Noise Monitoring Assessment

Hera Gold Mine
Nymagee, NSW
May 2024

Prepared for: Aurelia Metals Limited
June 2024
MAC190976-01RP6

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Hera Gold Mine and Federation Project

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Prepared for: Aurelia Metals Limited

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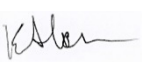
MAC190976-01RP6	5 June 2024	Kristian Allen		Oliver Muller	

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CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Aurelia Metals Ltd (AM) to complete a Noise Monitoring Assessment (NMA) for Hera Gold Mine (HGM) and Federation Project (FED), Nymagee, NSW.

The NMA included quantifying the noise contribution of the HGM by direct attended measurements to determine mining noise emissions.

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

- Department of Planning and Environment (DPE), Project Approval 10_0191 (PA), modified on September 2016;
- Aurelia Metals Limited, Noise Management Plan (NMP), May 2023;
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA's), Approved methods for the measurement and analysis of environmental noise in NSW, 2022;
- NSW Environment Protection Authority (EPA), Environment Protection Licence EPL #20179 (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 Noise Criteria

2.1 Operational Noise Criteria

The Hera Gold Mine (HGM) and Federation Project (FED) are located at Nymagee, NSW approximately 6km south of the town centre. Receivers in the locality surrounding the HGM and FED are primarily rural residential. Five residential receivers included in this assessment are located on Burthong Road and on Balowra Road.

2.2 Noise Monitoring Locations

Monitoring locations that are representative of all assessment locations were selected in accordance with the EPL and Project Approval and are representative of the nearest noise sensitive receivers to the HGM and FED. Five monitoring locations have been selected as part of the NMA and are presented in **Table 1**.

Table 1 Noise Monitoring Locations

Monitoring Location	Receivers	Address	MGA 55 Coordinates	
			Easting, m	Northing, m
NM1	R1, R2	688 Burthong Road, Nymagee	434382	6444403
NM2	R3	224 Burthong Road, Nymagee	434809	6448336
NM3	R4	39 Burthong Road, Nymagee	435200	6450737
NM4	R18	2781 Balowra Road, Nymagee	442772	6427557
NM5	R19	2120 Burthong Road, Nymagee	433736	6430509

The relevant noise criteria for each noise catchment outlined in the EPL is presented in **Table 2**. **Figure 1** presents a visual representation of the assessed receivers.

Table 2 Noise Criteria, dBA

Receivers	Day[1,2]	Evening[1,2]	Night[1,2]	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
R1, R2, R3, R4, R18, R19 Nymagee, NSW	35	35	35	45

Note 1: Noise criteria in accordance with L4.1 of the EPL and the Project Approval.

Note 2: Day - the period from 7am to 6pm Monday to Friday; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Conditions L4.2 to L4.8 of the EPL set out the conditions under which the noise limits apply and are reproduced below.

L4.2 For the purpose of condition L4.1:

- *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 6pm to 10pm;*
- *Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays;*
- *LAeq (15 minute) is defined as the continuous 'A' weighted sound pressure level-the energy average of the noise measured over a 15 minute period; and*
- *LA1 (1 minute) is defined as the sound pressure level exceeded for one percent of a 1-minute measurement period.*

L4.3 The noise limits set out in condition L4.1 apply under all meteorological conditions except for the following:

- *wind speeds greater than 3m/second at 10 metres above ground level; and*
- *stability category G temperature inversion conditions and wind speeds greater than 2m/second at 10 metres above ground level.*

L4.4 For the purposes of condition L4.3:

- *the meteorological data to be used for determining meteorological conditions is the data recorded by the on-site meteorological weather station at the Hera project site at Nymagee; and*
- *temperature inversion will be assessed by use of the sigma-theta process as outlined in Appendix E4 of the NSW Industrial Noise Policy (INP).*

L4.5 For the purpose of determining the noise generated at the premises Class 1 or 2 noise monitoring equipment as defined by AS IEC61672.1-2004 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing, must be used.

L4.6 To determine compliance:

a) With the $LA_{eq(15min)}$ noise limits in condition L4.1, the noise measurement equipment must be located:

- *within 30 metres of a dwelling façade, but not closer than 3 metres, where any dwelling on the property is situated more than 30 metres from the property boundary that is closest to the premises;*
- *approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; and*
- *within approximately 50 metres of the boundary of a National Park or a Nature Reserve.*

b) With the $LA_{1(1\ minute)}$ noise limits in condition L4.1; the noise monitoring equipment must be located within 1 metre of a dwelling façade.

c) The noise monitoring equipment must be located in a position that is:

- *at the most affected point at a location where there is no dwelling at the location; or*
- *at the most affected point within an area at a location prescribed by conditions L4.6(a) or L4.6(b).*

L4.7 A breach of this Environmental Protection License will still occur where noise generated from the premises in excess of the appropriate limit specified in the condition L4.1 is detected:

- *at a location other than an area prescribed by conditions L4.6(a) and L4.6(b); and/or*
- *at a point other than the most affected point at a location.*

L4.8 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy (INP) must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

2.3 Low Frequency Noise Criteria

Section L4.8 of the EPL states that modifying factor adjustments outlined in Fact Sheet C of the NPI requires an assessment of low frequency (LF) noise generated by HGM and FED to be quantified. The LF requirement is reproduced below along with one third octave $LZ_{eq(15min)}$ thresholds presented in **Table 3**.

Measure/assess C and A weighted Leq,T levels over the same time period. Where the C minus A level is 15dB or more and:

- *where any of the 1/3 octave noise levels in Table 4-1 are exceeded by up to 5dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period; and*
- *where any of the 1/3 octave noise levels in Table 4-1 are exceeded by more than 5dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period and a 2dB positive adjustment applies for the daytime period.*

Table 3 One-third octave low frequency noise thresholds

Hz/dB(Z)	*One-third octave LZeq 15minute threshold level*												
Frequency (Hz)	*10*	*12.5*	*16*	*20*	*25*	*31.5*	*40*	*50*	*63*	*80*	*100*	*125*	*160*
dB(Z)	*92*	*89*	*86*	*77*	*69*	*61*	*54*	*50*	*50*	*48*	*48*	*46*	*44*

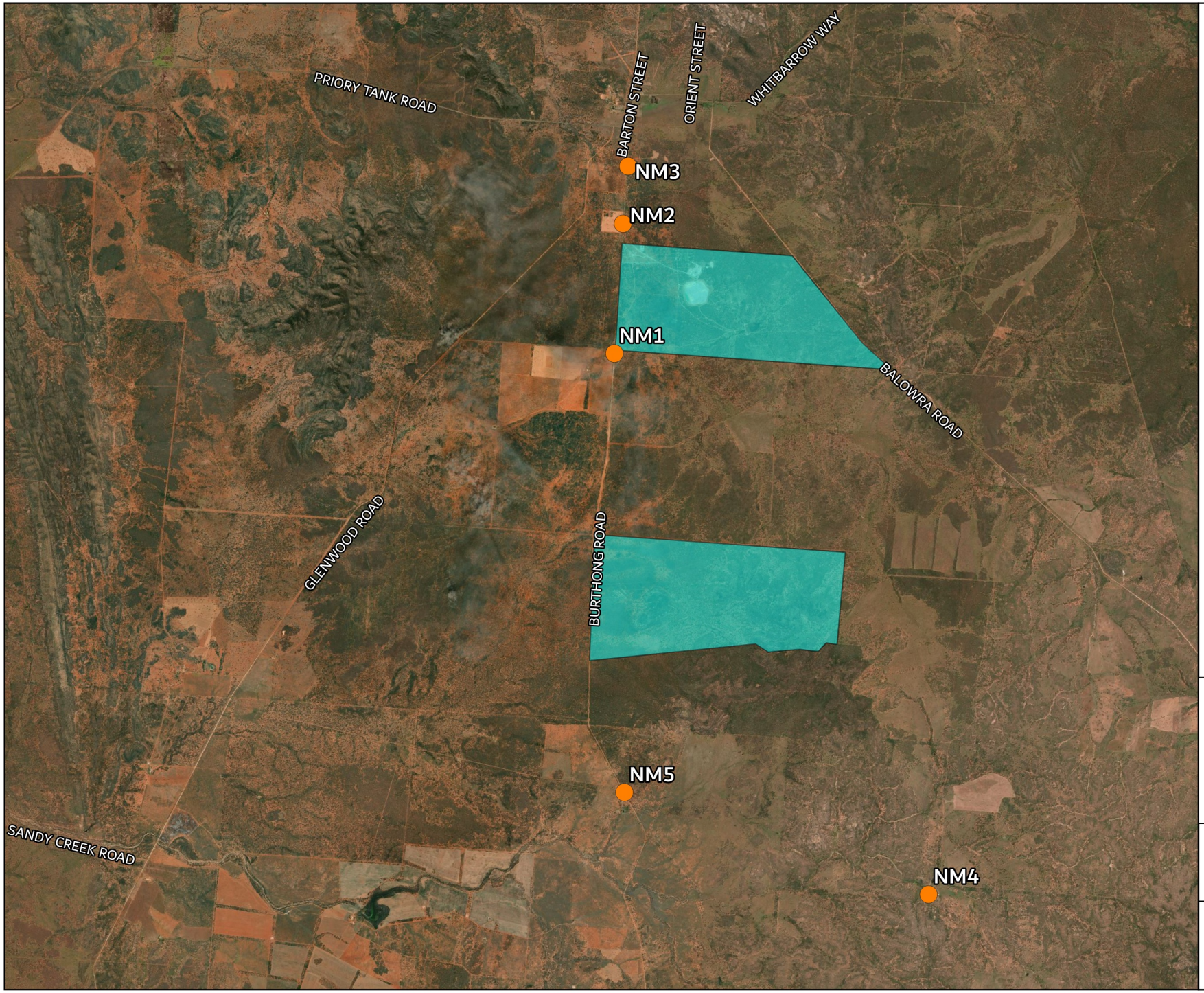

FIGURE 1

Locality Plan

MAC190976-01

Hera Gold Mine

and Federation Project

KEY

Receiver Locations

Site Boundary

0 1 2 3 4 5 6 km

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3 Methodology

Noise monitoring consisted of operator attended monitoring during the daytime, evening and night-time periods.

3.1 Attended Noise Monitoring

Operator attended noise monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018. All measurements were carried out using a Svantek Type 1, 977 noise analyser. All 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 ±0.5dBA.

Attended noise monitoring included one 15-minute measurement during daytime, evening and night-time periods. Where possible, throughout each measurement the operator quantified the contribution of each significant noise source.

Extraneous sources were excluded from the analysis to determine the $LA_{eq(15min)}$ HGM and FED noise contribution for comparison against the relevant criteria.

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4 Results

4.1 Meteorological Conditions

As prescribed in Condition L4.4 of the EPL (EPL #20179) weather data for the noise assessment period was sourced from onsite weather station to determine prevailing meteorological conditions at the time of the attended measurements. Results are presented in **Table 4** to **Table 6**. The data shows that wind speeds at 10m above ground level were compliant at levels where the EPL criteria are applicable. Additionally, the observed wind speeds at ground level were less than 3m/s during all measurements, meeting the requirements of AS1055.

Table 4 Prevailing Meteorological Conditions – Day Period

Date	Time	Onsite Weather Station (10mAGL)		
		Wind Direction	Wind (m/s)	Stability Class
15/05/2024	08:00	SSW	0.3	B
15/05/2024	08:10	SSW	0.3	B
15/05/2024	08:20	SW	0.3	B
15/05/2024	08:30	SSW	0.3	A
15/05/2024	08:40	S	0.3	A
15/05/2024	08:50	S	0.6	B
15/05/2024	09:00	S	0.5	B
15/05/2024	09:10	SSE	0.7	A
15/05/2024	09:20	SE	1.1	B
15/05/2024	09:30	SE	0.9	A
15/05/2024	09:40	SE	0.6	A
15/05/2024	09:50	W	0.6	A
15/05/2024	10:00	NE	1.5	B
15/05/2024	10:10	NE	1.2	B
15/05/2024	10:20	ESE	1.0	A
15/05/2024	10:30	ESE	1.2	A
15/05/2024	10:40	NE	1.1	A
15/05/2024	10:50	NE	1.5	B
15/05/2024	11:00	SSW	1.3	A
15/05/2024	11:10	SW	1.3	A
15/05/2024	11:20	WNW	1.7	A
15/05/2024	11:30	NNW	2.1	B
15/05/2024	11:40	NNW	1.7	A
15/05/2024	11:50	W	1.3	A

Note: Day - the period from 7am to 6pm Monday to Saturday, 8am to 6pm Sundays and public holidays.

Table 5 Prevailing Meteorological Conditions - Evening Period				
Date	Time	Onsite Weather Station (10mAGL)		
		Wind Direction	Wind (m/s)	Stability Class
14/05/2024	18:00	ESE	0.1	D
14/05/2024	18:10	SE	0.0	F
14/05/2024	18:20	SW	0.2	F
14/05/2024	18:30	SW	0.0	D
14/05/2024	18:40	SSW	0.3	E
14/05/2024	18:50	SSE	0.4	E
14/05/2024	19:00	SE	0.4	D
14/05/2024	19:10	SE	0.2	F
14/05/2024	19:20	SE	0.0	F
14/05/2024	19:30	SSE	0.3	D
14/05/2024	19:40	SSE	0.5	D
14/05/2024	19:50	SSE	0.2	E
14/05/2024	20:00	SSE	0.2	D
14/05/2024	20:10	S	0.3	F
14/05/2024	20:20	SSW	0.3	E
14/05/2024	20:30	SSW	0.4	E
14/05/2024	20:40	WSW	0.4	F
14/05/2024	20:50	W	0.2	F
14/05/2024	21:00	SSW	0.1	F
14/05/2024	21:10	SSW	0.4	D
14/05/2024	21:20	SE	0.2	F
14/05/2024	21:30	SE	0.0	F
14/05/2024	21:40	E	0.0	F
14/05/2024	21:50	SSW	0.2	F

Note: Evening - the period from 6pm to 10pm Monday to Sunday.

Table 6 Prevailing Meteorological Conditions - Night Period				
Date	Time	Onsite Weather Station (10mAGL)		
		Wind Direction	Wind (m/s)	Stability Class
14/05/2024	22:00	W	0.1	F
14/05/2024	22:10	NNW	0.5	D
14/05/2024	22:20	S	0.3	E
14/05/2024	22:30	NE	0.3	F
14/05/2024	22:40	ENE	0.2	E
14/05/2024	22:50	ESE	0.3	F
14/05/2024	23:00	NNE	0.1	D
14/05/2024	23:10	ESE	0.0	F
14/05/2024	23:20	WSW	0.3	F
14/05/2024	23:30	SSW	0.4	F
14/05/2024	23:40	SSW	0.1	F
14/05/2024	23:50	S	0.1	F
15/05/2024	00:00	SE	0.4	D
15/05/2024	00:10	S	0.6	D
15/05/2024	00:20	SSW	0.7	D
15/05/2024	00:30	SSW	0.4	E
15/05/2024	00:40	SSW	0.2	D
15/05/2024	00:50	WSW	0.2	F
15/05/2024	01:00	WNW	0.0	F
15/05/2024	01:10	WNW	0.0	F
15/05/2024	01:20	S	0.0	E
15/05/2024	01:30	SE	0.0	F
15/05/2024	01:40	SE	0.0	F
15/05/2024	01:50	SE	0.0	F

Note: Night - the period from 10pm to 7am Monday to Saturday, 10pm to 8am Sundays and public holidays.

4.2 Attended Noise Monitoring Results

The results of the attended noise monitoring completed on Tuesday 14 May 2024 and Wednesday 15 May 2024 (by field officer: Daniel Brown, B.Env.Sc.) are presented in the following sections.

4.2.1 Attended Assessment Results - Location NM1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location NM1 for the NMA are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location NM1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{A1}	L_{Aeq}	L_{A90}		
15/05/2024	09:45 (Day)	83	71	58	19	WD: S WS: 0.2m/s Rain: Nil	Birds 23-51 Traffic 20-83 Insects 18-28 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	20:23 (Evening)	56	25	21	<15	WD: SE WS: 0.2m/s Rain: Nil	Insects 10-24 Birds 18-46 MAC Operator 56 Traffic 20-24 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	22:53 (Night)	57	29	24	<15	WD: SE WS: 0.3m/s Rain: Nil	Insects 14-17 Bats 23-44 MAC Operator 57 Aircraft 20-30 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
HGM and FED $L_{A(1min)}$ Contribution							<40

Note: Day - the period from 7am to 6pm Monday to Friday; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: At operator position as per AS1055.

4.2.2 Attended Assessment Results - Location NM2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location NM2 for the NMA are presented in **Table 8**.

Table 8 Operator-Attended Noise Survey Results – Location NM2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology[1]	Description and SPL, dBA
		L_{Amax}	L_{A1}	L_{Aeq}	L_{A90}		
15/05/2024	9:02 (Day)	84	66	57	18	WD: E WS: 0.2m/s Rain: Nil	Birds 15-58 Traffic 33-84 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	19:17 (Evening)	79	72	57	24	WD: SE WS: 0.5m/s Rain: Nil	Residential Generator 24-28 Traffic 27-79 Site Inaudible
HGM $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	22:12 (Night)	45	34	27	25	WD: SE WS: 0.2m/s Rain: Nil	Residential Generator 25-28 Wildlife 29-45 Aircraft 30-35 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
HGM and FED $L_{A(1min)}$ Contribution							<40

Note: Day - the period from 7am to 6pm Monday to Friday; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: At operator position as per AS1055.

4.2.3 Attended Assessment Results - Location NM3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location NM3 for the NMA are presented in **Table 9**.

Table 9 Operator-Attended Noise Survey Results – Location NM3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology[1]	Description and SPL, Dba
		L_{Amax}	L_{A1}	L_{Aeq}	L_{A90}		
15/05/2024	09:22 (Day)	74	52	47	<15	WD: S WS: 0.1m/s Rain: Nil	Birds 23-43 Traffic 20-74 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	20:01 (Evening)	79	62	53	15	WD: SE WS: 0.3m/s Rain: Nil	Insects 11-24 Traffic 22-79 Dogs Barking 21-41 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	22:32 (Night)	55	24	21	<15	WD: SE WS: 0.1m/s Rain: Nil	Wildlife 20-46 MAC Operator 55 Insects 13-18 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
HGM and FED $L_{A(1min)}$ Contribution							<40

Note: Day - the period from 7am to 6pm Monday to Friday; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: At operator position as per AS1055.

4.2.4 Attended Assessment Results - Location NM5

The monitored noise level contributions and observed meteorological conditions for each assessment period at location NM5 for the NMA are presented in **Table 10**.

Table 10 Operator-Attended Noise Survey Results – Location NM5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology[1]	Description and SPL, Dba
		L_{Amax}	L_{A1}	L_{Aeq}	L_{A90}		
15/05/2024	10:09 (Day)	57	36	26	15	WD: S WS: 0.1m/s Rain: Nil	Birds 18-43 MAC Operator 57 Aircraft 21-30 Insects 16-20 Site Inaudible
HGM $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	20:50 (Evening)	60	28	25	<15	WD: SE WS: 0.2m/s Rain: Nil	Insects 10-18 MAC Operator 60 Wildlife 23-40 Site Inaudible
HGM $L_{Aeq(15min)}$ Contribution							<25
14/05/2024	23:17 (Night)	55	34	27	<15	WD: W WS: 0.1m/s Rain: Nil	Wildlife 20-54 MAC Operator 55 Dogs Barking 14-23 Site Inaudible
HGM and FED $L_{Aeq(15min)}$ Contribution							<25
HGM and FED $L_{A(1min)}$ Contribution							<40

Note: Day - the period from 7am to 6pm Monday to Friday; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: At operator position as per AS1055.

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5 Low Frequency Noise Assessment

The low-frequency assessment for each monitoring location and assessment period is summarised in **Table 11** to **Table 13** presenting the A weighted noise level, C-weighted noise level and their difference (C–A). Where the difference between the ambient A-weighted and C-weighted noise level (C–A) is greater than 15dB (indicated by a tick ✓) indicates that further analysis is required to determine the quarry specific low-frequency noise contribution to determine if an adjustment/penalty is applicable.

Table 11 Daytime Low Frequency Compliance Assessment

Receiver No.	dB $LC_{eq(15min)}$	dB $LA_{eq(15min)}$	Difference	Mitigation Trigger
NM1	67	58	9	×
NM2	63	57	6	×
NM3	53	47	6	×
NM5	37	26	11	×

Note: Day - the period from 7am to 6pm Monday to Saturday, 8am to 6pm Sundays and public holidays.

Table 12 Evening Low Frequency Compliance Assessment

Receiver No.	dB $LC_{eq(15min)}$	dB $LA_{eq(15min)}$	Difference	Mitigation Trigger
NM1	37	22	15	×
NM2	61	57	4	×
NM3	63	53	10	×
NM5	32	25	7	×

Note: Evening - the period from 6pm to 10pm Monday to Sunday.

Table 13 Night Low Frequency Compliance Assessment

Receiver No.	dB $LC_{eq(15min)}$	dB $LA_{eq(15min)}$	Difference	Mitigation Trigger
NM1	38	24	14	×
NM2	42	27	15	×
NM3	35	21	14	×
NM5	29	27	2	×

Note: Night - the period from 10pm to 7am Monday to Saturday, 10pm to 8am Sundays and public holidays.

During the measuring period the C minus A level remained at or below 15 dB at all locations and therefore indicates no further analysis is required to determine mine specific low frequency noise contribution.

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6 Discussion of Results

6.1 Discussion of Results - Location NM1

HGM and FED noise emissions were inaudible during all measurements conducted on Tuesday 14 May 2024 and Wednesday 15 May 2024, HGM and FED noise emissions remained below the relevant noise limit of 35dB $LA_{eq(15min)}$ at NM1.

Extraneous noise sources included birds, wildlife, traffic, insects and passing aircraft.

6.2 Discussion of Results - Location NM2

HGM and FED noise emissions were inaudible during all measurements conducted on Tuesday 14 May 2024 and Wednesday 15 May 2024, HGM and FED noise emissions remained below the relevant noise limit of 35dB $LA_{eq(15min)}$ at NM2.

Extraneous noise sources included birds, wildlife, traffic and residential generator.

6.3 Discussion of Results - Location NM3

HGM and FED noise emissions were inaudible during all measurements conducted on Tuesday 14 May 2024 and Wednesday 15 May 2024, HGM and FED noise emissions remained below the relevant noise limit of 35dB $LA_{eq(15min)}$ at NM3.

Extraneous noise sources included birds, traffic, wildlife, insects, and MAC operator noise.

6.4 Discussion of Results – Location NM4

Due to persistent heavy rainfall events and limited access, location NM4 was inaccessible and unable to be assessed.

6.5 Discussion of Results - Location NM5

HGM and FED noise emissions were inaudible during all measurements conducted on Tuesday 14 May 2024 and Wednesday 15 May 2024, HGM and FED noise emissions remained below the relevant noise limit of 35dB $LA_{eq(15min)}$ at NM5.

HGM and FED noise sources generator noise. Extraneous noise sources included birds, passing aircraft, wildlife, dogs barking, insects, and MAC operator noise.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Aurelia Metals Limited for the Hera Gold Mine (HGM) and Federation Project (FED), at Nymagee, NSW. The assessment was completed to assess compliance with the relevant noise criteria for EPL #20179.

Attended noise monitoring was completed on Tuesday 14 May 2024 and Wednesday 15 May 2024 at four representative monitoring locations. The assessment has identified that noise emissions generated by HGM and FED were inaudible at all receiver locations. The noise emissions from HGM and FED remained below relevant noise limits.

An assessment of low frequency noise was also completed and identified compliance with the relevant criteria.

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Appendix A - Glossary of Terms

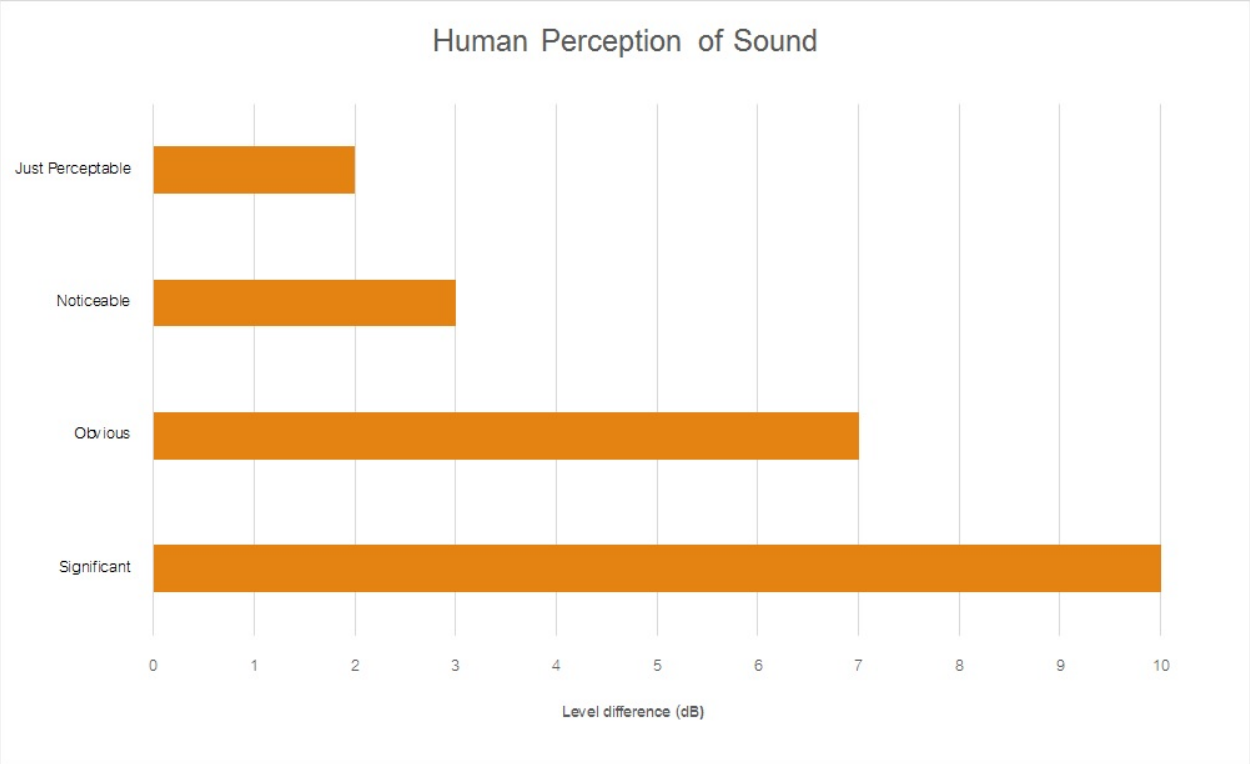
Table A1 provides a number of technical terms have been used in this report.

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.
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 (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.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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