

# MOOLARBEN COAL COMPLEX OC3 EXTENSION PROJECT

## ENVIRONMENTAL IMPACT STATEMENT

### APPENDIX H

## NOISE AND BLASTING IMPACT ASSESSMENT



# 610.13549.01500-R01-V1.0-20221102

## NOISE AND BLASTING IMPACT ASSESSMENT

### Noise and Blasting Impact Assessment

#### Prepared for:

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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Moolarben Coal Operations Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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### APPENDICES

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# 1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Moolarben Coal Operations (MCO) to undertake a Noise and Blasting Impact Assessment (NBIA) for the Moolarben Coal Complex Open Cut 3 Extension Project (the Project).

## 1.1 Overview of the Moolarben Coal Complex

The Moolarben Coal Complex is located approximately 40 kilometres (km) north of Mudgee, New South Wales (NSW) (**Figure 1**). The Moolarben Coal Complex is operated by MCO on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Yancoal Moolarben Pty Ltd [YM] and a consortium of Korean power companies). MCO, MCM and YM are wholly owned subsidiaries of Yancoal Australia Limited (Yancoal).

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 with a combined coal production rate of 22 million tonnes per annum (Mtpa) in accordance with Project Approval (05\_0117) (Stage 1) (as modified) and Project Approval (08\_0135) (Stage 2) (as modified). The Moolarben Coal Complex comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities) (**Figure 2**).

MCO currently operates across multiple open cut mining areas and at current production rates, mining (i.e. run of mine [ROM] coal extraction) within the OC3 mining area will likely be completed in 2025. Mining of the remaining Stage 2 open cut mining area (OC4) would continue beyond 2025 within the currently approved mine life of the Moolarben Coal Complex (i.e. until 2038).

## 1.2 Project Description

MCO has identified an opportunity to extend open cut mining operations immediately south of the approved OC3 open cut pit as well as develop four new open cut pits to the east and south-east of the approved OC3 mining area, within existing mining tenements. The extended open cut mining operations would provide 10 years of mining (from 2025 to 2034), maximise use of the existing mining fleet and maintain steady production of ROM coal at the Moolarben Coal Complex post-completion of mining within the Stage 1 open cut mining areas.

It is expected the Project would include the following activities:

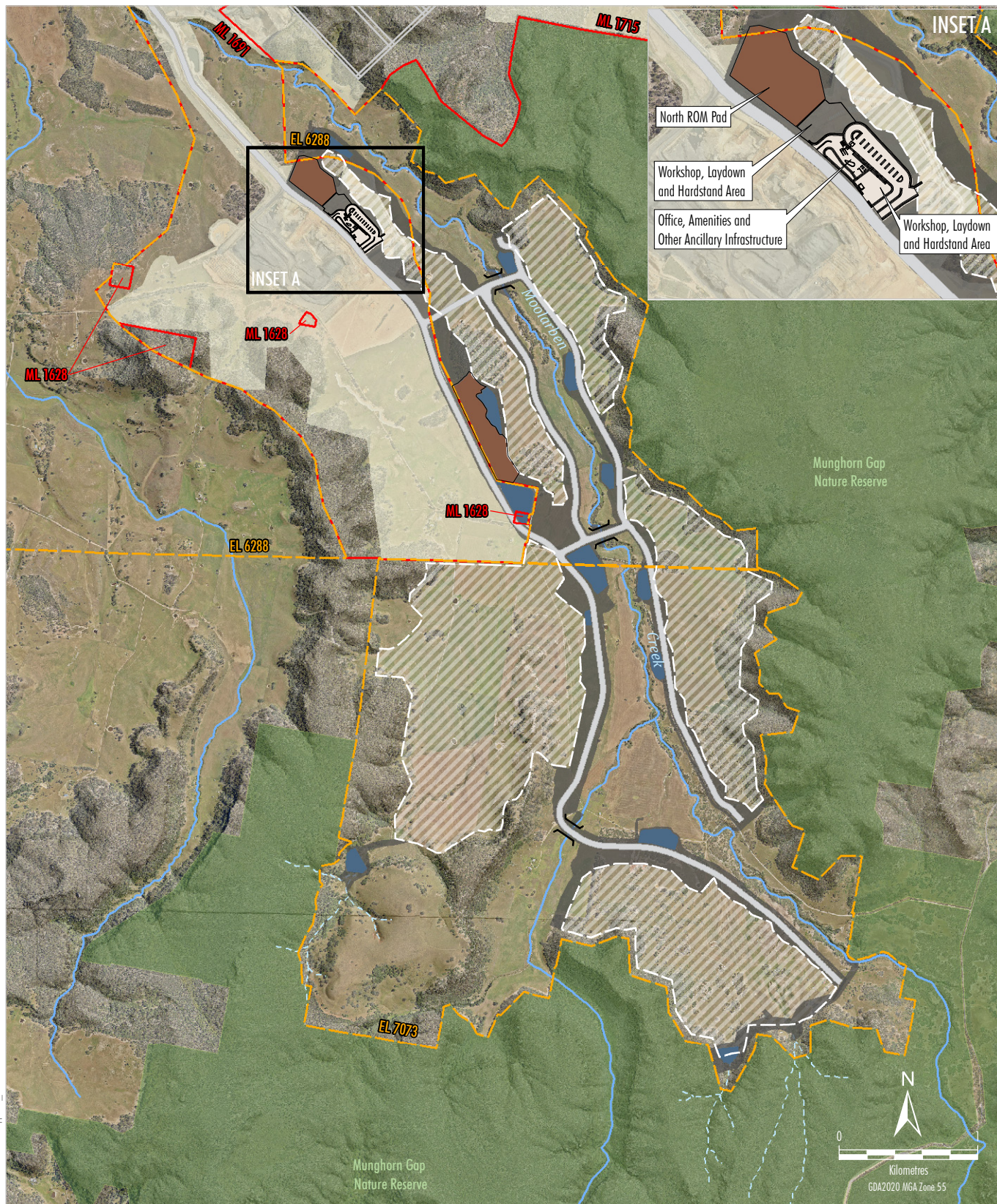
- extension of open cut mining operations within mining lease (ML) 1691, exploration licence (EL) 6288, and EL 7073 to allow mining of additional coal resources;
- extraction of up to 9 Mtpa of ROM coal with a total of approximately 40 million tonnes (Mt) over the life of the Project;
- mining operations between approximately 2025 to 2034 (which is within the approved life of the Moolarben Coal Complex ending on 31 December 2038);
- extension of employment of existing open cut workforce;
- construction and operation of ancillary infrastructure, services, plant and equipment in support of mining operations;





- 
- construction and operation of water management and water storage infrastructure in support of mining operations;
  - development of an integrated final landform with the approved OC3 mining area;
  - ongoing exploration activities in the Project area;
  - construction of haul road creek crossings;
  - quarrying and/or excavation of borrow pits within approved disturbance areas to retrieve construction materials;
  - conventional open cut mining related activities such as drilling and blasting, and other associated activities; and
  - rehabilitation, decommissioning and closure.

The Project general arrangement is shown on **Figure 3**.



#### LEGEND

- National Park/Nature Reserve
- Exploration Licence Boundary
- Mining Lease Boundary
- Moolarben Coal Complex Disturbance Footprint
- Watercourse
- Underground Longwall Layout
- OC3 Extension Project
- Indicative Open Cut Pit Extent
- Indicative Infrastructure Area
- Indicative ROM Pad
- Culvert
- Indicative Haul Roads
- Indicative Water Management

Source: MCO (2022); NSW Spatial Services (2021)  
Orthophoto: MCO (Jan 2021)



### MOOLARBEN COAL COMPLEX General Arrangement of the Project

Figure 3

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## 2 Moolarben Coal Complex Site and Land Ownership

The Project is located within the Moolarben Valley, which is characterised by lower lying areas associated with Moolarben Creek, and is surrounded by the undulating foothills and ridges of the adjacent Munghorn Gap Nature Reserve and the Moolarben Coal Complex in the north.

The land ownership plan provided in **Figure 4** identifies the nearest noise sensitive receivers. Land ownership details including property ID numbers, receiver type and co-ordinates are provided in **Appendix A**.

Given the location of the Project, this NBIA has focussed on the potential noise and blasting impacts at private receivers in Cooks Gap and Cooyal. Receivers in areas further from the Project (e.g. Ulan, Linburn) have also been included in the assessment in consideration of potential noise impacts from the approved Moolarben Coal Complex.

## 3 Assessment Objectives

This NBIA forms part of an Environmental Impact Statement (EIS) which has been prepared to accompany a Development Application made for the Project in accordance with Part 4 of the *Environmental Planning and Assessment Act 1999* (EP&A Act).

In preparing this assessment, SLR has considered several documents including (but not limited to) the following:

- *Moolarben Coal Complex – Open Cut Optimisation Modification – Noise Assessment* (MCO Optimisation NIA) (SLR, 2017).
- *Noise Management Plan* (NMP) (MCO, 2020a).
- *Blast Management Plan* (BMP) (MCO, 2020b).
- *Moolarben Coal Complex Annual Review 2019* (MCCAR 2019) (MCO, 2020c).
- *Moolarben Coal Complex Annual Review 2020* (MCCAR 2020) (MCO, 2021).
- *Moolarben Coal Complex Annual Review 2021* (MCCAR 2021) (MCO, 2022a).
- *Monthly Environmental Monitoring Reports January 2022 to June 2022* (MEMRs) (MCO, 2022b).
- *Moolarben Coal Project Independent Environmental Audit* (MCCIEA [2018]) (Pitt and Sherry, 2019).
- *Moolarben Coal Project Independent Environmental Audit* (MCCIEA [2021]) (Barnett and May, 2022).
- *Moolarben Coal Complex – Rock Shelter Blast Assessment* (SLR, 2018).

### 3.1 Assessment Requirements

#### 3.1.1 Secretary's Environmental Assessment Requirements

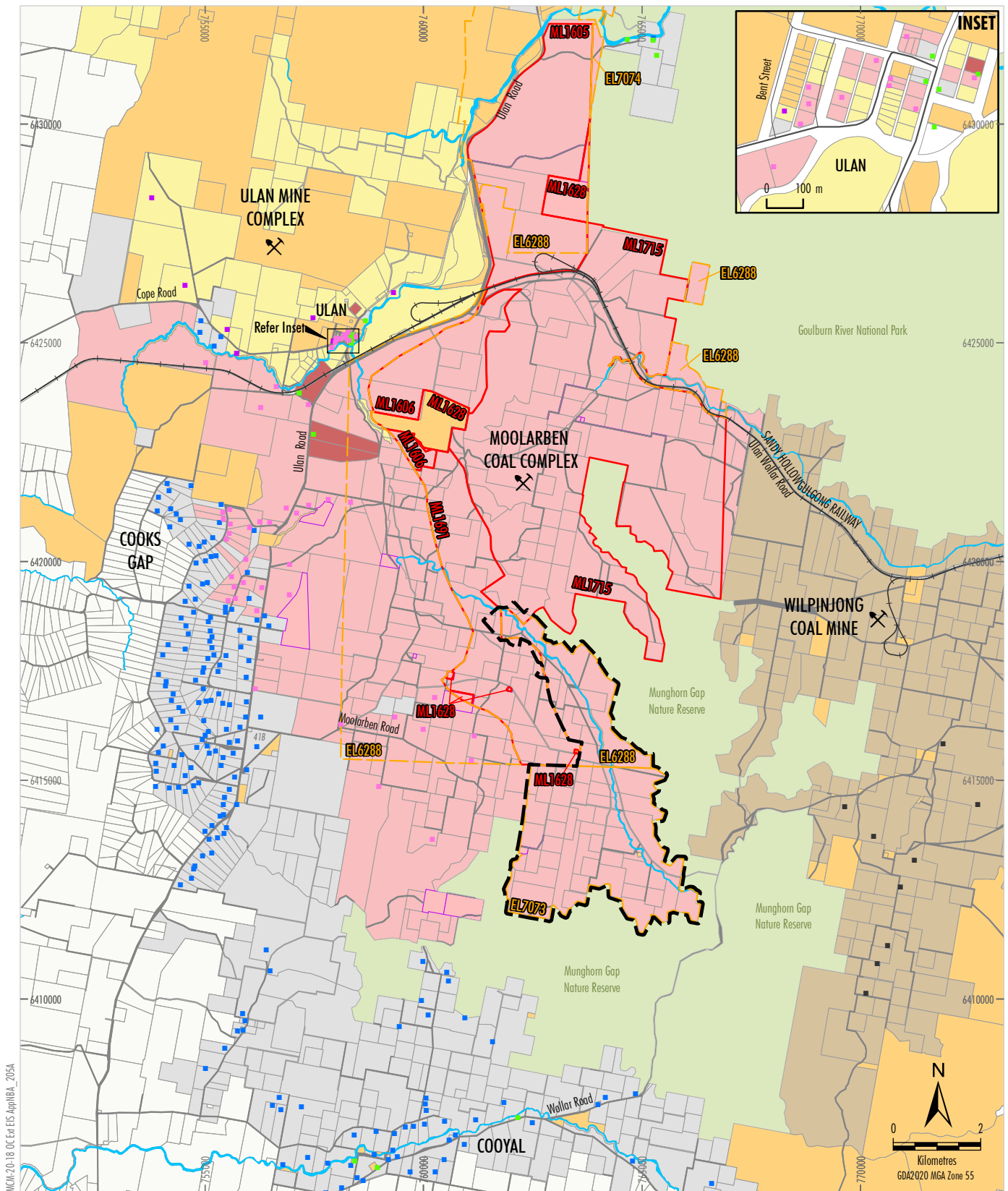
The NBIA for the Project has been guided by the Planning Secretary's Environmental Assessment Requirements (SEARs). The SEARs relevant to noise and vibration are provided in **Table 1** together with the relevant section of the NBIA indicating where the requirements have been addressed.

**Table 1 Noise and Blasting Impact Assessment Requirements**

| Environmental Assessment Requirement                                                                                                                                                                                                                                                                         | Relevant NBIA Section                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| The EIS must address the following specific matters:<br><b>3. Amenity</b> – including:                                                                                                                                                                                                                       |                                                                              |
| - an assessment of the likely construction, operational and traffic noise impacts of the development, in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry (EPA) and NSW Road Noise Policy, and having regard to the Voluntary Land Acquisition and Mitigation Policy; | <b>Section 5</b><br><b>Section 6</b><br><b>Section 7</b><br><b>Section 8</b> |
| - the likely blasting impacts of the development on people, animals, buildings and infrastructure, and significant natural features, having regard to the relevant ANZECC guidelines;                                                                                                                        | <b>Section 9</b>                                                             |

### 3.1.2 Environment Protection Authority

The NBIA for the Project has been prepared in consideration of the NSW Environment Protection Authority's (EPA's) input to the SEARs that states the *proposed level and scope of assessment summarised for each environmental matter in Table 3 (of the SEARs) is appropriate.*



Source: MCO (2022); NSW Spatial Services (2021)

**YANCOAL**  
MOOLARBEN COAL  
MOOLARBEN COAL COMPLEX  
Land Ownership Overview

Figure 4

## 4 Noise and Blasting Management and Compliance

### 4.1 Approvals

With respect to noise and vibration emissions, MCO currently operates the approved Moolarben Coal Complex in accordance with the following:

- Project Approval (05\_0117) dated 6 September 2007 (as modified), with the relevant sections attached as **Appendix B**.
- Project Approval (08\_0135) dated 30 January 2015 (as modified), with the relevant sections attached as **Appendix B**.
- EPA Environment Protection Licence (EPL) No 12932 anniversary date 1 January.

Project Approval (05\_0117) and Project Approval (08\_0135) have identical noise conditions and include conditions relating to acquisition upon request, mitigation upon request and noise assessment criteria (i.e. the Project Approval noise limits).

Note, the Project Approval noise limits are presented as external noise levels, except for the school and church which are nominated as 35 A weighted decibels (dBA) (internal when in use). The internal noise levels can be conservatively transposed to an external noise level by adding 10 dBA. It follows that the Project Approval noise limits in relation to the school and church would have equivalent external noise levels of 45 dBA equivalent continuous noise level ( $L_{Aeq(1hour)}$ ) and 45 dBA  $L_{Aeq(period)}$ , respectively.

### 4.2 Noise Management Strategy

MCO has an approved Environmental Management Strategy (EMS) that establishes the overarching framework for environmental management and monitoring of activities undertaken at the Moolarben Coal Complex.

The EMS has been prepared in accordance with Project Approval (05\_0117) and Project Approval (08\_0135) and provides the strategic framework for environmental management at the Moolarben Coal Complex. In addition, Project Approval (05\_0117) and Project Approval (08\_0135) set out specific requirements for noise management.

#### 4.2.1 Noise Management Plan

MCO has prepared and implemented a NMP in accordance with the relevant Project Approvals. The approved NMP (approved 29 October 2020) has been prepared to manage noise impacts associated with the Moolarben Coal Complex.

The NMP describes the current noise management regime, which consists of nine off-site operator-attended monitoring sites, five off-site continuous real-time monitors, and two Automatic Weather Stations (AWS – WS3, WS4) (**Appendix C**).

In accordance with the NMP, operator-attended noise monitoring is primarily used for demonstrating compliance with noise criteria, whilst continuous real-time monitoring is used as a noise management tool to assist MCO to take pre-emptive noise management actions to avoid potential noise non-compliances.

## 4.2.2 Noise Control and Management Measures

MCO implements a range of noise control and management measures at the Moolarben Coal Complex that includes planning controls, operational controls, engineering controls, a real-time response protocol, meteorological forecasting and continuous improvement, as described in the NMP, to identify and manage noise impacts aimed to achieve compliance with the approved noise criteria. The approved NMP describes MCO's Management Practices; Source and Transmission Noise Controls; and Real-time Response Protocols in further detail.

## 4.2.3 Noise Monitoring Program

A summary of the noise monitoring locations and associated monitoring frequency are presented in **Table 2** together with a cross reference to the monitoring locations (**Appendix C**).

**Table 2 Noise Monitoring Program Summary**

| Locality                            | Location ID <sup>1</sup> | Frequency  | Purpose    |
|-------------------------------------|--------------------------|------------|------------|
| Operator-attended noise monitoring  |                          |            |            |
| Ulan                                | NA1                      | Monthly    | Compliance |
| Lower Ridge Road                    | NA6                      |            |            |
| Winchester Crescent                 | NA12                     |            |            |
| Goulburn River National Park (GRNP) | -                        | Quarterly  | Compliance |
| Munghorn Gap Nature Reserve (MGNR)  | -                        |            |            |
| Cope Road                           | NA11                     |            |            |
| Lagoons Road                        | NA2                      | Annually   | Validation |
| Upper Ridge Road                    | NA3                      |            |            |
| Moolarben Road                      | NA10                     |            |            |
| Real-time noise monitoring          |                          |            |            |
| Cope Road                           | ND2                      | Continuous | Management |
| Lagoons Road                        | NR3                      |            |            |
| Winchester Crescent                 | NR4                      |            |            |
| Upper Ridge Road                    | NR5                      |            |            |
| Moolarben Road                      | NR10                     |            |            |
| Meteorological monitoring           |                          |            |            |
| Ulan Road                           | WS3                      | Continuous | Compliance |
| Lagoons Road                        | WS4                      | Continuous | Management |

Source: Table 6 Noise Management Plan (NMP) (MCO, 2020a)

Note 1: Location ID = Identification, refer **Appendix C**.

## 4.3 Noise Compliance

### 4.3.1 Independent Environmental Audit Noise Compliance Results

#### 2018 Audit

MCCIEA (2018) assessed the compliance of noise management at the Moolarben Coal Complex in accordance with Project Approval conditions and EPL Conditions for the audit period 1 January 2016 to 16 October 2018 as part of the Moolarben Coal Complex Independent Environmental Audit 2018.

No non-compliances regarding operational noise were recorded over the audit period.

#### 2021 Audit

MCCIEA (2021) assessed the compliance of noise management at the Moolarben Coal Complex in accordance with Project Approval conditions and EPL Conditions for the audit period October 2018 to 30 September 2021 as part of the Moolarben Coal Complex Independent Environmental Audit 2021.

No non-compliances regarding operational noise were recorded over the audit period.

### 4.3.2 Operator-attended Noise Compliance Results 2019

The MCCAR (2019) Section 6.2.2 states:

*During the 2019 reporting period, attended environmental noise monitoring was conducted monthly with additional sites monitored quarterly. ...*

*Noise Criteria are specified for day, evening, and night period for the amenity of neighbours residences. Noise Criteria are expressed as  $L_{Aeq}(15min)$  and  $L_{A1}(1min)$ . Table 11 provides a summary of the project noise criteria and noise performance based on attended noise monitoring for 2019, together with management implications and proposed actions.*

*MCO complied with the project specific noise criteria at all monitoring sites during attended noise monitoring in the reporting period. ...*

### 4.3.3 Operator-attended Noise Compliance Results 2020

The MCCAR (2020) Section 6.2.2 states:

*During the 2020 reporting period, attended environmental noise monitoring was conducted monthly (NA1, NA6 & NA12), with additional sites monitored quarterly (NA11) and annually (MGNR & GRNP). ...*

*Noise Criteria are specified for day, evening, and night period for the amenity of neighbours residences. Noise Criteria are expressed as  $L_{Aeq}(15min)$  and  $L_{A1}(1min)$ . Table 11 provides a summary of the project noise criteria and noise performance based on attended noise monitoring for 2020, together with management implications and proposed actions.*

*MCO complied with the project specific noise criteria at all monitoring sites during attended noise monitoring in the reporting period. ...*

#### 4.3.4 Operator-attended Noise Compliance Results 2021

The MCCAR (2021) Section 6.2.2 states:

*During the 2021 reporting period, attended environmental noise monitoring was conducted monthly (NA1, NA6 & NA12), with additional sites monitored quarterly (NA11) and annually Munghorn Gap Nature Reserve (MGNR) and Goulburn River National Park (GRNP). ...*

*Noise Criteria are specified for day, evening, and night period for the amenity of neighbours residences. Noise Criteria are expressed as  $L_{Aeq}(15min)$  and  $L_{A1}(1min)$ . Table 11 provides a summary of the project noise criteria and noise performance based on attended noise monitoring for 2021, together with management implications and proposed actions.*

*MCO complied with the project specific noise criteria at all monitoring sites during attended noise monitoring in the reporting period. ...*

#### 4.3.5 Operator-attended Noise Compliance Results January 2022 to June 2022

The MEMRs (MCO 2022b) were reviewed for the six month period commencing January 2022, and demonstrated that MCO maintains its program of operator-attended monitoring in accordance with the NMP at five monitoring locations, namely: NA1; NA6; NA12; GRNP and MGNR.

There were no recorded noise exceedances during the six month monitoring period to the end of June 2022.

### 4.4 Blast Management Strategy

As described in **Section 4.2**, the EMS has been prepared in accordance with Project Approval (05\_0117) and Project Approval (08\_0135) and provides the strategic framework for environmental management at the Moolarben Coal Complex. In addition, Project Approval (05\_0117) and Project Approval (08\_0135) set out specific requirements for blast management. MCO has prepared and implemented the approved Blast Management Plan (BMP) in accordance with the Project Approvals.

#### 4.4.1 Blast Management Plan

In accordance with Project Approval (05\_0117) and Project Approval (08\_0135), the BMP (approved 29 October 2020) has been prepared to ensure that ground vibration and airblast impacts from the Moolarben Coal Complex are minimised on the local community, proximal infrastructure (e.g. Ulan-Wollar Road and associated road closures) and cultural heritage sites to the extent required. The BMP describes the current blast management regime, which consists of:

- Blast management strategies used to minimise and manage any impacts;
- Monitoring of ground vibration and airblast at a range of locations;
- Communication with the local community and regulators in relation to blasting activities;
- Measures to be implemented for compliance; and
- Protocols for managing and reporting any blast related exceedances or non-compliances.

#### 4.4.2 Blast Monitoring Program

As presented in **Table 3**, blast emission monitoring consists of three permanent off-site at sensitive receiver sites and two AWSs (**Appendix C**).

In accordance with the BMP, blast emission monitoring is used for demonstrating compliance with relevant ground vibration and airblast limits.

**Table 3 Blast Monitoring Program Summary**

| Locality                                              | Location ID | Frequency                                                      | Purpose                                           |
|-------------------------------------------------------|-------------|----------------------------------------------------------------|---------------------------------------------------|
| Permanent blast monitoring at sensitive receivers     |             |                                                                |                                                   |
| Ulan School                                           | BM1         | Every Blast                                                    | Compliance with human comfort and damage criteria |
| Ridge Road                                            | BM5         |                                                                |                                                   |
| Moolarben Road                                        | BM8         |                                                                |                                                   |
| Portable blast monitoring at Aboriginal rock shelters |             |                                                                |                                                   |
| S1MC55, S1MC56                                        | BM2         | Every blast within 230 m of the Aboriginal rock shelter sites. | Compliance with the relevant damage risk criteria |
| S2MC232, S2MC233                                      | Various     |                                                                |                                                   |
| Portable blast monitoring at infrastructure sites     |             |                                                                |                                                   |
| Roadway                                               | Various     | Every blast within 500 m                                       | Compliance with the relevant damage risk criteria |
| Railway                                               | Various     |                                                                |                                                   |
| ETL <sup>1</sup>                                      | Various     |                                                                |                                                   |
| Meteorological monitoring                             |             |                                                                |                                                   |
| Ulan Road                                             | WS3         | Continuous                                                     | Compliance                                        |
| Lagoons Road                                          | WS4         | Continuous                                                     | Management                                        |

Note 1: ETL = Electricity Transmission Line.

## 4.5 Blast Compliance

### 4.5.1 Independent Environmental Audit Blast Compliance Results

#### 2018 Audit

MCCIEA (2018) assessed the compliance of blast management at the Moolarben Coal Complex in accordance with Project Approval conditions and EPL Conditions for the audit period 1 January 2016 to 16 October 2018 as part of the Moolarben Coal Complex Independent Environmental Audit 2018.

It was noted that during the audit period one recorded airblast level exceeded 120 dBLinear peak level (dBLpk) at a noise sensitive location on 17 February 2017, leading to a non-compliance with EPL Condition L6.3.

MCO completed an investigation into the cause of the airblast and implemented remedial actions which included a revision to the blasting procedures.

## 2021 Audit

MCCIEA (2021) assessed the compliance of blast management at the Moolarben Coal Complex in accordance with Project Approval conditions and EPL Conditions for the audit period October 2018 to 30 September 2021 as part of the Moolarben Coal Complex Independent Environmental Audit 2021.

No non-compliances regarding blasting were recorded over the audit period.

### 4.5.2 Blast Emission Compliance Results 2019

The MCCAR (2019) Section 6.3.1 indicates that a total of 157 blasts occurred with an annual average of 3.0 blasts per week over the reporting period and that no exceedances of the blasting criteria occurred during the reporting period.

### 4.5.3 Blast Emission Compliance Results 2020

The MCCAR (2020) Section 6.3.1 indicates that a total of 175 blasts occurred with an annual average of 3.4 blasts per week over the reporting period and that no exceedances of the blasting criteria occurred during the reporting period.

### 4.5.4 Blast Emission Compliance Results 2021

The MCCAR (2021) Section 6.3.1 indicates that a total of 179 blasts occurred with an annual average of 3.4 blasts per week over the reporting period and that no exceedances of the blasting criteria occurred during the reporting period.

### 4.5.5 Emissions Monitoring Results January 2022 to June 2022

The MEMRs (MCO 2022b) were reviewed for the six month period commencing January 2022, and demonstrated that MCO maintains its program of blast monitoring in accordance with the BMP.

It was noted that one recorded airblast level exceeded 120 dBLpk at a noise sensitive location in May 2022 leading to a non-compliance with EPL Condition L6.3.

MCO reported the exceedance to the NSW Department of Planning and Environment (DPE) and the EPA on 23 May 2022. MCO completed an investigation into the cause of the airblast and implemented remedial actions, including a review of the existing blast model and implementation of revised initiation sequencing timing for blasts with similar orientation.

There were no other recorded airblast exceedances during the six month monitoring period to the end of June 2022.

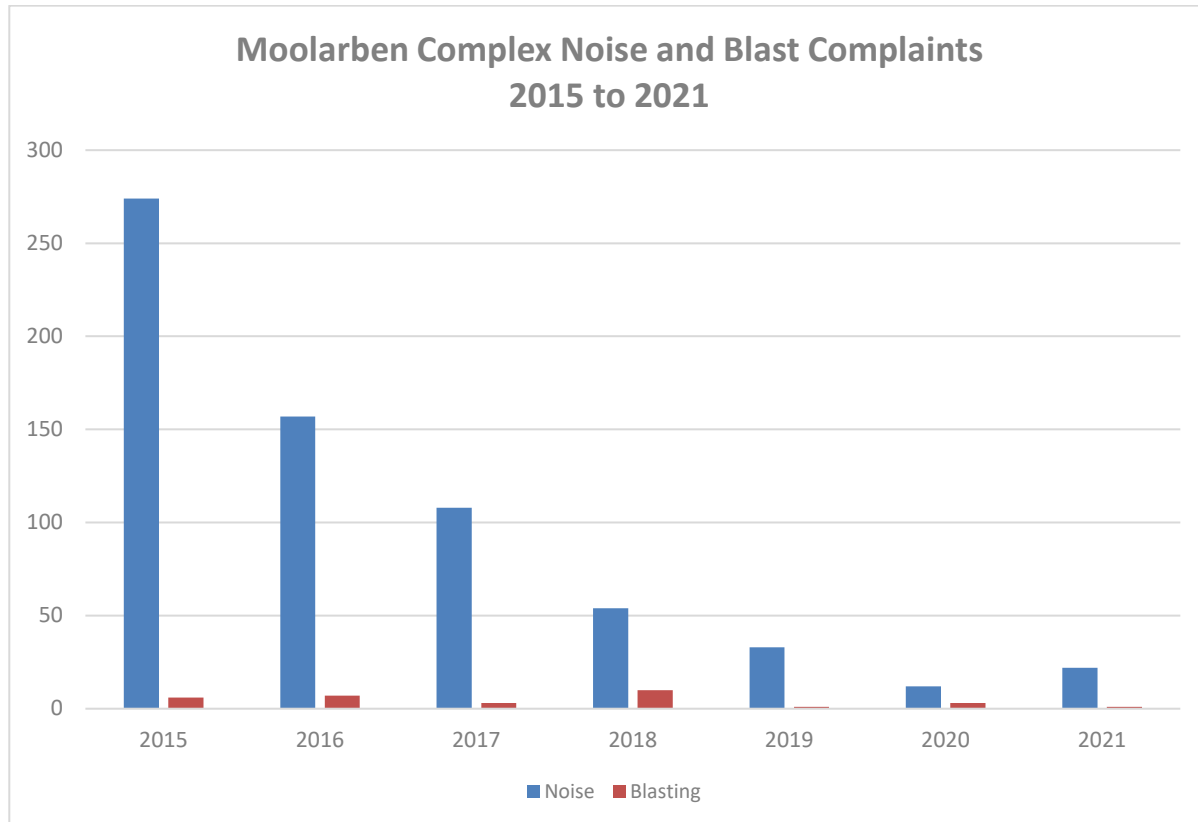
## 4.6 Operational Noise and Blast Complaints Summary

MCO maintains a complaints register in accordance with Project Approval requirements. A summary of the complaint records regarding noise and blasting for 2015 to 2021 are presented in **Figure 5**.

**Figure 5** shows the number of noise related complaints has reduced significantly since 2015 due to a range of factors including implementation of MCO's proactive noise control and management measures described in **Section 4.2.2**.

**Figure 5** also shows that the number of blast related complaints are generally low (e.g. one blast related complaint was received in 2019 and 2021, and three were received in 2018 and 2020).

**Figure 5 Complaints Register Summary 2015 to 2021**



All complaints received by MCO relating to noise and blasting were responded to in accordance with the Community Complaints Procedure detailed in the EMS. Following each noise or blast related complaint, the source and noise levels were determined or verified. In some instances of noise complaint, mining operations were altered in response to a complaint lodged with MCO during adverse weather conditions. However, there were no reportable environmental incidents (i.e. reportable non-compliances) relating to noise in the period 2016 to 2021. As described in **Section 4.5**, there was one blast related non-compliance in May 2022 and one in February 2017. MCO investigated these non-compliances and implemented remedial measures as required.

## 5 Existing Meteorological and Noise Environment

### 5.1 Meteorological Environment

#### 5.1.1 NPfI Meteorological Conditions

In general terms, NPfI Fact Sheet D sets out procedures for establishing noise enhancing weather conditions, where two options are available to consider meteorological effects, as follows:

1. *Adopt the noise-enhancing meteorological conditions for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur - a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night.*

or

2. *Determine the significance of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.*

NPfI Fact Sheet D also contains several important notes, and in particular states:

*Noise limits derived for consents and licences will apply under the meteorological conditions used in the environmental assessment process, that is, standard or noise-enhancing meteorological conditions. For 'very noise-enhancing meteorological conditions' (see glossary) a limit is set based on the limit derived under standard or noise-enhancing conditions (whichever is adopted in the assessment) plus 5 dB. In this way a development is subject to noise limits under all meteorological conditions.*

*It should be noted that noise limit conditions will include the wind speed (scalar quantity without direction) under which noise limits will apply.*

#### 5.1.2 Wind

Wind has the potential to increase noise levels at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration. Where wind blows from the source to the receiver at speeds up to 3 metres per second (m/s) for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

Weather data was obtained for a period of three years (1 August 2018 to 1 August 2021) from the on-site weather station (WS3). This data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for day, evening and night in each season<sup>1</sup>.

<sup>1</sup> Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours and Night-time 2200 hours to 0700 hours.

A summary of the most frequently occurring winds for each period is contained in **Table 4** to **Table 6**.

**Table 4 Seasonal Frequency of Occurrence of Wind Speed Intervals - Daytime**

| Season | Percentage Occurrence - Wind Direction $\pm 45^\circ$ |      |      |      |     |      |      |      |
|--------|-------------------------------------------------------|------|------|------|-----|------|------|------|
|        | N                                                     | NE   | E    | SE   | S   | SW   | W    | NW   |
| Summer | 11.5                                                  | 15.0 | 17.1 | 14.6 | 6.3 | 7.7  | 9.9  | 11.8 |
| Autumn | 12.5                                                  | 16.3 | 19.7 | 15.8 | 5.8 | 11.0 | 12.9 | 13.6 |
| Winter | 12.9                                                  | 12.6 | 13.5 | 11.0 | 4.9 | 11.3 | 17.0 | 18.0 |
| Spring | 11.9                                                  | 14.3 | 15.6 | 13.2 | 7.7 | 10.2 | 10.2 | 10.9 |

**Bold and underline** indicates a frequency greater than 30%.

**Table 5 Seasonal Frequency of Occurrence of Wind Speed Intervals - Evening**

| Season | Percentage Occurrence - Wind Direction $\pm 45^\circ$ |     |      |      |     |      |                    |                    |
|--------|-------------------------------------------------------|-----|------|------|-----|------|--------------------|--------------------|
|        | N                                                     | NE  | E    | SE   | S   | SW   | W                  | NW                 |
| Summer | 2.8                                                   | 7.4 | 14.1 | 15.1 | 5.5 | 6.3  | 6.9                | 4.7                |
| Autumn | 2.2                                                   | 4.1 | 17.5 | 23.1 | 9.0 | 5.4  | 8.1                | 6.9                |
| Winter | 3.0                                                   | 4.0 | 10.4 | 12.6 | 5.8 | 20.7 | <b><u>39.6</u></b> | <b><u>31.3</u></b> |
| Spring | 2.5                                                   | 6.8 | 14.1 | 17.5 | 5.1 | 9.8  | 10.5               | 5.7                |

**Bold and underline** indicates a frequency greater than 30%.

**Table 6 Seasonal Frequency of Occurrence of Wind Speed Intervals - Night**

| Season | Percentage Occurrence - Wind Direction $\pm 45^\circ$ |     |                    |                    |      |      |      |      |
|--------|-------------------------------------------------------|-----|--------------------|--------------------|------|------|------|------|
|        | N                                                     | NE  | E                  | SE                 | S    | SW   | W    | NW   |
| Summer | 2.4                                                   | 7.2 | <b><u>40.1</u></b> | <b><u>39.3</u></b> | 10.3 | 3.4  | 2.3  | 2.4  |
| Autumn | 3.2                                                   | 5.9 | <b><u>39.1</u></b> | <b><u>43.6</u></b> | 9.8  | 3.5  | 5.3  | 7.0  |
| Winter | 5.4                                                   | 3.1 | 12.2               | 14.8               | 8.4  | 11.4 | 26.8 | 27.3 |
| Spring | 6.0                                                   | 8.0 | <b><u>35.7</u></b> | <b><u>37.6</u></b> | 10.1 | 5.9  | 5.4  | 6.1  |

**Bold and underline** indicates a frequency greater than 30%.

Long term seasonal wind records indicate that prevailing winds are a feature of the area since the frequency of occurrence of winds up to 3 m/s is above the 30% threshold during some seasonal assessment periods. Therefore, noise enhancing winds have been considered as part of this assessment.

### 5.1.3 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For the purpose of assessing the frequency occurrence of temperature inversions during the winter months the night-time period is from one hour before sunset to one hour after sunrise (taken to be 6.00pm to 7.00am).

Weather data was obtained for a period of three years (1 August 2018 to 1 August 2021) from the nearby inversion tower located at the Wilpinjong Coal Mine, and would be representative of the temperature gradients that occur in the Project area. The occurrence of atmospheric stability classes during the winter night-time period at the Wilpinjong Coal Mine inversion tower are presented in **Table 7**.

**Table 7 Night-time (6.00pm - 7.00am) Stability Frequency of Occurrence During Winter**

| Pasquil Stability Class | Frequency of Occurrence Percentage During Winter <sup>1</sup> |
|-------------------------|---------------------------------------------------------------|
| A                       | 0.0%                                                          |
| B                       | 0.0%                                                          |
| C                       | 0.0%                                                          |
| D                       | 8.2%                                                          |
| E                       | 27.8%                                                         |
| F                       | 23.0%                                                         |
| G                       | 41.1%                                                         |
| <b>F+G</b>              | <b>64.0%</b>                                                  |

1. Rounded to the nearest decimal place

The frequency of occurrence of F and G atmospheric stability classes occurs for more than 30% of the total night-time period. As such temperature inversions are a significant feature of the area and have been considered as part of this assessment.

#### 5.1.4 NPfl Noise Modelling Meteorological Parameters

To provide a conservative approach and based on wind and temperature inversion conditions being significant within the Project area, the standard and noise enhancing meteorological conditions (NPfl Table D1), have been adopted and are presented in **Table 8**.

**Table 8 NPfl Table D1 Standard and Noise Enhancing Meteorological Conditions**

| Meteorological Conditions | Meteorological Parameters                                                                                                                                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard                  | Day/evening/night: stability categories A-D with wind speed up to 0.5 m/s at 10 m AGL                                                                                                                                                |
| Noise-enhancing           | Day/evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL)<br>Night-time: stability categories A-D with light winds (up to 3 m/s at 10 m AGL)<br>and/or stability category F with winds up to 2 m/s at 10m AGL |

Notes: m/s = metres per second, m = metres, AGL = above ground level

Where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10m AGL. Stability categories are based on the Pasquill-Gifford stability classification scheme.

The adopted NPfl standard and noise enhancing meteorological conditions can be further defined for noise modelling purposes as presented in **Table 9**.

**Table 9 Meteorological Parameters Considered for Noise Predictions**

| Period  | Meteorological Conditions                                  | Air Temperature (°C) | Relative Humidity (%) | Wind Speed (m/s) (Source to receiver) | Stability Category |
|---------|------------------------------------------------------------|----------------------|-----------------------|---------------------------------------|--------------------|
| Day     | Standard                                                   | 18                   | 55                    | 0.5                                   | D Class            |
|         | Noise enhancing - Wind                                     | 19                   | 55                    | 3                                     |                    |
| Evening | Standard                                                   | 16                   | 66                    | 0.5                                   | D Class            |
|         | Noise enhancing - Wind                                     | 16                   | 65                    | 3                                     |                    |
| Night   | Standard                                                   | 12                   | 75                    | 0.5                                   | D Class            |
|         | Noise enhancing - Wind                                     | 12                   | 75                    | 3                                     |                    |
|         | Noise Enhancing - Temperature Inversion with Drainage Flow | 6                    | 70                    | 2                                     | F Class            |

The meteorological parameters provided in **Table 9** are consistent with the meteorological conditions contained in Project Approval (05\_0117) and Project Approval (08\_0135).

## 5.2 Noise Environment

Although the Moolarben Coal Complex has approved noise limits for privately owned receivers in Project Approval (05\_0117) and Project Approval (08\_0135), the NPfI procedures for the modification, expansion or upgrade of existing industrial premises (i.e. the Project) require that noise impact assessments determine the relevant Rating Background Levels (RBLs) and noise amenity levels ( $L_{Aeq(period)}$ ) in the absence of Moolarben Coal Complex operations.

Background noise monitoring to characterise and quantify the noise environment in the area surrounding Moolarben Coal Complex were conducted in July 2005 and presented in the *Moolarben Coal Project Noise and Vibration Impact Assessment* prepared by Spectrum Acoustics in 2006 (Moolarben Coal Project [MCP] Stage 1 NIA). The background noise monitoring was undertaken in Ulan, as well as locations west and north of the Moolarben Coal Complex. These background levels are considered indicative of pre-Moolarben Coal Complex levels in Cooks Gap, Cooyal and Ulan. The background levels could however, be influenced by nearby developments (e.g. the Ulan Mine Complex) that have been operating since the background noise monitoring was undertaken in 2006 (e.g. in Ulan).

The measurement methodology and analysis procedures are described in the MCP Stage 1 NIA. The relevant estimated RBLs and noise amenity levels ( $L_{Aeq(period)}$ ) are presented in **Table 10**.

**Table 10 Background Ambient Noise Levels - MCP Stage 1 NIA**

| Locality             | Estimated RBL <sup>1,2</sup> All Noise Sources |         |       | Estimated $L_{Aeq(period)}$ <sup>1,2</sup> Industrial Noise Only |         |       |
|----------------------|------------------------------------------------|---------|-------|------------------------------------------------------------------|---------|-------|
|                      | Day                                            | Evening | Night | Day                                                              | Evening | Night |
| Privately Owned Land | 30                                             | 30      | 30    | <44                                                              | <39     | <34   |

Source: Spectrum Acoustics (2006)

Note 1: Estimated RBLs and noise amenity levels in the absence of Moolarben Coal Complex operation.

Note 2: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours and Night-time 2200 hours to 0700 hours.

To provide some contemporary ambient noise levels in the vicinity of the Moolarben Coal Complex, statistical ambient noise level data from the four real-time continuous noise monitoring at NR3, NR4, NR5 and NR10 (**Appendix C**) for the period July 2020 to August 2021 was analysed to determine the RBLs and are presented in **Table 11**. Given the analysed data spans more than a year it provides a robust dataset representative of long term background noise levels inclusive of seasonal variations.

Weather data for the analysis was obtained from the onsite AWS (WS3). Data recorded during wind speeds greater than 5 m/s and/or periods of rainfall were excluded in accordance with NPfI data exclusion methodology.

**Table 11 Unattended Noise Monitoring Results - July 2020 to August 2021**

| Real-Time Noise Monitor Location | Rating Background Level (dBA) |         |       |
|----------------------------------|-------------------------------|---------|-------|
|                                  | Day                           | Evening | Night |
| NR3 - Lagoons Road               | 32                            | 33      | 31    |
| NR5 - Lower Ridge Road           | 29                            | 29      | 27    |
| NR10 - Moolarben Road            | 27                            | 27      | 25    |
| NR4 - Winchester Crescent        | 31                            | 29      | 25    |

The RBLs indicate that background noise levels, inclusive of any influence from Moolarben Coal Complex operations, are generally below NPfI minimum RBLs and are consistent with pre-mining noise levels. In view of the foregoing the adopted RBLs are presented in **Table 12**. These form the basis of establishing the Project Noise Trigger Level (PNTL) assessment criteria (**Section 6.2**) consistent with NPfI procedures. It is noted that these levels conservatively assume the most stringent criteria for receivers in Ulan in absence of recent background noise data.

**Table 12 Adopted RBLs for Impact Assessment Purposes**

| Locality              | Adopted Rating Background Level (dBA) <sup>1,2</sup> |                      |                    |
|-----------------------|------------------------------------------------------|----------------------|--------------------|
|                       | Day <sup>3</sup>                                     | Evening <sup>4</sup> | Night <sup>5</sup> |
| Residential receivers | 35                                                   | 30                   | 30                 |

Note 1: In accordance with NPfI Table 2.1, if the day-time RBL is < 35dBA, then 35dBA shall be the assumed RBL.

Note 2: In accordance with NPfI Table 2.1, if the evening or night RBL is < 30dBA, then 30dBA shall be the assumed RBL.

Note 3: Day-time Monday to Saturday 7:00am to 6:00pm, Sunday and Public Holidays 8:00am to 6:00pm.

Note 4: Evening Monday to Sunday 6:00pm to 10:00pm.

Note 5: Night-time Monday to Saturday 10:00pm to 7:00am, Sunday and Public Holidays 10:00pm to 8:00am.

## 6 Noise Criteria and Assessment Procedure

### 6.1 Construction Noise Assessment Criteria

The EPA's Interim Construction Noise Guideline (ICNG) sets out construction noise management levels for residential and other noise-sensitive receivers and outlines how they are to be applied. The ICNG suggests restricting the hours of construction for activities that generate noise at residences above the 'highly affected' noise management level. A summary of the noise management levels from the ICNG is contained in **Table 13**.

**Table 13 Construction Noise Management at Residential Receivers**

| Time of Day                                                                                                                  | Noise Management Level<br>LAeq(15minute) <sup>1</sup> | How to Apply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended standard hours<br>Monday to Friday 7am to 6pm<br>Saturday 8am to 1pm<br>No work on Sundays or public<br>holidays | Noise Affected<br>RBL + 10 dBA                        | The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> <li>Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</li> </ul>                                                                                                                                                                                                                                |
|                                                                                                                              | Highly Noise Affected<br>75 dBA                       | The highly noise affected level represents the point above which there may be strong community reaction to noise. <ul style="list-style-type: none"> <li>Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:               <ol style="list-style-type: none"> <li>times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences.</li> <li>if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol> </li> </ul> |

| Time of Day                        | Noise Management Level<br>LAeq(15minute) <sup>1</sup> | How to Apply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outside recommended standard hours | Noise Affected<br>RBL + 5 dBA                         | <p>A strong justification would typically be required for works outside the recommended standard hours.</p> <ul style="list-style-type: none"> <li>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.</li> <li>For guidance on negotiating agreements see section 7.2.2 of the ICNG.</li> </ul> |

Note 1: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise-affected residence.

The ICNG explains that due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into two categories:

- Industrial premises: external LAeq(15minute) 75 dBA; and
- Offices, retail outlets: external LAeq(15minute) 70 dBA.

Construction activities for the Project would be limited to the development of facilities and infrastructure to support the extension of open cut operations. On the basis that such works would be indistinguishable from mining operations, construction activities have been considered negligible compared to operational noise sources from the approved Moolarben Coal Complex and Project.

## 6.2 Operational Noise Assessment Criteria

### 6.2.1 Recommended Amenity, Project Amenity and Intrusive PNTLs

The EPA has regulatory responsibility for the control of noise from “scheduled premises” under the *Protection of the Environment Operations Act, 1997*. In implementing the NPfI, the EPA has two broad objectives:

- Controlling intrusive noise levels in the short term; and
- Maintaining noise amenity levels for particular land uses over the medium to long-term.

The Project comprises on-site mining (industrial) operations which are dealt with in the accordance the NPfI, whereas road, rail and waterway transportation corridors are specifically excluded from the NPfI. In general terms, the NPfI sets out procedures for establishing the project intrusive noise level and project amenity noise level, with a view determining the lower (that is, the more stringent) being the PNTL.

Firstly, the NPfI Section 2.4 states:

*The recommended noise amenity levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for noise from a single industrial development at a receiver location.*

Based on measured pre-mining RBLs the nearest potentially affected residential areas to the Project equate with the “rural” residential receiver category. In accordance with NPfI Section 2.4, the proposed recommended amenity noise levels (RANL) for each locality are presented in **Table 14**, together with the project amenity noise levels being 5 dBA less than the recommended amenity noise level derived from NPfI Table 2.2.

**Table 14 Amenity Criteria - Recommended LAeq Noise Levels from Industrial Noise Sources**

| Receiver Area | NPfI Noise Amenity Area <sup>1, 2</sup> | Recommended Amenity Noise Level<br>LAeq(period) <sup>3</sup> |         |       | Project Amenity Noise Level<br>LAeq(period) <sup>3</sup> |         |       |
|---------------|-----------------------------------------|--------------------------------------------------------------|---------|-------|----------------------------------------------------------|---------|-------|
|               |                                         | Daytime                                                      | Evening | Night | Daytime                                                  | Evening | Night |
| Any           | Rural <sup>4</sup>                      | 50                                                           | 45      | 40    | 45                                                       | 40      | 35    |
| Any           | Commercial                              | 65 when in use                                               |         |       | 60 when in use                                           |         |       |
| Any           | Industrial                              | 70 when in use                                               |         |       | 65 when in use                                           |         |       |
| Any           | Active Recreation                       | 55 when in use                                               |         |       | 50 when in use                                           |         |       |
| Any           | Passive Recreation                      | 50 when in use                                               |         |       | 45 when in use                                           |         |       |
| Any           | School Classroom                        | 50 <sup>5,6</sup>                                            |         |       | 45 <sup>5,6</sup>                                        |         |       |
| Any           | Place of Worship                        | 50 <sup>5</sup>                                              |         |       | 45 <sup>5</sup>                                          |         |       |

Note 1: In accordance with the NPfI Table 2.2.

Note 2: In accordance with the NPfI Table 2.3.

Note 3: Daytime Monday to Saturday 7:00am to 6:00pm, Sunday and Public Holidays 8:00am to 6:00pm; Evening Monday to Sunday 6:00pm to 10:00pm; Night-time Monday to Saturday 10:00pm to 7:00am, Sunday and Public Holidays 10:00pm to 8:00am.

Note 4: At the most-affected point within 30 m of the residential premises.

Note 5: Equivalent external noise level.

Note 6: Acceptable internal noise level increased to 40 dBA LAeq(1hour) due to noise from existing industrial noise sources.

The NPfI Section 2.4 states:

*The recommended amenity noise levels have been selected on the basis of studies that relate industrial noise to annoyance in communities (Miedema and Voss, 2004). They have been subjectively scaled to reflect the perceived differential expectations and ambient noise environments of rural, suburban and urban communities for residential receivers. They are based on protecting the majority of the community (90%) from being highly annoyed by industrial noise.*

Secondly, the NPfI Section 2.1 states:

*The project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Applying the most stringent requirement as the project noise trigger level ensures that both intrusive noise is limited and amenity is protected and that no single industry can unacceptably change the noise level of an area.*

The project intrusive noise level (LAeq(15minute)) should not exceed the RBL (once beyond a minimum threshold) by more than 5 dB. The PNTLs are then determined in accordance with NPfI Section 2.1, by identifying the lower of the project amenity noise level or project intrusive noise level (following conversion of the project amenity noise level LAeq(period) to an equivalent LAeq(15minute) value for comparison with the project intrusive noise level LAeq(15minute) using the NPfI Section 2.2 default conversion factor of plus 3 dB).

The project amenity noise levels, the project intrusive noise levels and the resulting LAeq(15minute) PNTLs for the nearest receiver types in the vicinity of the Project are presented in **Table 15**. These criteria are nominated for the purposes of assessing potential noise impacts from the Project.

**Table 15 NPfl Project Amenity, Intrusive Noise Levels and Resulting LAeq(15minute) PNTLs (dBA re 20µPa)**

| Receiver Area | NPfi Noise Amenity Area <sup>1, 2</sup> | Project Amenity Noise Level LAeq(15minute) <sup>1,2</sup> |         |       | Project Intrusive Noise Level LAeq(15minute) <sup>1,3</sup> |         |       | Resulting PNTL LAeq(15minute) <sup>1,4,5</sup> |         |       |
|---------------|-----------------------------------------|-----------------------------------------------------------|---------|-------|-------------------------------------------------------------|---------|-------|------------------------------------------------|---------|-------|
|               |                                         | Day                                                       | Evening | Night | Day                                                         | Evening | Night | Day                                            | Evening | Night |
| Any           | Rural                                   | 48                                                        | 43      | 38    | 40                                                          | 35      | 35    | 40                                             | 35      | 35    |
| Any           | Commercial                              | 63 when in use                                            |         |       | not applicable                                              |         |       | 63 when in use                                 |         |       |
| Any           | Industrial                              | 68 when in use                                            |         |       |                                                             |         |       | 68 when in use                                 |         |       |
| Any           | Active Recreation                       | 53 when in use                                            |         |       |                                                             |         |       | 53 when in use                                 |         |       |
| Any           | Passive Recreation                      | 48 when in use                                            |         |       |                                                             |         |       | 48 when in use                                 |         |       |
| Ulan          | School Classroom - External             | 48 when in use                                            |         |       |                                                             |         |       | 48 when in use                                 |         |       |
| Any           | Place of Worship - External             | 48 when in use                                            |         |       |                                                             |         |       | 48 when in use                                 |         |       |

Note 1: Daytime Monday to Saturday 7:00am to 6:00pm, Sunday and Public Holidays 8:00am to 6:00pm; Evening Monday to Sunday 6:00pm to 10:00pm; Night-time Monday to Saturday 10:00pm to 7:00am, Sunday and Public Holidays 10:00pm to 8:00am.

Note 2: Project amenity noise level LAeq(15minute) equivalent to the project amenity noise level LAeq(period) plus 3 dBA.

Note 3: Project intrusive noise level LAeq(15minute) equivalent to the RBL plus 5 dBA.

Note 4: Resulting LAeq(15minute) PNTL is the lower of the project amenity noise level or project intrusive noise level.

Note 5: At the most-affected point within 30 m of the residential premises.

It is noted under the NPfl assessment approach that resultant PNTLs are in some cases more or less stringent (i.e. higher or lower) than existing noise limits. In qualitative terms, the extent of noise protection provided by the PNTLs is described in *A Guide to the Noise Policy for Industry* (EPA 2017).

In those cases where the NPfl noise assessment criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise “unacceptable”. In subjective terms, NPfl Table 4.1 and Table 4.2 characterise the noise impacts resulting from residual noise exceedances generally as follows:

- If the residual noise exceedance is 1-2 dBA above the PNTL, then noise impacts are considered to be negligible (i.e. not discernible by the average listener);
- If the residual noise exceedance is 3-5 dBA above the PNTL, and the project would contribute less than (or equal to) 1 dB to the total industrial noise level, then noise impacts are considered to be marginal;
- If the residual noise exceedance is 3-5 dBA above the PNTL, and the project would contribute more than 1 dB to the total industrial noise level, then noise impacts are considered to be moderate;
- If the residual noise exceedance is >5 dBA above the PNTL, and the total industrial noise level is less than (or equal to) the relevant amenity level, then noise impacts are considered to be moderate; or
- If the residual noise exceedance is > 5 dBA above the PNTL, and the total industrial noise level is greater than the relevant amenity level, then noise impacts are considered to be significant.

## 6.2.2 NPfI Corrections for Annoying Characteristics (Modifying Factors)

Sources of industrial noise can cause greater annoyance where they contain certain characteristics, such as tonality, intermittency or dominant low-frequency content. The NPfI specifies the following modifying factors, shown in **Table 16**, which are to be applied where annoying characteristics are present. An assessment of modifying factors is provided in **Section 7.3**.

**Table 16 NPfI Modifying Factors**

| Factor              | Assessment/Measurement                                                                                     | When to Apply                                                                                                                                                                                                                         | Correction <sup>1</sup>                                                  |
|---------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Tonal noise         | One-third octave or narrow band analysis                                                                   | Level of one-third octave band exceeds the level of the adjacent bands on both sides by the levels defined in the NPfI.                                                                                                               | 5 dB <sup>2</sup>                                                        |
| Low-frequency noise | Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements       | Measure/assess source contribution C and A weighted $Leq,t$ levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and the level to which the thresholds defined in the NPfI are exceeded. | 2 or 5 dB <sup>2</sup>                                                   |
| Intermittent noise  | Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level | The source noise heard at the receiver varies by more than 5 dB and the intermittent nature of the noise is clearly audible.                                                                                                          | 5 dB <sup>3</sup>                                                        |
| Maximum adjustment  | Refer to individual modifying factors                                                                      | Where two or more modifying factors are indicated.                                                                                                                                                                                    | Maximum correction of 10 dB <sup>2</sup> (excluding duration correction) |

Note 1: Corrections to be added to the measured or predicted levels.

Note 2: Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

Note 3: Adjustment to be applied to night-time only.

## 6.2.3 Sleep Disturbance

Given the Project is proposed to operate 24 hours per day, 7 days per week, it is appropriate to consider the potential for sleep disturbance at residential receivers during the night-time period.

In addition to the PNTLs, the NPfI provides guidance in relation to the assessment of sleep disturbance. Specifically, the NPfI states:

*Where the subject development/premises night-time noise levels at a residential location exceed:*

- *$LA_{eq}(15\text{minute})$  40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *$LAF_{max}$  52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,*

*a detailed maximum noise level assessment should be undertaken.*

Based on the foregoing, the applicable night-time sleep disturbance noise levels (SDNLs) for residences are an intrusive ( $LA_{eq}(15\text{minute})$ ) noise level of 40 dBA and a maximum noise level ( $LAF_{(max)}$ ) of 52 dBA.

Where those trigger levels are not met, it is appropriate to consider any effect of the noise with regard to:

- The extent to which the maximum noise level exceeds the RBL.
- How often high noise events will occur.
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development.
- Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods).
- Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

It may also be appropriate to consider other published research including the NSW *Road Noise Policy* (RNP) (Department of Environment, Climate Change and Water 2011) which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions; and that
- One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

Internal noise levels in a dwelling, with the windows open, are commonly 10 dB lower than external noise levels. Therefore, the first conclusion above suggests that short-term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

### 6.3 Voluntary Land Acquisition and Mitigation Policy

The *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) (Department of Planning and Environment 2018) took effect pursuant to a corresponding amendment to clause 12A of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) from 21 September 2018. The Department of Planning, Industry and Environment's (now DPE) supporting document to the VLAMP, notes that a key change in comparison with the previous VLAMP (DPE, 2014) is that the noise criteria have been adjusted to align with the NPfI, however no changes to cumulative noise levels were made and strong night-time noise protections were maintained.

The VLAMP describes the NSW Government's policy for voluntary mitigation and land acquisition to address noise (and dust) impacts from State Significant Mining, Petroleum and Extractive Industry Developments. The NSW Government has had long-standing processes in place for land acquisition and mitigation associated with mining developments and these procedures are formalised in the VLAMP, including:

- That industry needs to apply all feasible and reasonable measures to minimise noise (and dust) impacts;
- When noise (and dust) impacts are considered appreciable and warrant mitigation measures at the receiver and or land acquisition rights upon request;

- The mitigation measures that need to be offered to affected landowners when impacts are marginal or moderate; and
- Requirements for negotiated agreements between applicants and landowners.

An extract from the VLAMP details how the policy applies to noise impacts and the key Table 1 is reproduced as **Table 17**.

**Table 17 VLAMP Table 1 - Characterisation of Noise Impacts and Potential Treatments**

| If the predicted noise level minus the PNTL is: | And the total cumulative industrial noise level is:                                                                                                                                                                                   | Characterisation of impacts:                    | Potential treatment:                                                                                                                                                             |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All time periods<br>0-2dB                       | Not applicable                                                                                                                                                                                                                        | Impacts are considered to be <b>negligible</b>  | The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls.                                          |
| All time periods<br>3-5dB                       | < = recommended amenity noise level in Table 2.2 of the NPfl; or<br>> recommended amenity noise level in Table 2.2 of the NPfl, but the increase in total cumulative industrial noise level resulting from the development is < = 1dB | Impacts are considered to be <b>marginal</b>    | Provide mechanical ventilation / comfort condition systems to enable windows to be closed without compromising internal air quality / amenity.                                   |
| All time periods<br>3-5dB                       | > recommended amenity noise level in Table 2.2 of the NPfl, and the increase in total cumulative industrial noise level resulting from the development is > 1dB                                                                       | Impacts are considered to be <b>moderate</b>    | As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels. |
| Day and evening<br>>5dB                         | < = recommended amenity noise levels in Table 2.2 of the NPfl                                                                                                                                                                         | Impacts are considered to be <b>moderate</b>    | As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels. |
| Day and evening<br>>5dB                         | > recommended amenity noise levels in Table 2.2 of the NPfl                                                                                                                                                                           | Impacts are considered to be <b>significant</b> | Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above.                                                                                  |
| Night<br>>5dB                                   | Not applicable                                                                                                                                                                                                                        | Impacts are considered to be <b>significant</b> | Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above.                                                                                  |

## 6.4 Cumulative Industrial Noise

The NPfI notes:

*Where the project amenity noise levels apply and it can be met, no additional consideration of cumulative industrial noise is required.*

The NPfI seeks to protect against cumulative noise impacts and by setting the PNTLs at the more stringent of the project intrusiveness criteria or project amenity criteria, that aims to ensure intrusive noise is limited, and amenity is protected.

Notwithstanding, given the significant industry within the study area an assessment of cumulative noise levels has been conducted. The NPfI recommended noise amenity levels for receivers in the vicinity of the Project are shown in **Table 14**.

A review of major approved and proposed industrial developments in the vicinity of the Project was conducted and is presented in **Table 18**. The anticipated night-time operating  $L_{Aeq}(9\text{hour})$  amenity levels from the Ulan Mine Complex and Wilpinjong Coal Mine have been established by reviewing the project approvals and environmental assessments and then used for the purposes of the cumulative night-time noise amenity assessment.

**Table 18 Approved/Proposed Industrial Developments in the Vicinity of the Project**

| Development Site       | Approval Date                                           | Status                                              | Source of Noise Data                                                                                    |
|------------------------|---------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Ulan Coal Mine         | 15 November 2010                                        | Existing/Approved under MP 08_0184 (as modified)    | Ulan Coal Continued Operations EA Appendix 12 (Umwelt, 2009).                                           |
| Wilpinjong Coal Mine   | 24 April 2017                                           | Existing/Approved under SSD-6764                    | Wilpinjong Extension Project Noise and Blasting Assessment (SLR, 2015)                                  |
| Moolarben Coal Complex | 6 September 2007 (Stage 1)<br>30 January 2015 (Stage 2) | Existing/approved under PA 05_0117 and PA (08_0135) | MCO (pers. comms). Approved Moolarben Coal Complex operation incorporated into Project noise modelling. |

The Ulan West Modification (MOD 3) Environmental Assessment (EA) (Umwelt, 2015) includes the repositioning of approved ventilation shafts and dewatering bores as well as the installation of additional ventilation shafts and associated surface infrastructure. The Ulan West Modification Noise Impact Assessment (EA Appendix 7) Section 5.4 concludes that the cumulative noise impact assessment criteria would not be exceeded due to MOD 3. A review of predicted noise impacts (as described in the EA Appendix 7) indicates that the Ulan Continued Operations Project (as modified) would not have the potential to increase noise in the vicinity of the Project above the noise levels previously identified in the Ulan Continued Operations Project EA (Umwelt, 2009) Appendix 12.

Furthermore, the Ulan Longwall Optimisation Project MOD 4 Noise Impact Assessment (Umwelt, 2018) provides results of noise modelling and an assessment for the construction of additional dewatering infrastructure as part of the MOD 4 Project. Given that MOD 4 construction noise would not occur in conjunction with operation of the Project the noise levels previously identified in the Ulan Continued Operations Project EA (Umwelt, 2009) Appendix 12 have been used in the assessment of cumulative noise.

It should be noted that for each of the developments identified above, the likelihood of the existing, approved and proposed developments emitting maximum noise emissions simultaneously is remote, due to the range of development locations and directional and other differences in the noise enhancing (and diminishing) weather effects. The cumulative noise assessment is therefore considered to be conservative.

## **6.5 Off-site Road Transport**

There would be no change to the approved peak workforce at the Moolarben Coal Complex, and therefore off-site road traffic noise is not further considered in this report.

## **6.6 Off-site Rail Transport**

Product coal produced by the Coal Handling and Preparation Plant (CHPP) at the Moolarben Coal Complex would continue to be stockpiled prior to being reclaimed and loaded onto trains for transport to the Port of Newcastle via the Gulgon to Sandy Hollow railway line before connecting to the Main North Line at Muswellbrook.

There would be no increase in the approved average or peak product coal train departures from the site due to the Project, and off-site rail transport noise is not further considered in this report.

## 7 Operational Noise Assessment Methodology

### 7.1 Moolarben Coal Complex and Project Noise Model Validation

A computer model was used to predict noise emissions from the operation of the Project. The operational noise modelling was undertaken using the CONCAWE algorithms within SoundPLAN v8.1 software. The CONCAWE noise prediction algorithms as implemented within the SoundPLAN software are commonly used and accepted by the EPA and DPE for the assessment of industrial noise in NSW. Furthermore the meteorological category used within the CONCAWE algorithm is assessed in accordance with Pasquill and Turner Stability Categories and aligns with the 'standard' and 'noise enhancing' NPfI meteorological conditions. The six meteorological categories used within the CONCAWE algorithm based on Pasquill Stability Category and vector wind speeds are shown in **Table 19**.

**Table 19 CONCAWE Meteorological Category**

| Meteorological Category | Pasquill Stability Category |                   |                   |
|-------------------------|-----------------------------|-------------------|-------------------|
|                         | A, B                        | C, D, E           | F, G              |
| 1                       | $V^1 < -3.0$                | -                 | -                 |
| 2                       | $-3.0 < V < -0.5$           | $V < -3.0$        | -                 |
| 3                       | $-0.5 < V < +0.5$           | $-3.0 < V < -0.5$ | $V < -3.0$        |
| 4                       | $+0.5 < V < +3$             | $-0.5 < V < 0.5$  | $-3.0 < V < -0.5$ |
| 5                       | $V > 3$                     | $0.5 < V < +3$    | $-0.5 < V < +0.5$ |
| 6                       | -                           | $V > +3$          | $+0.5 < V < +3$   |

Note 1: V = wind speed in m/s with a negative value meaning wind from receiver to source and a positive value meaning wind from the source to the receiver.

A three-dimensional digital terrain map providing relevant topographic information was used in the modelling process, together with noise source data, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

SLR have conducted a validation study to update and validate the Moolarben Coal Complex noise model and reflect as-built noise emissions. Far-field operator-attended noise surveys conducted as part of routine compliance noise monitoring has been used to determine Moolarben Coal Complex's noise level contribution at the NA6 and NA12 compliance noise monitoring locations. For each survey the prevailing weather conditions as well as the number and general location of operating plant and equipment were provided. These validation scenarios were then modelled, with the modelled results then compared to measured results.

The outcomes of the validation study indicate that predicted noise levels are generally within 2 dB of measured values with a difference of up to 5 dB. Considering the limitations of the study, the validation study indicates that no correction factor for the noise model is warranted and that the noise model developed is deemed suitable for predicting noise from the Project.

## 7.2 Modelling Scenarios and Mobile Equipment and Fixed Plant Sound Power Levels

In accordance with NPfI assessment requirements, the Project description was reviewed to determine representative operating scenarios to assess potential noise impacts. Three operational years of the Project (i.e. 2028, 2029 and 2031) were selected for modelling in consideration of maximum potential noise emissions (e.g. to account for the maximum mobile equipment fleet and proximity to privately-owned residences and non-residential receivers in different localities) to evaluate potential noise impacts of the Project.

These scenarios were selected as they are representative of maximum proposed open cut ROM coal mining rates for the Project (9 Mtpa) (i.e. 2028), maximum combined mining rate for the Project and Stage 2 open cut (OC4) operations (16 Mtpa) (i.e. 2028 and 2029) and Project mining operations at the southern-most location (i.e. the closest proximity to residences in Cooyal) (i.e. 2031).

The potential for machinery to emit noise is quantified as the SWL expressed in dBA re 1 pico watt (pW). At the receptor, the received noise is quantified as the sound pressure level (SPL) expressed in dBA re 20  $\mu$ Pa. In general terms, any variation in the on-site plant and equipment SWLs will produce a similar variation in the off-site SPL at the receiver (i.e. an increase of 5 dBA in the SWL of equipment operating at a site would result in a corresponding 5 dBA increase in SPL of intrusive noise at the receiver, when averaged over the same 15-minute period).

Equipment SWLs at the Moolarben Coal Complex are the subject of ongoing measurements in accordance with the NMP, and MCO has refined the SWLs for individual fleet items accordingly. Comparative mobile equipment, fixed plant and total SWLs for each operating scenario are provided in **Appendix D** along with the source of SWL data and the modelled elevation above ground level.

The three operational noise modelling scenarios include existing and proposed plant and equipment items operating concurrently to simulate the overall maximum energy equivalent (i.e.  $L_{Aeq[15minute]}$ ) intrusive noise level. A large proportion of the mobile equipment is operated in repeatable routines and a relatively smaller proportion of the emissions emanate from continuous fixed plant items. The total Moolarben Coal Complex (including the Project) SWL is 135.6 dBA for the 2028, 2029 and 2031 scenarios, with Project SWLs ranging from 131.1 dBA for the 2028 and 2029 modelling scenario, reducing to 130.3 dBA in 2031.

In addition to the SWLs contained in **Appendix D**, in order to predict sleep disturbance noise levels, a maximum ( $L_{Amax}$ ) SWL of 123 dBA has been adopted on all excavators, loaders and shovels as well as a maximum ( $L_{Amax}$ ) SWL of 122 dBA for haul trucks and dozers.

## 7.3 Modifying Factor Assessment

Analysis of routine compliance monitoring to date indicates that the Moolarben Coal Complex noise emissions do not contain any tonal, impulsive and low frequency components as per definitions of “modifying factor corrections” in accordance with the NPfI.

Notwithstanding the above a low frequency noise analysis was conducted at the following six (6) geographically representative locations:

- Receiver 160 (Ulan Public School) in the township of Ulan
- Receiver 258 to the west of Ulan on Cope Road

- Receiver 70 on the lower part of Ridge Road in Cooks Gap
- Receiver 176 on the upper part of Ridge Road in Cooks Gap
- Receiver 380 representative of receivers at the northern end of Drip Lane in Cooyal
- Receiver 394 representative of the suburb of Cooyal

The analysis comprised a comparison of the predicted intrusive  $L_{Ceq}(15\text{minute})$  noise level against the corresponding intrusive  $L_{Aeq}(15\text{minute})$  noise level under noise enhancing conditions. The resulting C and A weighted night-time predicted intrusive noise levels differences under noise enhancing meteorological conditions are presented in **Table 20** for Project operations in 2028, 2029 and 2031.

**Table 20 C and A Weighted Predicted Intrusive Noise Level Differences**

| Assessed Receiver and Representative Area | Year | $L_{Aeq}(15\text{minute})$ (dBA) | $L_{Ceq}(15\text{minute})$ (dBC) | Level Difference (dB) <sup>1</sup> |
|-------------------------------------------|------|----------------------------------|----------------------------------|------------------------------------|
| 160 - Ulan Township                       | 2028 | 45                               | 57                               | 11.6                               |
|                                           | 2029 | 45                               | 57                               | 12.0                               |
|                                           | 2031 | 43                               | 56                               | 12.8                               |
| 258 - Cope Road                           | 2028 | 34                               | 49                               | <b>15.3</b>                        |
|                                           | 2029 | 34                               | 49                               | <b>15.5</b>                        |
|                                           | 2031 | 33                               | 49                               | <b>16.2</b>                        |
| 70 - Lower Ridge Road Cooks Gap           | 2028 | 36                               | 49                               | 13.8                               |
|                                           | 2029 | 35                               | 49                               | 14.2                               |
|                                           | 2031 | 34                               | 48                               | 14.6                               |
| 176 - Upper Ridge Road Cooks Gap          | 2028 | 34                               | 48                               | 14.3                               |
|                                           | 2029 | 34                               | 48                               | 14.7                               |
|                                           | 2031 | 32                               | 47                               | <b>15.1</b>                        |
| 380 - Drip Lane Cooyal                    | 2028 | 16                               | 30                               | 14.8                               |
|                                           | 2029 | 18                               | 34                               | <b>16.0</b>                        |
|                                           | 2031 | 18                               | 33                               | <b>15.5</b>                        |
| 394 - Cooyal Township                     | 2028 | 20                               | 38                               | <b>17.8</b>                        |
|                                           | 2029 | 20                               | 39                               | <b>18.9</b>                        |
|                                           | 2031 | 19                               | 38                               | <b>19.1</b>                        |

<sup>1</sup> **Bold** indicates a level difference greater than 15 dB.

As shown in **Table 20**, the resulting C and A weighted predicted (noise enhancing) intrusive noise level difference exceeds 15 dB at some receivers off Cope Road in Ulan and in Cooyal and therefore triggers a more detailed assessment of low frequency noise at these locations. **Table 21** summarises the predicted 1/1 octave band noise Project noise level against the NPfI low frequency 1/3 octave band low frequency threshold values.

**Table 21 NPfl Low Frequency Analysis**

| Location and Year | Noise Parameter                                    | Frequency (Hz) |      |    |    |    |    |     |     |     |
|-------------------|----------------------------------------------------|----------------|------|----|----|----|----|-----|-----|-----|
|                   |                                                    | 25             | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
| Threshold values  | LZeq(15minute) NPfl threshold Level dBZ            | 69             | 61   | 54 | 50 | 50 | 48 | 48  | 46  | 44  |
| 258 - 2028        | Project Octave band LZeq(15minute) noise level dBZ | 49             |      |    | 42 |    |    | 44  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 258 - 2029        | Project Octave band LZeq(15minute) noise level dBZ | 49             |      |    | 42 |    |    | 44  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 258 - 2031        | Project Octave band LZeq(15minute) noise level dBZ | 49             |      |    | 41 |    |    | 43  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 176 - 2031        | Project Octave band LZeq(15minute) noise level dBZ | 46             |      |    | 41 |    |    | 43  |     |     |
|                   | Exceedance                                         |                |      |    |    |    |    |     |     |     |
| 380 - 2029        | Project Octave band LZeq(15minute) noise level dBZ | 29             |      |    | 33 |    |    | 26  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 380 - 2031        | Project Octave band LZeq(15minute) noise level dBZ | 28             |      |    | 32 |    |    | 26  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 394 - 2028        | Project Octave band LZeq(15minute) noise level dBZ | 37             |      |    | 31 |    |    | 32  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 394 - 2029        | Project Octave band LZeq(15minute) noise level dBZ | 38             |      |    | 35 |    |    | 33  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |
| 394 - 2031        | Project Octave band LZeq(15minute) noise level dBZ | 38             |      |    | 34 |    |    | 32  |     |     |
|                   | Exceedance                                         | -              | -    | -  | -  | -  | -  | -   | -   | -   |

As shown in **Table 21**, all predicted Project octave band LZeq(15minute) noise levels are below the NPfl 1/3 octave low frequency threshold values. As such, no modifying factor correction for low-frequency noise is triggered for the Project. This is consistent with the results of ongoing compliance noise monitoring which indicates that no dominant low frequency noise from existing Moolarben Coal Complex operations is present and no modifying factors are applicable.

## 7.4 Noise Mitigation and Management Measures

MCO is obligated to manage noise levels from the Moolarben Coal Complex in accordance with the noise limits specified in Project Approval (05\_0117) and Project Approval (08\_0135), using reasonable and feasible mitigation measures. The obligation to meet the Project Approval noise limits has been achieved through a combination of the following:

- For the majority of private landowners, the implementation of the noise management strategy as per the NMP including the use of real-time noise monitoring to manage noise levels.
- For a minority of private landowners, property acquisitions and private compensation agreements, which has had the effect of reducing the number of privately-owned receivers that could potentially be affected by noise impacts from the Moolarben Coal Complex.

An appreciable level of effort has been applied by MCO to identify and implement reasonable and feasible on-site noise controls since the commencement of open cut mining, particularly to minimise the impact of night-time noise emissions from the Moolarben Coal Complex. The noise management strategy and MCO's compliance with the noise limits specified in Project Approval (05\_0117) and Project Approval (08\_0135) is described in **Sections 4.2 and 4.3** and includes:

- A description of real-time continuous noise monitoring, investigation of triggers and response protocol.
- The continuation of real-time monitoring, and the temporary stand-down of equipment, as required, as part of the response protocol for Real-Time Response Trigger Levels.
- A summary of operator-attended monitoring results showing MCO complied with the Project Approval noise limits in the 2016 to June 2022 reporting periods.
- A summary of complaints received by MCO showing that the number of noise related complaints has diminished through 2021 from previous years.

MCO considers the continued use of real-time mitigation implemented at the Moolarben Coal Complex to be reasonable and feasible.

## 8 Intrusive Noise Impact Assessment

### 8.1 Daytime Operating Intrusive Noise Levels

The predicted daytime  $L_{Aeq(15\text{minute})}$  intrusive noise levels for the 2028, 2029 and 2031 operating scenarios are presented in **Appendix E** for private residences and non-residential receivers in the vicinity of the Moolarben Coal Complex. Predicted noise levels are shown against the relevant PNTL as well as the relevant Project Approval noise limits.

Compliance with the PNTLs and the Project Approval (05\_0117) and Project Approval (08\_0135) noise limits are achieved at all private residences and non-residential receivers during standard and noise enhancing meteorological conditions during the day, evening and night.

### 8.2 Evening Operating Intrusive Noise Levels

The predicted evening  $L_{Aeq(15\text{minute})}$  intrusive noise levels for the 2028, 2029 and 2031 operating scenarios are presented in **Appendix E** for non-Project related or resource company owned noise sensitive receivers in the vicinity of the Moolarben Coal Complex. Predicted noise levels are shown against the relevant PNTL as well as the relevant Project Approval noise limits.

Compliance with the PNTLs and the Project Approval (05\_0117) and Project Approval (08\_0135) noise limits are achieved at all private residences and non-residential receivers during standard and noise enhancing meteorological conditions during the day, evening and night.

### 8.3 Night-time Operating Intrusive and Sleep Disturbance Noise Levels

The predicted night-time  $L_{Aeq(15\text{minute})}$  intrusive noise levels and sleep disturbance  $L_{Amax}$  noise levels for the 2028, 2029 and 2031 operating scenarios are presented in **Appendix E** for all private residences and non-residential receivers in the vicinity of the Moolarben Coal Complex. Predicted noise levels are shown against the relevant PNTL as well as the relevant Project Approval noise limits.

Compliance with the PNTLs and the Project Approval (05\_0117) and Project Approval (08\_0135) noise limits are achieved at all private residences and non-residential receivers during standard and noise enhancing meteorological conditions during the day, evening and night.

### 8.4 Impact Assessment Summary

In summary, the predicted daytime, evening and night-time intrusive  $L_{Aeq(15\text{minute})}$  noise levels and night time  $L_{Amax}$  noise levels for the 2028, 2029 and 2031 operating scenario shows that compliance with the PNTL is achieved at all private residences and non-residential receivers during standard and noise enhancing meteorological conditions for the Moolarben Coal Complex and the Project. Given this, compliance with the PNTL would also be expected for the Project in isolation (i.e. without the concurrent operation of the approved Moolarben Coal Complex) for the 2028, 2029 and 2031 operating scenarios.

Based on the outer envelope night-time  $L_{Aeq(15\text{minute})}$  intrusive noise contours for years 2028, 2029 and 2031 presented in **Appendix F**, the noise levels at publicly accessible areas within the Goulburn River National Park and Munghorn Gap Nature Reserve would comply with the relevant amenity PNTL of 48 dBA.

## 8.5 Cumulative Noise Impact Assessment

The predicted industrial noise amenity levels from the Project and approved Moolarben Coal Complex, Ulan Mine Complex and Wilpinjong Coal Mine were also conservatively considered for relevant receivers in Ulan and Cooks Gap. Receivers in Linburn and Cooyal have not been considered in the cumulative assessment due to their significant separation from potential cumulative noise sources. The estimated industrial (mining) operational evening and night-time  $L_{Aeq(period)}$  noise amenity levels from each of these developments have been established by reviewing the relevant EAs (where available) (**Section 6.4**). These are then used for the purposes of the cumulative night-time noise amenity assessment.

It should be noted that for each of the developments noted above, the likelihood of the existing, approved and proposed developments emitting simultaneous maximum noise emissions is unlikely, due to the range of development locations and directional and other differences in the noise-enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

The highest predicted evening and night-time  $L_{Aeq(period)}$  amenity noise levels for the 2028, 2029 and 2031 operating scenarios are presented in **Appendix G**.

Cumulative evening and night-time  $L_{Aeq(period)}$  amenity noise levels are predicted to be within the NPfl relevant recommended amenity levels at all private residences and non-residential receivers.

## 8.6 Privately-owned Vacant Land Impact Assessment

Based on the outer envelope night-time  $L_{Aeq(15minute)}$  intrusive noise contours for years 2028, 2029 and 2031 presented in **Appendix F**, noise generated by the Moolarben Coal Complex (including the Project) would not contribute to exceedances of the acceptable noise level plus 5 dB on more than 25% of any privately-owned land where there is an existing dwelling, or where a dwelling could be built under existing planning controls.

## 9 Blasting Impact Assessment

### 9.1 Blasting Assessment Criteria

#### 9.1.1 Australian Standard Criteria

Australian Standard (AS) 2187: Part 2-2006 *Explosives - Storage and Use - Part 2: Use of Explosives* provides guidance in assessing blast-induced ground (and structural) vibration and airblast effects on buildings and their occupants; details are presented in Appendix J of AS 2187.

Recommended vibration limits are based on international standards (or studies) as presented in Appendix J Tables J4.5(A) and J4.5(B) of AS 2187, for human comfort and structural building damage, respectively. Similarly, recommended human comfort and structural damage airblast limits are presented in Appendix J Tables J5.4(A) and J5.4(B) AS 2187, respectively.

#### 9.1.2 Human Comfort Noise and Vibration Criteria

The currently adopted limits for assessing potential annoyance from blasting during daytime hours are as per the Australian and New Zealand Environment Council (ANZEC) *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* dated September 1990, as follows:

- The recommended maximum level for airblast is 115 dB Linear.
- The level of 115 dB Linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dB Linear at any time.
- The recommended maximum level for ground vibration is 5 millimetres per second (mm/s), peak particle velocity (PPV).
- The PPV level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

The ANZEC criteria are generally consistent with AS 2187: Part 2-2006 Appendix J Tables J4.5(A) and J5.4(A) with respect to vibration and airblast human comfort, respectively.

The ANZEC guideline notes:

*The intent of these criteria is to minimise annoyance and discomfort to persons at noise sensitive sites (e.g residences, hospitals, schools etc.) caused by blasting.*

It is noted that external recreational areas are not covered under the ANZEC guideline. Table J4.5(A) and Table J5.4(A) of AS 2187 provide airblast and vibration limits for human comfort for occupied noise sensitive sites of 125 dBL and 25 mm/s.

In the absence of criteria relating to outdoor recreational areas, and for the purpose of assessing potential blast impacts at the Moolarben Picnic Area and Castle Rock Walking Track in the Munghorn Gap Nature Reserve the criteria for 'noise sensitive sites' have conservatively been adopted when the recreational areas are in use.

### 9.1.3 Livestock Comfort Airblast and Vibration Criteria

In a study by Casaday and Lehmann (1967) (*Responses of Farm Animals to Sonic Booms*) animal installations were selected for observations on animal behaviour under sonic boom conditions. The number of animals observed in this study included approximately 10,000 commercial feedlot beef cattle, 100 horses, 150 sheep and 320 lactating dairy cattle. Booms during the test period were scheduled at varying intervals during the morning hours on Monday to Friday of each week.

Results of the study showed that the reactions of the sheep and horses to sonic booms were slight. Dairy cattle were little affected by sonic booms (125 dB to 136 dB). Only 19 of 104 booms produced even a mild reaction, as evidenced by a temporary cessation of eating, rising of heads, or slight startle effects in a few of those being milked. Milk production was not affected during the test period, as evidenced by total and individual milk yield. The researchers developed a summary by species and farms, indicating that the few abnormal behavioural changes observed were well within the range of activity variation within a group of animals. They defined these changes as horses jumping up and galloping around the paddock, bellowing of dairy cattle, and increased activity by beef cattle (Casaday and Lehmann, 1967). In order to provide for a conservative assessment, the lowest airblast exposure studied (125 dB) was adopted as a criterion for the purposes of assessment of livestock impacts.

Similarly, an investigation (Heggies Australia Pty Ltd, 2006) was conducted to determine the vibration levels experienced by cattle during typical short-term road transportation, together with any vibration-induced health affects as observed by a registered veterinary surgeon. The study concluded that cattle are commonly exposed to vibration levels in excess of 200 mm/s during road transportation with no adverse effects on the cattle's health, including levels of stress and contentment. It was consequently presumed that there would only be an effect on the cattle's health at vibration levels well in excess of 200 mm/s.

### 9.1.4 Building Damage Airblast and Vibration Criteria

In relation to building damage airblast criteria, AS 2187: Part 2-2006 Appendix J J5.4(B) recommends a maximum airblast of 133 dBLpk.

The applicable building damage vibration criteria AS 2187: Part 2-2006 Appendix J J4.5(B) is derived from British Standard 7385: Part 2-1993 *Evaluation and Measurement for Vibration in Buildings Part 2. Guideline to damage levels from ground borne vibration*. The standard sets guideline values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels have been established to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration which are considered in the standard include blasting (carried out during mineral extraction or construction excavation), demolition, piling, ground treatments (e.g. compaction), construction equipment, tunneling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 22** and graphically in **Figure 6**.

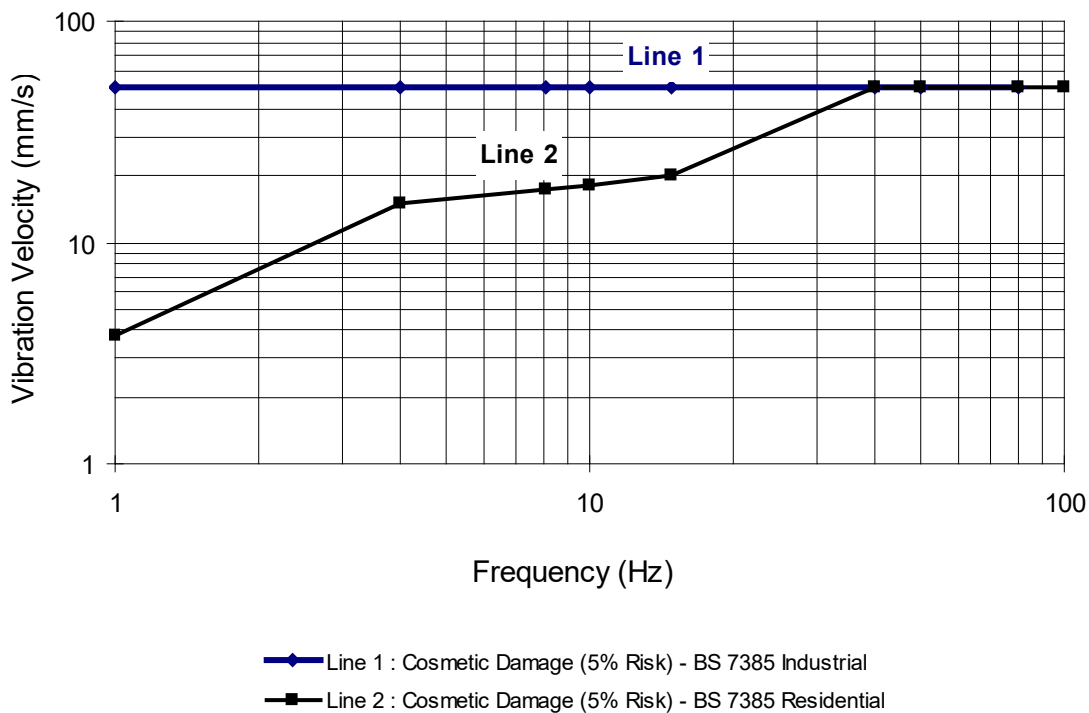
**Table 22 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage**

| Line | Type of Building                                                                          | Vibration in PCPV <sup>1</sup> in Frequency Range of Predominant Pulse |                                                           |
|------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------|
|      |                                                                                           | 4 to 15 Hz                                                             | 15 Hz and Above                                           |
| 1    | Reinforced or framed structures<br>Industrial and heavy commercial buildings              | 50 mm/s at 4 Hz and above                                              | -                                                         |
| 2    | Unreinforced or light framed structures<br>Residential or light commercial type buildings | 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz                         | 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above |

Note 1: Vibration Peak Component Particle Velocity - PCPV (mm/s).

The standard states that the guide values in **Table 22** relate predominantly to transient vibration which does not give rise to resonant responses in either structures or low-rise buildings. The standard notes that where the dynamic loading cause by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies, then the guide values for transient vibration may need to be reduced by up to 50%. However, blasting vibration is typically not of continuous character and therefore a reduction of the thresholds is not justified.

**Figure 6 Graph of Transient Vibration Guide Values for Cosmetic Damage**



The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 22**, and major damage to a building structure may occur at values greater than four times the tabulated values. It is noteworthy that in addition to the guide values nominated in **Table 22**, the standard states that:

*Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.*

Also that:

*A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.*

Based on the foregoing discussion a conservative vibration (PCPV) damage assessment criterion of 12.5 mm/s would be applicable to all privately-owned residential dwellings, as well as unreinforced or light framed structures or light commercial type buildings.

#### 9.1.5 Railway, Roadway and Other Public Infrastructure Vibration Damage Criteria

Infrastructure located outside of existing mining tenements includes the railway (line), roadway (culverts) and electricity transmission lines (ETLs). Accordingly, consideration has been given to potential vibration effects on such infrastructure.

The German Standard DIN 4150-3:1999 *Structural Vibration Part 3: Effects of vibration in structures* provides guideline values for evaluating the effect of vibration on buried pipework. The values are based on the assumption that pipes have been manufactured and laid using current technology. Additional considerations may be required at junctions. The recommended limits for short-term vibration to ensure minimal risk of damage are presented in **Table 23**.

**Table 23 Guideline Values for Vibration - Effects of Short-Term Vibration on Buried Pipework**

| Pipe Material                                                                              | Vibration PCPV Measured on the Pipe |
|--------------------------------------------------------------------------------------------|-------------------------------------|
| Steel (including welded pipes)                                                             | 100 mm/s                            |
| Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange) | 80 mm/s                             |
| Masonry, plastic                                                                           | 50 mm/s                             |

The railway infrastructure comprises mainly steel with concrete and similar materials and based on the foregoing a vibration (PCPV) damage assessment criterion of 100 mm/s would be applicable (refer to ACARP “Effect of blasting on infrastructure” guideline, ACARP project No. C14057, 2008). Similarly, roadway infrastructure comprises mainly concrete and similar materials, and a vibration (PCPV) damage assessment criterion of 80 mm/s would be applicable. ETLs would also typically attract a damage assessment of criteria of 50 mm/s to 100 mm/s.

The approved BMP has adopted a (PCPV) damage assessment criterion of 50 mm/s for all public infrastructure (unless otherwise agreed with DPE).

### 9.1.6 Aboriginal Heritage Site and Geological Vibration Damage Criteria

There are no regulatory criteria nominated in Australia for the assessment of damage to Aboriginal rock shelter sites or geological features from vibration. Research, however, has been undertaken by the United States (US) Army Corps of Engineers into the effects of large surface blasts on the dynamic stability of nearby unlined tunnels of various diameters in sandstone and granite (*Blast Vibration Monitoring and Control* [Dowding, 1985]). The results of the research indicated that intermittent rock fall or observable damage was not observed until vibration levels exceeded 460 mm/s.

This assessment therefore adopts a conservative blast design vibration damage criterion of 250 mm/s (5% exceedance) applicable to Aboriginal rock shelters as adopted in the MCO BMP based on available science plus (related) field observations, but absent of site specific damage analysis. MCO has developed a management protocol for Aboriginal rock shelters, where if blasting is proposed within 230 m of identified potential Aboriginal rock shelter sites, vibration blast monitoring will be undertaken and blast designs will be adjusted, as necessary, to comply with the adopted blast criterion. The Project open cut mining area extends within 230 m of known Aboriginal rock shelters.

The Project open cut mining area also extends within close proximity to significant natural geological features that form the potential cliff habitat for threatened bat species. The assessment adopts a maximum blast design criteria of 250 mm/s (5% exceedance) for cliff habitat features for threatened bat species. If blasting is proposed within the generalised safe working distances (**Section 9.6**) of cliff habitat features for threatened bat species, vibration blast monitoring would be undertaken and blast designs adjusted, as necessary.

## 9.2 Proposed Open Pit Blasting Practices

Assessment of the ground vibration and airblast emissions arising from coal and overburden blasting within the Project area has been based on the indicative Project blast design parameters presented in **Table 24**, which are generally similar to the current blasting practices in the existing Moolarben Coal Complex open cut mining areas. Potential blast impacts associated with the Project open cut mining area have been assessed.

**Table 24 Project Coal and Overburden Indicative Blast Design Parameters**

| Parameter                          | Coal Ranges                                       | Overburden Ranges                                  |
|------------------------------------|---------------------------------------------------|----------------------------------------------------|
| Bench Height                       | Typically 5m to 12m                               | Typically 6m to 37m                                |
| Burden and Spacing                 | Typically 7.5m to 8m                              | Typically 7m to 9m                                 |
| Stemming                           | Typically 4.0m (aggregate)                        | Typically 5.0m (aggregate)                         |
| Hole Diameter                      | Typically 229mm                                   | Typically 229mm & 251mm                            |
| Number of Holes                    | Typically 300 holes                               | Typically 400 holes                                |
| Charge Mass per Hole               | Typically up to 100 kilograms (kg)                | Typically up to 1,000 kilograms (kg)               |
| Holes per Delay                    | Typically 1 to 5 holes                            | Typically 1 to 5 holes                             |
| Maximum Instantaneous Charge (MIC) | Maximum 400 kg                                    | Typically 1,500 kg, Maximum 4,500 kg               |
| Effective Powder Factor            | Typically 0.1 to 0.15kg <sup>m</sup> <sup>3</sup> | Typically 0.5 to 0.75 kg <sup>m</sup> <sup>3</sup> |

To determine the blasting emissions levels at the nearest potentially affected receivers, the 50% and 5% exceedance ground vibration and airblast site laws for both coal and overburden blasts have been determined from measured vibration and airblast levels from the Moolarben Coal Complex blast monitoring programme and presented in *Moolarben Coal Complex - Open Cut Optimisation Modification - Noise Assessment* (MCO Optimisation NIA) (SLR 2017). The adopted site blast laws for coal and overburden blasts are provided below:

#### Coal Blast Site Laws – Offsite Privately-owned Receivers:

$$\begin{aligned}\text{PVS (50\%)} &= 360 * (R/Q^{1/2})^{-1.25} \\ \text{PVS (5\%)} &= 885 * (R/Q^{1/2})^{-1.25} \\ \text{SPL (50\%)} &= 158 - 20 * (\log(R) - \frac{1}{3} \log(Q)) \\ \text{SPL (5\%)} &= 169 - 20 * (\log(R) - \frac{1}{3} \log(Q))\end{aligned}$$

where,

$$\begin{aligned}\text{PVS} &= \text{Vibration velocity Peak Vector Sum (PVS) (mm/s)} \\ \text{SPL} &= \text{Airblast Linear Peak Level (dBLpk re 20 } \mu\text{Pa).} \\ R &= \text{Distance between charge and receiver (m)} \\ Q &= \text{Charge mass per delay (kg)}\end{aligned}$$

#### Overburden Blast Site Laws – Offsite Privately-owned Receivers:

$$\begin{aligned}\text{PVS (50\%)} &= 489 * (R/Q^{1/2})^{-1.48} \\ \text{PVS (5\%)} &= 1651 * (R/Q^{1/2})^{-1.48} \\ \text{SPL (50\%)} &= 146 - 17 * (\log(R) - \frac{1}{3} \log(Q)) \\ \text{SPL (5\%)} &= 156 - 17 * (\log(R) - \frac{1}{3} \log(Q))\end{aligned}$$

where,

$$\begin{aligned}\text{PVS} &= \text{Vibration velocity Peak Vector Sum (PVS) (mm/s)} \\ \text{SPL} &= \text{Airblast Level Linear Peak (dBLpk re 20 } \mu\text{Pa)} \\ R &= \text{Distance between charge and receiver (m)} \\ Q &= \text{Charge mass per delay (kg)}\end{aligned}$$

To determine the ground vibration levels at the nearest archaeological/ geological features and Aboriginal heritage sites the 50% and 5% exceedance ground vibration laws for both coal and overburden blasts have been determined from measured vibration levels at blast monitoring location BM2 as presented in the *Moolarben Coal Complex – Rock Shelter Blast Assessment* (SLR, 2018).

#### Coal Blast Site Laws – Rock Shelters and Geological Features:

$$\begin{aligned}\text{PVS (50\%)} &= 4,762 * (R/Q^{1/2})^{-1.76} \\ \text{PVS (5\%)} &= 9,238 * (R/Q^{1/2})^{-1.76}\end{aligned}$$

where,

$$\begin{aligned}\text{PVS} &= \text{Vibration velocity Peak Vector Sum (PVS) (mm/s)} \\ R &= \text{Distance between charge and receiver (m)} \\ Q &= \text{Charge mass per delay (kg)}\end{aligned}$$

### Overburden Blast Site Laws – Rock Shelters and Geological Features:

$$\text{PVS (50\%)} = 1,444 * (R/Q^{1/2})^{-1.74}$$

$$\text{PVS (5\%)} = 4,586 * (R/Q^{1/2})^{-1.74}$$

where,

PVS = Vibration velocity Peak Vector Sum (PVS) (mm/s)

R = Distance between charge and receiver (m)

Q = Charge mass per delay (kg)

## 9.3 Privately-owned Receivers and Community Facilities

Using the ground vibration and airblast site laws described above, blast emissions were predicted at the nearest privately-owned receivers and community facilities for a coal blast design Maximum Instantaneous Charge (MIC) 400 kg and overburden blast design MIC 4,500 kg for blasts within the Project area. The predicted ground vibration and airblast emissions are presented in **Appendix H** and the results are summarised below:

- Predicted blast emission levels show no exceedances of the human comfort criteria for ground vibration or airblast at all receivers in Cooks Gap, Linburn and Ulan.
- In absence of blast mitigation measures and assuming a coal blast design MIC 400 kg and overburden blast design MIC 4,500 kg, the results indicate an exceedance of the airblast criteria at three residential receiver locations in Cooyal (R379, R380 and R384) when at the nearest pit extent using equations for 5% exceedance levels.
- In absence of blast mitigation measures and assuming a coal blast design MIC 400 kg and overburden blast design MIC 4,500 kg, the results indicate the airblast criteria at the Moolarben Picnic Area and Castle Rocks Walking Track would be exceeded using the 5% exceedance levels, however, the airblast noise levels remain below the limits for an occupied 'non-sensitive' site.

Using the ground vibration and airblast site laws, outside of approximately 4,200 m for coal blasts and 3,800 m for overburden blasts, the safe blast design criterion for 'noise sensitive sites' (e.g. privately-owned receivers, recreational areas [when in use]) would be complied with, without limiting blast MIC. MCO would implement appropriate blast design and execution to achieve compliance with relevant blasting criteria at all times, but particularly when coal blasting within 4,200 m and overburden blasting within 3,800 m of the closest private receivers in Cooyal.

Any potential blasting impacts would continue to be managed and monitored in accordance with the BMP as amended to address the Project.

Furthermore, calculations were conducted using the respective 5% site law equations for overburden and coal blasts in order to determine the MIC for blasting at the nearest pit extents. The limiting MIC for each receiver based on ground vibration or airblast is provided in **Table 25**. The approach of this assessment was to determine the limiting factors to the blast design for the Project with the aim of achieving the relevant criteria at all private residences and non-residential receivers.

The MIC may exceed (or be less than) the values in **Table 25**, depending on the location of the area being mined and its relation to the nearest affected receivers. MCO will continue to utilise independent technical advice with regard to initiation techniques and timing as well as blast hole loading profiles to control the ground vibration and airblast impacts from operational blasting.

**Table 25 Limiting MIC 5% Exceedance Calculations**

| Receiver                                | Approximate Closest Blast Distance to Receiver (m) | MIC Based on Ground Vibration or Airblast (kg) |      | Blast Emission Prediction Based on MIC (5% exceedance) |                               |                               |                               |
|-----------------------------------------|----------------------------------------------------|------------------------------------------------|------|--------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                         |                                                    | Overburden                                     | Coal | Overburden                                             |                               | Coal                          |                               |
|                                         |                                                    |                                                |      | Vibration (mm/s) <sup>1</sup>                          | Airblast (dBLpk) <sup>2</sup> | Vibration (mm/s) <sup>1</sup> | Airblast (dBLpk) <sup>2</sup> |
| R379                                    | 3,625                                              | 3,350                                          | 230  | 3.6                                                    | 115                           | 1.0                           | 115                           |
| R380                                    | 3,440                                              | 2,900                                          | 195  | 3.5                                                    | 115                           | 0.9                           | 115                           |
| R384                                    | 3,582                                              | 3,250                                          | 220  | 3.6                                                    | 115                           | 0.9                           | 115                           |
| Moolarben Picnic Area <sup>4</sup>      | 1,430                                              | 205                                            | 15   | 1.8                                                    | 115                           | 0.6                           | 115                           |
| Castle Rocks Walking Track <sup>4</sup> | 3,728                                              | 3,100                                          | 250  | 3.3                                                    | 115                           | 1.0                           | 115                           |

Note 1: Vibration Velocity Peak Vector Sum (PVS) - (mm/s).

Note 2: Airblast Level Linear Peak - (dBLpk re 20 µPa).

Note 3: Predicted blast emission level complies with the human comfort criteria of 5 mm/s and 115 dBLpk.

Note 4: Criteria would be applied when recreational areas are in use.

MCO currently has a network of blast monitors which are used to provide feedback on ground vibration and airblast levels for each blast. Data collected from the monitors is correlated with blast parameters such as charge weight and location and used to ensure future blasts are adequately designed to avoid exceedances of appropriate noise and vibration criteria. With the incorporation of additional blast monitoring for the Cooyal area this feedback and design process will continue to be appropriate for future blasts within the Project disturbance boundary.

## 9.4 Public Infrastructure and Structures on Private Property

Using the ground vibration site law described above, blast emissions were predicted at public infrastructure and the nearest structure on private property for a coal blast design MIC 400 kg and overburden blast design MIC 4,500 kg (from blasts within the Project areas). The predicted ground vibration levels are presented in **Table 26**.

Results show no exceedance of the relevant vibration damage criteria for any public infrastructure or structure on private property. Notwithstanding, consistent with existing blast management measures, MCO would monitor blasts from the Project area occurring within 500 m of public infrastructure to ensure compliance is maintained with relevant criteria.

**Table 26 Predicted Ground Vibration Levels for Public Infrastructure and Structures on Private Property**

| Receiver ID or Land Use        | Landowner/Property ID        | Ground Vibration (mm/s) <sup>1</sup> |      |             |     |
|--------------------------------|------------------------------|--------------------------------------|------|-------------|-----|
|                                |                              | Overburden 4,500 kg                  |      | Coal 400 kg |     |
|                                |                              | 50%                                  | 5%   | 50%         | 5%  |
| Public Infrastructure          |                              |                                      |      |             |     |
| Moolarben Road                 | Mid-Western Regional Council | 1.6                                  | 5.5  | 0.6         | 1.6 |
| Mayberry Road                  |                              | 8.4                                  | 28.4 | 2.6         | 6.4 |
| Ulan Road                      |                              | 0.7                                  | 2.3  | 0.3         | 0.8 |
| Wollar Road                    |                              | 10.0                                 | 33.6 | 3.0         | 7.3 |
| Off-site Railway Line          | ARTC                         | 0.6                                  | 2.1  | 0.3         | 0.7 |
| Structures on Private Property |                              |                                      |      |             |     |
| R34                            | Property ID 34               | 2.0                                  | 6.7  | 0.8         | 1.9 |

Note 1: Vibration Velocity Peak Vector Sum (PVS) - (mm/s).

Note 2: Predicted ground vibration level complies with public infrastructure vibration criterion of 50 mm/s.

Note 3: Predicted ground vibration level complies with the light framed structure vibration criterion of 12.5 mm/s.

## 9.5 Livestock

The generalised predicted ground vibration and airblast overpressure level (5% likelihood of exceedance) safe working distances from typical coal (MIC 400 kg) and typical overburden (MIC 4,500 kg) blast designs for livestock disturbance are presented in **Table 27**.

**Table 27 Livestock Ground Vibration and Airblast Safe Working Distances**

| Blast Design | Blast MIC | Stockyard Livestock Vibration <sup>1</sup><br>(200 mm/s) | Stockyard Livestock Airblast <sup>1</sup><br>(125 dBLpk) |
|--------------|-----------|----------------------------------------------------------|----------------------------------------------------------|
| Coal         | 400 kg    | 66 m (5%)                                                | 1,300 m (5%)                                             |
| Overburden   | 4,500 kg  | 279 m (5%)                                               | 1,000 m (5%)                                             |

Note 1: The distance from blast to where the ground vibration or airblast is predicted to meet the relevant livestock disturbance criteria.

No private land is located within 1,300 m from the Project open cut mining area. Subsequently, the relevant ground vibration and airblast criteria for livestock are predicted to not be exceeded for the Project.

## 9.6 Aboriginal Heritage Site and Geological Vibration Damage

Using the Aboriginal Rock Shelter blast ground vibration site law described above, vibration levels were predicted at the subject Aboriginal rock shelter sites for a coal blast design MIC 400 kg (indicative maximum), and overburden blast designs with MIC 1,500 kg, MIC 3,000 kg and MIC 4,500 kg from the near-point distance to the Project open cut mining area. The predicted ground vibration levels are presented in **Table 28**.

**Table 28 Predicted PVS Ground Velocity Vibration Levels at Aboriginal Rock Shelter Sites (mm/s)**

| Aboriginal Rock Shelter ID | Approximate Nearest Point to Project mining area | Coal MIC 400 kg |       | Overburden MIC 1,500 kg |       | Overburden MIC 3,000 kg |       | Overburden MIC 4,500 kg |        |
|----------------------------|--------------------------------------------------|-----------------|-------|-------------------------|-------|-------------------------|-------|-------------------------|--------|
|                            |                                                  | 50%             | 5%    | 50%                     | 5%    | 50%                     | 5%    | 50%                     | 5%     |
| S1MC403 <sup>1</sup>       | -                                                | -               | -     | -                       | -     | -                       | -     | -                       | -      |
| S1MC403 <sup>1</sup>       | -                                                | -               | -     | -                       | -     | -                       | -     | -                       | -      |
| S1MC508                    | 80                                               | 416             | 807   | 409                     | 1,298 | 747                     | 2,372 | 1,063                   | 3,375  |
| S1MC509 <sup>1</sup>       | -                                                | -               | -     | -                       | -     | -                       | -     | -                       | -      |
| S1MC510                    | 120                                              | 204             | 396   | 202                     | 641   | 369                     | 1,171 | 525                     | 1,667  |
| S1MC511                    | 40                                               | 1,408           | 2,731 | 1,365                   | 4,335 | 2,495                   | 7,924 | 3,550                   | 11,275 |
| S1MC512 <sup>1</sup>       | -                                                | -               | -     | -                       | -     | -                       | -     | -                       | -      |
| S1MC513                    | 70                                               | 526             | 1,021 | 516                     | 1,637 | 942                     | 2,992 | 1,341                   | 4,258  |
| S1MC514                    | 60                                               | 690             | 1,339 | 674                     | 2,141 | 1,232                   | 3,913 | 1,753                   | 5,568  |
| S1MC515                    | 80                                               | 416             | 807   | 409                     | 1,298 | 747                     | 2,372 | 1,063                   | 3,375  |
| S1MC516                    | 70                                               | 526             | 1,021 | 516                     | 1,637 | 942                     | 2,992 | 1,341                   | 4,258  |
| S1MC517                    | 40                                               | 1,408           | 2,731 | 1,365                   | 4,335 | 2,495                   | 7,924 | 3,550                   | 11,275 |
| S1MC518                    | 50                                               | 951             | 1,845 | 926                     | 2,940 | 1,692                   | 5,374 | 2,408                   | 7,647  |
| S1MC538                    | 190                                              | 91              | 176   | 91                      | 288   | 166                     | 526   | 236                     | 749    |
| S1MC540                    | 60                                               | 690             | 1,339 | 674                     | 2,141 | 1,232                   | 3,913 | 1,753                   | 5,568  |

Note 1: Located within proposed indicated open cut mining area.

Note 2: Predicted ground vibration level complies with Aboriginal rock shelter vibration criterion of 250 mm/s.

Based on the coal blast design MIC of 400 kg at the approximate nearest point to the Project mining area the relevant damage vibration criteria is predicted to be exceeded at all locations with the exception of S1MC538.

Based on the overburden blast design MICs of 1,500 kg, 3,000 kg and 4,500 kg at the approximate nearest point to the Project mining area the relevant damage vibration criteria is predicted to be exceeded at all locations.

It is noted that significant natural geological features (i.e. cliff habitat) that potentially form habitat for threatened bat species are also located near to the Project open cut mining area and coal blast design MIC of 400 kg and overburden blast design MICs of 1,500 kg, 3,000 kg and 4,500 kg would also exceed the relevant damage vibration criteria.

The exceedances of blast vibration damage criteria are due to the proximity of the Aboriginal rock shelters and geological features to the Project open cut mining area. This highlights the need for mitigation and management of potential blast impacts including appropriate blast design and execution (including the reduction of MIC) when blasting in proximity to Aboriginal rock shelters and geological features. The BMP notes that MCO will adjust its blast designs, as necessary, to comply with the vibration damage criteria of 250 mm/s for Aboriginal rock shelters.

The generalised ground vibration safe working distances from coal and overburden blast designs are presented in **Table 29**.

**Table 29 Generalised Safe Working Distances to Aboriginal Rock Shelters and Geological Features**

| Blast Design | Blast MIC | Vibration Damage Criteria <sup>1</sup><br>(250 mm/s) |
|--------------|-----------|------------------------------------------------------|
| Coal         | 400 kg    | 156 m (5%)                                           |
| Overburden   | 1,500 kg  | 206 m (5%)                                           |
|              | 3,000 kg  | 292 m (5%)                                           |
|              | 4,500 kg  | 357 m (5%)                                           |

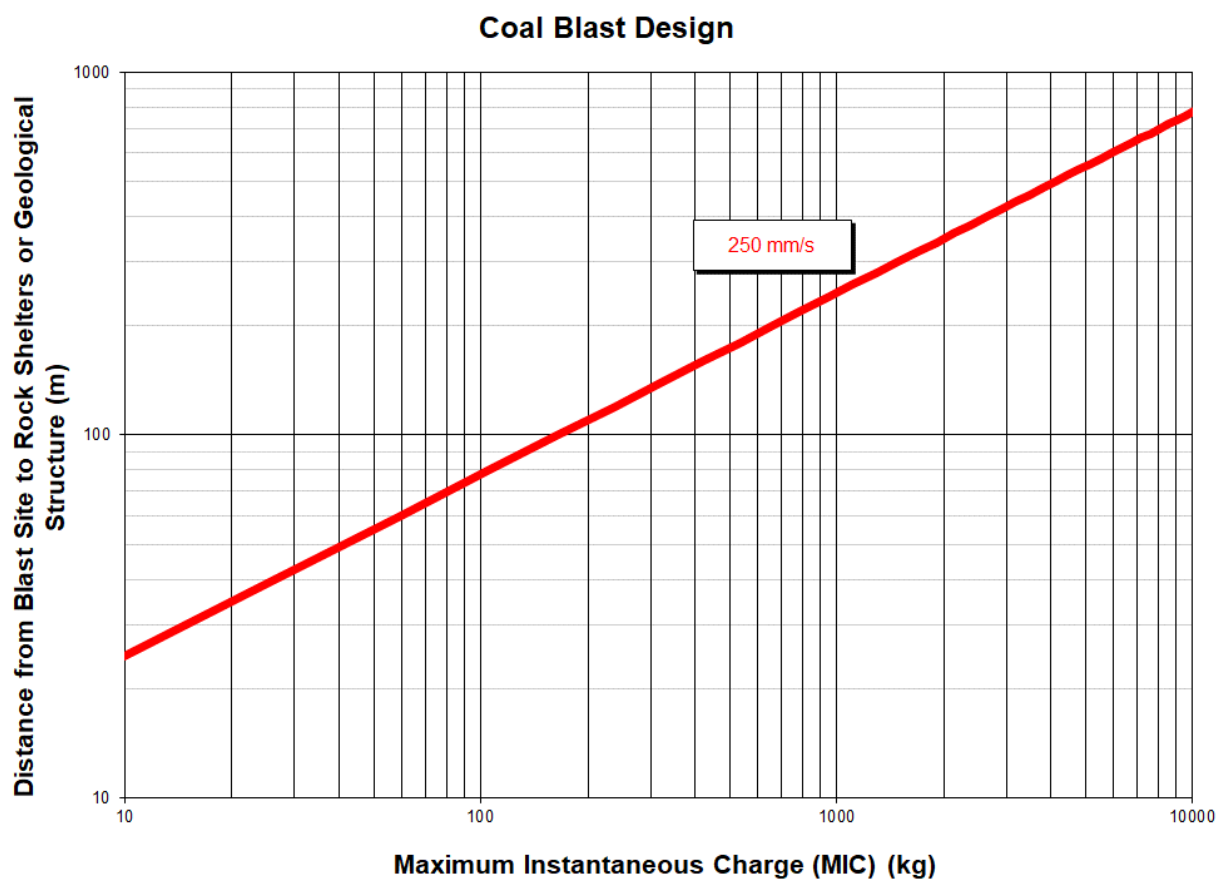
Note 1: The distance from the blast where the ground vibration level is predicted to meet the relevant criteria.

Blast design and execution would be adjusted as required for blasts located in close proximity to identified sensitive features (e.g. Aboriginal rock shelters, significant geological features) to maintain compliance with relevant vibration or airblast criteria.

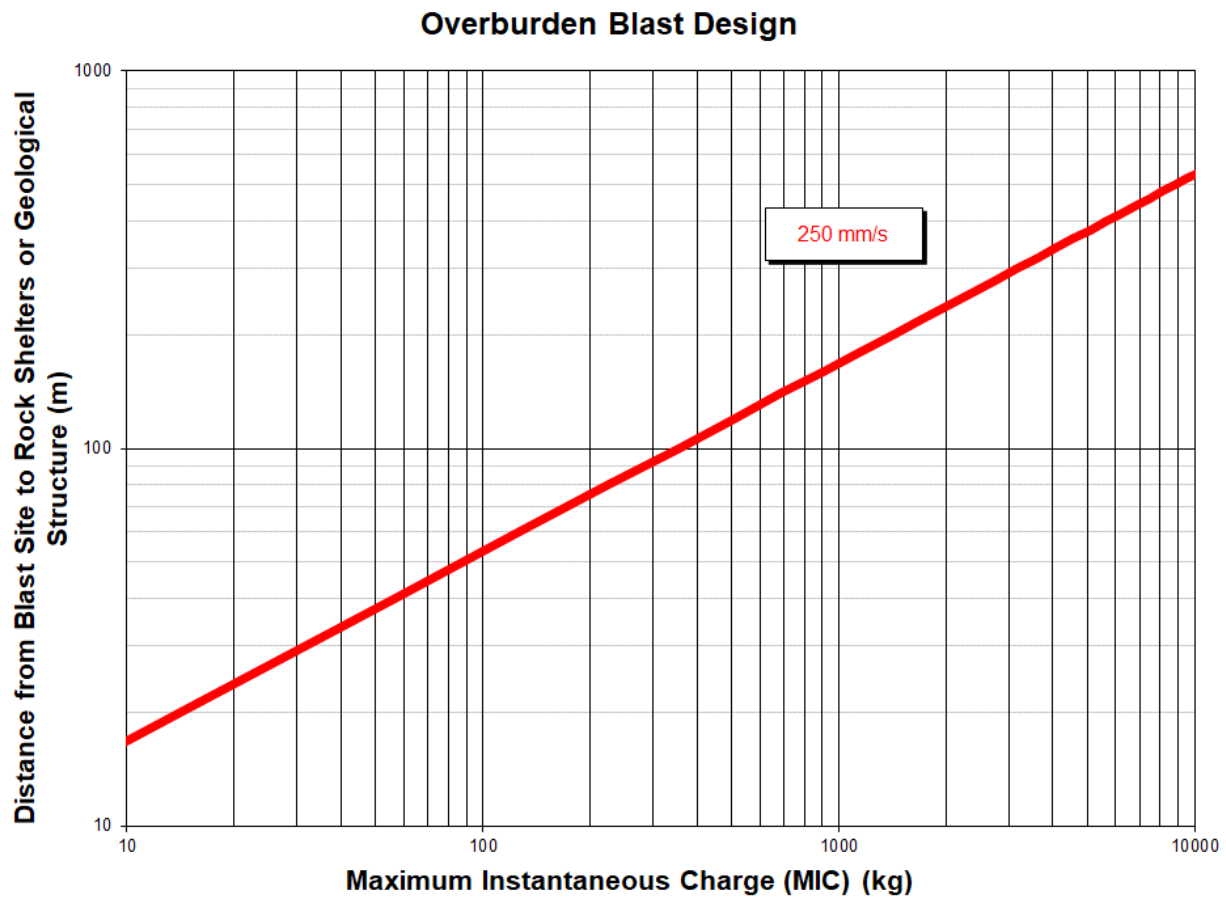
In addition to the generalised safe working distances, the predicted MIC versus distance (e.g. such as to the Aboriginal rock shelter or geological features) to comply with the vibration damage criteria for a coal or overburden blast is presented in **Figure 7** and **Figure 8**, respectively.

Consistent with existing blast management measures, MCO would monitor blasts from the Project area occurring within 230 m of Aboriginal cultural heritage rock shelter sites to ensure compliance is maintained with relevant criteria.

**Figure 7 Coal Blast Design MIC and Distance Relationship to Rock Shelter or Geological Feature**



**Figure 8 Overburden Blast Design MIC and Distance Relationship to Rock Shelter or Geological Feature**



It is recommended that when blasting for the Project approaches these calculated safe working distances, vibration monitoring be conducted to ensure compliance and to increase the accuracy of site-laws used above to ensure continued compliance with the vibration damage criteria.

## 10 Conclusion

This assessment has addressed potential noise and blasting impacts associated with the Project.

### Operational Noise Assessment

The potential operational noise for the Project and approved Moolarben Coal Complex were assessed for three years (2028, 2029 and 2031) for different periods of the day (day, evening and night) and with regard to noise enhancing meteorological conditions of moderate-to-strong temperature inversion plus a wind of 2 m/s (source-to-residence/receiver).

The operational noise prediction indicate that noise levels from the Project and approved Moolarben Coal Complex comply with the PNTLs and Project Approval criteria at all private residences and non-residential receivers under standard and noise enhancing meteorological conditions.

Operational noise levels are also predicted to comply with the relevant project noise trigger levels and Project Approval criteria at all community facilities.

A low-frequency noise assessment was conducted which indicates that it is unlikely that any of the receivers surrounding the Project would be subject to low-frequency noise. Therefore, no modifying factor correction for low-frequency noise is warranted for the Project.

### Sleep Disturbance Assessment

The  $L_{Amax}$  noise level is predicted to be below the relevant sleep disturbance noise level under standard and noise enhancing meteorological conditions at all privately owned residential locations.

### Cumulative Noise Impact Assessment

The cumulative noise predictions of the Project and the approved Moolarben Coal Complex, the Wilpinjong Coal Mine and the Ulan Mine Complex were conducted.

The assessment indicates that the concurrent operation of the Project and the approved Moolarben Coal Complex, the Wilpinjong Coal Mine and the Ulan Mine Complex are predicted to be within the recommended amenity noise levels at all private residences and non-residential receivers.

### Vacant Land Assessment

Noise generated by the Project and approved Moolarben Coal Complex would not contribute to exceedances of the acceptable noise level plus 5 dB on more than 25% of any privately-owned land.

### Blasting

Predicted blast emission levels show no exceedance of the human comfort criteria for ground vibration or airblast at all receivers in Cooks Gap, Linburn and Ulan. In absence of blast mitigation measures and assuming a coal blast design MIC 400 kg and overburden blast design MIC 4,500 kg, the results indicate an exceedance of the airblast criteria at three residential receiver locations in Cooyal (R379, R380 and R384). MCO would implement appropriate blast design and execution to achieve compliance with relevant blasting criteria at all times, but particularly when coal blasting within 4,200 m and overburden blasting within 3,800 m of the closest private receivers in Cooyal.

Design coal and overburden blasts indicate that exceedances of blast vibration damage criteria is likely due to the proximity of the Aboriginal rock shelters and geological features to the Project open cut mining area. This highlights the need for mitigation and management of potential blast impacts including appropriate blast design and execution (including the reduction of MIC) when blasting in proximity to Aboriginal rock shelters and geological features. The BMP notes that MCO will adjust its blast designs, as necessary, to comply with the vibration damage criteria of 250 mm/s for Aboriginal rock shelters.

Blast emissions levels collected from blasts within the Project disturbance boundary in Cooyal and at nearby Aboriginal rock shelters or potential cliff habitat for threatened bat species will be monitored and managed to ensure future blasts are adequately designed to avoid exceedances of appropriate noise and vibration criteria. This feedback and design process will continue to be appropriate for future blasts for the Project.

## 11 References

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# APPENDIX A

## Land Ownership Details

| Receiver ID | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|-------------|---------------------|-----------------|--------------|---------------|
|             |                     | Easting (m)     | Northing (m) |               |
| Cooks Gap   |                     |                 |              |               |
| 39          | Private Residential | 755957          | 6415238      | 591           |
| 40          | Private Residential | 756276          | 6416447      | 556           |
| 41B         | Private Residential | 756189          | 6415779      | 576           |
| 53          | Private Residential | 755729          | 6414441      | 605           |
| 60          | Private Residential | 756465          | 6418533      | 529           |
| 61          | Private Residential | 756362          | 6418760      | 524           |
| 70          | Private Residential | 756127          | 6420702      | 512           |
| 75          | Private Residential | 755972          | 6419749      | 516           |
| 79          | Private Residential | 756016          | 6419156      | 520           |
| 80          | Private Residential | 755616          | 6418917      | 533           |
| 82          | Private Residential | 756194          | 6418654      | 525           |
| 83          | Private Residential | 755803          | 6418427      | 536           |
| 84          | Private Residential | 756023          | 6418247      | 533           |
| 86          | Private Residential | 755480          | 6417846      | 562           |
| 87          | Private Residential | 755823          | 6418049      | 541           |
| 88          | Private Residential | 756004          | 6417733      | 541           |
| 89          | Private Residential | 755335          | 6417627      | 565           |
| 90          | Private Residential | 755302          | 6417490      | 567           |
| 91          | Private Residential | 755944          | 6417351      | 546           |
| 94          | Private Residential | 754861          | 6416778      | 614           |
| 95          | Private Residential | 755030          | 6416808      | 605           |
| 96          | Private Residential | 755139          | 6416837      | 597           |
| 97          | Private Residential | 755318          | 6416980      | 578           |
| 98          | Private Residential | 755411          | 6416759      | 578           |
| 99          | Private Residential | 755563          | 6416733      | 572           |
| 100         | Private Residential | 755952          | 6416803      | 558           |
| 101a        | Private Residential | 755937          | 6416442      | 566           |
| 101b        | Private Residential | 755802          | 6416227      | 573           |
| 102         | Private Residential | 755497          | 6416176      | 582           |
| 103         | Private Residential | 754977          | 6416365      | 600           |
| 104         | Private Residential | 755076          | 6416125      | 595           |
| 105         | Private Residential | 755010          | 6416030      | 603           |
| 106         | Private Residential | 755558          | 6415865      | 599           |
| 107         | Private Residential | 755751          | 6415907      | 589           |
| 108         | Private Residential | 755649          | 6415620      | 602           |
| 109         | Private Residential | 755418          | 6415526      | 620           |
| 110         | Private Residential | 755372          | 6415350      | 619           |
| 111         | Private Residential | 755053          | 6415799      | 605           |
| 112         | Private Residential | 755104          | 6415629      | 608           |

| Receiver ID | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|-------------|---------------------|-----------------|--------------|---------------|
|             |                     | Easting (m)     | Northing (m) |               |
| 113         | Private Residential | 755246          | 6415676      | 606           |
| 114         | Private Residential | 755679          | 6415074      | 603           |
| 115         | Private Residential | 755559          | 6414793      | 615           |
| 116         | Private Residential | 755447          | 6414617      | 618           |
| 117         | Private Residential | 755422          | 6414448      | 619           |
| 118         | Private Residential | 755425          | 6414223      | 611           |
| 119         | Private Residential | 755354          | 6414179      | 609           |
| 120         | Private Residential | 755164          | 6413978      | 616           |
| 121         | Private Residential | 755006          | 6413833      | 588           |
| 123         | Private Residential | 755494          | 6413914      | 617           |
| 124         | Private Residential | 755438          | 6413800      | 614           |
| 125         | Private Residential | 755288          | 6413699      | 601           |
| 126         | Private Residential | 755158          | 6413349      | 595           |
| 127         | Private Residential | 754950          | 6413275      | 592           |
| 180         | Private Residential | 755259          | 6420128      | 571           |
| 181         | Private Residential | 755148          | 6420111      | 576           |
| 182         | Private Residential | 755014          | 6420019      | 584           |
| 183         | Private Residential | 754798          | 6419973      | 587           |
| 184         | Private Residential | 755057          | 6419516      | 569           |
| 185         | Private Residential | 754949          | 6419481      | 582           |
| 186         | Private Residential | 754638          | 6419444      | 589           |
| 187         | Private Residential | 754779          | 6419149      | 597           |
| 188         | Private Residential | 754549          | 6419085      | 584           |
| 189         | Private Residential | 754741          | 6418847      | 592           |
| 190         | Private Residential | 754457          | 6418711      | 577           |
| 191         | Private Residential | 754568          | 6418525      | 587           |
| 192         | Private Residential | 754624          | 6418356      | 587           |
| 194         | Private Residential | 754160          | 6418104      | 579           |
| 195         | Private Residential | 754552          | 6417996      | 591           |
| 196         | Private Residential | 754042          | 6417867      | 583           |
| 199         | Private Residential | 753940          | 6417424      | 594           |
| 200         | Private Residential | 754114          | 6417262      | 602           |
| 201a        | Private Residential | 754274          | 6416981      | 609           |
| 201b        | Private Residential | 754097          | 6417159      | 603           |
| 202         | Private Residential | 754238          | 6416826      | 608           |
| 203         | Private Residential | 754406          | 6416674      | 621           |
| 204         | Private Residential | 754496          | 6416577      | 634           |
| 205         | Private Residential | 754220          | 6416380      | 616           |
| 206         | Private Residential | 754346          | 6416199      | 628           |
| 207         | Private Residential | 754049          | 6415791      | 635           |

| Receiver ID | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|-------------|---------------------|-----------------|--------------|---------------|
|             |                     | Easting (m)     | Northing (m) |               |
| 208         | Private Residential | 753939          | 6415646      | 650           |
| 209         | Private Residential | 753875          | 6415395      | 653           |
| 210         | Private Residential | 753893          | 6415216      | 661           |
| 211         | Private Residential | 754186          | 6414834      | 676           |
| 212         | Private Residential | 754397          | 6414851      | 674           |
| 213         | Private Residential | 754551          | 6414746      | 678           |
| 215         | Private Residential | 754742          | 6414888      | 668           |
| 216         | Private Residential | 754858          | 6414950      | 658           |
| 217         | Private Residential | 754679          | 6415294      | 662           |
| 218         | Private Residential | 754556          | 6415106      | 667           |
| 219         | Private Residential | 754473          | 6415585      | 649           |
| 220         | Private Residential | 754298          | 6415350      | 647           |
| 222         | Private Residential | 754816          | 6415764      | 629           |
| 223         | Private Residential | 754939          | 6415939      | 612           |
| 224         | Private Residential | 754969          | 6417094      | 591           |
| 226         | Private Residential | 754789          | 6417292      | 594           |
| 227         | Private Residential | 754954          | 6417471      | 589           |
| 228         | Private Residential | 754975          | 6417573      | 589           |
| 229         | Private Residential | 755066          | 6417794      | 583           |
| 230         | Private Residential | 755206          | 6417867      | 576           |
| 231         | Private Residential | 755162          | 6418030      | 566           |
| 232         | Private Residential | 755113          | 6418179      | 565           |
| 233         | Private Residential | 755163          | 6418282      | 558           |
| 234         | Private Residential | 755125          | 6418411      | 560           |
| 235         | Private Residential | 755075          | 6418636      | 563           |
| 236         | Private Residential | 755132          | 6418735      | 560           |
| 237         | Private Residential | 755471          | 6418847      | 542           |
| 238         | Private Residential | 755471          | 6418959      | 539           |
| 300         | Private Residential | 755371          | 6421300      | 544           |
| 303         | Private Residential | 755330          | 6420897      | 552           |
| 305         | Private Residential | 755177          | 6420541      | 562           |
| 306         | Private Residential | 754987          | 6420449      | 565           |
| 307         | Private Residential | 754870          | 6420348      | 565           |
| 308         | Private Residential | 754639          | 6420404      | 555           |
| 309         | Private Residential | 754197          | 6420789      | 537           |
| 310         | Private Residential | 754445          | 6420962      | 536           |
| 311         | Private Residential | 754347          | 6421083      | 527           |
| 312         | Private Residential | 754222          | 6421210      | 524           |
| 313         | Private Residential | 753913          | 6421160      | 520           |
| 314         | Private Residential | 753937          | 6421469      | 512           |

| Receiver ID    | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|----------------|---------------------|-----------------|--------------|---------------|
|                |                     | Easting (m)     | Northing (m) |               |
| 315            | Private Residential | 754185          | 6421618      | 513           |
| 316            | Private Residential | 754135          | 6421791      | 510           |
| 317            | Private Residential | 754680          | 6421741      | 521           |
| 360            | Private Residential | 753869          | 6414860      | 668           |
| 401            | Private Residential | 753908          | 6416164      | 629           |
| 407            | Private Residential | 754769          | 6413050      | 569           |
| 408            | Private Residential | 754746          | 6412972      | 566           |
| 409            | Private Residential | 754442          | 6412622      | 548           |
| 410            | Private Residential | 755097          | 6413654      | 587           |
| 411            | Private Residential | 754699          | 6412771      | 561           |
| <b>Linburn</b> |                     |                 |              |               |
| 340            | Private Residential | 757245          | 6404055      | 560           |
| 364            | Private Residential | 755012          | 6408419      | 543           |
| 364            | Private Residential | 755454          | 6408880      | 548           |
| 398            | Private Residential | 756400          | 6411139      | 594           |
| 402            | Private Residential | 755872          | 6409294      | 557           |
| 404            | Private Residential | 755921          | 6409512      | 566           |
| 405            | Private Residential | 755742          | 6409282      | 560           |
| 406            | Private Residential | 755862          | 6409675      | 572           |
| <b>Cooyal</b>  |                     |                 |              |               |
| 321            | Private Residential | 756740          | 6407469      | 543           |
| 322            | Place of Worship    | 758428          | 6406292      | 533           |
| 323            | Private Residential | 764166          | 6407753      | 573           |
| 324            | Private Residential | 759691          | 6406053      | 542           |
| 328            | Private Residential | 766594          | 6405798      | 611           |
| 329            | Private Residential | 757807          | 6406245      | 532           |
| 330            | Private Residential | 756703          | 6407761      | 550           |
| 331            | Private Residential | 758913          | 6406974      | 545           |
| 333            | Private Residential | 764853          | 6407842      | 602           |
| 335            | Private Residential | 760472          | 6406339      | 545           |
| 336            | Private Residential | 758620          | 6405852      | 537           |
| 337            | Private Residential | 758418          | 6406899      | 539           |
| 341            | Private Residential | 760931          | 6406673      | 544           |
| 342            | Private Residential | 758873          | 6406441      | 537           |
| 344            | Private Residential | 758480          | 6405913      | 535           |
| 346            | Private Residential | 757352          | 6406390      | 528           |
| 347            | Private Residential | 757763          | 6405572      | 535           |
| 348            | Private Residential | 760483          | 6407213      | 544           |
| 350            | Private Residential | 758128          | 6405688      | 537           |
| 351            | Private Residential | 756784          | 6406214      | 525           |

| Receiver ID | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|-------------|---------------------|-----------------|--------------|---------------|
|             |                     | Easting (m)     | Northing (m) |               |
| 353         | Private Residential | 754419          | 6403943      | 546           |
| 353         | Private Residential | 755137          | 6404030      | 528           |
| 354         | Private Residential | 755002          | 6402764      | 540           |
| 355         | Private Residential | 757211          | 6407550      | 550           |
| 356         | Private Residential | 757350          | 6405023      | 539           |
| 358         | Private Residential | 768172          | 6404949      | 601           |
| 361         | Private Residential | 764783          | 6406298      | 567           |
| 362         | Private Residential | 767765          | 6404788      | 589           |
| 363         | Private Residential | 757622          | 6404717      | 545           |
| 365         | Commercial          | 762490          | 6407176      | 552           |
| 367         | Private Residential | 758337          | 6406198      | 532           |
| 368         | Private Residential | 760268          | 6406057      | 547           |
| 369         | Private Residential | 756544          | 6407573      | 544           |
| 375         | Community Hall      | 758948          | 6406150      | 537           |
| 377         | Private Residential | 767252          | 6404797      | 587           |
| 378         | Private Residential | 768118          | 6405474      | 617           |
| 379         | Private Residential | 759980          | 6410860      | 615           |
| 380         | Private Residential | 760532          | 6410623      | 607           |
| 381         | Private Residential | 759949          | 6409977      | 604           |
| 383         | Private Residential | 760106          | 6409632      | 593           |
| 384         | Private Residential | 760571          | 6410422      | 604           |
| 385         | Private Residential | 760943          | 6409580      | 589           |
| 386         | Private Residential | 761575          | 6409031      | 576           |
| 387         | Private Residential | 761835          | 6407635      | 562           |
| 388         | Private Residential | 759294          | 6406541      | 537           |
| 388         | Private Residential | 759337          | 6406923      | 538           |
| 389         | Private Residential | 759581          | 6407081      | 542           |
| 390         | Private Residential | 759769          | 6407097      | 542           |
| 391         | Private Residential | 760023          | 6407144      | 544           |
| 392         | Private Residential | 760064          | 6407459      | 548           |
| 393         | Private Residential | 760039          | 6407610      | 551           |
| 394         | Private Residential | 760058          | 6407742      | 552           |
| 395         | Private Residential | 760732          | 6406902      | 542           |
| 396         | Private Residential | 761189          | 6407235      | 547           |
| 397         | Private Residential | 760588          | 6406788      | 542           |
| 400         | Commercial          | 762159          | 6407295      | 552           |
| 412         | Private Residential | 766845          | 6404815      | 587           |
| 413         | Private Residential | 759195          | 6406331      | 537           |
| 414         | Private Residential | 759401          | 6406407      | 538           |
| 415         | Private Residential | 763989          | 6407586      | 569           |

| Receiver ID                | Receiver Type       | MGA Coordinates |              | Elevation (m) |
|----------------------------|---------------------|-----------------|--------------|---------------|
|                            |                     | Easting (m)     | Northing (m) |               |
| Moolarben Picnic Area      | Passive Recreation  | 766780          | 6411313      | 595           |
| Castle Rocks Walking Track | Passive Recreation  | 767292          | 6408801      | 697           |
| <b>Ulan</b>                |                     |                 |              |               |
| 11                         | Private Residential | 765340          | 6431576      | 402           |
| 11                         | Private Residential | 765254          | 6431915      | 380           |
| 11                         | Private Residential | 764668          | 6431931      | 380           |
| 11                         | Private Residential | 765257          | 6431971      | 377           |
| 26                         | Commercial          | 757156          | 6423848      | 436           |
| 41B                        | Private Residential | 756189          | 6415779      | 576           |
| 46B                        | Commercial          | 758673          | 6425516      | 417           |
| 66                         | Commercial          | 758326          | 6425129      | 422           |
| 149                        | Commercial          | 758469          | 6425147      | 419           |
| 160                        | School              | 758348          | 6425003      | 419           |
| 162                        | Commercial          | 758344          | 6425197      | 422           |
| 168                        | Commercial          | 758361          | 6425106      | 421           |
| 255                        | Private Residential | 754910          | 6425510      | 458           |
| 256                        | Private Residential | 754888          | 6425252      | 453           |
| 258                        | Private Residential | 755217          | 6424928      | 452           |
| 258                        | Private Residential | 755369          | 6425144      | 455           |

# APPENDIX B

Project Approval 05\_0117 and 08\_0135

# Project Approval 05\_0117

## SCHEDULE 3 ENVIRONMENTAL CONDITIONS - GENERAL

### NOISE

#### Noise Criteria

##### Acquisition Upon Request

1A. (deleted)

*Note: The Proponent has acquired all properties provided acquisition rights under this approval.*

##### Transitional Acquisition and Mitigation Arrangements

1B. (deleted)

1. The Proponent shall ensure that the noise generated by the Moolarben mine complex does not exceed the noise criteria in Table 1 at any residence on privately-owned land or the other specified locations.

Table 1: Noise criteria dB(A)

| Land Number                                                 | Day<br>L <sub>Aeq</sub> (15min) | Evening<br>L <sub>Aeq</sub> (15min) | Night                    |                        |
|-------------------------------------------------------------|---------------------------------|-------------------------------------|--------------------------|------------------------|
|                                                             |                                 |                                     | L <sub>Aeq</sub> (15min) | L <sub>A1</sub> (1min) |
| 70                                                          | 37                              | 37                                  | 37                       | 45                     |
| 75                                                          | 36                              | 36                                  | 36                       | 45                     |
| All other privately owned residences                        | 35                              | 35                                  | 35                       | 45                     |
| Ulan Primary School                                         | 35 (internal)<br>when in use    |                                     |                          | -                      |
| Ulan Anglican Church                                        | 35 (internal)<br>when in use    |                                     |                          | -                      |
| Goulburn River National Park<br>Munghorn Gap Nature Reserve | 50<br>when in use               |                                     |                          | -                      |

*Note: To interpret the land referred to in Table 1 see the applicable figures in Appendix 5.*

Noise generated by the Moolarben mine complex is to be measured in accordance with the relevant requirements of the NSW Noise Policy for Industry. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

#### Land Acquisition Criteria

2. If the noise generated by the Moolarben mine complex exceeds the criteria in Table 2A, then upon receiving a written request for acquisition from an owner of the land listed in Table 2A, the Proponent shall acquire the land in accordance with the procedures in conditions 10 and 11 of Schedule 4.

Table 2A: Acquisition criteria dB(A) L<sub>Aeq</sub> (15min)

| Receiver ID                          | Day<br>(L <sub>Aeq</sub> (15min)) | Evening<br>(L <sub>Aeq</sub> (15min)) | Night<br>(L <sub>Aeq</sub> (15min)) |
|--------------------------------------|-----------------------------------|---------------------------------------|-------------------------------------|
| All other privately-owned residences | 40                                | 40                                    | 40                                  |

*Note: To interpret the land referred to Table 2A, see the applicable figures in Appendix 5.*

3. If the noise generated by the Moolarben mine complex contributes to exceedances of the relevant criteria in Table 2 on more than 25% of any privately-owned land (and a dwelling could be built on that land under existing planning controls), the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 10-11 of Schedule 4.

Table 2: Land acquisition criteria

| <b>Day/Evening/Night</b><br><b>L<sub>Aeq</sub>(period)</b> | <b>Receiver</b>          |
|------------------------------------------------------------|--------------------------|
| 55/50/45                                                   | All privately-owned land |

*Note: Noise generated by the complex is to be measured in accordance with the relevant requirements of the NSW Noise Policy for Industry. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

*However, these noise criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

#### Noise Mitigation Criteria

4. If the noise generated by the Moolarben mine complex exceeds the criteria in Table 3A, then upon receiving a written request the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Table 3A: Mitigation criteria dB(A) L<sub>Aeq</sub> (15min)

| <b>Receiver ID</b>                                         | <b>Day</b><br><b>(L<sub>Aeq</sub> (period))</b> | <b>Evening</b><br><b>(L<sub>Aeq</sub> (15min))</b> | <b>Night</b><br><b>(L<sub>Aeq</sub> (15min))</b> |
|------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------|--------------------------------------------------|
| All privately owned residences other than those in Table 3 | 37                                              | 37                                                 | 37                                               |

*Note: To interpret the land referred to Table 3A, see the applicable figures in Appendix 5.*

#### Mitigation Upon Request

5. (deleted)

*Note: The Proponent has acquired all properties provided mitigation upon request rights under this approval.*

#### Operating Conditions

6. The Proponent shall:
  - (a) implement best management practice to minimise the operational, road and rail noise of the project;
  - (b) operate a comprehensive noise management system on site that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
  - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 6);
  - (d) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL;
  - (e) co-ordinate noise management with the noise management at Ulan and Wilpinjong mines to minimise cumulative noise impacts; and
  - (f) carry out regular monitoring to determine whether the project is complying with the relevant conditions of this approval,
 to the satisfaction of the Secretary.

#### Noise Management Plan

7. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
  - (a) be prepared in consultation with the EPA and be submitted to the Secretary for approval by 31 March 2015;
  - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
  - (c) describe the proposed noise management system in detail;
  - (d) include a monitoring program that:
    - uses attended noise monitoring to evaluate compliance of the project against the noise criteria in this approval;
    - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used

as a better indicator of compliance with the noise criteria in this approval and trigger for further attended monitoring);

- evaluates and reports on:
  - the effectiveness of the noise management system; and
  - compliance against the noise operating conditions; and
- defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

## BLASTING

### Blasting Criteria

8. The Proponent shall ensure that the blasting on the Moolarben mine complex does not cause exceedances of the criteria in Table 4.

Table 4: Blasting criteria

| Location                                                | Airblast overpressure (dB(Lin Peak)) | Ground vibration (mm/s)                                                                                                                                                                                 | Allowable exceedance                                        |
|---------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Residence on privately owned land, churches and schools | 120                                  | 10                                                                                                                                                                                                      | 0%                                                          |
|                                                         | 115                                  | 5                                                                                                                                                                                                       | 5% of the total number of blasts over a period of 12 months |
| All public infrastructure                               | -                                    | 50<br>(or a limit determined by the structural design methodology in AS 2187.2-2006, or its latest version, or other alternative limit for public infrastructure, to the satisfaction of the Secretary) | 0%                                                          |

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner, and has advised the Department in writing of the terms of this agreement.

### Blasting Hours

9. The Proponent shall only carry out blasting on the site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary.

### Blasting Frequency

10. The Proponent may carry out a maximum of:
  - (a) 2 blasts a day; and
  - (b) 9 blasts a week, averaged over a calendar year, at the Moolarben mine complex.

This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, blasts misfires or blasts required to ensure the safety of the mine or its workers.

*Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.*

### Property Inspections

11. If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of any approved open cut mining pit on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection updated, then within 2 months of receiving this request the Proponent shall:
  - (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:
    - establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and
    - identify measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and
  - (b) give the landowner a copy of the new or updated property inspection report.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Secretary for resolution.

### Property Investigations

12. If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Proponent shall:
- commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and
  - give the landowner a copy of the property investigation report.

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Secretary.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

### Operating Conditions

13. The Proponent shall:
- implement best practice blasting management to:
    - protect the safety of people and livestock in the surrounding area;
    - protect public or private infrastructure/property in the surrounding area from any damage; and
    - minimise the dust and fume emissions of any blasting;
  - operate a suitable system to enable the public to get up-to-date information on the proposed blasting Schedule on site; and
  - co-ordinate the timing of blasting on site with the timing of blasting at the Ulan and Wilpinjong mines to minimise cumulative blasting impacts, to the satisfaction of the Secretary.
14. The Proponent shall not undertake blasting on site within 500 metres of:
- any public road;
  - the Gulgong to Sandy Hollow Railway Line;
  - the Wollar-Wellington 330kV Transmission Line; or
  - any land outside the site not owned by the Proponent,
- unless the Proponent has:
- demonstrated to the satisfaction of the Secretary that the blasting can be carried out closer to the infrastructure or land without compromising the safety of people or livestock or damaging the infrastructure and/or other buildings and structures; and
  - updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the infrastructure or land; or
  - a written agreement with the relevant infrastructure owner or landowner to allow blasting to be carried out closer to the infrastructure or land, and the Proponent has advised the Department in writing of the terms of this agreement.

### Blast Management Plan

15. The Proponent shall prepare and implement a Blast Management Plan for the project prior to undertaking any blasting on site to the satisfaction of the Secretary. This plan must:
- be prepared in consultation with the EPA **and be submitted to the Secretary for approval by 31 March 2015;**
  - describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this approval;
  - propose and justify any alternative ground vibration limits for public infrastructure in the vicinity of the site (if relevant); and
  - include a monitoring program for evaluating compliance with the blasting criteria and operating conditions of this approval.

## METEOROLOGICAL MONITORING

- 20B. For the life of the project, the Proponent shall ensure that there is a meteorological station in the vicinity of the site that:
- (a) complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline; and
  - (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Noise Policy for Industry unless a suitable alternative is approved by the Secretary following consultation with the EPA.

## ULAN PUBLIC SCHOOL

- 20C. The Proponent shall consult with DoE and, if requested:
- (a) implement agreed reasonable and feasible measures to ameliorate potential noise and/or dust impacts to Ulan Public School; or
  - (b) on a reasonable basis relating to the adverse effect of noise and/or dust from the project, contribute to or meet reasonable costs toward relocating the school.

## APPENDIX 6: NOISE COMPLIANCE ASSESSMENT

### Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:
  - (a) wind speeds greater than 3 m/s at 10 metres above ground level; or
  - (b) stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
  - (c) stability category G temperature inversion conditions.

### Determination of Meteorological Conditions

1. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station located on the site.

### Compliance Monitoring

2. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.
3. This monitoring must be carried out at least 12 times a year, unless the Secretary directs otherwise.
4. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Noise Policy for Industry (as amended from time to time), in particular the requirements relating to:
  - (a) monitoring locations for the collection of representative noise data;
  - (b) meteorological conditions during which collection of noise data is not appropriate;
  - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
  - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

# Project Approval 08\_0135

## SCHEDULE 3 ENVIRONMENTAL CONDITIONS - GENERAL

### NOISE

#### Acquisition Upon Request

- (deleted)

*Note: The Proponent has acquired all properties provided acquisition rights under this approval.*

#### Mitigation Upon Request

- (deleted)

*Note: The Proponent has acquired all properties provided mitigation upon request rights under this approval.*

### Noise Criteria

- The Proponent shall ensure that the noise generated by the Moolarben mine complex does not exceed the criteria in Table 3 at any residence on privately-owned land or the other specified locations.

Table 3: Noise criteria dB(A)

| Receiver ID                                                 | Day                      | Evening                      | Night                    |                        |
|-------------------------------------------------------------|--------------------------|------------------------------|--------------------------|------------------------|
|                                                             | L <sub>Aeq</sub> (15min) | L <sub>Aeq</sub> (15min)     | L <sub>Aeq</sub> (15min) | L <sub>A1</sub> (1min) |
| 30,63                                                       | 39                       | 39                           | 39                       | 45                     |
| 63                                                          | 39                       | 39                           | 39                       | 45                     |
| 70                                                          | 37                       | 37                           | 37                       | 45                     |
| 75                                                          | 36                       | 36                           | 36                       | 45                     |
| All other privately-owned residences                        | 35                       | 35                           | 35                       | 45                     |
| Ulan Primary School                                         |                          | 35 (internal)<br>when in use |                          | -                      |
| Ulan Anglican Church                                        |                          | 35 (internal)<br>when in use |                          | -                      |
| Goulburn River National Park<br>Munghorn Gap Nature Reserve |                          | 50<br>when in use            |                          | -                      |

*Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 5.*

Noise generated by the Moolarben mine complex is to be measured in accordance with the relevant requirements of the *NSW Noise Policy for Industry*. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

### Land Acquisition Criteria

- If the noise generated by the Moolarben mine complex exceeds the criteria in Table 4 then upon receiving a written request for acquisition from an owner of the land listed in Table 4, the Proponent shall acquire the land in accordance with the procedures in conditions 5 and 6 of Schedule 5.

Table 4: Acquisition criteria dB(A) L<sub>Aeq</sub> (15min)

| Receiver ID                          | Day<br>(L <sub>Aeq</sub> (15min)) | Evening<br>(L <sub>Aeq</sub> (15min)) | Night<br>(L <sub>Aeq</sub> (15min)) |
|--------------------------------------|-----------------------------------|---------------------------------------|-------------------------------------|
| 63                                   | 43                                | 43                                    | 42                                  |
| All other privately-owned residences | 40                                | 40                                    | 40                                  |

*Note: To interpret the land referred to Table 4, see the applicable figures in Appendix 5.*

- If the noise generated by the Moolarben mine complex contributes to exceedances of the relevant criteria in Table 5 on more than 25% of any privately-owned land (and a dwelling could be built on that land under existing planning controls), the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5 and 6 of Schedule 5.

**Table 5: Land acquisition criteria**

| <b>Day/Evening/Night</b><br><b>L<sub>Aeq</sub>(period)</b> | <b>Receiver</b>          |
|------------------------------------------------------------|--------------------------|
| 55/50/45                                                   | All privately-owned land |

*Note: Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Noise Policy for Industry. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

*However, these noise criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

## Noise Mitigation Criteria

4. If the noise generated by the Moolarben mine complex exceeds the criteria in Table 6 at any privately owned residence, then upon receiving a written request the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

**Table 6: Mitigation criteria dB(A) L<sub>Aeq</sub> (15min)**

| <b>Receiver ID</b>                                         | <b>Day</b><br><b>(L<sub>Aeq</sub> (15min))</b> | <b>Evening</b><br><b>(L<sub>Aeq</sub> (15min))</b> | <b>Night</b><br><b>(L<sub>Aeq</sub> (15min))</b> |
|------------------------------------------------------------|------------------------------------------------|----------------------------------------------------|--------------------------------------------------|
| 63                                                         | 40                                             | 40                                                 | 39                                               |
| All privately owned residences other than those in Table 2 | 37                                             | 37                                                 | 37                                               |

*Note: To interpret the land referred to Table 6, see the applicable figures in Appendix 5.*

## Operating Conditions

5. The Proponent shall:
  - (a) implement best management practice to minimise the operational and road noise of the project;
  - (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
  - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 6);
  - (d) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL;
  - (e) co-ordinate noise management at the Moolarben mine complex with the noise management at Ulan and Wilpinjong mines to minimise cumulative noise impacts; and
  - (f) carry out regular monitoring to determine whether the Moolarben mine complex is complying with the relevant conditions of this approval, to the satisfaction of the Secretary.

## Noise Management Plan

6. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
  - (a) be prepared in consultation with the EPA, and submitted to and approved by the Secretary prior to the commencement of any development on site under this approval;
  - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
  - (c) describe the proposed noise management system in detail; and
  - (d) include a monitoring program that:
    - evaluates and reports on:
      - the effectiveness of the noise management system;
      - compliance against the noise criteria in this approval; and
      - compliance against the noise operating conditions;
    - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this approval and trigger

- for further attended monitoring); and
- defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

## BLASTING

### Blasting Criteria

- The Proponent shall ensure that blasting on the Moolarben mine complex does not cause exceedances of the criteria in Table 7.

Table 7: *Blasting criteria*

| <b>Location</b>                   | <b>Airblast overpressure (dB(Lin Peak))</b> | <b>Ground vibration (mm/s)</b>                                                                                                                                                                          | <b>Allowable exceedance</b>                                 |
|-----------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Residence on privately owned land | 120                                         | 10                                                                                                                                                                                                      | 0%                                                          |
|                                   | 115                                         | 5                                                                                                                                                                                                       | 5% of the total number of blasts over a period of 12 months |
| All public infrastructure         | -                                           | 50<br>(or a limit determined by the structural design methodology in AS 2187.2-2006, or its latest version, or other alternative limit for public infrastructure, to the satisfaction of the Secretary) | 0%                                                          |

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner to exceed these criteria, and has advised the Department in writing of the terms of this agreement.

### Blasting Hours

- The Proponent shall only carry out blasting on site between 9 am and 5 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary.

### Blasting Frequency

- The Proponent may carry out a maximum of:
  - 2 blasts a day; and
  - 9 blasts a week, averaged over a calendar year, at the Moolarben mine complex.

This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, blast misfires or blasts required to ensure the safety of the mine or its workers.

*Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.*

### Property Inspections

- If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of any approved open cut mining pit on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection updated, then within 2 months of receiving this request the Proponent shall:
  - commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:
    - establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and
    - identify measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and
  - give the landowner a copy of the new or updated property inspection report.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Secretary for resolution.

## Property Investigations

13. If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Proponent shall:
- commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and
  - give the landowner a copy of the property investigation report.

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Secretary.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

## Operating Conditions

14. The Proponent shall:
- implement best management practice to:
    - protect the safety of people and livestock in the surrounding area;
    - protect public or private infrastructure/property in the surrounding area from any damage; and
    - minimise the dust and fume emissions of any blasting;
  - ensure that blasting on the site does not damage Aboriginal rock shelter sites S2MC232 (AHIMS No. 36-3-1379) or S2MC233 (AHIMS No. 36-3-1380);
  - operate a suitable system to enable the public to get up-to-date information on the proposed blasting Schedule on site; and
  - co-ordinate the timing of blasting on site with the timing of blasting at the Ulan and Wilpinjong mines to minimise cumulative blasting impacts, to the satisfaction of the Secretary.

15. The Proponent shall not undertake blasting on site within 500 metres of:

- any public road;
- the Gulgong to Sandy Hollow Railway Line;
- the Wollar-Wellington 330kV Transmission Line; or
- any land outside the site not owned by the Proponent,

unless the Proponent has:

- demonstrated to the satisfaction of the Secretary that the blasting can be carried out closer to the infrastructure or land without compromising the safety of people or livestock or damaging the infrastructure and/or other buildings and structures; and
- updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the infrastructure or land; or
- a written agreement with the relevant infrastructure owner or landowner to allow blasting to be carried out closer to the infrastructure or land, and the Proponent has advised the Department in writing of the terms of this agreement.

## Blast Management Plan

16. The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:
- be prepared in consultation with the EPA, and submitted to and approved by the Secretary prior to conducting any blasting on site;
  - describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this approval;
  - propose and justify any alternative ground vibration limits for public infrastructure in the vicinity of the site (if relevant); and
  - include a monitoring program for evaluating and reporting on compliance with the blasting criteria and operating conditions of this approval.

## **ULAN PUBLIC SCHOOL**

23. The Proponent shall consult with DEC and, if requested:
  - a) implement agreed reasonable and feasible measures to ameliorate potential noise and/or dust impacts to Ulan Public School; or
  - b) on a reasonable basis relating to the adverse effect of noise and/or dust from the project, contribute to or meet reasonable costs toward relocating the school.

## **METEOROLOGICAL MONITORING**

24. For the life of the project, the Proponent shall ensure that there is a meteorological station in the vicinity of the site that:
  - (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
  - (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Noise Policy for Industry*, unless a suitable alternative is approved by the Secretary following consultation with the EPA.

## **APPENDIX 6 NOISE COMPLIANCE ASSESSMENT**

### **Applicable Meteorological Conditions**

1. The noise criteria in Table 3 of the conditions are to apply under all meteorological conditions except the following:
  - (a) wind speeds greater than 3 m/s at 10 metres above ground level; or
  - (b) stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
  - (c) stability category G temperature inversion conditions.

### **Determination of Meteorological Conditions**

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station located on the site.

### **Compliance Monitoring**

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. This monitoring must be carried out at least 12 times a year, unless the Secretary directs otherwise.
5. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Noise Policy for Industry* (as amended from time to time), in particular the requirements relating to:
  - (d) monitoring locations for the collection of representative noise data;
  - (e) meteorological conditions during which collection of noise data is not appropriate;
  - (f) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
  - (g) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

# APPENDIX C

## Moolarben Coal Complex Noise and Blast Monitoring Sites



# APPENDIX D

## Modelled Plant and Equipment Sound Power Levels (SWL)

### Comparative Fixed Plant and Mobile Equipment Fleet SWLs (dBA re 1 pW)

| Equipment                      | Type/Capacity           | 2028      |              |              | 2029      |              |              | 2031      |              |              |
|--------------------------------|-------------------------|-----------|--------------|--------------|-----------|--------------|--------------|-----------|--------------|--------------|
|                                |                         | No. Items | SWL per Item | Total SWL    | No. Items | SWL per Item | Total SWL    | No. Items | SWL per Item | Total SWL    |
| Drill                          | DML60                   | 2         | 117          | 120          | 2         | 117          | 120          | 2         | 117          | 120          |
| Excavator                      | 9600                    | 2         | 114          | 117          | 2         | 114          | 117          | 1         | 114          | 114          |
|                                | 9400                    | 1         | 114          | 114          | 1         | 114          | 114          | 1         | 114          | 114          |
|                                | PC1250                  | 1         | 111          | 111          | 1         | 111          | 111          | 1         | 111          | 111          |
| Front End Loader               | WA1200                  | 1         | 121          | 121          | 1         | 121          | 121          | 1         | 121          | 121          |
|                                | WA480                   | 1         | 115          | 115          | 1         | 115          | 115          | 1         | 115          | 115          |
| Haul Truck                     | 830E                    | 14        | 115          | 126          | 14        | 115          | 126          | 12        | 115          | 126          |
|                                | 789                     | 4         | 114          | 120          | 4         | 114          | 120          | 3         | 114          | 119          |
| Dozer                          | D475                    | 2         | 113          | 116          | 2         | 113          | 116          | 2         | 113          | 116          |
|                                | D375                    | 2         | 113          | 116          | 2         | 113          | 116          | 3         | 113          | 118          |
|                                | D11                     | 2         | 116          | 119          | 2         | 116          | 119          | 1         | 116          | 116          |
| Water Truck                    | HD785                   | 3         | 115          | 120          | 3         | 115          | 120          | 1         | 115          | 115          |
| Grader                         | GD825                   | 1         | 110          | 110          | 1         | 110          | 110          | 1         | 110          | 110          |
|                                | 24M                     | 1         | 110          | 110          | 1         | 110          | 110          | 1         | 110          | 110          |
|                                | 16M                     | 1         | 108          | 108          | 1         | 108          | 108          | -         | 108          | -            |
| Support Excavator              | PC850                   | -         | 107          | -            | -         | 107          | -            | 1         | 107          | -            |
| Service Truck                  | 775F                    | 1         | 115          | 115          | 1         | 115          | 115          | 1         | 115          | 115          |
|                                | 773F                    | 1         | 114          | 114          | 1         | 114          | 114          | -         | 114          | -            |
| Crusher+Screen                 |                         | 1         | 118          | 118          | 1         | 118          | 118          | 1         | 118          | 118          |
| MMU                            |                         | 2         | 108          | 111          | 2         | 108          | 111          | 2         | 108          | 111          |
| 800KVA Generator               |                         | 1         | 111          | 111          | 1         | 111          | 111          | 1         | 111          | 111          |
| <b>OC3 Total</b>               |                         | <b>44</b> |              | <b>131.2</b> | <b>44</b> |              | <b>131.2</b> | <b>37</b> |              | <b>130.4</b> |
| Excavator                      | 90t Excavator           | 1         | 109          | 109          | 1         | 109          | 109          | 1         | 109          | 109          |
| Crusher+Screen                 |                         | 1         | 118          | 118          | 1         | 118          | 118          | 1         | 118          | 118          |
| Front End Loader               | 25t (CAT972 or similar) | 2         | 107          | 110          | 2         | 107          | 110          | 2         | 107          | 110          |
| Articulated Dump truck         | A60H or similar         | 3         | 111          | 116          | 3         | 111          | 116          | 3         | 111          | 116          |
| <b>Quarry/Borrow Pit Total</b> |                         | <b>7</b>  |              | <b>120.7</b> | <b>7</b>  |              | <b>120.7</b> | <b>7</b>  |              | <b>120.7</b> |
| Drill                          | DML60                   | 2         | 117          | 120          | 2         | 117          | 120          | 1         | 117          | 117          |
|                                | Pit Viper 275           | 1         | 115          | 115          | 1         | 115          | 115          | 1         | 115          | 115          |
| Excavator                      | 9800                    | 2         | 114          | 117          | 2         | 114          | 117          | 2         | 115          | 118          |
|                                | 6050                    | 1         | 118          | 118          | 1         | 118          | 118          | 1         | 118          | 118          |
|                                | 9600                    | -         | 114          | -            | -         | 114          | -            | 1         | 114          | 114          |
|                                | PC1250                  | 1         | 111          | 111          | 1         | 111          | 111          | 1         | 111          | 111          |
|                                | WA1200                  | 2         | 121          | 124          | 2         | 121          | 124          | 2         | 121          | 124          |

| Equipment                     | Type/Capacity | 2028       |                |              | 2029       |                |              | 2031       |                |              |
|-------------------------------|---------------|------------|----------------|--------------|------------|----------------|--------------|------------|----------------|--------------|
|                               |               | No. Items  | SWL per Item   | Total SWL    | No. Items  | SWL per Item   | Total SWL    | No. Items  | SWL per Item   | Total SWL    |
| Front End Loader              | WA480         | 1          | 115            | 115          | 1          | 115            | 115          | 1          | 115            | 115          |
| Haul Truck                    | 930E          | 11         | 113            | 123          | 11         | 113            | 123          | 10         | 113            | 123          |
|                               | 830E          | 5          | 115            | 122          | 5          | 115            | 122          | 11         | 115            | 125          |
|                               | 789           | 8          | 114            | 123          | 8          | 114            | 123          | 9          | 114            | 124          |
| Dozer                         | D475          | 2          | 113            | 116          | 2          | 113            | 116          | 2          | 113            | 116          |
|                               | D375          | 1          | 113            | 116          | 2          | 113            | 116          | -          | -              | -            |
|                               | D10           | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
|                               | D11           | 2          | 116            | 119          | 2          | 116            | 119          | 4          | 116            | 122          |
|                               | 854           | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
| Water Truck                   | HD785         | 2          | 115            | 118          | 2          | 115            | 118          | 2          | 115            | 118          |
| Grader                        | GD825         | 1          | 110            | 110          | 1          | 110            | 110          | 1          | 110            | 110          |
|                               | 24M           | 1          | 110            | 110          | 1          | 110            | 110          | 1          | 110            | 110          |
|                               | 16M           | -          | 108            | -            | -          | 108            | -            | 1          | 108            | 108          |
| Support Excavator             | PC850         | 2          | 107            | 110          | 2          | 107            | 110          | 1          | 107            | 107          |
| Service Truck                 | 775F          | 1          | 115            | 115          | 1          | 115            | 115          | 1          | 115            | 115          |
|                               | 773F          | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
| MMU                           |               | 1          | 108            | 108          | 1          | 108            | 108          | 1          | 108            | 108          |
| Stemming Truck                |               | 1          | 108            | 108          | 1          | 108            | 108          | 1          | 108            | 108          |
| <b>OC4 Total</b>              |               | <b>51</b>  |                | <b>131.7</b> | <b>51</b>  |                | <b>131.7</b> | <b>58</b>  |                | <b>132.3</b> |
| <b>Mobile Equipment Total</b> |               | <b>102</b> |                | <b>134.6</b> | <b>102</b> |                | <b>134.6</b> | <b>102</b> |                | <b>134.6</b> |
| CHPP                          |               | 1          | 118            | 118          | 1          | 118            | 118          | 1          | 118            | 118          |
| Reject Bin                    |               | 1          | 104            | 104          | 1          | 104            | 104          | 1          | 104            | 104          |
| Feeder                        |               | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
| Crusher                       |               | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
| Transfer Station              |               | 3          | 115            | 120          | 3          | 115            | 120          | 3          | 115            | 120          |
| Sizing Station                |               | 1          | 116            | 116          | 1          | 116            | 116          | 1          | 116            | 116          |
| Stacker                       |               | 2          | 105            | 108          | 2          | 105            | 108          | 2          | 105            | 108          |
| Conveyor                      |               |            | 101 (per 100m) | 120          |            | 101 (per 100m) | 120          |            | 101 (per 100m) | 120          |
| Conveyor Drive                |               | 11         | 98             | 109          | 11         | 98             | 109          | 11         | 98             | 109          |
| Ventilation Fans              |               | 2          | 112            | 115          | 2          | 112            | 115          | 2          | 112            | 115          |
| Loadout Bin                   |               | 2          | 113            | 116          | 2          | 113            | 116          | 2          | 113            | 116          |
| Locomotive                    |               | 3          | 109            | 114          | 3          | 109            | 114          | 3          | 109            | 114          |
| <b>CHPP Plant</b>             |               |            |                | <b>126.5</b> |            |                | <b>126.5</b> |            |                | <b>126.5</b> |
| Dozer                         |               | 1          | 114            | 114          | 1          | 114            | 114          | 1          | 114            | 114          |
| Sizing Station                |               | 1          | 116            | 116          | 1          | 116            | 116          | 1          | 116            | 116          |

| Equipment              | Type/Capacity | 2028      |                |              | 2029      |                |              | 2031      |                |              |
|------------------------|---------------|-----------|----------------|--------------|-----------|----------------|--------------|-----------|----------------|--------------|
|                        |               | No. Items | SWL per Item   | Total SWL    | No. Items | SWL per Item   | Total SWL    | No. Items | SWL per Item   | Total SWL    |
| Conveyor               |               |           | 101 (per 100m) | 115          |           | 101 (per 100m) | 115          |           | 101 (per 100m) | 115          |
| Conveyor Drives        |               | 3         | 95/98/101      | 103          | 3         | 95/98/101      | 103          | 3         | 95/98/101      | 103          |
| Rear Air Intake        |               | 1         | 112            | 112          | 1         | 112            | 112          | 1         | 111.6          | 112          |
| <b>Underground 1</b>   |               |           |                | <b>120.7</b> |           |                | <b>120.7</b> |           |                | <b>120.7</b> |
| Dozer                  |               | 2         | 113            | 116          | 2         | 113            | 116          | 2         | 113            | 116          |
| Transfer Station       |               | 2         | 115            | 118          | 2         | 115            | 118          | 2         | 115            | 118          |
| Conveyor               |               | 1817      | 101 (per 100m) | 114          | 1817      | 101 (per 100m) | 114          | 1817      | 101 (per 100m) | 114          |
| Conveyor Drive         |               | 4         | 98             | 104          | 4         | 98             | 104          | 4         | 98             | 104          |
| Discharge              |               | 2         | 96             | 99           | 2         | 96             | 99           | 2         | 96             | 99           |
| Sizing Station         |               | 1         | 116            | 116          | 1         | 116            | 116          | 1         | 116            | 116          |
| <b>Bypass Conveyor</b> |               |           |                | <b>122.3</b> |           |                | <b>122.3</b> |           |                | <b>122.3</b> |
| <b>Total Mine Site</b> |               |           |                | <b>135.6</b> |           |                | <b>135.6</b> |           |                | <b>135.6</b> |

#### Mobile Plant SWL Source and Modelled Source Elevation

| Equipment        | Type/Capacity | Source Elevation | SWL Source/Reference                         |
|------------------|---------------|------------------|----------------------------------------------|
| Drill            | DML60         | 3 m              | SLR 2017                                     |
|                  | Pit Viper 275 | 3 m              | SLR 2017                                     |
| Excavator        | 6050          | 5 m              | SLR 2017                                     |
|                  | 9800          | 5 m              | SLR 2017                                     |
|                  | 9600          | 4 .5m            | Attenuation kit to match performance of 9800 |
|                  | 9400          | 4 .5m            | Attenuation kit to match performance of 9800 |
|                  | PC1250        | 4.5 m            | SLR 2017                                     |
| Front End Loader | WA1200        | 4 m              | SLR 2017                                     |
|                  | WA480         | 3 m              | SLR 2017                                     |
| Haul Truck       | 930E          | 3.5 m            | SLR 2017                                     |
|                  | 830E          | 3.5 m            | SLR 2017                                     |
|                  | 789           | 3.5 m            | SLR 2017                                     |
| Dozer            | D475          | 3.2 m            | SLR 2017                                     |
|                  | D375          | 3.2 m            | SLR 2017                                     |
|                  | D10           | 3.2 m            | SLR 2017                                     |
|                  | D11           | 3.2 m            | SLR 2017                                     |
| Water Truck      | HD785         | 3.5              | SLR 2017                                     |

| Equipment              | Type/Capacity           | Source Elevation | SWL Source/Reference                                    |
|------------------------|-------------------------|------------------|---------------------------------------------------------|
| Grader                 | GD825                   | 3 m              | SLR 2017                                                |
|                        | 24M                     | 3 m              | SLR 2017                                                |
|                        | 16M                     | 3 m              | SLR 2017                                                |
| Support Excavator      | PC850                   | 3 m              | Manufacturer specification                              |
| Service Truck          | 775F                    | 3.5 m            | SLR 2017                                                |
|                        | 773F                    | 3.5 m            | SLR 2017                                                |
| Stemming Struck        |                         | 3 m              | SLR 2017                                                |
| MMU                    |                         | 3 m              | SLR 2017                                                |
| Excavator              | 90t Excavator           | 3 m              | Manufacturer specification (CAT395)                     |
| Crusher+Screen         |                         | 3 m              | Construction Noise and Vibration Strategy (TfNSW, 2018) |
| Front End Loader       | 25t (CAT972 or similar) | 3 m              | Manufacturer specification (CAT972)                     |
| Articulated Dump truck | A60H or similar         | 3 m              | Manufacturer specification (A60H)                       |

# APPENDIX E

## Operating Intrusive and Sleep Disturbance Noise Levels

## Daytime Operating Intrusive Noise Levels - Years 2028, 2029 and 2031 (dBA re 20 µPa)

| Receiver ID      | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|                  | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| <b>Cooks Gap</b> |           |                 |           |                 |           |                 |                |                |
| 39               | 26        | 28              | 26        | 28              | 25        | 26              | 40             | 35             |
| 40               | 27        | 29              | 27        | 28              | 26        | 27              | 40             | 35             |
| 41B              | 27        | 28              | 27        | 28              | 26        | 27              | 40             | 35             |
| 53               | 25        | 26              | 26        | 27              | 24        | 25              | 40             | 35             |
| 60               | 25        | 27              | 25        | 27              | 24        | 25              | 40             | 35             |
| 61               | 27        | 29              | 27        | 28              | 25        | 27              | 40             | 35             |
| 70               | 32        | 34              | 32        | 34              | 30        | 32              | 40             | 37             |
| 75               | 31        | 32              | 31        | 32              | 29        | 31              | 40             | 36             |
| 79               | 29        | 30              | 29        | 31              | 28        | 29              | 40             | 35             |
| 80               | 28        | 29              | 28        | 30              | 27        | 28              | 40             | 35             |
| 82               | 27        | 29              | 27        | 29              | 26        | 27              | 40             | 35             |
| 83               | 27        | 28              | 28        | 29              | 26        | 27              | 40             | 35             |
| 84               | 26        | 27              | 26        | 28              | 25        | 26              | 40             | 35             |
| 86               | 27        | 28              | 27        | 28              | 25        | 27              | 40             | 35             |
| 87               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 88               | 24        | 25              | 26        | 27              | 23        | 24              | 40             | 35             |
| 89               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 90               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 91               | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 94               | 26        | 27              | 26        | 27              | 25        | 25              | 40             | 35             |
| 95               | 26        | 27              | 27        | 28              | 25        | 26              | 40             | 35             |
| 96               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 97               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 98               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 99               | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 100              | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 101a             | 27        | 29              | 27        | 28              | 26        | 27              | 40             | 35             |
| 101b             | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 102              | 26        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 103              | 25        | 26              | 25        | 26              | 23        | 24              | 40             | 35             |
| 104              | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 105              | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 106              | 26        | 27              | 27        | 28              | 25        | 26              | 40             | 35             |
| 107              | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 108         | 26        | 27              | 26        | 27              | 25        | 26              | 40             | 35             |
| 109         | 26        | 27              | 26        | 27              | 25        | 26              | 40             | 35             |
| 110         | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 111         | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 112         | 25        | 26              | 26        | 27              | 24        | 25              | 40             | 35             |
| 113         | 25        | 26              | 25        | 26              | 24        | 25              | 40             | 35             |
| 114         | 26        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 115         | 25        | 26              | 26        | 27              | 24        | 25              | 40             | 35             |
| 116         | 25        | 26              | 25        | 26              | 24        | 25              | 40             | 35             |
| 117         | 25        | 25              | 25        | 26              | 24        | 25              | 40             | 35             |
| 118         | 23        | 24              | 24        | 25              | 22        | 23              | 40             | 35             |
| 119         | 23        | 24              | 24        | 25              | 23        | 23              | 40             | 35             |
| 120         | 19        | 20              | 21        | 22              | 19        | 20              | 40             | 35             |
| 121         | 15        | 16              | 18        | 19              | 17        | 18              | 40             | 35             |
| 123         | 24        | 25              | 25        | 25              | 23        | 24              | 40             | 35             |
| 124         | 22        | 23              | 23        | 24              | 22        | 22              | 40             | 35             |
| 125         | 18        | 19              | 20        | 21              | 19        | 20              | 40             | 35             |
| 126         | 19        | 20              | 19        | 20              | 18        | 19              | 40             | 35             |
| 127         | 22        | 23              | 22        | 23              | 21        | 22              | 40             | 35             |
| 180         | 30        | 31              | 30        | 31              | 28        | 29              | 40             | 35             |
| 181         | 29        | 30              | 29        | 30              | 27        | 29              | 40             | 35             |
| 182         | 29        | 30              | 29        | 30              | 27        | 29              | 40             | 35             |
| 183         | 26        | 27              | 26        | 27              | 24        | 26              | 40             | 35             |
| 184         | 29        | 30              | 29        | 30              | 27        | 29              | 40             | 35             |
| 185         | 28        | 30              | 29        | 30              | 27        | 28              | 40             | 35             |
| 186         | 26        | 28              | 26        | 28              | 25        | 26              | 40             | 35             |
| 187         | 28        | 29              | 28        | 29              | 26        | 27              | 40             | 35             |
| 188         | 21        | 22              | 22        | 23              | 20        | 21              | 40             | 35             |
| 189         | 27        | 28              | 28        | 29              | 26        | 27              | 40             | 35             |
| 190         | 21        | 22              | 21        | 22              | 20        | 21              | 40             | 35             |
| 191         | 23        | 24              | 23        | 24              | 22        | 23              | 40             | 35             |
| 192         | 27        | 28              | 27        | 28              | 26        | 27              | 40             | 35             |
| 194         | 26        | 27              | 26        | 27              | 25        | 26              | 40             | 35             |
| 195         | 25        | 27              | 26        | 27              | 24        | 25              | 40             | 35             |
| 196         | 25        | 26              | 26        | 27              | 24        | 25              | 40             | 35             |
| 199         | 22        | 23              | 23        | 24              | 21        | 22              | 40             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 200         | 21        | 22              | 22        | 22              | 20        | 21              | 40             | 35             |
| 201a        | 23        | 24              | 23        | 24              | 21        | 22              | 40             | 35             |
| 201b        | 21        | 22              | 22        | 22              | 20        | 21              | 40             | 35             |
| 202         | 23        | 24              | 23        | 24              | 22        | 23              | 40             | 35             |
| 203         | 24        | 24              | 24        | 25              | 22        | 23              | 40             | 35             |
| 204         | 25        | 26              | 25        | 26              | 24        | 24              | 40             | 35             |
| 205         | 19        | 20              | 20        | 20              | 18        | 19              | 40             | 35             |
| 206         | 24        | 24              | 24        | 25              | 22        | 23              | 40             | 35             |
| 207         | 24        | 25              | 25        | 25              | 23        | 24              | 40             | 35             |
| 208         | 24        | 25              | 24        | 25              | 23        | 23              | 40             | 35             |
| 209         | 24        | 24              | 24        | 25              | 23        | 23              | 40             | 35             |
| 210         | 24        | 24              | 24        | 25              | 22        | 23              | 40             | 35             |
| 211         | 24        | 24              | 24        | 25              | 23        | 23              | 40             | 35             |
| 212         | 24        | 25              | 24        | 25              | 23        | 24              | 40             | 35             |
| 213         | 24        | 25              | 25        | 25              | 23        | 24              | 40             | 35             |
| 215         | 25        | 25              | 25        | 26              | 24        | 24              | 40             | 35             |
| 216         | 25        | 26              | 25        | 26              | 24        | 25              | 40             | 35             |
| 217         | 25        | 26              | 25        | 26              | 24        | 24              | 40             | 35             |
| 218         | 24        | 25              | 24        | 25              | 23        | 24              | 40             | 35             |
| 219         | 24        | 25              | 24        | 25              | 23        | 23              | 40             | 35             |
| 220         | 22        | 22              | 22        | 23              | 21        | 22              | 40             | 35             |
| 222         | 25        | 26              | 26        | 26              | 24        | 25              | 40             | 35             |
| 223         | 25        | 26              | 26        | 27              | 24        | 25              | 40             | 35             |
| 224         | 26        | 27              | 27        | 28              | 25        | 26              | 40             | 35             |
| 226         | 26        | 27              | 26        | 27              | 25        | 26              | 40             | 35             |
| 227         | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 228         | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 229         | 27        | 28              | 27        | 28              | 25        | 26              | 40             | 35             |
| 230         | 27        | 28              | 27        | 28              | 25        | 27              | 40             | 35             |
| 231         | 27        | 28              | 27        | 28              | 26        | 27              | 40             | 35             |
| 232         | 27        | 28              | 28        | 29              | 26        | 27              | 40             | 35             |
| 233         | 27        | 29              | 28        | 29              | 26        | 27              | 40             | 35             |
| 234         | 27        | 29              | 28        | 29              | 26        | 27              | 40             | 35             |
| 235         | 28        | 29              | 28        | 29              | 27        | 28              | 40             | 35             |
| 236         | 28        | 29              | 28        | 29              | 27        | 28              | 40             | 35             |
| 237         | 27        | 29              | 28        | 30              | 27        | 28              | 40             | 35             |

| Receiver ID    | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|                | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 238            | 28        | 29              | 28        | 30              | 27        | 28              | 40             | 35             |
| 300            | 25        | 26              | 25        | 26              | 23        | 25              | 40             | 35             |
| 303            | 29        | 31              | 29        | 31              | 28        | 29              | 40             | 35             |
| 305            | 28        | 30              | 28        | 30              | 27        | 29              | 40             | 35             |
| 306            | 29        | 30              | 29        | 30              | 27        | 29              | 40             | 35             |
| 307            | 26        | 27              | 26        | 27              | 24        | 26              | 40             | 35             |
| 308            | 28        | 29              | 27        | 29              | 26        | 27              | 40             | 35             |
| 309            | 25        | 26              | 25        | 26              | 24        | 25              | 40             | 35             |
| 310            | 25        | 27              | 25        | 27              | 24        | 25              | 40             | 35             |
| 311            | 24        | 25              | 24        | 25              | 22        | 24              | 40             | 35             |
| 312            | 23        | 24              | 23        | 24              | 21        | 22              | 40             | 35             |
| 313            | 24        | 25              | 24        | 25              | 22        | 23              | 40             | 35             |
| 314            | 22        | 23              | 22        | 23              | 20        | 21              | 40             | 35             |
| 315            | 21        | 22              | 21        | 22              | 19        | 20              | 40             | 35             |
| 316            | 21        | 22              | 21        | 22              | 19        | 20              | 40             | 35             |
| 317            | 21        | 22              | 22        | 23              | 20        | 21              | 40             | 35             |
| 360            | 21        | 22              | 22        | 22              | 20        | 21              | 40             | 35             |
| 401            | 24        | 25              | 25        | 25              | 23        | 24              | 40             | 35             |
| 407            | 12        | 13              | 13        | 13              | 11        | 12              | 40             | 35             |
| 408            | 12        | 12              | 12        | 13              | 11        | 12              | 40             | 35             |
| 409            | 15        | 16              | 16        | 17              | 15        | 16              | 40             | 35             |
| 410            | 17        | 18              | 19        | 20              | 19        | 19              | 40             | 35             |
| 411            | 13        | 13              | 13        | 14              | 12        | 13              | 40             | 35             |
| <b>Linburn</b> |           |                 |           |                 |           |                 |                |                |
| 340            | 16        | 16              | 18        | 18              | 16        | 16              | 40             | 35             |
| 364            | 16        | 17              | 18        | 18              | 17        | 17              | 40             | 35             |
| 364            | 17        | 17              | 18        | 19              | 17        | 17              | 40             | 35             |
| 398            | 9         | 10              | 12        | 14              | 11        | 13              | 40             | 35             |
| 402            | 16        | 16              | 17        | 17              | 16        | 16              | 40             | 35             |
| 404            | 16        | 16              | 16        | 16              | 15        | 16              | 40             | 35             |
| 405            | 16        | 16              | 17        | 17              | 15        | 16              | 40             | 35             |
| 406            | 18        | 18              | 18        | 18              | 17        | 18              | 40             | 35             |
| <b>Cooyal</b>  |           |                 |           |                 |           |                 |                |                |
| 321            | 14        | 14              | 17        | 18              | 15        | 16              | 40             | 35             |
| 322            | 15        | 15              | 18        | 19              | 17        | 18              | 48             | -              |
| 323            | 9         | 11              | 10        | 11              | 9         | 11              | 40             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 324         | 18        | 18              | 20        | 20              | 18        | 19              | 40             | 35             |
| 328         | 21        | 22              | 22        | 23              | 20        | 21              | 40             | 35             |
| 329         | 16        | 16              | 17        | 18              | 16        | 16              | 40             | 35             |
| 330         | 13        | 14              | 14        | 15              | 12        | 13              | 40             | 35             |
| 331         | 14        | 15              | 16        | 17              | 15        | 16              | 40             | 35             |
| 333         | 10        | 12              | 11        | 12              | 10        | 12              | 40             | 35             |
| 335         | 19        | 20              | 20        | 21              | 19        | 20              | 40             | 35             |
| 336         | 16        | 16              | 19        | 20              | 17        | 18              | 40             | 35             |
| 337         | 13        | 13              | 14        | 15              | 13        | 14              | 40             | 35             |
| 341         | 20        | 20              | 20        | 21              | 19        | 20              | 40             | 35             |
| 342         | 15        | 16              | 19        | 20              | 18        | 18              | 40             | 35             |
| 344         | 15        | 15              | 19        | 19              | 17        | 18              | 40             | 35             |
| 346         | 16        | 16              | 17        | 17              | 15        | 16              | 40             | 35             |
| 347         | 16        | 16              | 18        | 18              | 16        | 17              | 40             | 35             |
| 348         | 17        | 19              | 20        | 21              | 19        | 21              | 40             | 35             |
| 350         | 15        | 15              | 18        | 19              | 16        | 17              | 40             | 35             |
| 351         | 14        | 14              | 16        | 17              | 15        | 16              | 40             | 35             |
| 353         | 15        | 15              | 16        | 16              | 15        | 15              | 40             | 35             |
| 353         | 16        | 16              | 17        | 17              | 15        | 15              | 40             | 35             |
| 354         | 15        | 15              | 16        | 16              | 14        | 14              | 40             | 35             |
| 355         | 12        | 12              | 12        | 13              | 10        | 11              | 40             | 35             |
| 356         | 16        | 17              | 18        | 18              | 16        | 16              | 40             | 35             |
| 358         | 11        | 12              | 12        | 12              | 11        | 12              | 40             | 35             |
| 361         | 16        | 17              | 19        | 20              | 19        | 20              | 40             | 35             |
| 362         | 14        | 15              | 14        | 15              | 14        | 15              | 40             | 35             |
| 363         | 17        | 17              | 18        | 19              | 16        | 17              | 40             | 35             |
| 365         | 7         | 8               | 7         | 8               | 7         | 9               | 63             | -              |
| 367         | 14        | 15              | 18        | 19              | 17        | 17              | 40             | 35             |
| 368         | 19        | 20              | 21        | 21              | 19        | 20              | 40             | 35             |
| 369         | 14        | 14              | 16        | 16              | 13        | 14              | 40             | 35             |
| 375         | 16        | 16              | 19        | 20              | 18        | 18              | 48             | -              |
| 377         | 17        | 17              | 18        | 19              | 17        | 17              | 40             | 35             |
| 378         | 10        | 10              | 10        | 11              | 9         | 10              | 40             | 35             |
| 379         | 11        | 13              | 13        | 15              | 12        | 14              | 40             | 35             |
| 380         | 12        | 14              | 14        | 17              | 14        | 16              | 40             | 35             |
| 381         | 11        | 12              | 13        | 15              | 13        | 15              | 40             | 35             |

| Receiver ID                | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|----------------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|                            | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 383                        | 12        | 13              | 13        | 15              | 13        | 14              | 40             | 35             |
| 384                        | 12        | 14              | 14        | 16              | 14        | 16              | 40             | 35             |
| 385                        | 11        | 13              | 12        | 14              | 12        | 15              | 40             | 35             |
| 386                        | 22        | 25              | 23        | 26              | 23        | 25              | 40             | 35             |
| 387                        | 18        | 20              | 22        | 24              | 21        | 23              | 40             | 35             |
| 388                        | 17        | 17              | 20        | 21              | 18        | 19              | 40             | 35             |
| 388                        | 15        | 16              | 17        | 18              | 16        | 17              | 40             | 35             |
| 389                        | 16        | 17              | 19        | 20              | 18        | 19              | 40             | 35             |
| 390                        | 17        | 18              | 20        | 21              | 19        | 20              | 40             | 35             |
| 391                        | 17        | 18              | 20        | 21              | 19        | 20              | 40             | 35             |
| 392                        | 17        | 18              | 19        | 21              | 18        | 20              | 40             | 35             |
| 393                        | 17        | 18              | 18        | 19              | 16        | 18              | 40             | 35             |
| 394                        | 17        | 18              | 17        | 18              | 16        | 17              | 40             | 35             |
| 395                        | 20        | 20              | 20        | 21              | 19        | 20              | 40             | 35             |
| 396                        | 17        | 19              | 20        | 21              | 19        | 21              | 40             | 35             |
| 397                        | 20        | 20              | 20        | 21              | 19        | 20              | 40             | 35             |
| 400                        | 12        | 12              | 11        | 12              | 10        | 11              | 63             | -              |
| 412                        | 19        | 20              | 21        | 21              | 19        | 19              | 40             | 35             |
| 413                        | 16        | 17              | 20        | 21              | 18        | 19              | 40             | 35             |
| 414                        | 17        | 17              | 20        | 21              | 18        | 19              | 40             | 35             |
| 415                        | 9         | 10              | 9         | 10              | 9         | 11              | 40             | 35             |
| Moolarben Picnic Area      | 31        | 34              | 27        | 28              | 29        | 31              | 48             | 50             |
| Castle Rocks Walking Track | 26        | 28              | 27        | 28              | 28        | 30              | 48             | 50             |
| <b>Ulan</b>                |           |                 |           |                 |           |                 |                |                |
| 11                         | 15        | 16              | 16        | 17              | 16        | 17              | 40             | 35             |
| 11                         | 12        | 13              | 13        | 14              | 14        | 15              | 40             | 35             |
| 11                         | 14        | 15              | 14        | 16              | 14        | 15              | 40             | 35             |
| 11                         | 12        | 13              | 13        | 14              | 14        | 15              | 40             | 35             |
| 26                         | 37        | 40              | 37        | 39              | 35        | 38              | 63             | -              |
| 41B                        | 27        | 28              | 27        | 28              | 26        | 27              | 40             | 35             |
| 46B                        | 42        | 45              | 41        | 44              | 40        | 42              | 63             | -              |
| 66                         | 41        | 44              | 40        | 43              | 39        | 42              | 63             | -              |
| 149                        | 41        | 44              | 41        | 44              | 39        | 42              | 63             | -              |
| 160                        | 41        | 44              | 40        | 43              | 39        | 42              | 48             | 45             |
| 162                        | 41        | 44              | 40        | 43              | 39        | 42              | 63             | -              |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 168         | 41        | 44              | 40        | 43              | 39        | 42              | 48             | 45             |
| 255         | 29        | 30              | 28        | 30              | 27        | 29              | 40             | 35             |
| 256         | 29        | 31              | 29        | 31              | 28        | 29              | 40             | 35             |
| 258         | 30        | 32              | 30        | 32              | 29        | 31              | 40             | 35             |
| 258         | 30        | 32              | 30        | 32              | 29        | 30              | 40             | 35             |

Note 1: Highest predicted noise level from the NPfl meteorological conditions (**Table 9**) for each receiver.

Note 2: Predicted noise level complies with the Project Approval noise limit.

## Evening Operating Intrusive Noise Levels - Years 2028, 2029 and 2031 (dBA re 20 µPa)

| Receiver ID      | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|                  | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| <b>Cooks Gap</b> |           |                 |           |                 |           |                 |                |                |
| 41B              | 27        | 29              | 27        | 29              | 26        | 27              | 35             | 35             |
| 39               | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 40               | 28        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 53               | 25        | 26              | 26        | 27              | 24        | 25              | 35             | 35             |
| 60               | 25        | 27              | 26        | 27              | 24        | 26              | 35             | 35             |
| 61               | 27        | 29              | 27        | 29              | 26        | 27              | 35             | 35             |
| 70               | 32        | 34              | 32        | 34              | 31        | 33              | 35             | 37             |
| 75               | 31        | 33              | 31        | 33              | 29        | 31              | 35             | 36             |
| 79               | 29        | 31              | 29        | 31              | 28        | 30              | 35             | 35             |
| 80               | 28        | 30              | 28        | 30              | 27        | 29              | 35             | 35             |
| 82               | 27        | 29              | 28        | 29              | 26        | 28              | 35             | 35             |
| 83               | 27        | 29              | 28        | 30              | 26        | 28              | 35             | 35             |
| 84               | 26        | 28              | 26        | 28              | 25        | 26              | 35             | 35             |
| 86               | 27        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 87               | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 88               | 24        | 26              | 26        | 27              | 24        | 25              | 35             | 35             |
| 89               | 27        | 28              | 27        | 29              | 25        | 27              | 35             | 35             |
| 90               | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 91               | 26        | 28              | 27        | 28              | 24        | 25              | 35             | 35             |
| 94               | 26        | 27              | 27        | 28              | 25        | 26              | 35             | 35             |
| 95               | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 96               | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 97               | 27        | 29              | 27        | 29              | 25        | 27              | 35             | 35             |
| 98               | 27        | 28              | 27        | 29              | 25        | 27              | 35             | 35             |
| 99               | 27        | 29              | 27        | 29              | 25        | 27              | 35             | 35             |
| 100              | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 101a             | 28        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 101b             | 27        | 29              | 27        | 29              | 26        | 27              | 35             | 35             |
| 102              | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 103              | 25        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 104              | 26        | 27              | 26        | 28              | 25        | 26              | 35             | 35             |
| 105              | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 106              | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 107              | 27        | 28              | 27        | 28              | 25        | 27              | 35             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 108         | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 109         | 26        | 27              | 26        | 28              | 25        | 26              | 35             | 35             |
| 110         | 26        | 27              | 26        | 27              | 25        | 26              | 35             | 35             |
| 111         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 112         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 113         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 114         | 26        | 27              | 26        | 27              | 25        | 26              | 35             | 35             |
| 115         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 116         | 25        | 26              | 26        | 27              | 24        | 25              | 35             | 35             |
| 117         | 25        | 26              | 26        | 27              | 24        | 25              | 35             | 35             |
| 118         | 23        | 24              | 24        | 25              | 23        | 24              | 35             | 35             |
| 119         | 24        | 24              | 25        | 26              | 23        | 24              | 35             | 35             |
| 120         | 19        | 21              | 22        | 23              | 20        | 21              | 35             | 35             |
| 121         | 15        | 17              | 18        | 19              | 17        | 18              | 35             | 35             |
| 123         | 24        | 25              | 25        | 26              | 23        | 24              | 35             | 35             |
| 124         | 22        | 23              | 23        | 25              | 22        | 23              | 35             | 35             |
| 125         | 19        | 20              | 21        | 22              | 19        | 20              | 35             | 35             |
| 126         | 20        | 20              | 20        | 20              | 19        | 19              | 35             | 35             |
| 127         | 22        | 23              | 22        | 23              | 22        | 22              | 35             | 35             |
| 180         | 30        | 31              | 30        | 31              | 28        | 30              | 35             | 35             |
| 181         | 29        | 31              | 29        | 31              | 28        | 29              | 35             | 35             |
| 182         | 29        | 31              | 29        | 31              | 28        | 29              | 35             | 35             |
| 183         | 26        | 28              | 26        | 27              | 25        | 26              | 35             | 35             |
| 184         | 29        | 30              | 29        | 30              | 28        | 29              | 35             | 35             |
| 185         | 29        | 30              | 29        | 30              | 27        | 29              | 35             | 35             |
| 186         | 27        | 28              | 27        | 28              | 25        | 27              | 35             | 35             |
| 187         | 28        | 29              | 28        | 29              | 27        | 28              | 35             | 35             |
| 188         | 21        | 23              | 22        | 23              | 21        | 22              | 35             | 35             |
| 189         | 28        | 29              | 28        | 29              | 27        | 28              | 35             | 35             |
| 190         | 21        | 22              | 21        | 22              | 20        | 21              | 35             | 35             |
| 191         | 23        | 24              | 23        | 25              | 22        | 23              | 35             | 35             |
| 192         | 27        | 28              | 27        | 29              | 26        | 27              | 35             | 35             |
| 194         | 26        | 27              | 27        | 28              | 25        | 26              | 35             | 35             |
| 195         | 26        | 27              | 26        | 27              | 24        | 26              | 35             | 35             |
| 196         | 26        | 27              | 26        | 27              | 25        | 26              | 35             | 35             |
| 199         | 22        | 24              | 23        | 24              | 22        | 23              | 35             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 200         | 21        | 22              | 22        | 23              | 20        | 21              | 35             | 35             |
| 201a        | 23        | 24              | 23        | 24              | 22        | 23              | 35             | 35             |
| 201b        | 21        | 22              | 22        | 23              | 20        | 21              | 35             | 35             |
| 202         | 23        | 24              | 24        | 25              | 22        | 23              | 35             | 35             |
| 203         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 204         | 25        | 26              | 26        | 27              | 24        | 25              | 35             | 35             |
| 205         | 19        | 20              | 20        | 21              | 19        | 19              | 35             | 35             |
| 206         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 207         | 24        | 25              | 25        | 26              | 23        | 24              | 35             | 35             |
| 208         | 24        | 25              | 25        | 26              | 23        | 24              | 35             | 35             |
| 209         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 210         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 211         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 212         | 24        | 25              | 25        | 26              | 23        | 24              | 35             | 35             |
| 213         | 25        | 25              | 25        | 26              | 24        | 24              | 35             | 35             |
| 215         | 25        | 26              | 25        | 26              | 24        | 25              | 35             | 35             |
| 216         | 25        | 26              | 25        | 26              | 24        | 25              | 35             | 35             |
| 217         | 25        | 26              | 25        | 26              | 24        | 25              | 35             | 35             |
| 218         | 24        | 25              | 25        | 26              | 23        | 24              | 35             | 35             |
| 219         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 220         | 22        | 23              | 22        | 23              | 21        | 22              | 35             | 35             |
| 222         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 223         | 26        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 224         | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 226         | 26        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 227         | 27        | 28              | 27        | 28              | 25        | 26              | 35             | 35             |
| 228         | 27        | 28              | 27        | 29              | 26        | 27              | 35             | 35             |
| 229         | 27        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 230         | 27        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 231         | 27        | 29              | 28        | 29              | 26        | 27              | 35             | 35             |
| 232         | 28        | 29              | 28        | 29              | 26        | 28              | 35             | 35             |
| 233         | 28        | 29              | 28        | 29              | 27        | 28              | 35             | 35             |
| 234         | 28        | 29              | 28        | 29              | 27        | 28              | 35             | 35             |
| 235         | 28        | 29              | 28        | 30              | 27        | 28              | 35             | 35             |
| 236         | 28        | 30              | 28        | 30              | 27        | 28              | 35             | 35             |
| 237         | 28        | 29              | 28        | 30              | 27        | 28              | 35             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 238         | 28        | 30              | 29        | 30              | 27        | 29              | 35             | 35             |
| 300         | 25        | 27              | 25        | 27              | 24        | 25              | 35             | 35             |
| 303         | 30        | 32              | 29        | 31              | 28        | 30              | 35             | 35             |
| 305         | 29        | 31              | 29        | 30              | 27        | 29              | 35             | 35             |
| 306         | 29        | 31              | 29        | 31              | 28        | 29              | 35             | 35             |
| 307         | 26        | 28              | 26        | 28              | 25        | 26              | 35             | 35             |
| 308         | 28        | 29              | 28        | 29              | 26        | 28              | 35             | 35             |
| 309         | 25        | 27              | 25        | 27              | 24        | 25              | 35             | 35             |
| 310         | 25        | 27              | 26        | 27              | 24        | 25              | 35             | 35             |
| 311         | 24        | 25              | 24        | 26              | 23        | 24              | 35             | 35             |
| 312         | 23        | 24              | 23        | 24              | 22        | 23              | 35             | 35             |
| 313         | 24        | 25              | 24        | 25              | 23        | 24              | 35             | 35             |
| 314         | 22        | 23              | 22        | 24              | 21        | 22              | 35             | 35             |
| 315         | 21        | 22              | 21        | 22              | 20        | 21              | 35             | 35             |
| 316         | 21        | 22              | 21        | 22              | 19        | 20              | 35             | 35             |
| 317         | 22        | 23              | 22        | 23              | 20        | 21              | 35             | 35             |
| 360         | 21        | 22              | 22        | 23              | 20        | 21              | 35             | 35             |
| 401         | 25        | 26              | 25        | 26              | 23        | 24              | 35             | 35             |
| 407         | 12        | 13              | 13        | 14              | 12        | 12              | 35             | 35             |
| 408         | 12        | 13              | 13        | 13              | 12        | 12              | 35             | 35             |
| 409         | 16        | 16              | 16        | 17              | 16        | 16              | 35             | 35             |
| 410         | 18        | 19              | 20        | 21              | 19        | 20              | 35             | 35             |
| 411         | 13        | 14              | 13        | 14              | 12        | 13              | 35             | 35             |
| Linburn     |           |                 |           |                 |           |                 |                |                |
| 340         | 17        | 17              | 18        | 19              | 16        | 17              | 35             | 35             |
| 364         | 17        | 17              | 18        | 19              | 17        | 18              | 35             | 35             |
| 364         | 17        | 18              | 18        | 19              | 17        | 18              | 35             | 35             |
| 398         | 9         | 10              | 13        | 14              | 12        | 13              | 35             | 35             |
| 402         | 17        | 17              | 17        | 17              | 16        | 17              | 35             | 35             |
| 404         | 16        | 16              | 16        | 17              | 16        | 16              | 35             | 35             |
| 405         | 16        | 17              | 17        | 17              | 16        | 16              | 35             | 35             |
| 406         | 18        | 18              | 18        | 19              | 18        | 18              | 35             | 35             |
| Cooyal      |           |                 |           |                 |           |                 |                |                |
| 321         | 14        | 15              | 17        | 18              | 16        | 17              | 35             | 35             |
| 322         | 15        | 15              | 19        | 20              | 17        | 18              | 48             | -              |
| 323         | 9         | 11              | 10        | 11              | 10        | 11              | 35             | 35             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 324         | 18        | 18              | 20        | 21              | 19        | 20              | 35             | 35             |
| 328         | 21        | 22              | 23        | 24              | 21        | 21              | 35             | 35             |
| 329         | 16        | 17              | 17        | 18              | 16        | 17              | 35             | 35             |
| 330         | 14        | 14              | 15        | 15              | 13        | 13              | 35             | 35             |
| 331         | 15        | 16              | 17        | 18              | 15        | 16              | 35             | 35             |
| 333         | 11        | 12              | 11        | 13              | 11        | 12              | 35             | 35             |
| 335         | 20        | 20              | 20        | 22              | 19        | 20              | 35             | 35             |
| 336         | 16        | 16              | 19        | 20              | 17        | 18              | 35             | 35             |
| 337         | 13        | 14              | 14        | 15              | 14        | 15              | 35             | 35             |
| 341         | 20        | 21              | 21        | 22              | 20        | 21              | 35             | 35             |
| 342         | 15        | 16              | 19        | 20              | 18        | 19              | 35             | 35             |
| 344         | 15        | 16              | 19        | 20              | 17        | 18              | 35             | 35             |
| 346         | 16        | 17              | 17        | 18              | 15        | 16              | 35             | 35             |
| 347         | 16        | 17              | 18        | 19              | 16        | 17              | 35             | 35             |
| 348         | 18        | 19              | 20        | 22              | 20        | 21              | 35             | 35             |
| 350         | 15        | 16              | 18        | 19              | 17        | 17              | 35             | 35             |
| 351         | 14        | 15              | 17        | 18              | 15        | 16              | 35             | 35             |
| 353         | 16        | 16              | 17        | 17              | 15        | 15              | 35             | 35             |
| 353         | 16        | 16              | 17        | 17              | 15        | 15              | 35             | 35             |
| 354         | 15        | 15              | 16        | 16              | 14        | 14              | 35             | 35             |
| 355         | 12        | 12              | 12        | 13              | 11        | 11              | 35             | 35             |
| 356         | 17        | 17              | 18        | 19              | 16        | 17              | 35             | 35             |
| 358         | 12        | 12              | 12        | 13              | 12        | 12              | 35             | 35             |
| 361         | 16        | 17              | 19        | 20              | 19        | 20              | 35             | 35             |
| 362         | 14        | 15              | 14        | 15              | 14        | 15              | 35             | 35             |
| 363         | 17        | 17              | 19        | 19              | 17        | 17              | 35             | 35             |
| 365         | 7         | 8               | 7         | 8               | 8         | 9               | 63             | -              |
| 367         | 15        | 15              | 18        | 19              | 17        | 18              | 35             | 35             |
| 368         | 19        | 20              | 21        | 22              | 19        | 20              | 35             | 35             |
| 369         | 14        | 15              | 16        | 17              | 14        | 14              | 35             | 35             |
| 375         | 16        | 17              | 20        | 21              | 18        | 19              | 48             | -              |
| 377         | 17        | 18              | 18        | 19              | 17        | 18              | 35             | 35             |
| 378         | 10        | 11              | 11        | 11              | 9         | 10              | 35             | 35             |
| 379         | 11        | 13              | 13        | 15              | 12        | 15              | 35             | 35             |
| 380         | 12        | 15              | 15        | 17              | 14        | 17              | 35             | 35             |
| 381         | 11        | 13              | 14        | 15              | 13        | 15              | 35             | 35             |

| Receiver ID                | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|----------------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|                            | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 383                        | 12        | 13              | 13        | 15              | 13        | 15              | 35             | 35             |
| 384                        | 12        | 14              | 14        | 16              | 14        | 17              | 35             | 35             |
| 385                        | 11        | 13              | 12        | 14              | 13        | 15              | 35             | 35             |
| 386                        | 22        | 25              | 24        | 26              | 23        | 26              | 35             | 35             |
| 387                        | 19        | 21              | 22        | 24              | 22        | 24              | 35             | 35             |
| 388                        | 17        | 18              | 20        | 21              | 19        | 20              | 35             | 35             |
| 388                        | 16        | 17              | 18        | 19              | 16        | 17              | 35             | 35             |
| 389                        | 17        | 18              | 19        | 20              | 18        | 19              | 35             | 35             |
| 390                        | 17        | 18              | 20        | 21              | 19        | 21              | 35             | 35             |
| 391                        | 17        | 18              | 20        | 22              | 19        | 21              | 35             | 35             |
| 392                        | 17        | 19              | 20        | 21              | 19        | 20              | 35             | 35             |
| 393                        | 17        | 18              | 18        | 19              | 17        | 18              | 35             | 35             |
| 394                        | 17        | 18              | 17        | 18              | 17        | 18              | 35             | 35             |
| 395                        | 20        | 21              | 20        | 22              | 19        | 21              | 35             | 35             |
| 396                        | 17        | 19              | 20        | 22              | 19        | 21              | 35             | 35             |
| 397                        | 20        | 21              | 21        | 22              | 20        | 21              | 35             | 35             |
| 400                        | 12        | 13              | 12        | 12              | 11        | 12              | 63             | -              |
| 412                        | 20        | 20              | 21        | 22              | 19        | 20              | 35             | 35             |
| 413                        | 17        | 17              | 20        | 21              | 18        | 19              | 35             | 35             |
| 414                        | 17        | 18              | 20        | 21              | 19        | 20              | 35             | 35             |
| 415                        | 9         | 10              | 9         | 11              | 9         | 11              | 35             | 35             |
| Moolarben Picnic Area      | 32        | 34              | 27        | 29              | 30        | 32              | 48             | 50             |
| Castle Rocks Walking Track | 27        | 28              | 27        | 28              | 28        | 30              | 48             | 50             |
| Ulan                       |           |                 |           |                 |           |                 |                |                |
| 11                         | 15        | 17              | 16        | 17              | 16        | 17              | 35             | 35             |
| 11                         | 13        | 14              | 13        | 14              | 14        | 15              | 35             | 35             |
| 11                         | 14        | 16              | 15        | 16              | 14        | 16              | 35             | 35             |
| 11                         | 13        | 14              | 13        | 14              | 14        | 15              | 35             | 35             |
| 26                         | 37        | 40              | 37        | 40              | 35        | 38              | 63             | -              |
| 41B                        | 27        | 29              | 27        | 29              | 26        | 27              | 35             | 35             |
| 46B                        | 42        | 45              | 41        | 45              | 40        | 43              | 63             | -              |
| 66                         | 41        | 44              | 40        | 43              | 39        | 42              | 63             | -              |
| 149                        | 42        | 45              | 41        | 44              | 39        | 42              | 63             | -              |
| 160                        | 41        | 44              | 41        | 44              | 39        | 42              | 48             | 45             |

| Receiver ID | Year 2028 |                 | Year 2029 |                 | Year 2031 |                 | Noise Criteria |                |
|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|----------------|----------------|
|             | Standard  | Noise Enhancing | Standard  | Noise Enhancing | Standard  | Noise Enhancing | PNTL           | PA Noise Limit |
| 162         | 41        | 44              | 40        | 43              | 39        | 42              | 63             | -              |
| 168         | 41        | 44              | 41        | 44              | 39        | 42              | 48             | 45             |
| 255         | 29        | 31              | 29        | 30              | 28        | 29              | 35             | 35             |
| 256         | 30        | 31              | 30        | 31              | 28        | 30              | 35             | 35             |
| 258         | 31        | 33              | 31        | 33              | 29        | 31              | 35             | 35             |
| 258         | 31        | 32              | 30        | 32              | 29        | 31              | 35             | 35             |

Note 1: Highest predicted noise level from the NPfl meteorological conditions (**Table 9**) for each receiver.

Note 2: Predicted noise level complies with the Project Approval noise limit.

**Night-time Operating Intrusive and Sleep Disturbance Noise Levels - Years 2028, 2029 and 2031 (dBA re 20 µPa)**

| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| Cooks Gap   |           |                 |                   |           |                 |                   |           |                 |                   |                |                |
| 41B         | 28        | 30              | 32                | 28        | 30              | 32                | 26        | 29              | 31                | 35/52          | 35/45          |
| 39          | 27        | 29              | 31                | 27        | 29              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 40          | 28        | 31              | 32                | 28        | 30              | 32                | 40        | 29              | 31                | 35/52          | 35/45          |
| 53          | 26        | 28              | 29                | 26        | 28              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 60          | 26        | 28              | 31                | 26        | 28              | 31                | 25        | 27              | 31                | 35/52          | 35/45          |
| 61          | 28        | 31              | 33                | 28        | 30              | 33                | 26        | 29              | 32                | 35/52          | 35/45          |
| 70          | 33        | 36              | 37                | 33        | 35              | 37                | 31        | 34              | 36                | 35/52          | 37/45          |
| 75          | 31        | 34              | 36                | 31        | 34              | 36                | 30        | 32              | 35                | 35/52          | 36/45          |
| 79          | 29        | 32              | 34                | 30        | 32              | 34                | 28        | 31              | 34                | 35/52          | 35/45          |
| 80          | 28        | 31              | 33                | 29        | 31              | 33                | 28        | 30              | 32                | 35/52          | 35/45          |
| 82          | 28        | 31              | 33                | 28        | 31              | 33                | 27        | 29              | 32                | 35/52          | 35/45          |
| 83          | 28        | 30              | 32                | 29        | 31              | 33                | 27        | 29              | 32                | 35/52          | 35/45          |
| 84          | 27        | 29              | 32                | 27        | 29              | 32                | 25        | 28              | 31                | 35/52          | 35/45          |
| 86          | 28        | 30              | 31                | 28        | 30              | 32                | 26        | 28              | 30                | 35/52          | 35/45          |
| 87          | 27        | 30              | 32                | 27        | 30              | 31                | 26        | 28              | 31                | 35/52          | 35/45          |
| 88          | 25        | 27              | 29                | 27        | 29              | 30                | 24        | 26              | 29                | 35/52          | 35/45          |
| 89          | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 90          | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 91          | 27        | 29              | 31                | 27        | 29              | 31                | 25        | 27              | 30                | 35/52          | 35/45          |
| 94          | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 95          | 27        | 29              | 31                | 27        | 29              | 31                | 26        | 28              | 29                | 35/52          | 35/45          |
| 96          | 27        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 97          | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 98          | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 99          | 28        | 30              | 31                | 28        | 30              | 32                | 26        | 28              | 30                | 35/52          | 35/45          |
| 100         | 28        | 30              | 32                | 28        | 30              | 32                | 26        | 28              | 31                | 35/52          | 35/45          |
| 101a        | 28        | 31              | 32                | 28        | 30              | 32                | 26        | 29              | 31                | 35/52          | 35/45          |
| 101b        | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 102         | 27        | 29              | 31                | 27        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 103         | 26        | 28              | 29                | 26        | 28              | 30                | 24        | 26              | 28                | 35/52          | 35/45          |
| 104         | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 105         | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |

| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 106         | 27        | 29              | 31                | 27        | 29              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 107         | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 108         | 27        | 29              | 31                | 27        | 29              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 109         | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 110         | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 111         | 26        | 28              | 30                | 27        | 29              | 30                | 25        | 27              | 28                | 35/52          | 35/45          |
| 112         | 26        | 28              | 29                | 27        | 29              | 30                | 25        | 27              | 28                | 35/52          | 35/45          |
| 113         | 26        | 28              | 29                | 26        | 28              | 29                | 25        | 26              | 28                | 35/52          | 35/45          |
| 114         | 27        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 115         | 26        | 28              | 29                | 26        | 28              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 116         | 26        | 27              | 29                | 26        | 28              | 29                | 25        | 27              | 29                | 35/52          | 35/45          |
| 117         | 25        | 27              | 29                | 26        | 28              | 29                | 25        | 26              | 28                | 35/52          | 35/45          |
| 118         | 24        | 26              | 28                | 25        | 27              | 28                | 23        | 25              | 27                | 35/52          | 35/45          |
| 119         | 24        | 26              | 28                | 25        | 27              | 29                | 24        | 25              | 28                | 35/52          | 35/45          |
| 120         | 20        | 22              | 26                | 22        | 24              | 27                | 20        | 22              | 26                | 35/52          | 35/45          |
| 121         | 16        | 18              | 24                | 18        | 21              | 25                | 17        | 20              | 25                | 35/52          | 35/45          |
| 123         | 25        | 26              | 28                | 26        | 27              | 29                | 24        | 26              | 28                | 35/52          | 35/45          |
| 124         | 23        | 25              | 27                | 24        | 26              | 28                | 23        | 24              | 27                | 35/52          | 35/45          |
| 125         | 19        | 21              | 25                | 21        | 23              | 26                | 20        | 22              | 25                | 35/52          | 35/45          |
| 126         | 20        | 22              | 23                | 20        | 22              | 23                | 19        | 21              | 22                | 35/52          | 35/45          |
| 127         | 23        | 25              | 27                | 23        | 25              | 27                | 22        | 24              | 27                | 35/52          | 35/45          |
| 180         | 30        | 33              | 34                | 30        | 33              | 34                | 29        | 31              | 33                | 35/52          | 35/45          |
| 181         | 30        | 32              | 34                | 30        | 32              | 34                | 28        | 31              | 33                | 35/52          | 35/45          |
| 182         | 30        | 32              | 34                | 30        | 32              | 33                | 28        | 31              | 32                | 35/52          | 35/45          |
| 183         | 27        | 29              | 31                | 26        | 29              | 31                | 25        | 28              | 30                | 35/52          | 35/45          |
| 184         | 29        | 32              | 33                | 30        | 32              | 33                | 28        | 30              | 32                | 35/52          | 35/45          |
| 185         | 29        | 32              | 33                | 29        | 32              | 33                | 28        | 30              | 32                | 35/52          | 35/45          |
| 186         | 27        | 30              | 31                | 27        | 29              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 187         | 28        | 31              | 32                | 29        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 188         | 22        | 24              | 25                | 22        | 24              | 25                | 21        | 23              | 24                | 35/52          | 35/45          |
| 189         | 28        | 30              | 32                | 28        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 190         | 22        | 24              | 24                | 22        | 24              | 24                | 21        | 23              | 24                | 35/52          | 35/45          |
| 191         | 23        | 25              | 26                | 24        | 26              | 27                | 22        | 24              | 26                | 35/52          | 35/45          |
| 192         | 28        | 30              | 31                | 28        | 30              | 31                | 27        | 29              | 30                | 35/52          | 35/45          |
| 194         | 27        | 29              | 30                | 27        | 29              | 30                | 26        | 27              | 29                | 35/52          | 35/45          |

| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 195         | 26        | 29              | 30                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 196         | 26        | 28              | 29                | 27        | 29              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 199         | 23        | 25              | 26                | 24        | 26              | 27                | 22        | 24              | 26                | 35/52          | 35/45          |
| 200         | 22        | 24              | 25                | 23        | 24              | 26                | 21        | 23              | 25                | 35/52          | 35/45          |
| 201a        | 24        | 26              | 27                | 24        | 26              | 27                | 22        | 24              | 26                | 35/52          | 35/45          |
| 201b        | 22        | 24              | 25                | 23        | 24              | 26                | 21        | 23              | 24                | 35/52          | 35/45          |
| 202         | 24        | 26              | 27                | 24        | 26              | 27                | 23        | 25              | 26                | 35/52          | 35/45          |
| 203         | 24        | 26              | 28                | 25        | 26              | 28                | 23        | 25              | 27                | 35/52          | 35/45          |
| 204         | 26        | 28              | 29                | 26        | 28              | 29                | 24        | 26              | 28                | 35/52          | 35/45          |
| 205         | 20        | 22              | 23                | 20        | 22              | 23                | 19        | 21              | 23                | 35/52          | 35/45          |
| 206         | 25        | 27              | 28                | 25        | 27              | 28                | 23        | 25              | 27                | 35/52          | 35/45          |
| 207         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 25              | 27                | 35/52          | 35/45          |
| 208         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 25              | 27                | 35/52          | 35/45          |
| 209         | 25        | 26              | 27                | 25        | 27              | 28                | 23        | 25              | 26                | 35/52          | 35/45          |
| 210         | 25        | 26              | 27                | 25        | 27              | 27                | 23        | 25              | 26                | 35/52          | 35/45          |
| 211         | 25        | 26              | 27                | 25        | 27              | 28                | 24        | 25              | 27                | 35/52          | 35/45          |
| 212         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 26              | 27                | 35/52          | 35/45          |
| 213         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 26              | 28                | 35/52          | 35/45          |
| 215         | 25        | 27              | 28                | 26        | 28              | 29                | 24        | 26              | 28                | 35/52          | 35/45          |
| 216         | 26        | 27              | 29                | 26        | 28              | 29                | 25        | 26              | 28                | 35/52          | 35/45          |
| 217         | 26        | 27              | 29                | 26        | 28              | 29                | 25        | 26              | 28                | 35/52          | 35/45          |
| 218         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 26              | 27                | 35/52          | 35/45          |
| 219         | 25        | 27              | 28                | 25        | 27              | 28                | 24        | 25              | 27                | 35/52          | 35/45          |
| 220         | 22        | 24              | 26                | 23        | 25              | 26                | 22        | 24              | 25                | 35/52          | 35/45          |
| 222         | 26        | 28              | 29                | 26        | 28              | 29                | 25        | 27              | 28                | 35/52          | 35/45          |
| 223         | 26        | 28              | 30                | 27        | 29              | 30                | 25        | 27              | 28                | 35/52          | 35/45          |
| 224         | 27        | 29              | 31                | 27        | 29              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 226         | 27        | 29              | 30                | 27        | 29              | 31                | 26        | 27              | 29                | 35/52          | 35/45          |
| 227         | 27        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 228         | 28        | 30              | 31                | 28        | 30              | 31                | 26        | 28              | 30                | 35/52          | 35/45          |
| 229         | 28        | 30              | 31                | 28        | 30              | 32                | 26        | 28              | 30                | 35/52          | 35/45          |
| 230         | 28        | 30              | 32                | 28        | 30              | 32                | 26        | 28              | 30                | 35/52          | 35/45          |
| 231         | 28        | 30              | 32                | 28        | 30              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 232         | 28        | 30              | 32                | 29        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 233         | 28        | 30              | 32                | 29        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |

| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 234         | 28        | 30              | 32                | 29        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 235         | 29        | 31              | 32                | 29        | 31              | 32                | 28        | 30              | 32                | 35/52          | 35/45          |
| 236         | 29        | 31              | 33                | 29        | 31              | 33                | 28        | 30              | 32                | 35/52          | 35/45          |
| 237         | 28        | 31              | 33                | 29        | 31              | 33                | 27        | 30              | 32                | 35/52          | 35/45          |
| 238         | 29        | 31              | 33                | 29        | 32              | 33                | 28        | 30              | 32                | 35/52          | 35/45          |
| 300         | 26        | 28              | 32                | 26        | 28              | 32                | 24        | 27              | 31                | 35/52          | 35/45          |
| 303         | 30        | 33              | 35                | 30        | 33              | 34                | 29        | 31              | 34                | 35/52          | 35/45          |
| 305         | 29        | 32              | 34                | 29        | 32              | 33                | 28        | 31              | 33                | 35/52          | 35/45          |
| 306         | 30        | 32              | 34                | 30        | 32              | 34                | 28        | 31              | 33                | 35/52          | 35/45          |
| 307         | 27        | 29              | 31                | 27        | 29              | 30                | 25        | 28              | 30                | 35/52          | 35/45          |
| 308         | 28        | 31              | 32                | 28        | 31              | 32                | 27        | 29              | 31                | 35/52          | 35/45          |
| 309         | 26        | 28              | 30                | 26        | 28              | 30                | 25        | 27              | 29                | 35/52          | 35/45          |
| 310         | 26        | 28              | 31                | 26        | 29              | 31                | 25        | 27              | 30                | 35/52          | 35/45          |
| 311         | 24        | 27              | 29                | 25        | 27              | 29                | 23        | 26              | 29                | 35/52          | 35/45          |
| 312         | 24        | 26              | 29                | 24        | 26              | 29                | 22        | 24              | 28                | 35/52          | 35/45          |
| 313         | 25        | 27              | 29                | 25        | 27              | 29                | 23        | 25              | 28                | 35/52          | 35/45          |
| 314         | 23        | 25              | 28                | 23        | 25              | 28                | 21        | 23              | 27                | 35/52          | 35/45          |
| 315         | 22        | 24              | 27                | 22        | 24              | 27                | 20        | 22              | 27                | 35/52          | 35/45          |
| 316         | 22        | 24              | 27                | 22        | 24              | 27                | 20        | 22              | 26                | 35/52          | 35/45          |
| 317         | 22        | 24              | 28                | 23        | 25              | 28                | 21        | 23              | 27                | 35/52          | 35/45          |
| 360         | 22        | 24              | 25                | 23        | 24              | 26                | 21        | 23              | 25                | 35/52          | 35/45          |
| 401         | 25        | 27              | 28                | 26        | 27              | 28                | 24        | 26              | 27                | 35/52          | 35/45          |
| 407         | 13        | 14              | 15                | 13        | 15              | 16                | 12        | 14              | 16                | 35/52          | 35/45          |
| 408         | 12        | 14              | 15                | 13        | 15              | 16                | 12        | 13              | 15                | 35/52          | 35/45          |
| 409         | 16        | 18              | 20                | 17        | 18              | 20                | 16        | 18              | 20                | 35/52          | 35/45          |
| 410         | 18        | 20              | 25                | 20        | 22              | 25                | 19        | 21              | 25                | 35/52          | 35/45          |
| 411         | 14        | 15              | 16                | 14        | 15              | 16                | 13        | 14              | 15                | 35/52          | 35/45          |
| Linburn     |           |                 |                   |           |                 |                   |           |                 |                   |                |                |
| 340         | 17        | 19              | 21                | 19        | 20              | 22                | 17        | 18              | 22                | 35/52          | 35/45          |
| 364         | 17        | 19              | 21                | 19        | 20              | 24                | 18        | 19              | 23                | 35/52          | 35/45          |
| 364         | 18        | 19              | 21                | 19        | 21              | 24                | 18        | 19              | 23                | 35/52          | 35/45          |
| 398         | 9         | 11              | 17                | 13        | 15              | 19                | 12        | 14              | 19                | 35/52          | 35/45          |
| 402         | 17        | 18              | 20                | 17        | 19              | 20                | 17        | 18              | 20                | 35/52          | 35/45          |
| 404         | 17        | 18              | 19                | 17        | 18              | 20                | 16        | 18              | 19                | 35/52          | 35/45          |
| 405         | 17        | 18              | 21                | 17        | 19              | 23                | 16        | 18              | 20                | 35/52          | 35/45          |

| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 406         | 19        | 20              | 22                | 19        | 20              | 22                | 18        | 20              | 21                | 35/52          | 35/45          |
| Cooyal      |           |                 |                   |           |                 |                   |           |                 |                   |                |                |
| 321         | 15        | 16              | 19                | 18        | 20              | 24                | 16        | 18              | 24                | 35/52          | 35/45          |
| 322         | 16        | 17              | 21                | 19        | 21              | 25                | 18        | 19              | 25                | 48             | -              |
| 323         | 10        | 12              | 15                | 10        | 13              | 16                | 10        | 13              | 16                | 35/52          | 35/45          |
| 324         | 18        | 20              | 25                | 21        | 22              | 26                | 19        | 21              | 26                | 35/52          | 35/45          |
| 328         | 22        | 23              | 26                | 23        | 25              | 27                | 21        | 23              | 26                | 35/52          | 35/45          |
| 329         | 17        | 18              | 21                | 18        | 20              | 24                | 16        | 18              | 24                | 35/52          | 35/45          |
| 330         | 14        | 16              | 19                | 15        | 17              | 24                | 13        | 15              | 20                | 35/52          | 35/45          |
| 331         | 15        | 17              | 23                | 17        | 19              | 26                | 16        | 18              | 25                | 35/52          | 35/45          |
| 333         | 11        | 13              | 18                | 12        | 14              | 18                | 11        | 13              | 16                | 35/52          | 35/45          |
| 335         | 20        | 22              | 26                | 21        | 23              | 27                | 20        | 22              | 27                | 35/52          | 35/45          |
| 336         | 17        | 18              | 23                | 20        | 22              | 25                | 18        | 20              | 24                | 35/52          | 35/45          |
| 337         | 14        | 15              | 21                | 15        | 17              | 24                | 14        | 16              | 24                | 35/52          | 35/45          |
| 341         | 20        | 22              | 27                | 21        | 23              | 28                | 20        | 22              | 28                | 35/52          | 35/45          |
| 342         | 16        | 18              | 23                | 20        | 22              | 26                | 18        | 20              | 25                | 35/52          | 35/45          |
| 344         | 16        | 18              | 22                | 20        | 21              | 25                | 18        | 20              | 24                | 35/52          | 35/45          |
| 346         | 17        | 18              | 21                | 18        | 19              | 24                | 16        | 18              | 23                | 35/52          | 35/45          |
| 347         | 17        | 18              | 21                | 19        | 20              | 24                | 17        | 18              | 23                | 35/52          | 35/45          |
| 348         | 18        | 21              | 28                | 21        | 23              | 28                | 20        | 23              | 28                | 35/52          | 35/45          |
| 350         | 16        | 17              | 21                | 19        | 21              | 24                | 17        | 19              | 24                | 35/52          | 35/45          |
| 351         | 15        | 16              | 19                | 17        | 19              | 23                | 16        | 18              | 23                | 35/52          | 35/45          |
| 353         | 16        | 17              | 19                | 17        | 19              | 21                | 16        | 17              | 20                | 35/52          | 35/45          |
| 353         | 17        | 18              | 19                | 18        | 19              | 21                | 16        | 17              | 20                | 35/52          | 35/45          |
| 354         | 16        | 17              | 18                | 17        | 18              | 20                | 15        | 16              | 19                | 35/52          | 35/45          |
| 355         | 13        | 14              | 15                | 13        | 14              | 15                | 11        | 13              | 14                | 35/52          | 35/45          |
| 356         | 17        | 19              | 21                | 19        | 20              | 23                | 17        | 18              | 22                | 35/52          | 35/45          |
| 358         | 12        | 14              | 16                | 13        | 14              | 16                | 12        | 14              | 15                | 35/52          | 35/45          |
| 361         | 17        | 19              | 25                | 20        | 22              | 26                | 19        | 22              | 27                | 35/52          | 35/45          |
| 362         | 15        | 16              | 21                | 15        | 17              | 21                | 15        | 17              | 22                | 35/52          | 35/45          |
| 363         | 18        | 19              | 22                | 19        | 21              | 23                | 17        | 19              | 22                | 35/52          | 35/45          |
| 365         | 8         | 10              | 12                | 8         | 10              | 12                | 8         | 11              | 13                | 63             | -              |
| 367         | 15        | 17              | 21                | 19        | 21              | 25                | 18        | 19              | 24                | 35/52          | 35/45          |
| 368         | 20        | 22              | 26                | 21        | 23              | 27                | 20        | 22              | 26                | 35/52          | 35/45          |
| 369         | 15        | 16              | 19                | 17        | 18              | 24                | 14        | 16              | 20                | 35/52          | 35/45          |

| Receiver ID                | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|----------------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|                            | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 375                        | 17        | 18              | 24                | 20        | 22              | 26                | 19        | 20              | 25                | 48             | -              |
| 377                        | 18        | 19              | 22                | 19        | 21              | 23                | 18        | 19              | 23                | 35/52          | 35/45          |
| 378                        | 10        | 12              | 14                | 11        | 13              | 14                | 10        | 11              | 13                | 35/52          | 35/45          |
| 379                        | 12        | 14              | 19                | 14        | 16              | 20                | 13        | 16              | 17                | 35/52          | 35/45          |
| 380                        | 13        | 16              | 21                | 15        | 18              | 21                | 15        | 18              | 21                | 35/52          | 35/45          |
| 381                        | 12        | 14              | 19                | 14        | 16              | 20                | 14        | 16              | 19                | 35/52          | 35/45          |
| 383                        | 12        | 14              | 18                | 14        | 16              | 19                | 14        | 16              | 19                | 35/52          | 35/45          |
| 384                        | 12        | 15              | 20                | 14        | 17              | 21                | 15        | 18              | 20                | 35/52          | 35/45          |
| 385                        | 12        | 14              | 18                | 13        | 16              | 19                | 13        | 16              | 19                | 35/52          | 35/45          |
| 386                        | 23        | 26              | 34                | 24        | 27              | 35                | 24        | 27              | 34                | 35/52          | 35/45          |
| 387                        | 19        | 22              | 30                | 23        | 26              | 31                | 22        | 25              | 31                | 35/52          | 35/45          |
| 388                        | 18        | 19              | 25                | 21        | 23              | 26                | 19        | 21              | 26                | 35/52          | 35/45          |
| 388                        | 16        | 18              | 24                | 18        | 20              | 26                | 17        | 19              | 25                | 35/52          | 35/45          |
| 389                        | 17        | 19              | 25                | 20        | 22              | 27                | 19        | 21              | 26                | 35/52          | 35/45          |
| 390                        | 18        | 20              | 27                | 21        | 23              | 28                | 20        | 22              | 28                | 35/52          | 35/45          |
| 391                        | 18        | 20              | 27                | 21        | 23              | 28                | 20        | 22              | 28                | 35/52          | 35/45          |
| 392                        | 18        | 20              | 28                | 20        | 23              | 28                | 19        | 22              | 27                | 35/52          | 35/45          |
| 393                        | 18        | 20              | 26                | 18        | 21              | 28                | 17        | 19              | 27                | 35/52          | 35/45          |
| 394                        | 18        | 20              | 27                | 18        | 20              | 27                | 17        | 19              | 27                | 35/52          | 35/45          |
| 395                        | 20        | 22              | 28                | 21        | 23              | 28                | 20        | 22              | 28                | 35/52          | 35/45          |
| 396                        | 18        | 20              | 28                | 21        | 23              | 29                | 20        | 23              | 29                | 35/52          | 35/45          |
| 397                        | 20        | 22              | 27                | 21        | 23              | 28                | 20        | 22              | 28                | 35/52          | 35/45          |
| 400                        | 13        | 14              | 17                | 12        | 14              | 16                | 11        | 13              | 16                | 63             | -              |
| 412                        | 20        | 22              | 24                | 21        | 23              | 25                | 20        | 21              | 24                | 35/52          | 35/45          |
| 413                        | 17        | 19              | 25                | 21        | 22              | 26                | 19        | 21              | 26                | 35/52          | 35/45          |
| 414                        | 18        | 19              | 25                | 21        | 23              | 26                | 19        | 21              | 26                | 35/52          | 35/45          |
| 415                        | 9         | 12              | 15                | 10        | 12              | 15                | 10        | 12              | 15                | 35/52          | 35/45          |
| Moolarben Picnic Area      | 32        | 35              | 39                | 28        | 30              | 32                | 30        | 33              | 36                | 48             | 50             |
| Castle Rocks Walking Track | 27        | 30              | 32                | 28        | 30              | 32                | 29        | 31              | 34                | 48             | 50             |
| Ulan                       |           |                 |                   |           |                 |                   |           |                 |                   |                |                |
| 11                         | 16        | 18              | 18                | 16        | 18              | 19                | 17        | 19              | 19                | 35/52          | 35/45          |
| 11                         | 13        | 15              | 16                | 13        | 15              | 16                | 14        | 16              | 17                | 35/52          | 35/45          |

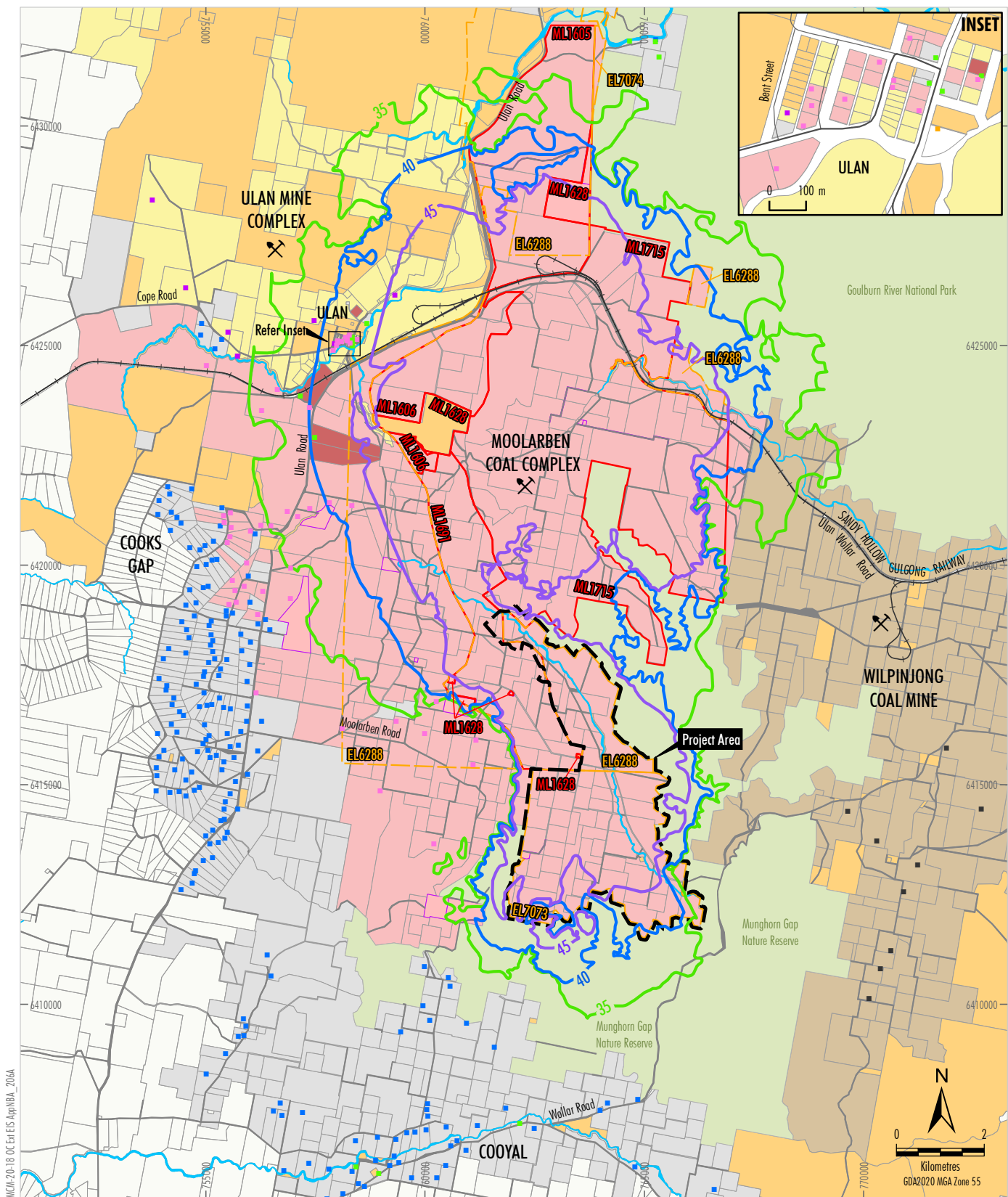
| Receiver ID | Year 2028 |                 |                   | Year 2029 |                 |                   | Year 2031 |                 |                   | Noise Criteria |                |
|-------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|-----------|-----------------|-------------------|----------------|----------------|
|             | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | Standard  | Noise Enhancing | L <sub>Amax</sub> | PTNL/SDNL      | PA Noise Limit |
| 11          | 15        | 17              | 18                | 15        | 17              | 18                | 15        | 17              | 17                | 35/52          | 35/45          |
| 11          | 13        | 15              | 15                | 14        | 15              | 16                | 14        | 16              | 17                | 35/52          | 35/45          |
| 26          | 38        | 41              | 44                | 38        | 41              | 44                | 36        | 39              | 43                | 63             | -              |
| 41B         | 28        | 30              | 32                | 28        | 30              | 32                | 26        | 29              | 31                | 35/52          | 35/45          |
| 46B         | 42        | 46              | 49                | 42        | 45              | 48                | 40        | 44              | 46                | 63             | -              |
| 66          | 41        | 45              | 48                | 41        | 44              | 47                | 39        | 43              | 46                | 63             | -              |
| 149         | 42        | 45              | 49                | 41        | 45              | 48                | 40        | 43              | 47                | 63             | -              |
| 160         | 42        | 45              | 48                | 41        | 45              | 47                | 40        | 43              | 47                | 48             | 45             |
| 162         | 41        | 45              | 48                | 41        | 44              | 47                | 39        | 43              | 46                | 63             | -              |
| 168         | 42        | 45              | 48                | 41        | 45              | 47                | 40        | 43              | 46                | 48             | 45             |
| 255         | 30        | 32              | 34                | 29        | 32              | 34                | 28        | 31              | 33                | 35/52          | 35/45          |
| 256         | 30        | 33              | 34                | 30        | 33              | 34                | 29        | 31              | 33                | 35/52          | 35/45          |
| 258         | 31        | 34              | 36                | 31        | 34              | 36                | 30        | 33              | 35                | 35/52          | 35/45          |
| 258         | 31        | 34              | 36                | 31        | 34              | 36                | 30        | 32              | 35                | 35/52          | 35/45          |

Note 1: Highest predicted noise level from the NPfl meteorological conditions (**Table 9**) for each receiver.

Note 2: Predicted noise level complies with the Project Approval noise limit.

# APPENDIX F

## Outer Envelope Noise Contours



Source: MCO (2022); NSW Spatial Services (2021); SLR (2022)

## MOOLARBEN COAL COMPLEX

### LEGEND

# APPENDIX G

## Cumulative Noise Levels

## Evening Cumulative LAeq(period) Noise Amenity Levels

| Receiver ID | Individual Project Amenity Level |                              |                                           | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project¹ |                          |                           |
| Cooks Gap   |                                  |                              |                                           |                          |                           |
| 39          | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 40          | 25                               | 21                           | 26                                        | 29                       | 45                        |
| 41B         | 25                               | 20                           | 26                                        | 29                       | 45                        |
| 60          | 27                               | 21                           | 24                                        | 29                       | 45                        |
| 61          | 27                               | 21                           | 26                                        | 30                       | 45                        |
| 70          | 29                               | 20                           | 31                                        | 34                       | 45                        |
| 75          | 28                               | 20                           | 30                                        | 32                       | 45                        |
| 79          | 27                               | 20                           | 28                                        | 31                       | 45                        |
| 80          | 27                               | 20                           | 27                                        | 30                       | 45                        |
| 82          | 27                               | 21                           | 26                                        | 30                       | 45                        |
| 83          | 26                               | 20                           | 27                                        | 30                       | 45                        |
| 84          | 26                               | 21                           | 25                                        | 29                       | 45                        |
| 86          | 26                               | 20                           | 26                                        | 29                       | 45                        |
| 87          | 26                               | 20                           | 25                                        | 29                       | 45                        |
| 88          | 26                               | 21                           | 24                                        | 29                       | 45                        |
| 89          | 26                               | 20                           | 26                                        | 29                       | 45                        |
| 90          | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 91          | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 94          | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 95          | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 96          | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 97          | 25                               | 20                           | 26                                        | 29                       | 45                        |
| 98          | 25                               | 20                           | 26                                        | 29                       | 45                        |
| 99          | 25                               | 20                           | 26                                        | 29                       | 45                        |
| 100         | 25                               | 20                           | 25                                        | 29                       | 45                        |
| 101         | 24                               | 20                           | 26                                        | 29                       | 45                        |
| 102         | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 103         | 24                               | 20                           | 24                                        | 28                       | 45                        |
| 104         | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 105         | 24                               | 20                           | 24                                        | 28                       | 45                        |
| 106         | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 107         | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 109         | 24                               | 20                           | 25                                        | 28                       | 45                        |
| 110         | 24                               | 20                           | 24                                        | 28                       | 45                        |

| Receiver ID | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| 111         | 24                               | 20                           | 24                                                    | 28                       | 45                        |
| 112         | 24                               | 20                           | 24                                                    | 28                       | 45                        |
| 113         | 24                               | 20                           | 24                                                    | 28                       | 45                        |
| 119         | 25                               | 20                           | 23                                                    | 28                       | 45                        |
| 180         | 28                               | 20                           | 28                                                    | 32                       | 45                        |
| 181         | 28                               | 20                           | 28                                                    | 31                       | 45                        |
| 182         | 28                               | 20                           | 28                                                    | 31                       | 45                        |
| 183         | 27                               | 19                           | 25                                                    | 29                       | 45                        |
| 184         | 27                               | 20                           | 27                                                    | 31                       | 45                        |
| 185         | 27                               | 20                           | 27                                                    | 31                       | 45                        |
| 186         | 27                               | 19                           | 25                                                    | 30                       | 45                        |
| 187         | 27                               | 20                           | 26                                                    | 30                       | 45                        |
| 188         | 26                               | 19                           | 20                                                    | 28                       | 45                        |
| 189         | 26                               | 20                           | 26                                                    | 30                       | 45                        |
| 190         | 26                               | 19                           | 19                                                    | 28                       | 45                        |
| 191         | 26                               | 19                           | 22                                                    | 28                       | 45                        |
| 192         | 26                               | 19                           | 26                                                    | 29                       | 45                        |
| 194         | 25                               | 19                           | 25                                                    | 28                       | 45                        |
| 195         | 25                               | 19                           | 24                                                    | 28                       | 45                        |
| 196         | 25                               | 19                           | 24                                                    | 28                       | 45                        |
| 200         | 25                               | 19                           | 20                                                    | 27                       | 45                        |
| 201a        | 25                               | 19                           | 21                                                    | 27                       | 45                        |
| 201b        | 25                               | 19                           | 20                                                    | 27                       | 45                        |
| 202         | 24                               | 19                           | 22                                                    | 27                       | 45                        |
| 203         | 24                               | 19                           | 22                                                    | 27                       | 45                        |
| 204         | 24                               | 19                           | 24                                                    | 27                       | 45                        |
| 206         | 24                               | 19                           | 22                                                    | 27                       | 45                        |
| 207         | 24                               | 19                           | 23                                                    | 27                       | 45                        |
| 208         | 23                               | 19                           | 23                                                    | 27                       | 45                        |
| 209         | 23                               | 19                           | 22                                                    | 26                       | 45                        |
| 210         | 23                               | 19                           | 22                                                    | 26                       | 45                        |
| 217         | 23                               | 19                           | 23                                                    | 27                       | 45                        |
| 218         | 23                               | 19                           | 23                                                    | 27                       | 45                        |
| 219         | 24                               | 19                           | 22                                                    | 27                       | 45                        |
| 220         | 23                               | 19                           | 20                                                    | 26                       | 45                        |
| 222         | 24                               | 19                           | 24                                                    | 28                       | 45                        |

| Receiver ID | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| 223         | 24                               | 19                           | 24                                                    | 28                       | 45                        |
| 224         | 25                               | 20                           | 25                                                    | 29                       | 45                        |
| 226         | 25                               | 20                           | 25                                                    | 29                       | 45                        |
| 227         | 25                               | 20                           | 25                                                    | 29                       | 45                        |
| 229         | 26                               | 20                           | 26                                                    | 29                       | 45                        |
| 230         | 26                               | 20                           | 26                                                    | 29                       | 45                        |
| 231         | 26                               | 20                           | 26                                                    | 29                       | 45                        |
| 232         | 26                               | 20                           | 26                                                    | 30                       | 45                        |
| 233         | 26                               | 20                           | 26                                                    | 30                       | 45                        |
| 234         | 26                               | 20                           | 26                                                    | 30                       | 45                        |
| 235         | 26                               | 20                           | 27                                                    | 30                       | 45                        |
| 236         | 26                               | 20                           | 27                                                    | 30                       | 45                        |
| 237         | 27                               | 20                           | 27                                                    | 30                       | 45                        |
| 238         | 27                               | 20                           | 27                                                    | 30                       | 45                        |
| 300         | 29                               | 20                           | 24                                                    | 31                       | 45                        |
| 303         | 29                               | 20                           | 29                                                    | 32                       | 45                        |
| 305         | 28                               | 20                           | 28                                                    | 31                       | 45                        |
| 306         | 28                               | 20                           | 28                                                    | 31                       | 45                        |
| 307         | 28                               | 19                           | 25                                                    | 30                       | 45                        |
| 308         | 28                               | 19                           | 26                                                    | 31                       | 45                        |
| 309         | 28                               | 19                           | 24                                                    | 30                       | 45                        |
| 310         | 28                               | 19                           | 24                                                    | 30                       | 45                        |
| 312         | 28                               | 19                           | 21                                                    | 29                       | 45                        |
| 313         | 28                               | 19                           | 22                                                    | 29                       | 45                        |
| 314         | 28                               | 19                           | 21                                                    | 29                       | 45                        |
| 315         | 28                               | 19                           | 19                                                    | 29                       | 45                        |
| 316         | 28                               | 19                           | 19                                                    | 29                       | 45                        |
| 317         | 29                               | 19                           | 20                                                    | 30                       | 45                        |
| Ulan        |                                  |                              |                                                       |                          |                           |
| 11          | 25                               | 23                           | 14                                                    | 27                       | 45                        |
| 11          | 25                               | 23                           | 12                                                    | 27                       | 45                        |
| 11          | 25                               | 23                           | 13                                                    | 27                       | 45                        |
| 255         | 30                               | 20                           | 28                                                    | 32                       | 45                        |
| 256         | 28                               | 20                           | 28                                                    | 32                       | 45                        |
| 258         | 28                               | 20                           | 30                                                    | 32                       | 45                        |

| Receiver ID                  | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|------------------------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|                              | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| Ulan Village Non-Residential |                                  |                              |                                                       |                          |                           |
| 9                            | 34                               | 22                           | 39                                                    | 40                       | 65                        |
| 26                           | 36                               | 21                           | 37                                                    | 40                       | 65                        |
| 46B                          | 48                               | 23                           | 42                                                    | 49                       | 65                        |
| 66                           | 43                               | 23                           | 41                                                    | 45                       | 65                        |
| 149                          | 44                               | 23                           | 42                                                    | 46                       | 65                        |
| 160                          | 42                               | 23                           | 41                                                    | 45                       | 50                        |
| 162                          | 43                               | 23                           | 41                                                    | 45                       | 65                        |
| 168                          | 43                               | 23                           | 41                                                    | 45                       | 50                        |

Note 1: Highest predicted noise level from the NPfl meteorological conditions (Table 9) for each receiver

Note 2: Predicted noise level complies with the noise amenity levels (Table 15).

### Night-time Cumulative LAeq(period) Noise Amenity Levels

| Receiver ID | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| Cooks Gap   |                                  |                              |                                                       |                          |                           |
| 39          | 25                               | 23                           | 26                                                    | 30                       | 40                        |
| 40          | 26                               | 23                           | 28                                                    | 31                       | 40                        |
| 41B         | 26                               | 22                           | 27                                                    | 30                       | 40                        |
| 60          | 28                               | 24                           | 25                                                    | 31                       | 40                        |
| 61          | 28                               | 23                           | 28                                                    | 31                       | 40                        |
| 70          | 30                               | 23                           | 33                                                    | 35                       | 40                        |
| 75          | 29                               | 23                           | 31                                                    | 34                       | 40                        |
| 79          | 28                               | 23                           | 29                                                    | 32                       | 40                        |
| 80          | 28                               | 23                           | 28                                                    | 32                       | 40                        |
| 82          | 28                               | 23                           | 28                                                    | 32                       | 40                        |
| 83          | 27                               | 23                           | 28                                                    | 31                       | 40                        |
| 84          | 27                               | 23                           | 26                                                    | 31                       | 40                        |
| 86          | 27                               | 23                           | 27                                                    | 31                       | 40                        |
| 87          | 27                               | 23                           | 27                                                    | 31                       | 40                        |
| 88          | 27                               | 23                           | 26                                                    | 30                       | 40                        |
| 89          | 27                               | 23                           | 27                                                    | 31                       | 40                        |
| 90          | 26                               | 23                           | 27                                                    | 30                       | 40                        |
| 91          | 26                               | 23                           | 26                                                    | 30                       | 40                        |
| 94          | 26                               | 22                           | 26                                                    | 30                       | 40                        |

| Receiver ID | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| 95          | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 96          | 26                               | 22                           | 27                                                    | 30                       | 40                        |
| 97          | 26                               | 23                           | 27                                                    | 30                       | 40                        |
| 98          | 26                               | 23                           | 27                                                    | 30                       | 40                        |
| 99          | 26                               | 23                           | 27                                                    | 30                       | 40                        |
| 100         | 26                               | 23                           | 27                                                    | 30                       | 40                        |
| 101         | 25                               | 23                           | 27                                                    | 30                       | 40                        |
| 102         | 25                               | 23                           | 27                                                    | 30                       | 40                        |
| 103         | 25                               | 22                           | 25                                                    | 29                       | 40                        |
| 104         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 105         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 106         | 25                               | 23                           | 26                                                    | 30                       | 40                        |
| 107         | 25                               | 23                           | 27                                                    | 30                       | 40                        |
| 109         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 110         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 111         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 112         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 113         | 25                               | 22                           | 25                                                    | 29                       | 40                        |
| 119         | 26                               | 23                           | 24                                                    | 29                       | 40                        |
| 180         | 29                               | 22                           | 30                                                    | 33                       | 40                        |
| 181         | 29                               | 22                           | 29                                                    | 33                       | 40                        |
| 182         | 29                               | 22                           | 29                                                    | 33                       | 40                        |
| 183         | 28                               | 22                           | 26                                                    | 31                       | 40                        |
| 184         | 28                               | 22                           | 29                                                    | 32                       | 40                        |
| 185         | 28                               | 22                           | 29                                                    | 32                       | 40                        |
| 186         | 28                               | 22                           | 27                                                    | 31                       | 40                        |
| 187         | 28                               | 22                           | 28                                                    | 31                       | 40                        |
| 188         | 27                               | 22                           | 21                                                    | 29                       | 40                        |
| 189         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 190         | 27                               | 22                           | 21                                                    | 29                       | 40                        |
| 191         | 27                               | 22                           | 23                                                    | 29                       | 40                        |
| 192         | 27                               | 22                           | 27                                                    | 31                       | 40                        |
| 194         | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 195         | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 196         | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 200         | 26                               | 22                           | 21                                                    | 28                       | 40                        |

| Receiver ID | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|             | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| 201         | 26                               | 22                           | 21                                                    | 28                       | 40                        |
| 201         | 26                               | 22                           | 23                                                    | 29                       | 40                        |
| 202         | 25                               | 22                           | 23                                                    | 28                       | 40                        |
| 203         | 25                               | 22                           | 23                                                    | 28                       | 40                        |
| 204         | 25                               | 22                           | 25                                                    | 29                       | 40                        |
| 206         | 25                               | 22                           | 24                                                    | 29                       | 40                        |
| 207         | 25                               | 21                           | 24                                                    | 28                       | 40                        |
| 208         | 24                               | 21                           | 24                                                    | 28                       | 40                        |
| 209         | 24                               | 21                           | 24                                                    | 28                       | 40                        |
| 210         | 24                               | 21                           | 24                                                    | 28                       | 40                        |
| 217         | 24                               | 22                           | 25                                                    | 28                       | 40                        |
| 218         | 24                               | 22                           | 24                                                    | 28                       | 40                        |
| 219         | 25                               | 22                           | 24                                                    | 29                       | 40                        |
| 220         | 24                               | 22                           | 22                                                    | 27                       | 40                        |
| 222         | 25                               | 22                           | 25                                                    | 29                       | 40                        |
| 223         | 25                               | 22                           | 26                                                    | 29                       | 40                        |
| 224         | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 226         | 26                               | 22                           | 26                                                    | 30                       | 40                        |
| 227         | 26                               | 22                           | 27                                                    | 30                       | 40                        |
| 229         | 27                               | 22                           | 27                                                    | 31                       | 40                        |
| 230         | 27                               | 22                           | 27                                                    | 31                       | 40                        |
| 231         | 27                               | 22                           | 27                                                    | 31                       | 40                        |
| 232         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 233         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 234         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 235         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 236         | 27                               | 22                           | 28                                                    | 31                       | 40                        |
| 237         | 28                               | 23                           | 28                                                    | 32                       | 40                        |
| 238         | 28                               | 23                           | 29                                                    | 32                       | 40                        |
| 300         | 30                               | 22                           | 25                                                    | 32                       | 40                        |
| 303         | 30                               | 22                           | 30                                                    | 33                       | 40                        |
| 305         | 29                               | 22                           | 29                                                    | 32                       | 40                        |
| 306         | 29                               | 22                           | 29                                                    | 33                       | 40                        |
| 307         | 29                               | 22                           | 26                                                    | 31                       | 40                        |
| 308         | 29                               | 22                           | 28                                                    | 32                       | 40                        |

| Receiver ID                         | Individual Project Amenity Level |                              |                                                       | Cumulative Amenity Level | Recommended Amenity Level |
|-------------------------------------|----------------------------------|------------------------------|-------------------------------------------------------|--------------------------|---------------------------|
|                                     | Ulan Coal Continued Operations   | Wilpinjong Extension Project | Moolarben Coal Complex including Project <sup>1</sup> |                          |                           |
| 309                                 | 29                               | 22                           | 25                                                    | 31                       | 40                        |
| 310                                 | 29                               | 22                           | 26                                                    | 31                       | 40                        |
| 312                                 | 29                               | 22                           | 23                                                    | 31                       | 40                        |
| 313                                 | 29                               | 21                           | 24                                                    | 31                       | 40                        |
| 314                                 | 29                               | 21                           | 22                                                    | 30                       | 40                        |
| 315                                 | 29                               | 22                           | 21                                                    | 30                       | 40                        |
| 316                                 | 29                               | 22                           | 21                                                    | 30                       | 40                        |
| 317                                 | 30                               | 22                           | 22                                                    | 31                       | 40                        |
| <b>Ulan</b>                         |                                  |                              |                                                       |                          |                           |
| 11                                  | 27                               | 26                           | 16                                                    | 30                       | 40                        |
| 11                                  | 27                               | 26                           | 13                                                    | 30                       | 40                        |
| 11                                  | 27                               | 26                           | 14                                                    | 30                       | 40                        |
| 255                                 | 32                               | 23                           | 29                                                    | 34                       | 40                        |
| 256                                 | 31                               | 23                           | 30                                                    | 34                       | 40                        |
| 258                                 | 31                               | 23                           | 31                                                    | 34                       | 40                        |
| <b>Ulan Village Non-Residential</b> |                                  |                              |                                                       |                          |                           |
| 9                                   | 35                               | 24                           | 39                                                    | 41                       | 65                        |
| 26                                  | 37                               | 24                           | 38                                                    | 41                       | 65                        |
| 46B                                 | 50                               | 26                           | 43                                                    | 51                       | 65                        |
| 66                                  | 45                               | 26                           | 42                                                    | 47                       | 65                        |
| 149                                 | 46                               | 26                           | 42                                                    | 48                       | 65                        |
| 160 <sup>2</sup>                    | -                                | -                            | -                                                     | -                        | 50                        |
| 162                                 | 45                               | 26                           | 42                                                    | 47                       | 65                        |
| 168 <sup>2</sup>                    | -                                | -                            | -                                                     | -                        | 50                        |

Note 1: Highest predicted noise level from the NPfl meteorological conditions (Table 9) for each receiver

Note 2: In use daytime and evening only

Note 3: Predicted noise level complies with the noise amenity levels (Table 15).

# APPENDIX H

## Predicted Vibration and Airblast Levels for Privately-owned Receivers and Community Facilities

## Predicted Vibration and Airblast Levels for Privately-owned Receivers and Community Facilities

| Receiver ID      | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|------------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|                  | Overburden 4,500 kg           |     | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|                  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| <b>Cooks Gap</b> |                               |     |                               |     |                               |     |                               |     |
| 41B              | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 39               | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 112 |
| 40               | 0.6                           | 2.1 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 53               | 0.5                           | 1.8 | 100                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 60               | 0.7                           | 2.4 | 102                           | 113 | 0.3                           | 0.8 | 102                           | 113 |
| 61               | 0.7                           | 2.3 | 102                           | 112 | 0.3                           | 0.8 | 102                           | 113 |
| 70               | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.7 | 101                           | 112 |
| 75               | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 79               | 0.6                           | 2.1 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 80               | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.7 | 101                           | 112 |
| 82               | 0.6                           | 2.2 | 102                           | 112 | 0.3                           | 0.7 | 102                           | 112 |
| 83               | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 84               | 0.6                           | 2.1 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 86               | 0.5                           | 1.9 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 112 |
| 87               | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 88               | 0.6                           | 2.1 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 89               | 0.5                           | 1.8 | 100                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 90               | 0.5                           | 1.8 | 100                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 91               | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 94               | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 95               | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 96               | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 97               | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 98               | 0.5                           | 1.8 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 99               | 0.5                           | 1.8 | 101                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 100              | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 101a             | 0.6                           | 1.9 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 101b             | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 112 |
| 102              | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 103              | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 104              | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 105              | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 106              | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 107              | 0.5                           | 1.8 | 101                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 108              | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 109              | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |

| Receiver ID | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|-------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|             | Overburden 4,500 kg           |     | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|             | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| 110         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 111         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 112         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 113         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 114         | 0.5                           | 1.8 | 100                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 115         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 116         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 117         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 118         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 119         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 120         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 121         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 100                           | 110 |
| 123         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 124         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 125         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 126         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 127         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 180         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 181         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 182         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 183         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 100                           | 110 |
| 184         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 185         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 186         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 187         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 188         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 189         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 190         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 191         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 192         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 100                           | 110 |
| 194         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 195         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 196         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 199         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 200         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 201a        | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 201b        | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 202         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 203         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |

| Receiver ID | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|-------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|             | Overburden 4,500 kg           |     | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|             | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| 204         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 205         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 206         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 207         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 99                            | 109 |
| 208         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 209         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 210         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 211         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 212         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 213         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 215         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 216         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 217         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 218         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 219         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 220         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 222         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 223         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 100                           | 110 |
| 224         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 226         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 227         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 228         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 229         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 230         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 231         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 232         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 233         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 234         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 235         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 236         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 237         | 0.5                           | 1.8 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 111 |
| 238         | 0.5                           | 1.8 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 111 |
| 300         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 303         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 305         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 306         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 307         | 0.5                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 308         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 309         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |

| Receiver ID | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|-------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|             | Overburden 4,500 kg           |     | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|             | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| 310         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 311         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 312         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 99                            | 109 |
| 313         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 314         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 315         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 316         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 317         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 360         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 401         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 99                            | 109 |
| 407         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 408         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 409         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 410         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 411         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| Linburn     |                               |     |                               |     |                               |     |                               |     |
| 340         | 0.3                           | 0.9 | 97                            | 108 | 0.1                           | 0.3 | 96                            | 107 |
| 364         | 0.3                           | 1.2 | 98                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 364         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 398         | 0.5                           | 1.9 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 112 |
| 402         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 404         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 405         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 406         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| Cooyal      |                               |     |                               |     |                               |     |                               |     |
| 321         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 322         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 323         | 1.1                           | 3.7 | 104                           | 115 | 0.5                           | 1.1 | 105                           | 115 |
| 324         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 328         | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 329         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 330         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 331         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 333         | 1.2                           | 3.9 | 104                           | 115 | 0.5                           | 1.2 | 105                           | 116 |
| 335         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 336         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 337         | 0.4                           | 1.5 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 341         | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.6 | 101                           | 112 |
| 342         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |

| Receiver ID | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|-------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|             | Overburden 4,500 kg           |     | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|             | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| 344         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 98                            | 109 |
| 346         | 0.4                           | 1.2 | 99                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 347         | 0.3                           | 1.1 | 98                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 348         | 0.6                           | 1.9 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 350         | 0.4                           | 1.2 | 98                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 351         | 0.3                           | 1.1 | 98                            | 109 | 0.2                           | 0.4 | 98                            | 109 |
| 353         | 0.2                           | 0.7 | 96                            | 106 | 0.1                           | 0.3 | 95                            | 106 |
| 353         | 0.2                           | 0.8 | 96                            | 107 | 0.1                           | 0.3 | 96                            | 106 |
| 354         | 0.2                           | 0.7 | 96                            | 106 | 0.1                           | 0.3 | 95                            | 106 |
| 355         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 356         | 0.3                           | 1.0 | 98                            | 108 | 0.2                           | 0.4 | 97                            | 108 |
| 358         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 361         | 0.7                           | 2.4 | 102                           | 113 | 0.3                           | 0.8 | 102                           | 113 |
| 362         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 363         | 0.3                           | 1.0 | 98                            | 108 | 0.2                           | 0.4 | 97                            | 108 |
| 365         | 0.8                           | 2.6 | 102                           | 113 | 0.3                           | 0.9 | 103                           | 113 |
| 367         | 0.4                           | 1.3 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 109 |
| 368         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 369         | 0.4                           | 1.3 | 99                            | 109 | 0.2                           | 0.5 | 99                            | 109 |
| 375         | 0.4                           | 1.4 | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 377         | 0.5                           | 1.6 | 100                           | 110 | 0.2                           | 0.6 | 100                           | 111 |
| 378         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 379         | 1.3                           | 4.5 | 105                           | 116 | 0.5                           | 1.3 | 106                           | 117 |
| 380         | 1.4                           | 4.8 | 106                           | 116 | 0.6                           | 1.4 | 106                           | 117 |
| 381         | 1.0                           | 3.5 | 104                           | 114 | 0.4                           | 1.1 | 104                           | 115 |
| 383         | 1.0                           | 3.3 | 104                           | 114 | 0.4                           | 1.0 | 104                           | 115 |
| 384         | 1.4                           | 4.6 | 105                           | 116 | 0.6                           | 1.4 | 106                           | 117 |
| 385         | 1.1                           | 3.7 | 104                           | 115 | 0.5                           | 1.1 | 105                           | 115 |
| 386         | 1.0                           | 3.5 | 104                           | 114 | 0.4                           | 1.1 | 104                           | 115 |
| 387         | 0.8                           | 2.6 | 102                           | 113 | 0.4                           | 0.9 | 103                           | 114 |
| 388         | 0.4                           | 1.5 | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 388         | 0.5                           | 1.6 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 389         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 390         | 0.5                           | 1.7 | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 391         | 0.5                           | 1.8 | 100                           | 111 | 0.3                           | 0.6 | 100                           | 111 |
| 392         | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.7 | 101                           | 112 |
| 393         | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 394         | 0.6                           | 2.0 | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 395         | 0.6                           | 1.9 | 101                           | 111 | 0.3                           | 0.7 | 101                           | 112 |

| Receiver ID                | Vibration (mm/s) <sup>1</sup> |      | Airblast (dBLpk) <sup>2</sup> |     | Vibration (mm/s) <sup>1</sup> |     | Airblast (dBLpk) <sup>2</sup> |     |
|----------------------------|-------------------------------|------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
|                            | Overburden 4,500 kg           |      | Overburden 4,500 kg           |     | Coal 400 kg                   |     | Coal 400 kg                   |     |
|                            | 50%                           | 5%   | 50%                           | 5%  | 50%                           | 5%  | 50%                           | 5%  |
| 396                        | 0.6                           | 2.2  | 101                           | 112 | 0.3                           | 0.7 | 102                           | 112 |
| 397                        | 0.5                           | 1.8  | 101                           | 111 | 0.3                           | 0.6 | 101                           | 111 |
| 400                        | 0.8                           | 2.6  | 102                           | 113 | 0.3                           | 0.8 | 102                           | 113 |
| 412                        | 0.5                           | 1.6  | 100                           | 111 | 0.2                           | 0.6 | 100                           | 111 |
| 413                        | 0.4                           | 1.4  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 414                        | 0.4                           | 1.5  | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 415                        | 1.0                           | 3.4  | 104                           | 114 | 0.4                           | 1.1 | 104                           | 115 |
| Moolarben Picnic Area      | 5.3                           | 17.8 | 112                           | 123 | 1.7                           | 4.3 | 114                           | 124 |
| Castle Rocks Walking Track | 1.3                           | 4.3  | 105                           | 116 | 0.5                           | 1.3 | 105                           | 116 |
| <b>Ulan</b>                |                               |      |                               |     |                               |     |                               |     |
| 11                         | 0.2                           | 0.6  | 95                            | 106 | 0.1                           | 0.3 | 94                            | 105 |
| 11                         | 0.2                           | 0.6  | 95                            | 106 | 0.1                           | 0.3 | 94                            | 105 |
| 11                         | 0.2                           | 0.6  | 95                            | 106 | 0.1                           | 0.3 | 94                            | 105 |
| 11                         | 0.2                           | 0.6  | 95                            | 106 | 0.1                           | 0.2 | 94                            | 105 |
| 26                         | 0.5                           | 1.6  | 100                           | 110 | 0.2                           | 0.6 | 100                           | 110 |
| 41B                        | 0.6                           | 2.0  | 101                           | 112 | 0.3                           | 0.7 | 101                           | 112 |
| 46B                        | 0.4                           | 1.4  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 66                         | 0.4                           | 1.4  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 149                        | 0.4                           | 1.5  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 160                        | 0.4                           | 1.5  | 100                           | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 162                        | 0.4                           | 1.4  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 168                        | 0.4                           | 1.5  | 99                            | 110 | 0.2                           | 0.5 | 99                            | 110 |
| 255                        | 0.3                           | 1.0  | 97                            | 108 | 0.2                           | 0.4 | 97                            | 108 |
| 256                        | 0.3                           | 1.0  | 98                            | 108 | 0.2                           | 0.4 | 97                            | 108 |
| 258                        | 0.3                           | 1.1  | 98                            | 108 | 0.2                           | 0.4 | 97                            | 108 |
| 258                        | 0.3                           | 1.1  | 98                            | 108 | 0.2                           | 0.4 | 97                            | 108 |

Note 1: Vibration Velocity Peak Vector Sum (PVS) - (mm/s).

Note 2: Airblast Level Linear Peak - (dBLpk re 20 µPa).

Note 3: Predicted blast emission level complies with the human comfort criteria of 5 mm/s and 115 dBLpk.

Note 4: Predicted blast emission level exceeds the human comfort criteria of 5 mm/s or 115 dBLpk.

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