



Moolarben Coal Complex
UG1 Optimisation Modification

Environmental Assessment

APPENDIX C

NOISE ASSESSMENT





global environmental solutions

**Moolarben Coal Complex
UG1 Optimisation Modification
Noise Assessment**

Report Number 610.13549-R2

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Yancoal Australia Limited
Level 25, 363 George Street
SYDNEY NSW 2000

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Moolarben Coal Complex

UG1 Optimisation Modification

Noise Assessment

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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 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. 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) dated 6 September 2007 (as modified) (**Appendix A1**) and Project Approval (08_0135) (Moolarben Coal Project Stage 2) dated 30 January 2015 (**Appendix A2**).

MCO has reviewed the mining sequence and associated infrastructure layout requirements at the Moolarben Coal Complex to enable more efficient access to the underground coal resource. As a consequence, the approved Stage 2 Preferred Project UG1 layout would be optimised to include additional coal handling infrastructure (including stockpiles, conveying and sizing station). The proposed UG1 Optimisation Modification (the Modification) would:

- Enable underground operations to reach a Run-of-Mine (ROM) coal rate of up to 8 million tonnes per annum (Mtpa);
- Involve increasing average daily rail departures from five to seven with an associated increase in the number of maximum daily departures to nine; and
- Incorporate increases to the approved Moolarben Coal Complex construction and operational workforces.

SLR Consulting Australia Pty Ltd (SLR) has been engaged by MCO to evaluate and assess the potential noise impacts associated with the Modification. In preparing this assessment SLR has considered several documents including the following:

- *Moolarben Coal Project Appendix 4 Noise and Vibration Impact Assessment* (MCP Stage 1 NIA) (Spectrum Acoustics, August 2006);
- *Moolarben Coal Project Stage 1 Optimisation Modification Appendix C Noise and Vibration Impact Assessment* (MCP Stage 1 Mod 9 NIA) (EMM, May 2013);
- *Moolarben Coal Project Stage 2 Preferred Project Report Appendix D Environmental Noise Assessment* (MCP Stage 2 PPR NIA) (Global Acoustics, January 2012);
- *Moolarben Coal Complex OC4 South-West Modification Noise Impact Assessment* (OC4 South-West Modification NIA) (SLR, February 2015);
- *Noise Management Plan* (NMP) (MCO, 2013);
- *Annual Environmental Management Report 2012-2013* (AEMR 2013) (MCO, 2013);
- *Monthly Environmental Noise Monitoring Reports September 2013 to September 2014* (MENMRs) (MCO, 2013/2014); and
- *Quarterly Environmental Noise Assessment Reports March 2013 to August 2014* (QENARs) (Advitech Environmental, 2013/2014).

1.2 Assessment Requirements

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

Table 1 Noise Impact Assessment Procedure Guidelines

Assessment Guideline	Criteria	Impact
Modification Maximum, Intrusive and Amenity Noise Guided by the requirements of the NSW <i>Industrial Noise Policy</i> (INP) (EPA ¹ , 2000) and associated Application Notes dated 12 June 2013 in relation to setting acceptable project specific noise levels (PSNLs) and assessing any impacts.	Section 5	Section 7, Section 8
Cumulative Amenity Noise Guided by the requirements of the INP in relation to existing and successive industrial development by setting acceptable (and maximum) cumulative equivalent continuous noise level (LAeq [period]) amenity levels for all industrial (ie non-transport related) noise in a receiver area.	Section 5	Section 9
Off-site Road Transport Noise Guided by the requirements of the RNP and associated Application Notes dated 15 February 2013 in relation to setting acceptable LAeq(period) noise levels for sub-arterial roads and assessing any impacts.	Section 10	Section 10
Off-site Rail Transport Noise Guided by the requirements of the Rail Infrastructure Noise Guideline (RING) Appendix 2 (EPA, May 2013) in relation to land-use developments (other than rail projects) likely to generate additional rail traffic on an existing rail network.	Section 11	Section 11

Note 1: EPA - Environment Protection Authority.

Other approved or proposed projects in the vicinity of Moolarben Coal Complex are presented in **Table 2**. The Wilpinjong Coal Project and Ulan Continued Operations Project are considered cumulatively for operational noise (**Section 9**) in this assessment.

Table 2 Other Approved or Proposed Projects

Proponent	Project	Status
Wilpinjong Coal Pty Ltd (WCPL)	Wilpinjong Coal Project (Modification 6)	Project Approval (MP 05_0021) dated 1 February 2006 (as modified), which was last modified on the 21 November 2014 (Modification 6). The Wilpinjong Coal Project is approved to operate up to a maximum coal export capacity (from the site) of 12.5 million tonnes per annum (Mtpa).
Ulan Coal Mines Ltd (UCML)	Ulan (Mine Complex) Continued Operations Project (Modification 2)	Project Approval (MP 08_0184) dated 15 November 2010 (as modified), which was last modified in May 2012 (Modification 2). The Ulan Mine Complex is approved to operate up to a maximum coal export capacity (from the site) of 20 Mtpa.
	Ulan West Modification (Modification 3) ¹	The Ulan West Modification (Modification 3) was lodged with the NSW Minister for Planning on 20 March 2015. Yet to be determined.

Note 1 Refer **Section 9**.

2 EXISTING MOOLARBEN COAL COMPLEX

2.1 Overview

Since commencement of coal mining operations in 2010, mining activities have only occurred within OC1 and OC2 (**Appendix B2**). Subject to all necessary approvals being in place, longwall panel extraction within UG1 is currently planned to commence in approximately 2017. The Moolarben Coal Project Stage 2 Preferred Project Report (MCP Stage 2 PPR) (MCO, 2012) described a maximum (total site) product coal rate of up to 13 Mtpa.

ROM coal from the open cut operations is transferred to the Stage 1 ROM coal facility or ROM stockpile by internal haul roads (**Appendix B2**). ROM coal from the underground operations will be transferred to the Stage 1 ROM coal facility or ROM stockpile by conveyor and internal haul roads.

Approved conveyors connecting the Stage 1 ROM coal facility to the OC4 pit are yet to be constructed (**Appendix B2**). Once constructed, these conveyors would allow transfer of OC4 ROM coal to the Stage 1 ROM coal facility and coal handling and preparation plant (CHPP) rejects from the CHPP to OC4.

Coal at the Stage 1 ROM coal facility is conveyed to the CHPP in the Stage 1 Infrastructure Area. Crushing and sizing facilities are included at the Stage 1 ROM coal facility and the CHPP (**Appendix B2**). The Moolarben Coal Complex is approved to process up to 13 Mtpa of ROM coal.

Product coal is loaded onto trains for export to the Port of Newcastle up to 24 hours per day, seven days per week.

2.2 Land Ownership

The Land Ownership Plan (**Appendix C1**) identifies the nearest receivers together with the Land Ownership Details (**Appendices C2 and C3**) including a list of property ID numbers, landowners and dwelling co-ordinates.

2.3 Approvals

The Moolarben Coal Project Stage 1 was assessed in the *Moolarben Coal Project Environmental Assessment Report* (MCO, 2006) (MCP Stage 1 EA) and was approved on 6 September 2007. The MCP Stage 1 Project Approval (05_0117) was modified on the 16 June 2014 (Modification 9), which was titled the Moolarben Coal Project Stage 1 Optimisation Modification, comprising minor extensions to the approved open cuts including OC1. The MCP Stage 1 Project Approval (05_0117) was last modified on 17 April 2015 (Modification 10).

A Major Project Application for the Moolarben Coal Project Stage 2 was lodged with the then Department of Planning and Infrastructure on 1 May 2008. Subsequently, MCO prepared the MCP Stage 2 PPR that was approved on 30 January 2015 (MCP Stage 2 Project Approval [08_0135]).

More recently, MCO prepared the *Moolarben Coal Complex OC4 South-West Modification* (OC4 South-West Modification) (MCO, 2014) that is currently being assessed by DP&E. The General Arrangement Plan for the approved Stages 1 and 2 of the Moolarben Coal Complex is presented as **Appendix B2**.

With respect to noise emissions, MCO operate in accordance with the following project approval and licence conditions:

- MCP Stage 1 Project Approval (05_0117) dated 6 September 2007 (as modified) with the relevant sections attached as **Appendix A1**.
- MCP Stage 2 Project Approval (08_0135) dated 30 January 2015 with the relevant sections attached as **Appendix A2**.
- EPA Environment Protection Licence (EPL) No 12932 anniversary date 18 August.

It is noted that MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135) have identical noise conditions and include conditions relating to acquisition upon request, mitigation upon request and noise assessment criteria (ie 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 (LAeq(1hour)) and 45 dBA LAeq(period) respectively (generally consistent with the INP).

The landowners that can request additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) include receiver 30 (RB Cox). Receiver 63 (Whiticker) is subject to a private noise agreement with MCO.

2.4 Noise Management Strategy

MCO has adopted an Environmental Management Strategy (EMS) which 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 the MCP Stage 1 Project Approval (05_0117) and provides the strategic framework for environmental management at the Moolarben Coal Complex. Accordingly, MCO has prepared and implemented the Noise Management Plan (NMP) and Environmental Monitoring Program (EMP) in accordance with the EMS.

The existing EMS is currently being updated to incorporate the Stage 2 Project Approval (08_0135).

2.4.1 Noise Management Plan

The approved NMP dated 29 October 2013 has been prepared to manage project specific, cumulative and traffic noise impacts associated with Stage 1 of the Moolarben Coal Complex. The NMP describes the current noise management regime, which consists of five off-site operator-attended monitoring sites, three off-site continuous real-time monitors and with two on-site Automatic Weather Stations (AWS) (**Appendix B1**). In accordance with the NMP, operator-attended noise monitoring is 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 non-compliances.

The existing NMP is currently being updated to incorporate the Stage 2 Project Approval (08_0135).

2.4.2 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 (refer **Section 2.3**).

Planning Controls - during underground mine planning, consideration is given to:

- Weather forecasting;
- Seasonal influences on noise impacts, including prevailing winds and temperature inversions;
- Sound power levels of mobile equipment during equipment procurement and scheduling;
- The location of fixed infrastructure;
- The location and design of mine site haul roads; and
- Noise monitoring results.

Underground Operational Controls - including the following:

- Use of shielded areas for any mobile fleet handling coal from the undergrounds during adverse (ie noise enhancing) weather conditions;
- Use of real-time noise monitoring that incorporates automatic noise alarms to assist operational personnel in proactive management of noise impacts;
- Use of operational personnel to monitor real time noise data to assist production supervisors in proactive management of noise impacts;
- Regular maintenance of equipment, including sound attenuation components;
- Conducting noise management training with relevant personnel to re-enforce the importance of noise mitigation; and
- Sound power testing of mobile and stationary equipment.

Engineering Controls - engineering controls are fitted to higher risk mobile and stationary equipment where noise levels are predicted, or demonstrated to exceed the relevant noise criteria and include:

- Enclosure of higher risk stationary equipment at the CHPP;
- Attenuation of mobile equipment such as the dozers working on the underground ROM coal stockpile; and
- Development of an equipment noise specification which details equipment Sound Power Levels (SWLs) to be met, which have been determined via noise modelling in previous noise impact assessments, subsequent commitments and associated approvals.

Continuous Improvement - implementation of feasible and reasonable mitigation 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, reported in the Annual Environmental Monitoring Report (AEMR)/Annual Review and considered from the results of Independent Environmental Audits.

Real-time Response Protocols - are implemented where reasonable and feasible, involving:

Noise control and management measures are implemented under the real-time noise conditions presented in **Table 3** with the responses shown in **Table 4**.

Table 3 Real-Time Response Trigger Levels

Time Period	Location	Green Low pass LAeq ¹	Amber Low pass LAeq ¹	Red Low pass LAeq ¹
Day (7am-6pm)	Lagoons Road	>34dBA for 24 consecutive 5 minute periods	>36dBA for 24 consecutive 5 minute periods	>38dBA for 12 consecutive 5 minute periods
	Winchester Crescent	>31dBA for 24 consecutive 5 minute periods	>33dBA for 24 consecutive 5 minute periods	>35dBA for 12 consecutive 5 minute periods
Evening (6pm-10pm)	Lagoons Road	>34dBA for 12 consecutive 5 minute periods	>36dBA for 6 consecutive 5 minute periods	>38dBA for 6 consecutive 5 minute periods
	Winchester Crescent	>31dBA for 12 consecutive 5 minute periods	>33dBA for 6 consecutive 5 minute periods	>35dBA for 6 consecutive 5 minute periods
Night (10pm-7am)	Lagoons Road	>33dBA for 12 consecutive 5 minute periods	>35dBA for 6 consecutive 5 minute periods	>37dBA for 6 consecutive 5 minute periods
	Winchester Crescent	>31dBA for 12 consecutive 5 minute periods	>33dBA for 6 consecutive 5 minute periods	>35dBA for 6 consecutive 5 minute periods

Source: Table 8 Noise Management Plan (NMP) (MCO, 2013)

Note 1: 630 hertz (Hz) Low pass filter frequency applied.

The real-time response measures evolve over time as a result of greater understanding of the weather patterns and mine operating conditions. The real-time response measures are based on algorithms which are written within the real-time noise software to post-process noise and meteorological data. The algorithms have been based upon noise modelling conducted for the MCP Stage 1 EA and actual noise and meteorological results recorded since commencement of operations in 2010.

The Moolarben Coal Complex Production and the Environment and Community departments are automatically notified when these triggers have been met through SMS alarming. The response trigger levels adequacies are reviewed on an annual basis with any changes reported in the AEMR/Annual Review.

Table 4 Real-Time Response Management Actions

Colour	Management/Control Action
Green	<ul style="list-style-type: none"> • Confirm prevailing weather conditions are acceptable as per approval requirements. • Review the audio to determine noise source and record observations. • If MCO noise is audible: <ul style="list-style-type: none"> - review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift - rerun the model if forecast has changed - review predicted noise impacts for the shift against actual observations - rerun the model if predictions have changed. • Monitor changes in noise levels. • Record management strategies, including details of investigation, type of response (if any required), real-time monitoring results and actions taken.
Amber	<ul style="list-style-type: none"> • Confirm prevailing weather conditions are acceptable as per approval requirements. • Drive to alarm location to determine noise source and record observations. • If MCO noise is audible: <ul style="list-style-type: none"> - alert the Open Cut Examiner (OCE) of the noise observations - review noise generating activities and make preparations for moving into a protected area or shutting down equipment if noise levels remain elevated - review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift - rerun the model if forecast has changed - review predicted noise impacts for the shift against actual observations - rerun the model if predictions have changed. • Monitor changes in noise levels. • Record management strategies, including details of investigation, type of response (if any required), real-time monitoring results and actions taken.
Red	<ul style="list-style-type: none"> • Confirm prevailing weather conditions are acceptable as per approval requirements. • Drive to alarm location to determine noise source and record observations. • If MCO noise is audible: <ul style="list-style-type: none"> - alert the OCE of the noise observations - commence moving equipment into protected areas or shutting down equipment. • Monitor changes in noise levels against operational changes: <ul style="list-style-type: none"> - review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift - rerun the model if forecast has changed - review predicted noise impacts for the shift against actual observations - rerun the model if predictions have changed. • Record management strategies, including details of investigation, type of response (if any required), real time monitoring results and actions taken.

Source: Table 9 Noise Management Plan (NMP) (MCO, 2013)

2.5 Noise Compliance

2.5.1 Noise Monitoring Program

A summary of recent noise monitoring locations and associated monitoring frequency are presented in **Table 5** together with a cross reference to the Noise Monitoring Location Plan (**Appendix B1**).

Table 5 Recent Noise Monitoring Programme Summary

Locality	Location ID ¹	Parameter	Frequency
Ulan	NA1 Ulan Public School	Operator-attended monitoring	Every month
Cooks Gap (North)	NA6 Lower Ridge Road ³		
Cooks Gap (South)	NA8 Southern Ridge Road		
Cooks Gap (Central)	NA9 Winchester Crescent		
Cooks Gap (South)	NA10 Moolarben Road ²	Real-time monitoring	Continuous
Cooks Gap (North)	NR5 Upper Northern Ridge Road ³		
Cooks Gap (North)	NR3 Lagoons Road ⁴		
Cooks Gap (Central)	NR4 Winchester Crescent		

Note 1: ID = Identification, refer **Appendix B1**. NA = Attended noise monitoring site. NR = Real-time noise monitoring site.

Note 2: Attended monitoring site to be established prior to commencement of mining in OC3.

Note 3: Real-time monitoring site moved from NR1 Ulan Public School to NR5 Upper Northern Ridge Road in Q4 2014.

Note 4: NR3 and NA6 MCO owned land.

2.5.2 Operator-attended Noise Compliance Results

A review of the AEMR 2013 and MENMRs between September 2013 and September 2014 presents monthly operator-attended noise monitoring at four locations during the period of November 2012 to September 2014, including NA1 Ulan Public School, NA6 Lower Ridge Road (MCO owned Receiver 64, Cooks Gap north), NA8 Southern Ridge Road (Receiver 268, Cooks Gap south) and NA9 Winchester Crescent (Receiver 83, Cooks Gap central).

Largely due to the implementation of the proactive noise control and management measures described in **Section 2.4.2**, MCO has maintained a strong record of recent compliance with the approved noise criteria, with no exceedances at privately owned receivers recorded during the November 2012 to September 2014 reporting period.

2.5.3 Continuous Noise Monitoring Results

The real-time noise monitoring system and response protocols form an integral part of the noise management of Moolarben Coal Complex operations. All data recorded by the real-time noise monitoring system is compiled into QENARs. The QENARs present an analysis of the long term continuous noise monitoring data to assist MCO with evaluation of the performance of mine noise management practices.

A review of the QENARs from March 2013 to August 2014 presents the real-time noise monitoring results recorded at 3 locations, including NR1 Ulan Public School, NR3 Lagoons Road (MCO owned Receiver 6, Cooks Gap north,) and NR4 Winchester Crescent (Receiver 234C, Cooks Gap central).

The LAeq descriptor is influenced by extraneous noise sources including livestock, traffic, early morning bird activity and insects, and often represents an over-estimate of the contribution from mining operations. Accordingly, the QENARs include the results of the 630 hertz (Hz) low pass filter frequency (ie LAeqLF(15min)), which aim to represent the intrusive mine noise level as accurately as possible.

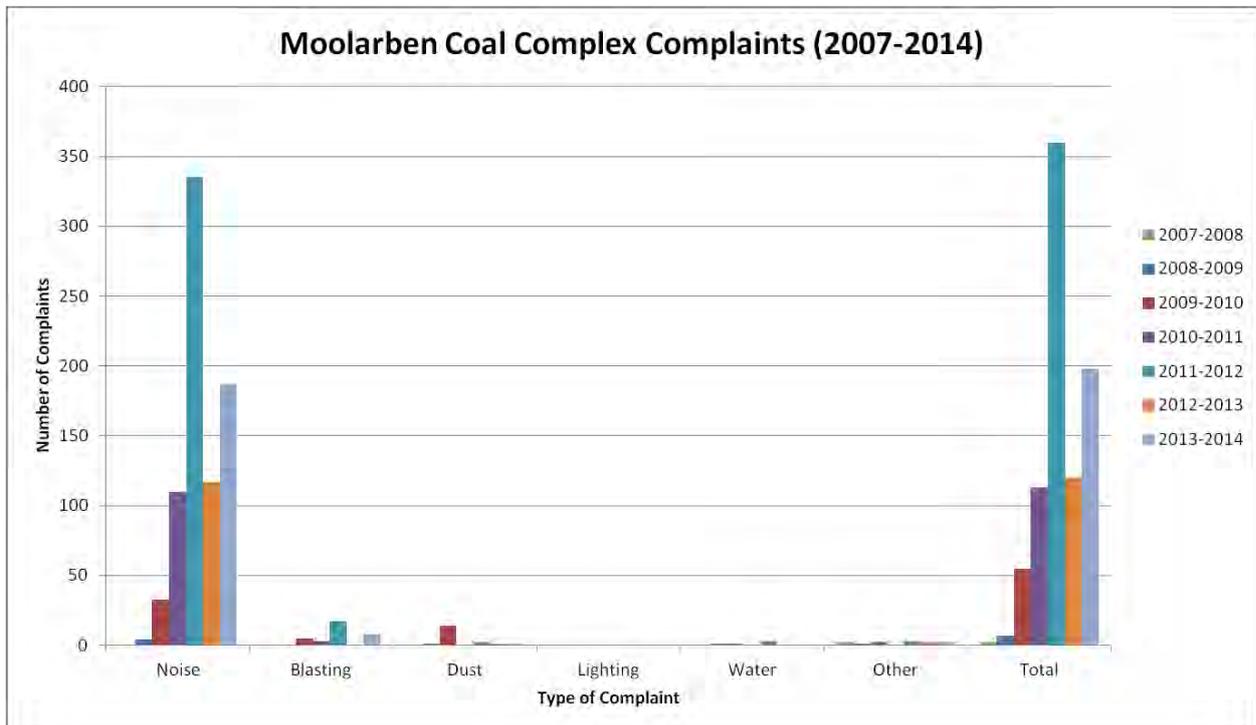
It is noted that in each instance that the Real-Time Response Trigger Levels were exceeded, the Real-time Response Protocols identified in **Section 2.4.2** were implemented, indicating the effectiveness of the Real-time Response Protocol.

2.6 Noise Complaints Summary

MCO maintains a complaints register in accordance with approval requirements. A summary of the complaint records from 2007 to 31 August 2014 are presented in **Figure 1**, including operating noise complaints. **Figure 1** shows the number of noise related complaints has diminished from the peak recorded in 2011/2012. The reduction in noise-related complaints coincides with the continued implementation of MCO's proactive noise control and management measures described in **Section 2.4.2** including the introduction of the Dura-Tray haul trucks, ongoing 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.

All complaints received by MCO relating to noise were responded to in accordance with the Community Complaints Procedure detailed in the NMP. 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 (ie reportable non-compliances) relating to noise in the 2014 reporting period.

Figure 1 Complaints Register Summary 2007 to 2014



Source: MCO, 2014

3 PROPOSED MODIFICATION

3.1 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 6**.

Table 6 Approved Moolarben Coal Complex and Modification Hours of Operation

Operation	Description	Currently Approved ¹	Modification
On-Site	Civil construction works	Generally daytime (0700 hours to 1800 hours, 7 days per week)	Unchanged
	Mine maintenance, operation, coal handling	24 hours 7 days per week	Unchanged
Off-Site	Train Traffic	24 hours, 7 days per week	Unchanged
	Road Traffic	24 hours, 7 days per week	Unchanged

Note 1: As per MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135).

3.2 On-site Construction Works

The proposed General Arrangement Plan incorporating the Modification (**Appendix B3**) shows the proposed Surface Infrastructure Areas including:

- Relocation and expansion of the underground ROM coal stockpile in OC1;
- Construction of a ROM coal conveyor and sizing station between the UG1 pit top facilities and the CHPP to transport underground ROM coal;
- Extension to the underground product coal stockpile in the CHPP area;
- Construction of remote services facilities and rear air intake shaft (and associated fan) above the extended UG1 longwall panels; and
- Relocation of an underground Mine Infrastructure Area within OC1.

It is anticipated that construction works for the UG1 facilities would be carried-out in 2016 and 2017, and would generally be restricted to daylight hours (ie 0700 hrs to 1800 hrs) up to seven days a week.

It is expected that the construction of the infrastructure listed above may involve the use of on-site mining fleet (eg excavators, trucks, dozers and drills) as well as cranes and other minor auxiliary fleet.

3.3 On-site Operation

MCO has reviewed the mining sequence and associated infrastructure layout requirements at the Moolarben Coal Complex to enable more efficient access to the underground coal resource. As a consequence, the approved Stage 2 Preferred Project UG1 layout would be optimised to include additional coal handling infrastructure (including stockpiles, conveying and sizing station) as described above.

Key elements of the Modification are summarised below:

- Recovery of approximately 3.7 Mt of additional ROM coal over the life of the mine;
- An extension of UG1 longwall panels in the north-east by approximately 150 to 500 metres (m);
- An extension of two UG1 longwall panels in the south-west by approximately 75 m;
- Relocation of the approved UG1 central main headings to the north-east;
- Relocation of underground access to UG2 and UG4;

- Longwall extraction of the portion of coal that forms the approved (central) main headings;
- An increase in the coal seam extraction height by approximately 300 millimetres (mm) to a maximum extraction thickness of 3.5 m;
- Construction of a ROM coal conveyor and associated transfer points between the UG1 pit top facilities in OC1 and the CHPP to transport underground ROM coal;
- Extension to the underground product coal stockpile in the CHPP area and relocation and expansion of the underground ROM coal stockpile at the UG1 pit top facilities;
- An increase to longwall panel void width from approximately 305 to 311 m centres;
- An increase in the maximum underground ROM coal production rate up to 8 Mtpa from UG1, UG2 and UG4 (combined);
- An increase in the maximum total site ROM coal rate to 21 Mtpa (ie 13 Mtpa from open cut operations and 8 Mtpa from underground operations);
- An increase in average daily rail departures from five to seven;
- Construction of Remote Services Facilities and rear air intake shaft and associated fans above the extended UG1 longwall panels; and
- Relocation of the underground Mine Infrastructure Area and site administration offices.

With respect to potential on-site noise impacts, the main components of the Modification that have been considered in this noise assessment are the coal conveyor system, additional dozers on the underground ROM stockpile and the fans above the rear air intake shaft and remote services facilities.

3.4 On-site Blasting

There would be no change in the approved Moolarben Coal Complex blasting regime due to the Modification and, therefore, blasting is not further considered in this report.

3.5 Off-site Road Transport

The existing Moolarben Coal Complex operational workforce comprises approximately 244 MCO employees and full-time equivalent on-site contractors. At full development, the Moolarben Coal Complex has an approved maximum workforce of approximately 439 people. Stage 2 has an approved construction workforce of 220 people.

As discussed in the **Section 3.2**, it is anticipated that construction works would be carried-out in 2016 and 2017, and would involve a daily (peak) construction work force (for open cut and underground construction activities) of 250 workers per day. The additional construction personnel would result in additional light vehicle movements on the local road network in 2016 and 2017 and a temporary increase of heavy vehicles for the delivery of construction materials. It is anticipated that the Moolarben Coal Complex operation in 2017 would involve a daily (peak) operational work force of 740 workers per day. The additional operational personnel would result in additional light vehicle movements on the local road network and an associated increase of heavy vehicles for the delivery of mine consumables.

For the purposes of assessing any potential road traffic noise impacts associated with the Moolarben Coal Complex incorporating the Modification, the total construction and operational traffic has been conservatively assessed by assuming a coincident peak in 2017 (ie up to 990 workers per day).

3.6 Off-site Rail Transport

The MCP Stage 2 PPR described a a maximum (total site) product coal rate of up to 13 Mtpa. The existing capacity of the product coal stockpiles is approximately 600,000 t. Product coal is reclaimed to the existing rail loading conveyor and bin adjacent to the rail loop. The approved underground product coal stockpile in the CHPP area would be extended and an additional underground ROM coal stockpile in OC1 would be required for the Modification.

Product coal is transported to the Port of Newcastle via the Gulgong to Sandy Hollow railway line before connecting to the Main North Line at Muswellbrook (**Appendix G1**). All train movements along the Hunter Valley Rail Network in NSW are co-ordinated with the Australian Rail Track Corporation Ltd (ARTC).

An average of ten product coal train movements per day is currently approved at the Moolarben Coal Complex. The proposed Modification would increase the average of ten product coal train movements¹ per day to fourteen per day (with a peak of eighteen movements per day).

4 EXISTING METEOROLOGICAL AND NOISE ENVIRONMENT

4.1 Meteorological Environment

As discussed in **Section 2.4.1**, MCO maintains two on-site AWSs as shown in **Appendix B1** and a mobile AWS. An assessment of prevailing wind conditions was derived from the EPA approved AWS located at WS3. The dominant seasonal wind speeds and directions recorded for the 42 month period from January 2011 to June 2014 are presented in **Appendix D** for daytime (0700 hours to 1800 hours), evening (1800 hours to 2200 hours) and night-time (2200 hours to 0700 hours) in accordance with a methodology consistent with the requirements of the INP.

An assessment of winter temperature gradients and atmospheric stability has been derived from the on-site Temperature Tower located at Wilpinjong Coal Mine. Presented in **Appendix D** is the winter Temperature Gradient Exceedance Levels summary, winter Temperature Gradient Exceedance Levels 24 hour profile and winter Temperature Gradient Cumulative Frequency Distribution for the 34 month period (August 2011 to July 2014) in accordance with a methodology consistent with the requirements of the INP Appendix E (E2).

4.1.1 Prevailing Winds

Section 5.3 of the INP, Wind Effects, states:

“Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season.”

The prevailing winds less than (or equal to) 3 metres per second (m/s) with a frequency of occurrence greater than (or equal to) 30% are presented in **Table 7** and considered to be relevant to the Moolarben Coal Complex in accordance with the INP.

¹ A train that has entered and departed the site is two train movements.

Table 7 Prevailing Seasonal 10 m Wind Velocities In Accordance with the INP

Season	Winds ± 45 degrees ≤ 3 m/s with Frequency of Occurrence $\geq 30\%$		
	Daytime	Evening	Night-Time
Annual	Nil	SW (33%), WSW (30.8%)	Nil
Summer	Nil	ENE (30.6%)	ENE (37.1%), E (36.3%)
Autumn	Nil	SSW (31.6%), SW (34.7%), WSW (30.3%)	Nil
Winter	WSW (30.8%), W (30%)	SSW (32.3%), SW (40.5%), WSW (40.4%), W (30.5%)	SW (32.7%), WSW (33.1%)
Spring	Nil	SSW (37.3%), SW (44.4%), WSW (42.1%)	SSW (36.1%), SW (37.5%), WSW (30.6%)

4.1.2 Temperature Inversions

Section 5.2 of the INP, Temperature Inversions, states:

“Assessment of impacts is confined to the night noise assessment period (10.00 pm to 7.00 am), as this is the time likely to have the greatest impact - that is, when temperature inversions usually occur and disturbance to sleep is possible.”

“Where inversion conditions are predicted for at least 30% (or approximately two nights per week) of total night-time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment”.

The seasonal combined evening/night-time temperature gradients and atmospheric stability are presented in **Table 8** and considered to be relevant to Moolarben Coal Complex in accordance with the INP.

Table 8 Prevailing Seasonal Temperature Gradients in Accordance with the INP

Stability Class	Frequency of Occurrence - Evening/Night-time					Temperature Gradient $^{\circ}\text{C}/100 \text{ m}^1$	Qualitative Description
	Annual	Summer	Autumn	Winter	Spring		
A	0.3%	0.7%	0.0%	0.0%	0.3%	<-1.9	Lapse
B	0.5%	1.3%	0.1%	0.0%	0.5%	-1.9 to -1.7	Lapse
C	0.9%	2.3%	0.2%	0.0%	0.9%	-1.7 to -1.5	Lapse
D	34.6%	58.1%	26.9%	17.4%	33.2%	-1.5 to -0.5	Neutral
E	25.0%	24.7%	28.6%	22.6%	23.5%	-0.5 to 1.5	Weak inversion
F	25.1%	9.5%	31.0%	39.1%	22.8%	1.5 to 4	Moderate inversion
G	13.7%	3.4%	13.1%	20.9%	18.7%	>4.0	Strong inversion
F+G	38.8%	12.9%	44.1%	59.9%	41.6%	>1.5	Moderate to Strong

Note 1: $^{\circ}\text{C}/100 \text{ m}$ = Degrees Celsius per 100 metres.

In accordance with **Table 8**, the combined frequency of occurrence of moderate to strong (ie $>1.5^{\circ}\text{C}/100 \text{ m}$) winter temperature inversions is greater than 30% (actually 59.9%) during the combined evening/night-time period and therefore requires assessment, in accordance with the INP. The assessment of winter temperature gradients and atmospheric stability derived from the Wilpinjong Coal Mine Temperature Tower data has provided additional data regarding the characterisation of temperature gradients that occur in the area.

Based on analysis of available data (**Appendix D**), it was determined that noise impacts coinciding with temperature gradients up to $5.2^{\circ}\text{C}/100 \text{ m}$ were assessable, in accordance with the INP, as these temperature inversions (less than and up to $5.2^{\circ}\text{C}/100 \text{ m}$) occur for up to 90% of the time during the evening/night periods during winter.

In addition, the INP Section 5.2 *Temperature Inversions* also states:

“The drainage-flow wind default value should generally be applied where a development is at a higher altitude than a residential receiver, with no intervening higher ground (for example, hills). In these cases, both the specified wind and temperature inversion default values should be used in the noise assessment for receivers at the lower altitude.”

Some of the Cooks Gap privately owned receivers are positioned at lower elevation relative to the Moolarben Coal Complex with minimal intervening topography between the site and the nearest receivers. A site specific 1.0 m/s east-northeast drainage flow has been adopted in this assessment (which is generally consistent with the MCP Stage 1 Mod 9 NIA).

4.1.3 Noise Model Meteorological Parameters

The Environmental Noise Model (ENM) noise modelling meteorological parameters are presented in **Table 9** based on foregoing analysis of the Moolarben Coal Complex AWS meteorological data set together with the Wilpinjong Coal Mine winter temperature gradients.

Table 9 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

4.2 Noise Environment

Although the Moolarben Coal Complex has approved noise limits for privately owned receivers in its Stages 1 and 2 Project Approvals, the INP procedures and Application Notes (12 June 2013) require noise impact assessments to review the pre-mining background noise data to determine the relevant Rating Background Levels (RBLs) and noise amenity levels (LAeq(period)). Background noise monitoring results to characterise and quantify the pre-mine noise environment in the area surrounding Moolarben Coal Complex were conducted in July 2005 for the *Noise and Vibration Impact Assessment Proposed Moolarben Coal Mine Ulan, NSW* (Spectrum Acoustics, 2006).

The measurement methodology and analysis procedures are described in the MCP Stage 1 NIA. The relevant estimated RBLs and noise amenity levels (LAeq(period)) are presented in **Table 10**, which form the basis of establishing the Project-specific noise assessment criteria (**Section 5.2**).

Table 10 Background Noise and Amenity Levels for Assessment Purposes

Locality	Estimated RBL ^{1,2} All Noise Sources			Estimated LAeq(period) ^{1,2} Industrial Noise Only		
	Daytime	Evening	Night-time	Daytime	Evening	Night-time
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.

4.3 Road Traffic Noise

A road traffic noise survey was conducted in December 2012 to quantify the near-field road traffic noise adjacent to Ulan Road. The measurement methodology and analysis procedures are described in SLR Report 610.10806.00200-R1 Wilpinjong Coal Mine Modification Noise and Blasting Impact Assessment Dated 5 July 2013. The unattended noise logger data and the on-site weather conditions were analysed on a daily basis and graphically as statistical 24 hour ambient noise profiles in Appendix F6 of the report. The data was then processed in accordance with the requirements of the RNP to derive the road traffic noise levels presented in **Table 11** and further assessed in **Section 10**.

Table 11 Unattended Road Traffic Noise Monitoring Results - December 2012 (dBA re 20 µPa)

Location	Position ¹	Leq(15hour)	Leq(9hour)
Corner of Ulan and Lagoons Roads	50 m from centre of Ulan Road	52	50

Note 1: Free field offset distance.

5 NOISE ASSESSMENT CRITERIA

The Moolarben Coal Complex operates in accordance with the Project Approval noise limits (**Section 2.3** and **Appendices A1** and **A2**). The Project Approval noise limit for privately owned receivers is 35 dBA LAeq(15minute) during the daytime, evening and night-time with the exception of five receivers (30, 31, 63², 70, 75) as shown in **Appendices A1** and **A2**. Notwithstanding, in accordance with the INP Application Notes (12 June 2013), PSNLs and Sleep Disturbance Noise Levels (SDNLs) for the Moolarben Coal Complex incorporating the Modification determined in accordance with the INP are described below.

5.1 Construction Assessment Criteria

As discussed in **Section 3.2**, construction activities for the proposed Surface Infrastructure Areas are anticipated to be carried-out in 2016 and would generally be restricted to daylight hours (ie 0700 hrs to 1800 hrs) up to seven days a week. The EPAs *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) suggests that mining related on-site construction noise be assessed in accordance with the INP. The predicted 2016 daytime intrusive construction noise levels have therefore been assessed cumulatively with the anticipated 2016 daytime intrusive mine operating noise levels as determined for the OC4 South-West Modification NIA (and presented in **Section 7.1**).

5.2 Intrusive and Amenity Noise Assessment Criteria

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 INP, 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 INP prescribes detailed calculation routines for establishing PSNLs (ie LAeq[15minute] intrusive criteria and LAeq[period] amenity criteria) at potentially affected receivers for an industrial development. Ideally, the intrusive noise level should not exceed the background level by more than 5 dBA. Similarly, the noise amenity level should not exceed the specified INP “acceptable” or “maximum” noise level appropriate for the particular land use. The applicable acceptable and maximum noise amenity levels for receivers in the vicinity of the Moolarben Coal Complex are shown in **Table 12**.

² Receiver 63 is subject to a private agreement with MCO and therefore the Project Approval noise criteria do not apply to this property.

Table 12 INP Acceptable and Maximum Noise Amenity Levels (dBA re 20 µPa)

Locality	INP Noise Amenity Zone	Amenity LAeq(period) ¹ Acceptable			Amenity LAeq(period) ¹ Maximum		
		Day	Evening	Night	Day	Evening	Night
Privately Owned Land	Rural Residential	50	45	40	55	50	45
Any	School ²	External 45 when in use			External 50 when in use		
Any	Church ²	External 50 when in use			External 55 when in use		
Any	Passive Recreation	External 50 when in use			External 55 when in use		
Any	Commercial	External 65 when in use			External 70 when in use		

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 2: External criteria equivalent to internal criteria plus 10 dBA.

In addition, the DP&E has released the Voluntary Land Acquisition and Mitigation Policy (VLA&MP) (DP&E, 2014) which formalises existing NSW Government practice in relation to land acquisition and mitigation associated with State Significant (mining, petroleum and extractive) Developments.

With regard to vacant land the VLA&MP indicates that the consent authority should only grant voluntary land acquisition rights where the noise generated by the development would contribute exceedances of the recommended maximum noise levels in Table 2.1 of the INP on more than 25% of any privately owned land, and a dwelling could be built on that land under existing planning controls. Based on the draft policy guidance, the residential rural night-time maximum recommended (LAeq(9hour)) noise amenity level would be 45 dBA.

In accordance with the INP's Chapter 2 Industrial Noise Criteria and relevant Application Notes, the PSNLs for the residential and other localities in the vicinity of the Moolarben Coal Complex are presented **Table 13** for both intrusive noise and amenity. These criteria are nominated for the purposes of assessing potential noise impacts from the Moolarben Coal Complex incorporating the Modification.

Table 13 Project-specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive LAeq(15minute) ¹			Amenity LAeq(period) ¹		
		Day	Evening	Night	Day	Evening	Night
Privately Owned Land	Rural Residential ²	35	35	35	50	45	40
Any	School ³	Intrusive noise criteria not applicable			External 45 when in use (daytime/evening only)		
Any	Church ³	Intrusive noise criteria not applicable			External 50 when in use (daytime/evening only)		
Any	Passive Recreation	Intrusive noise criteria not applicable			External 50 when in use		
Any	Commercial	Intrusive noise criteria not applicable			External 65 when in use		

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 2: At the most-affected point within 30 m of the residential area.

Note 3: External criteria equivalent to internal criteria plus 10 dBA.

The intrusiveness criterion is met if the LAeq(15minute) is less than or equal to the RBL plus 5 dBA, where the RBL is described in **Section 4.2**. Thus, the most stringent PSNLs for Moolarben Coal Complex incorporating the Modification at rural residential receivers (and vacant land) would be the intrusiveness criterion (ie 35 dBA LAeq(15minute)) for daytime, evening and night-time periods.

The Privately Owned Land amenity criteria nominated in **Table 13** are reflective of the general rural area generally consistent with Local Environmental Plan zoning. Cumulative noise impacts from the Moolarben Coal Complex incorporating the Modification are assessed against the amenity LAeq(period) acceptable noise levels specified in **Table 12** being the total noise level from all industrial sources.

The INP states that the PSNLs are based on preserving the amenity of at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the PSNLs can be described as follows:

- Negligible noise level increase <1 dBA - not noticeable by all people.
- Marginal noise level increase 1 dBA to 2 dBA - not noticeable by most people.
- Moderate noise level increase 3 dBA to 5 dBA - not noticeable by some people but may be noticeable by others.
- Appreciable noise level increase >5 dBA - noticeable by most people.

5.3 Low Frequency Noise Modifying Adjustment Factors

In accordance with the INP's Chapter 4 Modifying factor adjustments, where a noise source contains certain characteristics, such as a dominant low frequency content, the INP states that there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. The modifying factors (if applicable) are to be applied to the measured or predicted noise level at the receiver and then assessed against the PSNLs. In the case of low frequency (20 Hz to 250 Hz) noise, the INP requires a 5 decibel (dB) correction to be applied to the measured or predicted noise levels where the difference between the A and C weighted level is 15 dB (or more) at the receiver.

Noise measurements of the existing Moolarben Coal Complex noise emissions (coinciding with temperature inversions) were conducted by SLR for a duration of one week in August 2014 using a full spectrum noise monitor (ie capacity to measure low frequency noise) located at the receiver 175 (MCO) being generally representative of the nearest Cooks Gap receivers to the Moolarben Coal Complex.

The noise data were then analysed in accordance with the INP requirements to estimate the $L_{eq(15\text{minute})}$ A and C weighted noise levels of the Moolarben Coal Complex operations and this coincided with strong temperature inversions (average approximately 5.6°C/100 m) between 0000 hours to 0500 hours. The measurement results at the receiver 175 (MCO) show a mean difference of 13.3 dB between the estimated (mine-contributed) intrusive $L_{Aeq(15\text{minute})}$ and the $L_{Ceq(15\text{minute})}$ noise levels (ie below the INP's low frequency modifying threshold of 15 dB).

On review of this data and operator-attended noise monitoring results presented in the MENMRs, it is concluded that Moolarben Coal Complex noise emissions do not contain "dominant low frequency content" in accordance with the INP's assessment procedures.

In addition, recent research presented in the technical paper entitled *A Simple Outdoor Criterion for Assessment of Low Frequency Noise Emission* (Broner, 2011) indicates that a greater difference may be permissible at low A weighted noise levels, as the difference between A and C weighted noise levels for low background noise levels may exceed 20 dB to 25 dB without causing complaints. Furthermore, the INP's low frequency assessment approach does not involve an absolute noise level criterion and may not provide an appropriate assessment of annoyance. Based on a comprehensive review of many case histories and literature, the technical paper recommends criteria for the assessment of low frequency noise as presented in **Table 14**.

Table 14 Criteria for Assessment of Low Frequency Noise (dBC re 20 µPa)

Sensitive Receiver	Period	Range	Criteria L_{eq}
Residential	Night-time or Plant Operation 24/7	Desirable	60
		Maximum	65
	Daytime or Intermittent	Desirable	65

	(1-2 hours)	Maximum	70
Commercial/Office/ Industrial	Night-time or Plant Operation 24/7	Desirable	70
		Maximum	75
	Daytime or Intermittent (1-2 hours)	Desirable	75
		Maximum	80

Source: Broner, 2011

5.4 Sleep Disturbance Assessment Criteria

The INP Application Notes dated 12 June 2013 recognise that the current LA_{1(1minute)} sleep disturbance criterion of 15 dBA above the prevailing LA_{90(15minute)} level is not ideal. The assessment of potential sleep disturbance is complex and not fully understood; however the EPA believes that there is insufficient information to determine a suitable alternative criterion.

Appendix B (Technical Background to Road Traffic Noise Criteria) of the *Environmental Criteria for Road Traffic Noise* (EPA, 1999) contains a comprehensive review of research into to sleep disturbance and traffic noise. The review has been more recently updated in the NSW Road Noise Policy (Department of Environment, Climate Change and Water [DECCW], 2011) (Section 5.3 Sleep Disturbance) however the EPA's conclusion remains unchanged as follows:

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

It is noteworthy that conditions of approval generally include external noise limits. The internal noise levels (presented above) can be conservatively transposed to an external noise level by adding 10 dBA (or 12.5 dBA when measured 1 m from the dwelling facade). It follows, that an external LA_{1(1minute)} noise criteria of 60 dBA would appear to be consistent with the current research in relation to this matter.

The EPA continues to review research on sleep disturbance as it becomes available and in the interim, the EPA suggests that the LA_{1(1minute)} level of 15 dBA above the RBL is a suitable screening criterion for sleep disturbance for the night-time period. This approach is generally consistent with the MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135).

The Modification night-time LA_{1(1minute)} SDNLs are presented in **Table 15** together with the comparable approved LA_{1(1minute)} noise limit.

Table 15 Night-time LA_{1(1minute)} Sleep Disturbance Assessment Criteria (dBA re 20 µPa)

Locality	Project Approval LA _{1(1minute)} Limit ¹	Proposed Modification LA _{1(1minute)} Criteria ¹
Privately Owned Land	45	45

Note 1: Monday to Saturday 2200 hours to 0700 hours; Sundays and Public Holidays 2200 hours to 0800 hours.

Night-time operations would involve a larger proportion of the mobile equipment being operated in repeatable routines and a relatively smaller proportion of continuous fixed plant. Noise emissions from the mobile equipment are typically variable, whereas fixed plant noise emissions are relatively continuous (or steady) levels. When mobile equipment and fixed plant operate simultaneously, some noise sources (including the operation of coal trains) have the potential to emerge audibly above the overall mine noise.

The monthly operator-attended noise monitoring results as presented in the MENMRs from monitoring locations NA6, NA8 and NA9 have been reviewed to determine the mean difference between the intrusive LAeq(15minute) and the corresponding LA1(1minute) noise levels. The results are summarised in **Table 16** including the mean (mine-contributed) intrusive LAeq(15minute) and the LA1(1minute) noise levels.

Table 16 Measured Night-time LAeq(15minute) and LA1(1minute) Noise Levels (dBA re 20 µPa)

Locality	Location ID ¹	Mean LAeq(15minute)	Mean LA1(1minute)	Mean Difference
Cooks Gap (North)	NA6 Lower Ridge Road ²	27 dBA	31 dBA	3.9 dBA
Cooks Gap (South)	NA8 Southern Ridge Road	23 dBA	25 dBA	2.0 dBA
Cooks Gap (Central)	NA9 Winchester Crescent	27 dBA	30 dBA	3.0 dBA
	Overall	26 dBA	29 dBA	3.0 dBA

Note 1: ID = Identification, refer **Appendix B1**.

Note 2: NA6 MCO owned land.

The measured results at locations NA6, NA8 and NA9 show a mean difference of approximately 3 dBA between the (mine-contributed) intrusive LAeq(15minute) and the LA1(1minute) noise levels and are therefore consistent with similar mining operations where the difference is typically <10 dBA. Hence, if the intrusive PSNLs (**Section 5.2**) (ie RBL plus 5 dBA) are achieved, then the SDNLs (ie RBL plus 15 dBA) would also be met. This relationship enables the noise assessment process to focus on the setting and assessment of INP-based intrusive noise and amenity levels which aim to minimise annoyance at noise sensitive receiver locations.

Notwithstanding the foregoing, the predicted LA1(1minute) night-time noise levels are presented in **Section 7.3** together with an assessment of potential sleep disturbance impacts from Moolarben Coal Complex incorporating the Modification.

5.5 Modification and Cumulative Noise Impact Assessment Methodology

5.5.1 Noise Impact Assessment Methodology

In view of the foregoing, **Table 17** presents the methodology for assessing the Modification operating noise levels against the intrusive and amenity PSNLs (**Table 13**) and the LA1(1minute) SDNLs (**Table 15**) together with cumulative amenity noise levels (**Table 12**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of Moolarben Coal Complex.

Table 17 Modification and Cumulative Noise Impact Assessment (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone ¹		Noise Affection Zone
			Marginal	Moderate	
Modification	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria ²
	PSNL Amenity	INP acceptable			
	SDNL LA1(1minute)	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria ³

Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).

Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.

Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

For the purposes of assessing any potential Modification noise impacts, the noise management and affectation zones are further defined as follows.

5.5.2 Noise Management Zone

Depending on the degree of predicted exceedance of the PSNL and or SDNL (1 to 5 dBA), potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase). In addition to the noise mitigation measures included in the predictive modelling (**Section 6.1**), noise management procedures would include:

- Noise monitoring on-site and within the community.
- Prompt response to any community issues of concern.
- Refinement of on-site noise mitigation measures and operating procedures where practicable.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are 3 to 5 dBA above the relevant criteria.

5.5.3 Noise Affectation Zone

Exposure to Moolarben Coal Complex incorporating the Modification noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners. These landowners are typically afforded rights for acquisition upon request in the relevant approval documentation. Management procedures for the Noise Affectation Zone would include:

- Discussions with relevant land owners to assess concerns and define responses.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are >5 dBA above the relevant criteria.
- Negotiated agreements with land owners where required.

6 NOISE MODELLING METHODOLOGY

6.1 Noise Control and Management Measures

6.1.1 Moolarben Coal Complex Existing Operations

MCO is obligated to manage noise levels from the Moolarben Coal Complex in accordance with the noise limits specified in MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 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 during the night.
- 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.

While underground mining is yet to commence, 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. These are discussed in the OC4 South-West Modification NIA.

Further detail regarding the Moolarben Coal Complex noise management strategy and MCO's recent compliance with the noise limits specified in MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135) is provided in **Section 2.3**. MCO would continue to meet its obligation to comply with the noise limits specified in MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135) through the continued implementation of the noise management strategy. This would include the continuation of real-time monitoring, and the stand-down of equipment, as required, as part of the response to an exceedance of the Real-Time Response Trigger Levels.

6.1.2 Moolarben Coal Complex Incorporating the Modification

Given the successful implementation of the noise management strategy for the existing operations, MCO has made allowances for noise attenuated mobile equipment and fixed plant associated with the Modification in order to comply with the Project Approval noise limits.

However, further investigation of reasonable and feasible noise mitigation measures for the proposed Modification was necessary and was conducted in consultation with MCO particularly in relation to evening and night-time operations. A number of iterative steps were undertaken to develop noise mitigation measures for the Modification, including:

- Extensive preliminary noise modelling scenarios representative of the predicted maximum Modification noise emissions to identify any potential noise exceedances.
- Ranking the highest noise contributors and progressively introducing noise mitigation measures to appreciably reduce noise associated with the Modification.
- Evaluating various combinations of noise control and management measures to assess their relative effectiveness.
- Agreement by MCO to adopt a range of noise control and management measures (including low noise equipment and operational controls) to appreciably reduce noise emissions associated with the proposed Modification.

Similar to the OC4 South-West Modification NIA, the additional noise control and management measures specifically adopted by MCO aimed to reduce noise levels at or below the Project Approval noise limits for the privately owned receivers at Cooks Gap, included the following measures:

- Procuring of extra-quiet (XQ) Komatsu D475 dozers; and
- Procuring of "low noise" fixed plant (ie conveyor drives and conveyor idlers).

Given the optimised mine plan for the Modification, it is considered that the measures presented above are reasonable and feasible.

6.2 Mobile Equipment and Fixed Plant Sound Power Levels

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 micro pascals (µPa). 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 (ie 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 have refined the SWLs for individual fleet items. Comparative mobile equipment, fixed plant and total SWLs are presented in **Table 18** as determined from the OC4 South-West Modification NIA and the proposed Modification. Based on the OC4 South-West Modification NIA the total SWL was approximately 135.2 dBA and for the proposed Modification, the total SWL is approximately 135.3 dBA. As shown in **Table 18**, due to the additional mobile equipment and fixed plant the proposed Modification total SWL is approximately 0.1 dBA higher by comparison to the Moolarben Coal Complex as proposed in the OC4 South-West Modification.

Table 18 Comparative Fixed Plant and Mobile Equipment Fleets SWLs (dBA re 1 pW)

Equipment	Type/ Capacity	OC4 South-West Modification NIA ^{1,2}			Proposed Modification ³		
		No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL
Drill	Atlas Copco DML60	2	117	120	2	117	120
	Pit Viper 275	2	115	118	2	115	118
Excavator	Liebherr 996	2	117	120	2	117	120
	Liebherr 996B	1	111	111	1	111	111
	Liebherr 9800	1	114	114	1	114	114
	CAT 6050	2	118	121	2	118	121
Front-end Loader	Komatsu WA1200	2	121	124	2	121	124
	Komatsu WD900	1	120	120	1	120	120
	CAT 854	1	114	114	1	114	114
Truck	Komatsu 830E	29	115	130	29	115	130
	Komatsu 730E/CAT 789	9	114	124	9	114	124
Dozer	Komatsu D475	7	113	121	7	113	121
	Komatsu D375	3	113	118	3	113	118
	CAT D11T	8	116	125	8	116	125
	CAT D10T	4	114	120	4	114	120
Water Truck	Komatsu HD785	4	115	121	4	115	121
Grader	Komatsu GD825	2	110	113	2	110	113
	CAT 24M	2	110	113	2	110	113
	CAT 16M	2	108	111	2	108	111
Support Loader	Komatsu WA580-6	1	115	115	1	115	115
Support Excavator	Komatsu PC450	2	105	108	2	105	108
Support Scraper	CAT 657G	1	117	117	1	117	117
Service Truck	Komatsu HD785	1	115	115	1	115	115
Service Truck	CAT 773F	1	114	114	1	114	114
Mobile Equipment				134.6			134.6
	CHPP	1	118	118	1	118	118
	Reject Bin	1	104	104	1	104	104
	Feeder	1	114	114	1	114	114
	Crusher	1	114	114	1	114	114
	Transfer Station	2	115	118	2	115	118
	Sizing Station	1	116	116	1	116	116
	Stacker	1	105	105	1	105	105
	Conveyor		101 (per 100m)	120		101 (per 100m)	120
	Conveyor Drive	11	98	108	11	98	108
	Ventilation Fans	2	112	115	2	112	115
	Loadout Bin	1	113	113	1	113	113
	Locomotive	3	109	114	3	109	114
Underground Plant				125.9			125.9
	Dozer		Komatsu D475	-	2	114	117
	Sizing Station	-	-	-	1	116	116
	Conveyor	-	-	-		101 (per 100m)	115
	Conveyor Drives	-	-	-	3	95/98/101	103

Equipment	Type/ Capacity	OC4 South-West Modification NIA ^{1,2}			Proposed Modification ³		
		No. Items	SWL per Item	Total SWL	No. Items	SWL per Item	Total SWL
Rear Air Intake	Shaft & Fan	-	-	-	1	112	112
Underground 1							121.5
Estimated Mine Site				135.2	135.3		

Note 1: Estimated mobile equipment SWLs based on demonstrated noise controls. Estimated fixed plant SWLs based on achievable low noise emission standards and NIA acoustic design requirements.

Note 2: As modelled in the OC4 South-West Modification NIA.

Note 3: 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.

The LA_{eq} SWLs given for each item of mobile equipment or fixed plant do not include noise emissions which emanate from alarms or communication “horns”. It is noted that MCO have installed broad-band “quacker” reversing alarms on all of the Moolarben Coal Complex mobile equipment fleet. Further, implementation of “silent horns” which uses radio to communicate between mobile plant is used on-site. External horns are used in emergency situations only.

6.3 Noise Model Validation

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 acoustical algorithms utilised by this software have been endorsed by the Australian and New Zealand Environment Council and all State Environmental Authorities throughout Australia as representing one of the most appropriate predictive methodologies currently available. The ENM algorithm has been used for all major noise assessments at the Moolarben Coal Complex including the OC4 South-West Modification NIA, MCP Stage 1 Mod 9 NIA and MCP Stage 2 PPR NIA.

SLR conducted a noise investigation survey in July and August 2014 to update and validate the Moolarben Coal Complex noise model and reflect as-built noise emissions, as follows:

- On-site noise measurements to determine fixed plant SWLs including CHPP, conveyors and drives, ROM bin, sizing station as well as locomotives operating on the rail loop.
- On-site noise measurements to determine and/or verify mobile equipment SWLs including dozers, excavators, haul trucks and drills.
- The digital terrain was updated to include latest high resolution landforms, particularly extensive noise wall bunding on the western extent of OC2.
- Additional noise sources were added into the model to more accurately reflect the noise emissions from significant mobile equipment.
- Far-field operator-attended and unattended noise surveys (3 validation locations) were conducted to determine Moolarben Coal Complex's noise level contribution at each location. For each survey the prevailing weather conditions as well as the number and location of operating plant and equipment were recorded.
- The outcome of the validation exercise resulted in a noise model calibration factor (of negative 2.1 dBA) which has been included in the Modification noise assessment (while noting that the validation outcomes are generally consistent with field measurement and modelling results from similar large scale resource developments).

The operational noise modelling scenario (described below) include all existing and proposed plant and equipment items operating concurrently to simulate the overall maximum energy equivalent (ie LA_{eq}(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. Mobile fleet undergo regular maintenance on-site, resulting in a portion of the total mobile fleet (refer **Table 18**) being out of service at any given time. This has been reflected in the 2018

operational noise modelling scenario which assumes a mobile fleet utilisation of approximately 82%. Generally, 80% to 85% mobile equipment utilisation (and driver availability) is consistent with large scale open-cut mining operations.

6.4 Noise Modelling Scenario

In accordance with INP requirements, the Modification description was reviewed to determine a representative scenario to assess potential noise impacts. Longwall panel extraction in UG1 and the associated transfer and handling of coal will commence in approximately 2017. The scenario representing typical operations of Moolarben Coal Complex incorporating the Modification in 2018 was selected. Justification for this scenario is provided below.

6.4.1 Year 2016 Construction Scenario

As described in **Section 3.2**, construction of the proposed underground Mine Infrastructure Area and coal conveyor would occur in approximately 2016. Noise emissions associated with the operation of the construction fleet (**Section 3.2**) concurrently with the Year 2016 operational fleet modelled in the OC4 South-West Modification has been modelled for the daytime only.

6.4.2 Year 2018 Scenario

The 2018 scenario represents potential worst case noise impacts at the Cooks Gap privately owned receivers, as in this year operations for Moolarben Coal Complex incorporating the Modification would include:

- underground longwall panel extraction in UG1 is commenced and coal is transferred by conveyors between the UG1 pit top facilities via a sizing station to the CHPP area;
- concurrent impacts associated with the proposed OC4 South-West Modification would occur including OC1 and OC4 operations being focussed in the west (ie closer to the nearest private receivers in Cooks Gap);
- open cut and underground operations at the maximum ROM coal production rate (13 Mtpa for the open cuts and 8 Mtpa for the underground) and waste rock production rate would be near maximum (up to approximately 53 million bulk cubic metres per annum); and
- the operation of the maximum number of underground and open cut mobile equipment items (**Table 19**) in addition to CHPP, coal stockpiling, rail loading and maintenance operations.

The 2018 scenario noise modelling incorporates the Modification (described above) as well as the current mine plans as proposed for the OC4 South-West Modification activities and fleet.

Table 19 Year 2018 Scenario Typical Mobile Equipment Fleet Distribution¹

Open Cut 1 Area	Open Cut 4 Area	CHPP/ROM Area	Drill / Preparation Area	Underground 1 Area (UG1)
Overburden Fleet: 1 x Atlas Copco DML 60 Drill 1 x Komatsu D375 Dozer 1 x Liebherr 996B Excavator 4 x Komatsu 830E Trucks	Coal Fleet: 1 x Atlas Copco DML 60 Drill 2 x CAT D11 Dozers 1 x CAT 6050 Shovel 2 x Komatsu WD900 Dozers 8 x Komatsu 730E/CAT Haul Trucks Overburden Fleet 1: 1 x Liebherr 9800 Excavator 2 x CAT D11 Dozers 8 x Komatsu 830E Trucks 1 x Komatsu WA580 Loader 1 x Komatsu D475 Dozer Overburden Fleet 2: 1 x Liebherr 996 Excavator 2 x CAT D11 Dozers 5 x Komatsu 830E Trucks Overburden Fleet 3: 1 x Liebherr 996 Excavator 1 x CAT D10 Dozer 1 x CAT 854 Dozer 8 x Komatsu 830E Trucks	3 x Komatsu D475 Dozers (S/Pile) (ROM) 1 x Komatsu WA1200 Loader (ROM) 1 x Komatsu 730E /CAT 789D Haul Trucks (Reject)	2 x PitViper 275 Drills 1 x Komatsu PC450 Excavator 2 x CAT D10 Dozers 1 x CAT 16M Grader 1 x CAT 657 Scraper	2 x Komatsu D475 Dozers
Support Fleet: 1 x Komatsu GD825 Grader	Support Fleet: 3 x Komatsu HD785 Water Trucks 1 x CAT 16M Grader 2 x CAT 24M Grader 1 x CAT 773F Service Trucks			

Note 1: Based on approximate 82% mobile equipment utilisation by comparison with the total Modification fleet presented in **Table 18**.

7 INTRUSIVE NOISE IMPACT ASSESSMENT

7.1 Daytime Construction and Operating Intrusive Noise Levels

The predicted 2016 daytime construction LAeq(15minute) intrusive noise levels (ie UG1 construction works plus the OC4 South-West Modification) are presented in **Table 19** as well the predicted 2018 daytime operating LAeq(15minute) intrusive noise levels from the (UG1) Modification for privately owned receivers together with the relevant PSNLs and Project Approval noise limits (**Appendices A1** and **A2**).

Table 20 Daytime Years 2016 and 2018 LAeq(15minute) Intrusive Noise Levels (dBA re 20 µPa)

ID No and Landholder		2016 Modification Construction ⁴		2018 Modification Operation ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
Cooks Gap							
37	Szymkarczuk	10	6	10	6	35	35
39	Sprigg	12	9	12	9	35	35
40	Devenish	11	8	11	8	35	35
41(a)	Libertis	12	9	12	9	35	35
41(b)	Libertis	15	11	20	16	35	35
59	Szymkarczuk	18	13	24	19	35	35
60	Rayner & Munday	14	10	16	12	35	35
61	Miller	16	12	20	16	35	35
63 ^{1,2}	Whiticker	21	16	27	23	39	35
70 ²	Coventry	21	16	26	22	37	35
75 ²	Ban	18	14	25	21	36	35
76	Carbone	18	13	22	17	35	35
79	Nagle	16	12	23	19	35	35
80	Sebelic	17	12	23	18	35	35
82	Hungerford & Clemens	16	12	20	16	35	35
83	Wall	16	12	20	16	35	35
84	Sebelic	14	10	18	14	35	35
86	Harris	15	11	20	16	35	35
87	Howe	15	10	19	15	35	35
88	Meyers	12	8	14	10	35	35
89	Glover & Tomlinson	14	10	19	15	35	35
90	Powell	14	10	19	15	35	35
91	Graham	11	7	12	8	35	35
94	Mittmayer	14	10	18	14	35	35
95	Withington	13	9	17	13	35	35
96	Lazicic	13	9	17	13	35	35
97	Smith	12	8	16	12	35	35
98	Piper	12	8	15	11	35	35
99	Jenner & Jensen	12	8	12	9	35	35
100	Kapista	11	7	10	6	35	35
101	Hull	11	7	11	7	35	35
102	Roberts	11	7	11	7	35	35
103	Burnett & Grant	12	8	15	12	35	35
104	Deeben	12	8	13	10	35	35
105	Katsikaris	12	8	14	10	35	35
106	Reid	12	8	12	8	35	35
107	Raso	11	8	11	8	35	35
109	Evans	12	8	12	9	35	35
110	Thompson & Evans	12	8	12	8	35	35

ID No and Landholder		2016 Modification Construction ⁴		2018 Modification Operation ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
111	McEwan	12	8	12	9	35	35
112	Croft	12	8	11	8	35	35
113	Ratcliff	12	8	11	8	35	35
119	Kearns	11	7	10	7	35	35
171	McGregor	12	8	14	10	35	35
180	Barrett	21	16	25	20	35	35
181	Forster	21	16	22	17	35	35
182	Dutoitcook	20	15	24	19	35	35
183	Steines	20	15	23	18	35	35
184(a)	Stevenson	19	15	24	19	35	35
184(b)	Stevenson	20	15	23	19	35	35
186	Adamson	18	14	20	15	35	35
187	Feeney	19	14	23	18	35	35
188	Fielding	14	10	15	10	35	35
189	Goggin & Hyde	18	14	22	18	35	35
190	Sahyoun	15	10	15	11	35	35
191	Lasham	18	14	20	15	35	35
192	Williams	17	13	21	16	35	35
194	Potts	14	10	15	11	35	35
195	Cottam	17	13	19	15	35	35
196	Saxberg & Weir	15	11	16	12	35	35
200	Grimshaw	14	10	16	11	35	35
201(a)	Towerton	13	9	14	10	35	35
201(b)	Towerton	13	9	15	10	35	35
202	Butler	14	10	16	12	35	35
203	Miller	14	10	17	13	35	35
204	Donnan	14	10	18	14	35	35
206	Marshall & Vella	15	11	17	13	35	35
207	Smith	13	9	15	11	35	35
208	Hasaart	13	9	16	12	35	35
209	Mawson	12	8	15	11	35	35
210	Tebutt	12	8	15	11	35	35
217	Patterson	13	9	15	11	35	35
218	Soady	12	8	14	11	35	35
219	Riger	13	9	15	11	35	35
220	Rusten & Smith	13	9	15	11	35	35
222	Purtell	13	9	15	11	35	35
223	Palmer & Stewart	12	8	15	11	35	35
224	Dupond	14	10	19	15	35	35
226	Muscat	15	10	19	15	35	35
227	Hughes	15	11	20	16	35	35

ID No and Landholder		2016 Modification Construction ⁴		2018 Modification Operation ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
229	Lowe	15	11	21	16	35	35
230	Hoole & Rawlinson	16	11	21	17	35	35
231	Morrison & Benny	15	11	21	17	35	35
232	Haaring	16	11	21	17	35	35
233	Boal	16	11	22	17	35	35
234	Gaw	16	12	22	18	35	35
235	Wilson	17	12	22	18	35	35
236	Donovan	17	13	22	18	35	35
237	Puskaric	17	12	23	19	35	35
238	Powell	17	13	23	19	35	35
240	Hartley	18	13	23	19	35	35
300	Collins & Marshall	12	7	12	7	35	35
303	Ungaro	18	13	21	16	35	35
305	Barisic & Aul	18	13	20	16	35	35
306	Armstrong	19	14	21	16	35	35
307	Chant & Young	19	14	20	15	35	35
308	Dower	15	10	18	13	35	35
309	Maher	12	7	14	8	35	35
310	Death	12	7	12	7	35	35
312	Ioannou	10	5	10	5	35	35
313	Pracy	10	5	10	4	35	35
314	Ford	9	4	9	3	35	35
315	Richards & Uzelac	9	4	9	3	35	35
316	Vassel & Williams	9	4	9	3	35	35
317	Hore & Bingham	10	5	9	4	35	35
Moolarben Road							
30 ^{2,3}	Cox	13	10	15	13	39	35
31 ²	Cox	13	11	18	16	36	35
32	Stokes	5	6	4	6	35	35
35	Johnson & Thompson & Debreczeny	11	9	17	16	35	35
47	Andrews	10	9	15	15	35	35
Ulan							
11(b)	Mullins & Imrie	10	22	10	23	35	35
255	Schmitz	16	11	18	14	35	35
258	Elias	19	14	21	17	35	35

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer **Appendices A1** and **A2**).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: Predicted intrusive noise level complies with the intrusive PSNL.

7.2 Evening Operating Intrusive Noise Levels

The predicted evening operating LAeq(15minute) intrusive noise levels for the 2018 operating scenario for the (UG1) Modification (and including the OC4 South-West Modification) are presented in **Table 21** for privately owned receivers together with the relevant PSNLs and Project Approval noise limits (**Appendices A1 and A2**).

Table 21 Evening Year 2018 LAeq(15minute) Intrusive Noise Levels (dBA re 20 µPa)

ID No and Landholder		2018 OC4 South-West Modification ⁴		2018 (UG1) Modification ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
Cooks Gap							
37	Szymkarczuk	10	27	10	27	35	35
39	Sprigg	12	27	12	27	35	35
40	Devenish	11	26	12	27	35	35
41(a)	Libertis	12	27	12	27	35	35
41(b)	Libertis	21	29	21	29	35	35
59	Szymkarczuk	24	32	24	33	35	35
60	Rayner & Munday	16	28	16	28	35	35
61	Miller	20	30	20	30	35	35
63 ^{1,2}	Whiticker	27	36	27	36	39	35
70 ²	Coventry	27	35	27	35	37	35
75 ²	Ban	25	33	25	33	36	35
76	Carbone	22	33	22	33	35	35
79	Nagle	24	33	24	33	35	35
80	Sebelic	23	31	23	32	35	35
82	Hungerford & Clemens	20	30	20	30	35	35
83	Wall	20	30	21	30	35	35
84	Sebelic	19	29	19	29	35	35
86	Harris	20	29	20	29	35	35
87	Howe	19	29	19	29	35	35
88	Meyers	14	28	14	29	35	35
89	Glover & Tomlinson	19	28	19	29	35	35
90	Powell	19	28	19	28	35	35
91	Graham	11	28	12	28	35	35
94	Mittmayer	18	27	18	27	35	35
95	Withington	17	27	18	27	35	35
96	Lazicic	17	27	17	28	35	35
97	Smith	16	27	17	28	35	35
98	Piper	14	27	15	27	35	35
99	Jenner & Jensen	12	27	13	27	35	35
100	Kapista	10	27	10	27	35	35
101	Hull	11	26	11	26	35	35
102	Roberts	11	26	11	26	35	35
103	Burnett & Grant	15	27	16	27	35	35
104	Deeben	13	26	14	26	35	35
105	Katsikaris	13	26	14	26	35	35
106	Reid	12	26	12	26	35	35
107	Raso	11	26	12	26	35	35
109	Evans	12	26	13	26	35	35
110	Thompson & Evans	12	26	12	26	35	35

ID No and Landholder		2018 OC4 South-West Modification ⁴		2018 (UG1) Modification ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
111	McEwan	12	26	13	26	35	35
112	Croft	11	26	12	26	35	35
113	Ratcliff	11	26	12	26	35	35
119	Kearns	10	26	11	26	35	35
171	McGregor	14	21	15	21	35	35
180	Barrett	25	32	25	32	35	35
181	Forster	22	30	23	30	35	35
182	Dutoitcook	24	32	24	32	35	35
183	Steines	23	31	23	32	35	35
184(a)	Stevenson	24	31	24	32	35	35
184(b)	Stevenson	24	31	24	31	35	35
186	Adamson	20	28	20	28	35	35
187	Feeney	23	30	23	31	35	35
188	Fielding	15	27	15	27	35	35
189	Goggin & Hyde	22	30	23	30	35	35
190	Sahyoun	15	26	16	26	35	35
191	Lasham	20	27	20	27	35	35
192	Williams	21	29	21	30	35	35
194	Potts	15	26	16	26	35	35
195	Cottam	19	29	20	29	35	35
196	Saxberg & Weir	17	26	17	26	35	35
200	Grimshaw	16	24	16	24	35	35
201(a)	Towerton	14	24	14	24	35	35
201(b)	Towerton	15	26	15	26	35	35
202	Butler	16	24	16	24	35	35
203	Miller	17	26	17	27	35	35
204	Donnan	19	27	19	27	35	35
206	Marshall & Vella	17	24	17	24	35	35
207	Smith	15	25	16	25	35	35
208	Hasaart	16	25	16	26	35	35
209	Mawson	15	25	16	25	35	35
210	Tebutt	15	25	16	25	35	35
217	Patterson	15	26	15	26	35	35
218	Soady	14	25	15	26	35	35
219	Riger	15	26	16	26	35	35
220	Rusten & Smith	15	22	16	23	35	35
222	Purtell	15	26	15	26	35	35
223	Palmer & Stewart	15	26	15	26	35	35
224	Dupond	20	27	20	28	35	35
226	Muscat	20	28	20	28	35	35
227	Hughes	20	28	21	28	35	35
229	Lowe	21	29	21	29	35	35
230	Hoole & Rawlinson	21	29	22	29	35	35
231	Morrison & Benny	21	29	22	30	35	35
232	Haaring	22	30	22	30	35	35
233	Boal	22	30	22	30	35	35
234	Gaw	22	30	22	30	35	35
235	Wilson	22	30	22	31	35	35

ID No and Landholder		2018 OC4 South-West Modification ⁴		2018 (UG1) Modification ⁴		Project Approval Noise Limit	Intrusive PSNL
		Calm	Wind	Calm	Wind		
236	Donovan	22	30	23	31	35	35
237	Puskaric	23	31	23	31	35	35
238	Powell	23	31	23	32	35	35
240	Hartley	23	32	23	32	35	35
300	Collins & Marshall	12	30	12	31	35	35
303	Ungaro	21	30	21	31	35	35
305	Barisic & Aul	21	29	21	30	35	35
306	Armstrong	21	30	21	30	35	35
307	Chant & Young	21	29	21	30	35	35
308	Dower	18	28	18	28	35	35
309	Maher	14	28	14	28	35	35
310	Death	13	29	13	29	35	35
312	Ioannou	10	28	10	29	35	35
313	Pracy	9	28	10	28	35	35
314	Ford	9	28	9	29	35	35
315	Richards & Uzelac	8	29	9	29	35	35
316	Vassel & Williams	8	29	9	29	35	35
317	Hore & Bingham	9	29	9	29	35	35
Moolarben Road							
30 ^{2,3}	Cox	15	31	16	31	39	35
31 ²	Cox	18	29	18	30	35	35
32	Stokes	4	7	5	7	35	35
35	Johnson & Thompson & Debreczeny	17	28	17	28	35	35
47	Andrews	15	25	15	25	35	35
Ulan							
11(b)	Mullins & Imrie	10	7	10	7	35	35
255	Schmitz	18	30	19	31	35	35
258	Elias	21	32	22	33	35	35

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer **Appendices A1** and **A2**).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: Predicted intrusive noise level complies with the intrusive PSNL.

Note 6: Predicted intrusive noise level marginal 1 to 2 dBA above intrusive PSNL.

7.3 Night-time Operating Intrusive Noise and Sleep Disturbance

The predicted night-time LAeq(15minute) intrusive and sleep disturbance LA1(1minute) noise levels for the 2018 operating scenario for the (UG1) Modification (and including the OC4 South-West Modification) are presented in **Table 22** for privately owned receivers together with the relevant PSNLs, SDNLs and Project Approval noise limits (**Appendices A1** and **A2**).

Table 22 Night-time Year 2018 LAeq(15minute) & LA1(1minute) Noise Levels (dBA re 20 µPa)

ID No and Landholder		2018 OC4 South-West Modification ⁴			2018 (UG1) Modification ⁴			Project Approval Noise Limit	Intrusive PSNL/SDNL
		Calm	Wind or Inversion	LA1(1min)	Calm	Wind or Inversion	LA1(1min)		
Cooks Gap									
37	Szymkarczuk	10	30	33	10	30	33	35/45	35/45
39	Sprigg	12	29	32	13	29	32	35/45	35/45

ID No and Landholder	2018 OC4 South-West Modification ⁴			2018 (UG1) Modification ⁴			Project Approval Noise Limit	Intrusive PSNL/ SDNL	
	Calm	Wind or Inversion	LA1(1min)	Calm	Wind or Inversion	LA1(1min)			
40	Devenish	12	29	32	12	29	32	35/45	35/45
41(a)	Libertis	12	29	32	13	30	33	35/45	35/45
41(b)	Libertis	21	31	34	21	31	34	35/45	35/45
59	Szymkarczuk	24	35	38	25	35	38	35/45	35/45
60	Rayner & Munday	16	31	34	17	31	34	35/45	35/45
61	Miller	20	32	35	20	33	36	35/45	35/45
63 ^{1,2}	Whiticker	28	38	41	28	39	42	39/45	35/45
70 ²	Coventry	27	37	40	27	37	40	37/45	35/45
75 ²	Ban	26	36	39	26	36	39	36/45	35/45
76	Carbone	22	35	38	23	35	38	35/45	35/45
79	Nagle	24	35	38	24	35	38	35/45	35/45
80	Sebelic	23	34	37	24	34	37	35/45	35/45
82	Hungerford & Clemens	20	32	35	21	33	36	35/45	35/45
83	Wall	21	32	35	21	33	36	35/45	35/45
84	Sebelic	19	32	35	19	32	35	35/45	35/45
86	Harris	20	31	34	21	31	34	35/45	35/45
87	Howe	19	31	34	19	32	34	35/45	35/45
88	Meyers	14	31	34	15	31	34	35/45	35/45
89	Glover & Tomlinson	19	31	34	20	31	34	35/45	35/45
90	Powell	19	30	33	19	31	34	35/45	35/45
91	Graham	11	30	33	12	30	33	35/45	35/45
94	Mittemayer	18	29	32	19	29	32	35/45	35/45
95	Withington	18	29	32	18	29	32	35/45	35/45
96	Lazicic	17	29	32	18	30	33	35/45	35/45
97	Smith	16	29	32	17	30	33	35/45	35/45
98	Piper	15	29	32	15	29	32	35/45	35/45
99	Jenner & Jensen	12	29	32	13	29	32	35/45	35/45
100	Kapista	10	29	32	11	29	32	35/45	35/45
101	Hull	11	28	31	11	29	31	35/45	35/45
102	Roberts	11	28	31	11	28	31	35/45	35/45
103	Burnett & Grant	16	29	32	16	29	32	35/45	35/45
104	Deeben	13	28	31	14	28	31	35/45	35/45
105	Katsikaris	14	28	31	14	28	31	35/45	35/45
106	Reid	12	28	31	12	29	32	35/45	35/45
107	Raso	12	28	31	12	29	31	35/45	35/45
109	Evans	13	28	31	13	28	31	35/45	35/45
110	Thompson & Evans	12	28	31	13	28	31	35/45	35/45
111	McEwan	12	28	31	13	28	31	35/45	35/45
112	Croft	12	28	31	12	28	31	35/45	35/45
113	Ratcliff	12	28	31	12	28	31	35/45	35/45
119	Kearns	11	29	31	11	29	32	35/45	35/45
171	McGregor	14	22	25	15	22	25	35/45	35/45
180	Barrett	25	35	38	25	35	38	35/45	35/45
181	Forster	23	32	35	23	33	35	35/45	35/45

ID No and Landholder	2018 OC4 South-West Modification ⁴			2018 (UG1) Modification ⁴			Project Approval Noise Limit	Intrusive PSNL/SDNL	
	Calm	Wind or Inversion	LA1(1min)	Calm	Wind or Inversion	LA1(1min)			
182	Dutoitcook	24	34	37	25	34	37	35/45	35/45
183	Steines	24	34	37	24	34	37	35/45	35/45
184(a)	Stevenson	24	34	37	24	34	37	35/45	35/45
184(b)	Stevenson	24	33	36	24	33	36	35/45	35/45
186	Adamson	20	30	33	21	31	34	35/45	35/45
187	Feeney	23	33	36	24	33	36	35/45	35/45
188	Fielding	15	29	32	15	29	32	35/45	35/45
189	Goggin & Hyde	23	32	35	23	32	35	35/45	35/45
190	Sahyoun	16	28	31	16	29	32	35/45	35/45
191	Lasham	20	29	32	20	29	32	35/45	35/45
192	Williams	22	32	35	22	32	35	35/45	35/45
194	Potts	16	28	31	16	28	31	35/45	35/45
195	Cottam	20	31	34	20	31	34	35/45	35/45
196	Saxberg & Weir	17	28	31	17	28	31	35/45	35/45
200	Grimshaw	16	26	29	16	26	29	35/45	35/45
201(a)	Towerton	14	26	29	15	26	29	35/45	35/45
201(b)	Towerton	15	28	31	15	28	31	35/45	35/45
202	Butler	16	26	29	17	26	29	35/45	35/45
203	Miller	17	28	31	17	28	31	35/45	35/45
204	Donnan	19	28	31	19	29	32	35/45	35/45
206	Marshall & Vella	17	26	29	18	26	29	35/45	35/45
207	Smith	16	27	30	16	27	30	35/45	35/45
208	Hasaart	16	27	30	16	27	30	35/45	35/45
209	Mawson	16	27	30	16	27	30	35/45	35/45
210	Tebutt	16	26	29	16	27	30	35/45	35/45
217	Patterson	15	27	30	15	28	31	35/45	35/45
218	Soady	14	27	30	15	27	30	35/45	35/45
219	Riger	15	27	30	16	28	31	35/45	35/45
220	Rusten & Smith	15	24	27	16	24	27	35/45	35/45
222	Purtell	15	28	31	16	28	31	35/45	35/45
223	Palmer & Stewart	15	28	31	15	28	31	35/45	35/45
224	Dupond	20	29	32	20	30	33	35/45	35/45
226	Muscat	20	30	33	20	30	33	35/45	35/45
227	Hughes	21	30	33	21	31	34	35/45	35/45
229	Lowe	21	31	34	21	31	34	35/45	35/45
230	Hoole & Rawlinson	22	31	34	22	31	34	35/45	35/45
231	Morrison & Benny	22	32	35	22	32	35	35/45	35/45
232	Haaring	22	32	35	22	32	35	35/45	35/45
233	Boal	22	32	35	22	32	35	35/45	35/45
234	Gaw	22	32	35	23	33	36	35/45	35/45
235	Wilson	23	33	36	23	33	36	35/45	35/45
236	Donovan	23	33	36	23	33	36	35/45	35/45
237	Puskaric	23	34	36	24	34	37	35/45	35/45
238	Powell	24	34	37	24	34	37	35/45	35/45

ID No and Landholder	2018 OC4 South-West Modification ⁴			2018 (UG1) Modification ⁴			Project Approval Noise Limit	Intrusive PSNL/ SDNL
	Calm	Wind or Inversion	LA1(1min)	Calm	Wind or Inversion	LA1(1min)		
240	Hartley	24	35	38	24	35	38	35/45
300	Collins & Marshall	12	33	36	13	33	36	35/45
303	Ungaro	22	33	36	22	33	36	35/45
305	Barisic & Aul	21	32	35	21	32	35	35/45
306	Armstrong	21	32	35	22	32	35	35/45
307	Chant & Young	21	32	35	21	32	35	35/45
308	Dower	18	31	34	18	31	34	35/45
309	Maher	14	30	33	14	30	33	35/45
310	Death	13	31	34	13	32	35	35/45
312	Ioannou	10	31	34	10	31	34	35/45
313	Pracy	10	30	33	10	31	34	35/45
314	Ford	9	31	34	9	31	34	35/45
315	Richards & Uzelac	9	31	34	9	31	34	35/45
316	Vassel & Williams	9	31	34	9	32	35	35/45
317	Hore & Bingham	9	32	35	9	32	35	35/45
Moolarben Road								
30 ^{2,3}	Cox	16	34	37	16	34	37	39/45
31 ²	Cox	19	33	36	19	33	36	35/45
32	Stokes	5	16	19	5	16	19	35/45
35	Johnson & Thompson & Debreczeny	18	31	34	18	31	34	35/45
47	Andrews	15	28	31	15	28	31	35/45
Ulan								
11(b)	Mullins & Imrie	10	24	27	11	21	24	35/45
255	Schmitz	19	33	36	19	34	37	35/45
258	Elias	22	35	38	22	36	39	35/45

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer **Appendices A1** and **A2**).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: Predicted intrusive noise level complies with the intrusive PSNL and maximum SDNL.

Note 6: Predicted intrusive noise level marginal 1 to 2 dBA above intrusive PSNL or maximum SDNL.

Note 7: Predicted intrusive noise level moderate 3 to 5 dBA above intrusive PSNL or maximum SDNL.

7.4 Impact Assessment Summary and Comparison with Approved Moolarben Coal Complex

In summary, the predicted daytime, evening and night-time intrusive and maximum noise levels in 2016 (UG1 construction) and 2018 (UG1 operation) show that:

- No exceedance of the Project Approval noise limits are predicted during the daytime, evening and night-time (**Table 20**, **Table 21** and **Table 22**) at any privately owned receivers except 258 Elias.
- A marginal exceedance of 1 dBA above the approved intrusive noise limit (35 dBA) at 258 Elias is predicted during adverse weather conditions in the night-time (**Table 22**).
- A marginal exceedance of 1 dBA above the intrusive PSNL (35 dBA) at 63 Whiticker is predicted during adverse weather conditions in the evening (**Table 21**).

- A marginal exceedances of 1 dBA to 2 dBA above the intrusive PSNL (35 dBA) at 75 Ban, 70 Coventry and 258 Elias are predicted during adverse weather conditions in the night-time (**Table 22**).
- A moderate exceedance of 4 dBA above the intrusive PSNL (35 dBA) at 63 Whiticker is predicted during adverse weather conditions in the night-time (**Table 22**).
- No exceedance of the intrusive PSNL 35 dBA at all other privately owned receivers.
- No exceedance of the maximum SDNL 45 dBA at all privately owned receivers.

The Modification would result in only one additional predicted exceedance (258 Elias) of the intrusive PSNLs compared to those identified for the approved Moolarben Coal Complex. Therefore, as a result of the Modification, only one additional privately owned receiver (258 Elias) is predicted to experience noise levels above the current Project Approval noise limits.

7.5 Privately Owned Vacant Land Impact Assessment

The outer envelope night-time LAeq(15minute) intrusive noise contours for Year 2018 are presented in **Appendix E**. The calculation of the noise contours involves numerical interpolation of a noise level array with a graphical accuracy of up to approximately ±2 dBA. This means that in some cases the noise contours will differ slightly from the values in **Table 22**.

The noise impacts on vacant land have been assessed in accordance with **Section 5.2** on the basis that the subject vacant land is permitted to have a dwelling. The Year 2018 night-time LAeq(15minute) intrusive noise contour of 35 dBA is predicted to dissect two vacant properties (ie 34 and 178) and therefore remain below the VLA&MP residential rural night-time maximum recommended (LAeq(9 hour)) noise amenity level of 45 dBA. Similarly, both vacant properties also remain below the Project Approval noise limit with regard to the land acquisition of 45 dBA where more than 25% of the vacant land area is affected.

8 NOISE AMENITY IMPACT ASSESSMENT

8.1 Modification Operating Noise Amenity Levels

The predicted daytime, evening and night-time LAeq(period) noise amenity levels for the 2018 operating scenario for both the OC4 South-West Modification and the (UG1) Modification are presented in **Table 23** for privately owned receivers as well as schools, churches and commercial receivers in Ulan Village.

Table 23 Daytime, Evening and Night-time Noise Amenity Year 2018 (dBA re 20 µPa)

ID No and Landholder		OC4 South-West Modification NIA ⁴			UG1 Modification ⁴		
		Day	Evening	Night	Day	Evening	Night
Cooks Gap							
37	Szymkarczuk	7	24	27	7	25	27
39	Sprigg	10	24	27	10	24	27
40	Devenish	9	23	26	9	24	27
41(a)	Libertis	10	24	27	10	25	27
41(b)	Libertis	18	26	29	18	26	29
59	Szymkarczuk	21	30	33	21	30	33
60	Rayner & Munday	13	25	28	14	25	28
61	Miller	17	27	30	17	27	30
63 ^{1,2}	Whiticker	24	33	36	24	34	37

ID No and Landholder		OC4 South-West Modification NIA ⁴			UG1 Modification ⁴		
		Day	Evening	Night	Day	Evening	Night
70 ²	Coventry	24	32	35	24	32	35
75 ²	Ban	22	31	34	22	31	34
76	Carbone	19	30	33	19	30	33
79	Nagle	21	30	33	21	30	33
80	Sebelic	20	29	32	20	29	32
82	Hungerford & Clemens	17	27	30	18	27	30
83	Wall	18	27	30	18	27	30
84	Sebelic	16	26	29	16	27	29
86	Harris	17	26	29	17	27	29
87	Howe	16	26	29	16	26	29
88	Meyers	11	26	28	12	26	28
89	Glover & Tomlinson	16	26	28	16	26	29
90	Powell	16	26	28	16	26	28
91	Graham	9	25	28	9	25	28
94	Mittemayer	15	25	27	15	25	27
95	Withington	15	25	27	15	25	27
96	Lazicic	14	25	27	14	25	27
97	Smith	13	25	27	14	25	27
98	Piper	12	24	27	12	24	27
99	Jenner & Jensen	9	24	27	10	24	27
100	Kapista	7	24	27	8	24	27
101	Hull	8	23	26	8	23	26
102	Roberts	8	23	26	8	23	26
103	Burnett & Grant	12	24	26	13	24	27
104	Deeben	10	23	26	11	24	26
105	Katsikaris	11	23	26	11	23	26
106	Reid	9	23	26	9	24	26
107	Raso	9	23	26	9	23	26
109	Evans	10	23	26	10	23	26
110	Thompson & Evans	9	23	26	10	23	26
111	McEwan	10	23	25	10	23	26
112	Croft	9	23	25	9	23	26
113	Ratcliff	9	23	25	9	23	26
119	Kearns	8	23	26	8	23	26
171	McGregor	11	18	20	12	19	21
180	Barrett	22	30	33	22	30	33
181	Forster	19	28	30	19	28	30
182	Dutoitcook	21	29	32	21	30	32
183	Steines	20	29	32	20	29	32
184(a)	Stevenson	21	29	32	21	29	32
184(b)	Stevenson	21	29	31	21	29	32
186	Adamson	17	26	28	17	26	28
187	Feeney	20	28	31	20	28	31
188	Fielding	12	24	27	12	24	27
189	Goggin & Hyde	19	28	30	20	28	30
190	Sahyoun	12	23	26	13	24	26

ID No and Landholder		OC4 South-West Modification NIA ⁴			UG1 Modification ⁴		
		Day	Evening	Night	Day	Evening	Night
191	Lasham	17	25	27	17	25	27
192	Williams	18	27	30	18	27	30
194	Potts	12	23	26	13	23	26
195	Cottam	16	26	29	17	26	29
196	Saxberg & Weir	13	23	26	14	24	26
200	Grimshaw	13	22	24	13	22	24
201(a)	Towerton	11	21	23	11	21	24
201(b)	Towerton	12	23	26	12	23	26
202	Butler	13	22	24	13	22	24
203	Miller	14	24	26	14	24	26
204	Donnan	16	24	26	16	25	27
206	Marshall & Vella	14	22	24	14	22	24
207	Smith	12	23	25	13	23	25
208	Hasaart	13	23	25	13	23	25
209	Mawson	12	23	25	13	23	25
210	Tebutt	12	22	25	13	23	25
217	Patterson	12	23	25	12	23	26
218	Soady	11	23	25	12	23	25
219	Riger	12	23	26	13	23	26
220	Rusten & Smith	12	20	22	13	20	22
222	Purtell	12	23	26	13	24	26
223	Palmer & Stewart	12	23	26	12	24	26
224	Dupond	17	25	27	17	25	28
226	Muscat	17	25	28	17	26	28
227	Hughes	18	26	28	18	26	28
229	Lowe	18	27	29	18	27	29
230	Hoole & Rawlinson	18	27	29	18	27	29
231	Morrison & Benny	19	27	29	19	27	30
232	Haaring	19	27	30	19	27	30
233	Boal	19	28	30	19	28	30
234	Gaw	19	28	30	19	28	31
235	Wilson	19	28	31	19	28	31
236	Donovan	19	28	31	20	28	31
237	Puskaric	20	29	31	20	29	32
238	Powell	20	29	32	20	29	32
240	Hartley	20	30	33	20	30	33
300	Collins & Marshall	9	27	31	9	28	31
303	Ungaro	18	28	31	18	28	31
305	Barisic & Aul	17	27	30	18	27	30
306	Armstrong	18	27	30	18	27	30
307	Chant & Young	17	27	30	18	27	30
308	Dower	15	26	28	15	26	29
309	Maher	11	25	28	11	25	28
310	Death	9	26	29	10	26	29
312	Ioannou	7	26	29	7	26	29
313	Pracy	6	25	28	7	25	28

ID No and Landholder		OC4 South-West Modification NIA ⁴			UG1 Modification ⁴		
		Day	Evening	Night	Day	Evening	Night
314	Ford	6	25	29	6	26	29
315	Richards & Uzelac	5	26	29	6	26	29
316	Vassel & Williams	5	26	29	6	26	29
317	Hore & Bingham	6	26	29	6	26	30
Moolarben Road							
30 ^{2,3}	Cox	13	28	31	13	28	31
31 ²	Cox	16	27	30	16	27	30
32	Stokes	4	6	12	5	6	12
35	Johnson & Thompson & Debreczeny	16	26	28	16	26	29
47	Andrews	14	23	25	14	23	26
Ulan							
11(a)	Mullins & Imrie	23	9	23	24	10	23
11(b)	Mullins & Imrie	19	9	19	20	9	20
11(c)	Mullins & Imrie	21	10	21	22	10	22
255	Schmitz	16	28	31	16	28	32
258	Elias	19	30	33	19	30	34
Ulan Village Non-residential							
9	Orica Australia Pty Limited	27	37	40	28	38	41
26	Forty North P/L	16	16	34	19	26	35
46B	North Eastern Wiradjuri Wilpinjong Community Fund Limited	25	35	40	28	37	42
66	Rostherne P/L	16	16	38	23	34	40
149	Mid Western Regional Council	30	39	43	30	40	43
160 ⁵	Minister for Education and Training (Ulan Public School)	28	38	-	29	40	-
162	Rowmint P/L	16	16	38	24	34	40
168 ⁵	PJL Constructions Pty Limited (Church)	29	39	-	30	40	-

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer **Appendices A1** and **A2**).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: In use daytime and evening only.

Note 6: Predicted amenity level complies with the relevant amenity PSNL (**Table 13**).

8.2 Impact Assessment Summary

In summary, the predicted daytime, evening and night-time noise amenity levels in 2018 show that:

- No exceedance of the Project Approval noise limits are predicted during the daytime, evening and night-time (**Table 23**) at any school or church.
- No exceedance of the relevant amenity PSNL (**Table 13**) at all privately owned receivers.
- No exceedance of the relevant amenity PSNL (**Table 13**) at all commercial receivers.

Based on the outer envelope night-time LAeq(15minute) intrusive noise contours for 2018 presented in **Appendix E**, the noise levels at Goulburn River National Park and Munghorn Gap Nature Reserve are unlikely to exceed the relevant PNSL (and Project Approval noise limit) of LAeq(period) 50 dBA.

9 CUMULATIVE NOISE AMENITY ASSESSMENT

The INP provides non-mandatory cumulative noise assessment guidelines that address existing and successive industrial development by setting acceptable (and maximum) cumulative $L_{Aeq(Period)}$ noise amenity levels for all industrial noise sources only (ie non-transport related) for a particular land use. It is noted that the INP does not set acceptable cumulative $L_{Aeq(15minute)}$ intrusive criteria for all industrial noise sources, but rather seeks to control cumulative noise via the $L_{Aeq(Period)}$ noise amenity criterion (**Section 5.2**).

A summary of the major existing, approved and proposed industrial developments in the vicinity of Moolarben Coal Complex are presented in **Table 2**. The Ulan West Modification Environmental Assessment (EA) was prepared by Umwelt on half of UCML and 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 will not be exceeded due to the proposed modification and is therefore not further considered in this report.

The predicted noise amenity levels from the Moolarben Coal Complex incorporating the Modification, Ulan Continued Operations Project and Wilpinjong Coal Project (Modification 6) were also conservatively considered. The estimated mine operating 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). These are then used for the purposes of the cumulative evening and 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 remote, 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.

In accordance with the INP Chapter 2 Industrial Noise Criteria, the evening cumulative sum of the existing, approved and proposed developments $L_{Aeq(4hour)}$ noise amenity levels have been determined (**Appendix F1**). Similarly, the night-time cumulative sum of the existing, approved and proposed developments $L_{Aeq(9hour)}$ noise amenity levels have been determined (**Appendix F2**). In summary, the predicted daytime, evening and night-time (cumulative) noise amenity levels show that:

- No exceedance of the INP acceptable evening and night-time noise amenity levels (**Table 12**) are predicted at any privately owned receivers due to potential cumulative impacts.
- No exceedance of the INP acceptable evening and night-time noise amenity levels (**Table 12**) are predicted at any school, church or commercial receivers due to potential cumulative impacts.

10 ROAD TRAFFIC NOISE IMPACT ASSESSMENT

The detailed assessment of the road transport impacts are presented in the *Moolarben Coal Complex UG1 Optimisation Modification Road Transport Assessment* (Appendix H of the EA) (GTA Consultants, 2015) and includes consideration of the peak traffic generation from the Moolarben Coal Complex incorporating the Modification in 2017. This road traffic noise assessment focuses on Ulan Road (MR 214) as no private receivers remain on Ulan-Wollar Road.

10.1 Traffic Noise Criteria

Ulan Road is classified as a main road (MR 208/214) (GTA Consultants, 2015), which is essentially a sub-arterial road. The RNP and associated Application Notes dated 12 June 2013 (refer **Appendix G**) is the relevant policy for the assessment of road noise in NSW. The RNP adopts a classification scheme for assessing noise impacts on an existing road network from additional traffic generated by the increased workforce being sought by the Modification as presented in **Table 24**.

Table 24 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Road	Type of Project and Land Use	Total Traffic Noise Criteria ¹	Relative Increase Criteria
Ulan Road	Land use developments generating additional traffic on existing sub-arterial roads	Daytime 60 LAeq(15hour)	Existing LAeq(15hour) plus 12 dBA
		Night-time 55 LAeq(9hour)	Existing LAeq(9hour) plus 12 dBA

Note 1: Daytime 0700 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

It is noted that the NSW RNP Application Notes state that the relative increase criteria are primarily intended to protect existing quiet areas, being areas that are 12 dB or more below the relevant noise assessment criterion that applies day or night, from excessive changes in amenity due to noise from additional traffic.

In relation to situations where exceedances of the road traffic noise assessment criteria are predicted, the NSW RNP relevantly provides:

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

*...For existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.*

In practice, noise level increases of less than 2 dBA are generally achieved when the percentage increase to the existing light and heavy traffic is no greater than 60%. The RNP describes a number of steps for applying the criteria. In general accordance with these steps, this assessment has:

- Identified a study area, defined as the portion of the Ulan Road (south of the Cope Road in the vicinity of Cooks Gap) with the adjacent residential dwellings presented in **Table 25**.
- Tabulated road traffic flows within the study area, due to projected cumulative sources in 2017 and the Moolarben Coal Complex incorporating the Modification in 2017.
- Determined the relative increase in total traffic noise from the Moolarben Coal Complex incremental traffic in 2017 by comparison to the existing traffic (measured/predicted in 2012).
- Determined the relative increase in total traffic noise from the incremental increase in Moolarben Coal Complex traffic in 2017 by comparison to the projected 2017 traffic.

It is noted that residential dwellings are also located adjacent to Ulan Road south of the study area, however, total traffic flows also increase with distance south on Ulan Road. Hence the section of Ulan Road south of the Cope Road and north of Wollar Road (ie in the vicinity of Cooks Gap) was adopted as the study area, as Moolarben Coal Complex traffic as a proportion of total traffic is the highest in this section of Ulan Road.

Table 25 Ulan Road Adjacent Residential Dwellings

Dwelling No	Chainage (km)	Distance from Dwelling Façade (m)
1	25.859	108
2	26.891	78
3	27.061	106
4	27.392	73
5	27.613	67
6	27.959	28
7	30.294	82
8	30.655	44
9	32.169	81
10	32.339	26
11	32.946	84

Source: *Ulan Road Strategy* (ARRB Group, 2012)

10.2 Ulan Road Existing Traffic Noise 2012

As presented in **Section 4.3**, a road traffic noise survey was conducted in December 2012 to quantify the near-field road traffic noise adjacent to Ulan Road. The data were then processed in accordance with the requirements of the RNP to derive the 2012 road traffic noise levels presented in **Table 26**.

Table 26 Unattended Road Traffic Noise Monitoring Results - December 2012 (dBA re 20 µPa)

Location	Position ¹	Leq(15hour)	Leq(9hour)
Corner of Ulan and Lagoons Roads	50 m from centre of Ulan Road	52	50

Note 1: Free field offset distance.

The existing traffic noise levels have been used to calculate the nominal offset distances from the centre of the Ulan Road to meet the daytime and night-time total traffic noise criteria (refer **Table 2**) as presented in **Table 5**.

Table 27 Nominal Offset Distance to Meet the Total Traffic Noise Criteria - December 2012

Location	Offset Distance	Day Leq(15hour) ¹	Night Leq(9hour) ¹
Corner of Ulan and Lagoons Roads	20.5 m from centre of Ulan Road	60 dBA	-
	35.0 m from centre of Ulan Road	-	55 dBA

Note 1: Total traffic noise level inclusive of 2.5 dBA facade correction.

Based on the existing traffic noise levels, two residential dwellings in the study area (ie numbers 6 and 10) are within 35 m of the Ulan Road and therefore receiving night-time Leq(9hour) traffic noise levels above the total traffic noise criteria of 55 dBA. All receivers in the study area were below daytime Leq(15hour) traffic noise criteria of 60 dBA.

10.3 Ulan Road Traffic Noise Impact Assessment

The projected cumulative 2017 traffic flows on the Ulan Road are presented in **Table 28**, along with the incremental increase in Moolarben Coal Complex traffic (ie the increment by comparison to the approved maximum Moolarben Coal Complex). For the purposes of traffic noise impact assessment, the daytime and night-time projected cumulative 2017 traffic flows are shown, with the relative percentage increase associated with Moolarben Coal Complex traffic in parentheses.

Table 28 Ulan Road 2017 Traffic Flows (Between Cope Road and Wollar Road)

Time Period	Cumulative 2017 ¹	Modification Increment (Cumulative 2017) ²
Ulan Road Light Vehicles		
Daytime 15 hour traffic	2196	317 (14.4%)
Night-time 9 hour traffic	1066	200 (18.8%)
Ulan Road Heavy Vehicles		
Daytime 15 hour traffic	419	36 (8.6%)
Night-time 9 hour traffic	105	3 (2.9%)
Ulan Road Total Vehicles		
Daytime 15 hour traffic	2615	353 (13.5%)
Night-time 9 hour traffic	1171	203 (17.3%)

Note 1: Cumulative 2017 traffic flow includes the existing Moolarben Coal Complex, incremental increase sought by the Modification, other mines and non-mining related traffic.

Note 2: Incremental increase in Moolarben Coal Complex traffic in 2017 in comparison to approved maximum traffic - values in parentheses represent the increment as a percentage of the cumulative 2017 traffic.

Existing Traffic Noise plus Moolarben Coal Complex Increment

The incremental increase in Moolarben Coal Complex traffic would be approximately 18% higher than daytime existing traffic, which is equivalent to a negligible 0.7 dBA increase in daytime LAeq(15 hour) traffic noise levels. The incremental increase would be approximately 26% higher than night-time existing traffic, which is equivalent to a negligible 1 dBA increase in night-time LAeq(9 hour) traffic noise levels.

Hence, the relative increase in traffic noise arising from the incremental increase in Moolarben Coal Complex traffic in comparison to existing traffic levels is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible. In addition to conservatively considering the potential increase compared to existing traffic levels, the relative increase compared to projected 2017 traffic levels has also been considered.

Cumulative Traffic Noise 2017 plus Moolarben Coal Complex Increment

The daytime cumulative 2017 traffic is predicted to increase by approximately 14% due to the incremental increase in Moolarben Coal Complex 2017 traffic and result in a negligible 0.5 dBA increase in daytime LAeq(15 hour) traffic noise levels. The night-time cumulative 2017 traffic is predicted to increase by approximately 17% due to the incremental increase in Moolarben Coal Complex 2017 traffic and result in a negligible 0.7 dBA increase in night-time LAeq(9 hour) traffic noise levels.

Hence, the relative increase in traffic noise arising from the increase sought by the Modification in 2017 is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible.

The cumulative 2017 traffic has been used to estimate the nominal minimum offset distances from the centre of Ulan Road required to meet the daytime and night-time total traffic noise criteria (refer **Table 27**) as presented in **Table 29**. The relative increases in the daytime and night-time traffic noise from the incremental increase in Moolarben Coal Complex traffic have been used to update these nominal minimum offset distances (**Table 29**).

Table 29 Nominal Offset Distance to Meet the Total Traffic Noise Criteria

Scenario	Offset Distance ¹	Leq(15hour) ²	Leq(9hour) ²
Existing (2012)	20.5 m	60 dBA	-
	35.0 m	-	55 dBA

Cumulative 2017 (excluding Modification Increment)	32.5 m	60 dBA	-
	55.6 m	-	55 dBA
Cumulative 2017 plus Modification Increment	34.0 m	60 dBA	-
	60.6 m	-	55 dBA

Note 1: Offset distance from the centre of Ulan Road

Note 2: Total traffic noise level inclusive of 2.5 dBA facade correction.

Based on the offset distances presented in **Table 29** a total of three residential dwelling in the study area (ie numbers 6, 8 and 10) are within 55.6 m of the Ulan Road and therefore likely to receive night-time $Leq(9hour)$ traffic noise levels above the total traffic noise criteria of 55 dBA due to the predicted cumulative 2017 traffic excluding the incremental increase sought by the Modification. The Ulan Road Strategy (ARRB Group, 2012) also predicted these three residential dwellings would receive night-time $Leq(9hour)$ traffic noise levels above the total traffic noise criteria of 55 dBA

Based on the offset distances presented in **Table 29** two residential dwellings in the study area (ie number 6 and 10) are within 32.5 m of the Ulan Road and therefore likely to receive daytime $Leq(15hour)$ traffic noise levels above the total traffic noise criteria of 60 dBA due to the cumulative 2017 traffic excluding the incremental increase sought by the Modification.

The Ulan Road Strategy (ARRB Group, 2012) provides a mechanism for owners and residents of properties identified as at risk from increased cumulative road noise to be contacted to discuss the opportunities for noise attenuation treatments.

Based on the offset distances presented in **Table 29** for the cumulative 2017 traffic including the incremental increase sought by the Modification, no additional dwellings are predicted to exceed the total road traffic noise criteria due to the Modification within the study area.

Based on the above results, and the fact that Modification traffic increases would peak in 2017 and are modest in comparison to traffic baseline levels, no traffic noise evaluation for dwellings located on Ulan Road and south of the study area is warranted.

11 OFF-SITE RAIL TRANSPORT

The Modification proposes an increase in the average number of daily rail departures from five to seven with an associated increase in the maximum daily rail departures to nine.

11.1 Rail Generating Developments Noise Assessment Criteria

The ARTC operates the Hunter Valley Rail Network in NSW and the extent of the network is shown in the Hunter Valley Network Corridor Diagram attached as **Appendix H1**. Noise emissions from the ARTC's railways are regulated via their EPL No 3142, revision date 26 February 2014 (refer **Appendix H2**).

In addition, the EPA RING (EPA, May 2013) specifies noise and vibration trigger levels for (new and existing) heavy and light rail infrastructure projects. However, land use developments other than rail infrastructure projects (ie mining and extractive industries) that are likely to generate additional rail traffic on an existing rail network (ie the Modification) with potential noise impacts are assessed against the requirements detailed in the RING Appendix 2 (refer **Appendix H3**).

As a result, the rail noise assessment criteria from the ARTC's EPL and EPA's RING (Appendix 2) are now similar and the Modification has been assessed against the requirements of the RING (Appendix 2). The rail noise assessment trigger levels are reproduced **Table 30**.

Table 30 RING (Appendix 2) Rail Noise Assessment Trigger Levels

Railway	Descriptor	Rail Noise Assessment Trigger Levels
Main North, Merriwa and Gulgong to Sandy Hollow lines	Daytime/evening LAeq(15hour)	65 dBA
	Night-time LAeq(9hour)	60 dBA
	Maximum Pass-by [LAmax (95 th percentile)]	85 dBA

Note: 95th percentile equates to the 5% exceedance value.

The following rail noise assessment considers train movements along the Gulgong to Sandy Hollow railway line and in particular any rail noise impacts at nearest privately owned receivers in the vicinity of the Moolarben Coal Complex as shown in **Table 31**.

Table 31 Nearest Potentially Affect Receivers to Gulgong to Sandy Hollow Railway Line

Village Area	Number of Receivers (ID) ¹	Offset Distance to Railway
Ulan	1 (11b)	5,629 m
Araluen ¹	1 (640)	640 m
Wollar ¹	10 (903 to 953)	770 m to 1785 m
Mogo ¹	1 (102)	4,415 m
Barigan ¹	2 (160A to 160B)	535 m to 880 m

Note 1: Refer to the Wilpinjong Coal Project (Modification 6).

11.2 Gulgong to Sandy Hollow Railway Traffic

The existing, approved, operating and proposed daytime, night-time and 24 hour train movements are presented in **Table 32** together with the estimated operating conditions whilst travelling on the Gulgong to Sandy Hollow Railway. The train movement analysis assumes that the existing and approved Cobbora, Ulan, Moolarben and Wilpinjong mines operate at approved capacities and the cumulative coal train movements are unconstrained by the existing railway capacity.

Table 32 Gulgong to Sandy Hollow Railway Train Movements¹

Status	Train Type	Train Movements						Train Length (m)	Train Speed (kph)
		Daytime		Night-time		24 Hours			
		Mean	Peak	Mean	Peak	Mean	Peak		
Existing	Passenger	0	0	0	0	0	0	-	-
	Freight	2	2	0	0	2	2	850	60
Approved Mine	Cobbora Coal Project	10	11	2	3	12	14	1543	60
Operating Mines	Ulan Continued Operations ²	9	14	5	6	14	20	1543	60
	Moolarben Stage 1 & Stage 2 ³	7	7	3	3	10	10	1543	60
	Wilpinjong Coal Project ⁴	9	14	3	6	12	20	1543	60
Proposed Modification	Moolarben UG1 Optimisation	3	6	1	2	4	8	1543	60
Cumulative Existing + Approved/Operating Mines		37	48	13	18	50	66		
Cumulative Existing + Approved/Operating Mines + the Modification		40	54	14	20	54	74		
Existing + Unconstrained Cumulative Approved/Operating Mines		37	48	13	18	50	66		
The Modification		3	6	1	2	4	8		
Existing + Unconstrained Cumulative Approved/Operating Mines + the Modification		40	54	14	20	54	74		
% Increase due to the Modification		8%	13%	8%	11%	8%	12%		

Note 1: Two movements equals one arrival and departure of a single train.

Note 2: Ulan Coal Continued Operations Noise and Vibration Assessment, Wilkinson Murray Pty Ltd, 2009.

Note 3: Moolarben Coal Project Environmental Assessment Report, Wells Environmental Services, 2009.

Note 4: Wilpinjong Coal Mine Rail Traffic Noise Impact Assessment, SLR Consulting Australia Pty Ltd, 2011.

As can be seen from **Table 32**, on average the percentage increase due to the Modification would comprise less than 10% of (unconstrained) cumulative train movements along the railway.

11.3 Noise Modelling Methodology

The calculation of the daytime and night-time equivalent continuous noise levels and the maximum pass-by levels have been conducted using the Nordic Rail Prediction Method (1994) with corrections for NSW trains (SLR Consulting Australia Pty Ltd, 2007). The noise predictions from the modified method have been previously accepted by proponents, the NSW EPA and NSW DP&E.

The prediction model uses characteristic noise levels for the various sources (locomotive engine and exhaust noise as a function of throttle notch, wheel/rail noise as a function of train speed, and wagon type, etc) at a fixed reference distance. The model then makes adjustments for the train length, distance from the track (assuming no barriers), angle of view (assuming 180 degrees) and facade reflection. Parameters including the daytime LAeq(15hour), night-time LAeq(9hour) and maximum (5% exceedance) pass-by level, can then be determined by summing the effects of the individual noise sources and by incorporating the number of train events.

Note, the model assumes no intervening structures (ie existing topography, buildings and the like), therefore, the predicted noise levels are indicative and in some cases likely to be conservative at some receiver distances.

11.4 Gulgong to Sandy Hollow Railway Noise Prediction

11.4.1 Daytime Operations

The daytime LAeq(15hour) and maximum (5% exceedance) pass-by noise levels for the existing and approved rail traffic are presented in **Table 33** together with the cumulative existing, approved and the Modification. Train movements are considered on an average and peak basis.

Table 33 Daytime Predicted Rail Traffic Noise (dBA re 20 µPa)

Distance to Receiver	Existing + Unconstrained Cumulative Approved/Operating Mines			Existing + Unconstrained Cumulative Approved/Operating Mines + the Modification			Increase in Noise Levels	
	Average LAeq(15hour)	Peak LAeq(15hour)	Passby Maximum	Average LAeq(15hour)	Peak LAeq(15hour)	Passby Maximum	Average LAeq(15hour)	Peak LAeq(15hour)
30 m	66	67	89	67	68	89	0.3	0.5
60 m	63	64	86	64	65	86	0.3	0.5
90 m	62	63	84	62	63	84	0.3	0.5
120 m	60	61	82	61	62	82	0.3	0.5
150 m	59	60	81	60	61	81	0.3	0.5

Note 1: Train movements are considered on an average and peak basis.

The following assessments are derived from the predicted rail traffic noise levels:

- A comparison of the existing/approved average LAeq(15hour) rail noise with the cumulative existing/approved and the Modification levels indicates that the daytime rail noise would increase by up to 0.3 dBA.
- The existing/approved average LAeq(15hour) rail noise meets the 65 dBA criterion at a distance of 37 m (and greater). The cumulative existing/approved and the Modification average LAeq(15hour) rail noise level meets the 65 dBA criterion at a distance of 40 m (and greater).
- A comparison of the existing/approved peak LAeq(15hour) rail noise with the cumulative existing/approved and the Modification levels indicates that the daytime rail noise would increase by up to 0.5 dBA.
- The existing/approved peak LAeq(15hour) rail noise meets the 65 dBA criterion at a distance of 48 m (and greater). The cumulative existing/approved and the Modification peak LAeq(15hour) rail noise meets the 65 dBA criterion at a distance of 54 m (and greater).
- The existing/approved maximum pass-by noise level would remain unchanged due to the Modification and other proposed trains and would continue to meet the criterion of 85 dBA at a distance of 61 m (and greater).
- All privately owned receivers in the vicinity of the Modification (ie Ulan, Araluen, Wollar, Mogo and Barigan villages) are located well beyond 61 m from the Gulgong to Sandy Hollow railway line.

11.4.2 Night-time Operations

The night-time LAeq(9hour) and maximum (5% exceedance) pass-by noise levels for the existing and approved rail traffic are presented in **Table 34** together with the cumulative existing, approved and the Modification. Train movements are considered on an average and peak basis.

Table 34 Night-time Predicted Rail Traffic Noise (dBA re 20 µPa)

Distance to Receiver	Existing + Unconstrained Cumulative Approved/Operating Mines			Existing + Unconstrained Cumulative Approved/Operating Mines + the Modification			Increase in Noise Levels	
	Average LAeq(9hour)	Peak LAeq(9hour)	Passby Maximum	Average LAeq(9hour)	Peak LAeq(9hour)	Passby Maximum	Average LAeq(9hour)	Peak LAeq(9hour)
30 m	64	65	87	64	66	87	0.3	0.5
60 m	61	62	84	61	63	84	0.3	0.5
90 m	59	61	82	60	61	82	0.3	0.5
120 m	58	59	80	58	60	80	0.3	0.5
150 m	57	58	79	57	59	79	0.3	0.5

Note 1: Train movements are considered on an average and peak basis.

The following assessments are derived from the predicted rail traffic noise levels:

- A comparison of the existing/approved average LAeq(9hour) rail noise with the cumulative existing/approved and the Modification levels indicates that the night-time rail noise would increase by up to 0.3 dBA.
- The existing/approved average LAeq(9hour) rail noise meets the 60 dBA criterion at a distance of 68 m (and greater). The cumulative existing/approved and the Modification average LAeq(15hour) rail noise level meets the 60 dBA criterion at a distance of 73 m (and greater).
- A comparison of the existing/approved peak LAeq(9hour) rail noise with the cumulative existing/approved and the Modification levels indicates that the night-time rail noise would increase by up to 0.5 dBA.
- The existing/approved peak LAeq(9hour) rail noise meets the 60 dBA criterion at a distance of 94 m (and greater). The cumulative existing/approved and the Modification peak LAeq(9hour) rail noise meets the 60 dBA criterion at a distance of 105 m (and greater).
- The existing/approved maximum pass-by noise level would remain unchanged due to the Modification and other proposed trains and would continue to meet the criterion of 85 dBA at a distance of 40 m (and greater).
- All privately owned receivers in the vicinity of the Modification (ie Ulan, Araluen, Wollar, Mogo and Barigan villages) are located well beyond 105m from the Gulgong to Sandy Hollow railway line.

11.5 Summary Impact Assessment

In accordance with the requirements of the RING Appendix 2 (refer **Appendix H3**), where the cumulative rail noise level exceeds the noise assessment trigger levels and project related noise increases greater 0.5 dBA are predicted, all feasible and reasonable noise mitigation measures should be implemented.

As a general principle, where the reduction of existing noise levels can be achieved through feasible and reasonable measures, a reduction in noise levels to meet the noise assessment trigger levels is the primary objective. In all cases where the LAeq noise level increases are more than 2 dBA, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

In this case however, there are no Modification related rail noise level increases greater than 0.5 dBA at the nearest potentially affected villages in the vicinity of the Moolarben Coal Complex. Furthermore the nearest potentially affected villages of Ulan (1 receiver), Araluen (1 receiver), Wollar (10 receivers), Mogo (1 receivers), and Barigan (2 receivers) are located well beyond rail noise affected areas for daytime and night-time rail movements on an average, peak and maximum passby basis.

Notwithstanding the foregoing, there remains some concern in the community about potential noise increases on the greater rail network as a result of increased coal haulage but the EPA acknowledges that a strategic approach is needed to the assessment and management of noise generated on the rail network. The management of coal transportation by rail is the responsibility of the ARTC and is regulated by EPL 3142. Similarly, rail freight operators are responsible for maintaining their fleets to ensure consistency with operational standards. The ARTC is committed to developing and funding a noise abatement program, similar to that operated by the Roads and Maritime Services. Such a program has yet to be implemented but would help meet the objectives of their EPL to progressively reduce noise levels at potentially affected residential properties.

12 SUMMARY OF FINDINGS

12.1 Noise Assessment Criteria

12.1.1 Construction Assessment Criteria

Construction of the proposed UG1 Surface Infrastructure Areas are anticipated to be carried-out in 2016 and would generally be restricted to daylight hours (ie 0700 hours to 1800 hours) up to seven days a week. The EPAs *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) suggests that mining related on-site construction noise be assessed in accordance with the INP. The predicted 2016 daytime intrusive construction noise levels have therefore been assessed cumulatively with the anticipated 2016 daytime intrusive mine operating noise levels as determined for the OC4 South-West Modification NIA.

12.1.2 Operating Assessment Criteria

The NSW EPA has regulatory responsibility for the control of noise from “scheduled premises” under the *Protection of the Environment Operations Act 1997*. In implementing the INP, 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.

In accordance with the INP’s Chapter 2 Industrial Noise Criteria and associated Application Notes dated 12 June 2013, the PSNLs for the residential, industrial and other localities are presented in **Table 35** for intrusive noise and amenity levels. These criteria are nominated for the purposes of assessing potential noise impacts from the Modification.

Table 35 Project Specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive LAeq(15minute) ¹			Amenity LAeq(period) ¹		
		Day	Evening	Night	Day	Evening	Night
Privately Owned Land	Rural Residential ²	35	35	35	50	45	40
Any	School ³	Intrusive noise criteria not applicable			External 45 when in use		
Any	Church, Hall ³	Intrusive noise criteria not applicable			External 50 when in use		
Any	Passive Recreation	Intrusive noise criteria not applicable			External 50 when in use		
Any	Commercial	Intrusive noise criteria not applicable			External 65 when in use		

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 2: At the most-affected point within 30 m of the residential area.

Note 3: External criteria equivalent to internal criteria plus 10 dBA.

The INP states that the PSNLs have been selected to preserve the amenity of at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable.

12.1.3 Sleep Disturbance Assessment Criteria

The INP Application Notes dated 12 June 2013 suggest that the LA1(1minute) level of 15 dBA above the RBL is a suitable criterion for assessing sleep disturbance for the night-time period. The Modification night-time LA1(1minute) SDNLs are presented in **Table 36** together with the comparable approved LA1(1minute) noise limit.

Table 36 Night-time LA1(1minute) Sleep Disturbance Noise Levels (dBA re 20 µPa)

Locality	Project Approval LA1(1minute) Limit ¹	Proposed Modification LA1(1minute) Criteria ¹
Privately Owned Land	45	45

Note 1: Monday to Saturday 2200 hours to 0700 hours; Sundays and Public Holidays 2200 hours to 0800 hours.

12.1.4 INP Assessable Meteorological Conditions

An assessment of the Site Meteorological Measurement Methodology was prepared for the Modification (**Appendix D**) based on the analysis of the wind velocity from the EPA approved AWS located at WS3. An assessment of winter temperature gradients and atmospheric stability has been derived from the on-site Temperature Tower located at Wilpinjong Coal Mine. The INP assessable meteorological noise modelling parameters are presented in **Table 9**.

12.1.5 Noise Impact Assessment Methodology

Table 30 presents the methodology for assessing the Modification operating noise levels against the intrusive and amenity PSNLs and the LA1(1minute) SDNLs together with cumulative amenity noise levels (**Table 12**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of the Modification.

Table 37 Modification and Cumulative Mine Noise Impact Assessment (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone ¹		Noise Affatation Zone
			Marginal	Moderate	
Modification	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria ²
	PSNL Amenity	INP acceptable			
	SDNL LA1(1minute)	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria ³

Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).

Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.

Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

12.1.6 Noise Control and Management Measures

MCO is obligated to manage noise levels from the Moolarben Coal Complex in accordance with the Project Approval noise limits 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 during the night.
- For a minority of private landowners, property acquisitions and private compensation agreements and 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.

Further detail regarding the Moolarben Coal Complex noise management strategy and MCO's recent compliance with the noise limits specified in MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135) is provided in **Section 2.3**. MCO would continue to meet its obligation to comply with the noise limits specified in MCP Stage 1 Project Approval (05_0117) and MCP Stage 2 Project Approval (08_0135) through the continued implementation of the noise management strategy. This would include the continuation of real-time monitoring, and the stand-down of equipment, as required, as part of the response to an exceedance of the Real-Time Response Trigger Levels.

12.2 Modification and Cumulative Mine Operating Noise Impact Assessment

12.2.1 Privately Owned Receivers and Vacant Land

The exceedances at privately owned receivers of the PSNLs, SDNLs, and INP's acceptable noise amenity levels are presented in **Table 38** together with the Project Approval noise limits.

Table 38 Summary of Criteria Exceedances at Privately Owned Receivers¹ and Vacant Land

Exceedance Range	1 to 2 dBA above PSNL	3 to 5 dBA above PSNL	> 5 dBA above PSNL	
Intrusive LAeq(15minute)	70 Coventry 75 Ban 258 Elias	63 Whiticker ²	-	
Exceedance Range	1 to 2 dBA above SDNL	3 to 5 dBA above SDNL	> 5 dBA above SDNL	
Sleep Disturbance LA1(1minute)	-	-	-	
Exceedance Range	1 to 2 dBA above PSNL	3 to 5 dBA above PSNL	> 5 dBA above PSNL	
Amenity LAeq(period)	-	-	-	
Exceedance Range	1 to 2 dBA above INP Acceptable	3 dBA above INP Acceptable	> 3 dBA above INP Acceptable	
Cumulative Amenity LAeq(period)	-	-	-	
Exceedance Range	Intrusive LAeq(15minute)	Sleep Disturbance LA1(1minute)	Amenity LAeq(period) (ie school, hall, church)	Land Acquisition LAeq(15minute)
Project Approval Noise Limits	258 Elias	-	-	-

Note 1: Refer **Appendix C3**.

Note 2: Receiver subject to a private agreement with MCO.

In summary, during the daytime, evening and night-time, no privately owned receivers are predicted to exceed the relevant amenity PSNL, intrusive PSNL or maximum SDNL, except for four privately owned receivers (**Table 38**).

Marginal noise exceedances of 1 to 2 dBA above intrusive PSNL 35 dBA are predicted at privately owned receivers 70 Coventry, 75 Ban and 258 Elias and a moderate noise exceedance of 4 dBA above intrusive PSNL 35 dBA is predicted at privately owned receiver 63 Whiticker. Receiver 63 is subject to a private agreement with MCO.

No exceedance of the current Project Approval noise limits are predicted at any privately owned receivers or vacant land in 2018 based on the continued implementation of the noise management strategy except at 258 Elias where a marginal exceedance of 1 dBA has been predicted.

The additional infrastructure proposed for the Modification would only result in a small increase in noise levels at some of the nearest receivers of up to 1 dBA.

12.2.2 Review of the Noise Management Measures

MCO is committed to maintaining an awareness of best practice noise mitigation technologies and alternative operating methodologies. MCO implement 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.

The existing EMS and NMP are currently being updated to incorporate the Stage 2 Project Approval (08_0135). The NMP would be updated as necessary to incorporate the Modification.

12.3 Road Traffic Generating Developments Noise Assessment Summary

In accordance with the requirements of the RNP and associated Application Notes (refer **Appendix G**), where the road noise level exceeds the relevant total traffic noise criteria or the Modification related traffic noise increases greater 2 dBA are predicted, all feasible and reasonable noise mitigation measures should be considered. In this case however, there are no Modification related road noise level increases greater than 2 dBA along the section of Ulan Road south of the Cope Road and north of Wollar Road (ie in the vicinity of Cooks Gap).

Based on the offset distances presented in **Table 29** a total of three residential dwelling in the study area (ie numbers 6, 8 and 10) are within 55.6 m of the Ulan Road and therefore likely to receive night-time $Leq(9hour)$ traffic noise levels above the total traffic noise criteria of 55 dBA due to the predicted cumulative 2017 traffic excluding the incremental increase sought by the Modification. The Ulan Road Strategy (ARRB Group, 2012) also predicted these three residential dwellings would receive night-time $Leq(9hour)$ traffic noise levels above the total traffic noise criteria of 55 dBA

Based on the offset distances presented in **Table 29** two residential dwellings in the study area (ie number 6 and 10) are within 32.5 m of the Ulan Road and therefore likely to receive daytime $Leq(15hour)$ traffic noise levels above the total traffic noise criteria of 60 dBA due to the cumulative 2017 traffic excluding the incremental increase sought by the Modification.

The Ulan Road Strategy (ARRB Group, 2012) provides a mechanism for owners and residents of properties identified as at risk from increased cumulative road noise to be contacted to discuss the opportunities for noise attenuation treatments.

12.4 Rail Traffic Generating Developments Noise Assessment Summary

In accordance with the requirements of the RING Appendix 2 (refer **Appendix H3**), where the cumulative rail noise level exceeds the noise assessment trigger levels and project related noise increases greater 0.5 dBA are predicted, all feasible and reasonable noise mitigation measures should be implemented.

In this case however, there are no Modification related rail noise level increases greater than 0.5 dBA at the nearest potentially affected villages in the vicinity of the Moolarben Coal Complex. Furthermore the nearest potentially affected villages of Ulan (1 receiver), Araluen (1 receiver), Wollar (10 receivers), Mogo (1 receivers), and Barigan (2 receivers) are located well beyond rail noise affected areas for daytime and night-time rail movements on both an average and peak basis.

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NOISE**Noise Criteria****Acquisition Upon Request**

- 1A. Upon receiving a written request for acquisition from an owner of the land listed in Table 1A, the Applicant shall acquire the land in accordance with the procedures in conditions 10 and 11 of Schedule 4.

Table 1A: Land subject to acquisition upon request

Receiver ID
32

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

Transitional Acquisition and Mitigation Arrangements

- 1B. Any receiver that had made a written request for acquisition or mitigation prior to the determination of Modification 3, on 30 January 2015 shall be granted the acquisition or mitigation options in accordance with the condition that applied at the date of that request.

Note: Receivers 30, 63, 70, 75 and 31 were granted mitigation on request rights with the approval of Modification 9 in June 2014. A new Voluntary Land Acquisition and Mitigation Policy was gazetted on 19 December 2014, consequently the conditions have been updated to reflect the new policy, however transitional arrangements are provided for the owners of any privately owned land, if a written request for acquisition or mitigation had already been made, prior to the determination of Modification 3.

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	
	$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{A1}(1min)$
30, 63	39	39	39	45
70	37	37	37	45
75	36	36	36	45
31	36	35	35	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		-
Ulan Catholic Church		35 (internal) when in use		-
Goulburn River National Park		50		-
Munghorn Gap Nature Reserve				-

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

Noise generated by the complex is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. 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 at any residence on privately-owned land, 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

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Receiver ID	Day <i>(L_{Aeq} (15min))</i>	Evening <i>(L_{Aeq} (15min))</i>	Night <i>(L_{Aeq} (15min))</i>
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 <i>L_{Aeq}(period)</i>	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 Industrial Noise Policy. 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 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 3A: Mitigation criteria dB(A) L_{Aeq} (15min)

Receiver ID	Day <i>(L_{Aeq} (period))</i>	Evening <i>(L_{Aeq} (15min))</i>	Night <i>(L_{Aeq} (15min))</i>
63	40	40	39
All other privately owned residences	37	37	37

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

Mitigation Upon Request

5. Upon receiving a written request from the owner of the residence on the land listed in Table 3, 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 complex 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 3: Land subject to additional noise mitigation upon request

Receiver ID
30

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

Operating Conditions

6. The Proponent shall:
- implement best management practice to minimise the operational, road and rail noise of the project;
 - 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

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- 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 (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:

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- (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:
- (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and
 - (b) 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:
- (a) 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;
 - (b) operate a suitable system to enable the public to get up-to-date information on the proposed blasting Schedule on site; and
 - (c) 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:
- (a) any public road;
 - (b) the Gulgong to Sandy Hollow Railway Line;
 - (c) the Wollar-Wellington 330kV Transmission Line; or
 - (d) 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

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- 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:
- (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 blast criteria and operating conditions of this approval;
 - (c) propose and justify any alternative ground vibration limits for public infrastructure in the vicinity of the site (if relevant); and
 - (d) include a monitoring program for evaluating compliance with the blasting criteria and operating conditions of this approval.

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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 Industrial Noise Policy, unless a suitable alternative is approved by the Secretary following consultation with the EPA.

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**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) during periods of rain or hail;~~
 - ~~(b) average wind speed at microphone height exceeds 5 m/s;~~
 - ~~(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or~~
 - ~~(d) temperature inversion conditions greater than 3°C/100 m.~~

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

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 approval.
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 Industrial Noise Policy (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.

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NOISE**Acquisition Upon Request**

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Applicant shall acquire the land in accordance with the procedures in conditions 5 and 6 of Schedule 5.

Table 1: Land subject to acquisition upon request

Receiver ID
32

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

Mitigation Upon Request

2. Upon receiving a written request from the owner of any residence on the land listed in Table 2, 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 2: Residence subject to additional noise mitigation upon request

Receiver ID
30

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

Noise Criteria

3. 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	
	$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{Aeq}(15min)$	$L_{A1}(1min)$
30, 63	39	39	39	45
70	37	37	37	45
75	36	36	36	45
31	36	35	35	45
All other privately-owned residences	35	35	35	45
Ulan Primary School		35 (internal) when in use		-
Ulan Anglican Church Ulan Catholic Church		35 (internal) when in use		-
Goulburn River National Park Munghorn Gap Nature Reserve		50		-

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 Industrial Noise Policy*. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

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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

4. If the noise generated by the Moolarben mine complex exceeds the criteria in Table 4 at any residence on privately-owned land, 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_{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 4, see the applicable figures in Appendix 5.

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

Day/Evening/Night L_{Aeq} (period)	Receiver
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 Industrial Noise Policy. 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

6. 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_{Aeq} (15min)

Receiver ID	Day (L_{Aeq} (15min))	Evening (L_{Aeq} (15min))	Night (L_{Aeq} (15min))
63	40	40	39
All other privately owned residences	37	37	37

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

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Operating Conditions

7. The Proponent shall:
- implement best management practice to minimise the operational and road noise of the project;
 - 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;
 - minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 6);
 - 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;
 - co-ordinate noise management at the Moolarben mine complex with the noise management at Ulan and Wilpinjong mines to minimise cumulative noise impacts; and
 - 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

8. The Proponent shall prepare and implement a Noise 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 the commencement of any development on site under this approval;
 - describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - describe the proposed noise management system in detail; and
 - 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**

9. 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

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
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 (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.

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Blasting Hours

10. 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

11. 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, 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

12. 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

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:
- (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and
 - (b) 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:
- (a) 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;
 - (b) ensure that blasting on the site does not damage Aboriginal rock shelter sites S2MC229 (AHIMS No. 36-3-1376), S2MC232 (AHIMS No. 36-3-1379) or S2MC233 (AHIMS No. 36-3-1380);

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- (c) operate a suitable system to enable the public to get up-to-date information on the proposed blasting Schedule on site; and
- (d) 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.

Note: To identify the Aboriginal rock shelter sites, see the applicable figure in Appendix 8.

15. The Proponent shall not undertake blasting on site within 500 metres of:
- (a) any public road;
 - (b) the Gulgong to Sandy Hollow Railway Line;
 - (c) the Wollar-Wellington 330kV Transmission Line; or
 - (d) 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:
- (a) be prepared in consultation with the EPA, and submitted to and approved by the Secretary prior to conducting any blasting on site;
 - (b) describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this approval;
 - (c) propose and justify any alternative ground vibration limits for public infrastructure in the vicinity of the site (if relevant); and
 - (d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria and operating conditions of this approval.

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 Industrial Noise Policy*, 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

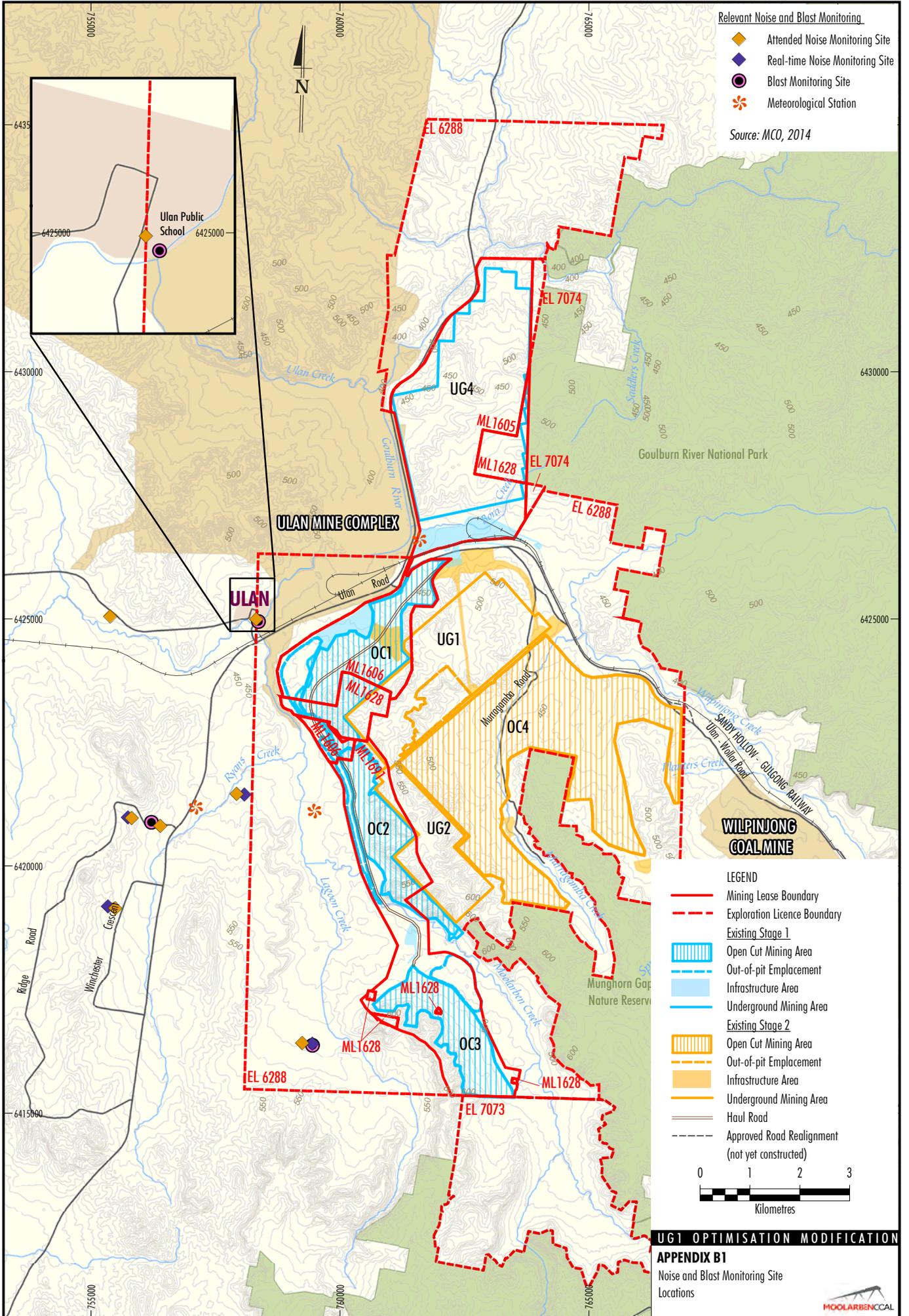
3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. This monitoring must be carried out at least 12 times a year, unless the Secretary directs otherwise.
5. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (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.

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NOISE MONITORING LOCATION PLAN

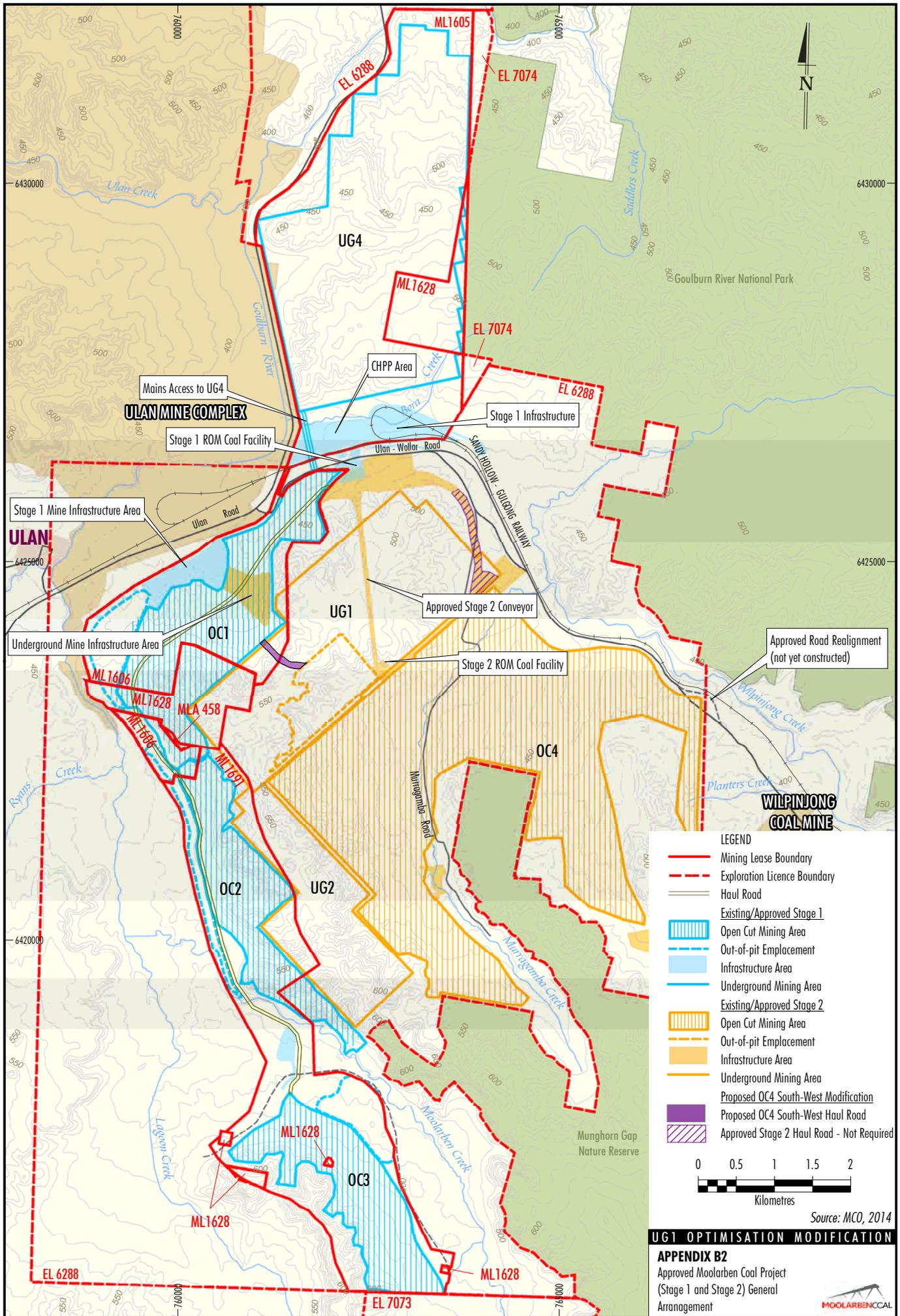


Appendix B2

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EXISTING GENERAL ARRANGEMENT PLAN STAGE 1 AND STAGE 2



LEGEND

- Mining Lease Boundary
- - - Exploration Licence Boundary
- Haul Road
- Existing/Approved Stage 1
- Open Cut Mining Area
- Out-of-pit Employment
- Infrastructure Area
- Underground Mining Area
- Existing/Approved Stage 2
- Open Cut Mining Area
- Out-of-pit Employment
- Infrastructure Area
- Underground Mining Area
- Proposed OC4 South-West Modification
- Proposed OC4 South-West Haul Road
- Approved Stage 2 Haul Road - Not Required

0 0.5 1 1.5 2
Kilometres

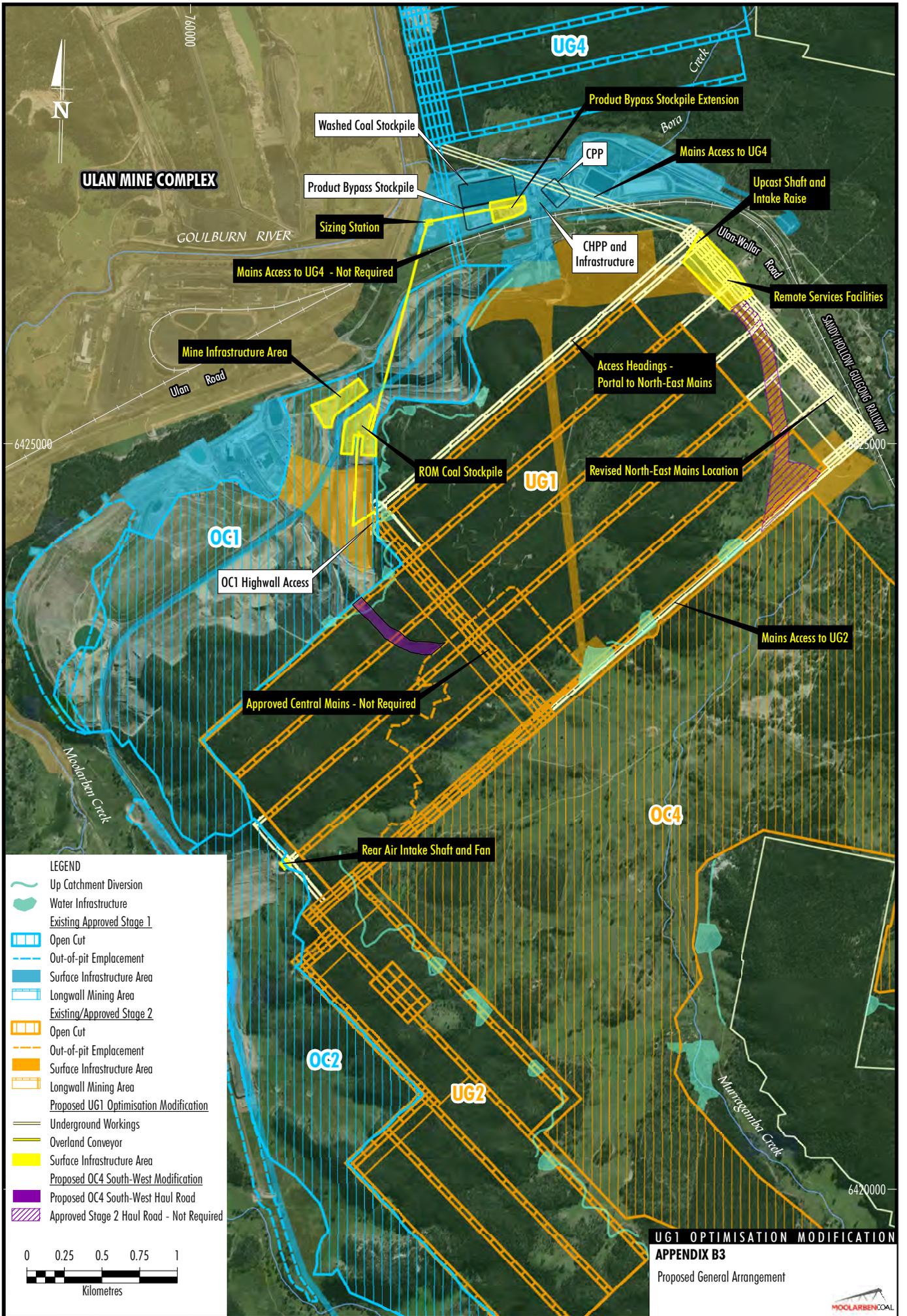
Source: MCO, 2014

UG1 OPTIMISATION MODIFICATION

APPENDIX B2
Approved Moolarben Coal Project
(Stage 1 and Stage 2) General
Arrangement



PROPOSED GENERAL ARRANGEMENT PLAN INCORPORATING THE MODIFICATION



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LAND OWNERSHIP PLAN

Appendix C2

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RELEVANT LAND OWNERSHIP LIST

Ref No	Landholder	Ref No	Landholder	Ref No	Landholder
9	Orica Australia Pty Limited	114	TF & K Holland	218	GF & GEL Soady
11	JE Mullins & CD Imrie	115	AK & BH Ouinn	219	T & S Riger
26	Forty North Pty Limited	116	DJ & SM Reid	220	SJ Rusten & NJ Smith
30	RB Cox	117	JM Dick	222	BJ Purtell
31	MB Cox	118	A Scott	223	EW Palmer & JM Stewart
32	DJ & JG Stokes	119	PJ Kearns	224	RS & PCC Dupond
34	J Asztalos	120	PS & DR Ord	225	G & RF Doualetas
37	J Szymkarczuk	121	EJ Cullen	226	LAA & FC Muscat
39	RM & DJ Sprigg	122	WF Wirth	227	WP & JA Hughes
40	JM Devenish	123	ND Sullivan	229	JJ & BA Lowe
41	PP Libertis	124	WJ & HE Bailey	230	DA Hoole & DT Rawlinson
42	C & L Schmidt	125	DB McBride	231	T Morrison & SM Benny
46	North Eastern Wiradjuri Wilpinjong Community Fund Limited	126	MP Julian	232	L & JA Haaring
47	SF & MR Andrews	127	BKT & SA Bracken	233	K & D Boal
53	WD & MS Bryant	128	AW Sims	234	D & L Gaw
54	MA & C Harris	129	M Yelds	235	LM & RS Wilson
56	MJ & V Cundy	130	GP McEwen	236	RG & CA Donovan
59	G & GM Szymkarczuk	131	GR & RA King	237	A Puskaric
60	CL Rayner & DM Munday	132	N Atkins	238	B Powell
61	MA Miller	149	Mid-Western Regional Council	240	GJ & DM Hartley
62	R Menchin	160	Minister For Education And Training	244	JT & YR Jones
63	BF & B Whiticker	162	DM Harrison	245	MP & KLE Cresham
66	Rostherne Pty Limited	168	PJL Constructions Pty Limited	247	J & K Batshon
70	DJ & A Coventry	171	AD & SA McGregor	248	G Boustani
75	P Ban	178	PR Stone	249	CJ & JI Eldridge
76	SR & PC Carbone	180	CD & LL Barrett	251	NF Potter & CE Selley
79	PTJ & SE Nagle	181	SM Forster	255	HJ & H Schmitz
80	W & D Sebelic	182	J Dutoitcook	256	RC Campbell
82	SC Hungerford & MC Clemens	183	R & EA Steines	258	PM & CD Elias
83	CF & CR Wall	184	LA Stevenson	300	CM Collins & CY Marshall
84	DS Sebelic	186	RW & IJ Adamson	303	HJ Ungaro
85	J & Z Nikolovski	187	BT & KM Feeney	304	G Balajan
86	NW Harris	188	KR & T Fielding	305	L Barisic & M Aul
87	BJ & K Howe	189	M, M, D & A Goggin & J, A, P & R Hyde	306	E Armstrong
88	BC Meyers	190	T & LK Sahyoun	307	M Chant & NK Young
89	MV & HM Glover & E & BJ Tomlinson	191	BW & TS Lasham	308	NA Dower
90	SA Powell	192	D Williams	309	GS Maher
91	HM Graham	193	DJ Maloney	310	KI Death
92	VA Pullicino & J & S & G Bonnici	194	PM & K Potts	311	BJ & LC Williamson
93	F & M Fenech	195	R Cottam	312	MS & JJ Ioannou
94	LK Mittermayer	196	F Saxberg & M Weir	313	NJ & BDE Pracy
95	BJ Withington	198	GR & ME Metcalfe	314	SL Ford
96	D Lazicic	199	PGG & I Nielsen	315	WJ Richards & BJ Uzelac
97	DJ & MD Smith	200	VK Grimshaw	316	CR Vassel & CM Williams
98	ME & JJ Piper	201	KR & GM Towerton	317	RJ Hore & V Bingham
99	DE Jenner & WB Jensen	202	H & VF Butler	325	S & T Fevale
100	A Kapišta	203	DJ Miller	326	AW & LM Murray
101	RD & DMZ Hull	204	RB & JE Donnan	327	CA Tanner
102	KA Roberts	205	DW Sparrow & M Tallan	328	Essential Energy
103	SB Burnett & SL Grant	206	CA Marshall & R Vella	329	G Tuck-Lee
104	RA & LA Deeben	207	AA & DM Smith		
105	DJ & N Katsikaris	208	SA & CR Hasaart		
106	TB & JH Reid	209	F Mawson		
107	ZJ & M & AA Raso	210	JM & AM Tebutt		
108	R Varga	211	SA McGregor & WJ Gray		
109	DA Evans	212	E & M Lepik		
110	JT Thompson & HT Evans	213	D & J Parsonage		
111	GJ & NJ McEwan	214	RK & EG O'Neil		
112	MJ & LM Croft	215	SG & PM Green		
113	CPG Ratcliff	216	G Holland & FA Handicott		
		217	RP & JL Patterson		

Source: MCO, 2014

UG1 OPTIMISATION MODIFICATION

APPENDIX C2

Relevant Landholder List



LAND OWNERSHIP DETAILS

ID	Owner	Type	Easting (MGA)	Northing (MGA)	Elevation
Cooks Gap					
37	J Szymkarczuk	Private	756179	6417107	547
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
59	G & GM Szymkarczuk	Private	756886	6419210	538
60	CL Rayner and DM Munday	Private	756500	6418546	527
61	MA Miller	Private	756375	6418755	524
63 ^{1,2}	BF & B Whiticker	Private	756497	6420923	494
70 ²	DJ & A Coventry	Private	756132	6420692	510
75 ²	P Ban	Private	756012	6419777	513
76	SR & PC Carbone	Private	755920	6419546	517
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 Mittermayer	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	DE Jenner & WB Jensen	Private	755603	6416770	568
100	A Kapista	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	JT Thompson & HT Evans	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

LAND OWNERSHIP DETAILS

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	M Goggin & JA Hyde	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	RP & JL Patterson	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
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

LAND OWNERSHIP DETAILS

ID	Owner	Type	Easting (MGA)	Northing (MGA)	Elevation
236	RG & CA Donovan	Private	755165	6418738	557
237	A Puskaric	Private	755468	6418862	540
238	B Powell	Private	755497	6418969	537
240	GJ & DM Hartley	Private	755694	6419408	527
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
Moolarben Road					
30 ^{2,3}	RB Cox	Private	758435	6416631	496
31 ²	MB Cox	Private	760008	6416123	501
32	DJ & JG Stokes	Private	763590	6413194	544
35	PR Johnson & MS & GJ Thompson & PH & FH Debreczeny	Private	759021	6414840	541
47	SF & MR Andrews	Private	760293	6413734	561
Ulan					
11 (a)	JE Mullins & CD Imrie	Commercial	765376	6431622	388
11 (b)	JE Mullins & CD Imrie	Private	765265	6431931	380
11 (c)	JE Mullins & CD Imrie	Commercial	764784	6431839	393
255	HJ & H Schmitz	Private	754922	6425602	458
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: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer Appendices A1 and A2).

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

MOOLARBEN COAL COMPLEX METEOROLOGICAL SUMMARY

On-site Automatic Weather Station (AWS) - August 2011 to July 2014

Table D1 Seasonal Frequency of Occurrence Wind Speed Intervals - Daytime

Period	Calm (< 0.5 m/s)	Wind Direction (± 45°)	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	10.0%	ENE	13.1%	10.4%	23.4%
Summer	4.1%	ENE	12.7%	15.0%	27.7%
Autumn	12.9%	ENE	17.0%	11.8%	28.8%
Winter	16.4%	WSW	17.5%	13.3%	30.8%
		W	16.3%	13.8%	30.0%
Spring	6.1%	WSW	9.9%	12.4%	22.4%

Table D2 Seasonal Frequency of Occurrence Wind Speed Intervals - Evening

Period	Calm (< 0.5 m/s)	Wind Direction (± 45°)	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	19.1%	SW	28.7%	4.4%	33.0%
		WSW	26.1%	4.7%	30.8%
Summer	9.5%	ENE	14.8%	15.8%	30.6%
Autumn	24.7%	SSW	29.8%	1.8%	31.6%
		SW	32.1%	2.6%	34.7%
		WSW	27.6%	2.8%	30.3%
Winter	28.0%	SSW	29.6%	2.8%	32.3%
		SW	35.5%	5.0%	40.5%
		WSW	34.3%	6.1%	40.4%
		W	24.4%	6.1%	30.5%
Spring	13.1%	SSW	32.0%	5.3%	37.3%
		SW	37.1%	7.3%	44.4%
		WSW	34.5%	7.5%	42.1%

Table D3 Seasonal Frequency of Occurrence Wind Speed Intervals - Night-Time

Period	Calm (< 0.5 m/s)	Wind Direction (± 45°)	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	36.1%	SW	25.5%	1.9%	27.4%
Summer	25.7%	ENE	21.2%	15.9%	37.1%
		E	20.3%	16.0%	36.3%
Autumn	43.8%	SW	25.2%	1.3%	26.5%
Winter	44.7%	SW	29.4%	3.3%	32.7%
		WSW	28.4%	4.7%	33.1%
Spring	28.6%	SSW	34.6%	1.6%	36.1%
		SW	35.4%	2.1%	37.5%
		WSW	28.4%	2.3%	30.6%

Table D4 Winter Temperature Gradient Exceedance Level (Degrees C per 100 m) Summary

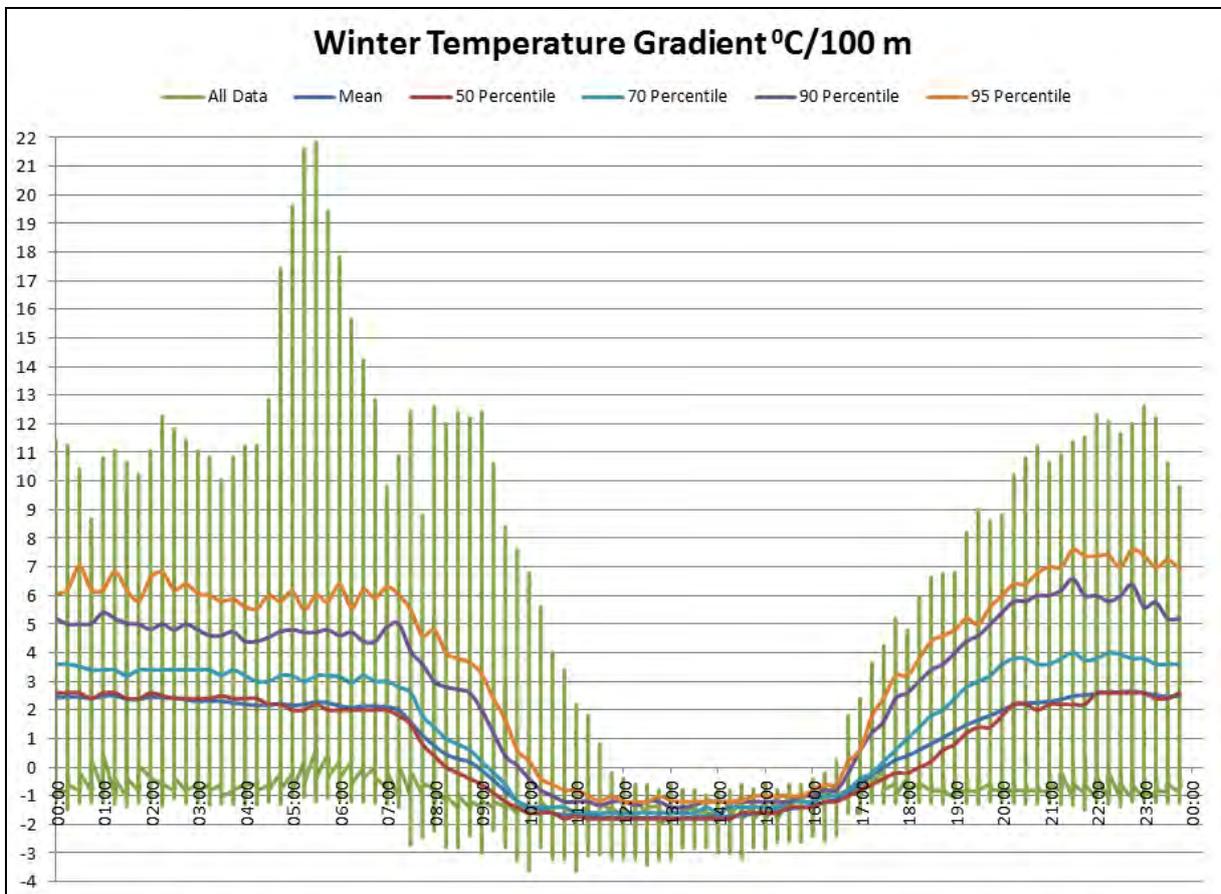
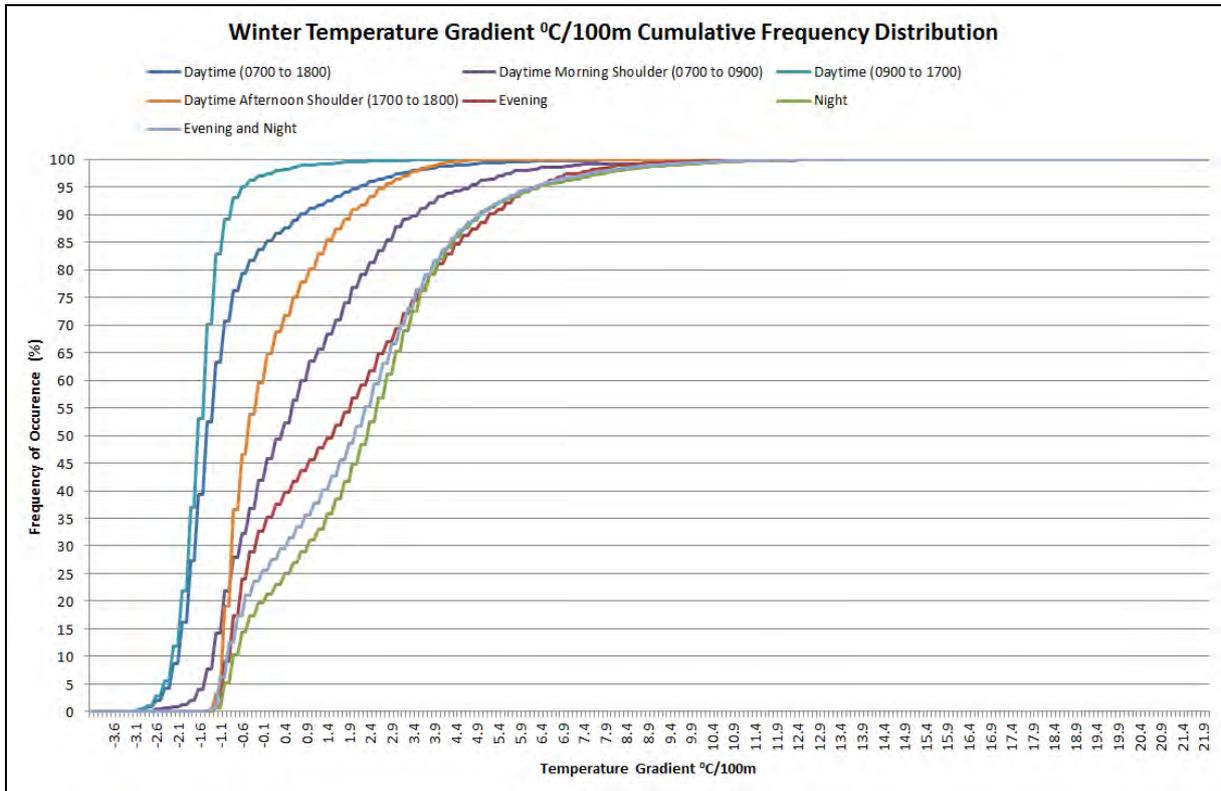
Daytime Exceedance			Evening Exceedance			Night-time Exceedance			Evening/Night-time Exceedance		
0700 to 1800 hours			1800 to 2200 hours			2200 to 0700 hours			1800 to 0700 hours		
50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%
-1.4	-1.0	0.8	1.6	3.2	5.2	2.4	3.4	5.0	2.2	3.4	5.2

Table D5 Morning Shoulder, Daytime and Afternoon Shoulder Exceedance

0700 to 0900 hours			0900 to 1700 hours				1700 to 1800 hours				
50%	30%	10%	5%	50%	30%	10%	5%	50%	30%	10%	5%
0.4	1.6	3.6	4.8	-1.6	-1.4	-0.8	-0.4	-0.4	0.4	2.0	2.8

MOOLARBEN COAL COMPLEX METEOROLOGICAL SUMMARY

On-site Automatic Temperature Tower (ATT) - August 2011 to July 2014



YEAR 2018 NIGHT-TIME OPERATING INTRUSIVE LAEQ(15MINUTE) NOISE CONTOUR

EVENING CUMULATIVE NOISE ASSESSMENT

In accordance with the INP Chapter 2 Industrial Noise Criteria (Section 2.2.4), the evening cumulative sum of the existing, approved and proposed developments LAeq(4hour) noise amenity levels have been determined as presented below.

Table F1 - Evening Cumulative (LAeq(4hour)) Noise Amenity Levels (dBA re 20 µPa)

ID No and Landholder		Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity
Cooks Gap						
37	Szymkarczuk	25	25	24	29	45
39	Sprigg	24	24	23	28	45
40	Devenish	24	25	24	29	45
41(a)	Libertis	25	24	23	29	45
41(b)	Libertis	26	25	23	30	45
59	Szymkarczuk	30	28	24	33	45
60	Rayner & Munday	25	27	24	30	45
61	Miller	27	27	24	31	45
63 ^{1,2}	Whiticker	34	30	24	35	45
70 ²	Coventry	32	29	23	34	45
75 ²	Ban	31	28	23	33	45
76	Carbone	30	28	23	33	45
79	Nagle	30	27	23	33	45
80	Sebelic	29	27	23	32	45
82	Hungerford & Clemens	27	27	24	31	45
83	Wall	27	26	23	31	45
84	Sebelic	27	26	24	30	45
86	Harris	27	26	23	30	45
87	Howe	26	26	23	30	45
88	Meyers	26	26	24	30	45
89	Glover & Tomlinson	26	26	23	30	45
90	Powell	26	25	23	30	45
91	Graham	25	25	23	30	45
94	Mittmayer	25	25	23	29	45
95	Withington	25	25	23	29	45
96	Lazicic	25	25	23	29	45
97	Smith	25	25	23	29	45
98	Piper	24	25	23	29	45
99	Jenner & Jensen	24	25	23	29	45
100	Kapista	24	25	23	29	45
101	Hull	23	24	23	28	45
102	Roberts	23	24	23	28	45
103	Burnett & Grant	24	24	23	29	45
104	Deeben	24	24	23	28	45
105	Katsikaris	23	24	23	28	45
106	Reid	24	24	23	28	45
107	Raso	23	24	23	28	45

EVENING CUMULATIVE NOISE ASSESSMENT

ID No and Landholder		Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity
109	Evans	23	24	23	28	45
110	Thompson & Evans	23	24	23	28	45
111	McEwan	23	24	23	28	45
112	Croft	23	24	23	28	45
113	Ratcliff	23	24	23	28	45
119	Kearns	23	25	23	29	45
171	McGregor	19	23	22	26	45
180	Barrett	30	28	23	33	45
181	Forster	28	28	23	31	45
182	Dutoitcook	30	28	23	32	45
183	Steines	29	27	22	32	45
184(a)	Stevenson	29	27	23	32	45
184(b)	Stevenson	29	27	23	32	45
186	Adamson	26	27	22	30	45
187	Feeney	28	27	23	31	45
188	Fielding	24	26	22	29	45
189	Goggin & Hyde	28	26	23	31	45
190	Sahyoun	24	26	22	29	45
191	Lasham	25	26	22	29	45
192	Williams	27	26	22	30	45
194	Potts	23	25	22	29	45
195	Cottam	26	25	22	30	45
196	Saxberg & Weir	24	25	22	28	45
200	Grimshaw	22	25	22	28	45
201(a)	Towerton	21	25	22	28	45
201(b)	Towerton	23	25	22	28	45
202	Butler	22	24	22	28	45
203	Miller	24	24	22	28	45
204	Donnan	25	24	22	29	45
206	Marshall & Vella	22	24	22	28	45
207	Smith	23	24	22	28	45
208	Hasaart	23	23	22	28	45
209	Mawson	23	23	22	27	45
210	Tebutt	23	23	22	27	45
217	Patterson	23	23	22	28	45
218	Soady	23	23	22	28	45
219	Riger	23	24	22	28	45
220	Rusten & Smith	20	23	22	27	45
222	Purtell	24	24	22	28	45
223	Palmer & Stewart	24	24	22	28	45
224	Dupond	25	25	23	29	45
226	Muscat	26	25	23	29	45

EVENING CUMULATIVE NOISE ASSESSMENT

ID No and Landholder		Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity
227	Hughes	26	25	23	30	45
229	Lowe	27	26	23	30	45
230	Hoole & Rawlinson	27	26	23	30	45
231	Morrison & Benny	27	26	23	30	45
232	Haaring	27	26	23	31	45
233	Boal	28	26	23	31	45
234	Gaw	28	26	23	31	45
235	Wilson	28	26	23	31	45
236	Donovan	28	26	23	31	45
237	Puskaric	29	27	23	32	45
238	Powell	29	27	23	32	45
240	Hartley	30	27	23	32	45
300	Collins & Marshall	28	29	23	32	45
303	Ungaro	28	29	23	32	45
305	Barisic & Aul	27	28	23	31	45
306	Armstrong	27	28	23	31	45
307	Chant & Young	27	28	22	31	45
308	Dower	26	28	22	31	45
309	Maher	25	28	22	30	45
310	Death	26	28	22	31	45
312	Ioannou	26	28	22	31	45
313	Pracy	25	28	22	30	45
314	Ford	26	28	22	31	45
315	Richards & Uzelac	26	28	22	31	45
316	Vassel & Williams	26	28	22	31	45
317	Hore & Bingham	26	29	22	31	45
Moolarben Road						
30 ^{2,3}	Cox	28	25	26	31	45
31 ²	Cox	27	25	27	31	45
32	Stokes	6	22	32	32	45
35	Johnson & Thompson & Debreczeny	26	24	26	30	45
47	Andrews	23	23	27	30	45
Ulan						
11(a)	Mullins & Imrie	28	25	26	31	65
11(b)	Mullins & Imrie	27	25	27	31	45
11(c)	Mullins & Imrie	6	22	32	32	65
255	Schmitz	26	24	26	30	45
258	Elias	23	23	27	30	45
Ulan Village Non-residential						
9	Orica Australia Pty Limited	38	34	25	39	65
26	Forty North P/L	26	36	25	37	65
46B	North Eastern Wiradjuri Wilpinjong Community Fund Limited	37	48	23	48	65

EVENING CUMULATIVE NOISE ASSESSMENT

ID No and Landholder	Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity
66 Rostherne P/L	34	43	23	43	65
149 Mid Western Regional Council	40	44	23	45	65
160 ⁵ Minister for Education and Training (Ulan Public School)	40	42	23	44	45/45 ⁶
162 Rowmint P/L	34	43	23	44	65
168 ⁵ P/JL Constructions Pty Limited (church)	40	43	23	45	50/45 ⁶

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer Appendices A1 and A2).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: In use daytime and evening only.

Note 6: INP Acceptable amenity noise level criteria/Project Approval noise limit.

Note 7: Predicted evening noise level complies with the INP Acceptable noise amenity level.

NIGHT-TIME CUMULATIVE NOISE ASSESSMENT

In accordance with the INP Chapter 2 Industrial Noise Criteria (Section 2.2.4), the night-time cumulative sum of the existing, approved and proposed developments LAeq(9hour) noise amenity levels have been determined as presented below.

Table F2 - Night-time Cumulative (LAeq(9hour)) Noise Amenity Levels (dBA re 20 µPa)

ID No and Landholder		Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity
Cooks Gap						
37	Szymkarczuk	27	26	26	29	40
39	Sprigg	27	25	25	28	40
40	Devenish	26	26	26	29	40
41(a)	Libertis	27	25	25	29	40
41(b)	Libertis	29	26	25	30	40
59	Szymkarczuk	33	29	26	33	40
60	Rayner & Munday	28	28	26	30	40
61	Miller	30	28	26	31	40
63 ^{1,2}	Whiticker	36	31	26	35	40
70 ²	Coventry	35	30	25	34	40
75 ²	Ban	34	29	25	33	40
76	Carbone	33	29	25	33	40
79	Nagle	33	28	25	32	40
80	Sebelic	32	28	25	32	40
82	Hungerford & Clemens	30	28	26	31	40
83	Wall	30	27	25	31	40
84	Sebelic	29	27	26	30	40
86	Harris	29	27	25	30	40
87	Howe	29	27	25	30	40
88	Meyers	28	27	26	30	40
89	Glover & Tomlinson	28	27	25	30	40
90	Powell	28	26	25	30	40
91	Graham	28	26	25	29	40
94	Mittmayer	27	26	25	29	40
95	Withington	27	26	25	29	40
96	Lazicic	27	26	25	29	40
97	Smith	27	26	25	29	40
98	Piper	27	26	25	29	40
99	Jenner & Jensen	27	26	25	29	40
100	Kapista	27	26	25	29	40
101	Hull	26	25	25	28	40
102	Roberts	26	25	25	28	40
103	Burnett & Grant	26	25	25	28	40
104	Deeben	26	25	25	28	40
105	Katsikaris	26	25	25	28	40
106	Reid	26	25	25	28	40
107	Raso	26	25	25	28	40

NIGHT-TIME CUMULATIVE NOISE ASSESSMENT

ID No and Landholder	Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity	
109	Evans	26	25	25	28	40
110	Thompson & Evans	26	25	25	28	40
111	McEwan	25	25	25	28	40
112	Croft	25	25	25	28	40
113	Ratcliff	25	25	25	28	40
119	Kearns	26	26	25	29	40
171	McGregor	20	24	24	26	40
180	Barrett	33	29	25	33	40
181	Forster	30	29	25	31	40
182	Dutoitcook	32	29	25	32	40
183	Steines	32	28	24	32	40
184(a)	Stevenson	32	28	25	32	40
184(b)	Stevenson	31	28	25	32	40
186	Adamson	28	28	24	30	40
187	Feeney	31	28	25	31	40
188	Fielding	27	27	24	29	40
189	Goggin & Hyde	30	27	25	31	40
190	Sahyoun	26	27	24	29	40
191	Lasham	27	27	24	29	40
192	Williams	30	27	24	30	40
194	Potts	26	26	24	29	40
195	Cottam	29	26	24	30	40
196	Saxberg & Weir	26	26	24	28	40
200	Grimshaw	24	26	24	28	40
201(a)	Towerton	23	26	24	28	40
201(b)	Towerton	26	26	24	28	40
202	Butler	24	25	24	28	40
203	Miller	26	25	24	28	40
204	Donnan	26	25	24	28	40
206	Marshall & Vella	24	25	24	27	40
207	Smith	25	25	24	28	40
208	Hasaart	25	24	24	28	40
209	Mawson	25	24	24	27	40
210	Tebutt	25	24	24	27	40
217	Patterson	25	24	24	28	40
218	Soady	25	24	24	28	40
219	Riger	26	25	24	28	40
220	Rusten & Smith	22	24	24	27	40
222	Purtell	26	25	24	28	40
223	Palmer & Stewart	26	25	24	28	40
224	Dupond	27	26	25	29	40
226	Muscat	28	26	25	29	40

NIGHT-TIME CUMULATIVE NOISE ASSESSMENT

ID No and Landholder	Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity	
227	Hughes	28	26	25	30	40
229	Lowe	29	27	25	30	40
230	Hoole & Rawlinson	29	27	25	30	40
231	Morrison & Benny	29	27	25	30	40
232	Haaring	30	27	25	30	40
233	Boal	30	27	25	31	40
234	Gaw	30	27	25	31	40
235	Wilson	31	27	25	31	40
236	Donovan	31	27	25	31	40
237	Puskaric	31	28	25	32	40
238	Powell	32	28	25	32	40
240	Hartley	33	28	25	32	40
300	Collins & Marshall	31	30	25	32	40
303	Ungaro	31	30	25	32	40
305	Barisic & Aul	30	29	25	31	40
306	Armstrong	30	29	25	31	40
307	Chant & Young	30	29	24	31	40
308	Dower	28	29	24	30	40
309	Maher	28	29	24	30	40
310	Death	29	29	24	31	40
312	Ioannou	29	29	24	31	40
313	Pracy	28	29	24	30	40
314	Ford	29	29	24	31	40
315	Richards & Uzelac	29	29	24	31	40
316	Vassel & Williams	29	29	24	31	40
317	Hore & Bingham	29	30	24	31	40
Moolarben Road						
30 ^{2,3}	Cox	31	26	28	31	40
31 ²	Cox	30	26	29	31	40
32	Stokes	12	23	34	32	40
35	Johnson & Thompson & Debreczeny	28	25	28	30	40
47	Andrews	25	24	29	30	40
Ulan						
11(a)	Mullins & Imrie	23	27	26	27	65
11(b)	Mullins & Imrie	19	27	26	27	40
11(c)	Mullins & Imrie	21	27	26	27	65
255	Schmitz	31	32	23	32	40
258	Elias	33	31	24	32	40
Ulan Village Non-residential						
9	Orica Australia Pty Limited	40	35	27	39	65
26	Forty North P/L	34	37	27	36	65
46B	North Eastern Wiradjuri	40	50	26	48	65

NIGHT-TIME CUMULATIVE NOISE ASSESSMENT

ID No and Landholder	Moolarben Coal Complex Modification ⁴	Ulan Coal Continued Operations	Wilpinjong Coal Project Modification 6	Cumulative Amenity Level	NSW INP Acceptable Amenity	
66	Wilpinjong Community Fund Limited Rostherne P/L	38	45	26	43	65
149	Mid Western Regional Council	43	46	26	45	65
160 ⁵	Minister for Education and Training (Ulan Public School)	-	-	-	44	45/45 ⁶
162	Rowmint P/L	38	45	26	43	65
168 ⁵	PJL Constructions Pty Limited (Church)	-	-	-	44	50/45 ⁶

Note 1: Receiver subject to a private agreement with MCO.

Note 2: Project Approval Noise Limit for this receiver is above the intrusive PSNL (refer Appendices A1 and A2).

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

Note 4: Highest predicted noise level from the INP meteorological conditions (**Table 9**) for each receiver.

Note 5: In use daytime and evening only.

Note 6: INP Acceptable amenity noise level criteria/Project Approval noise limit.

Note 7: Predicted night-time noise level complies with the INP Acceptable noise amenity level.

NSW Road Noise Policy - application notes

Relative increase criteria (see Section 2.4 of RNP)

The last paragraph in Section 2.4 (page 15) states: 'The relative increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project'.

'Quiet area' is intended to mean areas 'that are 12 dB or more below the relevant noise assessment criterion that applies day or night'. The relative increase criteria are intended to apply to 'noise from a road project' or 'noise from a land use development with the potential to generate additional traffic'.

The first sentence in the last paragraph should therefore be read to mean: 'The relative increase criteria are primarily intended to protect existing quiet areas, being areas that are 12 dB or more below the relevant noise assessment criterion that applies day or night, from excessive changes in amenity due to noise from additional traffic.'

Applying the assessment criteria to additional traffic on existing roads generated by land use developments (see Section 3.4.1 of RNP)

The second paragraph in Step 4 states: 'For existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding "no build option".'

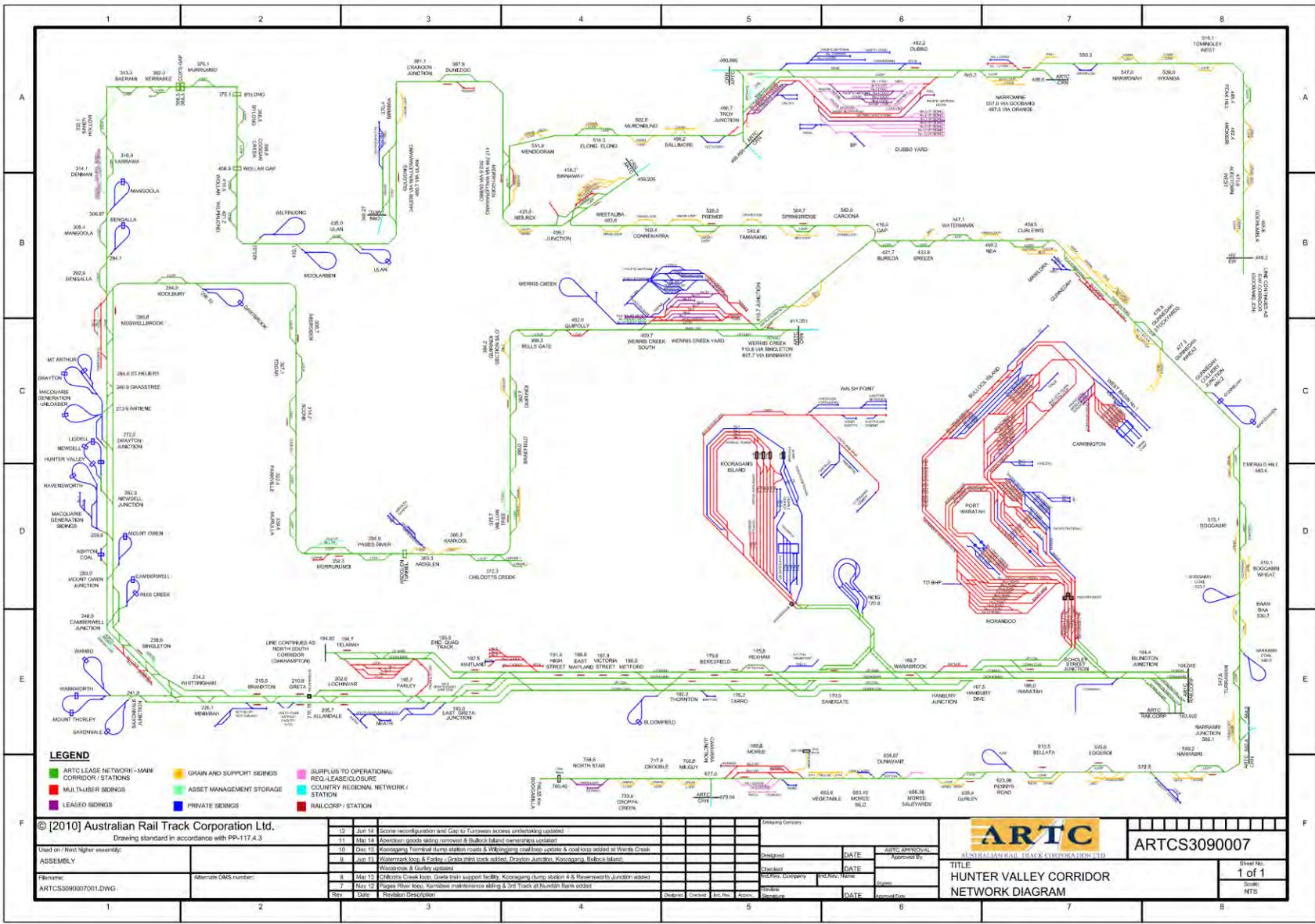
The policy provides for this 2 dB increase if the relevant assessment criteria identified in Step 2 is not achievable after the feasible and reasonable mitigation measures noted in Step 3 have been considered. The 2 dB increase applies to both the relevant day and night assessment criteria.

The second paragraph in Step 4 should therefore be read to mean: 'After taking Steps 1 to 3, for existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.'

Where cumulative impacts from road traffic-generating developments are likely, Section 3.5 notes that planning authorities should use strategic planning policies to minimise exposure to unacceptable noise levels.

Page last updated: 12 June 2013

HUNTER VALLEY NETWORK CORRIDOR DIAGRAM



L2 Noise limits

L2.1 Approvals for Locomotives

The licensee must obtain approval from the EPA prior to permitting operation on the “premises” of:

1. a class or type of locomotive, whether new or existing, that has not been operated on the NSW rail network; or
2. a locomotive that has been substantially modified since it was last used on the NSW rail network

EPA approval will be on the basis of compliance with the locomotive noise limits in Condition L2.3.

This condition L2 does not apply to the operation of a locomotive solely for the purposes of conducting noise or other tests that are required for the locomotive’s acceptance by the EPA, the licensee or any person concerned with the design, manufacture, supply or acquisition of the locomotive, provided that multiple pass bys do not occur adjacent to residential premises in the course of the testing.

Note: EPA approval for a class or type or model of locomotive will require noise test results from a representative number of locomotives from that class or type.

L2.2 General Noise Limits

It is an objective of this Licence to progressively reduce noise levels to the goals of 65 dB(A)Leq, (day time from 7am – 10pm), 60 dB(A)Leq, (night time from 10pm – 7am) and 85dB(A) (24 hr) max pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Programs.

L2.3 EPA Locomotive Noise Limits

Operating Condition	Speed and Location of Measurement	Noise Limit - Microphone height: 1.5 metres above
Idle with compressor radiator fans and air conditioning operating at maximum load occurring at idle	Stationary 15 metre contour	70 dB(A) Max
All other throttle settings under self load with compressor radiator fans and air conditioning operating	Stationary 15 metre contour	87 dB(A) Max 95 dB Linear Max
All service conditions	As per Australian Standard AS2377-2002 (Acoustics - Methods for the measurement of railbound vehicle noise) except as otherwise approved by the EPA	87 dB(A) Max 95 dB Linear Max

L2.4 Limits for Tonality

All external noise must be non-tonal. For the purpose of this condition, external noise is non-tonal if the sound pressure level in each unweighted (linear) one-third octave band does not exceed the level of the adjacent bands on both sides by:

- a) 5 dB if the centre frequency of the band containing the tone is above 400 Hz; and
- b) 8 dB if the centre frequency of the band containing the tone is between 160 and 400 Hz, inclusively; and
- c) 15 dB if the centre frequency of the band containing the tone is below 160 Hz.

L2.5 Limits for Low-Frequency Noise

All external noise must not exhibit an undue low-frequency component. To comply with this requirement, linear noise levels must not exceed the A-weighted noise levels by more than 15dB.

ARTC ENVIRONMENT PROTECTION LICENCE (26 FEBRUARY 2014)

L2.6 Locomotive Noise Emission Test Methods

Application for approval as required by L2.1 must be supported by type testing of the locomotive using procedures that are consistent with the requirements of Australian Standard AS2377-2002 (Acoustics – Methods for the measurement of railbound vehicle noise) except as otherwise approved by the EPA. The type testing must provide all necessary measurement parameters for demonstrating compliance with the locomotive noise limits in L2.3.

Information supplied to the EPA as part of the application for approval must fulfil the requirements of Section 11 of AS2377-2002 for reporting.

Note: The measurement parameters required in L2.3 differ in some cases from those identified in AS2377-2002. The test procedures, measurement equipment and environmental conditions applied in supporting the application to the EPA for approval are to yield all parameters identified in L2.3 but are otherwise to be applied in a manner that is consistent with the requirements of AS2377-2002. The 15 metre contour specified in L2.3 is to be represented by the 12 measurement points shown in AS2377-2002, Figure 1.

L2.7 Approval of Locomotives Not Meeting All EPA Limits

The EPA may approve locomotives that do not comply with all limits prescribed by L2.3, provided that the application for approval demonstrates that:

- a) the noise emission performance of the locomotive is consistent with current best practice; and
- b) all measures for minimising the extent of any non-compliance have been investigated and those that are identified as reasonable and feasible have been implemented; and
- c) none of the non-compliances will result in unacceptable environmental impacts.

U1 PRP 3.1 Audit of the Noise Performance of Locomotives on the ARTC Network

- U1.1 Almost a third of all rail noise complaints received by the Environment Protection Authority (EPA) between 2007 and 2011 were generated by pass by noise from locomotives. For this reason the EPA considers the ongoing monitoring and management of locomotive noise to be a critical component of environmental regulation of the NSW rail network.

The purpose of PRP 3.1 is for the licensee to:

1. obtain accurate measurements of the noise performance of locomotives operating on the NSW rail network by conducting wayside noise monitoring and to provide that data to relevant locomotive operators and the EPA; and
2. obtain accurate information on the actions of locomotive operators to rectify locomotives identified by the wayside monitoring as poorly performing in order to determine whether locomotive operators are implementing all reasonable and feasible noise mitigation measures.

The licensee is required to comply with PRP3.1 outlined in U1.2 below by completing each described action in the program within the set timeframe.

ARTC ENVIRONMENT PROTECTION LICENCE (26 FEBRUARY 2014)

U1.2 Action 3.1A

The licensee will implement and maintain a monitoring program which will:

- Monitor noise emissions from locomotives and rolling stock accessing ARTC's network and passing the Metford wayside measurement location; and
- Record and store data from wayside noise monitoring.

The noise monitoring program must be consistent with the *Australian Rail track Corporation Wayside Noise Monitoring Program Work Plan* submitted to the EPA by ARTC on 17 April 2009 and with the previous noise ARTC Wayside Noise Pilot Monitoring Program conducted between January – July 2010.

Timeframe – Commencement of the program will be within 16 weeks of inclusion of the PRP on the licence. The program will be conducted for a period of 12 months.

Action 3.1B

The licensee will submit to the EPA for approval a comprehensive reporting procedure that, as a minimum, includes:

1. providing quarterly reports to relevant locomotive operators on noise data collected which identify those locomotives with noise levels in the top 5% of locomotives measured in that quarter;
2. obtaining quarterly reports from locomotive operators on actions taken to reduce noise levels from identified locomotives; and
3. providing the EPA with quarterly reports which include:
 - noise monitoring data showing all noise monitoring results, and
 - the information received (from the preceding quarter) from locomotive operators on measures taken to reduce noise levels from identified locomotives.

Timeframe – Within 12 weeks of inclusion of the PRP on the licence.

Action 3.1C

The licensee will implement the EPA approved reporting procedure from Action 3.1B.

Timeframe – Within three weeks of the EPA approving the procedure.

Appendix 2 Environmental assessment requirements for rail traffic-generating developments

Land-use developments other than rail projects that are likely to generate additional rail traffic on an existing rail network should be assessed against the following requirements:

- Identify the typical offset distance/s of sensitive receivers from the rail line/s that are likely to be affected by increased rail movements.
- Quantify the existing level of rail noise at the offset distance/s identified above using the noise descriptors $L_{Aeq,15/9hr}$ and L_{Amax} (95th percentile) dB(A).
- Predict the cumulative rail noise level (i.e. from the existing and proposed rail movements) using a calibrated noise model (based on predicted increased rail movements) at the offset distances identified above.
- Compare the cumulative noise level with the rail noise assessment trigger levels: $L_{Aeq,15hr}$ 65 dB(A), $L_{Aeq,9hr}$ 60 dB(A), and L_{Amax} (95th percentile) 85 dB(A).
- Implement all feasible and reasonable noise mitigation measures where the cumulative noise level exceeds the noise assessment trigger levels and project-related noise increases are predicted.
- Where the L_{Aeq} noise level increases are more than 2 dB(A), which is equivalent to approximately 60 per cent of the total line or corridor rail traffic, and exceeds the relevant noise assessment trigger level, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

Notes

1. A project-related noise increase is an increase of more than 0.5 dB over the day or night periods.
2. The geographical extent of the rail noise assessment ideally should be where project-related rail noise increases are less than 0.5 dB. This roughly equates to where project-related rail traffic represents less than 10 per cent of the total line or corridor rail traffic.
3. Guidance on the concept of 'feasible and reasonable' is outlined in Appendix 6.

Mitigating noise from rail traffic-generating developments

For a traffic-generating development like a coal mine, the proponent would not have control over the public rail infrastructure. Consequently they would have limited opportunities to implement mitigation, such as noise barriers. In such cases, control of noise and vibration at the source is the most effective means of mitigation. However, the land-use developer responsible for the additional rail traffic (such as a mine, quarry or industrial site) could contract to a rail service provider who would use best practice rolling stock, including locomotives approved to operate on the NSW rail network in accordance with environment protection licences issued by the EPA. At property (architectural) treatments should be considered for affected receivers, if reasonable.