MALABAR

# MAXWELL UNDERGROUND MINE PROJECT

## APPENDIX G

### Noise Review

June 28, 2022

Donna McLaughlin
Health, Safety, Environment and Community Manager
Malabar Resources Limited

Dear Donna

**Re: Maxwell Underground Mine Project Modification 2 – Noise Assessment**

# Introduction

The Maxwell Underground Mine Project (the Project) is an underground coal mining operation owned by Maxwell Ventures (Management) Pty Ltd, a wholly owned subsidiary of Malabar Resources Limited (Malabar). The Project is located in the Upper Hunter Valley of New South Wales (NSW), with the Mine Entry Area (MEA) located approximately 15 kilometres (km) south-southwest of Muswellbrook.

Development Consent SSD 9526 was granted for the Project by the Independent Planning Commission (IPC) on 22 December 2020. Approval was granted under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on 10 March 2021 (EPBC 2018/8287). Malabar previously sought to modify Development Consent SSD 9526 under section 4.55(1A) of the Environmental Planning and Assessment Act 1979 (EP&A Act) for a minor extension to the MEA (Modification 1). Modification 1 was approved on 19 November 2021, and EPBC 2018/8287 was varied on 14 December 2021.

A proposed Modification is sought under section 4.55(2) of the EP&A Act (the Modification). The Modification is located wholly within the approved Development Application Area and would comprise the following:

- re-orientation of the longwall panels in the Woodlands Hill, Arrowfield and Bowfield Seams resulting in minor increase in the approved underground mining extent;
- reduction in width of some of the longwall panels in the Woodlands Hill Seam, which facilitates earlier commencement of longwall mining;
- repositioning of the upcast ventilation shaft site and associated infrastructure;
- other minor works and ancillary infrastructure components (e.g. access road and ancillary water management infrastructure for the repositioned ventilation shaft site).

The Modification does not change the total resource extraction and maximum annual production but would result in some minor changes to the timing of run-of-mine (ROM) coal extraction from the Maxwell Underground. No change to any coal handling and processing infrastructure is proposed as part of the Modification.

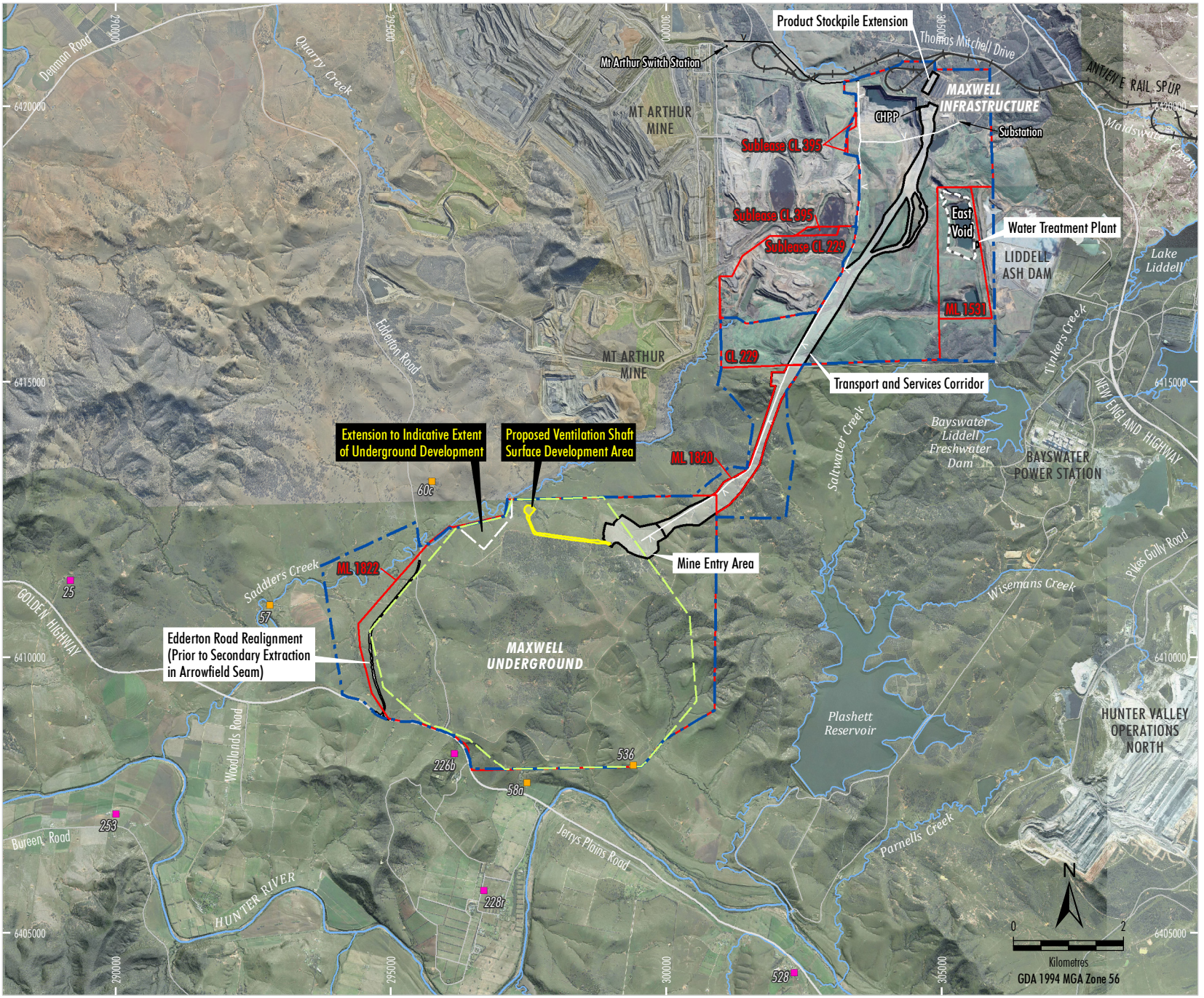
The Modification general arrangement is shown on **Figure 1**.

Wilkinson Murray (2019) completed the Noise Impact Assessment for the Project Environmental Impact Statement (EIS) and has since been acquired by RWDI Australia (RWDI). RWDI was commissioned by Malabar to conduct a noise assessment for the alternate ventilation shaft site in support of the Modification application. The assessment addresses operational and construction noise.

The noise assessment considers changes in noise levels, if any, as a result of the modification in comparison to the EIS (Wilkinson Murray Report 18226, dated June 2019) and assess predicted noise levels against the relevant Development Consent noise criteria.

This assessment is based on the following NSW noise policies and guidelines:

- NSW *Noise Policy for Industry (NPfI)* (NSW Environment Protection Authority [EPA], 2017).
- *Voluntary Land Acquisition and Mitigation Policy (VLAMP)* (NSW Government, 2014).
- The *Interim Construction Noise Guideline (ICNG)* (Department of Environment and Climate Change, 2009).




LEGEND

- Mining and Coal Lease Boundary
- Proposed Ausgrid 66 kV Power Supply Extension #

Approved Maxwell Underground Mine

- Development Application Area
- Indicative Extent of Underground Development
- Indicative Surface Development Area
- CHPP Reject Emplacement Area
- 66 kV Power Supply

Proposed Modification

- Modified Indicative Extent of Underground Development
- Indicative Modification Surface Development Area

Representative Receivers Used in Noise Assessment

- Mine-owned Dwelling
- Privately-owned Dwelling

# Subject to separate assessment and approval.

*Source: NSW Spatial Services (2022); MSEC (2021, 2019)*
*Orthophoto Mosaic: 2020, 2019*

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MAXWELL UNDERGROUND MINE PROJECT

**Modification General Arrangement**

**Figure 1**

## Noise Sensitive Receivers

Receivers in the vicinity of the Project have been grouped into two groups of receivers, namely the northern receivers (north of the Maxwell Infrastructure Area) and the southern receivers (south of the MEA and Maxwell Underground).

The proposed ventilation shaft is located in the southern portion of the site. Given the distance to the northern receivers, any changes in noise levels are expected to be negligible. As such, the assessment has focused on the southern receivers located near the Golden Highway and Hunter River, with a focus on the five key representative receivers. Compliance at those five key receivers would infer compliance at all the southern receivers identified in the EIS. **Table 1** summarises these five key receivers and **Figure 1** presents their location with respect to the repositioned ventilation shaft.

**Table 1: Description of Receivers Included in Assessment**

| Receiver Label | Ownership | UTM Coordinates | |
|---|---|---|---|
| | | X | Y |
| **Privately-owned dwellings** | | | |
| **25** | PM, BR & DE Wolfgang | 289188 | 6411398 |
| **226b** | Calogo Bloodstock AG (T/A Coolmore Australia) | 296159 | 6408251 |
| **228r** | Calogo Bloodstock AG (T/A Coolmore Australia) | 296688 | 6405768 |
| **253** | NE Ray | 290014 | 6407156 |
| **528** | Tomag Holdings Pty Ltd | 302325 | 6404276 |
| **Mine-owned dwellings** | | | |
| **57** | Maxwell Ventures (Management) Pty Ltd | 292808 | 6410941 |
| **58a** | Maxwell Ventures (Management) Pty Ltd | 297477 | 6407717 |
| **60c** | Hunter Valley Energy Coal Pty Ltd (BHP) | 295752 | 6413191 |
| **536** | Maxwell Ventures (Management) Pty Ltd | 299404 | 6408034 |

# Development Consent Noise Criteria

Table 1 of the Development Consent (SSD 9526) provides noise criteria for the approved Project. The relevant noise criteria for the representative receivers are presented below in **Table 2**.

**Table 2: Development Consent Noise Criteria**

| Receiver | Day $L_{Aeq,15min}$ | Evening $L_{Aeq,15min}$ | Night $L_{Aeq,15min}$ | Night $L_{Amax}$ |
|---|---|---|---|---|
| **Privately-owned**<br>25, 226b, 228r, 253, 528 | 40 | 35 | 35 | 52 |
| **Mine-owned**<br>57, 58a, 60c, 536 | - | - | - | - |

# Noise Modelling Methodology

The noise modelling methodology adopted for the assessment is consistent with what was applied in the EIS assessment. Operational and construction noise levels at nearby receivers have been predicted using the Environmental Noise Model (ENM) (a proprietary computer program from RTA Technology Pty Ltd). This modelling software is compatible with the *NPfI* and has been previously accepted by the EPA and the DP&E for use in environmental noise assessments. The assessment models the total noise at each receiver including the operation of the approved Project.

Consistent with the EIS noise assessment, construction activities have been included in the assessed operational noise scenarios. As perceived by receivers in the vicinity of the Project, noise associated with construction activities would largely be indistinguishable from operational activities given similar plant would be deployed and construction activities would occur in areas adjacent to operational activities.

In addition to consideration in the operational noise scenarios, noise contributions from construction works have also been assessed against the *ICNG*.

## Meteorological Environment for Noise Assessment Purposes

Analysis of the local meteorological environment was completed in the EIS noise assessment for northern and southern receivers, separately. Analysis was completed in accordance with the *NPfI*. Consistent with the EIS, **Table 3** presents the meteorological conditions specific to the southern receivers.

**Table 3: Relevant *NPfI* Meteorological Conditions**

| Assessment Period | NPfI Meteorological Condition | Description of Meteorological Parameters |
|---|---|---|
| **Daytime** | Standard meteorological conditions | 0.5 m/s wind in source-to-receiver direction; stability categories A-D |
| **Evening** | Standard meteorological conditions | 0.5 m/s wind in source-to-receiver direction; stability categories A-D |
| **Night** | Noise-enhancing meteorological conditions | Stability category F; no wind component |
| | Standard meteorological conditions | 0.5 m/s wind in source-to-receiver direction; stability categories A-D |

For each assessment period, only the highest noise predictions under the relevant *NPfI* meteorological conditions presented in **Table 3** (including both standard and noise-enhancing meteorological conditions as described in Fact Sheet D) are reported.

## Operational Noise Assessment Scenarios

Noise modelling was undertaken for the day, evening, and night operating scenarios for three assessment years, consistent with the EIS. They can be described as follows:

- **Project Year 1**, noise from the construction of the alternate ventilation shaft (including construction of the access road) in combination with operational noise from Project Year 1 of the EIS.
- **Project Year 3**, noise from the operation of the alternate ventilation shaft in combination with operational noise from Project Year 3 of the EIS.
- **Project Year 4 Onwards**, noise from the operation of the alternate ventilation shaft in combination with operational noise from Project Year 4 of the EIS, which is considered to be representative of maximum noise levels over the life of the approved Project.

## Noise Source Levels

### Construction Activities

An indicative construction fleet and corresponding sound power levels (SWLs) are summarised in **Table 4**. It has been assumed that construction of the alternate ventilation shaft would occur 24 hours of the day, consistent with the EIS.

**Table 4: Indicative Noise Sources & Sound Power Levels for Construction Equipment**

| Construction Activity | Number of Items | Item Description | SWL per item dBA | Total Activity SWL dBA |
|---|---|---|---|---|
| **Sealing of the site access road** | 4 | Scraper (CAT 651) | 113 | 121 |
| | 1 | Dozer (CAT D8) | 116 | |
| | 3 | Padfoot rollers (18 tonne) | 109 | |
| | 1 | Smooth drum roller (12 tonne) | 107 | |
| | 2 | Smooth drum rollers (18 tonne) | 107 | |
| | 1 | Flat-bed truck | 100 | |
| | 5 | Truck and dog | 108 | |
| | 3 | Water cart (12 kL) | 100 | |
| | 10 | Sealing (bitumen and aggregate) | 104 | |
| | 1 | Grader (CAT 16H) | 108 | |
| | 1 | Excavator (14 tonne) | 97 | |
| | 1 | Excavator (CAT 349) | 104 | |
| | 1 | Terex Finlay J1170 (mobile crushing and screening) | 120 | |
| | 1 | Terex Finlay 693 (mobile crushing and screening) | 110 | |
| | 1 | Terex Finlay I130 (mobile crushing and screening) | 120 | |
| | 1 | Terex Finlay I130 (mobile crushing and screening) | 120 | |
| **Construction of ventilation shaft site** | 2 | Shaft drill rig (enclosed) | 108 | 110 |
| | 2 | Generator | 101 | |

| Construction Activity | Number of Items | Item Description | SWL per item dBA | Total Activity SWL dBA |
|---|---|---|---|---|
| | 2 | Excavator (30 tonne) | 103 | |
| | 2 | Crane (110 tonne) | 95 | |
| | 1 | Watercart (12 kL) | 100 | |
| | 2 | Loader (20 tonne) | 108 | |

## Ventilation Shaft

The operational sound power level (SWL) of the alternate ventilation shaft was provided by Malabar. The SWL for each ventilation shaft is expected to be 97 dBA with a tolerance of ± 4 dBA.

Malabar advises that three ventilation fans may be established at the ventilation shaft pad, with two fans planned to operate at any one time and a third fan for redundancy. Notwithstanding, modelling has conservatively assumed three fans operating with a SWL of 101 dBA per fan (to account for tolerance of ± 4 dBA).

## Operational Noise Assessment

**Table 5** summarises the noise levels for the three assessment years. Predictions for the day and evening periods represent standard meteorological conditions (**Table 3**). Predictions for noise-enhancing meteorological conditions have been presented for the night period (**Table 3**).

**Table 5: Predicted $L_{Aeq,15min}$ Operational Noise Levels**

| Receiver Label | Year 1 | | | Year 3 | | | Year 4 Onwards | | |
|---|---|---|---|---|---|---|---|---|---|
| | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| **Privately-owned residential receivers** | | | | | | | | | |
| **25** | <20 | <20 | 24 | <20 | <20 | <20 | <20 | <20 | <20 |
| **226b** | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| **228r** | 24 | <20 | 26 | <20 | <20 | 23 | <20 | <20 | 24 |
| **253** | 22 | <20 | 24 | <20 | <20 | <20 | <20 | <20 | <20 |
| **528** | 21 | <20 | 26 | <20 | <20 | 20 | <20 | <20 | <20 |
| **Mine-owned residential receivers** | | | | | | | | | |
| **57** | 27 | 23 | 28 | 20 | <20 | 22 | 20 | 20 | 22 |
| **58a** | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| **60c** | 38 | 36 | 40 | 27 | 26 | 31 | 27 | 27 | 34 |
| **536** | 24 | <20 | 29 | <20 | <20 | 25 | <20 | <20 | 28 |

Predictions indicate that the noise levels at all privately-owned residences would comply with the Development Consent noise criteria. As such, the proposed modification is not expected to impact on the acoustic amenity of the surrounding community.

The highest noise levels are observed during the night period of Year 1 at receiver 60c, which is mine-owned. The highest noise levels are predicted to occur during construction of the ventilation shaft given this receiver is located approximately 1.8 kilometres (km) from the alternate ventilation shaft location. The noise-enhancing meteorological conditions also contribute to the elevated noise levels during construction.

## Low Frequency Noise Assessment

A low-frequency noise assessment was conducted to ascertain whether any of the identified receivers should be subject to a modifying factor correction due to dominant low-frequency content. Such correction would be applied to the predicted noise levels before comparing to the Development Consent noise criteria.

The *NPfI* provides a method for assessing low-frequency noise based on:

- overall 'C' weighted and 'A' weighted predicted or measured levels; and
- one-third octave predicted or measured levels in the range 10–160 Hz.

The C-weighted noise level minus A-weighted noise level assessment was conducted for a selection of receivers considered to be representative of various catchment areas surrounding the Project. The assessment was based on the relevant night *NPfI* meteorological conditions resulting in the highest noise levels.

Two representative receivers were selected for the low-frequency noise assessment for the Modification:

- Receiver 228r: this receiver is located approximately 7 km south of the alternate ventilation shaft.
- Receiver 253: this receiver is located approximately 9 km south-west of the alternate ventilation shaft.

Both these receivers were considered in the EIS assessment. **Table 6** summarises the difference between the C-weighted noise level and the A-weighted noise level from operational noise for the three Project Years.

**Table 6: C-Weighted Minus A-Weighted Noise Levels**

| Assessed Receiver | $L_{Ceq,15min}$ Noise Level - $L_{Aeq,15min}$ Noise Level (dB) | | |
|---|---|---|---|
| | Year 1 | Year 3 | Year 4 |
| **Receiver 228r** | 17.8 | 18.0 | 17.5 |
| **Receiver 253** | 18.7 | 19.2 | 20.1 |

**Table 6** indicates that differences of 15 dB or more is expected for all project years.

Reliable data of low-frequency mining noise over long-distances is currently limited. The most reliable dataset available to establish a typical low-frequency spectrum shape was captured as part of a noise audit conducted at Bulga Village for an open cut mine (Wilkinson Murray, 2016). While the Project is not an open cut mine and not directly comparable to the Bulga open cut, measurements conducted for the audit were carried out at an approximate distance of 3 to 4 km from the mine, with a propagation path comparable to those surrounding the Maxwell Project. The spectrum shape shown in

**Table 7** corresponds to an average of 37 low frequency measurements in third octave bands between 10 Hertz (Hz) to 160 Hz.

**Table 7: Typical Measured Low-Frequency Spectrum – Bulga Village Noise Audit**

| | Third Octave Band Centre Frequency, Hz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **10** | **12.5** | **16** | **20** | **25** | **31.5** | **40** | **50** | **63** | **80** | **100** | **125** | **160** |
| **Measured level (dBZ)** | 49 | 55 | 57 | 52 | 52 | 52 | 51 | 52 | 49 | 50 | 48 | 45 | 40 |

The low-frequency spectrum shape was then normalised to the 63 Hz octave component of the predicted noise levels at each of the assessed receivers and compared against the low frequency noise threshold curve (Table C2 of the *NPfI*). The 63 Hz octave component is considered to be the most reliable octave band as source spectra were not always available at lower octave bands.

It was found that all normalised low-frequency spectrum shapes are below the low-frequency noise threshold.

As such, the low-frequency noise assessment indicates that it is unlikely that any of the receivers surrounding the Project would be subject to dominant low-frequency noise. Therefore, no modifying factor correction for low-frequency noise is warranted for the Project incorporating the Modification.

## Sleep Disturbance Noise Assessment

Assessment of potential maximum noise level events was completed to determine the potential for sleep disturbance from night construction activities associated with the proposed modification.

The instantaneous noise sources associated with the Modification and their typical $L_{AFmax}$ SWL (consistent with the EIS) can be summarised as follows:

- Loader dumping in empty truck bodies: 115-125 dBA $L_{AFmax}$
- Dozer track noise in 1st gear: 114-124 dBA $L_{AFmax}$

To be conservative the upper end of the level range has been used for noise predictions. The predicted night $L_{AFmax}$ levels from construction activities at the key representative receivers are summarised in **Table 8.**

$L_{AFmax}$ noise predictions are based on the relevant night meteorological conditions determined in accordance with Fact Sheet D of the *NPfI* (**Table 3**). It should be noted that the reported levels in **Table 8** are conservative as the highest levels have been assumed

and the resultant $L_{AFmax}$ noise predictions were added to the highest $L_{Aeq,15min}$ predicted levels.

**Table 8: Predicted $L_{AFmax}$ Noise Levels**

| Receiver Label | $L_{AFmax}$ Noise Level | Development Consent $L_{AFmax}$ Criteria |
|---|---|---|
| **Privately-owned receivers** | | |
| **25** | 27 | 52 |
| **226b** | <20 | 52 |
| **228r** | 30 | 52 |
| **253** | 26 | 52 |
| **528** | 27 | 52 |
| **Mine-owned receivers** | | |
| **57** | 32 | n/a[1] |
| **58a** | <20 | n/a[1] |
| **60c** | 46 | n/a[1] |
| **536** | 35 | n/a[1] |

Note 1: Development Consent Criteria does not apply to mine-owned receivers

**Table 8** indicates that $L_{AFmax}$ noise levels due to night operations from the Project incorporating the Modification are predicted to below the $L_{AFmax}$ criteria.

## Conclusion

Malabar is intending to submit a modification application which would involve the development of an alternate ventilation shaft and associated access road, as well as the re-orientation of the longwall panels in the Woodlands Hill, Bowfield, and Arrowfield Seams.

Potential noise impacts associated with the Modification have been considered in this noise assessment.

Noise predictions indicate that operational and construction noise levels associated with the proposed modification would comply with the existing Development Consent noise limits at all surrounding noise-sensitive receivers.

I trust this information is sufficient.  Please contact us if you have any further queries.

Yours faithfully

**Peter Thang**
Project Engineer
RWDI

# References

Department of Environment and Climate Change (2009) *Interim Construction Noise Guideline*.

Department of Planning and Environment (2018) *Voluntary Land Acquisition and Mitigation Policy.*

Department of Planning and Environment (2020) *Notice of State significant Development Determination - Maxwell Underground Coal Mine Project SSD 9526*

NSW Environment Protection Authority (2017) *Noise Policy for Industry.*

Wilkinson Murray (2009a) *Bulli Seam Operations Noise Impact Assessment.*

Wilkinson Murray (2016) *Bulga Village Noise Audit – Final Report.*

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