
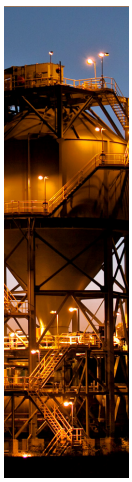


MOOLARBENCOAL

Moolarben Coal Complex
UG4 Ancillary Works Modification

Modification Report

APPENDIX E

NOISE REVIEW

YANCOAL
兖煤澳大利亚有限公司

UG4 ANCILLARY WORKS MODIFICATION

Noise Review

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Yancoal Australia Limited (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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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.13549.01300-R01-v1.0	1 October 2019	Glenn Thomas	Martin Davenport	Glenn Thomas

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1 Introduction

1.1 Background

Moolarben Coal Operations Pty Ltd (MCO), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), operates the Moolarben Coal Complex, which is located approximately 40 kilometres (km) north of Mudgee in the Western Coalfields of New South Wales (NSW).

The Moolarben Coal Complex comprises four approved open cut coal mining areas (OC1 to OC4), three approved underground coal mining areas (UG1, UG2 and UG4) and other mining related infrastructure, including coal processing and transport facilities (**Appendix A**). Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038, and will continue to be carried out in accordance with Project Approval (05_0117) Moolarben Coal Project Stage 1 (MCP Stage 1) dated 6 September 2007 (as modified) **(Appendix B)** and Project Approval (08_0135) (Moolarben Coal Project Stage 2) (MCP Stage 2) dated 30 January 2015 (as modified)

MCO is seeking to modify the Moolarben Coal Complex Stage 1 Project Approval (05_0117) referred to as the UG4 Ancillary Works Modification (the Modification) under section 4.55(2) of the *Environmental Protection and Assessment Act, 1979* (EP&A Act) to allow for changes to the currently approved operations, including:

- Development of four additional bore sites and pads and extension of the associated access and infrastructure corridor for the UG4 underground workings and associated infrastructure;
- Development of a downcast ventilation shaft for UG4 and associated infrastructure; and
- Development of Remote Services Infrastructure Area.

The Modification would not change the approved longwall panel layout, panel widths, extraction height, sequence or production limits or the distance between longwalls and the Drip and Corner Gorge. As a result of the above there would be changes in surface disturbance limits at the Moolarben Coal Complex (**Appendix C**).

SLR Consulting Australia Pty Ltd (SLR) has been engaged by MCO to evaluate and assess the potential noise impacts associated with the Modification where the key noise-generating activities would be associated with construction of the proposed infrastructure, in particular the 24/7 construction of the downcast ventilation shaft. In preparing this assessment SLR has considered several documents including the following:

- Moolarben Coal Complex Open Cut Optimisation Modification Noise Assessment (OC Optimisation Modification NIA) (SLR, September 2017);
- Noise Management Plan (NMP) (MCO, May 2015);
- Moolarben Coal Complex Annual Review 2017 (MCCAR 2017) (MCO, June 2018);
- Moolarben Coal Complex Annual Review 2018 (MCCAR 2018) (MCO, March 2018); and
- Monthly Environmental Monitoring Reports January 2019 to July 2019 (MEMRs) (MCO, 2019).

1.2 Assessment Requirements

The Modification noise impacts have been guided by the assessment guidelines as presented in **Table 1**.

Table 1 Modification Noise Impact Assessment Guidelines

Assessment Guideline	Assessment	Section
Construction Intrusive Noise[1] Guided by the requirements of the ICNG in relation to setting the construction noise management levels (CNMLs) and assessing any impacts.	No claim is made for specific construction noise criteria under the ICNG, rather noise levels from the Modification are considered as operational.	**Not Applicable**
Operation Maximum, Intrusive and Amenity Noise[2] Guided by the requirements of the NPfI in relation to setting the project trigger noise levels (PTNLs) and sleep disturbance noise levels (SDNLs) and assessing any impacts.	No claim is made for specific operating noise criteria under the NPfI, rather noise from the Modification plus the approved OC Optimisation Modification have been assessed against the relevant project approval noise limits.	**Section 4.1 and Section 5**
Road Traffic Noise[3] Guided by the requirements of the RNP in relation to setting acceptable $L_{Aeq(period)}$ noise levels for arterial and sub-arterial roads and assessing any impacts.	No claim is made for specific traffic noise criteria under the RNP, rather operational road traffic is approved under the OC Optimisation Modification, and the temporary road traffic generated by the Modification is considered qualitatively only.	**Section 3.6**

Note 1: Interim Construction Noise Guideline (ICNG) (EPA, 2009).

Note 2: Noise Policy for Industry (NPfI) (EPA, 2017).

Note 3: NSW Road Noise Policy (RNP) (DECCW, 2011) and associated Application Notes dated 15 February 2013.

The Moolarben Coal Complex Stage 1 Project Approval (05_0117) and Stage 2 Project Approval (08_0135) include prescribed noise limits for the operation (and the meteorological conditions under which these limits apply). (The approved noise criteria are more conservative in comparison with the requirements of the NPfI - for example, a comprehensive noise assessment in accordance the NPfI would likely give rise to a daytime intrusive noise limit 40 dBA, and a maximum night-time noise limit of 52 dBA at the nearest receivers, which are greater than the approved noise criteria).

The Modification noise assessment has therefore been (conservatively) assessed against the noise criteria set out in Project Approval (05_0117). (**Appendix B)**.

Other approved or proposed projects in the vicinity of Moolarben Coal Complex are presented in **Table 2**. The Wilpinjong Extension Project and the Ulan Continued Operations are considered cumulatively for operational noise in this assessment.

Table 2 Other Approved or Proposed Projects[1]

Proponent	Project	Status
Wilpinjong Coal Pty Ltd (WCPL)	Wilpinjong Extension Project (WEP)	Project Approval (SSD-6764) dated 24 April 2017. The WEP is approved to operate up to a maximum coal export capacity (from the site) of 16Mtpa.
Ulan Coal Mines Ltd (UCML)	Ulan (Mine Complex) Continued Operations Project (as modified)	Project Approval (MP 08_0184) dated 15 November 2010 (as modified), with MOD 4 approved 17 July 2019. The Ulan Mine Complex is approved to operate up to a maximum coal export capacity (from the site) of 20 Mtpa.

2 Existing Moolarben Coal Complex

2.1 Overview

The General Arrangement Plan for the existing and approved Stages 1 and 2 of the Moolarben Coal Complex is presented as **Appendix A**. As shown, the Moolarben Coal Complex comprises four approved open cut coal mining areas (OC1 to OC4), three approved underground coal mining areas (UG1, UG2 and UG4) and other mining related infrastructure including coal processing and transport facilities. Approved operations are 24 hours per day, seven days per week.

In any calendar year, MCO is approved to extract up to 24 Mtpa of ROM coal from open-cut and underground mining operations; up to 16 Mtpa of ROM coal can be washed via the coal handing and preparation plant (CHPP), and up to 22 Mtpa of product coal can be loaded onto trains and exported to the Port of Newcastle.

2.2 Land Ownership

The Land Ownership Plan (**Appendix D1**) identifies the nearest receivers and the Land Ownership Details (**Appendices D2**), including a list of property ID numbers, landowners and dwelling co-ordinates.

2.3 Noise Management Strategy

MCO has an 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) MCP Stage 1 and Project Approval (08_0135) MCP Stage 2 set out specific requirements for noise management.

2.3.1 Noise Management Plan

MCO has prepared and implemented the Noise Management Plan[1] (NMP) in accordance with the relevant Project Approvals. The approved NMP (approved 23 June 2015) 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 an Automatic Weather Station (AWS – WS3) (**Appendix E**).

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.

[1] The NMP is currently being updated to include revised monitoring locations as a result of the Open Cut Optimisation Modification (Mod 14 Approved July 2019).

2.3.2 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.

2.3.3 Noise Monitoring Program

A summary of the noise monitoring locations and associated monitoring frequency are presented in **Table 3** together with a cross reference to the monitoring locations (**Appendix E**).

Table 3 Noise Monitoring Program Summary[1]

Locality	Location ID[1]	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		Management
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

Source: Table 5 Noise Management Plan (NMP) (MCO, 2015)

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

2.4 Noise Compliance

2.4.1 Operator-attended Noise Compliance Results 2017

The Moolarben Coal Complex Annual Review 2017 (MCCAR 2017) Section 6.2.2 states:

> *During the 2017 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 2017, 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. …*

2.4.2 Operator-attended Noise Compliance Results 2018

The Moolarben Coal Complex Annual Review 2018 (MCCAR 2018) Section 6.2.2 states:

> *During the 2018 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 2018, 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. …*

2.4.3 Operator-attended Noise Compliance Results January 2019 to July 2019

The Monthly Environmental Monitoring Reports (MEMRs) (MCO, 2019) were reviewed for the 7 month period commencing January 2019, 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.

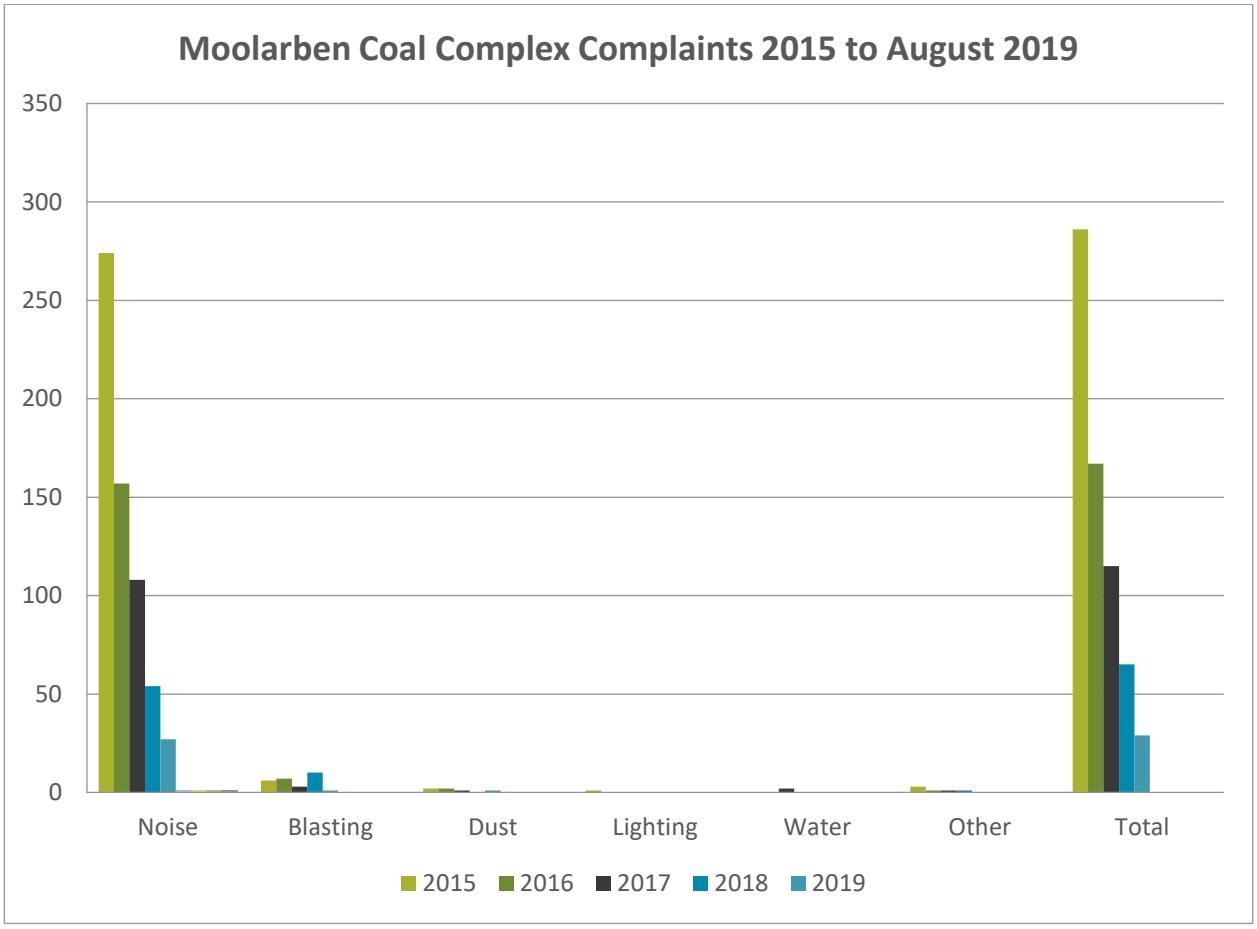
There were no recorded noise exceedances during the 7 month monitoring period to the end of July 2019.

2.5 Noise Complaints Summary

MCO maintains a complaints register in accordance with Project Approval requirements. A summary of the complaint records from 2015 to August 2019 are presented in **Figure 1**, including operating noise complaints.

Figure 1 shows the number of noise related complaints has diminished over the past 5 years. The reduction in noise related complaints coincides with the continued implementation of MCO's proactive noise control and management measures described in **Section 2.3.2,** including the introduction of the Dura-Tray haul trucks, on-going noise attenuation to mining fleet, the use of dedicated Mining and Production Environmental Assistants to provide real-time feedback to the mining operations, mine planning to allow for protected work areas to be developed, ongoing community consultation, and land acquisitions.

Figure 1 Complaints Register Summary 2015 to August 2019



Source: MCO, 2019

All complaints received by MCO relating to noise were responded to in accordance with the Community Complaints Procedure detailed in the EMS. Following each noise related complaint, the source and noise levels were determined or verified. In some instances, 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 2017 to August 2019.

3 Proposed Modification

3.1 Comparison of the Approved and Modified Moolarben Coal Complex

A summary comparison of the approved and modified Moolarben Coal Complex under Project Approval (05_0117) MCP Stage 1 (MOD 14) is shown in **Appendix F**.

3.2 Hours of Operation

There would be no change in the approved operating hours of the Moolarben Coal Complex due to the Modification as presented in **Table 4**.

Table 4 Approved Moolarben Coal Complex and Modification Hours of Operation

Operation	Description	Currently Approved[1]	Modification
On-Site	Construction works	24 hours 7 days per week	Unchanged
	Maintenance; Operation; Coal handling, processing and stockpiling; and Train loading	24 hours 7 days per week	Unchanged
	Blasting	0900 hours to 1700 hours, Monday to Saturday A maximum of 2 blasts per day and 9 blasts per week on average over any 12-month period	Unchanged
Off-Site	Train Traffic	24 hours, 7 days per week	Unchanged
	Road Traffic	24 hours, 7 days per week	Unchanged

Note 1: Currently approved under Project Approval (05_0117) MCP Stage 1.

3.3 UG4 Ancillary Works Construction

A summary description of the proposed Modification is provided below. The UG4 Ancillary Works will be implemented in two phases, with Phase 1 work comprising the southern dewatering sites; downcast ventilation shaft compound; and remote services infrastructure area. Phase 2 work comprises the northern dewatering sites and will occur approximately 3 years after the completion of Phase 1.

Construction of each dewatering site would occur seven days per week generally during daytime hours (between the hours of 7 am and 6 pm) for approximately eight to twelve weeks per site. Earthworks and access for each site would take approximately eight weeks. However, earth works for the construction of the northern most dewatering site would be undertaken during daytime hours, Monday to Friday, while drilling would occur during daytime hours 7 days per week.

3.3.1 Phase 1 Work - Southern Dewatering Sites

A borefield, associated surface infrastructure and a 10 metre (m) access and infrastructure corridor is approved to be developed above UG4. The Modification would involve:

- The relocation/expansion of two dewatering sites; and
- Minor extension of the 10 m wide access and infrastructure corridor (which would contain a 5 m wide access track, drainage infrastructure, powerline, communications and surface-run pipeline) to connect to the Stage 1 Infrastructure Area.

The extent of disturbance associated with the southern dewatering sites would be within the indicative survey area shown on the Modification plan (**Appendix C**).

3.3.2 Phase 1 Work - Downcast Ventilation Shaft Compound

The Modification would involve the construction and operation of a downcast ventilation shaft compound above the western extent of UG4. The ventilation shaft compound would include the following:

- Downcast ventilation shaft, with a nominal diameter of 5.5 m (lined to 5 m);
- Access road and new intersection with Ulan Road;
- Temporary offices, lay-down areas, drilling sumps and drying pads during the construction phase; and
- Other ancillary service and infrastructure (e.g. access track, ballast drop hole, ballast storage area, water tanks, etc.).

The extent of disturbance associated with the downcast ventilation shaft compound would be within the indicative survey area shown on the Modification plan (**Appendix C**).

3.3.3 Phase 1 Work - Remote Services Infrastructure Area

The Modification would involve the construction and operation of a new remote services infrastructure area above the UG4 main access headings. The remote services infrastructure area would include the following:

- Service boreholes for each of the following services, including but not limited to:
    - Electrical;
    - Ballast;
    - Stonedust; and
    - Compressed air;
- Construction of an internal access road and services corridor for power lines and water pipelines;
- Internal road crossing of Bora Creek;
- Temporary offices, lay-down areas and drilling sumps during construction; and
- Other ancillary services and infrastructure (e.g. firewall tanks, sediment dam, stockpiles, etc.).

The extent of additional disturbance would be within the indicative survey area shown on the Modification plan (**Appendix C**).

3.3.4 Phase 2 Work - Northern Dewatering Sites

Construction of the northern dewatering sites will occur after the completion of other construction associated with the Modification. A borefield, associated surface infrastructure and a 10 m access and infrastructure corridor is approved to be developed above UG4. The Modification would involve:

- The relocation/expansion of two dewatering sites;
- Minor extension of the 10 m wide access and infrastructure corridor (which would contain a 5 m wide access track, drainage infrastructure, powerline and surface-run pipeline) to connect to the Stage 1 Infrastructure Area; and

- Use of a temporary 3 m screen (i.e. noise mitigation screen) along the eastern edge of the northern most dewatering site.

The extent of disturbance associated with the northern dewatering sites would be within the indicative survey area shown on the Modification plan (**Appendix C**).

3.4 Indicative Construction Schedule and Equipment Fleet

The indicative construction schedule and equipment fleet for the UG4 Ancillary Works (Phase 1 and Phase 2) is presented in **Table 5** together with the overall sound power level (SWL) for each item of equipment.

Table 5 Indicative Construction Schedule and Equipment Fleet Sound Power Levels (SWL dBA re pW)

Works	Component[4]	Construction Timing	Potential Overlaps	Equipment SWL[1,2,3]
Phase 1	Southern Dewatering Sites	• 7am to 6pm Mon to Sat and 8am to 6pm Sundays and public holidays • Earth works and access would take approximately 8 weeks • Bore construction would take approximately 8 to 12 weeks	• Construction of southern dewatering sites may overlap with the construction of the remote services infrastructure area and the downcast ventilation shaft.	• 5 t Excavator (95 dBA) • 30 t Excavator (105 dBA) • CAT D8 Dozer (104 dBA) • CAT 14M Grader (108 dBA) • 12 t Roller (108 dBA) • 3 x 12 t Road Trucks (99 dBA) • Water Cart (98 dBA) • Franna Crane (98 dBA) • Drill Rig (104 dBA)
	Ventilation Shaft Compound	• 24 hours per day • 7 days per week • Earth works and access would take approximately 12 weeks • Construction would take approximately 6 months	• Construction of the southern dewatering sites may overlap with the construction of the downcast ventilation shaft	• 5 t Excavator (95 dBA) • 30 t Excavator (105 dBA) • CAT D8 Dozer (104 dBA) • CAT 14M Grader (108 dBA) • 12 t Roller (108 dBA) • 3 x 12 t Road Trucks (99 dBA) • Water Cart (98 dBA) • Franna Crane (98 dBA) • Drill Rig (104 dBA)
	Remote Services Infrastructure Area	• 7am to 6pm Mon to Sat and 8am to 6pm Sundays and public holidays • Earth works and access would take approximately 12 weeks • Total construction would take approximately 3 to 4 months	• Construction of southern dewatering sites may overlap with the construction of the remote services infrastructure area	• 5 t Excavator (95 dBA) • 30 t Excavator (105 dBA) • CAT D8 Dozer (104 dBA) • CAT 14M Grader (108 dBA) • 12 t Roller (108 dBA) • 3 x 12 t Road Trucks (99 dBA) • Water Cart (98 dBA) • Franna Crane (98 dBA)

Works	Component[4]	Construction Timing	Potential Overlaps	Equipment SWL[1,2,3]
Phase 2	Northern Dewatering SItes[4]	• 7am to 6pm Mon to Sat and 8am to 6pm Sundays and public holidays • Earthworks construction Monday to Friday • Drilling 7 days per week • Earth works and access would take approximately 8 weeks • Bore construction would take approximately 8 to 12weeks	• Construction of the northern dewatering sites will occur approximately 3 years after the completion of other construction associated with the Modification	• 5 t Excavator (95 dBA) • 30 t Excavator (105 dBA) • CAT D8 Dozer (104 dBA) • CAT 14M Grader (108 dBA) • 12 t Roller (108 dBA) • 3 x 12 t Road Trucks (99 dBA) • Water Cart (98 dBA) • Franna Crane (98 dBA) • Drill Rig (104 dBA)

Source: MCO, 2019

Note 1: The potential for machinery to emit noise is quantified as the SWL expressed in dBA re 1 pico watt (pW).
Note 2: At the receptor, the received noise is quantified as the sound pressure level (SPL) expressed in dBA re 20 micro pascals (µPa).
Note 3: tonne (t).
Note 4: Noise mitigation measures to be implemented (i.e. 3m screening and minimising concurrent operation of heavy machinery).

3.5 UG4 Ancillary Works Operation

The noise levels associated with the on-going operation of the Modification infrastructure and any associated noise levels are therefore expected to be significantly less than that associated with the construction of the infrastructure and is therefore not further considered in this assessment.

3.6 UG4 Ancillary Works Road Traffic

Vehicular access to the two southern dewatering sites would be via the CHPP Access Road. Vehicles would pass through the CHPP to access each dewatering site via new access tracks, which would remain in use throughout construction, operation, maintenance and decommissioning activities. Vehicular access to the two northern dewatering sites would be via Saddler's Creek Road which would be accessed from Ulan Road.

Assessment of traffic noise associated with the Modification against the Road Noise Policy (RNP) is not considered to be required given:

- The Modification does not involve any increase to the previously assessed (and approved) workforce;
- There would be no increase in peak workforce vehicle movements in comparison to what has been previously assessed for the Moolarben Coal Complex;
- There are no private receivers along the roads that would be used to transport material from the Modification construction sites to the open cut mining areas;
- the traffic associated with the Modification would be a redistribution of existing site traffic (i.e. there would be no additional trucks in comparison to those being operated at the Moolarben Coal Complex).

For the northern dewatering sites (Phase 2), trucks required for construction are included in the modelling of construction noise (**Table 5**) with the result compared against the approved operational noise limits.

3.7 Open Cut, Underground and Coal Processing Operations

The Moolarben Coal Complex operating noise levels (i.e. open cut, underground and coal processing operations) were previously assessed in the OC Optimisation Modification NIA (SLR, 2017), approved by the Independent Planning Commission in June 2019. As shown in the summary comparison of the Moolarben Coal Complex approved under Project Approval (05_0117) and as proposed for the Modification (**Appendix F)** there would be no change to the approved open cut and underground operations (and associated coal extraction limits) and coal processing operations.

Section 6.3.1 of the OC Optimisation Modification NIA identified three noise modelling scenarios representative of the Moolarben Coal Complex operations in Years 2019, 2021 and 2026 (SLR, 2017). The same three noise modelling scenarios and the predicted intrusive noise levels (as presented in Section 7 of the OC Optimisation Modification NIA) have been used as the basis for calculating the total intrusive noise levels resulting from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the Modification (i.e. UG4 Ancillary Works) as described in **Section 3.4**.

4 Modification Noise Assessment Methodology

4.1 Project Approval Noise Limits

As described in Section 1.2, Project Approval (05_0117) (**Appendix B**) includes noise limits (and the meteorological conditions under which these limits apply) generally consistent with the requirements of the NPfI.

The Project Approval noise limits are presented as external noise levels for privately owned receivers being 35 dBA ($L_{Aeq(15minute)}$) during the daytime, evening and night-time with the exception of three receivers, namely 63, 70 and 75 (with receiver 63 being subject to a private agreement between the landowner and MCO and not further considered in this assessment). The Project Approval noise limits include an external night-time noise limit of 45 dBA ($L_{A1(1minute)}$) applicable to all privately owned receivers.

The Project Approval noise limits for the school and church is presented as internal noise level being 35 dBA (when in use) which 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 equate with external noise levels of 45 dBA ($L_{Aeq(1hour)}$) and 45 dBA ($L_{Aeq(period)}$) respectively, being generally consistent with the NPfI Table 2.2.

4.2 Noise Modelling Meteorology

The NIA (SLR, 2017) for the recently approved OC Optimisation Modification established noise modelling meteorological parameters as presented in **Table 6** which have been used for the Modification noise assessment as presented in **Section 5**.

Table 6 Calm (Neutral) and Noise Enhancing Meteorological Modelling Parameters

Period	Meteorological Parameter	Air Temperature	Relative Humidity	Wind Velocity	Temperature Gradient
Daytime	Calm	18°C	55%	0 m/s	0°C/100 m
	Wind only	19°C	55%	WSW and W 3 m/s	0°C/100 m
Evening	Calm	16°C	66%	0 m/s	0°C/100 m
	Wind only	16°C	65%	ENE, SSW, SW, WSW and W 3 m/s	0°C/100 m
Night-time	Calm	12°C	75%	0 m/s	0°C/100 m
	Wind only	12°C	75%	ENE, E, SSW, SW and WSW 3 m/s	0°C/100 m
	Strong Inversion	6°C	70%	0 m/s	5.2°C/100 m
	Strong Inversion plus Drainage	6°C	70%	ENE 1.0 m/s	5.2°C/100 m

4.3 Noise Modelling Procedure

The noise model for the Moolarben Coal Complex was prepared using RTA Software's Environmental Noise Model (ENM for Windows, Version 3.06), a commercial software system developed in conjunction with the NSW EPA. The ENM algorithm has been used for all major noise assessments at the Moolarben Coal Complex, including the OC Optimisation Modification NIA, UG1 Optimisation Modification NIA, OC4 South-West Modification NIA, MCP Stage 1 Mod 9 NIA and MCP Stage 2 PPR NIA.

A detailed description of the noise modelling methodology is presented in the OC Optimisation Modification NIA (SLR, 2017), and **Appendix F** presents the approved OC Optimisation Modification fixed plant and mobile equipment fleet. The OC Optimisation Modification noise model was utilised for Modification noise assessment with the additional noise sources for the UG4 Ancillary Works (**Table 5**) being incorporated into the model and then configured into representative Phase 1 work and Phase 2 work noise modelling scenarios.

4.4 Modification Scenarios

4.4.1 UG4 Ancillary Work Phase 1 Year 2019 and 2021

The three noise modelling scenarios (described below) includes the UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Work Phase 1 operating concurrently to simulate the overall maximum energy equivalent (i.e. $L_{Aeq[15minute]}$) intrusive noise level.

- Daytime UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1;
- Evening UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1; and
- Night-time UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1.

A large proportion of the mobile equipment is operated in repeatable routines and a relatively smaller proportion of the noise emissions emanate from continuous fixed plant items.

4.4.2 UG4 Ancillary Work Phase 2 Year 2021 and 2026

The noise modelling scenario (described below) includes the UG4 Ancillary Work Phase 2 in isolation as well as the total noise level from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Work Phase 2 operating concurrently to simulate the overall maximum energy equivalent (i.e. $L_{Aeq[15minute]}$) intrusive noise level. A noise screen will be utilised at the northern most dewatering site as a pre-emptive mitigation measure. Further, earthworks would be limited to daytime hours, Monday to Friday only, while drilling of the bores would occur during daytime hours 7 days per week (**Table 5**).

- Daytime UG4 Ancillary Work Phase 2 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2021 and 2026 operations plus the UG4 Ancillary Work Phase 2.

Similarly, a large proportion of the mobile equipment is operated in repeatable routines and a relatively smaller proportion of the noise emissions emanate from continuous fixed plant items.

5 Modification Noise Impact Assessment

5.1 UG4 Ancillary Work Phase 1 Years 2019 and 2021

5.1.1 Daytime Operating Intrusive Noise Levels

The predicted daytime $L_{Aeq(15minute)}$ intrusive noise levels for the UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1 are presented in **Table 7** for privately owned receivers in the vicinity of the Moolarben Coal Complex, together with the relevant Project Approval noise limits.

Table 7 Overall Daytime Operating Intrusive Noise Years 2019 and 2021 (dBA re 20 µPa)

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
Cooks Gap								
39	Sprigg	0	0	19	15	16	12	35
40	Devenish	0	0	17	12	15	11	35
41(a)	Libertis	0	0	20	15	16	12	35
41(b)	Libertis	3	0	17	12	20	15	35
60	Rayner & Mundey	0	0	14	10	17	13	35
61	O'Malley	0	0	16	12	19	16	35
70	Coventry	6	3	24	19	26	21	37
75	Ban	4	1	21	16	23	19	36
79	Nagle	3	0	18	14	22	17	35
80	Sebelic	3	0	18	13	21	17	35
82	Hungerford & Clemens	2	0	16	12	19	16	35
83	Wall	1	0	16	12	20	16	35
84	Sebelic	1	0	15	11	18	14	35
86	Harris	2	0	16	11	19	15	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
87	Howe	2	0	15	11	18	14	35
88	Meyers	0	0	14	10	15	11	35
89	Glover & Tomlinson	2	0	16	11	19	15	35
90	Powell	2	0	16	11	19	15	35
91	Graham	0	0	14	10	13	9	35
94	Mittemayer	3	0	18	13	19	15	35
95	Withington	3	0	17	13	18	14	35
96	Lazicic	2	0	17	12	18	14	35
97	Smith	1	0	16	11	17	13	35
98	Piper	1	0	16	12	16	12	35
99	Moles & Newton	0	0	16	11	15	10	35
100	Ellem	0	0	15	10	13	9	35
101	Hull	0	0	17	12	14	10	35
102	Roberts	0	0	17	12	14	10	35
103	Burnett & Grant	2	0	17	12	17	13	35
104	Deeben	1	0	17	12	15	11	35
105	Katsikaris	1	0	17	12	15	11	35
106	Reid	1	0	19	14	16	12	35
107	Raso	0	0	19	14	15	11	35
109	Evans	2	0	21	16	17	13	35
110	Papps	0	0	21	16	16	12	35
111	McEwan	1	0	17	13	15	11	35
112	Croft	1	0	18	13	15	11	35
113	Ratcliff	1	0	18	13	15	11	35
119	Kearns	0	0	17	12	14	10	35
171	McGregor	0	0	15	11	15	11	35
180	Barrett	4	1	24	18	24	19	35
181	Forster	5	2	24	18	24	19	35
182	Dutoitcook	2	0	23	18	24	19	35
183	Steines	0	0	22	17	23	18	35
184(a)	Stevenson	5	1	22	17	23	18	35
184(b)	Stevenson	5	1	22	17	23	18	35
186	Adamson	0	0	20	15	21	16	35
187	Feeney	5	1	21	16	22	17	35
188	Fielding	0	0	17	12	17	12	35
189	Fay	4	1	20	15	21	17	35
190	Sahyoun	0	0	16	11	17	12	35
191	Lasham	3	0	19	15	21	17	35
192	Williams	3	0	18	14	20	16	35
194	Potts	0	0	15	11	16	12	35
195	Cottam	2	0	18	14	20	16	35
196	Saxberg & Weir	0	0	16	11	17	13	35
200	Grimshaw	0	0	16	11	17	12	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
201(a)	Towerton	0	0	16	11	15	11	35
201(b)	Towerton	0	0	15	10	16	12	35
202	Butler	0	0	15	11	17	13	35
203	Miller	2	0	17	13	18	14	35
204	Donnan	2	0	18	13	19	14	35
206	Marshall & Vella	0	0	18	14	19	15	35
207	Smith	0	0	17	12	17	12	35
208	Hasaart	1	0	17	12	17	13	35
209	Mawson	0	0	16	11	16	12	35
210	Tebutt	1	0	16	11	17	12	35
217	Francis	3	0	20	15	17	13	35
218	Soady	2	0	20	13	17	12	35
219	Riger	3	0	18	13	17	13	35
220	Rusten & Smith	1	0	15	11	16	12	35
222	Purtell	2	0	18	13	17	13	35
223	Palmer & Stewart	2	0	18	13	16	12	35
224	Dupond	3	0	18	13	19	15	35
226	Muscat	1	0	17	12	19	15	35
227	Hughes	3	0	17	12	20	15	35
229	Lowe	3	0	17	12	20	16	35
230	Hoole & Rawlinson	3	0	17	12	20	16	35
231	Morrison & Benny	3	0	17	12	20	16	35
232	Haaring	3	0	17	13	20	16	35
233	Boal	3	0	17	12	20	16	35
234	Gaw	4	0	18	13	21	16	35
235	Wilson	4	1	18	14	21	17	35
236	Donovan	4	1	19	14	21	17	35
237	Stokes	4	1	18	14	21	17	35
238	Powell	4	1	19	14	22	17	35
300	Collins & Marshall	0	0	20	16	18	14	35
303	Ungaro	0	0	20	15	23	17	35
305	Barisic & Aul	0	0	20	15	21	17	35
306	Armstrong	0	0	21	16	22	17	35
307	Chant & Young	0	0	20	16	22	17	35
308	Dower	0	0	17	12	18	13	35
309	Maher	0	0	14	10	14	9	35
310	Death	0	0	15	11	14	10	35
312	Ioannou	0	0	13	9	12	8	35
313	Pracy	0	0	12	8	11	7	35
314	Ford	0	0	12	8	11	7	35
315	Richards & Uzelac	0	0	12	10	11	8	35
316	Vassel & Williams	0	0	12	10	11	8	35
317	Hore & Bingham	0	0	13	9	12	7	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
Ulan								
11(a)	Mullins & Imrie	5	14	12	23	12	24	35
11(b)	Mullins & Imrie	4	9	11	23	12	24	35
11(c)	Mullins & Imrie	6	11	12	23	12	24	35
255	Puckeridge	0	0	17	13	17	13	35
256	Campbell & Frost	0	0	18	14	19	15	35
258	Elias	0	0	19	15	20	16	35

Note 1: Highest predicted noise level from the meteorological conditions in **Table 6** for each receiver.

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

5.1.2 Evening Operating Intrusive Noise Levels

The predicted evening $L_{Aeq(15minute)}$ intrusive noise levels for the UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1 are presented in **Table 8** for privately owned receivers in the vicinity of the Moolarben Coal Complex, together with the relevant Project Approval noise limits.

Table 8 Overall Evening Operating Intrusive Noise Levels Years 2019 and 2021 (dBA re 20 µPa)

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
Cooks Gap								
39	Sprigg	0	0	20	31	16	31	35
40	Devenish	0	0	17	32	15	31	35
41(a)	Libertis	0	0	20	32	17	32	35
41(b)	Libertis	0	2	17	31	20	30	35
60	Rayner & Mundey	0	0	15	32	17	31	35
61	O'Malley	0	0	16	32	20	31	35
70	Coventry	0	5	24	35	26	36	37
75	Ban	0	3	21	34	24	34	36
79	Nagle	0	1	18	34	22	33	35
80	Sebelic	0	2	18	33	22	32	35
82	Hungerford & Clemens	0	0	16	32	20	31	35
83	Wall	0	0	16	32	21	30	35
84	Sebelic	0	0	15	32	18	30	35
86	Harris	0	1	16	31	20	29	35
87	Howe	0	0	15	32	18	30	35
88	Meyers	0	0	14	31	15	30	35
89	Glover & Tomlinson	0	0	16	31	19	30	35
90	Powell	0	0	16	30	19	30	35
91	Graham	0	0	14	31	14	29	35
94	Mittemayer	0	2	18	30	19	30	35
95	Withington	0	1	18	30	19	30	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
96	Lazicic	0	1	17	30	18	30	35
97	Smith	0	0	17	31	17	30	35
98	Piper	0	0	17	31	16	30	35
99	Moles & Newton	0	0	16	31	15	30	35
100	Ellem	0	0	16	31	13	31	35
101	Hull	0	1	17	31	15	30	35
102	Roberts	0	0	17	30	14	30	35
103	Burnett & Grant	0	0	17	30	17	30	35
104	Deeben	0	0	17	30	16	29	35
105	Katsikaris	0	0	17	30	16	29	35
106	Reid	0	0	19	31	16	30	35
107	Raso	0	1	19	31	16	31	35
109	Evans	0	0	21	30	17	30	35
110	Papps	0	0	21	30	17	30	35
111	McEwan	0	0	18	30	15	29	35
112	Croft	0	0	18	29	15	29	35
113	Ratcliff	0	0	18	30	16	29	35
119	Kearns	0	2	17	31	14	30	35
171	McGregor	0	0	15	24	16	23	35
180	Barrett	0	4	24	33	25	33	35
181	Forster	0	6	24	30	24	32	35
182	Dutoitcook	0	3	23	33	24	33	35
183	Steines	0	3	23	32	24	32	35
184(a)	Stevenson	0	4	22	33	23	32	35
184(b)	Stevenson	0	4	22	32	23	32	35
186	Adamson	0	4	20	29	22	30	35
187	Feeney	0	4	21	32	22	32	35
188	Fielding	0	2	17	28	17	28	35
189	Fay	0	4	20	32	22	32	35
190	Sahyoun	0	3	16	28	17	28	35
191	Lasham	0	3	20	29	21	29	35
192	Williams	0	2	19	31	21	31	35
194	Potts	0	2	16	28	17	27	35
195	Cottam	0	2	18	30	21	30	35
196	Saxberg & Weir	0	1	16	28	18	27	35
200	Grimshaw	0	0	16	27	17	26	35
201(a)	Towerton	0	0	16	26	16	25	35
201(b)	Towerton	0	2	15	28	16	27	35
202	Butler	0	2	15	26	17	26	35
203	Miller	0	1	18	28	19	28	35
204	Donnan	0	1	18	30	19	30	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
206	Marshall & Vella	0	1	18	26	19	26	35
207	Smith	0	1	17	28	17	28	35
208	Hasaart	0	0	17	28	17	28	35
209	Mawson	0	0	17	27	17	27	35
210	Tebutt	0	0	17	27	17	27	35
217	Francis	0	0	20	29	18	29	35
218	Soady	0	0	20	29	17	29	35
219	Riger	0	0	18	28	17	28	35
220	Rusten & Smith	0	0	15	25	16	24	35
222	Purtell	0	1	18	30	17	29	35
223	Palmer & Stewart	0	0	18	30	17	29	35
224	Dupond	0	2	18	30	19	30	35
226	Muscat	0	0	17	30	19	30	35
227	Hughes	0	0	17	31	20	30	35
229	Lowe	0	2	17	31	20	31	35
230	Hoole & Rawlinson	0	2	17	31	21	31	35
231	Morrison & Benny	0	2	17	31	21	30	35
232	Haaring	0	3	18	32	21	30	35
233	Boal	0	2	17	32	21	31	35
234	Gaw	0	3	18	32	21	31	35
235	Wilson	0	3	19	32	21	32	35
236	Donovan	0	3	19	32	22	32	35
237	Stokes	0	3	19	33	22	32	35
238	Powell	0	3	19	33	22	32	35
300	Collins & Marshall	0	4	20	30	18	32	35
303	Ungaro	0	4	20	30	23	32	35
305	Barisic & Aul	0	4	20	30	22	31	35
306	Armstrong	0	4	21	30	22	31	35
307	Chant & Young	0	4	21	30	22	31	35
308	Dower	0	3	17	29	18	30	35
309	Maher	0	3	14	28	14	29	35
310	Death	0	3	15	28	14	30	35
312	Ioannou	0	3	14	29	13	30	35
313	Pracy	0	3	13	28	12	29	35
314	Ford	0	3	12	28	11	29	35
315	Richards & Uzelac	0	3	13	28	11	30	35
316	Vassel & Williams	0	4	13	29	11	30	35
317	Hore & Bingham	0	0	14	29	12	30	35

ID No and Landholder		UG4 Ancillary Work Phase 1		Year 2019[1]		Year 2021[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
Ulan								
11(a)	Mullins & Imrie	0	0	11	8	11	8	35
11(b)	Mullins & Imrie	0	0	11	8	11	8	35
11(c)	Mullins & Imrie	0	0	11	8	11	8	35
255	Puckeridge	0	8	19	32	20	33	35
256	Campbell & Frost	0	8	18	32	19	32	35
258	Elias	0	10	19	32	20	33	35

Note 1: Highest predicted noise level from the meteorological conditions in for each receiver.

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

5.1.3 Night-time Operating Intrusive and Sleep Disturbance Noise Levels

The predicted night-time $L_{Aeq(15minute)}$ intrusive and maximum $L_{A1(1minute)}$ noise levels for the UG4 Ancillary Work Phase 1 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2019 and 2021 operations plus the UG4 Ancillary Work Phase 1 are presented in **Table 9** for privately owned receivers in the vicinity of the Moolarben Coal Complex, together with the relevant Project Approval noise limits.

Table 9 Overall Night-time Operating Intrusive and Sleep Disturbance Noise Levels (dBA re 20 µPa)

ID No and Landholder		UG4 Ancillary Work Phase 1			Year 2019[1]			Year 2021[1]			Project Approval Noise Limit LAeq/LA1
		Calm	Wind or Inver	LA1	Calm	Wind or Inver[2]	LA1	Calm	Wind or Inver[2]	LA1	
Cooks Gap											
39	Sprigg	0	0	5	20	32	37	17	32	37	35/45
40	Devenish	0	0	5	17	33	38	15	32	37	35/45
41(a)	Libertis	0	0	4	21	33	38	17	33	38	35/45
41(b)	Libertis	0	2	7	17	32	37	20	31	36	35/45
60	Rayner & Mundey	0	1	6	15	33	38	17	31	36	35/45
61	O'Malley	0	0	5	17	34	39	20	32	37	35/45
70	Coventry	0	6	11	24	36	41	27	37	42	37/45
75	Ban	0	4	9	22	36	41	24	36	41	36/45
79	Nagle	0	2	7	19	35	40	23	34	39	35/45
80	Sebelic	0	2	7	18	34	39	22	34	39	35/45
82	Hungerford & Clemens	0	1	6	16	34	39	20	32	37	35/45
83	Wall	0	1	6	17	33	38	21	31	36	35/45
84	Sebelic	0	0	5	15	33	38	19	31	36	35/45
86	Harris	0	1	6	16	32	37	20	30	35	35/45
87	Howe	0	0	5	16	33	38	19	31	36	35/45
88	Meyers	0	0	5	15	33	38	16	30	35	35/45
89	Glover & Tomlinson	0	0	5	16	32	37	19	31	36	35/45
90	Powell	0	0	5	16	32	37	19	31	36	35/45

ID No and Landholder		UG4 Ancillary Work Phase 1			Year 2019[1]			Year 2021[1]			Project Approval Noise Limit LAeq/LA1
		Calm	Wind or Inver	LA1	Calm	Wind or Inver[2]	LA1	Calm	Wind or Inver[2]	LA1	
91	Graham	0	0	5	15	32	37	14	30	35	35/45
94	Mittemayer	0	2	7	18	31	36	19	30	35	35/45
95	Withington	0	1	6	18	31	36	19	31	36	35/45
96	Lazicic	0	1	6	18	31	36	18	31	36	35/45
97	Smith	0	1	6	17	32	37	17	31	36	35/45
98	Piper	0	1	6	17	31	36	17	31	36	35/45
99	Moles & Newton	0	0	5	17	32	37	15	31	36	35/45
100	Ellem	0	0	5	16	32	37	13	31	36	35/45
101	Hull	0	2	7	18	32	37	15	31	36	35/45
102	Roberts	0	0	5	17	31	36	15	31	36	35/45
103	Burnett & Grant	0	0	5	17	31	36	17	30	35	35/45
104	Deeben	0	0	5	17	31	36	16	30	35	35/45
105	Katsikaris	0	0	5	18	31	36	16	30	35	35/45
106	Reid	0	0	5	19	32	37	17	31	36	35/45
107	Raso	0	1	6	19	32	37	16	32	37	35/45
109	Evans	0	0	5	22	31	36	17	31	36	35/45
110	Papps	0	0	5	22	31	36	17	31	36	35/45
111	McEwan	0	0	5	18	30	35	16	30	35	35/45
112	Croft	0	0	5	18	30	35	15	30	35	35/45
113	Ratcliff	0	0	5	19	31	36	16	29	34	35/45
119	Kearns	0	2	7	17	32	37	14	31	36	35/45
171	McGregor	0	0	5	15	24	29	16	23	28	35/45
180	Barrett	0	4	9	24	35	40	25	35	40	35/45
181	Forster	0	6	11	24	31	36	25	32	37	35/45
182	Dutoitcook	0	3	8	24	34	39	24	34	39	35/45
183	Steines	0	4	9	23	33	38	24	33	38	35/45
184(a)	Stevenson	0	4	9	22	34	39	23	33	38	35/45
184(b)	Stevenson	0	4	9	23	34	39	23	33	38	35/45
186	Adamson	0	4	9	21	30	35	22	31	36	35/45
187	Feeney	0	5	10	22	33	38	23	33	38	35/45
188	Fielding	0	3	8	17	29	34	17	29	34	35/45
189	Fay	0	4	9	21	33	38	22	33	38	35/45
190	Sahyoun	0	3	8	17	29	34	17	29	34	35/45
191	Lasham	0	3	8	20	30	35	21	30	35	35/45
192	Williams	0	2	7	19	32	37	21	32	37	35/45
194	Potts	0	2	7	16	29	34	17	28	33	35/45
195	Cottam	0	2	7	18	32	37	21	30	35	35/45
196	Saxberg & Weir	0	1	6	16	29	34	18	27	32	35/45

ID No and Landholder		UG4 Ancillary Work Phase 1			Year 2019[1]			Year 2021[1]			Project Approval Noise Limit LAeq/LA1
		Calm	Wind or Inver	LA1	Calm	Wind or Inver[2]	LA1	Calm	Wind or Inver[2]	LA1	
200	Grimshaw	0	0	5	16	27	32	17	26	31	35/45
201(a)	Towerton	0	0	5	16	27	32	16	26	31	35/45
201(b)	Towerton	0	2	7	15	29	34	16	27	32	35/45
202	Butler	0	2	7	16	27	32	17	26	31	35/45
203	Miller	0	1	6	18	29	34	19	28	33	35/45
204	Donnan	0	1	6	18	30	35	19	30	35	35/45
206	Marshall & Vella	0	1	6	19	27	32	19	26	31	35/45
207	Smith	0	1	6	17	29	34	17	28	33	35/45
208	Hasaart	0	0	5	17	29	34	18	29	34	35/45
209	Mawson	0	0	5	17	28	33	17	27	32	35/45
210	Tebutt	0	0	5	17	28	33	17	27	32	35/45
217	Francis	0	1	6	21	30	35	18	30	35	35/45
218	Soady	0	1	6	21	30	35	17	29	34	35/45
219	Riger	0	0	5	19	29	34	17	28	33	35/45
220	Rusten & Smith	0	0	5	15	26	31	17	25	30	35/45
222	Purtell	0	1	6	19	30	35	17	30	35	35/45
223	Palmer & Stewart	0	0	5	18	31	36	17	30	35	35/45
224	Dupond	0	2	7	18	31	36	20	31	36	35/45
226	Muscat	0	1	6	18	31	36	20	30	35	35/45
227	Hughes	0	0	5	17	32	37	20	31	36	35/45
229	Lowe	0	3	8	17	32	37	21	32	37	35/45
230	Hoole & Rawlinson	0	3	8	17	32	37	21	32	37	35/45
231	Morrison & Benny	0	2	7	17	32	37	21	31	36	35/45
232	Haaring	0	3	8	18	33	38	21	31	36	35/45
233	Boal	0	3	8	18	33	38	21	31	36	35/45
234	Gaw	0	3	8	18	33	38	21	32	37	35/45
235	Wilson	0	3	8	19	33	38	22	33	38	35/45
236	Donovan	0	3	8	19	33	38	22	33	38	35/45
237	Stokes	0	3	8	19	34	39	22	33	38	35/45
238	Powell	0	3	8	19	34	39	22	34	39	35/45
300	Collins & Marshall	0	5	10	21	31	36	19	33	38	35/45
303	Ungaro	0	5	10	21	31	36	23	33	38	35/45
305	Barisic & Aul	0	5	10	21	31	36	22	32	37	35/45
306	Armstrong	0	4	9	22	31	36	23	32	37	35/45
307	Chant & Young	0	4	9	21	30	35	22	32	37	35/45
308	Dower	0	4	9	17	29	34	18	31	36	35/45
309	Maher	0	3	8	14	29	34	14	30	35	35/45
310	Death	0	4	9	15	29	34	14	31	36	35/45

ID No and Landholder		UG4 Ancillary Work Phase 1			Year 2019[1]			Year 2021[1]			Project Approval Noise Limit LAeq/LA1
		Calm	Wind or Inver	LA1	Calm	Wind or Inver[2]	LA1	Calm	Wind or Inver[2]	LA1	
312	Ioannou	0	4	9	14	29	34	13	30	35	35/45
313	Pracy	0	3	8	13	29	34	12	30	35	35/45
314	Ford	0	4	9	12	29	34	11	30	35	35/45
315	Richards & Uzelac	0	4	9	13	29	34	12	31	36	35/45
316	Vassel & Williams	0	4	9	13	30	35	11	31	36	35/45
317	Hore & Bingham	0	4	9	14	30	35	12	31	36	35/45
Ulan											
11(a)	Mullins & Imrie	0	0	5	11	24	29	11	26	31	35/45
11(b)	Mullins & Imrie	0	0	5	11	24	29	11	26	31	35/45
11(c)	Mullins & Imrie	0	0	5	11	24	29	11	26	31	35/45
255	Puckeridge	0	9	14	19	34	39	21	35	40	35/45
256	Campbell & Frost	0	9	14	18	33	38	19	34	39	35/45
258	Elias	0	11	16	19	34	39	21	35	40	35/45

Note 1: Highest predicted noise level from the meteorological conditions in **Table 6** for each receiver.

Note 2: Predicted noise level incorporate the implementation of real-time controls.

Note 3: Predicted noise level complies with the Project Approval noise limit.

5.2 UG4 Ancillary Work Phase 2 Years 2021 and 2026

5.2.1 Daytime Operating Intrusive Noise Levels

The predicted daytime $L_{Aeq(15minute)}$ intrusive noise levels for the UG4 Ancillary Work Phase 2 in isolation as well as the total noise level from the approved Moolarben Coal Complex 2021 and 2026 operations plus the UG4 Ancillary Works Phase 2 are presented in **Table 10** for privately owned receivers in the vicinity of the Moolarben Coal Complex, together with the relevant Project Approval noise limits.

Table 10 Overall Daytime Operating Intrusive Noise Years 2021 and 2026 (dBA re 20 µPa)

ID No and Landholder		UG4 Ancillary Work Phase 2[3]		Year 2021[1]		Year 2026[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
Cooks Gap								
39	Sprigg	0	0	16	12	10	7	35
40	Devenish	0	0	15	11	10	7	35
41(a)	Libertis	0	0	16	12	10	7	35
41(b)	Libertis	0	0	20	15	15	11	35
60	Rayner & Mundey	0	0	17	13	14	10	35
61	O'Malley	0	0	19	16	16	13	35
70	Coventry	0	0	26	21	19	14	37
75	Ban	0	0	23	19	17	13	36
79	Nagle	0	0	22	17	16	12	35
80	Sebelic	0	0	21	17	16	12	35
82	Hungerford & Clemens	0	0	19	16	16	12	35

ID No and Landholder		UG4 Ancillary Work Phase 2[3]		Year 2021[1]		Year 2026[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
83	Wall	0	0	20	16	16	11	35
84	Sebelic	0	0	18	14	15	11	35
86	Harris	0	0	19	15	15	11	35
87	Howe	0	0	18	14	15	11	35
88	Meyers	0	0	15	11	13	9	35
89	Glover & Tomlinson	0	0	19	14	15	11	35
90	Powell	0	0	19	14	15	11	35
91	Graham	0	0	13	9	11	7	35
94	Mittemayer	0	0	19	15	15	11	35
95	Withington	0	0	18	14	15	11	35
96	Lazicic	0	0	18	13	15	11	35
97	Smith	0	0	17	13	14	10	35
98	Piper	0	0	16	12	14	10	35
99	Moles & Newton	0	0	14	10	12	8	35
100	Ellem	0	0	13	9	10	6	35
101	Hull	0	0	14	10	10	6	35
102	Roberts	0	0	14	10	10	6	35
103	Burnett & Grant	0	0	17	12	14	10	35
104	Deeben	0	0	15	11	12	9	35
105	Katsikaris	0	0	15	11	12	9	35
106	Reid	0	0	16	12	10	6	35
107	Raso	0	0	15	11	10	6	35
109	Evans	0	0	17	13	10	7	35
110	Papps	0	0	16	12	10	6	35
111	McEwan	0	0	15	11	11	7	35
112	Croft	0	0	15	10	10	6	35
113	Ratcliff	0	0	15	11	10	6	35
119	Kearns	0	0	14	10	10	6	35
171	McGregor	0	0	15	11	13	9	35
180	Barrett	0	0	24	19	19	14	35
181	Forster	0	0	24	19	19	14	35
182	Dutoitcook	0	0	24	19	18	14	35
183	Steines	0	0	23	18	19	14	35
184(a)	Stevenson	0	0	23	18	18	13	35
184(b)	Stevenson	0	0	23	18	18	13	35
186	Adamson	0	0	21	16	17	12	35
187	Feeney	0	0	22	17	17	13	35
188	Fielding	0	0	16	12	13	8	35
189	Fay	0	0	21	17	17	12	35
190	Sahyoun	0	0	16	12	13	9	35
191	Lasham	0	0	21	17	17	13	35
192	Williams	0	0	20	16	16	12	35
194	Potts	0	0	16	12	13	8	35

ID No and Landholder		UG4 Ancillary Work Phase 2[3]		Year 2021[1]		Year 2026[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
195	Cottam	0	0	20	16	17	12	35
196	Saxberg & Weir	0	0	17	13	14	10	35
200	Grimshaw	0	0	17	12	14	10	35
201(a)	Towerton	0	0	15	11	13	9	35
201(b)	Towerton	0	0	16	12	12	8	35
202	Butler	0	0	17	13	14	10	35
203	Miller	0	0	18	14	14	10	35
204	Donnan	0	0	19	14	15	11	35
206	Marshall & Vella	0	0	19	15	15	11	35
207	Smith	0	0	16	12	13	9	35
208	Hasaart	0	0	17	13	13	9	35
209	Mawson	0	0	16	12	13	9	35
210	Tebutt	0	0	16	12	13	9	35
217	Francis	0	0	17	13	13	9	35
218	Soady	0	0	17	12	13	9	35
219	Riger	0	0	17	12	14	10	35
220	Rusten & Smith	0	0	16	12	14	10	35
222	Purtell	0	0	17	12	13	9	35
223	Palmer & Stewart	0	0	16	12	13	9	35
224	Dupond	0	0	19	15	15	11	35
226	Muscat	0	0	19	15	15	11	35
227	Hughes	0	0	19	15	15	11	35
229	Lowe	0	0	20	16	16	11	35
230	Hoole & Rawlinson	0	0	20	16	16	11	35
231	Morrison & Benny	0	0	20	16	16	11	35
232	Haaring	0	0	20	16	16	11	35
233	Boal	0	0	20	16	16	11	35
234	Gaw	0	0	21	16	16	11	35
235	Wilson	0	0	21	16	16	12	35
236	Donovan	0	0	21	17	16	12	35
237	Stokes	0	0	21	17	16	12	35
238	Powell	0	0	22	17	16	12	35
300	Collins & Marshall	0	0	18	14	11	6	35
303	Ungaro	0	0	23	17	16	11	35
305	Barisic & Aul	0	0	21	17	16	11	35
306	Armstrong	0	0	22	17	18	13	35
307	Chant & Young	0	0	21	17	17	12	35
308	Dower	0	0	18	13	13	8	35
309	Maher	0	0	14	9	9	5	35
310	Death	0	0	14	10	10	5	35
312	Ioannou	0	0	12	8	9	4	35
313	Pracy	0	0	11	6	8	3	35
314	Ford	0	0	11	6	8	3	35

ID No and Landholder		UG4 Ancillary Work Phase 2[3]		Year 2021[1]		Year 2026[1]		Project Approval Noise Limit
		Calm	Wind	Calm	Wind	Calm	Wind	
315	Richards & Uzelac	0	0	11	8	8	3	35
316	Vassel & Williams	0	0	11	8	8	3	35
317	Hore & Bingham	0	0	11	7	8	3	35
Ulan								
11(a)	Mullins & Imrie	23	26[3]	23	28	23	27	35
11(b)	Mullins & Imrie	23	29[3]	23	31	23	30	35
11(c)	Mullins & Imrie	26	34[3]	26	34	26	34	35
255	Puckeridge	0	0	17	13	13	8	35
256	Campbell & Frost	0	0	19	15	15	9	35
258	Elias	0	0	20	16	16	11	35

Note 1: Highest predicted noise level from the meteorological conditions in **Table 6** for each receiver.

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

Note 3: Noise mitigation measures to be implemented (i.e. 3m screening and minimising concurrent operation of heavy machinery).

5.3 Modification Noise Amenity Levels

The OC Optimisation Modification NIA (SLR, 2017) presents a detailed noise assessment of the predicted daytime, evening and night-time $L_{Aeq(period)}$ noise amenity levels for the 2019, 2021 and 2026 operating scenarios for privately owned receivers as well as the school, church and commercial (i.e. non-residential) receivers in Ulan Village in the vicinity of the Moolarben Coal Complex.

SLR (2017) predicted no exceedance of the relevant daytime, evening and night-time noise amenity criteria at the nearest privately owned receivers in Cooks Gap and Ulan and no exceedance of the relevant Project Approval limits at the nearest non-residential receivers in Ulan village resulting from the OC Optimisation Modification.

Due to the negligible noise amenity level contribution from the UG4 Ancillary Works at the nearest privately owned receivers in Cooks Gap and Ulan and non-residential receivers in Ulan village, this outcome would remain unchanged by the Modification during the daytime, evening and night-time periods.

5.4 Cumulative Noise Amenity Levels

The OC Optimisation Modification NIA (SLR, 2017) presents a detailed noise assessment of the predicted evening and night-time $L_{Aeq(period)}$ noise amenity levels from the Moolarben Coal Complex, Ulan Continued Operations Project and Wilpinjong Extension Project for privately owned receivers as well as the school, church and commercial (i.e. non-residential) receivers in Ulan Village in the vicinity of the Moolarben Coal Complex.

SLR (2017) predicted no exceedance of the evening and night-time cumulative noise amenity criteria at the nearest privately owned receivers in Cooks Gap and Ulan and the nearest non-residential receivers in Ulan village resulting from the cumulative operation of the Moolarben Coal Complex (incorporating the OC Optimisation Modification), Ulan Continued Operations Project and Wilpinjong Extension Project, and this outcome would remain unchanged by the Modification during the evening and night-time periods.

6 Modification Summary of Findings

6.1 UG4 Ancillary Work Phase 1 Years 2019 and 2021

The predicted daytime, evening and night-time intrusive $L_{Aeq(15minute)}$ noise levels and night-time maximum $L_{A1(1minute)}$ noise levels for the 2019 and 2021 operating scenarios show:

- Compliance is generally determined by evening and night-time noise levels, due to the noise-enhancing meteorological conditions (**Table 6**) that occur during the evening and night-time;
- No exceedance of the Project Approval noise limits are predicted during the daytime, evening and night-time (**Table 7**, **Table 8** and **Table 9**) at any privately owned receivers from the UG4 Ancillary Works Phase 1 in isolation;No exceedance of the Project Approval noise limits are predicted during the daytime, evening and night-time (**Table 7**, **Table 8** and **Table 9**) at any privately owned receivers from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Works Phase 1;
- The intrusive noise level contribution from the UG4 Ancillary Works Phase 1 (in isolation) is predicted to be very low and less than 15 dBA at all privately owned receivers. As a result, the predicted Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) as presented in the OC Optimisation Modification NIA (SLR, 2017) are effectively unaltered by the Modification; and
- The outcome of the vacant land impact assessment presented in the OC Optimisation Modification NIA (SLR, 2017) (i.e. that predicted noise levels on the nearest privately-owned vacant land would remain below the maximum recommended rural residential daytime, evening and night-time noise amenity level) remains unchanged by the UG4 Ancillary Works Phase 1 due to the negligible noise amenity level contribution from the UG4 Ancillary Works Phase 1.

6.2 UG4 Ancillary Work Phase 2 Years 2021 and 2026

The predicted daytime intrusive $L_{Aeq(15minute)}$ noise levels for the 2021 and 2026 operating scenarios show:

- No exceedance of the Project Approval noise limits is predicted during the daytime (**Table 10**) at any privately owned receivers from the UG4 Ancillary Works Phase 2 in isolation;
- No exceedance of the Project Approval noise limits are predicted during the daytime (**Table 10**) at any privately owned receivers from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Works Phase 2;
- The intrusive noise level contribution from the UG4 Ancillary Works Phase 2 (in isolation) is predicted to be negligible at all privately owned receivers (except at the nearest property 11 – Mullins & Imrie – discussed below). As a result, the predicted Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) as presented in the OC Optimisation Modification NIA (SLR, 2017) are effectively unaltered by the Modification;
- The outcome of the vacant land impact assessment presented in the OC Optimisation Modification NIA (SLR, 2017) (i.e. that predicted noise levels on the nearest privately-owned vacant land would remain below the maximum recommended rural residential daytime noise amenity level) remains unchanged by the UG4 Ancillary Works Phase 2 due to the negligible noise amenity level contribution from the UG4 Ancillary Works Phase 2;

- The nearest privately owned receiver (11 – Mullins & Imrie) is located to east of the UG4 Ancillary Works Phase 2 works. As described in **Section 3.3.4**, the construction of the northern dewatering sites will occur approximately 3 years after the completion of the UG4 Ancillary Works Phase 1. A temporary noise screen will be implemented during construction of the bores which would occur during daytime hours seven days per week with earthworks limited to daytime hours Monday to Friday only. The daytime intrusive noise level contributions from the UG4 Ancillary Works Phase 2 (in isolation) to property 11 range from 23 dBA to 34 dBA and would comply with the Project Approval noise limit of 35 dBA;
- Similarly, the daytime intrusive noise levels from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Works Phase 2 to property 11 also range from 23 dBA to 34 dBA and would comply with the Project Approval noise limit of 35 dBA; and
- It follows that the daytime noise amenity level from the approved Moolarben Coal Complex (i.e. open cut, underground and coal processing operations) plus the UG4 Ancillary Works Phase 2 to property 11 will be well less than the daytime recommended noise amenity criteria of 50dBA.

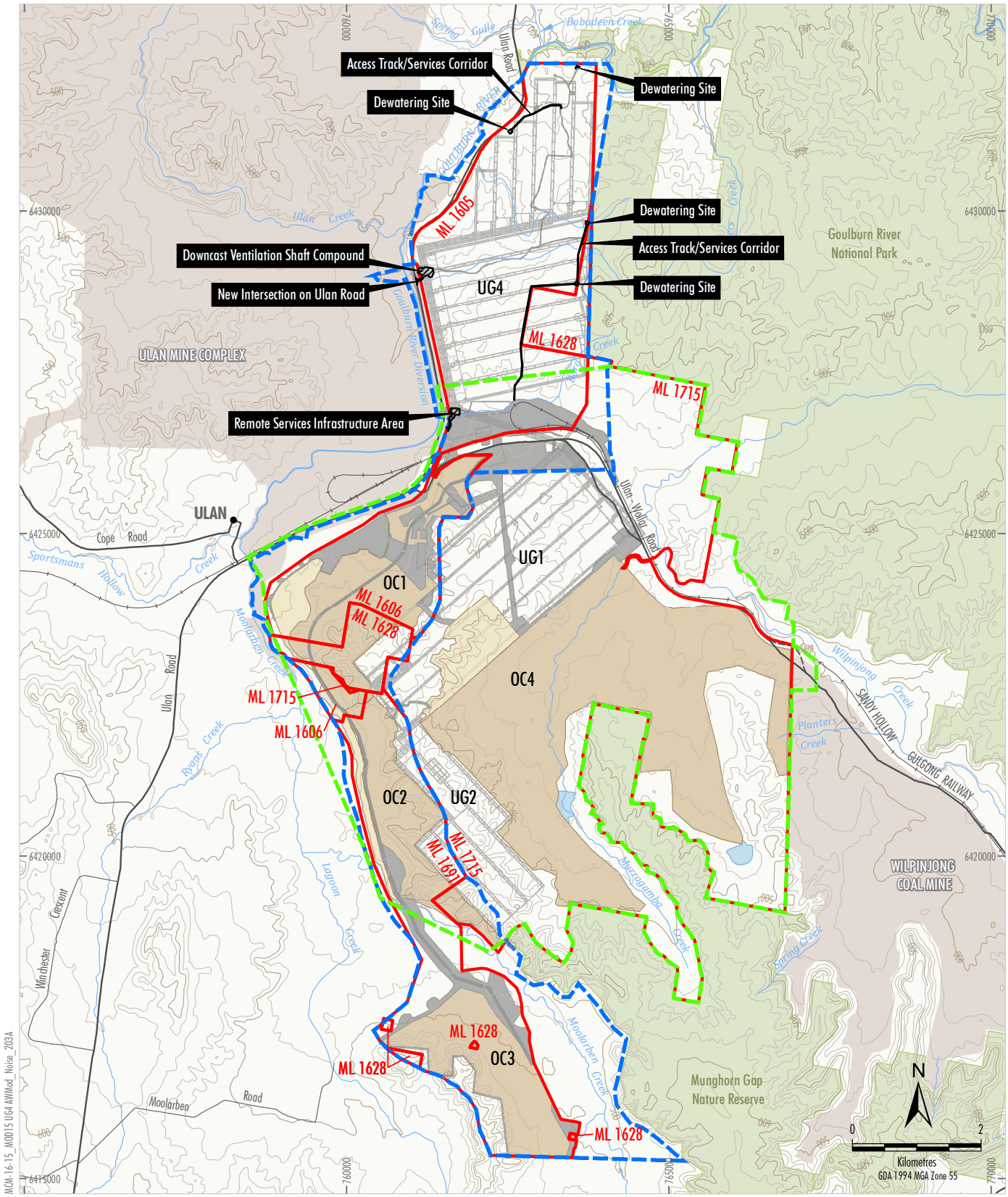
6.3 Review of the Noise Management Measures

MCO is committed to maintaining an awareness of best practice noise mitigation technologies and alternative operating methodologies. MCO implements noise control and management measures that are found to be feasible, reasonable and effective in the context of a safe and economic mining operation; and where there is a clear community benefit with their application. Available best practice mitigation technologies and alternative operating methodologies are reviewed on an ongoing basis.

Potential noise impacts would continue to be managed and monitored in accordance with the requirements of Project Approval (05_0117) MCP Stage 1 [and Project Approval (08_0135) MCP Stage 2] and the Moolarben Coal Complex NMP. The NMP would be updated as necessary to incorporate the Modification.

APPENDIX A

Approved Moolarben Coal Project (Stage 1 and Stage 2)
General Arrangement



MCM-16-15_MOD15 UG4 AWMod_Noise_203A

LEGEND

- NSW National Parks and Wildlife Service
- Other Mining Operations
- Mining Lease Boundary

Existing/Approved Development

- Open Cut Mining Area
- Out-of-pit Emplacement
- Surface Infrastructure Area
- Clean Water Diversion Infrastructure
- Underground Longwall Layout
- Haul Road
- Road Realignment (not yet constructed)
- Approved Stage 1 Project Boundary
- Approved Stage 2 Project Boundary

UG4 Ancillary Works Modification

- Indicative Surface Infrastructure Area

Source: MCO (2019); NSW Department of Planning, Industry and Environment (2019)

MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Indicative General Arrangement

APPENDIX B

Stage 1 (Noise Related) Approval Conditions

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	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
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) when in use		-
Ulan Anglican Church		35 (internal) when in use		-
Goulburn River National Park Munghorn Gap Nature Reserve		50 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) $L_{Aeq\ (15min)}$

Receiver ID	Day ($L_{Aeq\ (15min)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)
63	43	43	42
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

Day/Evening/Night $L_{Aeq(period)}$	Receiver
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) LAeq (15min)

Receiver ID	Day ($L_{Aeq\ (period)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)
63	40	40	39
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.

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.

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;

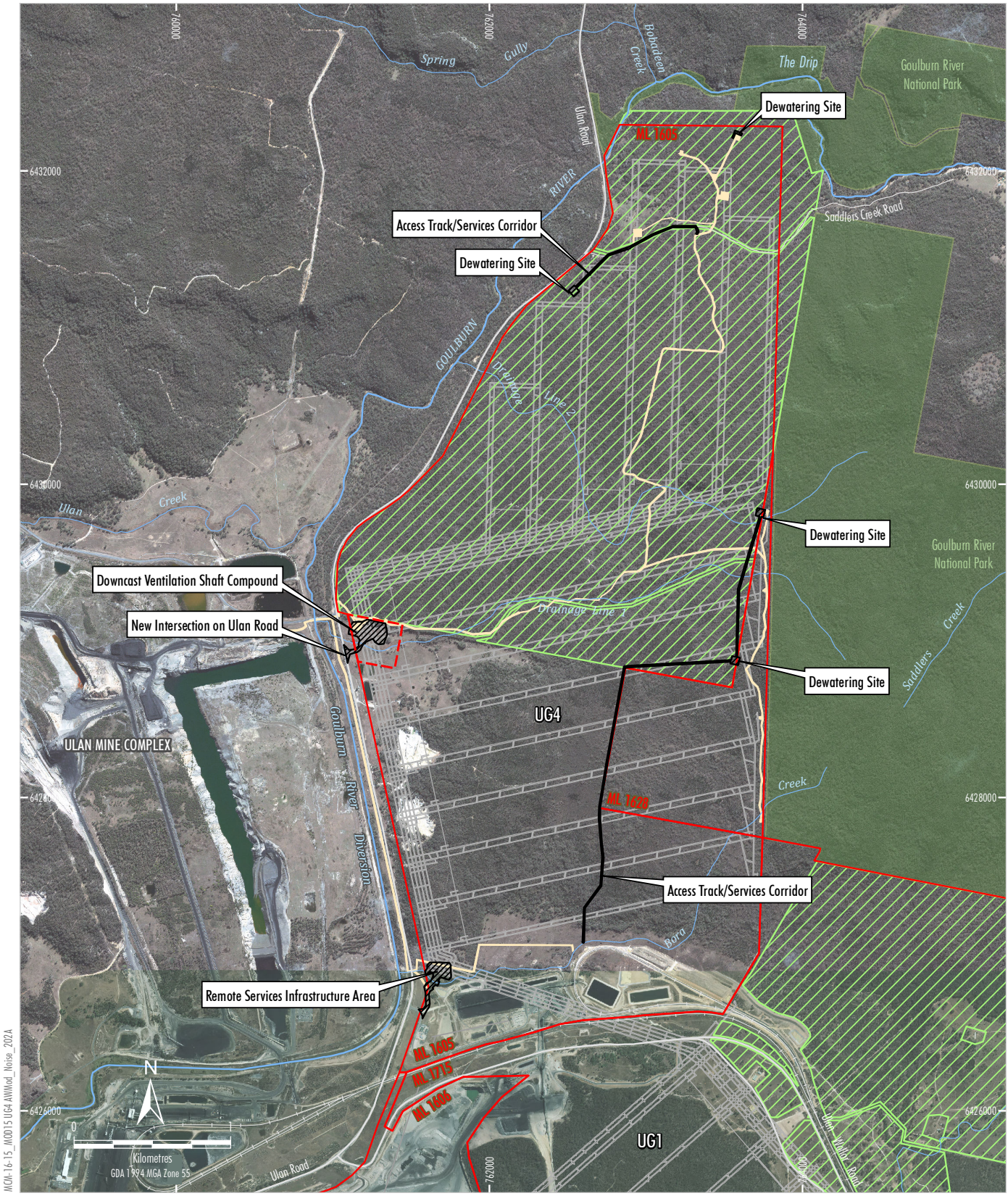
(b) meteorological conditions during which collection of noise data is not appropriate;

(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.

APPENDIX C

UG4 Ancillary Works Modification Plan



MCM-16-15_MOD15 UG4 AWMod_Noise_202A

LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Existing Biodiversity Offset Area
- Existing/Approved Development
- Underground Longwall Layout
- Pipeline and Borefield Infrastructure
- UG4 Ancillary Works Modification
- Indicative Surface Infrastructure Area

Source: MCO (2019); NSW Department of Planning, Industry and Environment (2019)
Orthophoto Mosaic: MCO (April 2016 - May 2012)

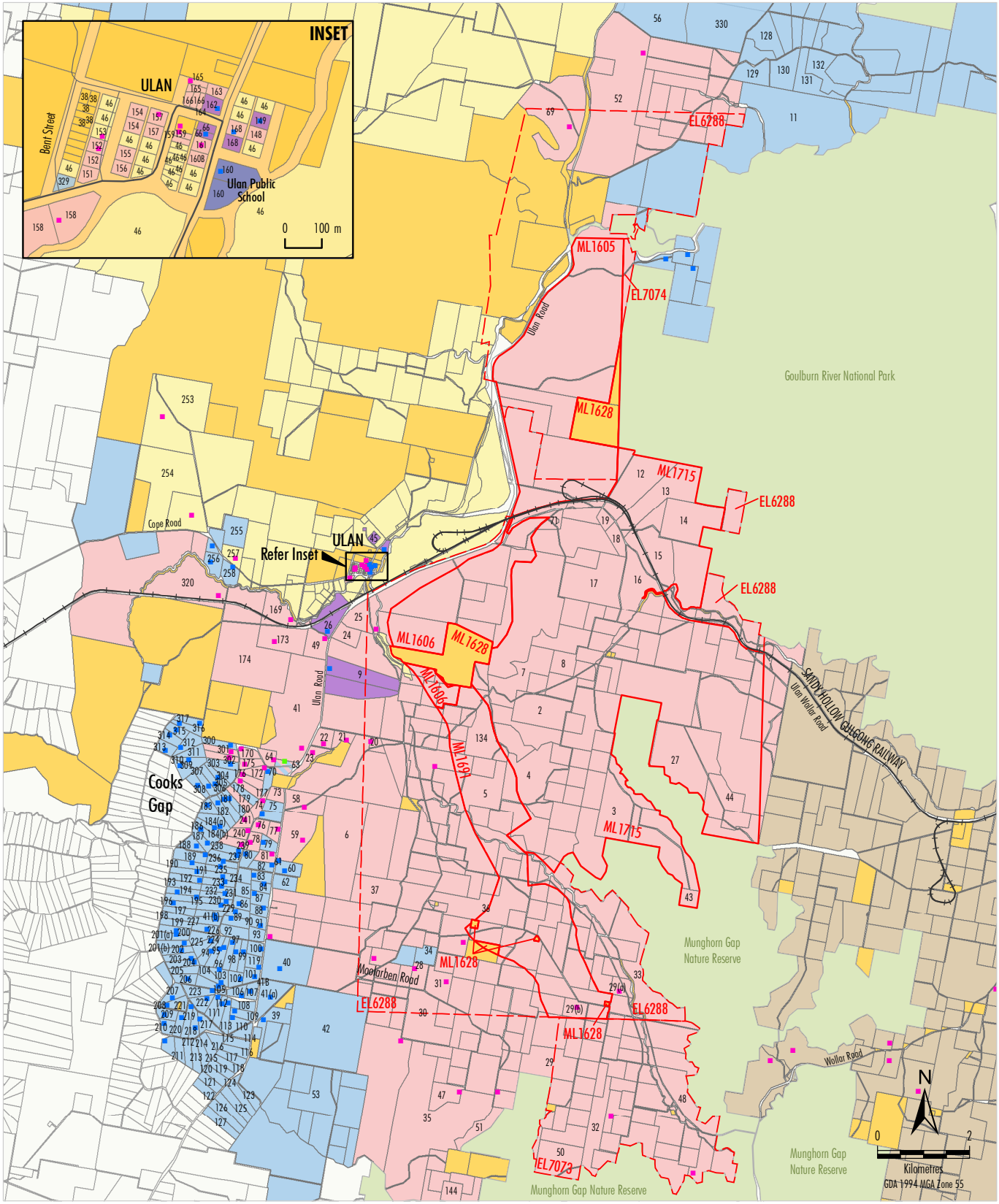
MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

UG4 Ancillary Works Modification Plan

APPENDIX D1

Land Ownership Plan



MCM-16-15_MOD15 UG4 AWMod_Noise_2044A

LEGEND

- Railway
- National Park/Nature Reserve
- Exploration Licence Boundary
- Mining Lease Boundary
- Mine Owned Receiver
- Private Receiver (Under Contract to MCO)
- Private Receiver

Land Ownership

- Moolarben Coal Operations Pty Ltd
- Moolarben Coal Operations Pty Ltd – Under Contract/Purchase Agreement
- Ulan Coal Mines Limited
- Wilpinjong Coal Mine
- Commercial
- Minister for Education
- Crown/State of NSW
- Privately Owned
- Unidentified Land

Source: MCO (2018); NSW Department of Planning, Industry and Environment (2019)

MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Relevant Land Ownership Plan

APPENDIX D2

Land Ownership Details

ID	Owner	Type	Easting (MGA)	Northing (MGA)	Elevation
Cooks Gap					
39	RM & DJ Sprigg	Private	756038	6415288	585
40	JM Devenish	Private	756389	6416414	554
41(a)	PP Libertis (Perpetual Lease)	Private	756194	6415791	574
41(b)	PP Libertis (Perpetual Lease)	Private	754978	6417572	586
60	CL Rayner and DM Mundey	Private	756500	6418546	527
61	O'Malley	Private	756375	6418755	524
70[1]	DJ & A Coventry	Private	756132	6420692	510
75[1]	P Ban	Private	756012	6419777	513
79	PTJ & SE Nagle	Private	756034	6419159	519
80	W & D Sebelic	Private	755649	6418908	531
82	SC Hungerford & MC Clemens	Private	756223	6418659	524
83	CF & CR Wall	Private	755832	6418444	533
84	DS Sebelic	Private	756047	6418248	531
86	NW Harris	Private	755506	6417818	558
87	BJ & K Howe	Private	755841	6418051	539
88	BC Meyers	Private	756043	6417724	539
89	MV & HM Glover & E & BJ Tomlinson	Private	755431	6417645	559
90	SA Powell	Private	755337	6417501	565
91	HM Graham	Private	755969	6417348	544
94	LK Mittemayer	Private	754900	6416785	609
95	BJ Withington	Private	755085	6416834	600
96	D Lazicic	Private	755183	6416867	590
97	DJ & MD Smith	Private	755364	6416985	573
98	ME & JJ Piper	Private	755440	6416783	575
99	JR Moles & AJ Newton	Private	755603	6416770	568
100	W Ellem	Private	755992	6416832	556
101	RD & DMZ Hull	Private	755850	6416237	571
102	KA Roberts	Private	755530	6416189	579
103	SB Burnett & SL Grant	Private	755072	6416399	595
104	RA & LA Deeben	Private	755112	6416116	592
105	DJ & N Katsikaris	Private	755061	6416033	597
106	TB & JH Reid	Private	755558	6415823	601
107	ZJ & M & AA Raso	Private	755752	6415919	587
109	DA Evans	Private	755410	6415494	620
110	SM and JH Papps	Private	755361	6415339	619
111	GJ & NJ McEwan	Private	755052	6415789	604
112	MJ & LM Croft	Private	755138	6415655	605
113	CPG Ratcliff	Private	755269	6415661	606
119	PJ Kearns	Private	755937	6416447	564

ID	Owner	Type	Easting (MGA)	Northing (MGA)	Elevation
171	AD & SA McGregor	Private	753898	6414840	665
180	CD & LL Barrett	Private	755292	6420111	565
181	SM Forster	Private	755178	6420092	568
182	J Dutoitcook	Private	755049	6420016	580
183	R & EA Steines	Private	754822	6419969	589
184(a)	LA Stevenson	Private	755093	6419504	564
184(b)	LA Stevenson	Private	754967	6419464	581
186	RW & IJ Adamson	Private	754674	6419437	589
187	BT & KM Feeney	Private	754816	6419137	594
188	KR & T Fielding	Private	754577	6419073	584
189	Fay	Private	754772	6418881	593
190	T & LK Sahyoun	Private	754488	6418711	579
191	BW & TS Lasham	Private	754592	6418520	588
192	D Williams	Private	754649	6418328	589
194	PM & K Potts	Private	754160	6418080	578
195	R Cottam	Private	754583	6417973	591
196	F Saxberg & M Weir	Private	754072	6417840	583
200	VK Grimshaw	Private	754141	6417241	604
201 (a)	KR & GM Towerton	Private	754138	6417158	605
201 (b)	KR & GM Towerton	Private	754311	6416962	609
202	H & VF Butler	Private	754258	6416804	609
203	DJ Miller	Private	754462	6416639	627
204	RB & JE Donnan	Private	754537	6416557	635
206	CA Marshall & R Vella	Private	754394	6416192	628
207	AA & DM Smith	Private	754057	6415768	635
208	SA & CR Hasaart	Private	753938	6415612	648
209	F Mawson	Private	753883	6415407	650
210	JM & AM Tebutt	Private	753873	6415226	660
217	CA Francis	Private	754659	6415319	661
218	GF & GEL Soady	Private	754550	6415117	666
219	T & S Riger	Private	754468	6415587	647
220	SJ Rusten & NJ Smith	Private	754258	6415351	645
222	BJ Purtell	Private	754813	6415761	628
223	EW Palmer & JM Stewart	Private	754921	6415935	612
224	RS & PCC Dupond	Private	754895	6417021	602
226	LAA & FC Muscat	Private	754812	6417270	592
227	WP & JA Hughes	Private	755000	6417482	585
229	JJ & BA Lowe	Private	755115	6417791	579
230	DA Hoole & DT Rawlinson	Private	755229	6417879	573
231	T Morrison & SM Benny	Private	755200	6418034	563

ID	Owner	Type	Easting (MGA)	Northing (MGA)	Elevation
232	L & JA Haaring	Private	755121	6418197	564
233	D & K Boal	Private	755196	6418290	554
234	D & L Gaw	Private	755157	6418405	557
235	LM & RS Wilson	Private	755107	6418631	559
236	RG & CA Donovan	Private	755165	6418738	557
237	B & S Stokes	Private	755468	6418862	540
238	B Powell	Private	755497	6418969	537
300	CM Collins & CY Marshall	Private	755327	6421268	542
303	HJ Ungaro	Private	755327	6420850	553
305	L Barisic & M Aul	Private	755052	6420566	559
306	E Armstrong	Private	754978	6420431	564
307	M Chant & NK Young	Private	754843	6420373	563
308	NA Dower	Private	754605	6420402	554
309	GS Maher	Private	754219	6420817	534
310	KI Death	Private	754407	6420948	534
312	MS & JJ Ioannou	Private	754239	6421215	523
313	NJ & BDE Pracy	Private	753906	6421166	518
314	SL Ford	Private	753997	6421486	512
315	WJ Richards & BJ Uzelac	Private	754141	6421605	511
316	CR Vassel & CM Williams	Private	754210	6421744	510
317	RJ Hore & V Bingham	Private	754646	6421744	519
Ulan					
11 (a)	JE Mullins & CD Imrie	Private	765376	6431622	388
11 (b)	JE Mullins & CD Imrie	Private	765265	6431931	380
11 (c)	JE Mullins & CD Imrie	Private	764784	6431839	393
255	M Puckeridge	Private	754922	6425602	458
256	R Campbell & S Frost	Private	754887	6425251	452
258	PM & CD Elias	Private	755375	6425132	453
Ulan Village Non-residential					
160	Minister for Education and Training (Ulan Public School)	School	758350	6425029	418
168	PJL Constructions Pty Limited (Church)	Church	758386	6425136	419
9	Orica Australia Pty Limited	Commercial	757478	6422930	451
26	Forty North Pty Limited	Commercial	757430	6423741	435
46B	North Eastern Wiradjuri Wilpinjong Community Fund Limited	Commercial	758663	6425526	416
66	Rostherne Pty Limited	Commercial	758310	6425130	420
149	Mid-Western Regional Council	Commercial	758457	6425165	417
162	Rowmint Pty Ltd	Commercial	758342	6425199	419

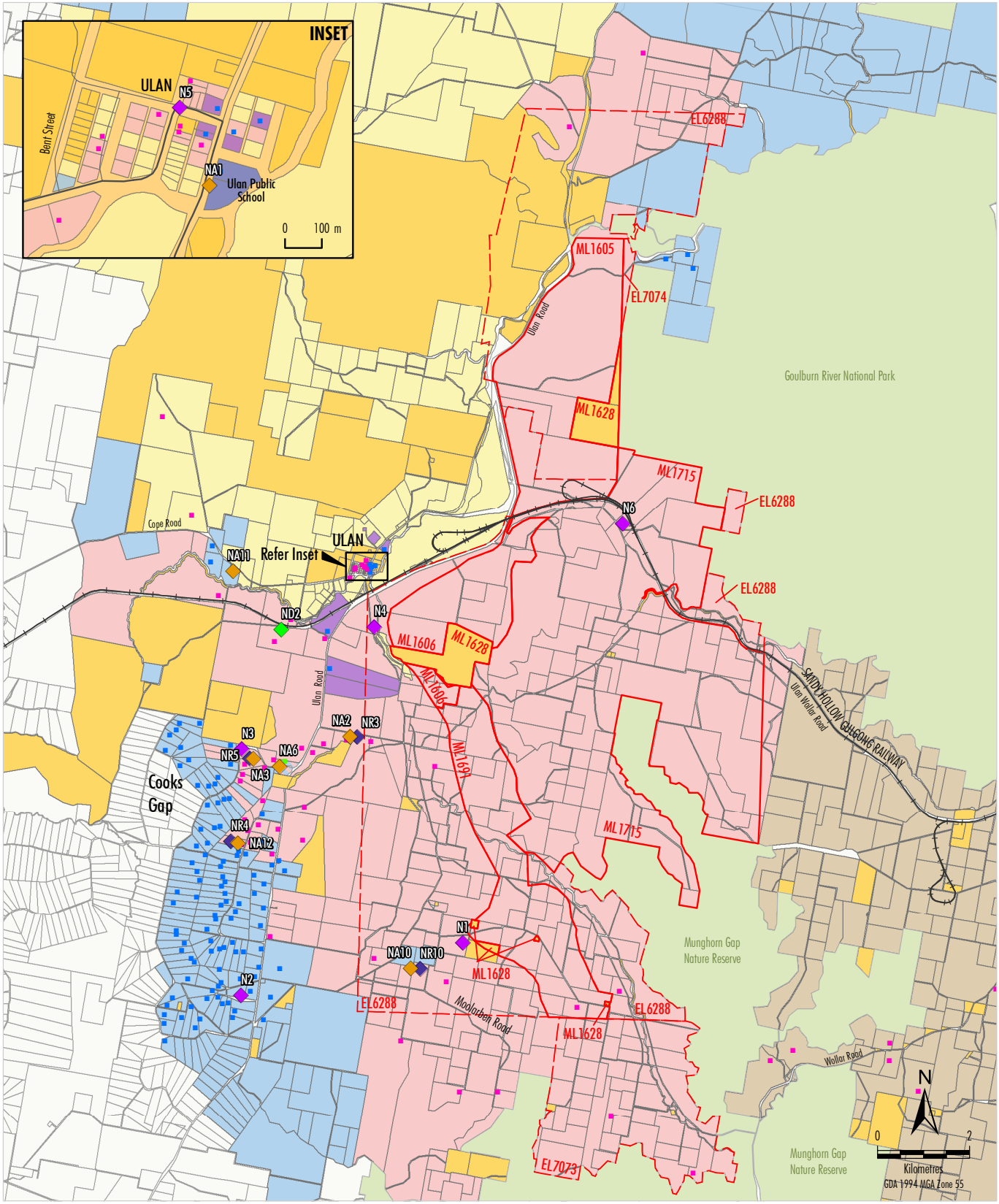
Note 1: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer Appendices A1 and A2).

Note 2: Mine-owned properties subject to completion of current purchase agreement.

Note 3: Landowner that can request additional noise mitigation measures.

APPENDIX E

Noise Monitoring Sites



MCM-16-15_MOD15 UG4 AWMod_Noise_2017A

LEGEND

- NSW National Parks and Wildlife Service
- Railway
- Exploration Licence Boundary
- Mining Lease Boundary

Land Ownership

- Moolarben Coal Operations Pty Ltd
- Moolarben Coal Operations Pty Ltd – Under Contract/Purchase Agreement
- Ulan Coal Mines Limited
- Wilpinjong Coal Mine
- Commercial
- Minister for Education
- Crown/State of NSW
- Privately Owned
- Unidentified Land

- Mine Owned Receiver
- Private Receiver (Under Contract to MCO)
- Private Receiver

Environmental Monitoring

- Attended Noise Monitoring Site
- Directional Noise Monitoring Site (UCML)
- Real-time Noise Monitoring Site
- 2005 Background Noise Monitoring Site

Source: MCC (2019); NSW Department of Planning, Industry and Environment (2019)

MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Moolarben Coal Complex
Noise Monitoring Sites

APPENDIX F

Comparison of Approved and Modified **Moolarben Coal Project (Stage 1)**

Summary Comparison of Approved and Modified Moolarben Coal Project Stage 1

Relevant Approval Component	Moolarben Coal Complex*	Moolarben Coal Complex (including the Modification)
	Stage 1 Project Approval (05_0117)	**Stage 1 Project Approval (05_0117)**
Operational Mine Life	Mining operations can be carried out until 31 December 2038.	Unchanged.
Hours of Operation	Mining operations can be carried out 24 hours per day, 7 days per week.	Unchanged.
Coal Extraction Limits	Up to 10 million tonnes (Mt) of ROM coal can be extracted from the open cut mining operations in any calendar year.	Unchanged.
	Up to 16 Mt (total) of ROM coal can be extracted from the open cut operations at the Moolarben Coal Complex in any calendar year.	
Underground Coal Extraction Limits	Up to 8 Mt (total) of ROM coal can be extracted from the underground mining operations at the Moolarben Coal Complex in any calendar year.	Unchanged.
Coal Processing and Offsite Transport	Up to 16 Mt (total) of ROM coal from the Moolarben Coal Complex can be processed (washed) in any calendar year, except in the year 2017.	Unchanged.
	Total coal production of 22 Mtpa.	
	All coal is to be transported from the site by rail (average of 8 trains per day and peak of 11 trains per day).	
Blasting Frequency Limits	A maximum of 2 blasts per day and 9 blasts per week (averaged over a calendar year) can be carried out at the Moolarben Coal Complex.	Unchanged.
	Blasting can be carried out on site between 9:00 am and 5:00 pm Monday to Saturday inclusive. No blasting allowed on Sundays, public holidays, or at any other time without written approval of the Secretary.	
Biodiversity Offset Strategy	The Biodiversity Offset Strategy is shown in Appendix 8 of the Project Approval (05_0117).	Updated Biodiversity Offset Strategy to account for additional disturbances as required.
Site Access	Site access via Ulan Road and Ulan-Wollar Road.	Additional site access to the Downcast Ventilation Shaft Compound via Ulan Road.
Water Management Design and Objectives	Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries.*	Unchanged.
	Ensure there is sufficient water for all stages of the project in accordance with Condition 29, Schedule 3 of Stage 1 Project Approval (05_0117).	
	Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site.	
	Mine water storage infrastructure is designed to store a 50 year average recurrence interval 72 hour storm event.	
	On-site storages (including tailings dams, mine infrastructure dams, groundwater storage and treatment dams) are suitably lined to comply with a permeability standard of less than 1 x 10^{-9} metres per second (m/s).	
	Unless an EPL authorises otherwise, MCO will comply with section 120 of the NSW *Protection of the Environment Operations Act, 1997* (PoEO Act).	

Relevant Approval Component	Moolarben Coal Complex*	Moolarben Coal Complex (including the Modification)
	Stage 1 Project Approval (05_0117)	**Stage 1 Project Approval (05_0117)**
Coal rejects	Co-disposal of coal rejects with waste rock in the open cut voids.	Unchanged.
Employment	Peak operational workforce of 740 personnel. Average operational workforce of 667 personnel. Peak construction workforce of 250 personnel. Average construction workforce of 120 personnel.	Unchanged.
Water Management Performance Measures	As per Condition 32 of Schedule 3 of Project Approval 05-0117.	Unchanged.
Air Quality Criteria	As per Condition 17 of Schedule 3 of Project Approval 05-0117.	Unchanged.
Noise Criteria	As per Condition 1 of Schedule 3 of Project Approval 05-0117.	Unchanged.
Subsidence Impact Performance Measures	As per Condition 73 and 75 of Schedule 3 of Project Approval 05-0117.	Unchanged.
Blasting Criteria	As per Condition 8 of Schedule 3 of Project Approval 05-0117.	Unchanged.

APPENDIX G

OC Optimisation Plant and Equipment Sound Power Levels

OC Optimisation Modification Fixed Plant and Mobile Equipment Fleets SWLs (dBA re 1 pW)

Equipment	Type/ Capacity	Year 2019[1]			Year 2021[1]			Year 2026[1]		
		No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL
Drill	Atlas Copco DML60	2	117	120	2	117	120	2	117	120
	Pit Viper 275	2	115	118	2	115	118	2	115	118
Excavator	Liebherr 996	2	117	120	2	117	120	2	117	120
	Liebherr 996B	1	111	111	1	111	111	1	111	111
	Liebherr 9800	1	114	114	1	114	114	1	114	114
	CAT 6050	2	118	121	2	118	121	2	118	121
	Komatsu PC1250	1	111	111	1	111	111	1	111	-
Front-end Loader	Komatsu WA1200	3	121	126	3	121	127	3	121	126
	Komatsu WD900	-	120	-	-	120	-	-	120	-
	CAT 854	1	114	114	1	114	117	1	114	114
Truck	Komatsu 930E	5	113	120	5	113	120	5	113	120
	Komatsu 830E	17	115	127	17	115	127	17	115	127
	Komatsu 730E/CAT 789	11	114	124	11	114	125	11	114	124
Dozer	Komatsu D475	17	113	125	17	113	125	17	113	125
	Komatsu D375	3	113	118	3	113	118	3	113	118
	CAT D11T	2	116	119	2	116	119	2	116	119
	CAT D10T	-	114	-	-	114	-	-	114	-
Water Truck	Komatsu HD785	5	115	122	5	115	122	5	115	122
Grader	Komatsu GD825	-	110	-	-	110	-	-	110	-
	CAT 24M	3	110	115	3	110	115	3	110	115
	CAT 16M	3	108	113	3	108	113	3	108	113
Support Loader	Komatsu WA580-6	1	115	115	1	115	115	1	115	-
Support Excavator	Komatsu PC450	3	105	110	3	105	108	3	105	112
Support Scraper	CAT 657G	-	117	-	-	117	-	-	117	-

Equipment	Type/ Capacity	Year 2019[1]			Year 2021[1]			Year 2026[1]		
		No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL
Service Truck	Komatsu HD785	1	115	115	1	115	115	1	115	115
Service Truck	CAT 773F	2	114	117	2	114	117	2	114	117
MMU		3	108	113	3	108	113	3	108	113
Stemming truck		1	108	108	1	108	108	1	108	108
Truck	Mack MetroLiner	1	108	108	1	108	108	1	108	108
Mobile Equipment		**93**		**134.1**	**93**		**134.1**	**93**		**134.1**
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
CHPP Plant				**126.5**			**126.5**			**126.5**
Dozer		1	114	114	1	114	114	1	114	114
Sizing Station		1	116	116	1	116	116	1	116	116
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

Equipment	Type/ Capacity	Year 2019[1]			Year 2021[1]			Year 2026[1]		
		No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL
Rear Air Intake		1	111.6	112	1	111.6	112	1	111.6	112
Underground 1				**120.7**			**120.7**			**120.7**
Dozer		-	-	-	2	113	116	2	113	116
Transfer Station		-	-	-	2	115	118	2	115	118
Conveyor		-	-	-	1817	101 (per 100m)	114	1817	101 (per 100m)	114
Conveyor Drive		-	-	-	4	98	104	4	98	104
Discharge		-	-	-	2	96.3	99	2	96.3	99
Sizing Station		-	-	-	1	116	116	1	116	116
Bypass Conveyor				**-**			**122.3**			**122.3**
Estimated Mine Site				**135.0**			**135.2**			**135.2**

Note 1: Estimated mobile equipment SWLs based on existing performance and demonstrated noise controls. Estimated fixed plant SWLs based on achievable low noise emission standards and NIA acoustic design requirements. The number of items stated is the total excluding any utilisation rate.

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