

# Noise Monitoring Assessment

Dargues Gold Mine  
Majors Creek, NSW  
Quarter Ending, December 2023

Prepared for: Aurelia Metals Ltd  
December 2023  
MAC201092-01RP16



# Document Information

## Noise Monitoring Assessment

### Dargues Gold Mine

### Majors Creek, NSW

### Quarter Ending December 2023

**Prepared for:** Aurelia Metals Ltd

Dargues Gold Mine

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# 1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Aurelia Metals Ltd to complete a quarterly Noise Monitoring Assessment (NMA) for Dargues Gold Mine, Majors Creek, NSW (the mine).

The monitoring has been conducted in accordance with Condition L2 of the Environmental Protection Licence (EPL) #20095, and in accordance with the site's Noise Management Plan (NMP) 20170123, at five representative monitoring locations. This assessment has been undertaken during Quarter 4, 2023 on Tuesday 5 December 2023 and Wednesday 6 December 2023 and forms part of the noise monitoring program to address relevant conditions.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA), Environment Protection Licence EPL #20095 (EPL);
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Dargues Gold Mine Noise Management Plan (NMP) (Aurelia Metals Ltd); and
- Dargues Gold Mine Project Approval, 10\_0054.

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

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## 2 Noise Criteria

### 2.1 Operational Noise Criteria

Section L2 of the project's EPL (EPL #20095) outlines the applicable operational noise criteria for all privately owned residential receivers surrounding the mine. The criteria outlined in the EPL is reproduced below:

*L2.1 Noise from the premises must not exceed the sound pressure level (noise) limits presented in the Table below. Note that the limits apply to the operation of the project and represent the sound pressure level (noise) contribution, at the nominated receiver locations in the table.*

**Table 1** summaries the applicable noise criteria at the five monitoring locations in accordance with the sites EPL and NMP.

Table 1 Noise Monitoring Program				
Monitoring Location	Noise Criteria, dBA LAeq(15min)			Noise Criteria, dB LA1(1min)
	Day	Evening	Night	Night
	(7am to 6pm)	(6pm to 10pm)	(10pm to 7am)	(10pm to 7am)
At any residence	35	35	35	45
Majors Creek State Conservation Area (when in use by any person)	35	35	35	45

*L2.2 For the purpose of Noise Limit Conditions above:*

*'Day' is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays;*

*'Evening' is defined as the period from 6pm to 10pm on any day; and*

*'Night' is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays.*

*L2.3 The noise emission limits identified in the table above apply under meteorological conditions of:*

*a) Wind speeds up to 3 m/s at 10m above ground level; or*

*b) temperature inversion conditions of up to 3 °C/100m and wind speeds up to 2 m/s at 10m above ground level .*

*L2.4 For the purpose of the Condition L4.3:*

- a) The meteorological data to be used for determining meteorological conditions is the data recorded by the meteorological weather station established at the premises for the purposes of this Environment Protection Licence ("Point 59" as outlined in Weather Monitoring conditions below); and*
- b) Stability category temperature inversion conditions are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the New South Wales Industrial Noise Policy (EPA 2000).*

*L2.5 Determining Compliance*

*To determine compliance:*

- a) with the Leq(15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:*
  - i) approximately on the property boundary, where any dwelling is situated 30 meters or less from the property boundary closest to the premises; or*
  - ii) within 30 meters of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 meters from the property boundary closest to the premises; or, where applicable*
  - iii) within approximately 50 meters of the boundary of a National Park, Nature Reserve or State Conservation Area.*
- b) with the LA1(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 meter of a dwelling façade.*
- c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:*
  - i) at the most affected point at a location where there is no dwelling at the location; or*
  - ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.*

*L2.6 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.*

*L2.7A breach of this license will still occur where noise generated from the premises in excess of the appropriate limit is measured: i) at a location other than an area prescribed in part (a) and part (b) of Condition L4.5; and/or ii) at a point other than the most affected point at a location.*

***MAC Technical Note: For sleep disturbance, the LA1(1 minute) descriptor is meant to represent a maximum noise level measured under 'fast' time response. DEC will accept analysis based on either LA1(1 minute) or LA(max).***



## 2.2 Road Noise Criteria

Section 2.2.2 of the NSW Road Noise Policy specifies noise criteria for principal haulage routes applicable to off-site traffic from the mine and are reproduced in **Table 2**.

Table 2 Traffic Noise Impact Assessment Criteria dB(A)		
Road	Assessment Criteria - dBA	
	Day (7am to 10pm)	Night (10pm to 7am)
Majors Creek Road, Araluen Road, Captains	60dBA	55dBA
Flat Road, Coghill Street and Wallace Street	LAeq(15hour)	LAeq(9hour)

Note: The noise generated by the project is to be measured in accordance with the relevant procedures in the NSW Road Noise Policy.

Section 8.7 of the Noise Management Plan regarding the traffic noise monitoring is reproduced below:

*During the initial stages of the Project and annually thereafter, the Company would undertake a traffic noise monitoring program at 600 Majors Creek Road, the closest residence to Majors Creek Road, between the Project Site and the intersection with Araluen Road.*

The traffic noise monitoring assessment has been completed during Quarter 1, 2023 and therefore is not included in this assessment.

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### 3 Methodology

All attended noise surveys for this assessment were conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, “Acoustics - Description and Measurement of Environmental Noise” and the EPL.

The acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) 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  $\pm 0.5$  dBA.

#### 3.1 Operator Attended Noise Measurement Methodology

The locality surrounding the mine is primarily rural/residential. Operator attended noise monitoring was completed at five representative receivers outlined in the mine’s NMP and are presented in **Table 3**.

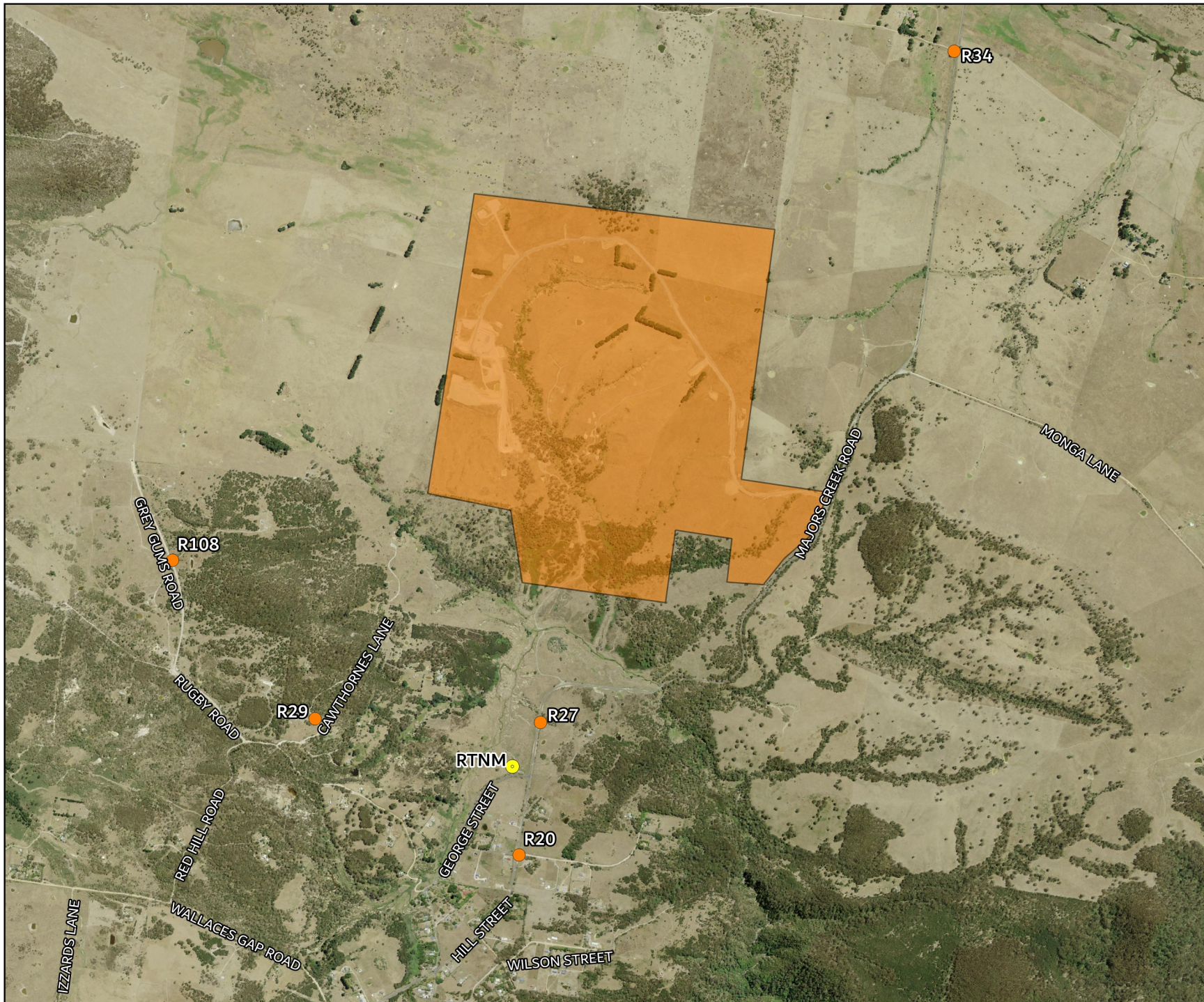
Monitoring Location	Resident Identifier	Coordinates (GDA94-MGA55)	
		Easting	Northing
NM1	R29	748148	6061931
NM2	R108	747454	6062651
NM3	R20	748672	6061250
NM5	R27	748998	6061467
NM6	R34	751242	6064950

Note 1: As per the Mine’s NMP.




The receiver locations and unattended real-time noise monitor location are presented in **Figure 1**.

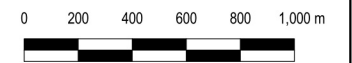
Attended measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 5 December 2023 and Wednesday 6 December 2023. Where possible throughout each survey the operator quantified the contribution of any significant noise sources.

FIGURE 1  
LOCALITY PLAN  
MAC201092-01  
Dargues Gold Mine



**KEY**

-  Project Boundary
-  Attended Monitoring Location
-  Real-Time Noise Monitoring Terminal



## 4 Results

### 4.1 Meteorological Conditions

Weather data for the noise assessment was sourced from DGMs on-site meteorological station as well as operator measured conditions on site of EPL nominated receiver locations. The data was used to determine prevailing meteorological conditions at the time of the attended measurements, which are presented in **Table 4**. It is noted that as per Condition L2.3 of the EPL, noise emission limits are applicable for the monitoring period.

**Table 4 Prevailing Meteorological Conditions**

Date & Time	DGM on-site Meteorological Station		Operator Measured Weather	
			Monitoring Location	
	Wind Direction	Wind (m/s)	Wind Direction	Wind (m/s)
05/12/2023 15:19	WNW	2.8	SW	2.0
05/12/2023 15:40	WNW	2.8	SW	2.5
05/12/2023 15:57	WNW	2.7	SW	2.0
05/12/2023 17:20	NW	1.6	SW	1.2
05/12/2023 17:38	NNW	1.0	N	1.8
05/12/2023 18:00	NNW	1.0	N	1.4
05/12/2023 18:32	NNE	1.1	N	0.2
05/12/2023 18:53	NW	1.0	N	0.4
05/12/2023 19:10	NW	1.0	N	0.1
05/12/2023 19:33	NW	1.0	N	0.2
06/12/2023 05:18	NW	0.8	E	0.1
06/12/2023 05:38	NW	0.4	E	0.1
06/12/2023 05:59	NNW	0.8	E	0.1
06/12/2023 06:17	N	0.9	E	0.1
06/12/2023 06:39	NNE	0.9	E	0.4

## 4.2 Assessment Results – Location R20

The results of the attended noise measurements at location R20 for the December 2023 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 R20								
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>				
05/12/2023 (Day)	15:57	77	57	39	35	WD: SW	Traffic 33-77	
						WS: 2.0m/s	Wind in vegetation 33-46	
						Stab Class: D	Local residential noise 33-42	
							Birds 34-50	
							DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<29
	Dargues Site L <sub>Amax</sub> Contribution	<29						
05/12/2023 (Evening)	18:53	79	55	37	35	WD: N	Traffic 35-79	
						WS: 0.4m/s	Birds 35-58	
						Stab Class: E	Local residential noise 35-44	
							DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<27
							Dargues Site L <sub>Amax</sub> Contribution	<27
06/12/2023 (Night)	05:59	78	54	35	35	WD: E	Traffic 29-78	
						WS: 0.1m/s	Birds 29-56	
						Stab Class: D	DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<25
							Dargues Site L <sub>Amax</sub> Contribution	<25

Note 1: Meteorology data obtained from DGM onsite weather station.

#### 4.3 Assessment Results – Location R27

The results of the attended noise measurements at location R27 for the December 2023 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 R27							
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>			
05/12/2023 (Day)	15:40	76	57	43	35	WD: SW	Birds <40
						WS: 2.5m/s	Wind in vegetation 40-50
						Stab Class: D	Traffic 40-76
							Local residential noise 40-44
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<33
Dargues Site L <sub>Amax</sub> Contribution							<33
05/12/2023 (Evening)	19:10	76	55	27	35	WD: N	Birds 25-56
						WS: 0.1m/s	Insects <26
						Stab Class: D	Traffic 25-76
							Livestock 25-36
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<20
Dargues Site L <sub>Amax</sub> Contribution							<20
06/12/2023 (Night)	06:17	73	51	27	35	WD: E	Traffic 24-73
						WS: 0.1m/s	Birds 24-54
						Stab Class: D	DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<20
Dargues Site L <sub>Amax</sub> Contribution							<20

Note 1: Meteorology data obtained from DGM onsite weather station.

#### 4.4 Assessment Results – Location R29

The results of the attended noise measurements at location R29 for the December 2023 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 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>				
05/12/2023 (Day)	17:20	63	43	34	35	WD: SW WS: 1.2m/s Stab Class: C	Birds 36-48	
							Operator 60-63	
							Wind in vegetation 32-42	
							Dog bark 32-44	
							Insects 32-38	
							DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<24
Dargues Site L <sub>Amax</sub> Contribution	<24							
05/12/2023 (Evening)	18:32	65	41	27	35	WD: N WS: 0.2m/s Stab Class: D	Insects <25	
							Birds 25-65	
							DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<20
							Dargues Site L <sub>Amax</sub> Contribution	<20
06/12/2023 (Night)	05:38	57	39	32	35	WD: E WS: 0.1m/s Stab Class: G	Birds 27-57	
							Insects 27-32	
							Traffic 27-30	
							DGM inaudible	
							Dargues Site L <sub>Aeq</sub> (15min) Contribution	<22
Dargues Site L <sub>Amax</sub> Contribution	<22							

Note 1: Meteorology data obtained from DGM onsite weather station.



#### 4.5 Assessment Results – Location R34

The results of the attended noise measurements at location R34 for the December 2023 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 R34							
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>			
05/12/2023 (Day)	15:19	77	56	43	35	WD: SW	Traffic 40-77
						WS: 2.0m/s	Birds 40-56
						Stab Class: D	Local residential noise 40-54
							Wind in vegetation 40-50
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<33
Dargues Site L <sub>Amax</sub> Contribution							<33
05/12/2023 (Evening)	19:33	81	56	31	35	WD: N	Traffic 28-81
						WS: 0.2m/s	Insects <28
						Stab Class: D	Birds 28-58
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<21
Dargues Site L <sub>Amax</sub> Contribution							<21
06/12/2023 (Night)	06:39	82	61	34	35	WD: E	Traffic 29-82
						WS: 0.4m/s	Birds 29-56
						Stab Class: D	DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<24
Dargues Site L <sub>Amax</sub> Contribution							<24

Note 1: Meteorology data obtained from DGM onsite weather station.

#### 4.6 Assessment Results – Location R108

The results of the attended noise measurements at location R108 for the December 2023 survey are summarised in **Table 9** with the relevant EPL limits, the calculated mining noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 9 Operator-Attended Noise Survey Results – Location R108							
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>			
05/12/2023 (Day)	17:38	55	35	27	35	WD: N WS: 1.8m/s Stab Class: D	Birds 26-55
							Wind in vegetation 26-36
							Insects <26
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<20
Dargues Site L <sub>Amax</sub> Contribution							<20
05/12/2023 (Evening)	18:00	65	45	27	35	WD: N WS: 1.4m/s Stab Class: D	Insects 24-30
							Birds 24-42
							Operator 38-65
							Aircraft 34-64
Livestock 32-36							
DGM inaudible							
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<20
Dargues Site L <sub>Amax</sub> Contribution							<20
06/12/2023 (Night)	05:18	86	56	28	35	WD: E WS: 0.1m/s Stab Class: E	Birds 24-58
							Insects <24
							Traffic 28-86
							DGM inaudible
Dargues Site L <sub>Aeq</sub> (15min) Contribution							<20
Dargues Site L <sub>Amax</sub> Contribution							<20

Note 1: Meteorology data obtained from DGM onsite weather station.

## 5 Discussion

### 5.1 Discussion of Results – Location R20

Operator attended measurement results at R20, on Tuesday 5 December 2023 and Wednesday 6 December 2023 identified that DGM emissions remained inaudible during the measurement period, therefore remained below relevant criteria. Generally, traffic, wind in vegetation, local residential noise and birds were audible throughout all three monitoring periods.

In summary, the noise contribution from the mine satisfied the relevant noise criteria for the attended measurements on Tuesday 5 December 2023 and Wednesday 6 December 2023.

### 5.2 Discussion of Results – Location R27

Operator attended measurement results at R27, on Tuesday 5 December 2023 and Wednesday 6 December 2023 identified that DGM emissions remained inaudible during the measurement period, therefore remained below relevant criteria. Generally, birds, wind in vegetation, traffic, local residential noise, insects and livestock were audible throughout all three monitoring periods.

In summary, the noise contribution from the mine satisfied the relevant noise criteria for the attended measurements on Tuesday 5 December 2023 and Wednesday 6 December 2023.

### 5.3 Discussion of Results – Location R29

Operator attended measurement results at R29, on Tuesday 5 December 2023 and Wednesday 6 December 2023 identified that DGM emissions remained inaudible during the measurement period, therefore remained below relevant criteria. Generally, birds, operator noise, wind in vegetation, dog bark, insects and traffic were audible throughout all three monitoring periods.

In summary, the noise contribution from the mine satisfied the relevant noise criteria for the attended measurements on Tuesday 5 December 2023 and Wednesday 6 December 2023.

#### 5.4 Discussion of Results – Location R34

Operator attended measurement results at R34, on Tuesday 5 December 2023 and Wednesday 6 December 2023 identified that DGM activities remained inaudible during the assessment periods and therefore remained below relevant criteria. Generally, traffic, birds, local residential noise, wind in vegetation and insects were audible sources throughout all three monitoring periods.

In summary, the noise contribution from the mine satisfied the relevant noise criteria for the attended measurements on Tuesday 5 December 2023 and Wednesday 6 December 2023.

#### 5.5 Discussion of Results – Location R108

Operator attended measurement results at R108, on Tuesday 5 December 2023 and Wednesday 6 December 2023 identified that DGM activities remained inaudible during the assessment periods and therefore remained below relevant criteria. Generally, birds, wind in vegetation, insects, operator noise, aircraft, livestock and traffic were audible sources throughout all three monitoring periods.

In summary, the noise contribution from the mine satisfied the relevant noise criteria for the attended measurements on Tuesday 5 December 2023 and Wednesday 6 December 2023.

## 6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Aurelia Metals Ltd at Dargues Gold Mine, Majors Creek, NSW. The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to mine operations during Quarter 4, 2023.

Attended monitoring on Tuesday 5 December 2023 and Wednesday 6 December 2023 has identified that operational noise emissions generated by the mine satisfy relevant  $L_{Aeq(15min)}$  and  $L_{Amax}$  noise limits at all assessed receivers.

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# Appendix A – Glossary of Terms

Table A1 provides a number of technical terms have been used in this report.

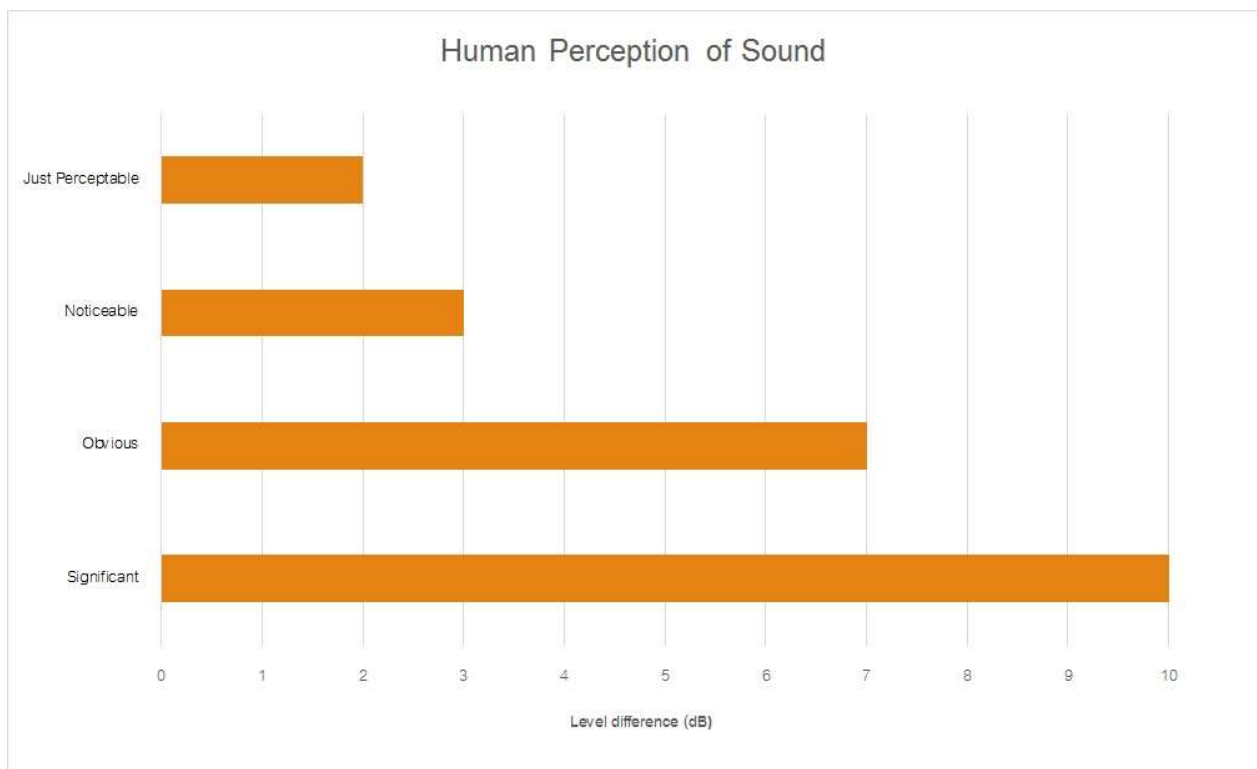
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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 (LW)	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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