.5 m/s<br>Stab Class: E | Highway traffic 24-85<br>Wind in trees 22-26 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 23:47 | 83 | 65 | 29 | 37 | Dir: S<br>0.1 m/s<br>Stab Class: E | Highway traffic 18-82 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 19:56 | 81 | 61 | 18 | 37 | Dir: S<br>0.1 m/s<br>Stab Class: D | Highway traffic 16-79 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 23:53 | 82 | 59 | 14 | 37 | Dir: S<br>0.1 m/s<br>Stab Class: F | Highway traffic 13-81 |
| | | 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 Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 20:42 | 51 | 23 | 16 | 36 | Dir: E<br>0.1 m/s<br>Stab Class: F | Distant highway traffic 16-22<br>Livestock 24-51 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 18/09/2018 | 23:04 | 51 | 24 | 20 | 36 | Dir: E<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 18-28<br>Livestock 20-51 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 20:30 | 50 | 28 | 21 | 36 | Dir: S<br>0.5 m/s<br>Stab Class: E | Distant highway traffic 20-38<br>Livestock 26-50 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 23:02 | 51 | 28 | 20 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 18-26<br>Livestock 26-51 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 20:43 | 54 | 28 | 17 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 16-54 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 23:10 | 50 | 30 | 19 | 36 | Dir: S<br>0.1 m/s<br>Stab Class: E | Distant highway traffic 24-38 |
| | | 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.

## 4.6 Assessment Results - Location R23

The results of the attended noise measurements at location R23 for Tuesday 18 September 2018 to Thursday 20 September 2018 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 |
|---|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | | |
| 18/09/2018 | 21:21 | 69 | 49 | 36 | 39 | Dir: E<br>0.1 m/s<br>Stab Class: F | Dog bark 38-58<br>Highway traffic 36-67 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 18/09/2018 | 22:21 | 60 | 50 | 38 | 39 | Dir: E<br>0.5 m/s<br>Stab Class: F | Idling highway traffic 38-43<br>Highway traffic 38-57<br>Birds 38-49 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 19/09/2018 | 21:24 | 62 | 46 | 38 | 39 | Dir: S<br>0.5 m/s<br>Stab Class: D | Highway traffic 42-61<br>Idling highway traffic 38-42<br>Crushing plant <36 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | <36 |
| 19/09/2018 | 22:22 | 68 | 50 | 37 | 39 | Dir: S<br>0.1 m/s<br>Stab Class: E | Highway traffic 36-51<br>Dog bark 39-66<br>Idling highway traffic 40-44 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 21:22 | 58 | 46 | 39 | 39 | Dir: S<br>0.1 m/s<br>Stab Class: F | Highway traffic 38-56<br>Idling highway traffic 38-44 |
| | | TGO Site $L_{Aeq(15min)}$ Contribution | | | | | TGO Inaudible |
| 20/09/2018 | 22:26 | 63 | 49 | 37 | 39 | Dir: S<br>0.1 m/s<br>Stab Class: F | Highway traffic 41-56<br>Idling highway traffic 41-44<br>Birds 41-57<br>Dog bark 42-48 |
| | | 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 18 September 2018 to Thursday 20 September 2018 identified that TGO mine noise was inaudible during all six occasions. Therefore, the relevant noise limit of 36dBA $LA_{eq(15min)}$ was satisfied during this monitoring period. Extraneous sources such as distant highway traffic, livestock, wind in trees, local traffic and dog bark were audible during the survey periods.

## 5.2 Discussion of Results - Location R3/R29

Monitoring results for R3/R29 were dominated by highway traffic that was constant for all six measurements conducted for the September 2018 survey. TGO mine noise was audible during one of six occasions, with contribution measured at 37dBA during the evening period on 18 September 2018, therefore, satisfied the noise limit of 40dBA $LA_{eq(15min)}$. Idling highway traffic, highway traffic and TGO crushing plant were audible during the measurements at R3/R29.

## 5.3 Discussion of Results - Location R4

TGO mine noise was audible during one of six measurements conducted from Tuesday 18 September 2018 to Thursday 20 September 2018 at R4, with contribution measured at 30dBA. Therefore, the relevant noise limit of 36dBA $LA_{eq(15min)}$ was satisfied during the September 2018 period. Distant highway traffic, livestock, local traffic and TGO crushing plant were audible during the measurements at R4.

## 5.4 Discussion of Results - Location R5

TGO mine noise was inaudible during all six attended noise measurements at R5 for the September 2018 period. Therefore, relevant noise limits of 37dBA $LA_{eq(15min)}$ were satisfied. Highway traffic was the dominant source at this receiver with the other non-mining sources including livestock and wind in trees.

## 5.5 Discussion of Results - Location R6

TGO mine noise was inaudible during six occasions throughout the September 2018 monitoring period at R6, therefore satisfying the relevant EPL noise limit of 36dBA $LA_{eq(15min)}$. Non-mining sources included distant highway traffic and livestock during the attended surveys.

## 5.6 Discussion of Results - Location R23

TGO mine noise was audible during one of six occasions at R23 with emissions measured at <36dBA during the evening period on 19 September 2018, therefore remained in compliance with the relevant EPL criteria of 39dBA $LA_{eq(15min)}$. Audible sources included dog bark, highway traffic, idling highway traffic, birds and TGO crushing plant.

# 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 one 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 influenced measured noise levels for this assessment. Furthermore, for September 2018, 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) LAmax | LAeq | LA90 | Criteria | Mine Noise Contribution | Meteorology[1] | Description and SPL, dBA |
|---|---|---|---|---|---|---|---|---|
| Tuesday 18 September 2018 | | | | | | | | |
| Attended | 21:21 | 69 | 49 | 36 | 39 | TGO Inaudible | Dir: E 0.1 m/s Stab Class: F | Dog bark 38-58 Highway traffic 36-67 |
| Unattended | 21:22 | 61 | 45 | 28 | 39 | TGO Inaudible | | Highway traffic |
| Attended | 22:21 | 60 | 50 | 38 | 39 | TGO Inaudible | Dir: E 0.5 m/s Stab Class: F | Idling highway traffic 38-43 Highway traffic 38-57 Birds 38-49 |
| Unattended | 22:22 | 58 | 44 | 33 | 39 | TGO Inaudible | | Highway traffic |
| Wednesday 19 September 2018 | | | | | | | | |
| Attended | 21:24 | 62 | 46 | 38 | 39 | TGO Inaudible | Dir: S 0.5 m/s Stab Class: D | Highway traffic 42-61 Idling highway traffic 38-42 Crushing plant <36 |
| Unattended | 21:22 | 51 | 40 | 36 | 39 | TGO Inaudible | | Highway traffic |
| Attended | 22:22 | 68 | 50 | 37 | 39 | TGO Inaudible | Dir: S 0.1 m/s Stab Class: E | Highway traffic 36-51 Dog bark 39-66 Idling highway traffic 40-44 |
| Unattended | 22:22 | 53 | 41 | 36 | 39 | TGO Inaudible | | Highway traffic |
| Thursday 20 September 2018 | | | | | | | | |
| Attended | 21:22 | 58 | 46 | 39 | 39 | TGO Inaudible | Dir: S 0.1 m/s Stab Class: F | Highway traffic 38-56 Idling highway traffic 38-44 |
| Unattended | 21:22 | 48 | 39 | 32 | 39 | TGO Inaudible | | Highway traffic |
| Attended | 22:26 | 63 | 49 | 37 | 39 | TGO Inaudible | Dir: S 0.1 m/s Stab Class: F | Highway traffic 41-56 Idling highway traffic 41-44 Birds 41-57 Dog bark 42-48 |
| Unattended | 22:22 | 54 | 40 | 32 | 39 | TGO Inaudible | | Highway traffic |

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 18 September 2018 to Thursday 20 September 2018, identified that TGO mine noise was audible on several occasions although did not exceed relevant limits during the September 2018 assessment period.

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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**

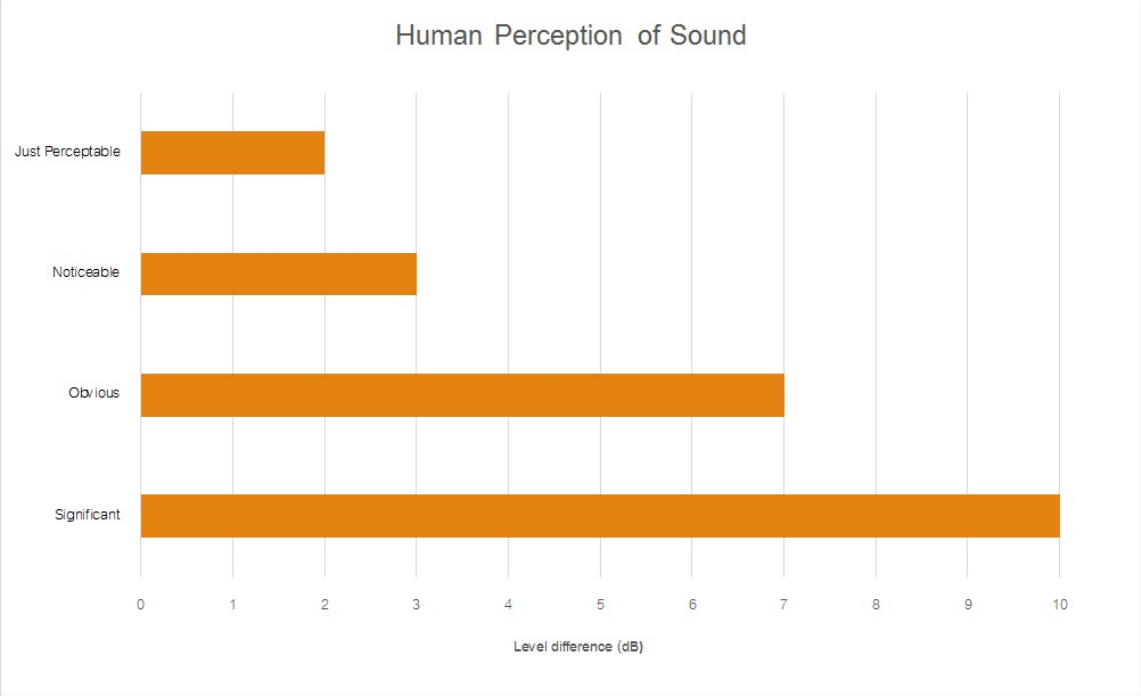
| Term | Description |
|---|---|
| 1/3 Octave | Single octave bands divided into three parts |
| Octave | A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit. |
| ABL | Assessment Background Level (ABL) is defined in the NPI as a 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 :<br>= 10.log10 (W/Wo)<br>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

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Muller Acoustic Consulting