APPENDIX D
ENVIRONMENTAL NOISE ASSESSMENT

Moolarben Coal Mine

Stage 2 Noise Modelling

Environmental Noise Assessment

Prepared for

Hansen Bailey Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Stage 2 Noise Modelling
Environmental Noise Assessment

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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics Pty Ltd was commissioned on behalf of Moolarben Coal Mines Pty Limited (MCM) to undertake an environmental noise assessment for the Moolarben Coal Stage 2 Project (Stage 2). The purpose of this assessment is to form part of a Preferred Project Report (PPR) being prepared by Hansen Bailey to support the application for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the development of a 24 year open cut and underground coal mine and associated infrastructure and integration with the existing Stage 1 operations.

Specifically, the Preferred Project will consist of:

- The construction and operation of an open cut (OC) mining operation (OC4) extracting up to 12 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal and up to 13 Mtpa combined rate with the Stage 1 open cuts;
- The construction and operation of two underground (UG) mining operations (UG1 and UG2) extracting up to 4 Mtpa ROM coal cumulative with the Stage 1 underground;
- The construction and operations of the Stage 2 ROM coal facility;
- Extension of the life of the Coal Handling and Preparation Plant (CHPP) to Year 24 of Stage 2 and increased throughput of up to 17 Mtpa (13 Mtpa open cut and 4 Mtpa underground);
- The development of the Northern Out Of Pit (OOP) emplacement area;
- The construction and operation of two conveyors and associated facilities between the Stage 2 ROM coal facility and Stage 1 CHPP;
- The construction and operation of a Mine Access Road;
- The construction and operation of administration, workshop and related facilities;
- The construction and operation of water management infrastructure; and
- The installation of supporting power and communications infrastructure.

This assessment considered six staged operational scenarios over the life of mine to Year 24 of operation. The following elements were included in the assessment:

- Intrusive noise impact from open cut and underground mining operations;
- Sleep disturbance impact from open cut mining operations;
- Cumulative noise impact due to the Moolarben Coal Complex (MCC) comprising Stage 1 and Stage 2 of the Moolarben Coal Project, Ulan Coal Mines Limited (UCML), and Wilpinjong Coal Mine (WCM);

- Road traffic noise;
- Construction noise; and
- Blast vibration and overpressure

One hundred and fifty four (154) receptor locations were included in the assessment. Project specific noise criteria (PSNC) were based on noise impact assessment criteria outlined in the MCC Stage 1 Project Approval.

Noise levels were predicted using RTA Technology's Environmental Noise Model (ENM), a computer based environmental noise model, to determine the acoustic impact of mining operations. Results were calculated for prevailing meteorological conditions determined in accordance with NSW Industrial Noise Policy (INP) guidelines. Importantly, predictive modelling as determined within this assessment was calibrated against current noise emissions from MCC Stage 1 Project Approval operating area in order that modelled predictions and actual noise performance from the existing operations correlated.

From the modelling undertaken:

- Sixteen (16) privately owned residences (receptors) were predicted to receive minor exceedances (1 to 2 dB), eleven (11) receptors were predicted to receive moderate exceedances (3 to 5 dB), and two (2) receptors were predicted to receive significant exceedances (more than 5 dB) of PSNC.

- An additional nine (9) privately owned properties were predicted to receive noise levels in exceedance of PSNC over more than 25 percent of the sum of the contiguous property area. Of these nine (9) properties, two (2) were predicted to receive noise levels in exceedance of Stage 1 land acquisition criteria (PSNC plus 5 dB) over more than 25 percent of the sum of the contiguous property area.

A conservative assessment of sleep disturbance impacts was undertaken. No additional properties were predicted to receive exceedance of the sleep disturbance criterion that were not already predicted to be affected by MCC operational noise.

An assessment of cumulative noise impacts with Ulan Coal Mine and Wilpinjong Coal Mine was undertaken. No additional properties were predicted to be impacted by cumulative noise that were not already predicted to be affected by MCC operational noise.

An assessment of road traffic noise was undertaken to determine potential noise increase due to additional traffic resulting from the Preferred Project. The assessment was supported by detailed actual traffic counts from Ulan Road, representing current operations within the area. Road traffic noise is predicted to increase during shift change peak periods by a maximum 2.1 dB in the evening, which is generally within the limits of the maximum permissible increase of 2 dB outlined in the NSW Road Noise Policy.

Modelling of a construction scenario indicates noise from this activity should not, when considered cumulatively with existing and proposed mining noise, result in criteria exceedance. In fact, it is likely to be inaudible at residential receptor locations.

An assessment was undertaken of potential blasting impacts resulting from the Stage 2 proposal. The assessment was based on historical blast monitoring data from the MCC Stage 1 operating area. The assessment concluded that MCC blasting results have been in full compliance with the lower ground vibration and overpressure criteria and this should continue to be the case.

All reasonable and feasible noise mitigation and management measures applied to this assessment are described in this report.

Global Acoustics Pty Ltd

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Appendices

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1 INTRODUCTION

1.1 Project Description

Global Acoustics Pty Ltd was commissioned on behalf of Moolarben Coal Mines Pty Limited (MCM) to undertake an environmental noise assessment for the Moolarben Coal Stage 2 Project (Stage 2). The purpose of this assessment is to form part of a Preferred Project Report (PPR) being prepared by Hansen Bailey to support the application for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the development of a 24 year open cut and underground coal mine and associated infrastructure and integration with the existing Stage 1 operations.

Specifically, the Preferred Project will consist of:

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- Extension of the life of the Coal Handling and Preparation Plant (CHPP) to Year 24 of Stage 2 and increased throughput of up to 17 Mtpa (13 Mtpa open cut and 4 Mtpa underground);
- The development of the Northern Out Of Pit (OOP) emplacement area;
- The construction and operation of two conveyors and associated facilities between the Stage 2 ROM coal facility and Stage 1 CHPP;
- The partial relocation of Murragamba and Eastern Creeks;
- The construction and operation of a Mine Access Road;
- The construction and operation of administration, workshop and related facilities;
- The construction and operation of water management infrastructure; and
- The installation of supporting power and communications infrastructure.

This assessment considers six staged operational scenarios over the life of mine from Year 2 to Year 24 of operation. The following elements were included in the assessment:

- Intrusive noise impact from open cut and underground mining operations;
- Sleep disturbance impact from open cut mining operations;
- Cumulative noise impact due to the Moolarben Coal Complex (MCC) comprising Stage 1 and Stage 2 of the Moolarben Coal Project, Ulan Coal Mines Limited (UCML), and Wilpinjong Coal Mine (WCM);
- Road traffic noise;
- Construction noise; and
- Blast vibration and overpressure.

This assessment has been prepared in accordance with the relevant guidelines contained in the NSW Industrial Noise Policy (INP), an Office of Environment & Heritage (OEH) document published in 2000 and is supported by monitoring results from the existing Stage 1 operation for the purposes of model calibration.

1.2 Receptor Locations

One hundred and fifty four (154) receptor locations were included in the assessment, some of which are zoned commercial, or are designated acquisition upon owner request in the MCC Stage 1 Project Approval. Details of receptors included in the assessment are presented in Appendix A, Table A.1.

The study area and receptor locations are illustrated in Figure 1.

1.3 Stage 2 Submissions

Following public exhibition of an Environmental Assessment report for MCC Stage 2, a number of noise related submissions were received. Relevant issues were addressed in the Coffey Natural Systems report *"Response to submissions report-Part B"* dated September 2009 (the Coffey report), specifically section 2.1, and are addressed in this report.

All issues raised are shown in Table 1.1, which provides a correlation between submission issues and the relevant report section. Submissions are referred to by heading and number as per the Response to Submissions.

Rail traffic noise issues were addressed in that document; the relevant sections are reproduced in Appendix F.

Table 1.1 SUBMISSIONS

Submission Number	Title	Where Addressed in this report
2.1.1	Cumulative Noise Impacts on Residences	Section 3.4
2.1.2	Underestimate of Noise Sources	Section 4.3
2.1.3	Heavy Machinery Noise	Section 4.3
2.1.4	Environmental Bund	Sections 3.1
2.1.5	Low Frequency Noise Emissions	Sections 3.3, 5.4 and 6.4
2.1.6	Road Traffic Noise	Sections 2.2, 3.6, 5.5 and 6.5
2.1.7	Rail Traffic Noise	Appendix F
2.1.8	Meteorological Conditions During Assessment Periods	Section 4.1
2.1.9	Noise Reflection	Section 3.1
2.1.10	Noise Monitoring	Section 7.2
2.1.11	Noise Management Zone	Section 7.2
2.1.12	NSW Industrial Noise Policy	Section 1.1
2.1.13	Background Noise Levels	Section 2.1
2.1.14	Clarification on Noise Assessment	Appendices D and E

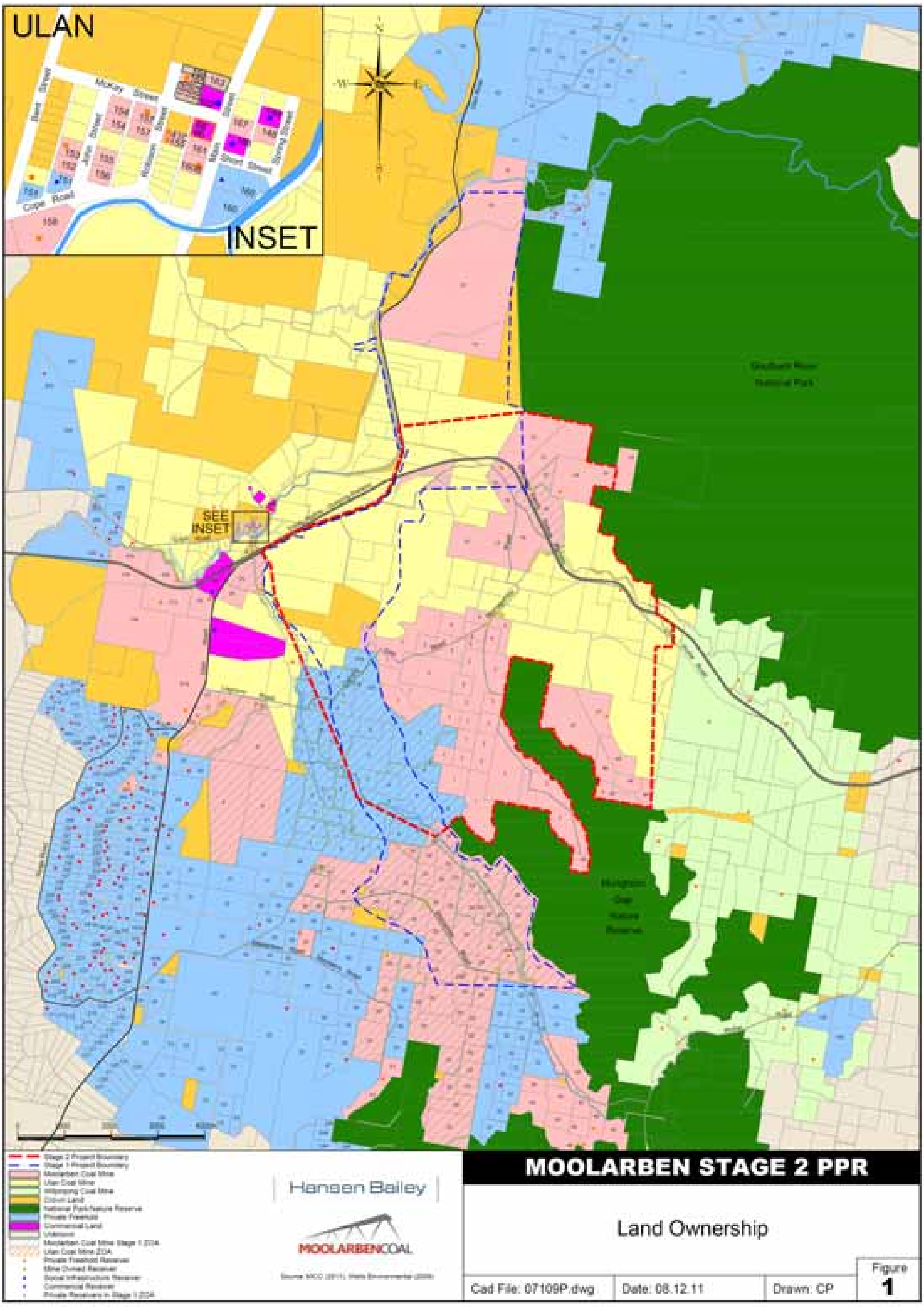
1.4 Terminology

Some definitions of acoustic terminology are as follows:

- L_A, the A-weighted root mean squared (RMS) noise level at any instant;
- L_{A1}, the noise level which is exceeded for 1 per cent of the time;
- $L_{A1,1\ minute}$, corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms, this represents the maximum measured level, and is often used to assess sleep disturbance;
- L_{A10}, the noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels;
- L_{A90}, the level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes;
- L_{Aeq}, the average noise energy during a measurement period;
- L_{pk}, the unweighted peak noise level at any instant;
- dB(A), noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise;
- sound power level (L_W), 10 times the logarithm of energy radiated from a source (as noise) divided by a reference power, the reference power being 1 picowatt;
- sound pressure level (L_p), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals;
- sound exposure level (SEL), the A-weighted noise energy during a measurement period normalised to one second.;
- Hertz (Hz), cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together;
- ABL, the 10th percentile background noise level for a single period (day, evening or night) of a 24 hour monitoring period;
- RBL, the background noise level for a period (day, evening or night) determined from ABL data;

- PPV or peak particle velocity, a measure of vibration, typically in units of millimetres per second. This descriptor is commonly used to quantify blast vibration measured in the ground as it has been found to correlate best to structural damage; and

- Overpressure is a transient pressure wave generated by blasting. It is measured on the decibel scale as an un-weighted peak.



Source: Hansen Bailey

Figure 1 Land Ownership as at 8 December 2011

2 CRITERIA

MCM received Project Approval for Stage 1 operations from the Minister for Planning in September 2007 (PA 05-0117), subject to the specific environmental conditions detailed in Schedule 3 of the approval. Criteria in this assessment are based on that approval.

2.1 Operational Noise Criteria

2.1.1 Project Specific Noise Criteria

Schedule 3, Table 2 of the Stage 1 Project Approval lists noise impact assessment criteria, and states:

"The Proponent shall ensure that noise generated by the project does not exceed the noise impact assessment criteria in Table 2 at any residence on privately-owned land, or on more than 25% of any privately owned land."

Noise impact assessment criteria listed in Schedule 3, Table 2 of the Stage 1 Project Approval have been adopted as Project Specific Noise Criteria (PSNC) in this assessment; notes after that table require consideration of modifying factors as per Section 4 of the INP. PSNC for receptors included in this assessment are included in Appendix A, Table A.1. These criteria have also been adopted for construction of the overland conveyor and OC4 ROM coal surface facilities, as this would be occurring concurrently with OC1 mining.

2.1.2 Land Acquisition Criteria

Schedule 3, Table 1 of the Stage 1 Project Approval indicates receptor locations that are subject to acquisition upon written request by the private property owner. These locations have criteria denoted "NA" in Table A.1.

Schedule 3, Table 3 lists land acquisition criteria. Land acquisition criteria for all residences on privately owned land are 5 dB higher than the criteria listed in Appendix A, TableA.1 (5 dB higher than PSNC). The approval states:

"If the noise generated by the project exceeds the criteria in Table 3 at any residence on privately-owned land, or on more than 25% of any privately owned land, the Proponent shall, upon receiving a written request for acquisition from the landowner acquire the land in accordance with the procedures in conditions 10-12 of Schedule 4."

2.1.3 Commercial Property Criteria

The Stage 1 Project Approval does not specify criteria for commercial properties. The recommended "acceptable" project specific noise level from the INP for commercial properties of L_{Aeq} 65 dB has been adopted in this assessment. Commercial receptors included in this assessment are included in Appendix A, Table A.1.

2.1.4 Background Levels

As Stage 1 Project Approval noise limits have been adopted in this assessment, measured background levels presented in the "Noise and Vibration Impact Assessment Moolarben Coal Project – Stage 2" prepared by Spectrum Acoustics, were not relevant to determination of those criteria. Receptor 11 criteria are the lowest possible when derived in accordance with the INP regardless of actual background levels.

2.2 Road Traffic Noise Criteria

The NSW Road Noise Policy (RNP) (OEH 2011) is applicable to the Preferred Project and applies different noise limits dependent upon the development category and receptor type. Table 2.1 shows the applicable residential noise level criteria for the proposed works.

Table 2.1 ROAD TRAFFIC NOISE CRITERIA – ARTERIAL ROADS

Development Type	Day Criteria $L_{eq(15hr)}$ dB(A)	Night Criteria $L_{eq(9hr)}$ dB(A)	Where Criteria is already exceeded
Land use developments with potential to create additional traffic on existing freeways/arterials/ sub-arterial roads	60	55	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criteria via judicious design and construction of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2dB.

Notes: 1. Day LAeq(15hr) from 7am to 10pm ~ Night LAeq(9hr) from 10pm to 7am.

However, while the RNP specifies $L_{Aeq,15\ hour}$ for day time and $L_{Aeq,9\ hour}$ for night time criteria, this assessment is based on $L_{Aeq,1\ hour}$ for day and evening to determine the likelihood of traffic noise impact at the closest receptor. A peak hourly traffic approach has been adopted because of the following:

- There are high volumes of traffic during shift change hours for MCC, UCML and WCM and very low levels of traffic volumes at other hours; and
- Earlier assessments done for MCC use the peak hourly traffic data to predict the noise levels at receptors (namely the Coffey report).

Maximum allowable hourly peak criteria from the RNP are shown below in Table 2.2.

Table 2.2 ROAD TRAFFIC NOISE CRITERIA – LOCAL ROADS

Development Type	Day Criteria LAeq(1hr) dB	Night Criteria LAeq(1hr) dB	Where Criteria is already exceeded
Land use developments with potential to create additional traffic on local roads	55	50	Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

2.3 Sleep Disturbance Criteria

Schedule 3, Table 2 of the MCC Stage 1 Project Approval contains an $L_{A1(1\ minute)}$ criterion for the night period, of 45 dB. This criterion has been adopted as the sleep disturbance impact criterion in this assessment.

2.4 Cumulative Noise Criteria

Schedule 3, Paragraphs 4 and 5 of the MCC Stage 1 Project Approval outline cumulative noise criteria, and are reproduced below:

Cumulative Noise Criteria

4. The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other mines does not exceed the following amenity criteria at any residence on privately owned land, or on more than 25% of any privately owned land, excluding the land listed in Table 1, to the satisfaction of the Director-General:
   - $L_{Aeq(11\ hour)}$ 50 dB(A) - Day;
   - $L_{Aeq(4\ hour)}$ 45 dB(A) - Evening;
   - $L_{Aeq(9\ hour)}$ 40 dB(A) – Night.

5. If the cumulative noise generated by the project combined with the noise generated by other mines exceeds the following amenity criteria at any residence on privately owned land, or on more than 25% of privately owned land, excluding the land listed in Table 1, then upon receiving a written request from the landowner, the Proponent shall take all reasonable and feasible measures to acquire the land on as equitable basis as possible with the relevant mines, in accordance with the procedures in conditions 10-12 of schedule 4, to the satisfaction of the Director-General:
   - $L_{Aeq(11\ hour)}$ 53 dB(A) - Day;
   - $L_{Aeq(4\ hour)}$ 48 dB(A) - Evening;
   - $L_{Aeq(9\ hour)}$ 43 dB(A) – Night.

Notes:
- *For the purpose of this condition, the expression "Proponent" in conditions 10-12 of schedule 4 should be interpreted as the Proponent and any other relevant mine owners.*
- *The cumulative noise generated by the project combined with the noise generated by other mines is to be measured in accordance with the relevant procedures in the NSW Industrial Noise Policy.*

Amenity criteria listed in Paragraph 4 are adopted in this assessment as cumulative noise criteria.

2.5 Blast Overpressure and Vibration

Conditions 11 to 20 to Schedule 3 of the MCC Stage 1 Project Approval relate to blasting. Blast criteria are contained in conditions 11 and 12 and are reproduced below:

Airblast Overpressure Impact Assessment Criteria

11. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 5 at any residence on privately owned land.

Table 5: Airblast overpressure impact assessment criteria

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

Ground Vibration Impact Assessment Criteria

12. The Proponent shall ensure that the ground vibration level from blasting at the project does not exceed the criteria in Table 6.

Table 6: Ground vibration impact assessment criteria

Receiver	Peak particle velocity (mm/s)	Allowable exceedance
Residence on privately owned land	5	5% of the total number of blasts over a period of 12 months
	10	0%
330kV transmission line	50	0%
Aboriginal rock shelters	40	0%

Note: The impact assessment criteria for Aboriginal rock shelters applies unless the Proponent develops site specific impact assessment criteria to the satisfaction of the Director-General.

Blast criteria listed in conditions 11 and 12 have been adopted for this assessment.

3 METHODOLOGY

3.1 Construction and Operational Noise Modelling Assessment

Noise levels were predicted using RTA Technology's Environmental Noise Model (ENM), a computer based environmental noise model, to determine the acoustic impact of construction and mining operations. The model takes into account geometric spreading, atmospheric absorption, and barrier and ground attenuation. Actual monitoring of the Stage 1 project for the purposes of model calibration supported the development of the noise model under this assessment.

Results were calculated for prevailing meteorological conditions determined from data sourced from a local meteorological station. This method is in accordance with the guidelines detailed in the INP and predicts noise levels for prevailing meteorological conditions. The INP defines prevailing conditions as those that occur more than 30% of any time period, in any season. Temperature inversion conditions are to be considered if there is more than 30% occurrence of stability classes F and G during winter nights (18:00 to 07:00). A discussion of meteorological data analysis is included below.

As discussed in Appendix 2 of the Coffey report, noise reflection from escarpments and rock outcrops are not considered likely, and are not considered further in this assessment.

3.2 Model Calibration Factor

Noise models developed within this assessment have been calibrated against current noise emissions from the MCC Stage 1 Project Approval operating area in order to confirm that modelled predictions and actual noise performance from the existing operations correlated.

A calibration of minus 3 dB has been adopted, and has been applied to all results for noise enhancing meteorology. The calibration factor has not been applied to results for calm atmospheric conditions. It is acknowledged that the adopted 3 dB calibration should not be applied to levels predicted for receptor to source winds or other non-enhancing meteorological conditions, however, predicted noise levels in those cases have little or no bearing on assessment of impact.

3.3 INP Modifying Factors

Section 4 of the INP requires consideration of modifying factors. These are characteristics of noise received at receptor locations that could result in more annoyance than would normally occur from that level. The modifying factors are tonal noise, low frequency noise, impulsive noise, intermittent noise and duration (if single event).

Years of environmental noise monitoring of open cut mining has shown that these factors are rarely if ever applicable. The only factor that has at times been considered as a possible issue is low frequency noise (LFN).

3.3.1 Low Frequency Noise

Two methodologies have been adopted for assessment of LFN:

- Evaluation of LFN through comparison of C-weighted and A-weighted predicted total noise levels at receptor. In this method, the difference between C – weighted and A-weighted levels at receptor locations is calculated, and if the difference is greater than 15 dB, a 5 dB penalty (modifying factor) is added to predicted levels; and

- Evaluation of LFN through comparison of total predicted C-weighted levels at receptor locations with an upper limit criterion. This method is in accordance with recommendations published in "A Simple Method for Low Frequency Noise Emission Assessment" by N. Broner, published in the Journal of Low Frequency Noise, Vibration and Active Control, Volume 29 Number 1 2010. The author of the document recommends outdoor criteria for LFN assessment; the following extract from the document presents recommended criteria. If the total predicted C – weighted noise level at a receptor exceeds the relevant criterion, a 5 dB penalty (modifying factor) is added to predicted levels.

Criteria for Assessment of LFN

	Sensitive Receiver	Range	Criteria Leq (dBC)
Residential	Night time or plant operation 24/7	Desirable	60
		Maximum	65
	Daytime or Intermittent (1 – 2 hours)	Desirable	65
		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: A Simple Method for Low Frequency Noise Emission Assessment by N. Broner

Nine receptors were chosen representing locations north, northwest and southwest of the site, and covering a range of distances from the site. Receptors assessed were Property/Lot numbers 11/1, 59/217, 75/31, 160/1, 172/62, 182/69, 188/75, 237/48 and 258/24.

The worst case scenario from Year 2 operations was assessed, and the worst case meteorological conditions with regards to noise enhancement were evaluated for each receptor. From these results, both methodologies described above were applied.

3.4 Cumulative Noise Assessment

Ulan Coal Mine Limited (UCML) and Wilpinjong Coal Mine (WCM) (as currently approved) both have potential to combine with noise emissions from the MCC to cause cumulative noise impacts at some receptor locations. However, these two mines are geographically situated at sufficient distance and source to receiver angle from each other that cumulative noise impacts from both mines simultaneously would be highly unlikely. When noise is being enhanced from one or the other due to meteorological effects, noise would tend to be attenuated from the other. In this assessment, cumulative noise impact from each of these mines is considered separately.

To convert predicted results from $L_{Aeq,15\ minute}$ to $L_{Aeq,period}$ an adjustment of minus 2 dB has been made to levels calculated for the modelled operating scenarios. This is on the basis that the operating scenarios are representative of worst-case plant locations, which would not occur for the entirety of any period (day, evening or night).

3.4.1 MCM and UCML Cumulative Noise Assessment

Year 2 operations at the MCC have the highest potential to combine with UCML noise emissions to cause cumulative noise impacts in the Ulan Village, Cope Road and Toole Road areas. Demonstration of compliance with amenity limits for this scenario indicates compliance for subsequent operating scenarios, where predicted noise emissions from the MCC are less than those predicted for Year 2. At all receptor locations, predicted results are higher for the evening and night periods than for the day period. Amenity criteria are lowest in the night period; therefore, the night period is the most critical period for assessment of cumulative noise impacts. On this basis, all assessment of cumulative noise is based on the critical night period, except for Ulan School (Receptor 160), where evening and night criteria do not apply. An assessment of cumulative noise during the day period has been conducted for Ulan School.

UCML noise emissions were determined by developing an environmental noise model for the CHPP area. Noise sources associated with CHPP operations are considered to represent the greatest contributions to potential cumulative noise impacts from UCML. Whilst open cut mining activities at UCML will at times impact some receptors included in this assessment, due to the geographical relationship between the MCC and UCML open cut, it is considered unlikely that both sources would contribute significant noise levels simultaneously.

The UCML environmental noise model considered all sources in and around the CHPP area that were included in the Ulan Coal Mines Limited Continued Operation Environmental Assessment (UCML EA) dated October 2009. Total A-weighted sound power levels for unmitigated plant items were sourced from this document. Representative sound power spectra were sourced from the Global Acoustics database, and adjusted such that the total A-weighted sound power matched those used in the UCML EA.

3.4.2 MCM and WCM Cumulative Noise Assessment

WCM has potential to combine with noise emissions from the MCC to cause cumulative noise impacts to receptors west of WCM and south west of the MCC, particularly when WCM operations are close to the western lease boundary. The highest potential for cumulative noise impact occurs in years 7 to 12 of the MCC operation when operation in OC4 coincides with WCM operations close to their western lease boundary. The Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment (WCM EA) dated May 2010 does not contain sufficient information to adequately assess cumulative noise impacts from the MCC and WCM.

A conservative approach has been adopted in this assessment whereby predicted levels from the MCC operations are assumed to also represent noise emissions from WCM. This approach over predicts WCM noise contributions, as WCM operations would be further away from all receptor locations than the MCC operations.

As in the MCC and UCML cumulative noise assessment, all assessment of cumulative noise is based on the critical night period. All potentially affected receptor locations were considered. Years 7 and 12 of the MCC operation were assessed, as these scenarios have the highest potential to cause cumulative noise impact with WCM.

3.5 Sleep Disturbance

All sources in the assessment of operational noise have been modelled at full power; therefore, there would generally be little difference between maximum and average sound power levels. Short duration maximum sound power levels for operation of most plant would typically be little higher than model inputs. However, excavator bucket noise and dozer track noise have potential to generate high, short-term noise levels that may cause sleep disturbance.

To assess potential sleep disturbance impact from these items, each dozer and excavator in the models was allocated a sound power 10 dB higher than the sound power input for operational noise. The result for each plant item was combined with results for the remainder of operational plant to obtain an estimate of possible short-term maximum noise emissions.

3.6 Road Traffic Noise

Traffic studies for this project and for planned expansions of UCML and WCM nearby have all shown the majority of traffic to and from the area travels along the road between Ulan and Mudgee. This assessment considers the impact of traffic expected to be generated by the Preferred Project on residences along that road.

As there are numerous set backs from the road to house facades, a conservative assessment of noise at the house nearest the road has been undertaken.

Traffic flow data provided by MCM has been used to estimate the potential for road traffic noise impact at Receptor 37 (the nearest) approximately 26 metres from the road. Calculations were made using CadnaA modelling software implementing the CoRTN method.

3.7 Blast Vibration and Overpressure

Blasting is a very controllable process. Rather than estimate future blast vibration and overpressure levels, it is relevant to review monitoring results of blasts to date because:

- OC1 blasts monitored at Ulan School to date are closer than any residential receptor will be for the Preferred Project; and
- Blasting in OC1 has been as close to existing infrastructure (within 500 metres) as is expected for the Preferred Project.

Comparison of measured blast results and criteria will provide an indication of the likelihood of achieving ongoing compliance.

4 NOISE MODEL PARAMETERS

4.1 Meteorology

Under various wind and temperature gradient conditions, noise may be increased or decreased compared with still-isothermal conditions – that is, no wind or temperature gradient. Atmospheric conditions that most affect noise propagation are temperature and wind velocity gradients. They can both enhance or reduce noise propagation from source to receiver due to refraction of sound propagating through the atmosphere, brought about by a change in sound speed with height.

Noise levels are increased when the wind blows from source to receiver or under temperature inversion conditions (both of which are sometimes referred to as adverse weather conditions), and decreased when the wind blows from receiver to the source or under temperature lapse conditions.

All available meteorological data from the UCML owned weather station located near Ulan Village from July 2007 to June 2008 inclusive was analysed to determine prevailing meteorological conditions for the site. The air quality consultant for the Preferred Project undertook a detailed assessment of available meteorological data, and determined this data set was the most applicable. For consistency between assessments, the same data set was adopted for this assessment. Sigma-theta data was analysed in accordance with procedures in Appendix E of the INP, to determine the appropriate stability class and associated vertical temperature gradient for each weather record.

4.1.1 Prevailing Meteorological Conditions

Section 5 of the INP provides procedures for considering meteorological effects. The effects of gradient winds, drainage flow winds and temperature inversions need to be considered.

Wind effects need to be assessed when wind is considered to be a feature of the area. Wind is considered a feature of the area when source-to-receiver wind speeds (at 10m height) of 3 m/s or less occur for more than 30 percent of the time in any time period, in any season.

Temperature inversions need to be assessed when there is more than a 30 percent occurrence during winter (June, July, August) nights. The time period used for this assessment is 18:00 to 07:00 as per INP guidelines. Default values are provided for temperature inversion and drainage flow wind speed for use when required. Alternatively, actual measured values may be used (INP, 2000).

A comprehensive assessment of meteorological data has been conducted in accordance with INP guidelines. Complete details of the assessment of meteorological data are presented in Appendix B. Meteorological conditions listed in Table 4.1 were included in the assessment as prevailing meteorological conditions.

Table 4.1 METEOROLOGICAL CONDITIONS INCLUDED IN ASSESSMENT AS PREVAILING CONDITIONS

Temperature °C	Humidity %	Wind Speed m/s	Wind Direction	VTG °/100m
		Day Period		
10	80	0	-	-0.65
		Evening and Night Periods		
10	80	3	ENE	-0.65
10	80	3	SW	-0.65
10	80	2	SW	3
10	80	0	-	3

Temperature inversion conditions were included for the evening period, as the time period for assessment of inversion conditions in winter is from 18:00 to 07:00, which includes the evening period.

4.2 Model Scenarios

Six primary operating scenarios were modelled representing the various stages of development throughout the life of mine. The following stages of operation were considered: Years 2, 7, 12, 16, 19 and 24. Years 2 and 24 scenarios were each divided into two secondary scenarios, representing day and evening/night operation. All known major noise sources including mobile and fixed infrastructure plant were included. The scenarios are described in the following report sections.

Table 4.2 lists plant quantities included in each model scenario with further discussion on each below. Appendix C Figure C.1 to Figure C.6 illustrate the location of mining activities, haul routes and noise sources for each operating scenario. Figure C.7 illustrates locations of CHPP infrastructure common to all scenarios.

Coal and reject transfer between OC4 and the CHPP was modelled for two options:

1. Use of overland conveyors between OC4 and the CHPP; and

2. Use of a haul road between OC4 and the CHPP.

The difference in predicted results between these two options was less than +/- 0.5 dB due to the higher contribution to total predicted noise levels by other noise sources. Therefore, although use of overland conveyors for transfer of coal and reject material between OC4 and the CHPP is a viable alternative from a noise perspective, no further consideration is given in this assessment. All results provided are for use of haul trucks to transfer material via a haul road around the north-eastern portion of the site, as this represents the worst case operating scenario, although this should only occur during periods when the overland conveyor does not operate due to maintenance or breakdown.

Table 4.2 INDICATIVE EQUIPMENT QUANTITIES

	Year 2		Year 7	Year 12	Year 16	Year 19	Year 24	
Plant Item	**Day**	**Eve/Night**	**All periods**	**All periods**	**All periods**	**All periods**	**Day**	**Eve/Night**
Open Cut 1								
Excavators (coal or overburden)	1	1	0	0	0	0	0	0
Haul trucks (coal or overburden)	3	3	0	0	0	0	0	0
Pit dozers	1	1	0	0	0	0	0	0
Dump dozers	1	1	0	0	0	0	0	0
Reject trucks	1	1	0	0	0	0	0	0
Graders	1	1	0	0	0	0	0	0
Water carts	1	1	0	0	0	0	0	0
Rehab dozers	1	1	0	0	0	0	0	0
Open Cut 2								
Coal excavators	1	0	0	0	0	0	0	0
Overburden excavators	0	1	0	0	0	0	0	0
Coal haul trucks	5	0	0	0	0	0	0	0
Overburden haul trucks	0	3	0	0	0	0	0	0
Pit dozers	1	1	0	0	0	0	0	0
Dump dozers	0	1	0	0	0	0	0	0
Graders	1	1	0	0	0	0	0	0
Water carts	1	1	0	0	0	0	0	0
Rehab dozers	1	1	0	0	0	0	0	0
Drills	1	1	0	0	0	0	0	0

Table 4.2 INDICATIVE EQUIPMENT QUANTITIES

	Year 2		Year 7	Year 12	Year 16	Year 19	Year 24	
Plant Item	**Day**	**Eve/Night**	**All periods**	**All periods**	**All periods**	**All periods**	**Day**	**Eve/Night**
Open Cut 3								
Coal excavators	0	0	0	0	0	0	1	0
Overburden excavators	0	0	0	0	0	0	1	1
Coal haul trucks	0	0	0	0	0	0	8	0
Overburden haul trucks	0	0	0	0	0	0	3	3
Pit dozers	0	0	0	0	0	0	4	2
Dump dozers	0	0	0	0	0	0	2	2
Reject trucks	0	0	0	0	0	0	1	0
Graders	0	0	0	0	0	0	2	1
Water carts	0	0	0	0	0	0	2	1
Rehab dozers	0	0	0	0	0	0	3	3
Drills	0	0	0	0	0	0	1	1
Open Cut 4								
Coal excavators	1	1	1	1	1	1	0	0
Overburden excavators	1	1	4	4	4	4	0	0
Coal haul trucks	5	5	5	5	6	8	0	0
Overburden haul trucks	3	3	12	12	12	12	0	0
Pit dozers	3	3	6	6	6	6	0	0
Dump dozers	2	2	5	5	5	5	0	0
Reject trucks	2	2	2	2	2	3	0	0

Table 4.2 INDICATIVE EQUIPMENT QUANTITIES

	Year 2		Year 7	Year 12	Year 16	Year 19	Year 24	
Plant Item	**Day**	**Eve/Night**	**All periods**	**All periods**	**All periods**	**All periods**	**Day**	**Eve/Night**
Graders	2	2	3	3	3	3	0	0
Water carts	2	2	3	3	3	3	0	0
Rehab dozers	0	0	2	2	2	2	0	0
Drills	1	1	3	3	3	3	0	0
Underground 1								
Underground 1 ventilation fans	0	0	1	1	0	0	0	0
Underground 2								
Underground 2 ventilation fans	0	0	0	1	1	0	0	0
CHPP								
CHPP building 1 (washery)	1	1	1	1	1	1	1	1
CHPP building 2	1	1	1	1	1	1	1	1
CHPP building 3	1	1	1	1	1	1	1	1
Sizing station ST001	1	1	1	1	1	1	1	1
ROM crusher	1	1	1	1	1	1	1	1
ROM front end loader	1	1	1	1	1	1	1	1
Conveyor drives	6	6	6	6	6	6	6	6
Conveyors	10	10	10	10	10	10	10	10
Product coal dozers	2	2	2	2	2	2	2	2
90 class locos idling on loop	3	3	3	3	3	3	3	3

4.2.1 Scenario 1: Year 2

Open cut mining is continuing in OC1, and has commenced in OC2 and OC4.

One excavating unit is proposed for operation in OC1, alternating between coaling and overburden stripping. Both activities are scheduled for day, evening and night periods, though not concurrently.

One excavating unit is proposed for operation in OC2, alternating between coaling and overburden stripping. Overburden stripping in OC2 is proposed for day, evening and night periods, although would not occur concurrently with coaling operations. Coaling in OC2 is restricted to the day period only.

Two excavators are proposed for OC4, one coaling and one stripping overburden. Both activities are proposed to occur simultaneously during day, evening and night periods. Mining commences in the central north-western portion of OC4 with the face progressing from northeast to southwest. The OOP emplacement is being utilised for overburden emplacement.

4.2.2 Scenarios 2 to 5: Year 7 to Year 19

OC1, OC2 and the OOP emplacement are complete prior to Year 7. One coaling excavator and four overburden excavators are scheduled for OC4 throughout this period. Mining proceeds generally from northwest to southeast, with overburden emplacement generally occurring behind the advancing pit. Overburden stripping and coaling are scheduled for day, evening and night operation.

Underground 1 (UG1) is scheduled to operate from Year 5 to Year 14. Underground 2 (UG2) is scheduled to operate from Year 10 to Year 17. The UG1 access portal and ventilation fans are proposed to be located in the OC1 void. The UG2 ventilation fans are proposed to be located in the OC2 void.

4.2.3 Scenario 6: Year 24

Open cut mining is complete in OC1, OC2 and OC4, and has commenced in OC3. One coaling and one overburden excavator are proposed to operate in OC3. Coaling in OC3 is restricted to the day period. Overburden stripping in OC3 is proposed for day, evening and night periods, and is scheduled to occur simultaneously with coaling operations during the day period.

4.2.4 Construction Scenario

Construction of the overland conveyor has been modelled as occurring at the northern end and, simultaneously, at a point approximately where the conveyor is highest (crossing over the ridge). Activity at each of these locations is assumed to be preparing conveyor footings using a backhoe and concrete truck.

The worst case OC4 ROM construction scenario is assumed to be preparatory earthworks involving an excavator, a small dozer and two highway trucks.

Conveyor and ROM construction have been modelled as concurrent activities occurring only in the day period.

4.3 Plant Sound Power

Sound power levels used in modelling are listed in Table 4.3. Much of the data in Table 4.3 is based on measured sound power levels of existing equipment at the MCC. Assumed sound power has been adopted for some equipment where test data is not available. These items are denoted with an asterisk. Sound power data for the Komatsu WA1200 front end loader, Komatsu 830E haul trucks and Liebherr 996, 995 and 9350 excavators are based on anticipated attenuated levels expected to be achieved at completion of attenuation work. A staged attenuation project has been in effect on the Liebherr R996 excavators at the MCC. Work to date includes installation of engine fan air inlet silencers, hydraulic air outlet silencers, hydraulic air inlet silencers and engine air outlet silencers. Significant reductions in sound power levels have been achieved, with these excavators currently operating at L_{wA} 119 dB, a reduction of 4 dB since September 2010. Recent attenuation work on Atlas Copco DML 60 blast hole drills at MCC have achieved a reduction in A-weighted sound power from 120 dB to 117 dB.

$L_{Aeq,15minute}$ sound power data was used for model inputs for all sources other than haul trucks, reject trucks, graders and water carts. For these items, a methodology which distributes the acoustic energy of the plant items along the length of the haul routes was utilised, as described below. This methodology has previously been accepted by the OEH in other environmental assessments prepared by Global Acoustics.

Haul truck sound powers were incorporated into haul routes by creating haul route strings consisting of an equivalent 30 second sound power for all haul trucks on each haul route. This methodology distributes the acoustic energy of the haul trucks along the length of the haul route. Routes comprised a string of segments of varying lengths, each having an $L_{Aeq,30second}$ sound power determined by the following:

- Sound power for type of trucks on route; trucks travelling down ramps greater than 5% grade were allocated a reduced sound power;
- Number of each truck type on route in 15-minute period, based on loading unit load rate;
- Speed of truck on segment grade toward dump/ROM; and
- Speed of truck on segment grade from dump/ROM.

Truck speeds are relative to grade in direction of travel and were allocated in accordance with truck speed data collected from mine sites in the Hunter Valley. Speed determined the spacing of each segment, an important variable when calculating L_{Aeq} for a specific time interval.

Sound powers for water carts and reject trucks were determined in a similar manner, however, haul route strings consisting of an equivalent 60 second sound power were determined. A 120-second sound power string was determined for the grader in a similar manner.

The sound power for Komatsu 475A and 375A dozers adopted was a composite of sound powers for forwards and reverse operation.

Sound powers of CHPP washery modules, ROM crusher, sizing station ST001, conveyors and conveyor drives were determined from actual sound pressure levels (L_p) measured on 23 and 24 September 2010. Some conveyors were not measured due to proximity to the washery. Sound powers determined for conveyors of similar size were assumed to be representative of these conveyors. Conveyors with assumed sound power levels have an asterisk beside the name in Table 4.3.

Sound power of proposed overland conveyors between OC4 and the CHPP was based on test results for overland conveyors in operation at another site.

Sound power levels for underground ventilation fans were based on measured data from fans in operation at another site. A vertical discharge is assumed.

Sound power of 3 x 90 class locomotives idling were sourced from the Global Acoustics database, as well as sound power levels for indicative construction plant.

Table 4.3 MODELLED SOUND POWER OF PLANT

	Octave Band Sound Power Spectrum, L_{eq} dB								Total L_{eq} dB	
Plant/Activity	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
Komatsu 830E Rear Dump Truck	115	116	111	113	109	104	100	107	121	115
Liebherr 996 Excavator	113	117	119	115	112	112	106	98	123	118
Liebherr 995 Excavator *	113	117	119	115	112	112	106	98	123	118
Liebherr 9350 Excavator	113	117	119	115	112	112	106	98	123	118
Komatsu 475A Dozer	113	115	112	113	108	104	97	96	120	114
Komatsu 375A Dozer	107	113	110	110	109	104	99	98	118	113
Komatsu HD785 Water Cart	111	120	119	110	108	105	102	96	123	114
Komatsu WA1200 Front End Loader	116	118	117	116	115	113	107	102	124	120
Komatsu WD900 Wheel Dozer	112	119	117	117	115	113	108	101	124	120
Komatsu GD825 Grader	102	120	111	107	105	101	95	87	121	110
Caterpillar 16G Grader *	105	114	109	105	109	105	99	93	117	112
Caterpillar 24M Grader *	105	114	109	105	109	105	99	93	117	112
Atlas Copco DML Blast Hole Drill	110	118	114	114	113	114	113	113	123	120
Pit Viper 235 Blast Hole Drill, *	107	113	112	111	108	104	97	91	118	113
CHPP module 1 (washery) – NE facade	122	120	118	118	117	115	111	104	127	121
CHPP module 1 (washery) – NW facade	115	108	105	102	100	97	93	87	118	106

Table 4.3 MODELLED SOUND POWER OF PLANT

	Octave Band Sound Power Spectrum, L_{eq} dB								Total L_{eq} dB	
Plant/Activity	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
CHPP module 1 (washery) – SW facade	121	117	115	113	110	107	103	96	125	116
CHPP module 1 (washery) – SE facade	109	104	101	97	95	91	87	80	114	101
CHPP building 2	114	108	105	105	105	98	91	82	116	108
CHPP building 3	95	90	89	88	85	82	79	72	98	90
Sizing station ST001	112	111	109	110	109	107	101	91	118	114
ROM crusher	117	113	109	110	108	104	103	92	120	113
Overland conveyor per 100m length *	103	105	100	101	97	93	85	79	109	102
Ventilation fan (each) *	115	114	110	113	102	98	94	83	122	112
IP07 conveyor drive	102	102	101	107	102	96	90	87	111	107
IP12 conveyor drive	99	99	96	100	102	98	92	85	107	105
IP13 conveyor drive	98	97	95	98	100	95	87	81	106	103
IP20 conveyor drive	98	98	93	101	97	95	89	83	105	102
IP21 conveyor drive	100	100	98	101	99	95	90	84	107	103
IP22 conveyor drive	92	93	93	99	99	100	102	98	107	107
CV1011 per metre	86	83	78	74	71	67	61	55	88	76
CV1014 per metre	84	85	81	79	76	72	67	61	89	81
CV1051 per metre*	80	81	74	72	72	69	63	53	85	77
CV1090 per metre*	80	81	74	72	72	69	63	53	85	77
CV1091 per metre*	86	83	78	76	74	71	65	56	89	79
CV1093 per metre*	86	83	78	76	74	71	65	56	89	79
CV1094 per metre*	86	83	78	76	74	71	65	56	89	79
CV1096 per metre*	80	81	74	72	72	69	63	53	85	77
CV1097 per metre	86	83	78	76	74	71	65	56	89	79
CV1098 per metre	80	81	74	72	72	69	63	53	85	77
3 x 90 class locos idling on loop *	87	99	102	102	104	102	97	90	110	108
Construction Plant										
Backhoe *	96	100	101	101	100	99	95	88	108	105
Truck *	95	108	103	106	103	103	97	94	113	109
Excavator *	105	108	107	109	103	99	91	85	114	109
Dozer *	105	112	107	102	102	99	91	86	115	107

Note: 1. '' denotes assumed sound power adopted.*

5 RESULTS

5.1 Operational Noise Results

5.1.1 Private Residential Receptors

Table 5.1 presents a summary of predicted exceedances of PSNC at privately-owned residential receptors, for each of the six modelled operating scenarios. Receptor locations have been grouped into the following exceedance categories:

- **Minor** – Predicted $L_{Aeq,15minute}$ level exceeds PSNC by 1 to 2 dB;
- **Moderate** – Predicted $L_{Aeq,15minute}$ level exceeds PSNC by 3 to 5 dB; and
- **Significant** – Predicted $L_{Aeq,15minute}$ level exceeds PSNC by more than 5 dB.

In all cases, the night period was most critical in terms of having the highest predicted levels, and most stringent criterion; therefore, all results in Table 5.1 are based on the night period.

Predicted results for all receptor locations included in the assessment are presented in Appendix D, Table D.1.

5.1.2 Property Area Assessment

In addition to the properties listed in Table 5.1, properties 34, 35, 37, 170, 178, 179 and 304 are predicted to have PSNC (but not land acquisition criteria) exceeded over more than 25 percent of the sum of their respective contiguous landholdings.

Properties 30 and 32 are predicted to have Stage 1 land acquisition criteria (PSNC plus 5 dB) exceeded over more than 25 percent of the sum of their respective contiguous landholdings.

Properties assessed as noise affected based on percentage of area exceeding PSNC are listed in Table 5.2. These properties are discussed further in Section 6.1.

5.1.3 Noise Contours

Noise contours for day and evening/night periods are presented in Appendix E for each of the modelled operational scenarios, six in total.

Table 5.1 EXCEEDANCE OF PROJECT SPECIFIC NOISE CRITERIA SUMMARY - RESIDENCES

Scenario	Minor Exceedance 1 to 2 dB(A) over PSNC		Moderate Exceedance 3 to 5 dB(A) over PSNC		Significant Exceedance > 5 dB(A) over PSNC	
	Property/Lot Number	Owner	Property/Lot Number	Owner	Property/Lot Number	Owner
Year 2	59/217	Szymkarczuk	58/235	Bevege	-	-
	76/36	Carbone	63/6	Whiticker	-	-
	77/35	Mulholland	64/58	Goninan & Boland	-	-
	78/54	Power	70/59	Coventry	-	-
	79/34	Nagle	74/53	Walsh	-	-
	81/33	Germent & McIntyre	75/31	Ban	-	-
	180/67	Barrett	172/62	Kimber	-	-
	181/68	Forster	175/61	Vale	-	-
	182/69	Dutoitcook	176/63	Wakefield	-	-
	184/71	Stevenson	177/64	Mobbs	-	-
	239/50	Delarue	-	-	-	-
	240/51	Hartley	-	-	-	-
	257/10	Cap	-	-	-	-
	258/24	Elias	-	-	-	-
	303/79	Ungaro	-	-	-	-
	320/288	Clark	-	-	-	-
Year 7	63/6	Whiticker	58/235	Bevege	-	-
	64/58	Goninan & Boland	-	-	-	-
	70/59	Coventry	-	-	-	-

Table 5.1 EXCEEDANCE OF PROJECT SPECIFIC NOISE CRITERIA SUMMARY - RESIDENCES

	Minor Exceedance 1 to 2 dB(A) over PSNC		Moderate Exceedance 3 to 5 dB(A) over PSNC		Significant Exceedance > 5 dB(A) over PSNC	
Scenario	**Property/Lot Number**	**Owner**	**Property/Lot Number**	**Owner**	**Property/Lot Number**	**Owner**
	74/53	Walsh	-	-	-	-
	75/31	Ban	-	-	-	-
	77/35	Mulholland	-	-	-	-
	175/61	Vale	-	-	-	-
	176/63	Wakefield	-	-	-	-
Year 12	-	-	-	-	-	-
Year 16	58/235	Bevege	-	-	-	-
	30/9	Cox	-	-	-	-
	70/59	Coventry	-	-	-	-
Year 19	-	-	-	-	-	-
Year 24	-	-	30/9	Cox	31/122	Cox
	-	-	-	-	47/138	Andrews

Table 5.2 EXCEEDANCE OF PROJECT SPECIFIC NOISE CRITERIA SUMMARY – PROPERTIES > 25% BY AREA

	Minor to Moderate Exceedance 1 to 5 dB(A) over PSNC		Significant Exceedance > 5 dB(A) over PSNC	
Scenario	**Property Number**	**Owner**	**Property Number**	**Owner**
Year 2	37	Szymkarczuk	-	-
	170	Montgomery	-	-
	178	Stone	-	-
	179	Stutsel	-	-
	304	Balajan	-	-
Year 24	34	Asztalos	30	Cox
	35	Johnson, Thompson & Debreczeny	32	Stokes

5.2 Sleep Disturbance Results

Table 5.3 presents results of the sleep disturbance assessment. Calculated $L_{A1,\ 1\ minute}$ noise levels are presented for receptor locations where exceedance of the sleep disturbance criterion is exceeded.

Table 5.3 SLEEP DISTURBANCE ASSESSMENT RESULTS - dB

Property/Lot Number	Owner	Sleep Disturbance Criterion $L_{A1,\ 1\ minute}$	Predicted Level $L_{A1,\ 1\ minute}$	Exceedance
63/6	Whiticker	45	46	1
31/122	Cox	45	50	5
47/138	Andrews	45	48	3

5.3 Cumulative Noise Assessment Results

5.3.1 MCC and UCML Cumulative Noise Assessment

Table 5.3 presents predicted model results at receptor locations with potential to receive cumulative noise impacts from the MCC and UCML. All results are for the critical night period for private residential receptors, except for Ulan School (Receptor 160), for which results for the day period are presented. Results in bold type exceed the relevant criterion.

$L_{Aeq,\ 15\ minute}$ predicted noise levels for worst case prevailing meteorological conditions from each site are presented. The cumulative result for comparison with amenity criteria was determined by adding the predicted level from each site, and applying a minus 2 dB adjustment factor to approximate the $L_{Aeq,\ period}$ noise level.

It is understood that MCM has commenced discussions with UCML to address the joint management of potential cumulative noise impacts.

Table 5.4 MCC AND UCML CUMULATIVE NOISE RESULTS - dB

Property/Lot Number	Owner	Amenity Criterion $L_{Aeq, period}$	UCML $L_{Aeq, 15 min}$	MCC Year 2 $L_{Aeq, 15 min}$	Cumulative $L_{Aeq, period}$[2]
160/1	Minister for Education and Training	50 [1]	42[3]	36[3]	41
64/58	Goninan & Boland	40	30	40	38
63/6	Whiticker	40	31	40	38
70/59	Coventry	40	31	40	38
58/235	Bevege	40	<30	40	38
172/62	Kimber	40	30	40	38
258/24	Elias	40	37	36	38
257/10	Cap	40	37	36	38
320/288	Clark	40	36	37	37
74/53	Walsh	40	<30	38	37
175/61	Vale	40	<30	38	37
256/23	Campbell	40	36	35	36
176/63	Wakefield	40	<30	38	36
75/31	Ban	40	<30	38	36
177/64	Mobbs	40	<30	38	36
255/30	Schmitz	40	36	34	36
76/36	Carbone	40	<30	37	36
77/35	Mulholland	40	<30	37	36
59/217	Szymkarczuk	40	<30	37	36

Table 5.4 MCC AND UCML CUMULATIVE NOISE RESULTS - dB

Property/Lot Number	**Owner**	**Amenity Criterion** $L_{Aeq, period}$	**UCML** $L_{Aeq, 15 min}$	**MCC Year 2** $L_{Aeq, 15 min}$	**Cumulative** $L_{Aeq, period}$[2]
170/60	Montgomery	40	<30	35	34
303/79	Ungaro	40	<30	36	34
254/56	Marshall	40	33	32	34
301/77	Stewart	40	<30	34	33
300/76	Collins & Marshall	40	<30	34	33
302/78	Hamilton	40	<30	34	33
11/1	Mullins & Imrie	40	<30	32	32
253/8	Highett	40	<30	<30	<30

Note: 1. *Amenity criterion for day period presented for Ulan School (Property 160);*

2. *Minus 2 dB adjustment factor applied to cumulative $L_{Aeq, period}$ results; and*

3. *Results for day period presented for Ulan School (Property 160).*

5.3.2 MCC and WCM Cumulative Noise Assessment

Table 5.5 presents predicted model results at receptor locations with potential to receive cumulative noise impacts from the MCC and WCM. All results are for the critical night period.

$L_{Aeq, 15\ minute}$ predicted noise levels for worst case prevailing meteorological conditions from each site are presented. For the MCC, the result presented is the maximum result predicted from Years 7 and 12 of operation. Results presented for WCM are a conservative estimated level assumed to be the same as the MCC results. The cumulative result for comparison with amenity criteria was determined by adding the predicted level from each site, and applying a minus 2 dB adjustment factor to approximate the $L_{Aeq,\ period}$ noise level.

Table 5.5 MCC AND WCM CUMULATIVE NOISE RESULTS - dB

Property/Lot Number	Owner	Amenity Criterion $L_{Aeq,\ period}$	WCM $L_{Aeq,\ 15\ min}$	MCC $L_{Aeq,\ 15\ min}$	Cumulative $L_{Aeq,\ period}$
47/138	Andrews	40	<30	<30	<30
35/263	Johnson & Thompson	40	30	30	31
31/122	Cox	40	33	33	34
30/9	Cox	40	34	34	35
40/190	Devendish	40	<30	<30	30
41B/273	Libertis	40	<30	<30	30
39/255	Sprigg	40	<30	<30	<30

Note: 1. .Minus 2 dB adjustment factor applied to cumulative LAeq, period results.

5.4 Low Frequency Noise Assessment Results

Table 5.6 presents results of the LFN assessment as described in Section 3.3.1. Results are discussed in Section 6.4.

Table 5.6 LOW FREQUENCY NOISE ASSESSMENT RESULTS

Units	Total	Octave Band (Hz) 63	125	250	500	1k	2k	4k
11/1 - Mullins & Imrie								
dB(A)	32	10	22	21	31	20	-11	-79
dB(C)	41	36	38	30	35	20	-12	-80
C-A (dB)	9							
59/217 - Szymkarczuk								
dB(A)	37	17	27	26	36	27	5	-51
dB(C)	47	43	43	35	39	27	3	-53
C-A (dB)	10							

Table 5.6 LOW FREQUENCY NOISE ASSESSMENT RESULTS

		Octave Band (Hz)						
Units	**Total**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**
				75/31 - Ban				
dB(A)	38	16	27	27	37	27	3	-59
dB(C)	47	42	43	36	40	27	2	-60
C-A (dB)	9							
				160/1 – Ulan School				
dB(A)	47	22	30	33	46	41	23	-9
dB(C)	53	47	46	41	49	41	22	-11
C-A (dB)	6							
				172/62 - Kimber				
dB(A)	40	17	29	27	39	30	5	-54
dB(C)	48	43	45	35	42	30	4	-56
C-A (dB)	9							
				182/69 - Dutoitcook				
dB(A)	36	17	27	24	35	24	-4	-74
dB(C)	46	42	43	33	38	24	-5	-75
C-A (dB)	11							
				188/75 - Fielding				
dB(A)	30	12	22	19	28	16	-11	-78
dB(C)	41	37	38	27	31	16	-12	-80
C-A (dB)	12							
				237/48 - Puskaric				
dB(A)	35	15	25	25	34	23	-4	-74
dB(C)	45	41	41	34	37	23	-6	-76
C-A (dB)	10							
				258/24 - Elias				
dB(A)	36	15	27	26	35	25	-3	-68
dB(C)	46	40	43	34	38	25	-4	-69
C-A (dB)	10							

5.5 Road Traffic Noise Results

5.5.1 Existing Road Traffic Noise

Traffic volume data measured on Ulan Road by Mid-Western Regional Council (MWRC) were provided by MCM. Volumes were counted from 17 February 2011 to 12 May 2011 as part of a detailed assessment of the traffic impacts to Ulan Road from mining operations within the area. The peak hourly traffic flow count on Ulan Road, 100 metres north of the Cope Road intersection has been used for this assessment, and is presented in Table 5.7.

Table 5.7 TRAFFIC VOLUME AT CLOSEST RECEPTOR

Road	All[1]	Day[2]	Evening[2]	Percentage Heavy Vehicles
Ulan Road (100 metres north of Cope Road intersection)	2,631	315	196	10

Note: 1. Average daily traffic volume for 5-day week; and

2. Hourly peak traffic volume.

Noise levels predicted for existing traffic volumes at representative Receptor 37, 26 metres from the road for peak hourly traffic flows during the day and evening periods are shown in Table 5.8. MCM advised that receptor 37 is the closest residence to Ulan Road.

Table 5.8 PREDICTED EXISTING TRAFFIC LEVELS AT RESIDENCE 37 - 2011

Period	Predicted levels $L_{Aeq(1\ hour)}$ dB
Day	67
Evening	65

Predicted existing traffic noise results for the nearest residence to the road are well above the day period hourly criterion of L_{Aeq} 55 dB. Accordingly, any change should be limited to 2 dB above existing levels.

5.5.2 MCC Stage 2 - Road Traffic Noise Change

MCM advise that Stage 2 would require up to 122 additional employees in addition to Stage 1. Conservatively, a maximum additional 122 vehicles could be added to existing daily traffic volumes on the local road network.

The worst-case scenario for this assessment is to assume all additional vehicles travel along the Ulan to Mudgee road. An increase in daily peak hour movements from 315 to 437 would theoretically increase the current estimated noise level by 1.4 dB ($10x\log_{10}(437/315)$); an evening hourly peak movement increase from 196 to 318 equates to an increase of 2.1 dB ($10x\log_{10}(318/196)$).

The predicted maximum increase in traffic noise levels on the Ulan to Mudgee road is, when rounded to the nearest whole decibel, within the allowable RNP increase of 2 dB, meaning the change due to the Preferred Project traffic complies with the traffic noise criterion relating to maximum permissible increase.

It should be noted that most residences along the road are set back much further than 26 metres and so traffic noise would be much less. However, the 2 dB increase would still result.

5.6 Construction Noise

Construction noise levels were predicted for the scenario described in Section 4.2.4 to all receptor locations. The highest predicted construction noise level was L_{Aeq} 23 dB at receptor 160/1 (Ulan School).

As this result is greater than 10 dB less than the lowest criterion, it is not possible for the combination of predicted construction noise and any complying operational noise level to result in an exceedance. The logarithmic addition of values more than 10 dB apart, and 12 dB is the minimum difference for the worst case of a just complying operational result of L_{Aeq} 35 dB, is no change to the higher value. That is, construction noise, as predicted, cannot change any significant operational result. Construction noise should not influence predictions of operational noise affectation or compliance and is not discussed further.

5.7 Blast Vibration and Overpressure

MCC has provided monitoring results for 136 overburden and coal blasts over the period 7 October 2009 to 17 November 2011. Additionally, Global Acoustics have been contracted to independently monitor the nearby 330 kV electricity line towers when blasting is taking place within 500 metres of them; to date this has been required on 18 occasions. A summary of blast monitoring results is presented in Table 5.9.

Table 5.9 Blast Monitoring Summary

Location	Criterion	Maximum Result	Number Of Exceedances
Vibration (mm/sec)			
Ulan School	5/10[1]	2.5	0
Rock Shelters	40	2.5	0
Moolarben Dam	Not specified	4.2	0
Lagoons Road	5/10[1]	0.9	0
Transmission Towers	50	43.4	0
Overpressure (dB)			
Ulan School	115/120[1]	120.6	2/1[2]
Rock Shelters	NA	NA	NA
Moolarben Dam	NA	NA	NA
Lagoons Road	115/120[1]	115.0	0
Transmission Towers	NA	NA	NA

Note: 1. Lower criterion may be exceeded up to 5% of blasts in 12-month period. Higher criterion is upper limit; and

2. Exceedance of lower criterion/exceedance of higher criterion.

As indicated in Section 2.5, Ulan School and private residences have two criteria for vibration and overpressure. The lower criterion may be exceeded for 5% of blasts in a 12-month period. The higher criterion is the upper limit, and should not be exceeded.

The above results show that blast vibration criteria have not been exceeded in over two years of mining. It is reasonable to conclude that this aspect of blasting is being adequately managed by MCC.

Overpressure has exceeded 115 dB at Ulan School on three occasions, one of which was greater than 120 dB (8 July 2010). Levels greater than 115 dB are permissible for 5 percent of blasts in a 12-month period and this has been complied with (0% in 2009, 4% in 2010 and 1.4% in 2011).

6 DISCUSSION

6.1 Operational Noise

6.1.1 Overview

From the assessment undertaken:

- Sixteen (16) receptors are predicted to receive minor exceedances (1 to 2 dB above PSNC);
- Eleven (11) receptors are predicted to receive moderate exceedances (3 to 5 dB above PSNC); and
- Two (2) receptors are predicted to receive significant exceedances (more than 5 dB above PSNC).

An additional nine (9) properties are predicted to receive noise levels in exceedance of PSNC (but less than land acquisition criteria) over more than 25 percent of the sum of the contiguous property area. Of these nine (9) properties, two (2) are predicted to receive noise levels in exceedance of Stage 1 land acquisition criteria (PSNC plus 5 dB) over more than 25 percent of the sum of the contiguous property area.

6.1.2 Scenario 1: Year 2

Scenario 1 (Year 2) is predicted to cause exceedance of PSNC at twenty-six (26) receptors. Operations in OC1 and OC2 contribute the highest levels to predicted totals. Coal haulage from OC2 to Stage 1 ROM facilities has the highest potential to cause noise impact to many receptors; therefore, coaling activities in OC2 will be restricted to the day period when neutral atmospheric conditions prevail. Overburden stripping in OC2 is scheduled for day, evening and night operation, although will not occur concurrently with coaling activities in OC2.

Additionally, properties 37, 170, 178, 179 and 304 are predicted to receive noise levels in exceedance of PSNC (but less than land acquisition criteria) over more than 25 percent of the sum of the contiguous property area.

6.1.3 Scenarios 2 to 5: Year 7 to Year 19

Predicted levels at most receptor locations are less during this period than for Scenario 1. Mining operations for these scenarios are scheduled for OC4 only, which receives significant topographical shielding from the ridges to the south and west of the mining operations. There is a minor increase in predicted levels to receptors southwest of the site for the Year 16 scenario, when mining in OC4 advances into the southernmost portion. There are no additional exceedances of PSNC predicted for these scenarios relative to Scenario 1.

6.1.4 Scenario 6: Year 24

Scenario 6 (Year 24) is predicted to cause exceedance of PSNC at one (1) receptor, and exceedance of Stage 1 land acquisition criteria at two (2) receptors. Coal haulage from OC3 to the ROM has the highest potential to cause noise impact to many receptors; therefore, coaling activities in OC3 are to be restricted to the day period when neutral atmospheric conditions prevail. Overburden stripping in OC3 is scheduled for day, evening and night operation, and is scheduled to occur simultaneously with coaling activities in OC3.

Additionally, properties 34 and 35 are predicted to receive noise levels in exceedance of PSNC (but less than land acquisition criteria) over more than 25 percent of the sum of the contiguous property area, however, properties 30 and 32 are predicted to receive noise levels in exceedance of Stage 1 land acquisition criteria (PSNC plus 5 dB) over more than 25 percent of the sum of the contiguous property area.

6.2 Sleep Disturbance Results

Exceedance of the sleep disturbance criterion of $L_{A1,\ 1\ minute}$ 45 dB is predicted at three (3) receptor locations. All of these receptors have exceedances of PSNC due to operational noise. No additional properties are predicted to receive exceedance of the sleep disturbance criterion that that are not already affected by MCC operational noise.

Management techniques that may assist in reducing the likelihood of sleep disturbance impacts include, but are not limited to:

- Positioning excavator buckets as close to the truck body as possible when loading trucks;
- Minimising excavator bucket impact with hard objects;
- Restricting use of dozers in second gear reverse during the night period to reduce track slap noise;
- Regular checking of dozer track tension to reduce track slap noise; and
- Training of operators and management to raise awareness and educate staff about utilising these management techniques.

6.3 Cumulative Noise Assessment

6.3.1 MCC and UCML Cumulative Noise Assessment

No additional properties are predicted to be noise affected due to combined noise emissions from the MCC and UCML that are not already affected by the MCC operational noise. Whilst this is the case, MCC and UCML are currently formalising a joint approach to cumulative noise management between the two operations.

6.3.2 MCC and WCM Cumulative Noise Assessment

There are no exceedances of night period amenity noise criteria predicted from cumulative noise impacts due to the MCC and WCM operations.

6.4 Low Frequency Noise Assessment

Model results indicate LFN will not exceed LFN criteria at any receptor location. The difference between C-weighted and A-weighted total predicted levels does not exceed 15 dB at any receptor and predicted total C-weighted noise levels do not exceed 60 dB; therefore a 5 dB modifying factor penalty is not warranted (as per the INP).

6.5 Road Traffic Noise Assessment

Road traffic noise is predicted to increase from current levels during shift change peak periods by a maximum 2.1 dB in the evening, which, while not less than, is within the limits of the maximum permissible increase of 2 dB.

6.6 Construction

Modelling of a construction scenario indicates noise from this activity should not add to any significant mining noise. The highest predicted level is only L_{Aeq} 24 dB and so it could be expected that construction noise would be generally inaudible.

6.7 Blast Vibration and Overpressure

MCM advises that future blasting from the Preferred Project will not be closer to residences than it has been to existing monitoring locations.

MCC blasting results to date show it is reasonable to expect ground vibration to be within criteria on an ongoing basis. To date, there has only been one minor exceedance (0.6 dB) of the upper overpressure criterion. Whilst there have been two other exceedances of the lower criterion of 115 dB, the rate of such exceedances has been well below the allowable rate of 5% per 12 months. It has been almost 18 months since the greater than 120 dB result, and only one result was greater than 115 dB in 2011 (1.4 %). This indicates blasting is being well managed at the MCC.

Given the distance from blasting activities to residential receptors is increasing with time, it is considered likely that overpressure criteria exceedances (if they occur) should remain less than the percentage allowed, as has been the case to date.

7 NOISE MITIGATION STRATEGIES

7.1 Operational Controls

MCM intends to meet the predicted noise levels for the Preferred Project presented in Section 5 through the adoption of the following operational controls to assist in managing noise emissions from the site:

- Overburden, reject and coal haul trucks on site are to be upgraded with attenuation packages. A linear sound power of L_W 121 dB has been adopted in the models to represent final in-service levels, as described in Section 4.3;
- Excavators on site are to be upgraded with attenuation packages. A linear sound power of L_W 123 dB has been adopted in the models to represent final in-service levels, as described in Section 4.3;
- The Komatsu WA1200 front end loader is to be upgraded with an attenuation package. A linear sound power of L_W 124 dB has been adopted in the models to represent final in-service levels, as described in Section 4.3;
- All future mobile equipment to be utilised at MCC will be maintained to ensure they do not exceed the linear sound power total levels adopted in this assessment;
- Coaling in OC2 is to be restricted to the day period only, as described in Section 6.1.2; and
- Coaling in OC3 is to be restricted to the day period only, as described in Section 6.1.4.

From the current Stage 1 mining operations, MCC has undertaken noise attenuation on various items of equipment. This attenuation works includes:

- Six (6) of the 830E dump trucks have had Stage 1 of their noise attenuation kits fitted; and
- Two (2) of the 996 excavators have had noise attenuation kits fitted.

The anticipated completion date for attenuation of existing mobile equipment at MCC is December 2012 due to supply timeframes for the attenuation kits.

7.2 Management Strategies

MCM intends to meet the predicted noise levels for the Preferred Project presented in Section 5 through the adoption of the following management strategies to assist in controlling noise emissions from the site:

- Continue to implement a proactive strategy to engage predicted noise impacted residences to achieve a management outcome agreed to by all parties;
- A continued program of regular sound power screening testing that will assist in managing sound power levels, and identify plant items requiring maintenance to noise attenuation packages;
- Development of a Noise Management Plan (NMP) outlining a revised noise monitoring program. The Stage 2 NMP will be integrated with the existing and approved Stage 1 NMP. The program will include attended and continuous real time noise monitoring at strategic locations to enable evaluation of compliance with relevant criteria;
- Continuous noise monitoring will be continued at strategic off site locations to provide real time feedback to the mine. This will allow operations to be modified, as required to prevent exceedance of PSNC. Locations and trigger levels will be determined through consultation with the OEH, and will be outlined in the Noise Management Plan; and
- Monitoring of real time meteorological conditions and forecasts. Operations may be modified in advance of adverse weather conditions that are reasonably expected to cause an unacceptable increase in off site noise levels.
- The continued engagement of adjacent mining companies to manage cumulative noise emissions to noise sensitive locations. This would include sharing of noise monitoring data between the respective operations;
- Continued management of blast vibration and overpressure through blast design utilising the established blast site law from Stage 1;
- Continued monitoring of blast vibration and overpressure in accordance with the MCC Blast Management Plan;
- Selection of quiet plant for use in construction activities. When using contractors for construction, preference will be given to contractors able to use low noise emission equipment. All construction personnel will be educated in best practice work methods to minimise noise;
- Implementation of reasonable and feasible noise mitigation measures such as double glazing, insulation and/or air conditioning will be made available to affected landowners, upon request.

8 SUMMARY

An environmental noise assessment for the Moolarben Coal Stage 2 Project was conducted to form part of a Preferred Project Report (PPR) being prepared by Hansen Bailey. The PPR is to support the application for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to facilitate the development of a 24 year open cut and underground coal mine and associated infrastructure.

The assessment considered six staged operational scenarios over the life of mine. The following elements were included in the assessment:

- Intrusive noise impact from open cut and underground mining operations;
- Sleep disturbance impact from open cut mining operations;
- Cumulative noise impact due to the Moolarben Coal Complex, Ulan Coal Mines Limited, and Wilpinjong Coal Mine.
- Road traffic noise;
- Construction noise; and
- Blast vibration and overpressure.

One hundred and fifty four (154) receptor locations were included in the assessment. Project specific noise criteria were based on noise impact assessment criteria outlined in the Stage 1 Project Approval.

Noise levels were predicted using RTA Technology's Environmental Noise Model (ENM), a computer based environmental noise model, to determine the acoustic impact of mining operations. Results were calculated for prevailing meteorological conditions determined in accordance with NSW Industrial Noise Policy (INP) guidelines.

Sixteen (16) privately owned residences (receptors) are predicted to receive minor exceedances (1 to 2 dB over PSNC), eleven (11) receptors are predicted to receive moderate exceedances (3 to 5 dB over PSNC), and two (2) receptors are predicted to receive significant exceedances (more than 5 dB over PSNC) of project specific noise levels under worst case meteorological conditions and operating scenarios.

An additional nine (9) privately owned properties were predicted to receive noise levels in exceedance of PSNC over more than 25 percent of the sum of the contiguous property area. Of these nine (9) properties, two (2) were predicted to receive noise levels in exceedance of Stage 1 land acquisition criteria (PSNC plus 5 dB) over more than 25 percent of the sum of the contiguous property area.

A conservative assessment of sleep disturbance impacts was undertaken. No additional properties are predicted to receive exceedance of the sleep disturbance criterion that are not already predicted to be affected by the MCC operational noise.

An assessment of cumulative noise impacts with Ulan Coal Mine and Wilpinjong Coal Mine was undertaken. No additional properties are predicted to be impacted by cumulative noise that are not already predicted to be affected by the MCC operational noise.

Road traffic noise is predicted to increase during shift change peak periods by a maximum 2.1 dB in the evening, which is generally within the limits of the maximum permissible increase of 2 dB.

Modelling of a construction scenario indicates noise from this activity should not, when considered cumulatively with mining noise, result in criteria exceedance. In fact, it is likely to be inaudible at residential receptor locations.

MCC blasting results have been in full compliance with the lower ground vibration and overpressure criteria and it is considered likely this should continue to be the case.

All reasonable and feasible noise mitigation and management measures applied to this assessment are described in this report.

Global Acoustics Pty Ltd

APPENDIX

A. RECEPTOR LOCATIONS AND NOISE IMPACT ASSESSMENT CRITERIA

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Table A.1 lists receptor locations included in modelling, and criteria derived from Moolarben Coal Operation Stage 1 Project Approval. Properties which are already subject to acquisition upon request based on the Stage 1 Project Approval have criteria denoted "NA".

Property 41A, Lot 7 is currently in negotiation of contract with MCM. This property is marked with an asterisk in the table.

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

Owner Number	Lot Number	DP	Property Owner	Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
				Day	Evening	Night
5	1	803204	MJ & PM Swords	NA	NA	NA
9	5	258998	ICI Australia Operations Pty Limited	65	65	65
11	21	755439	JE Mullins & CD Imrie	35	35	35
11	1	755439	JE Mullins & CD Imrie	35	35	35
11	26	755439	JE Mullins & CD Imrie	35	35	35
20	1	806698	AJ & NA Willimson	NA	NA	NA
25	8	626648	GG Tuck-Lee & SH Symons	NA	NA	NA
26	276	755442	Forty North Pty Limited	65	65	65
30	9	755442	RB Cox	35	35	35
31	122	755442	MB Cox	35	35	35
32	104	755442	DJ & JG Stokes	35	35	35
35	263	755442	PR Johnson & MS & GJ Thompson & PH & FH Debreczeny (Perpetual Lease)	35	35	35
36	139	755442	DJ & Y Rayner	NA	NA	NA
37	194	755442	J Szymkarczuk	35	35	35
39	255	755442	RM & DJ Sprigg	35	35	35
40	190	582575	JM Devenish	35	35	35
41A*	7	47521	PP Libertis	38	38	37
41B	273	755442	PP Libertis (Perpetual Lease)	35	35	35
47	138	755442	SF & MR Andrews	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

				Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
Owner Number	**Lot Number**	**DP**	**Property Owner**	**Day**	**Evening**	**Night**
58	235	755442	ML & JLM Bevege	35	35	35
59	217	755442	G & GM Szymkarczuk	35	35	35
60	215	664444	CL Rayner & DM Mundey	35	35	35
61	A	338953	MA Miller	35	35	35
63	6	47521	BF & B Whiticker	38	38	37
64	58	251603	JW Goninan & TL Boland	38	38	37
70	59	251603	DJ & A Coventry	35	35	35
74	53	251603	LR Walsh	35	35	35
75	31	251503	P Ban	35	35	35
76	36	251503	SR & PC Carbone	35	35	35
77	35	251503	GJ & JM Mulholland	35	35	35
78	54	251603	B & FV Power	35	35	35
79	34	251503	PTJ & SE Nagle	35	35	35
80	30	251503	W & DI Sebelic	35	35	35
81	33	251503	TK Germent & CA McIntyre	35	35	35
82	32	251503	SC Hungerford & MC Clemens	35	35	35
83	23	859736	CF & CR Wall	35	35	35
84	22	859736	DS Sebelic	35	35	35
86	26	251503	NW Harris	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

Owner Number	Lot Number	DP	Property Owner	Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
				Day	Evening	Night
87	21	859736	BJ & K Howe	35	35	35
88	20	859736	BC Meyers	35	35	35
89	27	251503	MV & HM Glover & E & BJ Tomlinson	35	35	35
90	28	251503	SA Powell	35	35	35
91	19	251503	HM Graham	35	35	35
94	15	251503	LK Mittermayer	35	35	35
95	14	251503	BJ Withington	35	35	35
96	13	251503	D Lazicic	35	35	35
97	12	251503	DJ & MD Smith	35	35	35
98	11	251503	ME & JJ Piper	35	35	35
99	10	251503	DE Jenner & WB Jensen	35	35	35
100	9	251503	A Kapista	35	35	35
101	7	251503	RD & DMZ Hull	35	35	35
102	6	251503	KA Roberts	35	35	35
103	5	251503	SB Burnett & SL Grant	35	35	35
104	4	251503	RA & LA Deeben	35	35	35
105	3	251503	DJ & N Katsikaris	35	35	35
106	2	251503	TB & JH Reid	35	35	35
107	1	251503	ZJ & M & AA Raso	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

				Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
Owner Number	**Lot Number**	**DP**	**Property Owner**	**Day**	**Evening**	**Night**
109	25	250885	DA Evans	35	35	35
110	27	250886	JT Thompson & HT Evans	35	35	35
111	30	250886	GJ & NJ McEwan	35	35	35
112	29	250886	MJ & LM Croft	35	35	35
113	28	250886	CPG Ratcliff	35	35	35
119	8	251503	PJ Kearns	35	35	35
149	7	759017	Merriwa Council	65	65	65
151	8	759017	AI Cunningham	65	65	65
160	1	759017	Minister for Education and Training	43	NA	NA
162	A	395141	DM Harrison	65	65	65
168	4	759017	PJL Constructions Management Co Pty Limited	35	35	35
170	60	251603	HW & CL Montgomery	35	35	35
171	49	250886	AD & SA McGreggor	35	35	35
172	62	251603	AJ & TM Kimber	38	38	37
175	61	251603	MG Vale	35	35	35
176	63	251603	VJ Wakefield	35	35	35
177	64	251603	PL & CM Mobbs	35	35	35
180	67	251603	CD & LL Barrett	35	35	35
181	68	251603	SM Forster	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

Owner Number	Lot Number	DP	Property Owner	Project Specific Noise Criteria - $L_{Aeq(15 min)}$ dB		
				Day	Evening	Night
182	69	251603	J Dutoitcook	35	35	35
183	70	251603	R & EA Steines	35	35	35
184	71	251603	LA Stevenson	35	35	35
185	72	251603	LA Stevenson	35	35	35
186	73	251603	RW & IJ Adamson	35	35	35
187	74	251603	BT & KM Feeney	35	35	35
188	75	251603	KR & T Fielding	35	35	35
189	132	251684	MEH & DI & MT & AC Goggin & JR & AR & PA & RA Hyde	35	35	35
190	133	251684	T & LK Sahyoun	35	35	35
191	134	251684	BW & TS Lasham	35	35	35
192	135	251684	D Williams	35	35	35
194	137	251684	PM & K Potts	35	35	35
195	138	251684	R Cottam	35	35	35
196	139	251684	F Saxberg & M Weir	35	35	35
200	143	251684	VK Grimshaw	35	35	35
201	144	251684	KR & GM Towerton	35	35	35
201	145	251684	KR & GM Towerton	35	35	35
202	146	251684	H & VF Butler	35	35	35
203	147	251684	DJ Miller	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

				Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
Owner Number	**Lot Number**	**DP**	**Property Owner**	**Day**	**Evening**	**Night**
204	148	251684	RB & JE Donnan	35	35	35
206	150	251684	CA Marshall & R Vella	35	35	35
207	34	250886	AA & DM Smith	35	35	35
208	33	250886	SA & CR Hasaart	35	35	35
209	37	250886	F Mawson	35	35	35
210	38	250886	JM & AM Tebbutt	35	35	35
217	42	250886	RP & JL Patterson	35	35	35
218	41	250886	GF & GEL Soady	35	35	35
219	40	250886	T & S Riger	35	35	35
220	39	250886	SJ Rusten & NJ Smith	35	35	35
222	31	250886	BJ Purtell	35	35	35
223	32	250886	EW Palmer & JM Stewart	35	35	35
224	16	251503	RS & PCC Dupond	35	35	35
226	37	251603	LAA & FC Muscat	35	35	35
227	38	251603	WP & JA Hughes	35	35	35
228	39	251603	PP Libertis	35	35	35
229	40	251603	JJ & BA Lowe	35	35	35
230	41	251603	DA Hoole & DT Rawlinson	35	35	35
231	42	251603	T Morrison & SM Benny	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

Owner Number	Lot Number	DP	Property Owner	Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
				Day	Evening	Night
232	43	251603	L & JA Haaring	35	35	35
233	2	1001145	TJ & LA Wilcox	35	35	35
234	1	1001145	B Stammers & BJ Elphick	35	35	35
235	46	251603	LM & RS Wilson	35	35	35
236	47	251603	RG & CA Donovan	35	35	35
237	48	251603	A Puskaric	35	35	35
239	50	251603	JE Delarue	35	35	35
240	51	251603	GJ & DM Hartley	35	35	35
241	52	251603	H & DL Danson	35	35	35
253	8	750773	SJ Highett	35	35	35
254	56	750773	W & MP Marshall	35	35	35
255	30	750773	HJ & H Schmitz	35	35	35
256	23	750773	RC Campbell	35	35	35
257	10	750773	W & LG Cap	35	35	35
258	24	750773	PM & CD Elias	35	35	35
300	76	251603	CM Collins & CY Marshall	35	35	35
301	77	251603	AW & SC Stewart	35	35	35
302	78	251603	DJ & KS Hamilton	35	35	35
303	79	251603	HJ Ungaro	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

				Project Specific Noise Criteria - $L_{Aeq(15\ min)}$ dB		
Owner Number	**Lot Number**	**DP**	**Property Owner**	**Day**	**Evening**	**Night**
305	81	251603	L Barisic & M Aul	35	35	35
306	82	251603	E Armstrong	35	35	35
307	83	251603	M Chant & NK Young	35	35	35
308	84	251603	NA Dower	35	35	35
309	104	251603	GS Maher	35	35	35
310	105	251603	KI Death	35	35	35
312	107	251603	MS & JJ Ioannou	35	35	35
313	108	251603	NJ & BDE Pracy	35	35	35
314	109	251603	SL Ford	35	35	35
315	110	251603	WJ Richards & BJ Uzelac	35	35	35
316	111	251603	CR Vassel & CM Williams	35	35	35
317	112	251603	RJ Hore & V Bingham	35	35	35
319	2A	877688	Wilpinjong Coal Pty Limited	65	65	65
319	1A	877688	Wilpinjong Coal Pty Limited	65	65	65
319	17	755425	Wilpinjong Coal Pty Limited	65	65	65
319	1B	602226	Wilpinjong Coal Pty Limited	65	65	65
319	231	41892	Wilpinjong Coal Pty Limited	65	65	65
319	2B	1078866	Wilpinjong Coal Pty Limited	65	65	65
320	288	704081	D Clark	35	35	35

Table A.1 MODELLED RECEPTORS AND PROJECT SPECIFIC NOISE CRITERIA

Owner Number	Lot Number	DP	Property Owner	Project Specific Noise Criteria - $L_{Aeq(15 min)}$ dB Day	Evening	Night
46B	31	655483	North Eastern Wiradjuri Wilpinjong Community Fund Limited	NA	NA	NA

Note:
1. *"NA" denotes criteria not applicable due to property being already subject to acquisition upon request; and*
2. *Criteria presented are from MCC Stage 1 development approval.*

APPENDIX

B. METEOROLOGICAL DATA ASSESSMENT

Under various wind and temperature gradient conditions, noise may be increased or decreased compared with still-isothermal conditions - that is, no wind or temperature gradient. Atmospheric conditions that most affect noise propagation are temperature and wind velocity gradients. They can both enhance or reduce noise propagation from source to receiver due to refraction of sound propagating through the atmosphere, brought about by a change in sound speed with height.

Noise levels are increased when the wind blows from source to receiver or under temperature inversion conditions (both of which are sometimes referred to as adverse weather conditions), and decreased when the wind blows from receiver to the source or under temperature lapse conditions.

All available meteorological data from the UCML owned weather station located near Ulan Village from July 2007 to June 2008 inclusive was analysed to determine prevailing meteorological conditions for the site. The air quality consultant for the Stage 2 project undertook a detailed assessment of available meteorological data, and determined this data set was the most applicable. For consistency between assessments, the same data set was adopted for this assessment. Sigma-theta data was analysed in accordance with procedures in Appendix E of the INP, to determine the appropriate stability class and associated vertical temperature gradient for each weather record.

B.1 PREVAILING METEOROLOGICAL CONDITIONS

Section 5 of the INP provides procedures for considering meteorological effects. The effects of gradient winds, drainage flow winds and temperature inversions need to be considered.

Wind effects need to be assessed when wind is considered to be a feature of the area. Wind is considered a feature of the area when source-to-receiver wind speeds (at 10m height) of 3 m/s or less occur for more than 30 percent of the time in any time period, in any season.

Temperature inversions need to be assessed when there is more than a 30 percent occurrence during winter (June, July, August) nights. The time period used for this assessment is 18:00 to 07:00. Default values are provided for temperature inversion and drainage flow wind speed for use when required. Alternatively, actual measured values may be used.

B.1.1 Gradient Wind

The INP states that when the occurrence of wind up to 3 m/s (source-to-receptor component) is greater than 30 percent, wind should be included as a model parameter for any given receptor. The INP proposes a wind speed of 3 m/s be used as a default wind speed, however, in the case where the occurrence of wind up to 3 m/s (source-to-receptor component) is greater than 30 percent; use the highest wind speed (below 3 m/s) instead of the default.

When the occurrence of wind up to 3 m/s (source-to-receptor component) is less than 30 percent, wind need not be included as a model parameter.

The analysis of wind data included the following steps:

- All wind speed data greater than 5 m/s was discarded, as higher wind speeds cause extraneous noise and, tend to drown out industrial noise;
- All wind speed data less than 0.5 m/s was discarded, as these conditions are considered calm, or neutral;
- Remaining data was sorted into data sets representing each time period (day, evening and night), and each season; and
- For each period, and for each season, the percentage occurrence of the vector component of each of the sixteen standard compass directions was calculated. Vector components with a resulting direction component more than 45 degrees from each compass direction were excluded.

The results of this analysis for each time period are included in Table B.1 to Table B.3. Bolded results exceed 30 percent.

Table B.1 PERCENTAGE OCCURRENCE OF WIND DIRECTION WITH VECTOR COMPONENT 0.5 TO 3.0 m/s – DAY PERIOD

Wind Direction	Summer	Autumn	Winter	Spring
N	8%	9%	6%	10%
NNE	12%	13%	8%	16%
NE	18%	17%	11%	22%
ENE	20%	20%	14%	26%
E	19%	17%	13%	23%
ESE	16%	14%	11%	18%
SE	10%	9%	8%	11%
ESE	5%	5%	6%	5%
S	4%	6%	8%	5%
SSW	5%	10%	15%	9%
SW	7%	13%	20%	12%
WSW	8%	13%	21%	14%
W	8%	11%	20%	14%
WNW	7%	9%	16%	12%
NW	7%	7%	10%	10%
NNW	7%	7%	7%	9%

Notes: 1. Vector component percentages are for the range +/- 45 degrees from each standard wind direction.

Table B.2 PERCENTAGE OCCURRENCE OF WIND DIRECTION WITH VECTOR COMPONENT 0.5 TO 3.0 m/s – EVENING PERIOD

Wind Direction	Summer	Autumn	Winter	Spring
N	6%	9%	7%	9%
NNE	16%	14%	9%	18%
NE	28%	20%	12%	27%
ENE	29%	22%	15%	33%
E	26%	19%	14%	30%
ESE	22%	15%	11%	21%
SE	10%	10%	8%	12%
ESE	4%	3%	8%	5%
S	4%	9%	18%	13%
SSW	8%	27%	33%	26%
SW	11%	35%	40%	31%
WSW	11%	37%	39%	31%
W	10%	32%	27%	23%
WNW	7%	16%	16%	11%
NW	3%	6%	8%	6%
NNW	3%	6%	5%	5%

Notes: 1. Vector component percentages are for the range +/- 45 degrees from each standard wind direction.

Table B.3 PERCENTAGE OCCURRENCE OF WIND DIRECTION WITH VECTOR COMPONENT 0.5 TO 3.0 m/s – NIGHT PERIOD

Wind Direction	Summer	Autumn	Winter	Spring
N	8%	7%	4%	8%
NNE	22%	14%	7%	16%
NE	36%	20%	9%	21%
ENE	41%	21%	11%	23%
E	38%	19%	11%	19%
ESE	28%	13%	9%	11%
SE	13%	7%	7%	6%
ESE	6%	6%	7%	5%
S	7%	19%	18%	14%
SSW	14%	40%	36%	28%
SW	16%	45%	43%	34%
WSW	16%	46%	40%	33%
W	12%	32%	29%	22%
WNW	6%	12%	13%	9%
NW	3%	6%	5%	3%
NNW	3%	5%	4%	3%

Notes: 1. Vector component percentages are for the range +/- 45 degrees from each standard wind direction.

Based on the analysis of meteorological data described above, the following wind directions were included in this assessment as prevailing wind conditions. In each case, a wind speed of 3 m/s was adopted as per INP recommendations.

- Day – Calm wind conditions only, as no direction in considered prevailing in accordance with INP guidelines;
- Evening – ENE and SW; and
- Night – ENE and SW.

Levels were calculated to all receptor locations for all conditions. The maximum result for each receptor from each of the considered prevailing conditions was adopted as the predicted level for that receptor.

B.1.2 Temperature Inversion Data Analysis

The effects of temperature inversion enhancement are to be considered if the percentage occurrence of positive inversions is greater than 30 percent of winter night periods. The night period for determining temperature inversion frequency is from 1 hour before sunset until 1 hour after sunrise (6pm to 7am).

Sigma-theta data was analysed, in accordance with procedures in Appendix E of the INP, to determine the appropriate stability class and associated vertical temperature gradient for each weather record.

Analysis of the meteorological data indicates that positive vertical temperature gradients (stability class F and G) occur 41 percent of the time during winter night time periods, and therefore are required to be assessed. During these periods, winds were in the range 0.75 to 3.0 m/s 59 percent of the time, and were from the southwestern quadrant 61% of the time. These results indicate a drainage flow wind typically occurs from the southwest during periods of positive temperature inversions. This correlates well with the local topography, which generally descends from the southwest to the northeast. Stability class G occurred less than 1% of the time during winter night time periods, therefore, a vertical temperature gradient of 3 degrees per 100m was adopted in model calculations.

Although this analysis indicates that during periods of positive temperature inversions, noise would propagate to the northeast (away from the majority of receptors), for completeness sake, calm wind conditions combined with a positive temperature inversion were also included.

B.1.3 Prevailing Conditions Included In Modelling

Based on the analysis of meteorological data described above, the conditions listed in Table B.4 were included in this assessment as prevailing meteorological conditions.

Table B.4 METEOROLOGICAL CONDITIONS INCLUDED IN ASSESSMENT AS PREVAILING CONDITIONS

Temperature ^{O}C	Humidity %	Wind Speed m/s	Wind Direction	VTG ^{O}/100m
Day Period				
10	80	0	-	-0.65
Evening and Night Periods				
10	80	3	ENE	-0.65
10	80	3	SW	-0.65
10	80	2	SW	3
10	80	0	-	3

Temperature inversion conditions were included for the evening period as the time period for assessment of inversion conditions in winter is from 18:00 to 07:00, which includes the evening period.

APPENDIX

C.MODELLED SOURCE LOCATIONS

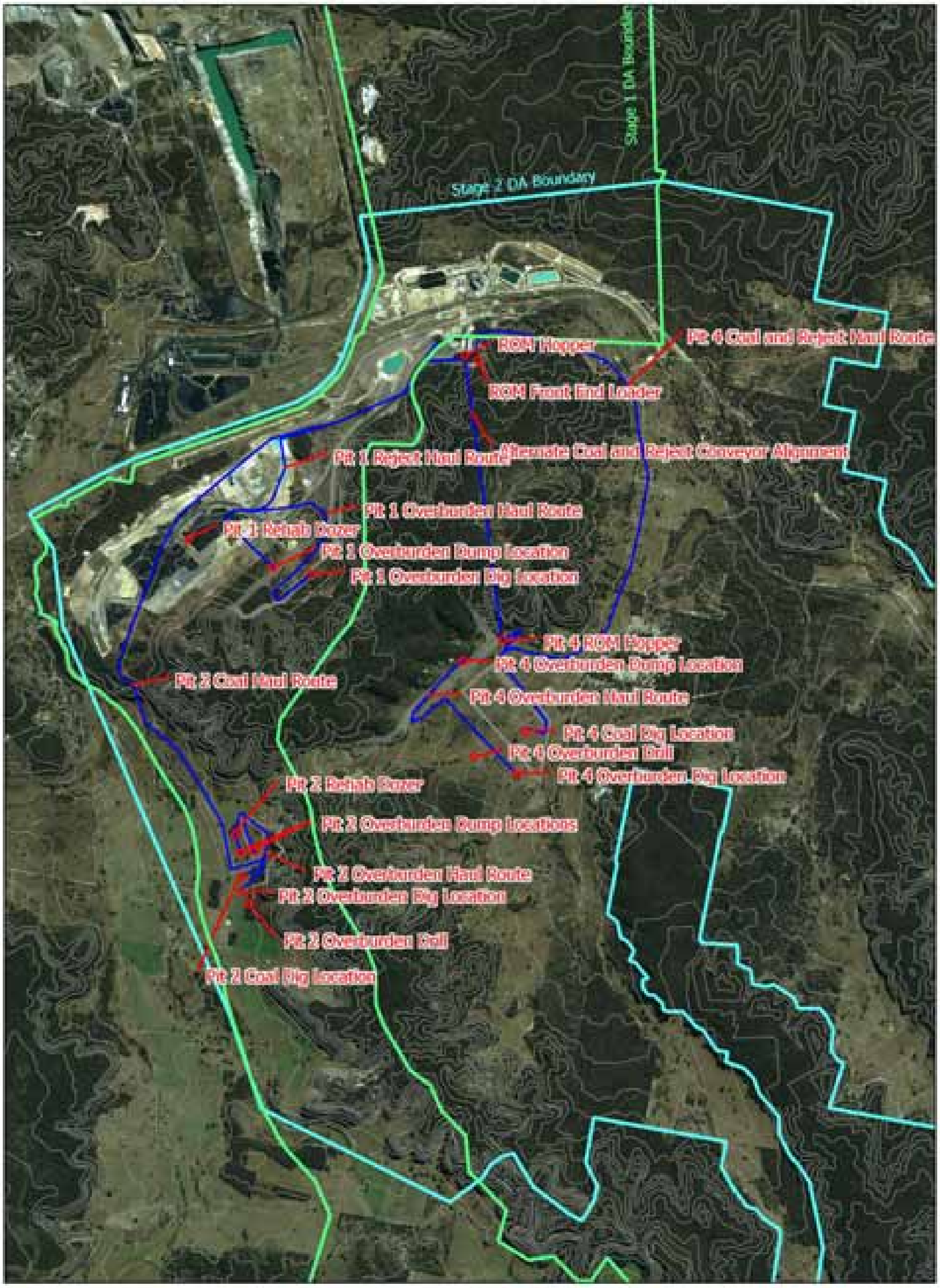

Figure C.1 Modelled Source Locations – Year 2 Scenario

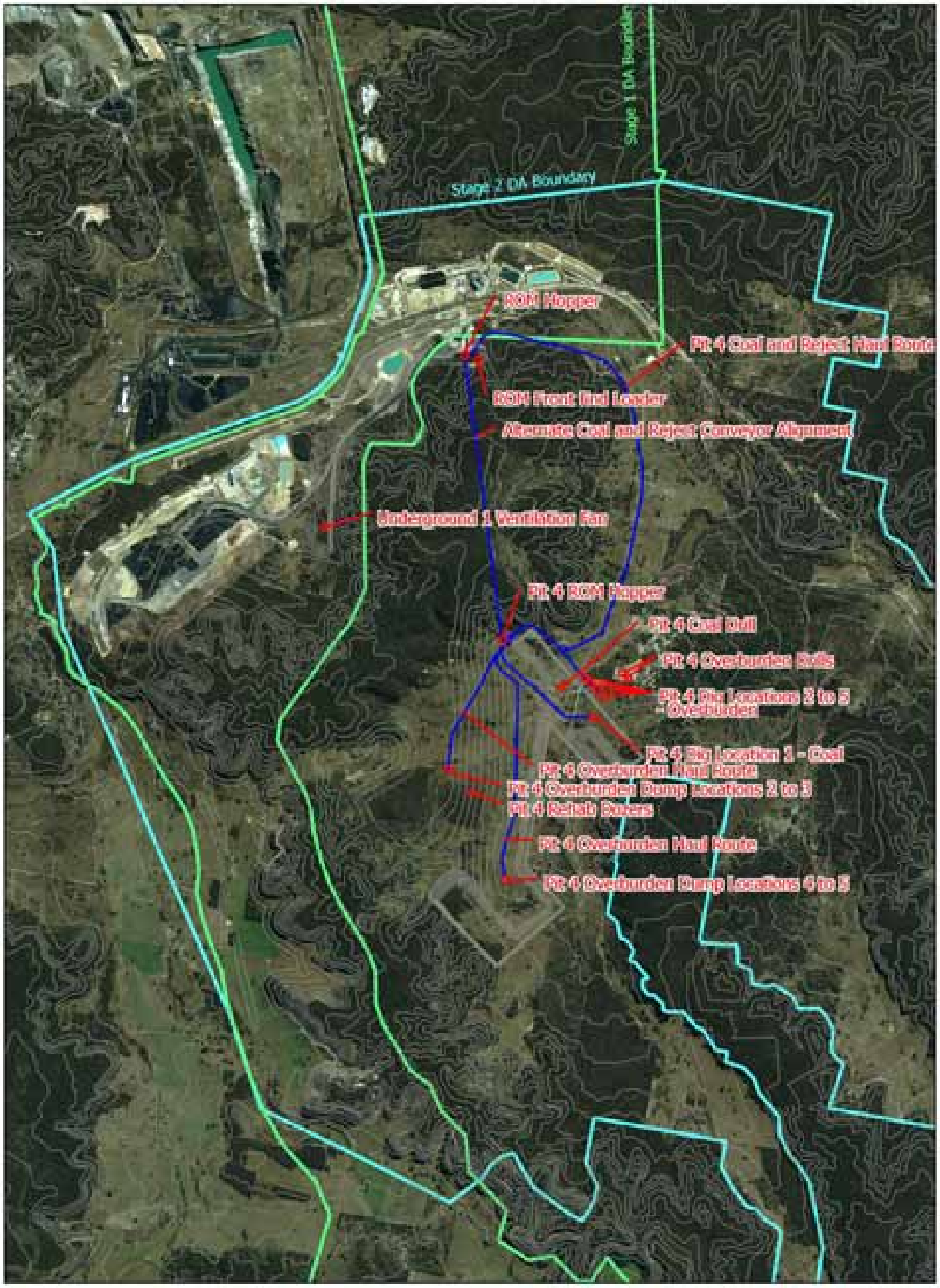

Figure C.2 Modelled Source Locations – Year 7 Scenario

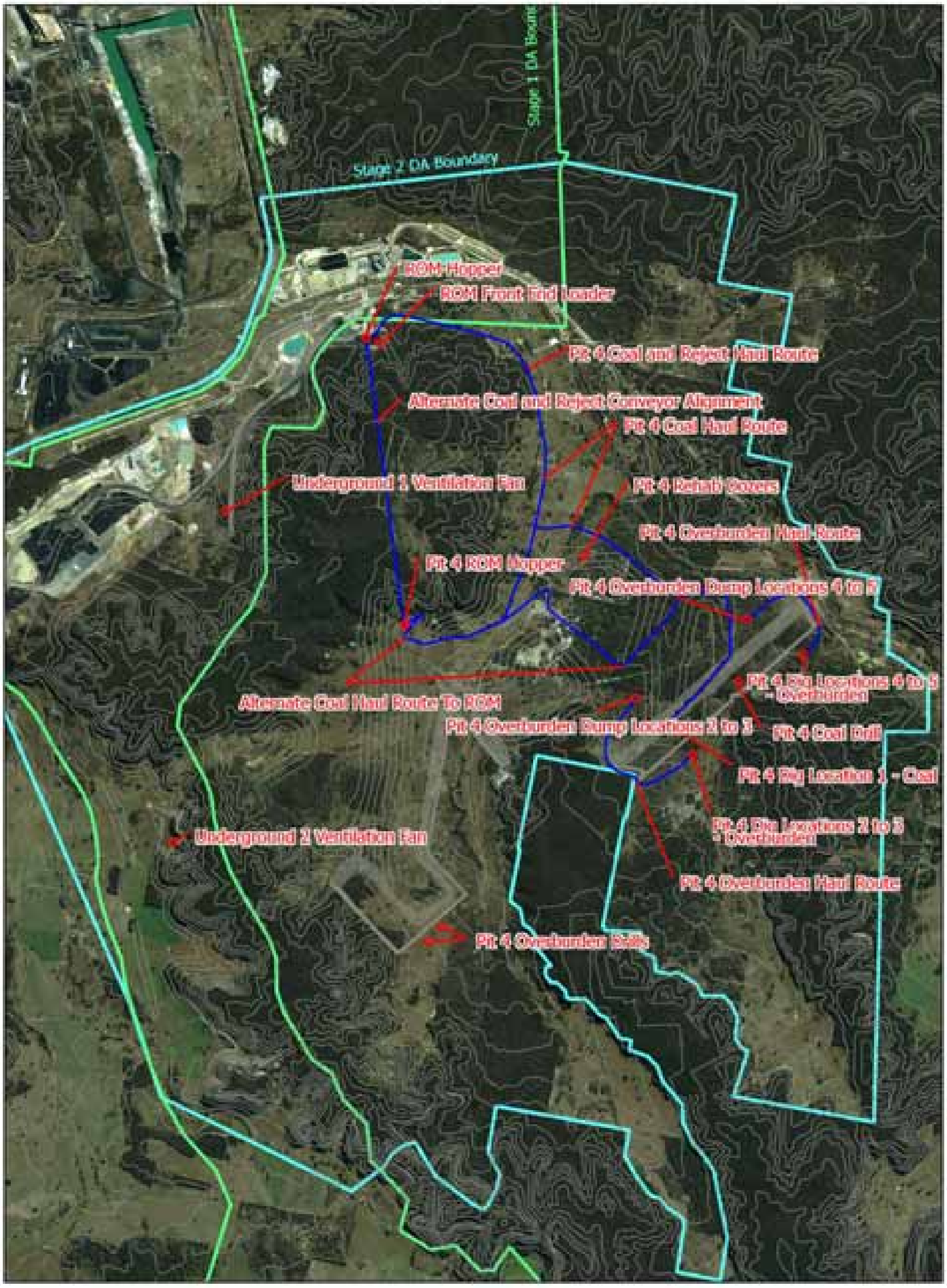

Figure C.3 Modelled Source Locations – Year 12 Scenario

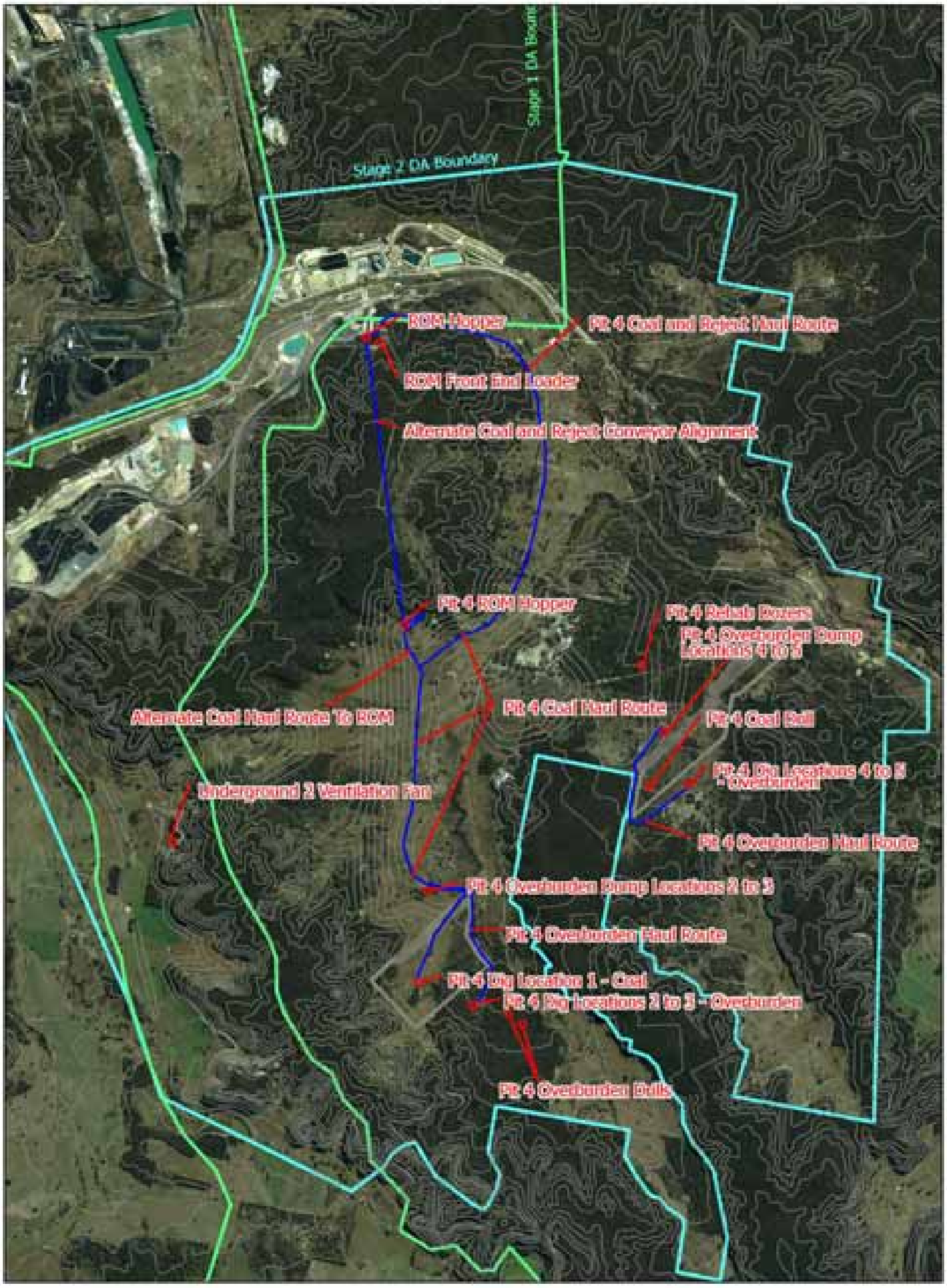

Figure C.4 Modelled Source Locations – Year 16 Scenario

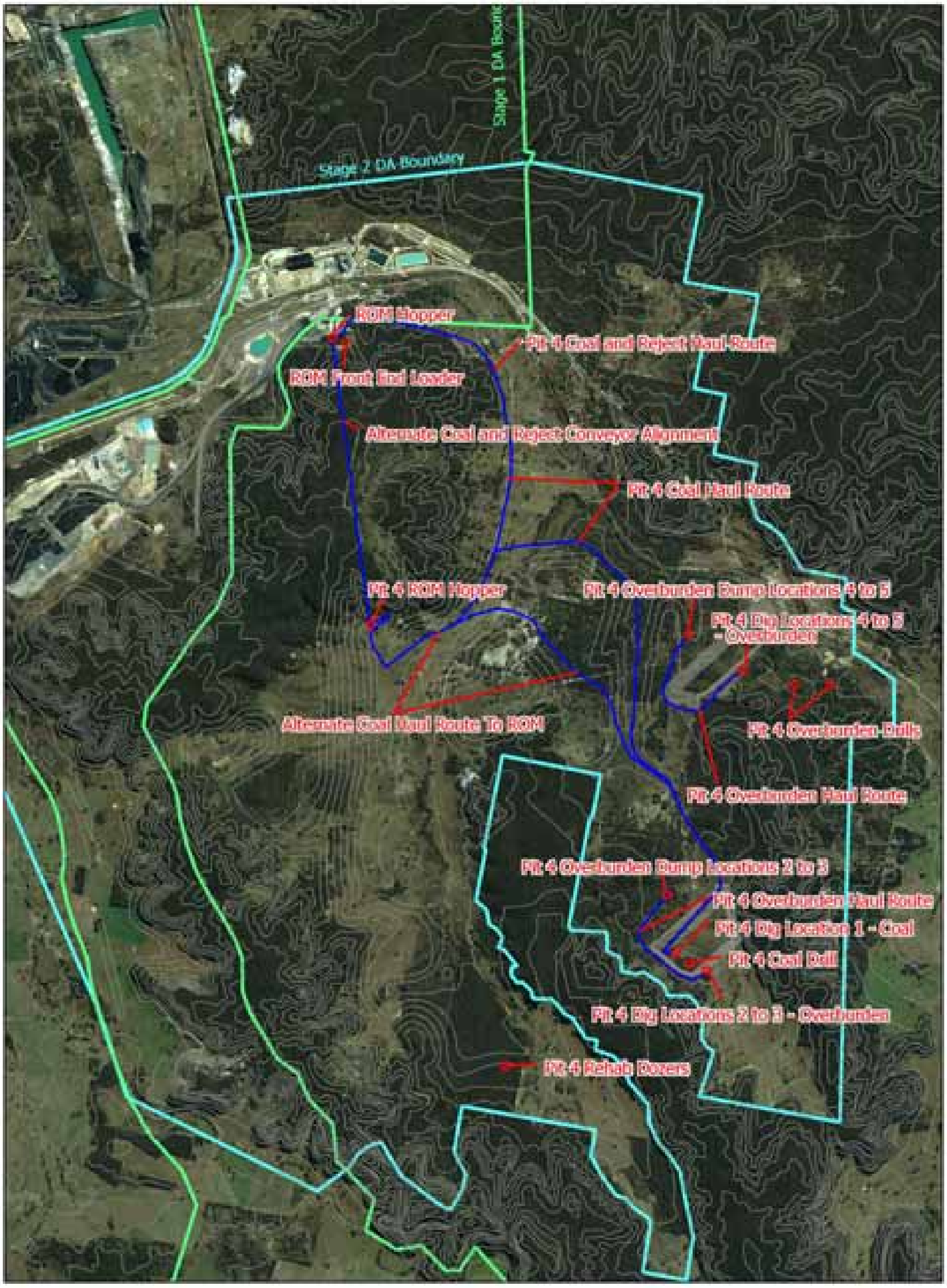

Figure C.5 Modelled Source Locations – Year 19 Scenario

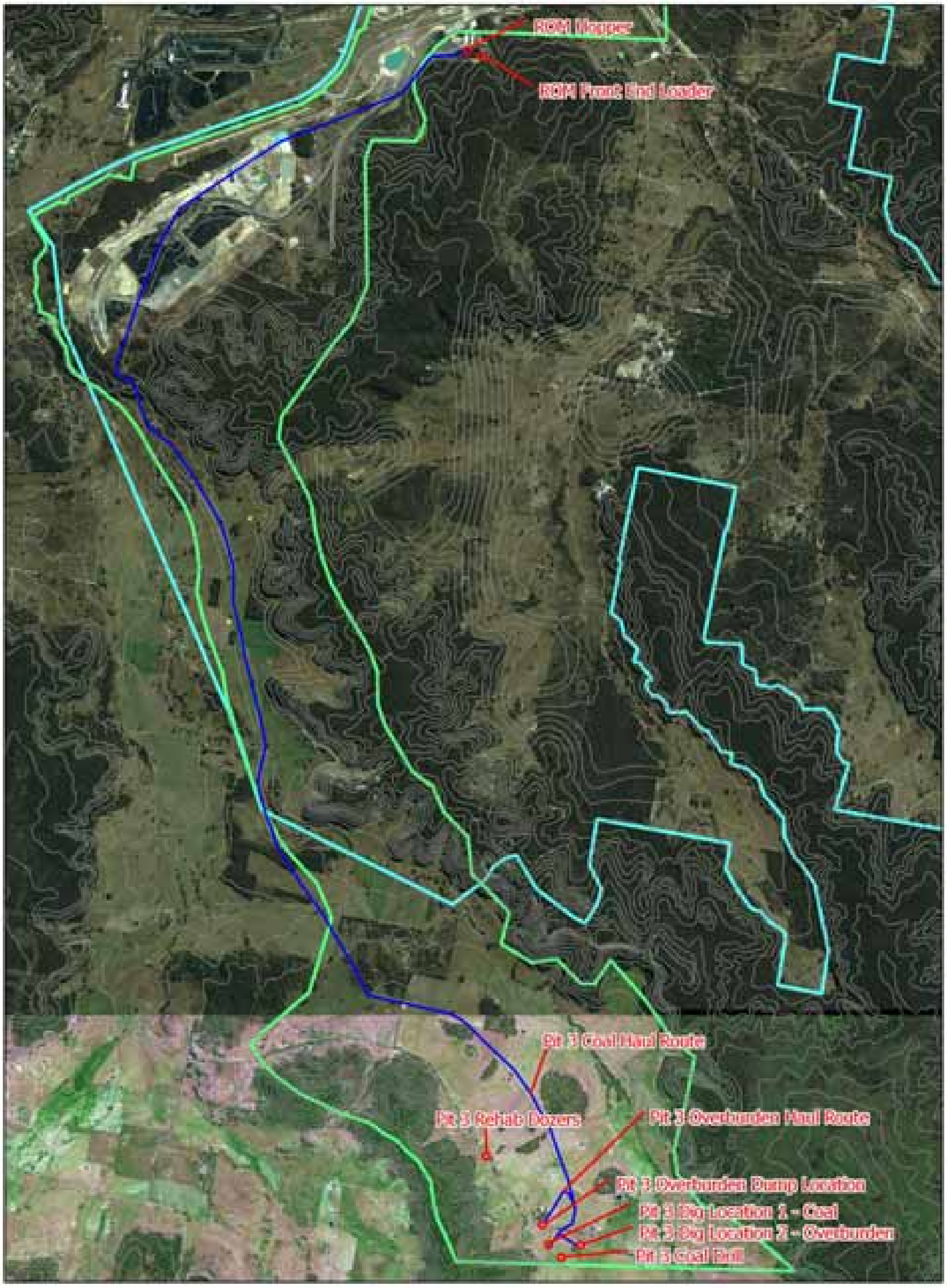

Figure C.6 Modelled Source Locations – Year 24 Scenario

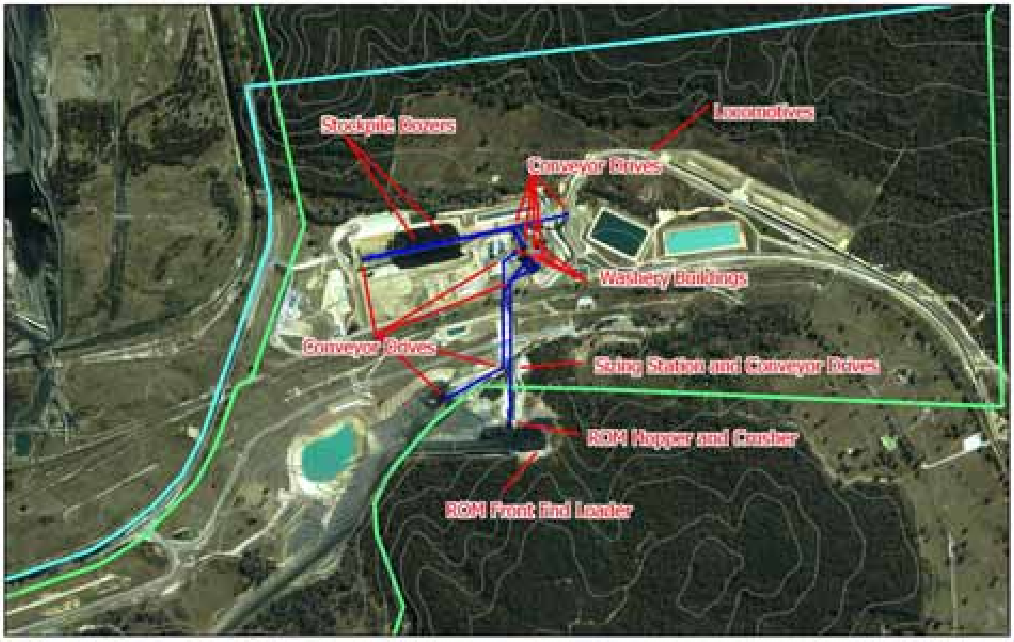

Figure C.7 Modelled Source Locations – All Scenarios CHPP Infrastructure Area

APPENDIX

D. OPERATIONAL NOISE RESULTS

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
5	1	NA	48	56	56	<30	47	47	<30	42	42	<30	45	45	<30	40	40	41	<30	<30
9	5	65/65/65	33	46	46	<30	41	41	<30	38	38	<30	38	38	<30	36	36	31	37	37
11	1	35/35/35	<30	32	32	<30	33	33	<30	33	33	<30	32	32	<30	31	31	<30	<30	<30
11	21	35/35/35	<30	35	35	<30	35	35	<30	35	35	<30	35	35	<30	35	35	<30	32	32
11	26	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
20	1	NA	38	49	49	<30	44	44	<30	41	41	<30	43	43	<30	37	37	35	31	31
25	8	NA	32	49	49	<30	41	41	<30	38	38	<30	38	38	<30	38	38	<30	36	36
26	276	65/65/65	31	45	45	<30	39	39	<30	37	37	<30	37	37	<30	37	37	<30	35	35
30	9	35/35/35	<30	34	34	<30	34	34	<30	32	32	<30	37	37	<30	32	32	<30	38	38
31	122	35/35/35	<30	31	31	<30	33	33	<30	31	31	<30	34	34	<30	31	31	<30	44	44
32	104	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
35	263	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
36	139	NA	<30	34	34	<30	36	36	<30	35	35	<30	41	41	<30	37	37	35	<30	<30
37	194	35/35/35	<30	31	31	<30	<30	<30	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
39	255	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
40	190	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
41A	7	NA	32	43	43	<30	39	39	<30	37	37	<30	38	38	<30	34	34	<30	33	33
41B	273	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	32	32
47	138	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	42	42
58	235	35/35/35	<30	40	40	<30	38	38	<30	34	34	<30	37	37	<30	33	33	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
59	217	35/35/35	<30	37	37	<30	35	35	<30	32	32	<30	33	33	<30	<30	<30	<30	<30	<30
60	215	35/35/35	<30	33	33	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
61	A	35/35/35	<30	35	35	<30	33	33	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
63	6	38/38/37	30	41	41	<30	38	38	<30	36	36	<30	37	37	<30	33	33	<30	31	31
64	58	38/38/37	<30	40	40	<30	38	38	<30	35	35	<30	37	37	<30	33	33	<30	31	31
70	59	35/35/35	<30	40	40	<30	37	37	<30	35	35	<30	36	36	<30	32	32	<30	31	31
74	53	35/35/35	<30	38	38	<30	36	36	<30	33	33	<30	35	35	<30	31	31	<30	<30	<30
75	31	35/35/35	<30	38	38	<30	36	36	<30	32	32	<30	35	35	<30	31	31	<30	<30	<30
76	36	35/35/35	<30	37	37	<30	35	35	<30	32	32	<30	35	35	<30	31	31	<30	<30	<30
77	35	35/35/35	<30	37	37	<30	36	36	<30	32	32	<30	34	34	<30	30	30	<30	<30	<30
78	54	35/35/35	<30	37	37	<30	34	34	<30	31	31	<30	33	33	<30	30	30	<30	<30	<30
79	34	35/35/35	<30	37	37	<30	34	34	<30	31	31	<30	34	34	<30	<30	<30	<30	<30	<30
80	30	35/35/35	<30	35	35	<30	34	34	<30	30	30	<30	33	33	<30	<30	<30	<30	<30	<30
81	33	35/35/35	<30	36	36	<30	33	33	<30	<30	<30	<30	33	33	<30	<30	<30	<30	<30	<30
82	32	35/35/35	<30	35	35	<30	32	32	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
83	23	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
84	22	35/35/35	<30	34	34	<30	31	31	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
86	26	35/35/35	<30	32	32	<30	31	31	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
87	21	35/35/35	<30	33	33	<30	31	31	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
88	20	35/35/35	<30	32	32	<30	31	31	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
89	27	35/35/35	<30	32	32	<30	30	30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
90	28	35/35/35	<30	31	31	<30	30	30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
91	19	35/35/35	<30	31	31	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
94	15	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
95	14	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
96	13	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
97	12	35/35/35	<30	30	30	<30	<30	<30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
98	11	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
99	10	35/35/35	<30	30	30	<30	<30	<30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
100	9	35/35/35	<30	31	31	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	30	30
101	7	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	30	30
102	6	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
103	5	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
104	4	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
105	3	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
106	2	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
107	1	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	30	30
109	25	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
110	27	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
111	30	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
112	29	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
113	28	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
119	8	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	30	30
149	7	65/65/65	39	48	48	31	44	44	30	43	43	30	42	42	30	42	42	36	45	45
151	8	65/65/65	35	46	46	<30	42	42	<30	41	41	<30	41	41	<30	40	40	34	43	43
160	1	43 day	36	47	47	<30	43	43	<30	42	42	<30	42	42	<30	41	41	33	44	44
162	A	65/65/65	38	47	47	31	43	43	31	42	42	31	42	42	31	42	42	36	44	44
170	60	35/35/35	<30	35	35	<30	34	34	<30	<30	<30	<30	33	33	<30	<30	<30	<30	<30	<30
171	49	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
172	62	38/38/37	<30	40	40	<30	37	37	<30	34	34	<30	36	36	<30	32	32	<30	31	31
175	61	35/35/35	<30	38	38	<30	36	36	<30	33	33	<30	35	35	<30	31	31	<30	<30	<30
176	63	35/35/35	<30	38	38	<30	36	36	<30	33	33	<30	35	35	<30	31	31	<30	<30	<30
177	64	35/35/35	<30	38	38	<30	35	35	<30	33	33	<30	35	35	<30	31	31	<30	<30	<30
180	67	35/35/35	<30	37	37	<30	34	34	<30	32	32	<30	34	34	<30	30	30	<30	<30	<30
181	68	35/35/35	<30	36	36	<30	34	34	<30	31	31	<30	33	33	<30	<30	<30	<30	<30	<30
182	69	35/35/35	<30	36	36	<30	34	34	<30	31	31	<30	33	33	<30	<30	<30	<30	<30	<30
183	70	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
184	71	35/35/35	<30	36	36	<30	33	33	<30	31	31	<30	33	33	<30	<30	<30	<30	<30	<30
185	72	35/35/35	<30	35	35	<30	33	33	<30	31	31	<30	33	33	<30	<30	<30	<30	<30	<30
186	73	35/35/35	<30	33	33	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
187	74	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
188	75	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
189	132	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
190	133	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
191	134	35/35/35	<30	30	30	<30	<30	<30	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
192	135	35/35/35	<30	33	33	<30	31	31	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
194	137	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
195	138	35/35/35	<30	31	31	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
196	139	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
200	143	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
201	144	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
201	145	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
202	146	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
203	147	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
204	148	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
206	150	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
207	34	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
208	33	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
209	37	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
210	38	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	Lot	PSNC	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
217	42	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
218	41	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
219	40	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
220	39	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
222	31	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
223	32	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
224	16	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
226	37	35/35/35	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
227	38	35/35/35	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
228	39	35/35/35	<30	31	31	<30	30	30	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
229	40	35/35/35	<30	32	32	<30	31	31	<30	<30	<30	<30	30	30	<30	<30	<30	<30	<30	<30
230	41	35/35/35	<30	32	32	<30	31	31	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
231	42	35/35/35	<30	33	33	<30	32	32	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
232	43	35/35/35	<30	33	33	<30	32	32	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
233	2	35/35/35	<30	33	33	<30	32	32	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
234	1	35/35/35	<30	33	33	<30	32	32	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
235	46	35/35/35	<30	34	34	<30	32	32	<30	30	30	<30	32	32	<30	<30	<30	<30	<30	<30
236	47	35/35/35	<30	34	34	<30	33	33	<30	30	30	<30	32	32	<30	<30	<30	<30	<30	<30
237	48	35/35/35	<30	35	35	<30	33	33	<30	<30	<30	<30	32	32	<30	<30	<30	<30	<30	<30
239	50	35/35/35	<30	36	36	<30	34	34	<30	31	31	<30	33	33	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	**Lot**	**PSNC**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**
240	51	35/35/35	<30	36	36	<30	35	35	<30	31	31	<30	34	34	<30	30	30	<30	<30	<30
241	52	NA	<30	37	37	<30	35	35	<30	32	32	<30	34	34	<30	30	30	<30	<30	<30
253	8	35/35/35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
254	56	35/35/35	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
255	30	35/35/35	<30	34	34	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	31
256	23	35/35/35	<30	35	35	<30	33	33	<30	31	31	<30	31	31	<30	30	30	<30	31	31
257	10	35/35/35	<30	36	36	<30	32	32	<30	31	31	<30	31	31	<30	30	30	<30	33	33
258	24	35/35/35	<30	36	36	<30	34	34	<30	32	32	<30	32	32	<30	31	31	<30	33	33
300	76	35/35/35	<30	34	34	<30	31	31	<30	<30	<30	<30	31	31	<30	<30	<30	<30	<30	<30
301	77	35/35/35	<30	34	34	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
302	78	35/35/35	<30	34	34	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
303	79	35/35/35	<30	36	36	<30	34	34	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
305	81	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
306	82	35/35/35	<30	34	34	<30	33	33	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
307	83	35/35/35	<30	34	34	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
308	84	35/35/35	<30	33	33	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
309	104	35/35/35	<30	32	32	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
310	105	35/35/35	<30	33	33	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
312	107	35/35/35	<30	33	33	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
313	108	35/35/35	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table D.5 OPERATIONAL NOISE RESULTS - $L_{Aeq, 15 minute}$ dB

			Year 2			Year 7			Year 12			Year 16			Year 19			Year 24		
Owner	**Lot**	**PSNC**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**	**Day**	**Eve**	**Night**
314	109	35/35/35	<30	32	32	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
315	110	35/35/35	<30	33	33	<30	30	30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
316	111	35/35/35	<30	33	33	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
317	112	35/35/35	<30	34	34	<30	31	31	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	17	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	231	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	1A	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	1B	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	2A	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
319	2B	65/65/65	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
320	288	35/35/35	<30	37	37	<30	34	34	<30	31	31	<30	32	32	<30	31	31	<30	31	31
46B	31	NA	39	47	47	32	45	45	32	44	44	32	43	43	32	43	43	38	46	46

Note: 1. *"NA" denotes criteria not applicable due to property being already subject to acquisition upon request; and*

2. *Criteria presented are for day/evening/night.*

APPENDIX

E. NOISE CONTOURS

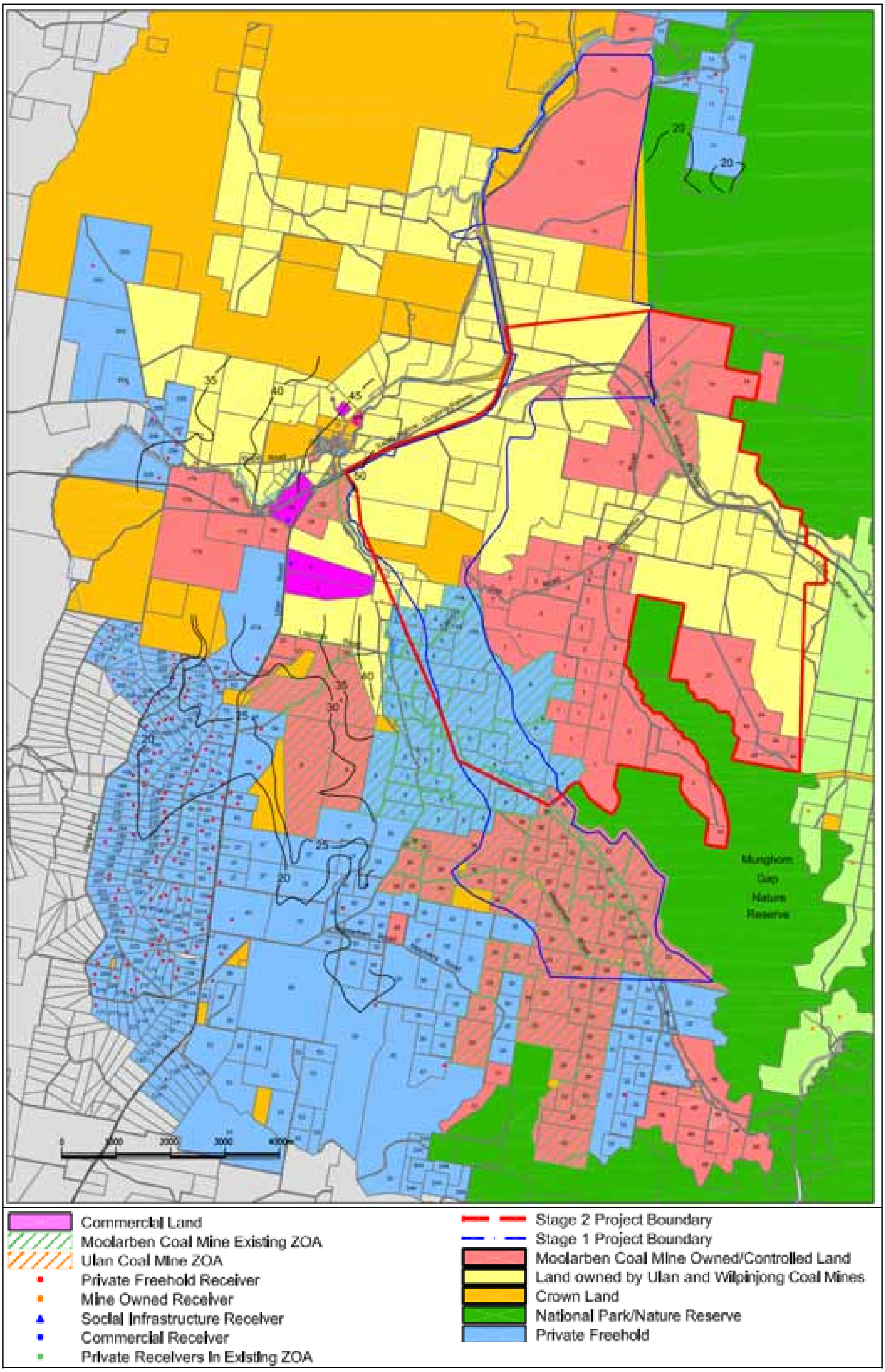

Figure E.1 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 2 Day Period

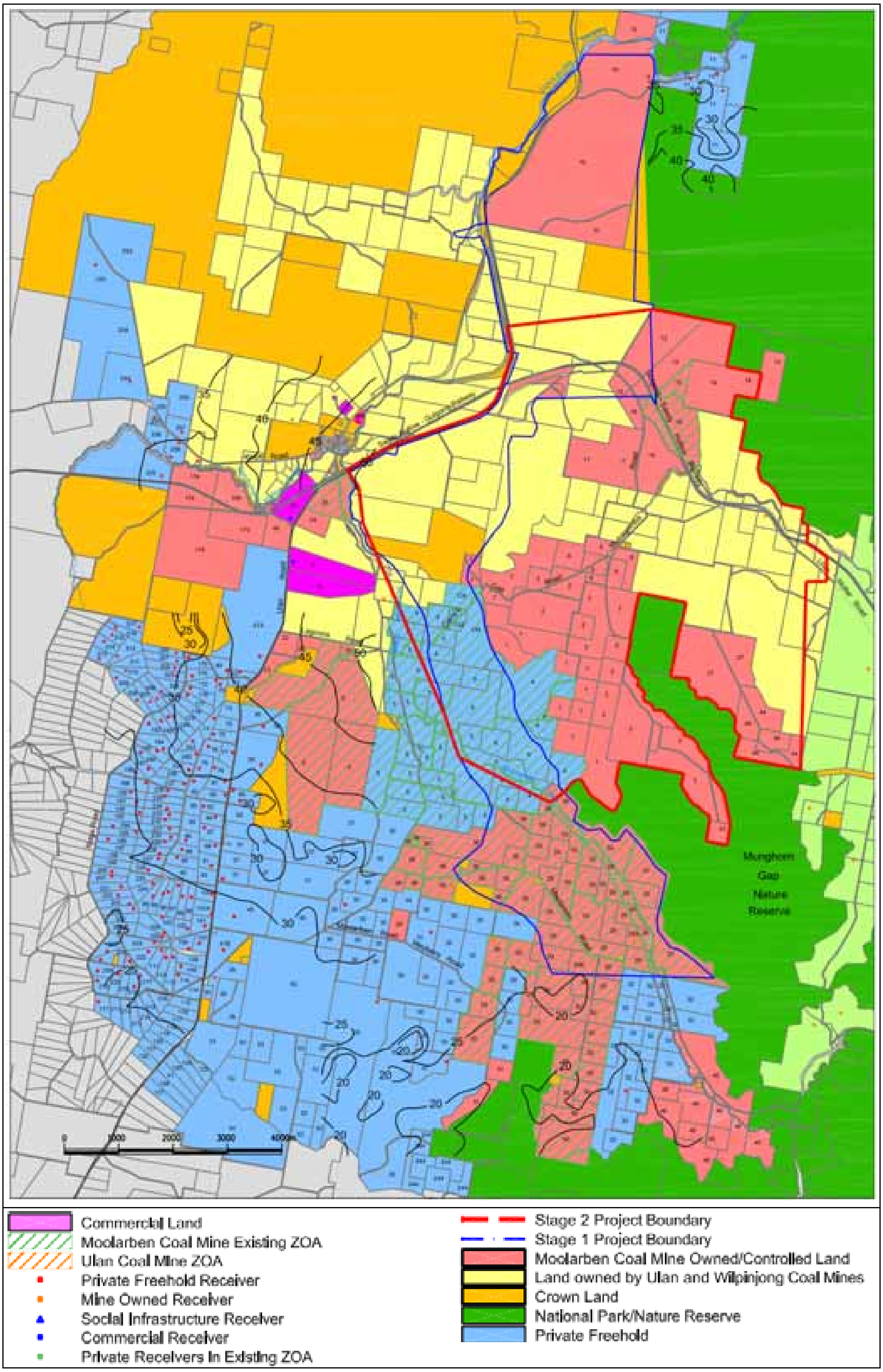

Figure E.2 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 2 Evening/Night Periods

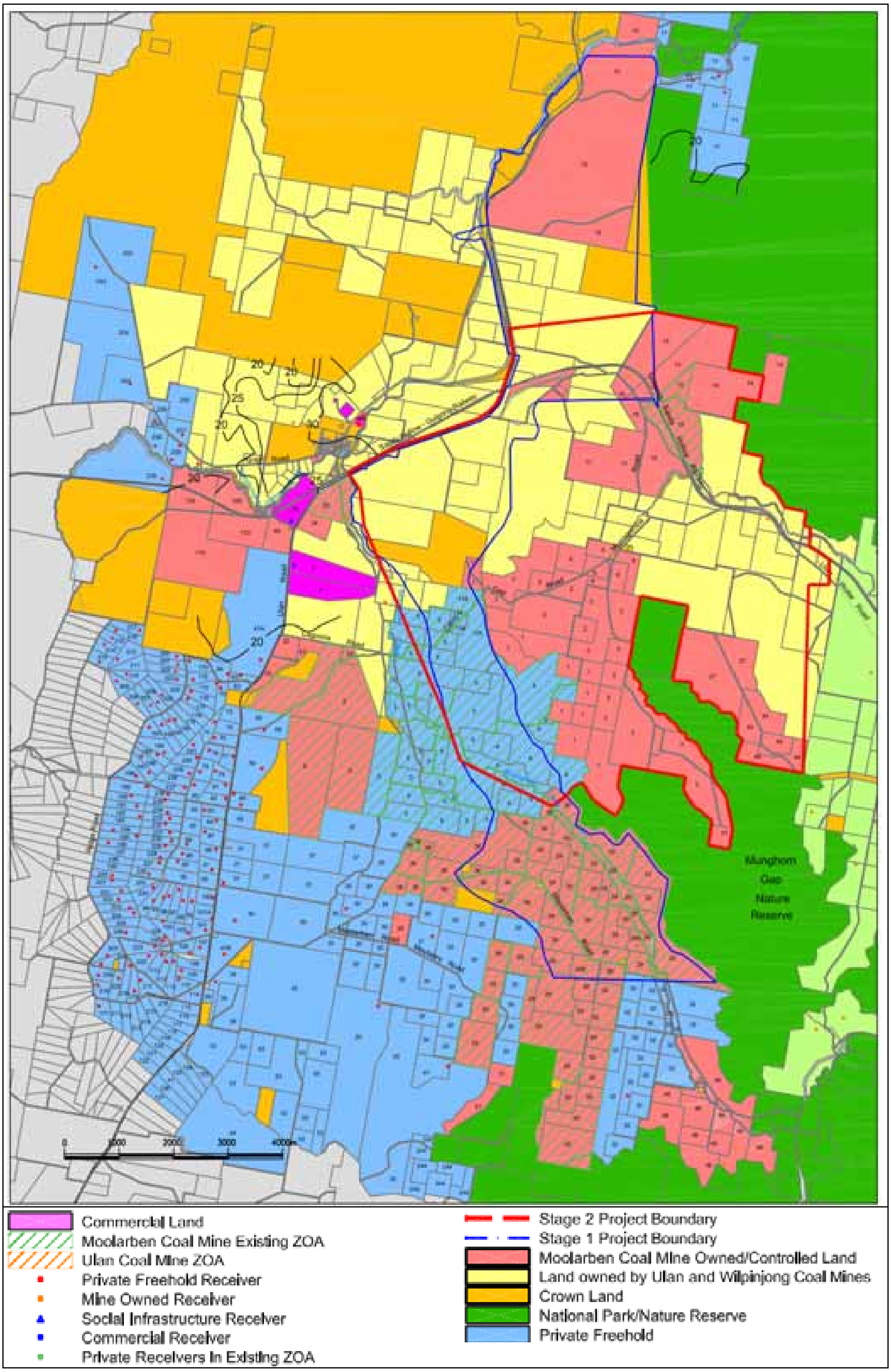

Figure E.3 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 7 Day Period

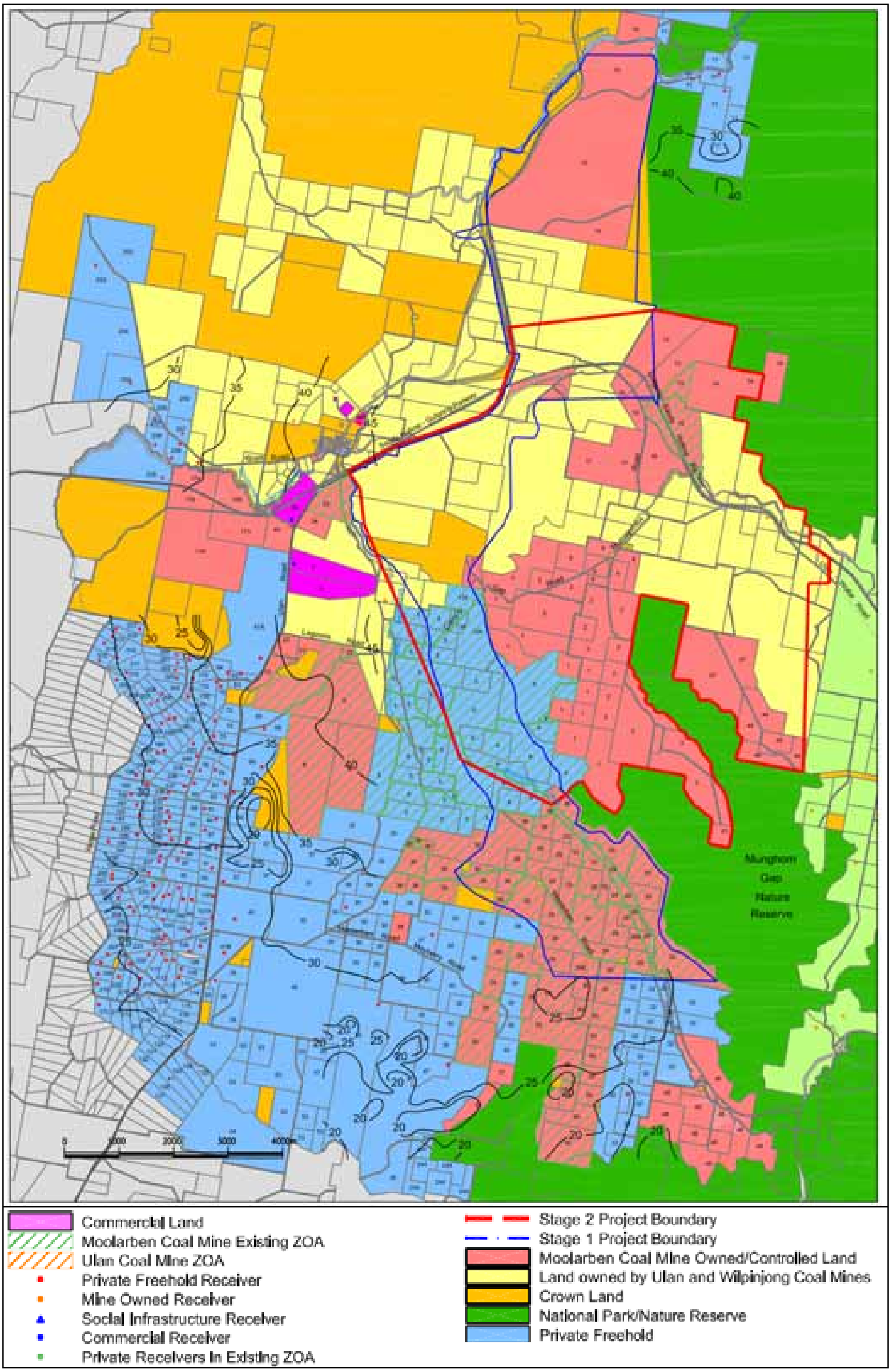

Figure E.4 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 7 Evening/Night Periods

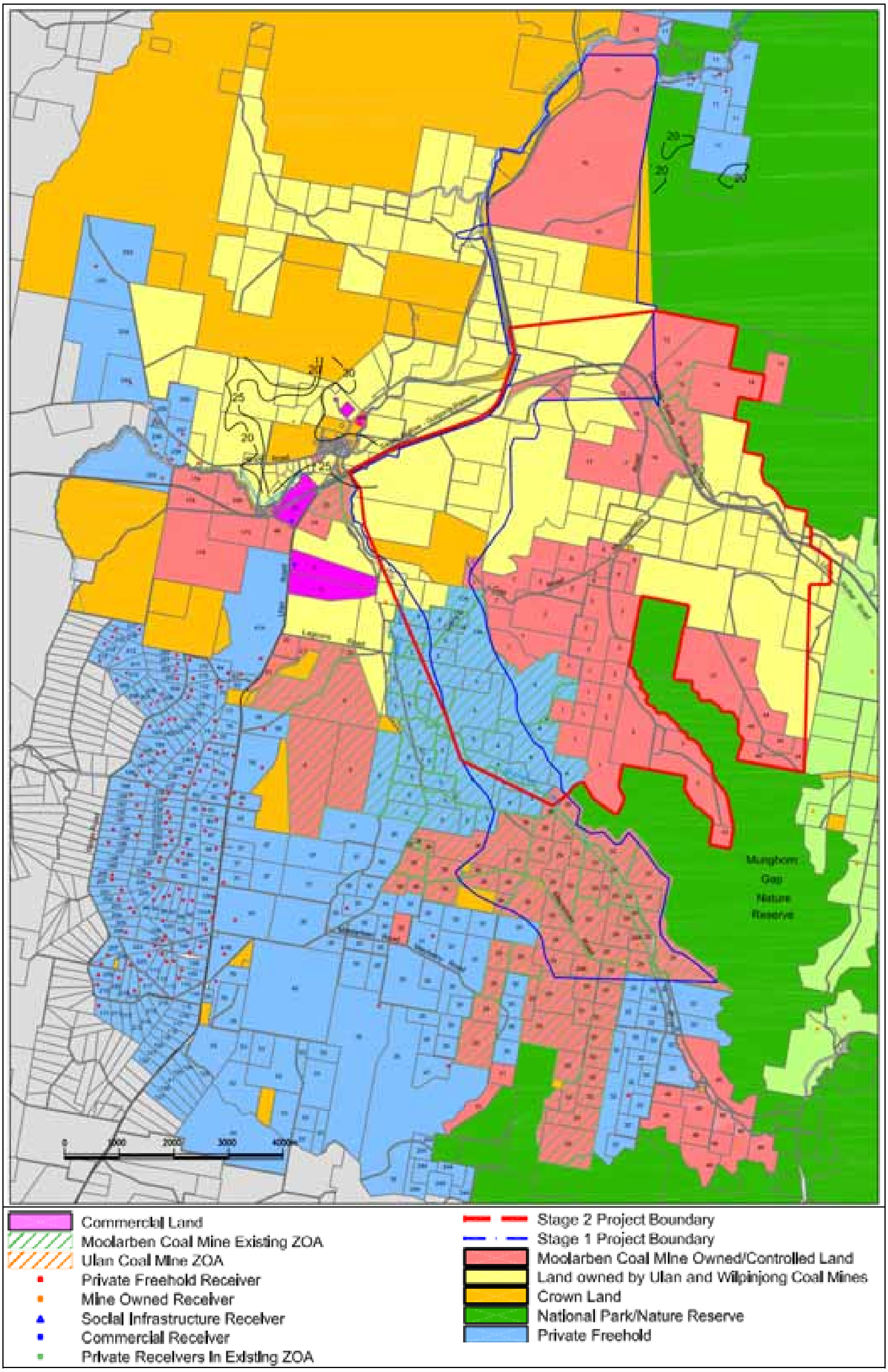

Figure E.5 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 12 Day Period

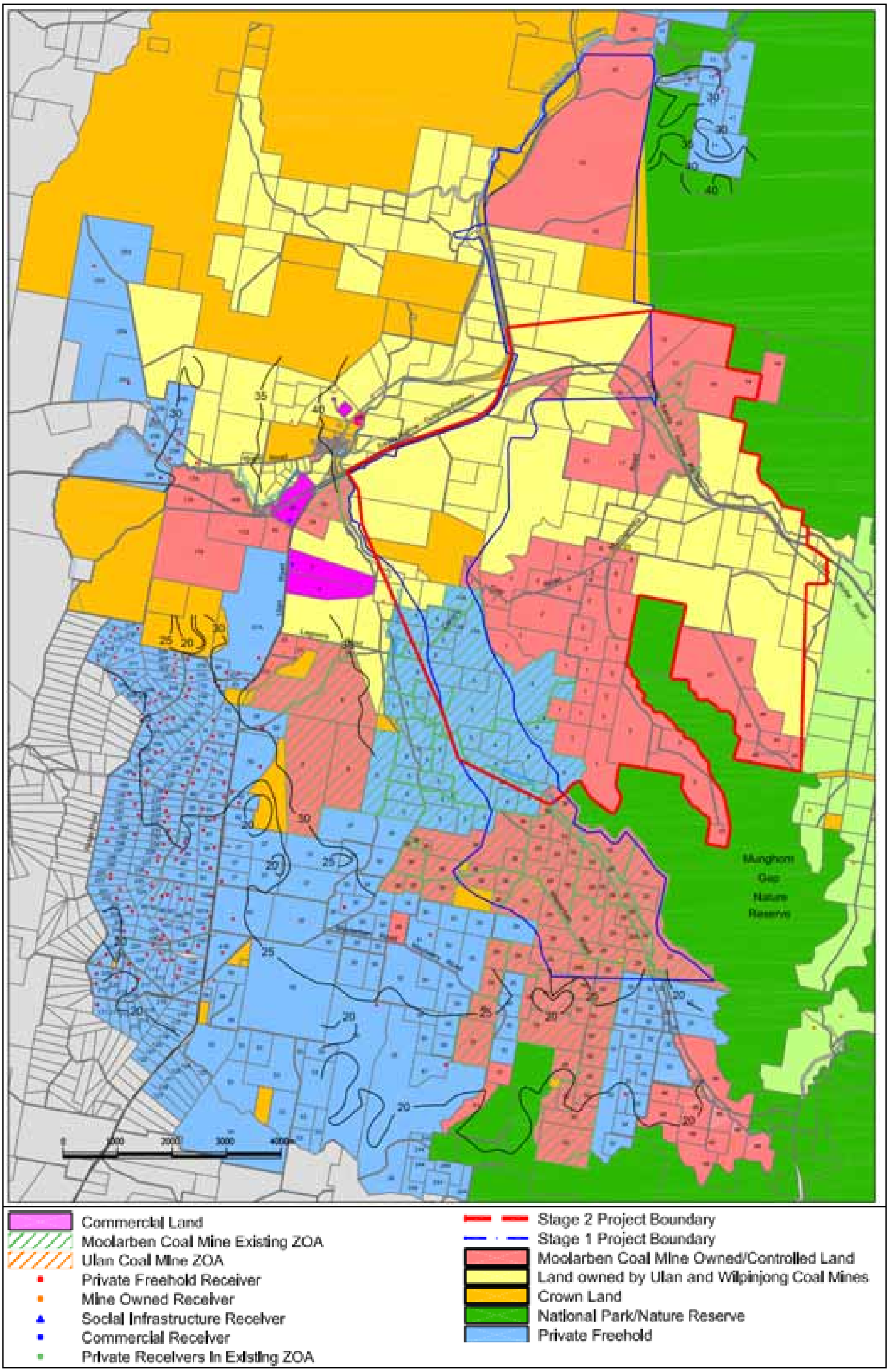

Figure E.6 Predicted LAeq 15 minute Noise Contours Year 12 Evening/Night Periods

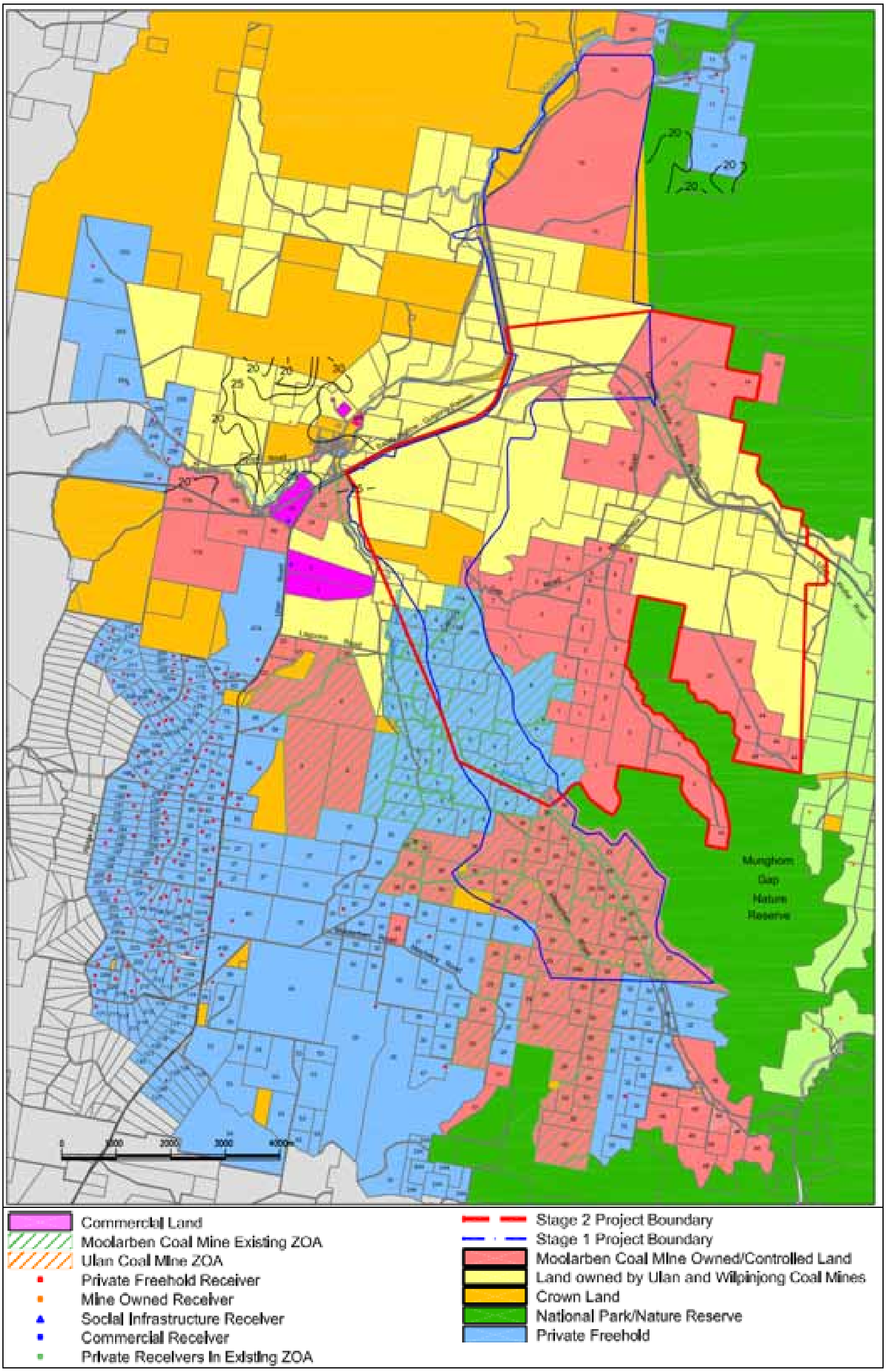

Figure E.7 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 16 Day Period

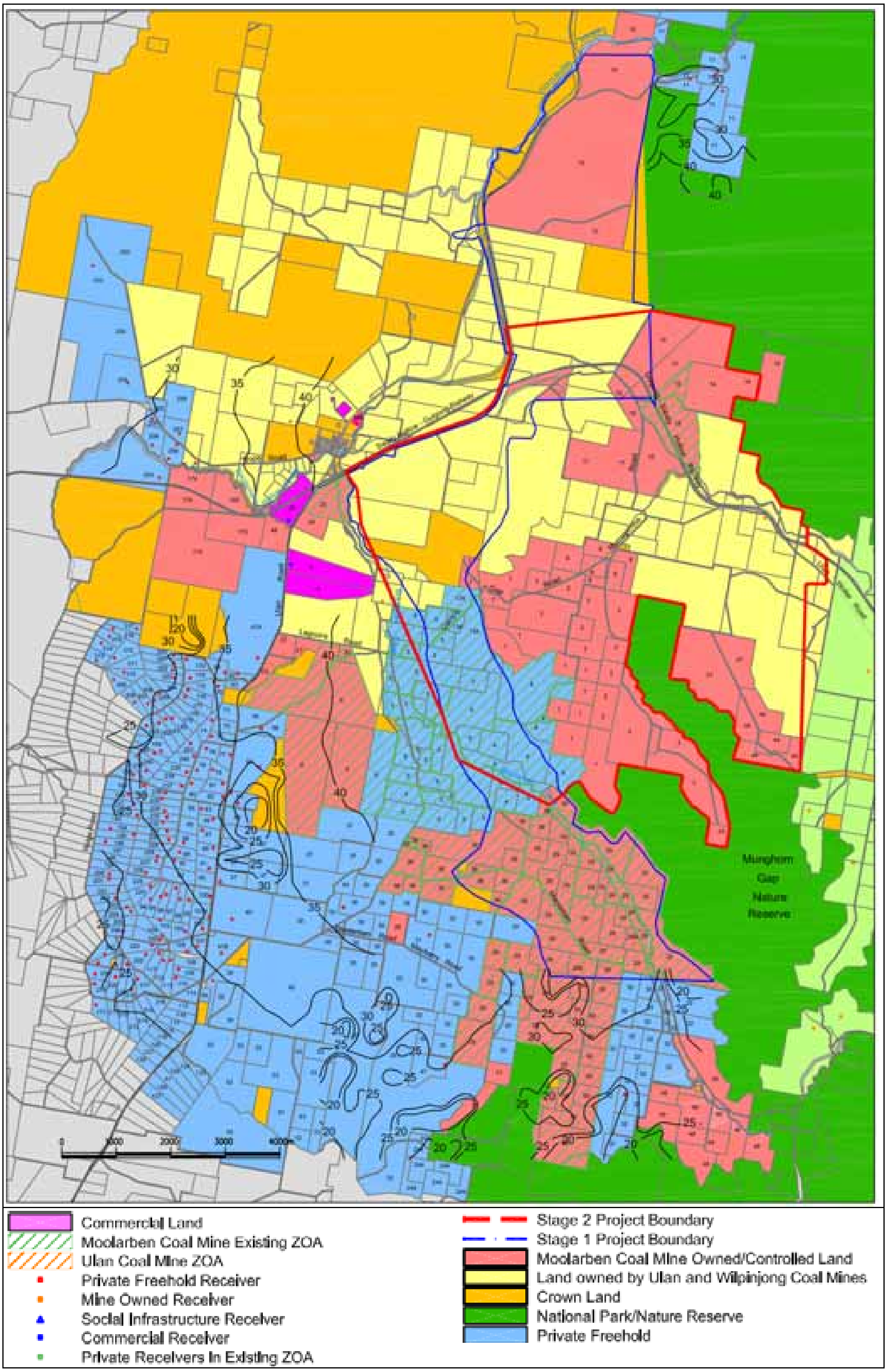

Figure E.8 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 16 Evening/Night Periods

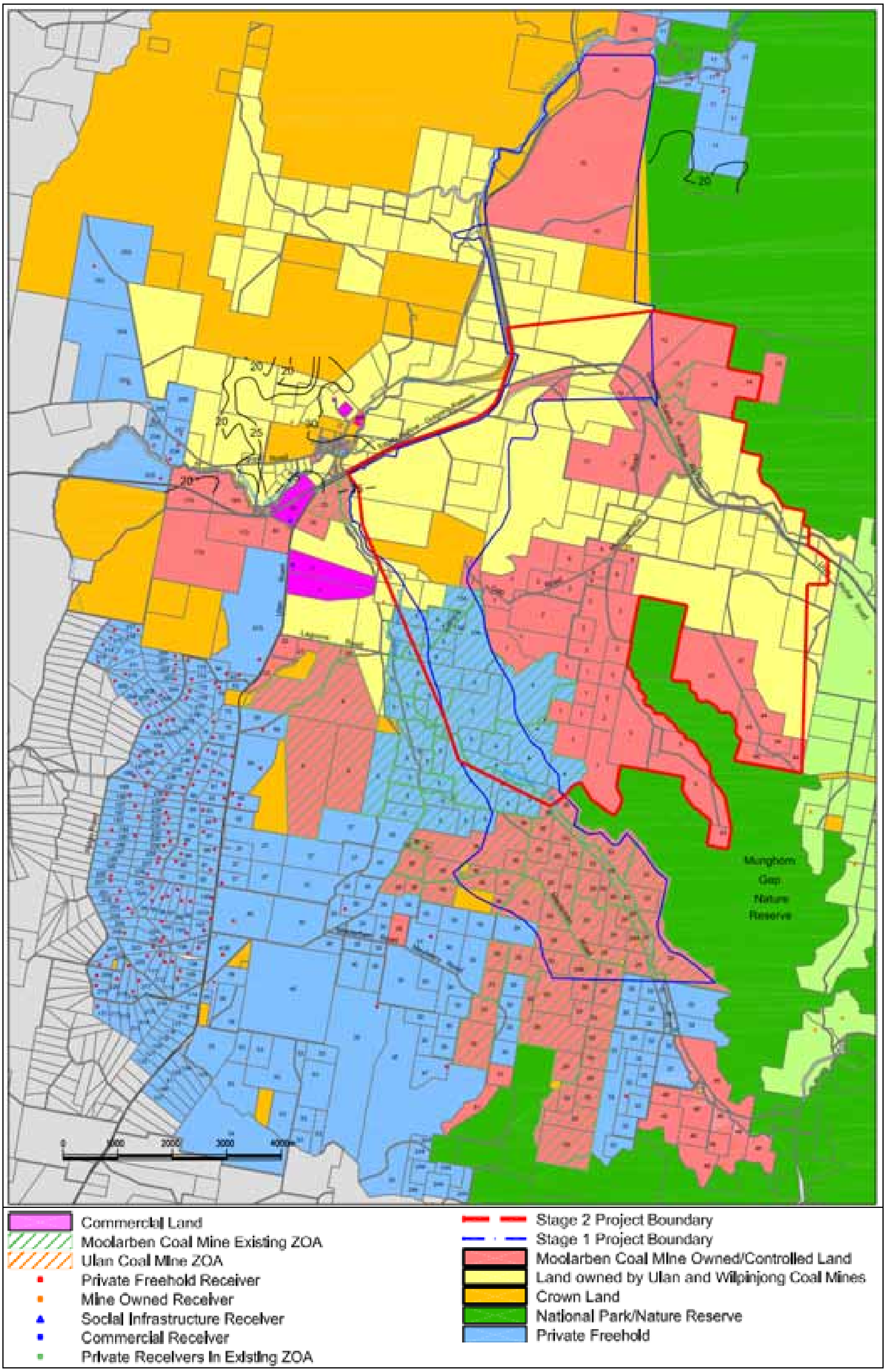

Figure E.9 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 19 Day Period

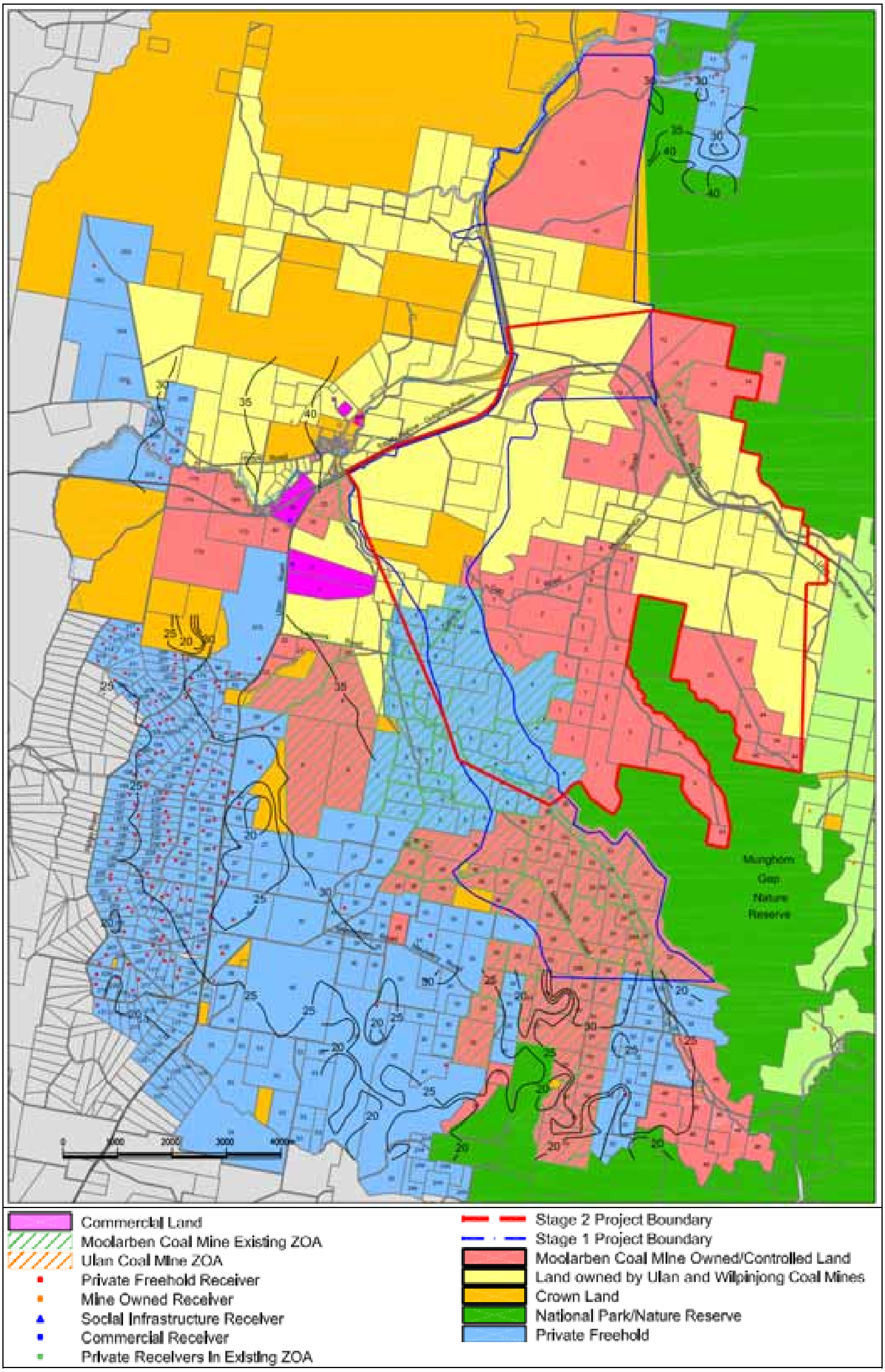

Figure E.10 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 19 Evening/Night Periods

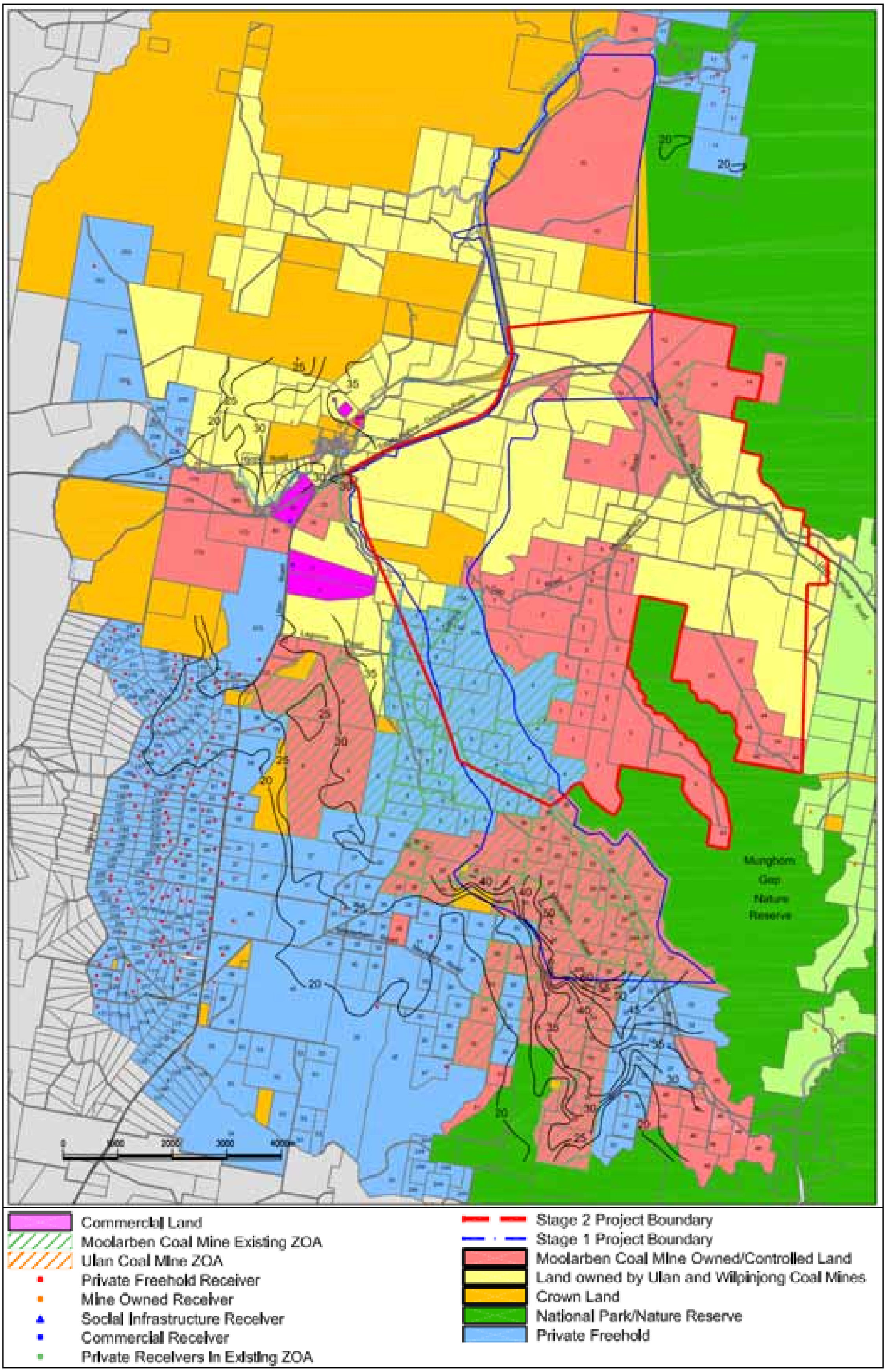

Figure E.11 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 24 Day Period

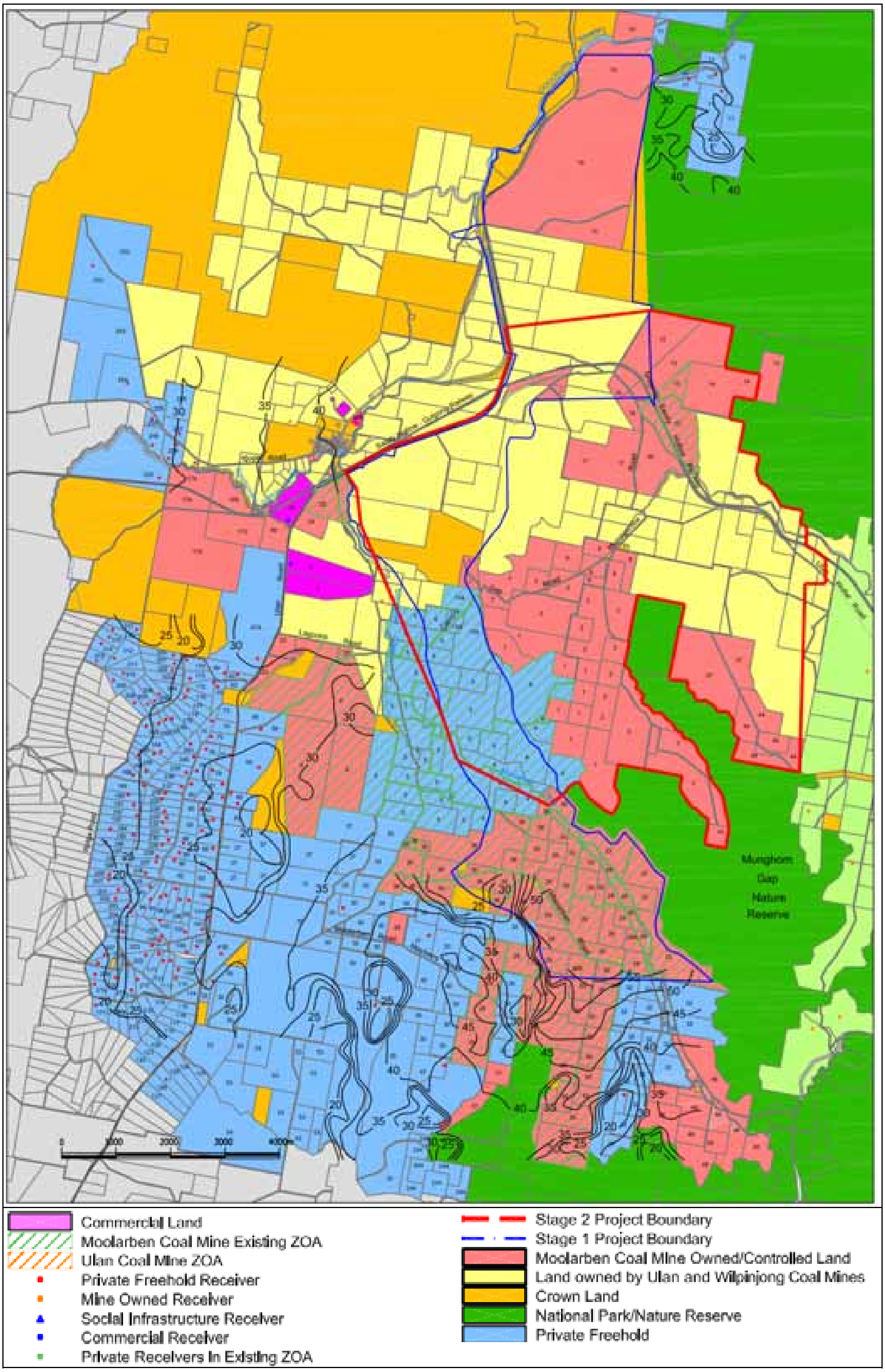

Figure E.12 Predicted $L_{Aeq\ 15\ minute}$ Noise Contours Year 24 Evening/Night Periods

APPENDIX

F. RESPONSE TO SUBMISSIONS

Following public exhibition of an Environmental Assessment report for MCM Stage 2, a number of noise related submissions were received. Relevant issues were addressed in the document 'Response to Submissions Report – Part B' (Response to Submissions, Coffey Natural Systems). Rail traffic noise issues were addressed in that document; the relevant sections are reproduced below.

2.1.7 Rail Traffic Noise

Issues

- Monitoring conducted by Advitech in Wollar, March 2009, observed each train emitting in excess of 35 dB(A) for over 15 minutes at a receiver at a distance of 400 m, and a maximum of 58 dB(A). This satisfies the Environment Protection Authority (EPA) definition of intrusive noise and is above the sleep disturbance level set by the World Health Organisation (WHO).
- All residents within 500 m of the length of the Gulgong–Sandy Hollow rail line will be affected by rail traffic noise.

Response

Once trains leave the approved Stage 1 rail loop and pass onto the Gulgong–Sandy Hollow rail line, they are subject to the conditions of Australian Rail Track Corporation's (ARTC) Environment Protection Licence (EPL) 3142. Currently, EPL 3142 does not contain environmental noise limits. However, it is an objective of the EPL to progressively reduce noise levels to the goals of 65 dB(A) L_{eq}, (day time from 7 am to 10 pm), 60 dB(A) L_{eq}, (night-time from 10 pm to 7 am) and 85 dB(A) (24-hour) maximum pass-by noise, measured at one metre from the facade of affected residential properties. These are the same noise criteria in the DECC's Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects (DECC, 2007).

The WHO suggests that the equivalent noise level (L_{eq}) inside bedrooms should be limited to 30-35 dB(A) and the maximum noise level (L_{max}) should be limited to 45 dB(A). When considering internal noise levels from an external source, it is normal practice to assume that windows may be partially open, which allows for open windows on warm nights. Based on windows being partially open, the WHO suggests that to achieve it guideline internal levels, the noise levels outside a bedroom window should be limited to 45 to 50 dB(A) L_{eq} and 60 dB(A) L_{max} (Bergland et al., 1999).

The noise impact assessment considered potential cumulative noise impacts from coal trains on the Gulgong–Sandy Hollow rail line against these criteria (EA Appendix 4 Section 6). The total cumulative coal train noise from Ulan and Wilpinjong coal mines and the MCP will be more than 4 dB(A) below the daytime rail traffic noise criteria of 65 dB(A) $L_{Aeq(15\ hour)}$ for residential land uses. However, the night-time rail traffic noise criteria of 60 dB(A) $L_{Aeq(9\ hour)}$ is predicted to be exceeded by 0.4 dB(A) $L_{Aeq(9\ hour)}$. Further investigation may need to be undertaken by ARTC given this predicted 0.4 dB(A) exceedence (EA Section 5.3).

The set back distance for meeting the ARTC's EPL noise criteria is approximately 70 m and is governed by predicted night-time noise levels (i.e., $L_{Aeq(9\ hour)}$). Residences set back greater than 70 m from the Gulgong–Sandy Hollow rail line are therefore not expected to experience exceedences of noise criteria although they will hear passing trains as they do currently.