



# MACH**Energy**

## **Appendix A**

Noise and  
Blasting  
Assessment

# MOUNT PLEASANT OPERATION

## MINE OPTIMISATION MODIFICATION NOISE & BLASTING ASSESSMENT

**REPORT NO. 15402**  
**VERSION A**

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**PREPARED FOR**

MACH ENERGY AUSTRALIA PTY LTD

## DOCUMENT CONTROL

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# 1 INTRODUCTION

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## 1.1 Overview of the Mount Pleasant Operation

MACH Energy Australia Pty Ltd (MACH Energy) acquired the Mount Pleasant Operation from Coal and Allied Operations Pty Ltd (Coal & Allied) on 4 August 2016.

The approved Mount Pleasant Operation includes the construction and operation of an open cut coal mine and associated infrastructure located approximately three kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figure 1-1). The mine is approved to produce up to 10.5 million tonnes per annum of run-of-mine (ROM) coal.

The Mount Pleasant Operation will operate in accordance with Development Consent DA 92/97, granted by the (then) NSW Minister for Urban Affairs and Planning on 22 December 1999. When Development Consent DA 92/97 was granted in 1999, the mine was permitted to carry out mining operations for a period of 21 years (until 22 December 2020).

Development Consent DA 92/97 was subsequently modified by Coal & Allied in 2011, at which time various Consent Conditions were updated. However, the Consented time limit on mining operations (Condition 5, Schedule 2) was not updated to reflect the fact that mining had not commenced at that time.

A further very minor Modification to Development Consent DA 92/97 (i.e. to relocate the South Pit Haul Road only) was proposed by MACH Energy and subsequently approved in March 2017.

The Mount Pleasant Operation was also approved under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) in 2012 (EPBC 2011/5795).

MACH Energy recommenced the construction of the Mount Pleasant Operation in November 2016 and will commence overburden and ROM coal mining operations in 2017, in accordance with Development Consent DA 92/97 and EPBC 2011/5795.

## 1.2 Overview of the Modification

The Mine Optimisation Modification (the Modification) would primarily comprise:

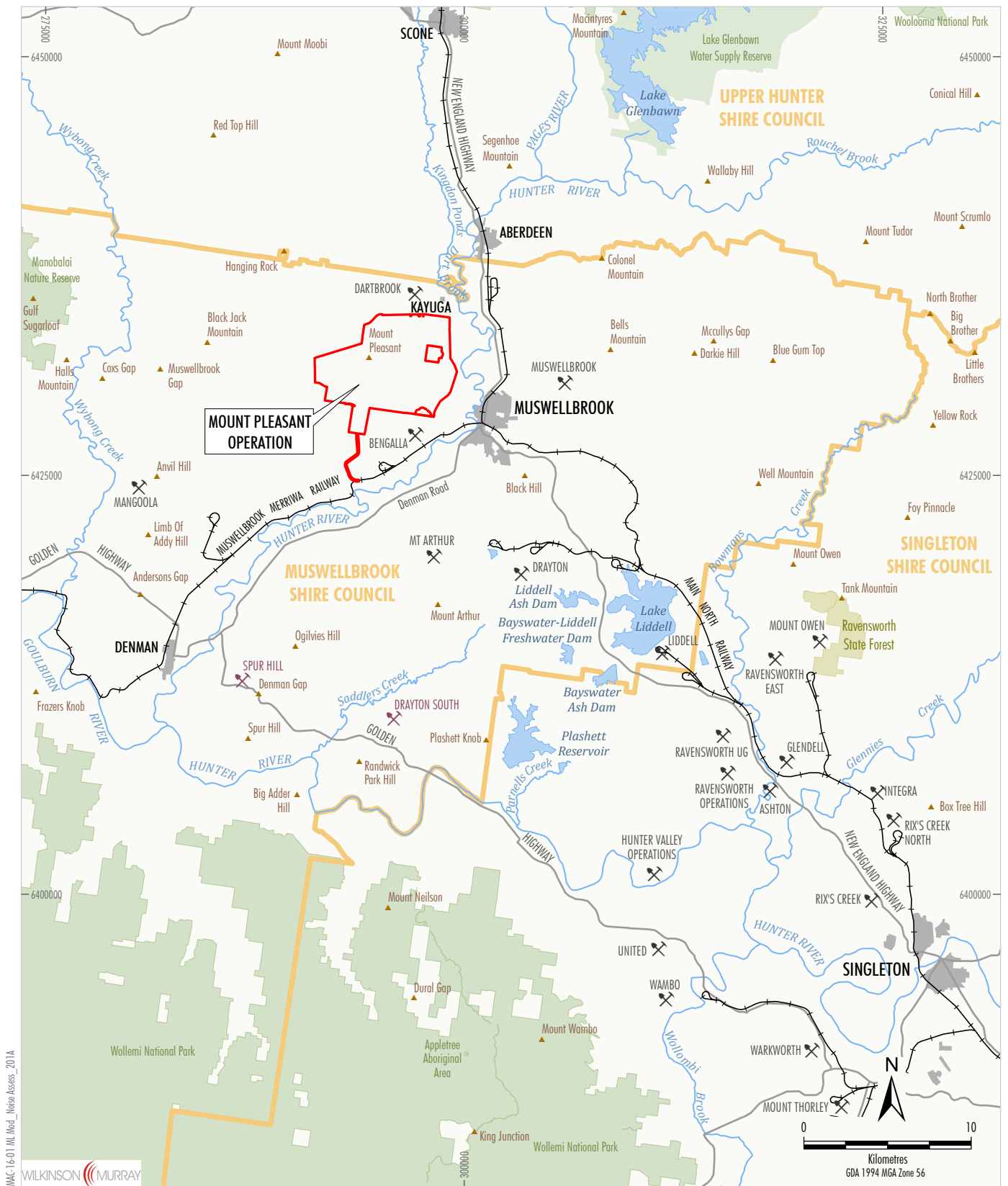
- An extension to the permitted period of mining operations at the Mount Pleasant Operation to provide for open cut mining to 22 December 2026.
- Extensions to the Eastern Out of Pit Emplacement to better align with the underlying topography and facilitate development of a final landform that is more consistent with the characteristics of the local topography and incorporates additional waste rock capacity.

The proposed extension to the Eastern Out of Pit Emplacement would enable MACH Energy to avoid the need to emplace waste rock material in the approved South West Out of Pit Emplacement and therefore the total development area of the Mount Pleasant Operation would be unchanged.

The Modification also involves some additional improvements to the final landform to be consistent with MACH Energy's intended truck and excavator mining methodology (as opposed to Coal & Allied's intended combination of truck, excavator and dragline operations) and associated minor adjustments to the development sequence of the mine.

The Modification would not increase the approved annual maximum ROM coal and waste rock production rates.





IMC-16-01 ML Mod\_Noise Assess\_2014

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- LEGEND**
- Mining Operation
  - Proposed Mining Operations (Application Lodged)
  - Mining Lease Boundary (Mount Pleasant)
  - Railway
  - Local Government Boundary
  - State Forest
  - National Parks and Wildlife Estate

Source: Geoscience Australia (2006); NSW Division of Resources & Energy (2016); Land and Property Information (2016)

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MOUNT PLEASANT OPERATION  
Regional Location

Figure 1-1

### 1.3 Assessment of the Modification

Wilkinson Murray Pty Limited (Wilkinson Murray) was commissioned by MACH Energy to prepare a noise and blasting assessment for the proposed Modification.

This assessment has been prepared to examine the potential noise and blasting impact of the proposed Modification on the surrounding community. In particular, this assessment considers the following:

- Noise generated by the mining operation using MACH Energy's intended truck and excavator mining methodology at various representative stages of the Modification period on the surrounding community.
- The application of modifying factor adjustments to noise measurements/predictions (e.g. for dominant low frequency noise content).
- Cumulative noise generated by the Modification and other nearby mines (Mt Arthur Coal Mine, Bengalla Mine and Dartbrook Mine) on the surrounding community.
- Impacts from overpressure noise and vibration associated with blasting from the Mount Pleasant Operation incorporating the Modification on the surrounding community.
- Noise generated by the continuation of rail transport associated with the Modification on nearby noise sensitive receivers.
- Road noise impacts associated with the continuation of road transport associated with the Modification on the local road network on nearby noise sensitive receivers.

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

- Australian and New Zealand Environment Council (1990) *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*.
- Department of Environment, Climate Change & Water (2011) *NSW Road Noise Policy (RNP)*.
- NSW Department of Planning & Environment (DP&E) (2014) *Voluntary Land Acquisition and Mitigation Policy*.
- NSW Environment Protection Authority (EPA) (2000) *NSW Industrial Noise Policy (NSW INP)*.
- EPA (2013) *Rail Infrastructure Noise Guideline (RING)*.

Reference is also made to the EPA document titled *draft Industrial Noise Guideline (dING)* (EPA, 2015), a draft guideline prepared by the NSW Government to replace the *NSW INP*.

## 2 NOISE SENSITIVE RECEIVERS

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The assessment considers all identified surrounding noise sensitive receivers potentially impacted by the Mount Pleasant Operation. They can be grouped into the following categories:

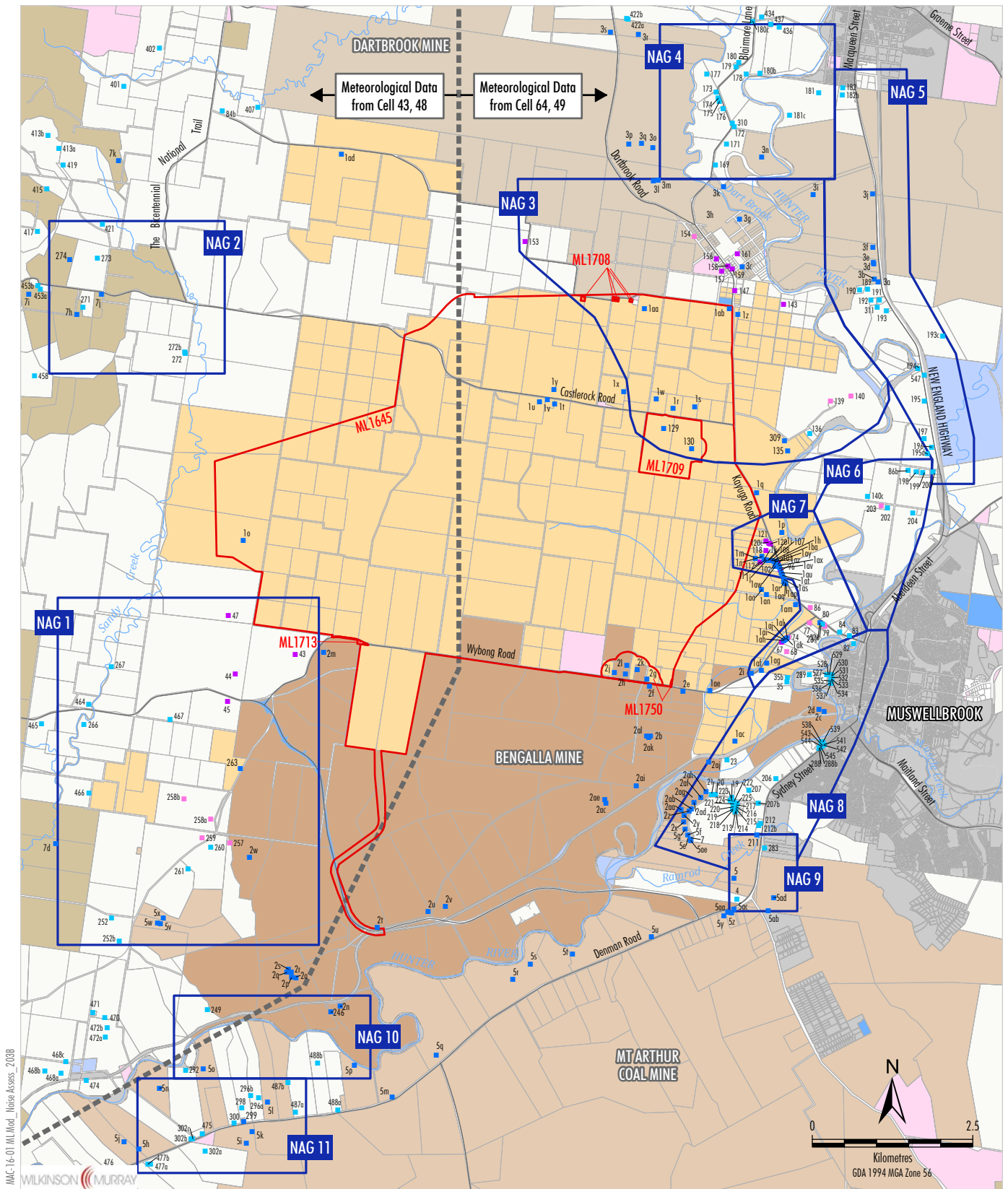
- 199 privately-owned dwellings that comprise the nearest privately-owned dwellings;
- an additional 13 generic dwellings that have been modelled as representative of other privately-owned dwellings within the Muswellbrook (12) and Aberdeen (one [1]) townships that are generally further away than the nearest privately-owned receivers to confirm no anomalous noise results in these local population centres;
- 158 mine-owned dwellings; and
- 25 commercial receivers.

A detailed list identifying all the above noise sensitive receivers (including Eastings and Northings in Map Grid of Australia [MGA] 84 coordinates, Zone 56) is provided in Appendix B. Figure 2-1 shows all noise sensitive receivers surrounding the Mount Pleasant Operation.

For ease of reference, privately-owned residences have been grouped into eleven (11) Noise Assessment Groups (NAGs) during the previous assessments of the approved operation. These NAGs, which are defined in Appendix 6 of Development Consent DA 92/97, are also shown in Figure 2-1.

The NAGs can be described as follows:

- NAG 1 – Isolated rural residences located to the west of Bengalla Mine in the vicinity of Roxburgh and Wybong Roads.
- NAG 2 – Isolated rural residences located to the west of the Mount Pleasant Operation in the vicinity of Castlerock Road.
- NAG 3 – Residences located directly to the north-east of the Mount Pleasant Operation in and around Kayuga.
- NAG 4 – Residences located to the north-east of the Mount Pleasant Operation along Blairmore Road.
- NAG 5 – Residences located to the north of Muswellbrook along the New England Highway.
- NAG 6 – Residences located to the east of the Mount Pleasant Operation between the New England Highway and the Hunter River.
- NAG 7 – Residences located to the north-west of Muswellbrook in the vicinity of Kayuga and Wybong Roads.
- NAG 8 – Residences located along the western side of the Muswellbrook township in the vicinity of Racecourse Road, Sydney Street, and the New England Highway.



#### LEGEND

- Mining Lease Boundary
- Mine-owned Dwelling
- Privately-owned Residence - MPO Acquisition on Request
- Privately-owned Residence - MPO Mitigation on Request
- Other Privately-owned Residence
- Noise Assessment Group (Development Consent DA 92/97)

- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Crown
- Crown/State of NSW
- The State of NSW
- Muswellbrook Shire Council
- Upper Hunter Shire Council
- Mount Pleasant Controlled
- Bengalla Controlled
- Dartbrook Controlled
- Mt Arthur Controlled
- Other Mining/Resource Company Controlled
- Privately Owned Land

Source: NSW Land & Property Information (2016); NSW Division of Resources & Energy (2016)

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MOUNT PLEASANT OPERATION  
Relevant Sensitive Receivers  
and Current Noise Assessment Groups

Figure 2-1

- NAG 9 – Residences located to the south of the Muswellbrook township near the intersection of Thomas Mitchell Drive and Denman Road.
- NAG 10 – Isolated rural residences located directly to the south of Bengalla Mine in the vicinity of the Hunter River.
- NAG 11 – Residences south of Bengalla Mine in the vicinity of Denman Road.

As shown in Figure 2-1, for completeness a number of additional residences have been added for this noise assessment (both within and outside NAGs), based on a contemporary review of land ownership and residential receivers in the vicinity of the Mount Pleasant Operation. The dwelling verification investigation also identified that a number of locations that have previously been assessed as privately-owned dwellings do not have habitable buildings, are now commercial spaces, are now abandoned, or are now mine-owned.

It is noted that some of the additional residences are close to, but outside of the NAGs shown on Figure 2-1, for example receiver 195d (NAG 5). This receiver lies approximately 20 metres (m) outside the NAG 5 boundary and it is expected that if this receiver had been identified in previous studies, it would have been included in NAG 5. The default NAG criteria for NAG 5 are materially higher than the default for 'all other privately-owned land' and therefore if the NAG boundaries currently described in Development Consent DA 92/97 were retained, a property approximately 20 m closer to the mine would have noise criteria unrealistically lower (6 dBA during the day) than other properties in NAG 5.

To avoid such a perverse outcome, it is recommended that the boundary of NAG 5 is modified to include the additional receiver and proximal land.

Similarly, it is recommended that the boundary of NAG 11 is modified to include the proximal additional receivers 476 and 488a and land.

While some newly-identified receivers are located proximal to NAGs 1, 2, 3, 4 and 10, the default criteria for these NAGs are the same as for 'all other privately-owned land' in Development Consent DA 92/97. Therefore, these NAGs are redundant and it is recommended that NAGs 1, 2, 3, 4 and 10 are removed for simplicity of presentation and management.

Review of land east of the boundaries of NAGs 6 and 8 (the urban/suburban area of Muswellbrook and associated highways) also indicates the potential for perverse outcomes similar to receiver 195d, as these areas would also inherently have higher background noise levels reflective of current land uses. It is therefore recommended that the boundaries of both NAGs 6 and 8 are extended to the east to incorporate the remainder of the urban/suburban area of Muswellbrook (i.e. extended to approximately the eastern boundary of NAG 5).

It is also recommended that the northern boundaries of NAGs 6 and 7 be amended slightly to include proximal privately-owned land east of the Hunter River where there was previously a gap in the NAGs.

The recommended revisions to the NAG boundaries are presented with the predicted noise contours for the Mount Pleasant Operation incorporating the Modification in Appendix C.

### 3 OPERATIONAL NOISE CRITERIA

#### 3.1 Development Consent DA 92/97 Assessment Criteria

Development Consent DA 92/97 has set noise criteria for the Mount Pleasant Operation in accordance with the *NSW INP*.

Noise related conditions of Development Consent DA 92/97 which discuss noise criteria, acquisition criteria and additional mitigation criteria are reproduced in this section.

Where relevant reference is made in the following discussion to the 2010 Environmental Assessment (the EA) noise results (EMGA Mitchell McLennan, 2010).

##### 3.1.1 Noise Criteria

Condition 3, Schedule 3 of Development Consent DA 92/97 requires MACH Energy to ensure that the noise generated by the development does not exceed the criteria in Table 3-1 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

The criteria specified in Table 3-1 do not apply to the noise-affected land subject to acquisition upon request conditions (Section 3.1.3) or if the Applicant has a written agreement with the relevant landowner to exceed the criteria, and the Applicant has advised the DP&E in writing of the terms of this agreement.

**Table 3-1 Noise Criteria (dBA)**

	Location	Day	Evening	Night	
		L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>A1,1min</sub>
NAG 1 <sup>1</sup>	260, 261	37	37	37	45
	258 <sup>2</sup>	40	40	40	45
	259	39	39	39	45
	All other privately-owned land	35	35	35	45
NAG 2	272	36	36	36	45
	All other privately-owned land	35	35	35	45
NAG 3 <sup>1</sup>	139, 154, 240 <sup>2</sup>	40	40	40	45
	241 <sup>2</sup>	39	39	39	45
	All other privately-owned land	35	35	35	45
NAG 4	169	36	36	36	45
	All other privately-owned land	35	35	35	45
NAG 5	All privately-owned land	41	40	39	45
NAG 6 <sup>1</sup>	205 <sup>2</sup>	41	41	41	45
	203, 242 <sup>2</sup>	40	40	40	45
	202	39	39	39	45
	204	38	38	38	45
	All other privately-owned land	37	37	37	45
NAG 7 <sup>1</sup>	68, 74, 279 <sup>2</sup>	43	42	42	45
	86, 290 <sup>2</sup>	42	42	42	45
	77	42	41	41	45
	79, 80, 231 <sup>3</sup>	41	41	41	45



Location	Day	Evening	Night	
	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>A1,1min</sub>
78 <sup>2</sup>	41	40	40	45
All other privately-owned land	40	37	37	45
35	42	41	41	45
289	41	40	40	45
23, 84	40	40	40	45
All other privately-owned land	41	39	39	45
NAG 9 All privately-owned land	39	38	37	45
NAG 10 All privately-owned land	35	35	35	45
NAG 11 All privately-owned land	37	36	35	45
All other privately-owned land	35	35	35	45

Source: Development Consent DA 92/97

Notes:

- The EA (EMGA Mitchell McLennan, 2010) predicted maximum noise levels of 40 dBA at receiver 257 (located in NAG 1), 39 dBA at receiver 140 (located in NAG 3), 38 dBA at receiver 198 (located in NAG 6) and 42 dBA at receiver 83 (located in NAG 7). While these EA predictions are not reflected in Table 3-1, receivers 257 and 140 are entitled to noise mitigation upon request under Development Consent DA 92/97.
- Following a detailed investigation of land ownership as described in Section 2, it was established that these receivers are no longer present/inhabited.
- Following a detailed investigation of land ownership as described in Section 2, it was established that receiver 231 is now an uninhabited mine-owned property.
  - To identify the locations referred to in Table 3-1, see Figure 2-1.
  - Noise generated by the development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions), of the *NSW INP*.
  - dBA = A weighted decibels.

### 3.1.2 Cumulative Noise Criteria

Condition 5, Schedule 3 of Development Consent DA 92/97 requires MACH Energy to implement all reasonable and feasible measures to ensure that the noise generated by the development combined with the noise generated by other mines in the area does not exceed the criteria in Table 3-2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land. These criteria do not apply to the noise-affected land subject to acquisition upon request conditions (Section 3.1.3).

**Table 3-2 Cumulative Noise Criteria (dBA)**

Location	Day	Evening	Night
	L <sub>Aeq</sub> (period)	L <sub>Aeq</sub> (period)	L <sub>Aeq</sub> (period)
NAG 8, 9	55	45	40
All other privately-owned land	50	45	40

Source: Development Consent DA 92/97

Notes:

- To identify the locations referred to in Table 3-2, see Figure 2-1; and
- Cumulative noise is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the *NSW INP*.

### 3.1.3 Acquisition Criteria

Condition 1, Schedule 3 of Development Consent DA 92/97 requires MACH Energy, upon receiving a written request for acquisition from the owner of the land listed in Table 3-3, to acquire the land in accordance with the procedures in Condition 6 and Condition 7 of Schedule 4.

**Table 3-3 Land Subject to Acquisition upon Request**

Receiver	Receiver
43, 44 - J.B. Moore	143, 161, <del>237</del> <sup>2</sup> - J.S. & N.M. Lonergan
45 - B.A. & T.E. Strachan	147 - M.J. & R.G. Adnum
47 - B.L. & M.L. Bates	156 - J.E. & J.L. Lonergan
67 - J.M. Simpson	158 - J.M. Hoath
96 - R.P. Grey	159, <del>236</del> <sup>2</sup> - J.E. & M.S. Ducey
<del>101</del> - C. Austin <sup>1</sup> (MACH Energy)	<del>129</del> - R.M. & S.D. Farrell <sup>1</sup> (MACH Energy)
102 - A. Mather	<del>130</del> - M.J. Farrell <sup>1</sup> (MACH Energy)
<del>107</del> - B.L. Wilton <sup>1</sup> (MACH Energy)	<del>135, 309</del> - K.J. & G.M. Yore <sup>1</sup> (MACH Energy)
108 - J.S. Gibson	<del>146</del> - C.R. & N.J. Hoath <sup>2</sup>
112 - B.D. Barry	153 - G.M. Casey
118 - J. & C. Hayes	157 - R.B. Parkinson & S.A. Peberdy
120, 308 - D.L. & P.A. Moore	<del>229</del> - C. Horne <sup>2</sup>
121 - C & J.M. Moore	<del>263</del> - R.R. & J.M. Hamilton <sup>1</sup> (MACH Energy)
<del>137, 138 A</del> - D.H. MacIntyre <sup>2</sup>	<del>C</del> - P.M. Yore <sup>1</sup> (MACH Energy)
<del>D</del> - S. Yore <sup>1</sup> (MACH Energy)	-

After: Development Consent DA 92/97

Notes:

- To identify the locations referred to in Table 3-3, see Figure 2-1; and
  - All land is noise affected, except receiver 67 which is air quality affected.
- It is noted that these receivers are now owned by MACH Energy.
  - It is noted that following investigation, no dwellings appear to be present at the locations of these previously identified receivers (e.g. habitable building not present, building abandoned, or building used for commercial purposes).

Condition 4, Schedule 3 of Development Consent DA 92/97 requires MACH Energy to acquire the relevant land in Table 3-4 in accordance with the procedures in Condition 6 and Condition 7 of Schedule 4, if:

- the noise generated by the Mount Pleasant Operation exceeds the criteria in Table 3-4 at any residence on privately-owned land or on more than 25 percent of any privately-owned land; and
- MACH Energy receives a written request for acquisition from the landowner.

**Table 3-4 Noise Acquisition Criteria (dBA)**

Location	Day	Evening	Night
	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>
All privately-owned land in NAG 1, NAG 2, NAG 3, NAG 4, and NAG 10	40	40	40
All privately-owned land in NAG 5	46	45	44
All privately-owned land in NAG 6	42	42	42
All privately-owned land in NAG 7	45	42	42
All privately-owned land in NAG 8	46	44	44
All privately-owned land in NAG 9	44	43	42
All privately-owned land in NAG 11	42	41	40
All other privately-owned land	40	40	40

Source: Development Consent DA 92/97

Notes:

- To identify the locations referred to in Table 3-4, see Figure 2-1;
- Noise generated by the development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions), of the *NSW INP*; and
- For this condition to apply, the exceedances of the criteria must be systematic.



Condition 6, Schedule 3 of Development Consent DA 92/97 requires MACH Energy to acquire the land in Table 3-5 on as equitable a basis as possible with the relevant mines in accordance with the procedures in Condition 6 and Condition 7 of Schedule 4, if:

- the noise generated by the Mount Pleasant Operation combined with the noise generated by other mines in the area exceeds the criteria in Table 3-5 at any residence on privately-owned land or on more than 25 percent of privately-owned land; and
- MACH Energy receives a written request for acquisition from the landowner.

**Table 3-5 Cumulative Noise Acquisition Criteria (dBA)**

Location	Day	Evening	Night
	L <sub>Aeq</sub> (period)	L <sub>Aeq</sub> (period)	L <sub>Aeq</sub> (period)
NAG 8, 9	60	50	45
All other privately-owned land	55	50	45

Source: Development Consent DA 92/97

Notes:

- To identify the locations referred to in Table 3-5, see Figure 2-1;
- Cumulative noise is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions), of the *NSW INP*, and
- For this condition to apply, the exceedances of the criteria must be systematic.

### 3.1.4 Additional Mitigation Criteria

Condition 2, Schedule 3 of Development Consent DA 92/97 requires MACH Energy, upon receiving a written request from the owner of any residence on the land listed in Table 3-6 or Table 3-3, to implement additional noise and/or dust mitigation measures (such as double-glazing, insulation, air filters, first flush roof water drainage system and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible and related to the noise and/or dust impacts on the residence.

**Table 3-6 Land where Additional Noise Mitigation Measures are Available on Request**

Receiver	Receiver
68 - Googe	203 - Millard
74 - Sormaz	205 - Dapkos Pty Ltd <sup>1</sup>
77 - Purser	231 - Wicks <sup>2</sup> (MACH Energy)
78 <sup>1</sup> , 80 - W.J. Adnum	240 - MacIntyre <sup>1</sup>
79 - W.J. & D.W. Adnum	242 - Raphael <sup>1</sup>
86, 290 <sup>1</sup> - Cowtime Investments Pty Ltd	257 - Lane
139 - Upton	258 - Ellis
140 - Dapkos Pty Limited	259 - Peel
154 - Standing	279 - Parkinson <sup>1</sup>

After: Development Consent DA 92/97

Notes:

- To identify the locations referred to in Table 3-6, see Figure 2-1; and
- It is noted that following investigation, no dwellings appear to be present at the locations of these previously identified receivers (e.g. habitable building not present, building abandoned, or building used for commercial purposes).
  - It is noted that this receiver is now owned by MACH Energy.

The Consent Condition also states that if within three (3) months of receiving this request from the owner, MACH Energy and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

### 3.2 NSW Government Voluntary Land Acquisition and Mitigation Policy

In 2014, the NSW Government released the *Voluntary Land Acquisition and Mitigation Policy* (DP&E, 2014). This guideline provides some useful context in regard to characterising the practical implications of exceedances of the *NSW INP* criteria (Table 3-7) and the application of the *NSW INP* to the assessment of noise on vacant land.

**Table 3-7 Characterisation of Noise Impacts & Potential Treatments**

Residual Noise Exceeds INP Criteria By	Characterisation of Impacts	Potential Treatment
0-2dB(A) above the project-specific noise level (PSNL)	Impacts are considered to be <b>negligible</b>	The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls.
3-5dB(A) above the PSNL in the INP <u>but</u> the development would contribute less than 1dB to the total industrial noise level	Impacts are considered to be <b>marginal</b>	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
3-5dB(A) above the PSNL in the INP <u>and</u> the development would contribute more than 1dB to the total industrial noise level	Impacts are considered to be <b>moderate</b>	As for marginal impacts but also upgraded façade elements like windows, doors, roof insulation etc. to further increase the ability of the building façade to noise levels.
>5dB(A) above the PSNL in the INP	Impacts are considered to be <b>significant</b>	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions below.

Source: DP&E (2014)

### 3.3 Background Noise Survey

It should be noted that in accordance with the *NSW INP*, PSNLs or noise criteria are established as an emergence over background noise levels (i.e. background noise level + 5 decibels [dB]) which would normally require a background noise survey in the vicinity of the site and surrounding noise sensitive receivers.

However, it is considered that no background noise monitoring was warranted for the Modification since Mount Pleasant Operation noise criteria are already set in Development Consent DA 92/97 for both individual receivers and all other receivers in the NAGs (Section 3.1).

### 3.4 Modifying Factor Adjustments

Where a noise source contains certain annoying characteristics, such as low frequency noise, the *NSW INP* states that a penalty should be applied to measured or predicted noise levels before comparing to the relevant criteria.

However, the low frequency noise penalty in the *NSW INP* has been found to be an unreliable indicator of low frequency noise when applied to large open cut mines.

Low frequency noise and the application of the Modifying Factor Adjustment was extensively discussed as part of the assessment of the Warkworth Continuation Project, where the NSW DP&E Assessment Report Addendum relevantly provides (DP&E, 2015):

*The EPA, the Department and the Department's independent noise expert all agree that the C – A method has significant limitations, particularly when assessing LFN impacts in areas distant from the noise source. This is because mid and higher frequencies are naturally attenuated as distance from the noise source increases, resulting in larger differences between dBC and dBA levels due to distance alone.*

*To illustrate, Dr Broner notes that a C – A difference of 7dB for a nominal noise source at 1 kilometre increases to a difference of 15dB at a distance of 3 kilometres from the noise source (see Attachment D).*

This issue is also discussed in Parnell (2015):

*Analysis supports the contention that use of a dB(C) minus dB(A) or a dB(lin) minus dB(A) delta to identify a low frequency noise impact is not scientifically valid in all situations due to the significant differential attenuation of high frequencies over distance.*

Parnell (2015) also recommended analysis of 'C' weighted noise using an 'audibility threshold' to remove inaudible components of the noise spectra.

Given the documented limitations associated with the *NSW INP* in regard to low frequency noise, there are two commonly referenced potential alternatives:

- The Broner method applies night-time criteria of 60 dB(C) (desirable) and 65 dB(C) (maximum), based on external noise levels at the receiver.
- The DEFRA curve method applies a range of threshold criteria across different low frequencies, again based on extensive scientific study of low frequency noise annoyance.

In September 2015, the NSW Government released the *dING* for public comment. Within this document, a revised method of low frequency noise assessment is proposed based on:

- the measurement of overall 'C' weighted and 'A' weighted level; and
- one-third octave measurements in the range 10–160 Hertz, with the one-third octave measurements based on the DEFRA curve method.

Two (2) penalties (5 dB and 2 dB) are nominated in the *dING*, depending on one-third octave measurements. Release of the final *dING* is currently pending. Once the Mount Pleasant Operation is operational, monitoring results would be assessed against the *NSW INP*, or a superseding policy (e.g. the finalised *dING*), with respect to modifying factors (including for low frequency noise). In the event the *dING* is not finalised and the *NSW INP* methodology suggests the potential for dominant low frequency content but the DEFRA methodology described in the *dING* does not, MACH Energy would consult with the EPA prior to applying the *NSW INP* modifying factor to noise monitoring results. If noise generated by the Mount Pleasant Operation is found to contain annoying characteristics (such as dominant low frequency content), the appropriate modifying factor would be applied to measured noise levels and assessed against noise criteria.

## 4 ASSESSMENT METHODOLOGY

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### 4.1 General Methodology

Based on the planned mine sequence of the Mount Pleasant Operation incorporating the Modification, the geographic spread of operations in consideration of the proximity to nearby noise sensitive receivers, and maximum operational material movements in the schedule, three (3) scenarios were selected to represent the Modification, namely Years 2018, 2021 and 2025.

For each scenario, the assessment models the total noise at each receiver from the operation of the Mount Pleasant Operation incorporating the Modification. Total predicted operational noise levels are then compared against the relevant noise criteria set in Development Consent DA 92/97 (Section 3.1) to determine whether the Mount Pleasant Operation incorporating the Modification would trigger any noise exceedances.

The infrastructure and mobile plant associated with the Modification would be operating on a 24-hour and seven day basis (noting that there would be a staged initial ramp-up of mining operations, with 24-hour mining operations commencing in 2018). Therefore, noise levels associated with the Modification were predicted for the day (7.00 am-6.00 pm), evening (6.00 pm-10.00 pm) and night (10.00 pm-7.00 am) assessment periods.

### 4.2 Noise Model Procedures

Operational noise levels at nearby receivers have been calculated using the Environmental Noise Model (ENM) (a proprietary computer program from RTA Technology Pty Ltd). This modelling software is recommended by the *NSW INP* and has been previously accepted by the EPA for use in environmental noise assessments.

The ENM takes account of the location of nearby noise sensitive receivers and surrounding terrain. In addition, the model takes into account noise attenuation due to geometric spreading of sound over distance, atmospheric absorption, shielding and the effect of acoustically soft ground. It can also be used to predict noise levels under various meteorological conditions, defined by a combination of temperature gradient, wind speed and wind direction.

### 4.3 Meteorological Conditions

The *NSW INP* generally directs the use of a single set of adverse meteorological data to use in the assessment of noise impacts. However, the assessment adopts a more rigorous approach where noise levels at sensitive receivers are calculated under a varied set of existing meteorological conditions (wind speed and direction and temperature inversion strength), using data obtained from the CALMET meteorological model for the Mount Pleasant Operation. Measured statistical occurrences of these conditions over a discrete period are then applied to the results, and a 10<sup>th</sup> percentile exceedance level calculated (i.e. the level that is exceeded 10% of the time), which is then compared with relevant criteria.

The meteorological data used for the noise assessment was provided by Todoroski Air Sciences (TAS), and is based on meteorological data sourced from on-site monitoring, other local meteorological monitoring (NSW Office of Environment and Heritage monitors) and regional Bureau of Meteorology monitoring stations. Prognostic meteorological model data from The Air Pollution Model (TAPM) and the surface observations were input into the CALMET meteorological model (TAS, 2017).

For the noise assessment, two (2) grid extracts were used. Each grid extract is deemed representative of an area surrounding the site believed to be subject to a different set of meteorological conditions potentially affecting propagation of noise.

Based on the meteorological analysis conducted by TAS (2017), data for CALMET cell extract (64, 49) near Muswellbrook is subject to a significant fraction of north-easterly winds, attributed to katabatic valley flows. Meteorological data for cell extract (64, 49) was considered when predicting noise at all identified receivers located within the valley running down from Aberdeen, past Muswellbrook and further to the south-west towards Denman.

Data for CALMET cell extract (43, 48), which is characterised by a significant fraction of winds from the north and north-west, was used for noise predictions at all identified receivers located on the flat areas to the north-west, west and south-west of the Mount Pleasant Operation.

Figure 2-1 indicates which receivers were assigned data for CALMET cell extract (64, 49) and which were assigned data for CALMET cell extract (43, 48).

Upon review of meteorological data for the relevant CALMET cell extracts, temperature inversions of up to 3 degrees Celsius (°C)/100 m are considered representative of the site, and have been used for determining P10 levels. The available data suggests that inversions of between 3 and 4°C/100 m at the Mount Pleasant Operation are rare (<1% of winter evening and night periods). When such inversions do occur, the reactive mitigation would continue to be used to maintain compliance with Development Consent DA 92/97 noise criteria.

Additional detail regarding the meteorological modelling conducted by TAS is provided in the Modification Air Quality and Greenhouse Gas Assessment (TAS, 2017).

#### **4.4 Noise Sources Associated with Modification Operations**

Operational noise associated with the Mount Pleasant Operation incorporating the Modification was calculated based on the indicative sound power levels (SWLs) summarised in Table 4-1. These SWLs are consistent with that of similar infrastructure and mobile plant items used in past assessments for similar projects. The SWLs have been sourced from Wilkinson Murray's extensive database, which is based on measurements taken at a number of operating mines in Australia. It should be noted that the SWLs used represent "low noise" noise attenuated mobile fleet.

**Table 4-1 Indicative Sound Power Levels and Number of Plant Items**

Fleet/ Infrastructure Item	Indicative Model <sup>1</sup>	Location/ Function	Number of Equipment						Sound Power Level L <sub>Aeq</sub> (dBA) On Grade/on Incline
			Year 2018		Year 2021		Year 2025		
			Day	Night	Day	Night	Day	Night	
Haul Trucks	CAT 789	Coal removal	6	6	6	6	6	6	114 / 116
	CAT 789	Reject material removal	1	1	1	1	1	1	114 / 116
	CAT 789	Waste rock removal	-	-	5	5	10	10	114 / 116
	Hitachi EH4500	Waste rock removal	9	9	8	8	8	8	114 / 116
	CAT 793	Topsoil removal	2	-	2	-	-	-	114 / 116
	CAT 45t articulated	Fine Rejects Emplacement Lift	-	-	3	-	-	-	112
Dozers	CAT D10T	Waste rock emplacement	2	2	3	3	4	4	114
	CAT D10T	In pit support	-	2	-	1	1	1	114
	CAT D10T	Topsoil removal	2	-	1	-	-	-	114
	CAT D11T	Infrastructure area	2	2	2	2	2	2	114
	CAT D6	Fine Rejects Emplacement Lift	-	-	1	-	-	-	110
Wheeled Dozer	CAT 854G	In-pit support	1	1	1	2	2	2	112
	CAT 854G	Topsoil emplacement	-	-	1	-	-	-	112
Excavators	Hitachi EX3600	Coal removal	1	1	1	1	1	1	115
	Hitachi EX3600	Waste rock removal	-	-	1	1	2	2	115
	Liebherr 996	Waste rock removal	2	2	2	2	2	2	116
	CAT 336	Topsoil removal	1	-	1	-	-	-	108
	Hitachi ZX850	Fine Rejects Emplacement Lift	-	-	1	-	-	-	111
Loader	CAT 994F	Coal removal	1	1	1	1	1	1	115
Drills	ReedriII SK-F	Waste rock blasting	1	1	1	1	1	1	118
	D75KS-AU	Waste rock blasting	1	1	1	1	1	1	118
	DP1100i	Waste rock blasting	-	-	-	-	1	1	118

Fleet/ Infrastructure Item	Indicative Model <sup>1</sup>	Location/ Function	Number of Equipment						Sound Power Level L <sub>Aeq</sub> (dBA) On Grade/on Incline
			Year 2018		Year 2021		Year 2025		
			Day	Night	Day	Night	Day	Night	
Graders	CAT 16M	Haul roads	1	1	1	1	1	1	108
	CAT 24M	Haul roads	1	1	1	1	1	1	112
Water Carts	CAT 14H	Fine Rejects Emplacement Lift	-	-	1	-	-	-	108
	CAT 777C	Haul roads	1	1	1	1	1	1	112
	Komatsu HD785	Haul roads	1	1	1	1	1	1	112
Compactor	CAT 740	Fine Rejects Emplacement Lift	-	-	1	-	-	-	109
	CAT 825	Fine Rejects Emplacement Lift	-	-	1	-	-	-	108
Scraper	CAT 623	Fine Rejects Emplacement Lift	-	-	1	-	-	-	108
Primary Crusher	-	Infrastructure area	1	1	1	1	1	1	114
Secondary Sizing Station	-	Infrastructure area	1	1	1	1	1	1	114
Tertiary Crusher	-	Infrastructure area	1	1	1	1	1	1	114
DMS Plant	-	Infrastructure area	1	1	1	1	1	1	117
Transfer Houses	-	Infrastructure area	6	6	6	6	6	6	100
Train Load Out Bin	-	Infrastructure area	1	1	1	1	1	1	103
Reject Bin	-	Infrastructure area	1	1	1	1	1	1	100
Conveyors	-	Infrastructure area	-	-	-	-	-	-	83/m (enclosed but conveyor idlers unmitigated)
Locomotives	-	Rail loop	3	3	3	3	3	3	101

Note:

- Indicative equipment models are shown only for the purposes of noise modelling. Throughout the life of the operation the mobile fleet is expected to vary based on equipment availability, mining requirements and advances in technology and noise mitigation that may be employed by MACH Energy to maintain compliance with Development Consent DA 92/97, while maximising mining efficiency.

## 5 OPERATIONAL NOISE ASSESSMENT

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### 5.1 Operational Noise

#### 5.1.1 Investigation of Feasible & Reasonable Noise Mitigation Measures

The modelled scenarios presented in this report represent the culmination of iterative noise modelling investigations to determine feasible and reasonable noise mitigation measures. This has included the investigations and findings of previous assessments undertaken for the Mount Pleasant Operation. The iterative steps undertaken are described below:

1. Review of previous noise assessments, including previously proposed mitigation measures and noise management commitments, in the context of the Modification and contemporary noise assessment practice.
2. To reduce potential impacts, the positions of mobile equipment during the evening and night-time were constrained to optimise the shielding provided by the Eastern Out of Pit Emplacement for receivers to the south-east and east.
3. Preliminary noise modelling of various scenarios representative of the likely maximum noise emissions from the Mount Pleasant Operation incorporating the Modification to identify the potential for noise exceedances. In accordance with previous noise management commitments, all scenarios modelled included the use of “low noise” noise attenuated mobile fleet and contemporary technology fixed plant.
4. Evaluation of various combinations of additional noise management and mitigation measures that could be employed in response to either predicted adverse conditions (i.e. proactive measures based on the predictive noise and meteorological forecasting system) or real-time monitoring triggers, to assess the relative effectiveness in further reducing potential noise impacts under adverse weather conditions.
5. Review of the effectiveness of these measures and assessment of their feasibility by MACH Energy.

#### 5.1.2 Pro-Active and Reactive Noise Management

As described in Section 5.1.1, MACH Energy proposes to have a real-time monitoring and forecasting system in place to assist with managing operational noise levels. This system would be used throughout the life of the Mount Pleasant Operation.

This assessment integrates pro-active and reactive noise management measures into the scenarios for Years 2018, 2021 and 2025. These measures have been particularly developed to target reductions in predicted noise levels that are reasonable and feasible for receivers to the east and south-east of the Mount Pleasant Operation (e.g. implement adaptive management measures to maintain compliance at receivers in NAGs 6, 7 and 8), as some receivers in these locations were predicted to experience exceedances of the relevant Development Consent DA 92/97 criteria in preliminary modelling.



A range of feasible and reasonable mitigation measures would be available to MACH Energy in addition to the operational controls already incorporated into the preliminary modelling (i.e. optimised operational shielding and use of “low noise” attenuated mobile plant). In practice, these measures (and if necessary, revisions to the arrangement and sequence of mining) would be employed as required throughout the life of the Mount Pleasant Operation in order to maintain compliance with relevant Development Consent DA 92/97 criteria.

Some examples of the additional pro-active/reactive mitigation scenarios considered and adopted in the noise modelling to address some identified potential exceedances at the closest privately-owned receivers are described in Table 5-1.

**Table 5-1 Example Mitigation Scenarios**

Applicable Modelling Scenario	Description of Example Mitigation Scenario	Approximate Noise Reduction
2018 – Day	Shutdown one drill and one dozer	1 dB
2018 – Evening/Night	Shutdown one drill, one waste removal haul route with associated dozer (on waste emplacement areas) and excavator (in pit area), and two additional dozers (one on waste emplacement areas and one in pit)	4 dB
2021 – Evening/Night	Shutdown two drills and one dozer	1 dB
2025 – Day	Shutdown one drill	0.5 dB
2025 – Evening/Night	Shutdown two drills	1 dB

As shown in Table 5-1, the most significant additional mitigation measures adopted in the noise modelling, for evening and night operations in 2018, would reduce noise levels by approximately 4 dB at key nearby receivers under adverse weather conditions.

To determine whether modifications to the planned operations of this scale are feasible with regard to achieving the overall production schedule, the frequency of the potential need for these mitigation requirements has also been considered.

Analysis of the frequency of meteorological conditions that result in exceedances at the most affected receivers indicates that mitigation of this scale would be required for only approximately 5% of available hours in 2018. MACH Energy has advised that this can be accommodated by the Modification schedule.

Less intensive mitigation scenarios (such as temporarily pausing the use of drills or other supporting mobile equipment in exposed locations) would have a minimal impact on the Modification schedule.

### 5.1.3 Noise Predictions

The 10<sup>th</sup> percentile  $L_{Aeq,15min}$  intrusive noise levels and levels under calm isothermal conditions for the day, evening and night time assessment periods were calculated using the ENM for each of the identified 370 noise sensitive residential receivers (199 privately-owned dwellings, 13 generic dwellings and 158 mine-owned dwellings) surrounding the Mount Pleasant Operation. Mine-owned receivers are included for the purpose of information for MACH Energy only.

Predicted noise levels associated with the Mount Pleasant Operation incorporating the Modification during Years 2018, 2021 and 2025, as well as associated noise contours and revised NAGs are included in Appendix C. Noise levels presented are rounded to the nearest dB, and where appropriate, incorporate the identified pro-active and reactive mitigation measures described in Section 5.1.2. Note that only the receivers with predicted exceedances (in the absence of pro-active and reactive mitigation measures) are presented as mitigated in the Appendix C results table. The implementation of pro-active and reactive mitigation measures would also benefit other receivers surrounding the Mount Pleasant Operation. For presentation purposes, the mitigated contours presented in Appendix C extend further than the individual receivers with mitigated results in the Appendix C results table.

With the implementation of operational controls (i.e. optimised shielding, use of “low noise” noise attenuated mobile plant and contemporary technology fixed plant) and the pro-active and reactive mitigation measures described above, predicted noise levels are generally consistent with those described in the EA. The Mount Pleasant Operation is predicted to achieve the relevant existing noise criteria described in Development Consent DA 92/97 at the majority of privately-owned receivers.

It should be noted that the mine plan initially modelled for Year 2021 included development of the approved South West Out of Pit Emplacement. This was subsequently revised to reflect the currently proposed mine plan that includes the extended Eastern Out of Pit Emplacement as described in Section 1 for the 2021 scenario, with no waste rock deposition in the South West Out of Pit Emplacement.

In addition, modelling without the potential topographic shielding of the South West Out of Pit Emplacement was conducted for the Year 2025 scenario for receivers to the south-west, west and north-west of the site. It was found that without the topographic shielding provided by the South West Out of Pit Emplacement, noise levels up to 1 dB higher would occur in 2025 at some residences in the north-west. However, these noise levels would remain below the relevant criteria in the Modification period.

Preliminary modelling was also carried out to establish potential noise impacts associated with the initial 2018 daytime operations while a dozer is operating near the bottom and outer edge of the extended Eastern Out of Pit Emplacement (i.e. closest to the receivers located to the north-west of Muswellbrook in the vicinity of Kayuga and Wybong Roads). It was found that in the absence of operational controls, some receivers would experience exceedances of the relevant Development Consent DA 92/97 criteria during adverse daytime meteorological conditions (e.g. adverse winds). However, this could be mitigated with the use of pro-active/reactive noise mitigation measures and for the majority of daytime operations in these exposed locations (i.e. >80% of the daytime in each season), no pro-active or reactive mitigation measures are predicted to be required to maintain compliance.

A single privately-owned dwelling, receiver 136, is predicted to exceed the criteria in Development Consent DA 92/97 (i.e. the default criteria for NAG 3 of 35 dBA for day, evening and night). This receiver is located to the north-east of the Mount Pleasant Operation and nearby receivers were also predicted to exceed the criteria in the previous EA. Accordingly, these nearby receivers were afforded either acquisition rights (e.g. receivers 135 and 309) or mitigation rights (e.g. receiver 139) in Development Consent DA 92/97.

Upon further investigation, the results for receiver 136 in Table 6.4 of the EA appear to be erroneous, as the results for all nearby receivers are in the order of 10 dB higher. The maximum noise level predicted for the Modification (in the absence of pro-active and reactive mitigation measures) is consistent with the maximum noise levels predicted for the nearest receivers, while this is not the case for the results for receiver 136 as provided in Table 6.4 of the EA. This discrepancy is illustrated in Table 5-2.

**Table 5-2 Analysis of Previous and Current Predictions for Receiver 136 and Nearby Receivers**

Receiver	Maximum Prediction During the Evening/Night		Approximate Distance from the Mount Pleasant Operation (distance north-east of Mining Lease 1645)
	2010 EA	This Assessment	
Receiver 135	45 dBA	43 dBA	800 m
Receiver 136	32 dBA	41 dBA	1,200 m
Receiver 139	40 dBA	37 dBA	1,800 m

After: EMGA Mitchell McLennan (2010).

Based on its location, it is apparent that the 2010 predicted noise level for receiver 136 should have been between 40 and 45 dBA, and this receiver would therefore have been afforded acquisition upon request rights in Development Consent DA 92/97. The maximum prediction at receiver 136 for the Mount Pleasant Operation incorporating the Modification (41 dBA) is therefore considered consistent with previous assessment and not an incremental increase in potential impacts, as there is no predicted increase for neighbouring receivers as a result of the Modification and no topographic explanation for a 10 dBA difference in the predicted results.

#### 5.1.4 Noise Criteria for Additional Privately-Owned Residences

As mentioned in Section 2 of the report, additional receivers have been included as part of this assessment when compared with those referred to in Development Consent DA 92/97.

For new privately-owned residences identified within NAGs, the default noise criteria (i.e. the 'All other privately-owned land' criteria presented in Table 3-1 for each NAG) has generally been adopted. This is a conservative approach as default noise criteria are the most stringent criteria for a NAG.

For additional receivers that are located outside of the NAGs, the most stringent criterion of 35 dBA has generally been conservatively adopted. This is the lowest possible noise criterion in accordance with the *NSW INP*.

Upon reviewing the newly identified receivers, however, it is apparent that adopting the default criteria for some receivers would result in lower criteria than would be expected if the receivers had been identified and assessed as part of the 2010 EA process.

For example, additional receiver 195d is just outside the boundary of NAG 5, and is therefore likely to have been included in NAG 5 if identified previously. It is therefore proposed to use the NAG 5 default noise criteria for receiver 195d.

Additional receiver 35b is approximately 70 m from the previously assessed receiver 35. It is therefore expected that if this receiver was identified previously it would have the same specific criteria as receiver 35, rather than the default criteria for NAG 8. It is therefore proposed to use the criteria for receiver 35 for receiver 35b. Similarly, additional receivers 86b, 140c, 258a and 526 are located in close proximity to previously assessed dwellings, and therefore it is proposed to use the criteria for the most proximal receivers, rather than the default.

It is also noted that additional receiver 120c is located on land already subject to acquisition upon request. As such, no change to Development Consent DA 92/97 would be required.

Table 5-3 summarises the adopted noise criteria for key newly identified (additional) privately-owned receivers.

**Table 5-3 Adopted Noise Criteria for Additional Receivers (dBA)**

Additional Receiver	NAG	NAG Default Noise Criteria ( $L_{Aeq,15min}$ )			Proposed Noise Criteria ( $L_{Aeq,15min}$ )			Reason for Proposed Criteria
		Day	Evening	Night	Day	Evening	Night	
35b	8	41	39	39	42	41	41	Very close proximity to receiver 35
86b	6	37	37	37	39	39	39	Close proximity to previous receiver 241
120c	7	40	37	37		- <sup>1</sup>		On land currently subject to acquisition upon request (property 120)
140c	6	37	37	37	41	41	41	Close proximity to previous receiver 205
195d	n/a <sup>2</sup>	35	35	35	41	40	39	Close proximity to NAG 5
258a	1	35	35	35	40	40	40	Close proximity to previous receiver 258
526	7	40	37	37	41	41	41	Close proximity to receivers 80 and 231
All other additional receivers		-			Development Consent Default Criteria			Other new receivers not proximal to previously assessed receivers

Notes: 1 - Receiver 120c is on land already subject to acquisition upon request and therefore no change to the criteria in Development Consent DA 92/97 is required.  
2 - Although very close to NAG 5, receiver 195d is located outside all identified NAGs according to Development Consent DA 92/97.

### 5.1.5 Summary of Proposed Changes to Noise Criteria

As described in Sections 2, 3.1.1, 5.1.3 and 5.1.4, some of the noise criteria set in Development Consent DA 92/97 are considered to have resulted from processing or transcription errors and some new receivers have also been identified. Therefore some changes are proposed to provide noise criteria consistent with the Development Consent DA 92/97 noise criteria for all receivers identified in the recent verification process conducted by MACH Energy.

The proposed changes include:

- updating Table 3 of Development Consent DA 92/97 as per the Note 1 of Table 3-1, that is ensuring that specific criteria are included for receivers 83, 140, 198 and 257 based on the predicted noise levels described in the EA;
- including receiver 136 in Table 1 of Development Consent DA 92/97 (land subject to acquisition upon request) based on previous predictions for neighbouring properties;
- updating Table 3 of Development Consent DA 92/97 with specific criteria for newly identified (additional) receivers 35b, 86b, 140c, 195d, 258a and 526; and
- updating Tables 1, 2 and 3 of Development Consent DA 92/97 with regard to the current land ownership and dwelling presence/habitability status, as annotated on Tables 3-1, 3-3 and 3-6.

Tables 5-4 to 5-6 summarise the proposed noise criteria and land subject to additional mitigation or acquisition upon request to be included in Development Consent DA 92/97. In addition, it is suggested that NAGs should be deleted where the default NAG criteria is consistent with the lowest available project-specific noise criteria under the *NSW INP* (Table 5-6).

**Table 5-4 Proposed Land Subject to Acquisition upon Request**

Receiver	Receiver
43, 44 - J.B. Moore	121 - C & J.M. Moore
45 - B.A. & T.E. Strachan	136 - D.G. Yore
47 - B.L. & M.L. Bates	143, 161 - J.S. & N.M. Lonergan
67 - J.M. Simpson	147 - M.J. & R.G. Adnum
96 - R.P. Grey	156 - J.E. & J.L. Lonergan
102 - A. Mather	158 - J.M. Hoath
108 - J.S. Gibson	159 - J.E. & M.S. Ducey
112 - B.D. Barry	153 - G.M. Casey
118 - J. & C. Hayes	157 - R.B. Parkinson & S.A. Peberdy
120, 308 - D.L. & P.A. Moore	

Note:

- Updated receivers are highlighted in green. Receivers that have been identified as no longer present or inhabitable based on the dwelling verification investigation, or are now mine-owned, have been removed.

**Table 5-5 Proposed Land Subject to Additional Noise and/or Air Quality Mitigation Measures upon Request**

Receiver	Receiver
68 - Googe	140, 140c - Dapkos Pty Limited
74 - Sormaz	154 - Standing
77 - Purser	203 - Millard
80 - W.J. Adnum	257 - Lane
79 - W.J. & D.W. Adnum	258 - Ellis
86 - Cowtime Investments Pty Ltd	259 - Peel
139 - Upton	

Note:

- Updated receivers are highlighted in green. Receivers that have been identified as no longer present or inhabitable based on the dwelling verification investigation, or are now mine-owned, have been removed.

**Table 5-6 Proposed Noise Criteria (dBA)**

	Location	Day	Evening	Night	
		L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>Aeq,15min</sub>	L <sub>A1,1min</sub>
N/A <sup>1</sup>	139, 154, 257, 258a	40	40	40	45
	140, 259	39	39	39	45
	260, 261	37	37	37	45
	169, 272	36	36	36	45
NAG 5	All privately-owned land <sup>2</sup>	41	40	39	45
	140c	41	41	41	45
NAG 6	203	40	40	40	45
	86b, 202	39	39	39	45
	198, 204	38	38	38	45
	All other privately-owned land	37	37	37	45
NAG 7	68, 74	43	42	42	45
	86	42	42	42	45
	77	42	41	41	45
	79, 80, 526	41	41	41	45
	83	40	39	39	45
	All other privately-owned land	40	37	37	45
NAG 8	35, 35b	42	41	41	45
	289	41	40	40	45
	23, 84	40	40	40	45
	All other privately-owned land	41	39	39	45
NAG 9	All privately-owned land	39	38	37	45
NAG 11	All privately-owned land	37	36	35	45
	All other privately-owned land	35	35	35	45

Note:

- Updated receivers are highlighted in green. Receivers that have been identified as no longer present or inhabitable based on the dwelling verification investigation, or are now mine-owned, have been removed. NAGs are as per the recommendations described in Section 2 and as shown in Appendix C.
- <sup>1</sup> As described in Section 2, it is recommended that NAGs with default criteria of 35 dBA (all periods) should be removed (i.e. NAGs 1, 2, 3, 4 and 10) as they do not represent areas with elevated default noise criteria.
- <sup>2</sup> Inclusive of additional receiver 195d.

### 5.1.6 Operational Noise at Commercial Receivers

Development Consent DA 92/97 has not set any noise criteria for commercial receivers potentially impacted by the Mount Pleasant Operation. The *NSW INP* recommends an amenity criterion for commercial premises of 65 dBA L<sub>Aeq,period</sub> when in use.

Preliminary modelling has indicated that L<sub>Aeq,period</sub> noise levels at all identified commercial receivers would easily comply with the *NSW INP* amenity criterion of 65 dBA and no further evaluation of commercial receivers is therefore required.

### 5.1.7 Vacant Land Assessment

A contemporary assessment of potential impacts on vacant land has been conducted in accordance with the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (DP&E, 2014). Under the policy, landowners are eligible to voluntary land acquisition rights when noise generated by the development contributes to exceedances of the recommended maximum noise levels in Table 2.1 of the NSW *INP* on more than 25% of privately owned land, and a dwelling could be built on that land under existing planning controls.

The vacant land assessment noise criteria, based on the recommended maximum noise levels in Table 2.1 of the NSW *INP*, are summarised in Table 5-7. Those criteria apply to  $L_{Aeq,Period}$  noise levels as opposed to  $L_{Aeq,15min}$  noise levels.

**Table 5-7 Vacant Land Assessment Noise Criteria**

Indicative Noise Amenity Area	Time of Day	Vacant Land Assessment Criteria (dBA)
Rural	Day	55 $L_{eq,11hr}$
	Evening	50 $L_{eq,4hr}$
	Night	45 $L_{eq,9hr}$
Suburban	Day	60 $L_{eq,11hr}$
	Evening	50 $L_{eq,4hr}$
	Night	45 $L_{eq,9hr}$
Urban	Day	65 $L_{eq,11hr}$
	Evening	55 $L_{eq,4hr}$
	Night	50 $L_{eq,9hr}$

The vacant land assessment for the Modification was based on noise contours generated for the evening period where noise levels are predicted to be higher. To be conservative, those contours were assessed against the more stringent night time vacant land assessment criteria and no correction was applied to the contours to account for the fact that the assessment is based on  $L_{Aeq,Period}$  noise levels as opposed to  $L_{Aeq,15min}$  noise levels (i.e. in the mining sector,  $L_{Aeq,15min}$  noise levels are conservatively converted to  $L_{Aeq,period}$  levels by subtracting 3 dB).

Based on the conservative methodology described above, no exceedances were found at any privately-owned vacant land for any of the three (3) Modification assessment years.

## 5.2 Cumulative Noise

If approved, the Modification would operate concurrently with the Mt Arthur Coal Mine, the Bengalla Mine, the Muswellbrook Coal Mine and the Dartbrook Mine (should it re-commence). In this event, receivers may potentially be exposed to noise from all five (5) industrial sources simultaneously.

The assessment of cumulative impacts considers the total and relative noise contributions from the Mount Pleasant Operation incorporating the Modification, and the following neighbouring mines (all shown on Figure 1-1):

- Mt Arthur Coal Mine – Project Approval 09\_0062 MOD 1, approved in 2014.
- Bengalla Mine – Project Approval SSD-5170, approved in 2015.
- Dartbrook Mine – Project Approval MOD 129-8-2005, approved in 2005.
- Muswellbrook Coal Mine – Development Application 205/2002, approved in 2016.



The contribution of noise from the Mt Arthur Coal Mine, the Bengalla Mine, the Muswellbrook Coal Mine and the Dartbrook Mine has been taken from predictions of noise emissions included in the following documents:

- *Mt Arthur Coal Open Cut Modification – Noise and Blasting Assessment* prepared by Wilkinson Murray (2013).
- *Bengalla Continuation of Mining Project – Acoustic Impact Assessment* prepared by Bridges Acoustics (2013).
- *Proposed Modification to the Dartbrook Coal Mine Development Consent – Assessment Report* prepared by NSW Department of Planning (2005).
- *Muswellbrook Coal Continuation Project Noise and Vibration Impact Assessment* prepared by EMM Consulting (2016).

It should be noted that subsequent modifications for the above projects were also considered as part of the cumulative noise assessment and it was found they resulted in no material changes to the above assessments.

The methodology used for assessment of cumulative impacts was to logarithmically sum the predicted day, evening and night time noise levels for each mine for key receivers. The overall cumulative noise levels are then reported against the cumulative noise criteria (Table 3-2).

With regard to the Muswellbrook Coal Mine, the western-most receiver modelled (EMM Consulting, 2016) is further to the east than the eastern-most receiver modelled for the Modification. The two assessments therefore do not have any modelled sensitive receivers in common. However, review of the predicted noise levels at the closest receivers suggests cumulative noise levels including the Muswellbrook Coal Mine would easily comply with the relevant criteria.

The assessment of cumulative noise impacts is undertaken in consideration of the average  $L_{Aeq}$  noise level over the entire daytime period (7.00 am to 6.00 pm, a period of eleven [11] hours), evening period (6.00 pm to 10.00 pm, a period of four [4] hours) and night period (10.00 pm to 7.00 am, a period of nine [9] hours), rather than the 10<sup>th</sup> percentile  $L_{Aeq,15min}$  noise level within that period as is required for the assessment of operational noise impacts (Section 5.1). Noise predictions associated with the Mount Pleasant Operation incorporating the Modification represent  $L_{Aeq,9hr}$  levels as calculated using the ENM. Because no  $L_{Aeq,period}$  levels were readily available for the other identified mines, the reported  $L_{Aeq,15min}$  noise levels were conservatively converted to  $L_{Aeq,period}$  levels by subtracting 3 dB.

For the purposes of cumulative assessment, the closest available corresponding noise prediction years for the three (3) other mining projects were selected. Only one set of predictions were available for the Dartbrook Mine, therefore these predictions were assumed for all cumulative assessment years. The summation of the various noise predictions used for cumulative assessment is summarised below:

- Cumulative Year 2018 = Modification (Year 2018) + Mt Arthur Coal Mine (Year 2016) + Bengalla Mine (Year 4) + Dartbrook Mine.
- Cumulative Year 2021 = Modification (Year 2021) + Mt Arthur Coal Mine (Year 2022) + Bengalla Mine (Year 8) + Dartbrook Mine.
- Cumulative Year 2025 = Modification (Year 2025) + Mt Arthur Coal Mine (Year 2026) + Bengalla Mine (Year 15) + Dartbrook Mine.



Assessment of cumulative impacts was undertaken for all privately-owned receivers at which there is predicted noise level data for the Modification and where relevant the Mt Arthur Coal Mine, the Bengalla Mine or the Dartbrook Mine. Noise predictions for those receivers were based on point source calculations. The predicted cumulative noise levels are presented in Appendix D, with exceedances of the amenity criterion shown in yellow.

The predicted noise levels from the Mount Pleasant Operation incorporating the Modification relate to the  $L_{Aeq,period}$  noise levels averaged over all recorded meteorological conditions over all day, evening or night periods within the worst case season.

Appendix D indicates that cumulative noise levels would comply with the cumulative noise criteria at all modelled privately-owned receivers during the day and evening periods. At night, cumulative noise levels without the pro-active and reactive mitigation measures in place (Section 5.1.2) would comply with the cumulative noise criteria at all but five (5) privately-owned receivers, namely receivers 20, 21, 23, 488a and 488b. Exceedances at the five (5) receivers would be negligible with only a 1 dB exceedance at receivers 20, 21, 23 and exceedances ranging between 1 and 2 dB at the two (2) receivers on property 488 (receivers 488a and 488b). No exceedances would be expected at receivers 20, 21, 23 with the Mount Pleasant Operation pro-active and reactive mitigation measures described in Section 5.1.2.

The negligible exceedances expected at receivers 488a and 488b are predicted to occur from the combined noise generated by the Mt Arthur Coal Mine and Bengalla Mine, irrespective of whether the Mount Pleasant Operation is active. Noise emitted from the Mount Pleasant Operation was found not to materially contribute to the cumulative noise levels at receivers 488a and 488b.

All cumulative noise predictions comply with the cumulative noise acquisition criteria in Development Consent DA 92/97.

### 5.3 Potential for Sleep Disturbance

The noise model was also used to analyse potential  $L_{Amax}$  noise levels likely to arise from the night time operations of the Mount Pleasant Operation. The instantaneous noise sources and their typical  $L_{Amax}$  SWL that may have the potential to disturb sleep can be summarised as follows:

- Plant reversing alarms 115 dBA  $L_{Amax}$
- Loaders/dozers/excavators dumping 118 dBA  $L_{Amax}$
- Infrastructure area impact noise 119 dBA  $L_{Amax}$
- Train Load out bin 114 dBA  $L_{Amax}$
- Impact noise associated with truck passby 118 dBA  $L_{Amax}$

The predicted night time  $L_{Amax}$  noise levels at receivers surrounding the Mount Pleasant Operation are presented in Appendix E and rounded to the nearest dB.  $L_{Amax}$  noise levels are conservatively compared with the Development Consent DA 92/97  $L_{A1,1min}$  criterion of 45 dBA. Mine-owned receivers are included for the purpose of information only for MACH Energy.

These  $L_{Amax}$  values were modelled using the same plant locations used for the modelling of operational noise impacts. The predictions are based on a typical adverse weather condition combining a temperature inversion of 3°C/100 m and a source-to-receiver wind of 2-2.5 metres per second (m/s). This adverse condition has conservatively been selected to represent meteorological conditions triggering 10<sup>th</sup> percentile exceedance levels. Each of the four (4) plant items listed above was modelled separately, and the highest predicted  $L_{Amax}$  value from any item is reported.

Review of noise predictions indicates that  $L_{Amax}$  noise levels due to night operations from the Mount Pleasant Operation incorporating the Modification are predicted to be below the  $LA_{1,1min}$  criterion in Development Consent DA 92/97 at all privately-owned receivers.

#### **5.4 Construction Noise**

As no material changes to construction of the Mount Pleasant Operation are proposed as part of the Modification, a construction noise assessment is not required.

## 6 ROAD TRANSPORTATION NOISE

### 6.1 Introduction

Although the Modification would not result in an increase of traffic accessing the site, the Modification would involve the continuation of road traffic associated with the approved Mount Pleasant Operation for the period December 2020 to December 2026. Road noise associated with the Mount Pleasant Operation incorporating the Modification has therefore been considered in this assessment.

The road transportation noise assessment focuses on Wybong Road and Kayuga Road, as these local roads are the most likely to be affected by noise generated by road transport movements associated with the Mount Pleasant Operation.

### 6.2 Road Traffic Noise Criteria

Development Consent DA 92/97 does not specify any criteria for road traffic noise associated with the Mount Pleasant Operation.

Criteria for assessment of noise from traffic on public roads are set out in the *RNP* (NSW Department of Environment, Climate Change and Water, 2011). Wybong Road and Kayuga Road are both considered as “local” roads under this policy.

Table 3 of the *RNP* is copied in Table 6-1 with the relevant sections highlighted.

**Table 6-1 Road Traffic Noise Criteria – Privately-owned Residences**

**Table 3 Road traffic noise assessment criteria for residential land uses**

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from <b>new</b> freeway/arterial/sub-arterial road corridors	L <sub>Aeq</sub> , (15 hour) 55 (external)	L <sub>Aeq</sub> , (9 hour) 50 (external)
	2. Existing residences affected by noise from <b>redevelopment</b> of existing freeway/arterial/sub-arterial roads	L <sub>Aeq</sub> , (15 hour) 60 (external)	L <sub>Aeq</sub> , (9 hour) 55 (external)
	3. Existing residences affected by <b>additional traffic</b> on existing freeways/arterial/sub-arterial roads generated by land use developments		
Local roads	4. Existing residences affected by noise from <b>new</b> local road corridors	L <sub>Aeq</sub> , (1 hour) 55 (external)	L <sub>Aeq</sub> , (1 hour) 50 (external)
	5. Existing residences affected by noise from <b>redevelopment</b> of existing local roads		
	6. Existing residences affected by <b>additional traffic</b> on existing local roads generated by land use developments		

Reference is also made to sections 3.4 and 3.4.1 of the *RNP*. Section 3.4 notes that “In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.”

Section 3.4.1 notes *“For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.”*

### 6.3 Road Traffic Volumes

Projected traffic volumes associated with the Modification are expected to have potential implications for noise on Wybong Road (between Bengalla Road and Kayuga Road) and Kayuga Road (north of Wybong Road). Impacts on the other roads surrounding the site are expected to be negligible from a road noise perspective and as such, only Wybong Road (between Bengalla Road and Kayuga Road) and Kayuga Road (north of Wybong Road) are addressed in the road traffic noise assessment.

Table 6-2 presents the non-Modification related peak hour traffic volumes obtained from traffic counts conducted in 2013 and supplemented with Mount Pleasant Operation data obtained in 2016. Traffic volumes are based on forecast traffic in 2026. For both Wybong Road and Kayuga Road the peak hours with the potential for most road traffic noise impacts was found to be the hour between 5.00 pm and 6.00 pm during the day and between 6.00 am and 7.00 am at night.

**Table 6-2 Non-Modification Related Peak Hour Traffic Volumes**

Road	Day Peak Hour (5.00 pm – 6.00 pm)		Night Peak Hour (6.00 am – 7.00 am)	
	Light	Heavy	Light	Heavy
Wybong Road (Bengalla Road to site access road)	77	90	114	76
Wybong Road (site access road to Kayuga Road)	79	90	117	76
Kayuga Road (north of Wybong Road)	2	0	3	0

The forecast traffic generated by the Modification is summarised in Table 6-3. Road traffic associated with the Mount Pleasant Operation is not expected to change materially throughout the period of Modification continued traffic generation (i.e. December 2020 to December 2026).

**Table 6-3 Peak Hour Traffic Volumes due to the Modification**

Road	Day Peak Hour (5.00 pm – 6.00 pm)		Night Peak Hour (6.00 am – 7.00 am)	
	Light	Heavy	Light	Heavy
Wybong Road (Bengalla Road to site access road)	53	20	76	28
Wybong Road (site access road to Kayuga Road)	20	0	28	0
Kayuga Road (north of Wybong Road)	11	0	15	0

### 6.4 Road Traffic Noise Impact – Wybong and Kayuga Roads

Based on the traffic data presented in Table 6-2 and Table 6-3, traffic noise levels at the closest privately-owned receivers located along Wybong Road and Kayuga Road have been predicted and are presented in Table 6-4 and Table 6-5, respectively. Levels highlighted in yellow indicate exceedances of the relevant road traffic noise criteria at privately-owned receivers.

**Table 6-4 Calculated Traffic Noise Levels - Wybong Road (East of Bengalla Road)**

Receiver ID	L <sub>Aeq,1hr</sub> (dBA) (Period December 2020 to December 2026)							
	Forecast		Forecast with Modification		Relative Increase		Road Noise Criteria	
	Day	Night	Day	Night	Day	Night	Day	Night
43	53	53	54	54	1	1.5	55	50
67	68	68	69	68	0.1	0.2	55	50
68	55	55	56	55	0.2	0.2	55	50
74	68	68	69	68	0.1	0.2	55	50
77	67	67	67	67	0.2	0.2	55	50

Note: 1. Levels highlighted in yellow indicate exceedances of the road traffic noise criteria at privately-owned receivers.

Traffic noise levels are expected to exceed the road traffic noise criteria at all five (5) identified receivers along Wybong Road at night, with or without the proposed Modification. One additional privately-owned receiver (receiver 68) is predicted to exceed the daytime criteria with the Modification. Review of Table 6-4 also indicates that the 2 dB relative increase criterion is complied with at all receivers. On this basis, the increase in noise levels due to the Modification (i.e. during the period December 2020 to December 2026) represents a minor impact barely perceptible to the average person in accordance with the *RNP*. However, it is important to note that this is merely a continuation of the impact associated with the approved Mount Pleasant Operation (i.e. the 'relative increase' is 0 dBA in comparison to the approved Mount Pleasant Operation road noise up to December 2020).

It should also be noted that receivers 43 and 67 are already subject to acquisition upon request due to the approved Mount Pleasant Operation. In addition, at the time of writing, receiver 68 has submitted a written request for acquisition to MACH Energy and acquisition negotiations are underway.

**Table 6-5 Calculated Traffic Noise Levels - Kayuga Road (North of Wybong Road)**

Receiver ID	L <sub>Aeq,1hr</sub> (dBA) (Period December 2020 to December 2026)							
	Forecast		Forecast with Modification		Relative Increase		Road Noise Criteria	
	Day	Night	Day	Night	Day	Night	Day	Night
86	38	39	46	47	8.1	7.8	55	50
96	44	45	52	53	8.1	7.8	55	50
102	44	45	52	53	8.1	7.8	55	50
118	33	35	41	43	8.1	7.8	55	50
120	44	46	52	54	8.1	7.8	55	50
120c	40	42	48	50	8.1	7.8	55	50
121	37	39	45	46	8.2	7.8	55	50
147	43	45	51	52	8.1	7.7	55	50
154	33	35	41	43	8.2	7.8	55	50
156	39	41	47	48	8.1	7.7	55	50
157	34	36	43	44	8.2	7.8	55	50
158	41	43	49	51	8.1	7.8	55	50
159	39	41	47	49	8.2	7.8	55	50

Note: 1. Levels highlighted in yellow indicate exceedances of the road traffic noise criteria at privately-owned receivers.

Due to very low non-Modification related traffic volumes during the identified peak hours, the predicted traffic noise levels along Kayuga Road north of Wybong Road are dominated by the Mount Pleasant Operation incorporating the Modification. However, it is important to note that this is merely a continuation of the impact associated with the approved Mount Pleasant Operation (i.e. the 'relative increase' is 0 dBA in comparison to the approved Mount Pleasant Operation road noise up to December 2020).

While predicted daytime traffic noise levels are below the relevant criteria, traffic noise levels at night with the Modification are expected to exceed the road traffic noise criteria at five (5) of the identified receivers along Kayuga Road, with negligible exceedances ranging 1-2 dB at receivers 147 and 158 and moderate exceedances of 3-4 dB at receivers 96, 102 and 120.

All five (5) receivers where road noise exceedances have been predicted are also subject to acquisition upon request due to Mount Pleasant Operation operational noise.

## 6.5 Conclusion

The Modification comprises an extension to the period of operations at the Mount Pleasant Operation and does not include any additional workforce or deliveries.

Projected traffic volumes associated with the Modification are expected to have potential implications for noise on Wybong Road (between Bengalla Road and Kayuga Road) and Kayuga Road (north of Wybong Road).

Although traffic noise levels are expected to exceed road traffic noise criteria at receivers along Wybong Road the relative increase with the Modification is less than 2 dB. As such, the increase in noise levels due to the Modification represents a minor impact barely perceptible to the average person in accordance with the *RNP*.

Some road traffic noise impact is expected at some receivers along Kayuga Road. However, all privately-owned receivers along Kayuga Road where road noise exceedances are anticipated are already subject to acquisition upon request due to Mount Pleasant Operation operational noise.

However, it is important to note that the predicted increases in traffic noise are merely a continuation of the impacts associated with the approved Mount Pleasant Operation (i.e. there is no predicted increase in road noise levels in comparison to the approved Mount Pleasant Operation road noise up to December 2020).

## 7 RAIL TRANSPORTATION NOISE

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### 7.1 Introduction

Although the Modification does not propose any changes to export of product coal via rail, except for the extension in mine life, rail noise associated with the Mount Pleasant Operation incorporating the Modification has been considered in this assessment.

Product coal from the Mount Pleasant Operation will be transported by rail from the onsite processing plant via the approved rail loop and rail spur to the Ulan Line to Muswellbrook, and from Muswellbrook to the Port of Newcastle via the Main Northern Railway.

The *RING* (EPA, 2013) (detailed in Section 7.2.2) has requirements for the geographic extent of rail noise assessments for rail traffic generating development. Specifically, assessment extends to where rail traffic associated with the assessed project (i.e. the Modification) represents less than 10% of total line/corridor rail traffic, as in this case the change in noise exposure is equivalent to less than 0.5 dB.

### 7.2 Rail Noise Criteria

#### 7.2.1 Australian Rail Track Corporation Environment Protection Licence

The Australian Rail Track Corporation (ARTC) operates the Ulan Line and Main Northern Railway. Noise emissions from railways operated by ARTC are regulated via ARTC's Environment Protection Licence (EPL) 3142. EPL 3142 Section L6 does not nominate specific environmental noise limits but notes that:

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

Based on the information presented above, the following noise criteria have been adopted for the Project on the network rail lines:

- $L_{Aeq,9 \text{ hour}} = 60 \text{ dBA}$ ;
- $L_{Aeq,15 \text{ hour}} = 65 \text{ dBA}$ ; and
- $L_{Amax} = 85 \text{ dBA}$ .

#### 7.2.2 Rail Infrastructure Noise Guideline

Appendix 2 of the *RING* deals with land-use developments, other than rail projects, that are likely to generate additional rail traffic on an existing rail network. The requirements are summarised below.

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

- *Identify the typical offset distance/s of sensitive receivers from the rail line/s that are likely to be affected by increased rail movements.*



- *Quantify the existing level of rail noise at the offset distance/s identified above using the noise descriptors  $L_{Aeq, 15/9hr}$  and  $L_{Amax}$  (5<sup>th</sup> percentile) dB(A).*
- *Predict the cumulative rail noise level (ie. from the existing and proposed rail movements) using a calibrated noise model (based on predicted increased rail movements) at the offset distances identified above.*
- *Compare the cumulative noise level with the rail noise assessment trigger levels:  $L_{Aeq, 15hr}$  65 dB(A),  $L_{Aeq, 9hr}$  60 dB(A), and  $L_{Amax}$  (95<sup>th</sup> percentile) 85 dB(A).*
- *Implement all feasible and reasonable noise mitigation measures where the cumulative noise level exceeds the noise assessment trigger levels and project-related noise increases are predicted.*
- *Where the  $L_{Aeq}$  noise level increases are more than 2 dB(A), which is equivalent to approximately 60% of the total line or corridor rail traffic, and exceeds the relevant noise assessment trigger level, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.*

*Notes:*

1. *A project-related noise increase is an increase of more than 0.5 dB over the day or night periods.*
2. *The geographical extent of the rail noise assessment ideally should be where project-related rail noise increases are less than 0.5 dB. This roughly equates to where project-related rail traffic represents less than 10% of the total line or corridor rail traffic.*

### 7.3 Rail Movements

The Mount Pleasant Operation is approved to generate an average of six (6) train movements per 24 hours (e.g. four [4] during the day and two [2] at night) and up to 18 train movements per 24 hours. The Modification would continue these approved train movements, for the period December 2020 to December 2026.

Currently, there are other projects in the planning phase which will potentially involve additional future movements. The Bylong Coal Project and Spur Hill Underground Coking Coal Project propose to generate an average of eight (8) and six (6) daily train movements, respectively.

The peak approved/proposed train movements have not been assessed, as it is extremely unlikely the peak movements from a large number of projects would occur in the same 24 hour period.

Average daily train movements used to assess potential impacts are summarised in Table 7-1.

It should be noted that rail traffic associated with the Bengalla Mine, which joins the Ulan Line less than four (4) km east of the Mount Pleasant Operation rail spur, was included in the non-Mount Pleasant Operation rail movements in Table 7-1 as no privately-owned receivers are located along the relatively small rail section between the two (2) spurs.



**Table 7-1 Average Daily Train Movements (Mount Pleasant Operation Rail Spur to Muswellbrook Junction)**

Status	Origin	Average Daily Train Number of Train Mvts <sup>1</sup>		
		Day	Night	24 Hour
Existing	Freight/Ore and grain <sup>2</sup>	4	0	4
	Ulan Continued Operations <sup>3</sup>	8	4	12
Approved/ Operating Mine	Wilpinjong Coal Project <sup>4</sup>	8	4	12
	Moolarben Coal Project <sup>5</sup>	10	4	14
	Mangoola Coal Project <sup>6</sup>	5	3	8
	Continuation of Bengalla Mine <sup>7</sup>	6	4	10
Proposed Mine	Bylong Coal Project <sup>8</sup>	5	3	8
	Spur Hill Underground Coking Coal Project <sup>9</sup>	4	2	6
<b>Total (without Mount Pleasant Operation)</b>		<b>50</b>	<b>24</b>	<b>74</b>
Example - Mount Pleasant Operation		4	2	6
<b>Total (with Mount Pleasant Operation incorporating Modification)</b>		<b>54</b>	<b>26</b>	<b>80</b>

Notes: 1. Two movements = one departure.

2. ARTC (2016) *2016-25 Hunter Valley Corridor Capacity Strategy*.

3. Wilkinson Murray (2009) *Ulan Coal Continued Operations - Noise & Vibration Assessment*.

4. SLR Global Environmental Solutions (2015) *Wilpinjong Extension Project - Noise and Blasting Assessment*.

5. Moolarben Coal (2016) *Moolarben Coal Complex Stage 1 (05\_0117) - Temporary Coal Washing Limit Increase Modification (Mod 13)*.

6. EMGA Mitchell McLennan (2013) *Mangoola Coal - Modification 6 Environmental Assessment - Main Report*.

7. Bengalla Mining Company (2013) *Continuation of Bengalla Mine - Environmental Impact Statement*.

8. Hansen Bailey (2015) *Bylong Coal Project - Noise and Blasting Impact Assessment*.

9. Spur Hill Underground Coking Coal (2014) *Spur Hill Underground Coking Coal Project - Project Description and Preliminary Environmental Assessment*.

Review of Table 7-1 indicates the Mount Pleasant Operation's contribution to average daily rail traffic on the eastern end of the Ulan Line (from the Mount Pleasant Operation rail spur to the Muswellbrook junction) for the additional approximately four (4) movements during the day and two (2) movements at night associated with the Modification would be approximately 8% and 8.3% of non-Mount Pleasant Operation day and night rail movements, respectively.

Percentages of Mount Pleasant Operation-related rail traffic over total rail traffic on the Ulan Line indicate that rail noise associated with the Mount Pleasant Operation incorporating the Modification would generate less than 0.5 dB increases when compared with existing rail noise. As such, the potential rail noise impact associated with the Modification does not warrant further consideration in accordance with the *RING*, including consideration of the Main Northern Railway south-east of Muswellbrook.

## 7.4 Conclusion

Although the Modification does not propose any changes to the coal export via rail, except for the extension in life, rail noise associated with the Mount Pleasant Operation incorporating the Modification has been considered in this assessment.

Review of existing/approved/proposed rail movements on the Ulan Line (from the Mount Pleasant Operation rail spur to the Muswellbrook junction) indicates that the proposed rail movements associated with the Modification would result in increases in noise levels of less than 0.5 dB. As such, the potential rail noise impact associated with the Modification does not warrant further consideration in accordance with the *RING*.

## 8 BLASTING ASSESSMENT

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The removal of overburden (and interburden) material at the Mount Pleasant Operation would be undertaken using a drill and blast programme.

A mixture of ANFO (dry holes) and emulsion blends (wet holes) explosives would be used for the Mount Pleasant Operation. Blast sizes would range up to 1,600 kilograms (kg) Maximum Instantaneous Charge (MIC).

Blast designs and sizes would vary over the life of the Mount Pleasant Operation and would depend on numerous factors including the depth of coal seams and the design of open cut benches.

Blasting at the Mount Pleasant Operation would only occur between the hours of 9.00 am and 5.00 pm Monday to Saturday (excluding public holidays).

The number of blasts per week would typically be up to five (5); however, up to six (6) blasts per week may occur on some occasions (i.e. a maximum of one blast per day).

At various stages in the life of the Mount Pleasant Operation, some sections of proximal public roads (e.g. Kayuga Road, Wybong Road and Castle Rock Road) would be temporarily closed during blast events within 500 m of the public road.

### 8.1 Airblast Overpressure & Vibration Criteria

#### 8.1.1 Criteria for the Minimisation of Human Annoyance from Blasting

The EPA guideline *Assessing Vibration: a technical guideline* (NSW Department of Environment and Conservation, 2006) defers to the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* prepared by the Australian and New Zealand Environment Council (1990). In that document, human annoyance criteria for blasting for any privately-owned receivers or other sensitive locations are:

- maximum overpressure due to blasting should not exceed 115 dB for more than 5% of blasts in any year, and should not exceed 120 dB for any blast; and
- maximum peak particle ground velocity should not exceed 5 millimetres per second (mm/s) for more than 5% of blasts in any year, and should not exceed 10 mm/s for any blast.

These criteria are consistent with the blasting criteria for residences on privately-owned land defined in Table 7 of Development Consent DA 92/97.

#### 8.1.2 Criteria for the Prevention of Structural Damage to Buildings

At sufficiently high levels, blast overpressure may in itself cause structural damage to some building elements such as windows.

Australian Standard (AS) 2187.2-2006 *Explosives – Storage and Use – Part 2 Use of explosives* indicates:

*From Australian and overseas research, damage (even of a cosmetic nature) has not been found to occur at airblast levels below 133dB.*

For assessment of damage due to ground vibration, *AS 2187.2-2006* recommends frequency-dependent criteria for vibration damage, derived from British Standard 7385-2 and United States Bureau of Mines Standard RI 8507. These are less stringent than the human comfort criterion of 5 mm/s noted above, and hence need to be considered only in the case of mine-owned receivers (Appendix G). For the frequencies typical of blast vibration, a value of 10 mm/s peak particle velocity (PPV) represents a conservatively low estimate of the level above which structural damage may possibly occur.

#### 8.1.3 Criterion for Historic Heritage Sites

Condition 10, Schedule 3 of Development Consent DA 92/97 includes a ground vibration criterion for historic heritage sites of 10 mm/s (no allowable exceedances). However, it is noted that this Condition does not apply if MACH Energy has a written agreement with the relevant owner and has advised the DP&E in writing of the terms of this agreement.

#### 8.1.4 Criterion for Public Infrastructure

Condition 10, Schedule 3 of Development Consent DA 92/97 includes a ground vibration criterion for public infrastructure of 50 mm/s (no allowable exceedances). However, this Condition does not apply if MACH Energy has a written agreement with the relevant infrastructure provider/owner and has advised the DP&E in writing of the agreement.

### 8.2 Prediction of Airblast Overpressure & Vibration Levels

Airblast overpressure and ground vibration levels from blasting are related to the “scaled distance” from the blast, which is defined as:

Scaled distance =  $D/W^{(1/3)}$  for airblast overpressure; and

Scaled distance =  $D/W^{(1/2)}$  for ground vibration.

where D is the distance from the blast in metres and W is the MIC of explosive, in kg ANFO equivalent.

Predictive curves relating scaled distance to overpressure and ground vibration levels have been derived from measurements conducted at numerous sites, typically at a distance varying between 2 and 7 km.

For this assessment, Wilkinson Murray has used data from over 7,600 records of blasts undertaken in the Hunter Valley, NSW to derive relationships between scaled distance and overpressure or vibration. These relationships are designed to predict not the mean level of overpressure or vibration, as in a standard “site law”, but the 95<sup>th</sup> percentile value, representing the level which would be exceeded by only 5% of blasts, given the use of current blast practice and the current level of variability in overpressure or vibration for the same scaled distance.

The raw data, and the derived prediction curves which are appropriate up to distances of 10 km, are shown in Appendix F.

For overpressure, a curvilinear relationship with  $\log(\text{Scaled Distance})$  was required to adequately explain the data:

$$\text{Overpressure (dB)} = 201.1 - 62.313 \log(\text{SD}) + 10.79 (\log(\text{SD}))^2$$

where SD is the overpressure-scaled distance (as per formula given above).

For vibration, a linear relationship with log(Peak Particle Velocity) was derived:

$$\text{Log (Peak Particle Velocity)} = 3.015 - 1.4359 \log(\text{SD})$$

where SD is the vibration-scaled distance (as per formula given above).

These formulae were used to predict vibration levels at all potentially-affected locations.

### 8.3 Predicted Overpressure & Vibration Levels at Privately-Owned Residences

Based on the predictive equations outlined in Section 8.2, Table 8-1 indicates the range of 5% exceedance overpressure and ground vibration levels expected at the nearest privately-owned residences resulting from the proposed maximum blast MIC of 1,600 kg. The 5% exceedance levels are the levels that should be compared to the 5% exceedance criteria of 115 dBLinear (dBL) for overpressure and 5 mm/s for vibration. Peak or maximum blasting levels are not presented because these levels are typically caused by geological or blasting anomalies, which are unpredictable.

The assumed blast characteristics are representative of deep overburden blasts which would result in the maximum potential impact.

**Table 8-1 Predicted Overpressure & Vibration<sup>(1)</sup> Levels Resulting from Blasting (5% Exceedance Levels)**

Direction & Closest Receiver ID	Years 2017-2019		Years 2020-2022		Years 2023-2026	
	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)
Dir- W ID- 43	111.6 to 112.4	0.9 to 1.4	111.2 to 112.1	0.6 to 1.1	111.2 to 112.8	0.6 to 1.6
Dir- WNW ID- 272	111.1 to 111.2	0.5 to 0.6	111.1 to 111.2	0.5 to 0.6	111.1 to 111.3	0.5 to 0.7
Dir- NNW ID- 153	111.3 to 111.5	0.6 to 0.8	111.4 to 112.5	0.8 to 1.4	111.3 to 113	0.7 to 1.7
Dir- NNE ID- 147	111.3 to 111.8	0.7 to 1	111.7 to 114.2	0.9 to 2.5	111.3 to 114.7	0.7 to 2.9
Dir- NE ID- 136	111.7 to 112.8	0.9 to 1.6	112.2 to <b>117.3</b>	1.2 to <b>5.3</b>	111.6 to <b>117.1</b>	0.8 to <b>5.1</b>
Dir- E ID- 121	112.6 to <b>115.7</b>	1.5 to 3.7	113.7 to <b>119.9</b>	2.1 to <b>8.6</b>	112.4 to <b>117.9</b>	1.3 to <b>6</b>
Dir- E ID- 112	112.8 to <b>116.4</b>	1.6 to 4.3	114 to <b>120.1</b>	2.3 to <b>8.8</b>	112.5 to <b>117.1</b>	1.4 to 5
Dir- E ID- 67	112.9 to <b>115.4</b>	1.6 to 3.5	113 to <b>115.6</b>	1.7 to 3.6	112.5 to 113.8	1.4 to 2.2
Dir- SE ID- 23	113.3 to <b>115.2</b>	1.9 to 3.3	111.9 to 114.3	1.1 to 2.6	111.7 to 113.6	0.9 to 2.1

Note: 1. Overpressure and ground vibration levels likely to result from the proposed maximum blast MIC of 1,600 kg.  
3. Values that are above the criterion are highlighted in bold.  
• S = South, W = West, N = North and E = East.

In the absence of blast MIC control, there would be a range of potential exceedances of both overpressure and/or vibration criteria at the selected residences, including a potential exceedance of the upper 120 dBL criterion at one receiver, namely receiver 112, during years 2020-2022.

The proposed maximum blast MIC of 1,600 kg would result in exceedances of the relevant human comfort criteria at receivers within 2,260 m of the blast.

To meet the relevant criteria when blasting within 2,260 m of the above receivers under all conditions, the MIC would therefore need to be reduced. For blasts closer than 2,260 m, trial blasting should be used to determine a site-specific site law to more accurately predict noise and vibration levels for the specific conditions applying in the area. This should be used to inform blast design so that the human comfort criteria are not exceeded. As a guide, Table 8-2 provides the required MIC to ensure compliance when blasting at the closest point within the blast areas, using the general blast law derived from a range of sites as described above.

**Table 8-2 Required MIC to Comply with Airblast Overpressure & Vibration Criteria**

Direction & Closest Receiver ID	Years 2017-2019		Years 2020-2022		Years 2023-2026	
	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance
Dir- NE ID- 136	n/a <sup>1</sup>	n/a <sup>1</sup>	1,580 m	550 kg	1,625 m	550 kg
Dir- E ID- 121	2,030 m	1,150 kg	1,130 m	200 kg	1,450 m	400 kg
Dir- E ID- 112	1,810 m	800 kg	1,100 m	150 kg	1,640 m	600 kg
Dir- E ID- 67	2,125 m	1,300 kg	2,050 m	1,200 kg	n/a <sup>1</sup>	n/a <sup>1</sup>
Dir- SE ID- 23	2,180 m	1,400 kg	n/a <sup>1</sup>	n/a <sup>1</sup>	n/a <sup>1</sup>	n/a <sup>1</sup>
Note: 1. Not relevant as blasting within proposed blast area and using proposed maximum blast MIC of 1,600 kg is expected to comply with relevant criteria.						

Compliance at the selected receivers presented in Table 8-2 is expected to result in compliance at all privately-owned residences.

5% exceedance overpressure and ground vibration levels expected at the nearest mine-owned residences are included in Appendix G.

#### 8.4 Predicted Vibration Levels at Historic Heritage Sites

In accordance with the Mount Pleasant Operation Blast Management Plan, MACH Energy will design and manage blast events in the vicinity of historic heritage sites such that the 10 mm/s vibration criterion is met, until the sites have been managed in accordance with the most contemporary assessment of historic heritage for the Mount Pleasant Operation (e.g. excavated, salvaged or demolished). If sites remain *in situ*, blast vibration monitoring will be undertaken when blasting within 500 m of a site.

The proposed maximum blast MIC of 1,600 kg would result in exceedances of the relevant vibration criterion at historic heritage sites within 1,010 m of the blast. It therefore follows that if MACH Energy were to complete the relevant historic heritage site management actions prior to blasting within 1,010 m of a historic heritage site, the proposed maximum blast MIC of 1,600 kg could be used.

The most contemporary historic heritage assessment for the Mount Pleasant Operation identifies 11 historic heritage sites that would be managed through *in situ* conservation or relocation. Table 8-3 presents the range of ground vibration levels resulting from the proposed maximum blast MIC of 1,600 kg expected at the historic heritage sites that would remain *in situ* or would be relocated.

**Table 8-3 Predicted Overpressure & Vibration<sup>1</sup> Levels Resulting from Blasting at Historic Heritage Sites**

Direction & Closest Historic Heritage Site ID	PPV Ground Vibration (mm/s)		
	Years 2017-2019	Years 2020-2022	Years 2023-2026
Dir- W ID- MP01	0.7 to 0.9	0.6 to 0.9	0.6 to 1
Dir- NW ID- MP21	0.8 to 1.1	1 to 2.8	0.8 to 3.9
Dir- E ID- MP37 <sup>2</sup>	7.6 to <b>178.6</b>	-	-
Dir- E ID- MP38	1.5 to 3.2	1.9 to 4.2	1.3 to 2.7
Dir- E ID- MP39	2.1 to 7.1	2.7 to <b>11.3</b>	1.8 to 3.8
Dir- ENE ID- MP41	1 to 1.9	1.4 to 8.1	1 to 7.7
Dir- WNW ID- MP44	0.7 to 1	0.8 to 1.2	0.8 to 1.4
Dir- N ID- MP50	0.7 to 1	0.9 to 2.6	0.7 to 3.1
Dir- E ID- MP51	1.1 to 1.8	1.3 to 2.2	1 to 1.6
Dir- SE ID- MP52	3.1 to 9.1	1.2 to 4	1 to 4.4
Dir- N ID- MP53	0.6 to 0.8	0.7 to 1.6	0.6 to 1.8

- Note:
1. Ground vibration levels likely to result from the proposed maximum blast MIC of 1,600 kg.
  2. Following acquisition of this property, MACH Energy intends to move the historic homestead to a location that would not be impacted by mining operations.
  3. Values that are above the criterion are highlighted in bold.

Apart from site MP37, which MACH Energy intends to relocate following acquisition of the property, only one historic heritage site is predicted to require a reduced MIC when blasting at the closest point – site MP39. However, Wilkinson Murray notes that site MP39 is a quarry, and would therefore not be expected to be sensitive to blast vibrations. As such it is recommended that this site is excluded from the list of historic heritage sites for blast management. Notwithstanding, for completeness, the MIC that would be required if the historic heritage blast vibration criteria was to be applied to the site has been calculated. The MIC would need to be reduced to approximately 1,350 kg when blasting at the closest point to the site (approximately 930 m).

Development Consent DA 92/97 states that no exceedance of the ground vibration criterion for historic heritage sites is allowed. Therefore, trial blasts using smaller MIC should be carried out before conducting normal size blasts at a distance of, and closer than 1,010 m to site MP39 (if this site was to remain a historic heritage site requiring blast management). If no geological or blasting anomalies are found to occur, the intended MIC may be used.

## 8.5 Predicted Vibration Levels at Public Infrastructure

To meet the Development Consent DA 92/97 vibration criteria at public infrastructure when using the maximum proposed blast MIC of 1,600 kg, blasts would be required to be at least 330 m from the infrastructure.

For blasts closer than 330 m, the blast MIC would be reduced to ensure compliance with the criteria.

Development Consent DA 92/97 states that no exceedance of the ground vibration criterion for public infrastructures is allowed. Therefore, trial blasts using smaller MIC should be carried out before conducting normal size blasts at a distance of, and closer than 330 m of any infrastructure. If no geological or blasting anomalies are found to occur, the intended MIC may be used.

## **8.6 Potential Flyrock Impacts**

Flyrock is any material ejected from the blast site by the force of the blast.

Flyrock would be managed through appropriate blast design in order to minimise risk to the public using proximal public roads (e.g. Kayuga Road, Wybong Road and Castle Rock Road), and to nearby residential receivers and livestock.

Blasting within 500 m of public roads or privately-owned land would be undertaken strictly in accordance with a Blast Management Plan developed in consultation with relevant stakeholders (e.g. Muswellbrook Shire Council) and approved by the DP&E.

## **8.7 Airblast Overpressure & Vibration Mitigation**

Blast and vibration management would be conducted in accordance with a Blast Management Plan which would be prepared for the Mount Pleasant Operation incorporating the Modification.

The Blast Management Plan would include measures to reduce the potential overpressure and vibration impacts of the Mount Pleasant Operation, including procedures for the management of livestock in close proximity to blast events.



## 9 CONCLUSION

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This assessment has considered the potential noise and blasting impacts associated with the Mount Pleasant Operation incorporating the Modification.

In summary, with the implementation of the proposed management measures the Modification would not materially change the noise and blasting impacts of the approved Mount Pleasant Operation.

### 9.1 Operational Noise

- Operational noise impacts were assessed for three years (2018, 2021 and 2025), for different periods of the day (daytime, evening and night-time) and with regard for noise-enhancing meteorological conditions including winds with speeds of up to 3 m/s and representative temperature inversions.
- The 10<sup>th</sup> percentile methodology was used, whereby noise levels were predicted for a number of representative meteorological conditions experienced at the site and the 10<sup>th</sup> percentile exceedance level reported. Consistent with the approved Mount Pleasant Operation, a pro-active and reactive noise management system is proposed to be implemented for the Mount Pleasant Operation incorporating the Modification, to maintain compliance with the relevant noise criteria.
- Review of previous noise assessments, including previously proposed mitigation measures and noise management commitments, informed the modelling conducted for the Modification, which included:
  - positioning mobile equipment during the evening and night-time periods to optimise the shielding provided by the Eastern Out of Pit Emplacement for receivers to the south-east and east;
  - the use of “low noise” noise attenuated mobile fleet and contemporary technology fixed plant; and
  - implementation of a pro-active and reactive noise management system that would modify operations during adverse meteorological conditions in order to maintain compliance with relevant criteria.
- The potential frequency that noise mitigation may need to be employed has been considered and MACH Energy has confirmed these controls can be accommodated in the Modification schedule.
- With the above controls in place, no exceedances of Development Consent DA 92/97 noise criteria are predicted, with the exception of receiver 136. Investigation into this receiver indicates this dwelling should have been afforded acquisition upon request rights in Development Consent DA 92/97 based on previous predictions for neighbouring properties.
- While the Modification does not result in any exceedances of the criteria in Development Consent DA 92/97 (excluding receiver 136), the detailed review of previous assessments and contemporary dwelling verification investigation has highlighted the need for some updates to the noise criteria and land subject to acquisition or mitigation upon request in Tables 1, 2 and 3 of Development Consent DA 92/97.

- Suggested replacement tables for noise criteria and land subject to acquisition or mitigation upon request to be included in an updated Development Consent for the Mount Pleasant Operation are provided as Tables 5-4, 5-5 and 5-6 of this report.
- Based on the above, the Modification would not materially change the approved noise envelope of the Mount Pleasant Operation.

## 9.2 Vacant Land Assessment

- A vacant land assessment was conducted in accordance with the contemporary *Voluntary Land Acquisition and Mitigation Policy*.
- The vacant land assessment was based on noise contours generated for the evening period where noise levels are predicted to be higher. To be conservative, those contours were assessed against the more stringent night time vacant land assessment criteria and no correction was applied to the contours to account for the fact that the assessment is based on  $L_{Aeq,Period}$  noise levels as opposed to  $L_{Aeq,15min}$  noise levels.
- Based on the conservative methodology described above, no exceedances were found at any privately-owned land for any of the three (3) assessment years.

## 9.3 Cumulative Noise

- Assessment of cumulative impacts was undertaken for all privately-owned receivers potentially impacted by noise from the Mount Pleasant Operation incorporating the Modification and where relevant the Mt Arthur Coal Mine, the Bengalla Mine or the Dartbrook Mine.
- Day, evening and night cumulative noise levels would comply with the cumulative noise criteria at all modelled privately-owned receivers with the pro-active and reactive mitigation measures in place, except for receivers 488a and 488b (two dwellings on the same property), where negligible exceedances ranging between 1 and 2 dB would be expected at night. Those exceedances are predicted to occur from the combined noise generated by the Mt Arthur Coal Mine and the Bengalla Mine, irrespective of whether the Mount Pleasant Operation is active. Noise generated by the Mount Pleasant Operation incorporating the Modification was found not to materially contribute to the cumulative noise levels at receivers 488a and 488b.
- All cumulative noise predictions comply with the cumulative noise acquisition criteria in Development Consent DA 92/97 at modelled privately-owned receivers.

## 9.4 Sleep Disturbance

- $L_{Amax}$  noise levels due to night operations of the Mount Pleasant Operation are predicted to be below the  $L_{A1,1min}$  criterion in Development Consent DA 92/97 at all modelled privately-owned receivers.

## 9.5 Road Transportation Noise

- The Modification comprises an extension to the period of operations at the Mount Pleasant Operation and does not include any additional workforce or deliveries (i.e. no change to approved daily movements).

- Although traffic noise levels are expected to exceed road traffic noise criteria at proximal privately-owned receivers along Wybong Road, the relative increase with the Modification is less than 2 dB. As such, the increase in noise levels due to the Modification represents a minor impact barely perceptible to the average person in accordance with the *RNP*.
- Some road traffic noise impact is expected at some receivers along Kayuga Road. However, all privately-owned receivers along Kayuga Road where road noise exceedances are predicted are already subject to acquisition upon request, due to approved Mount Pleasant Operation operational noise.

## 9.6 Rail Transportation Noise

- The Modification comprises an extension to the period of operations at the Mount Pleasant Operation and does not include any change to approved average or maximum daily train movements.
- Review of existing/approved/proposed rail movements on the Ulan Line (from the Mount Pleasant Operation rail spur to the Muswellbrook junction) indicates that the proposed rail movements associated with the Modification would result in increases in noise levels of less than 0.5 dB. As such, the potential rail noise impact associated with the Modification does not warrant further consideration in accordance with the *R/NG*.

## 9.7 Blasting

- The Modification does not include any extension to the approved Mount Pleasant Operation open cut pits, however potential blast designs were assessed to confirm management measures required.
- Blast MIC would be varied as required to maintain compliance with the human comfort overpressure limit of 115 dBL at proximal privately-owned receivers. The proposed maximum blast MIC of 1,600 kg would need to be reduced when blasting within 2,260 m of privately-owned receivers. For blasts closer than 2,260 m, trial blasting should be used to determine a site-specific site law to more accurately predict noise and vibration levels for the specific conditions applying in the area. This should be used to inform blast design so that the human comfort criteria are not exceeded.
- Blast MIC would be varied as required to maintain compliance with the Development Consent DA 92/97 vibration criterion of 10 mm/s for historic heritage sites that would be conserved in situ (most historic heritage sites would be managed, e.g. demolished, prior to blasting in close proximity). The proposed maximum blast MIC of 1,600 kg would need to be reduced when blasting within 1,010 m of historic heritage sites. Trial blasts using smaller MIC should be carried out before conducting normal size blasts at a distance of, and closer than 1,010 m of any historic heritage site to ensure no exceedance of the ground vibration criterion occurs.
- No exceedances of the relevant vibration criterion in Development Consent DA 92/97 are predicted when blasting more than 330 m from public infrastructure. The proposed maximum blast MIC of 1,600 kg would be reduced when blasting within 330 m of public infrastructure. Trial blasts using smaller MIC should be carried out before conducting normal size blasts at a distance of, and closer than 330 m of any public infrastructure to ensure no exceedance of the ground vibration criterion occurs.

## 10 REFERENCES

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# APPENDIX A

## GLOSSARY OF TERMS & DEFINITIONS

## GLOSSARY OF TERMS & DEFINITIONS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

**Maximum Noise Level ( $L_{Amax}$ )** – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

**$L_{A1}$**  – The  $L_{A1}$  level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the  $L_{A1}$  level for 99% of the time.

**$L_{A10}$**  – The  $L_{A10}$  level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the  $L_{A10}$  level for 90% of the time. The  $L_{A10}$  is a common noise descriptor for environmental noise and road traffic noise.

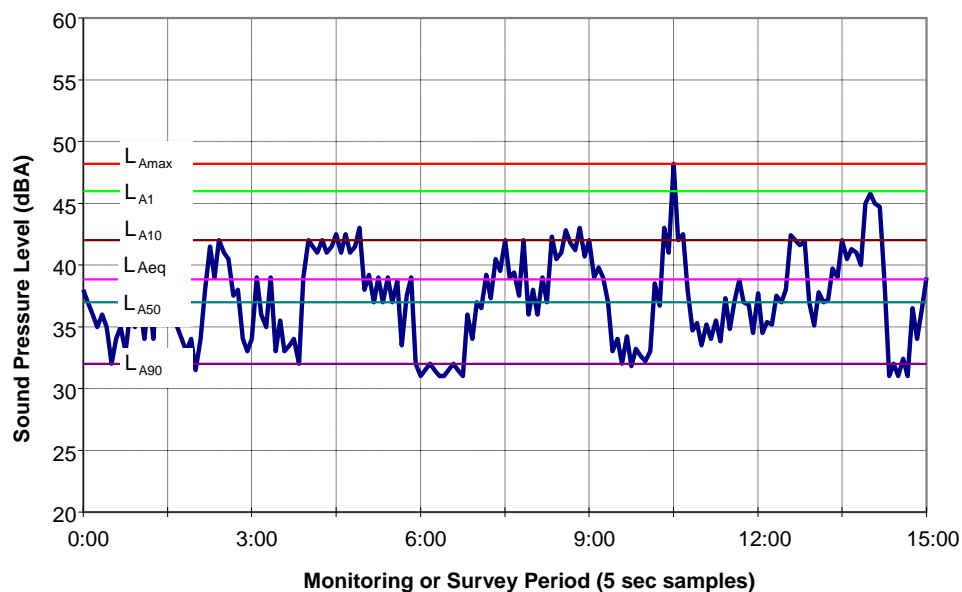
**$L_{A90}$**  – The  $L_{A90}$  level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the  $L_{A90}$  level for 10% of the time. This measure is commonly referred to as the background noise level.

**$L_{Aeq}$**  – The equivalent continuous sound level ( $L_{Aeq}$ ) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

**ABL** – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10<sup>th</sup> percentile (lowest 10<sup>th</sup> percent) background level ( $L_{A90}$ ) for each period.

**RBL** – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time





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## APPENDIX B

### NOISE SENSITIVE RECEIVERS

**Table B-1 Privately Owned Dwellings**

Receiver ID	NAG	Landholders	Easting	Northing
4	9	JR SCRIVEN	299202	6425195
19	8	DP ENGLEBRECHT	299120	6426779
20	8	KB & JA BARNETT	298866	6426826
21	8	MJ MCGOLDRICK	298804	6426823
23	8	JABETIN PTY LTD	299047	6427361
35	8	C HORNE	299980	6428580
35b	8	C HORNE	299986	6428649
43	1	JB MOORE	292318	6429012
44	1	JB MOORE	291384	6428700
45	1	BA & TE STRACHAN	291263	6428277
47	1	BL & ML BATES	291276	6429615
67	7	JM SIMPSON	299896	6429202
68	7	RK & NV GOOGE	299976	6429057
74	7	N & M SORMAZ	300003	6429277
77	7	DM PURSER	300332	6429501
79	7	DW ADNUM	300572	6429448
80	7	WJ ADNUM	300556	6429470
82	8	CK BIRCH	301020	6429170
83	7	LG & CM KELMAN	300956	6429298
84	8	GE PITMAN	300800	6429358
84b	n/a	GE PITMAN	291180	6437472
86	7	COWTIME INVESTMENTS PTY LTD	300342	6429734
86b	6	COWTIME INVESTMENTS PTY LTD	301865	6431879
96	7	RP GRAY	299879	6430321
102	7	AJPS MATHER	299829	6430440
108	7	JS GIBSON	299715	6430470
112	7	BD BARRY	299566	6430447
118	7	JM & CA HAYES	299655	6430627
120	7	DL & PA MOORE	299721	6430731
120c	7	DL & PA MOORE	299698	6430741
121	7	C & JM MOORE	299656	6430778
136	3	DG YORE	300336	6432453
139	3	RW & LP UPTON	300659	6432952
140	3	DAPKOS PTY LTD	300978	6433030
140c	6	DAPKOS PTY LTD	301236	6431474
143	3	JS & NM LONERGAN	299928	6434457
147	3	MJ & RG ADNUM	299165	6434674
153	3	GM CASEY	295898	6435444
154	3	PD & F STANDING	298537	6435520
156	3	JE & JL LONERGAN	298882	6435173
157	3	RB PARKINSON	298965	6434977
161	3	JS & NM LONERGAN	299209	6435244
158	3	JM HOATH	299063	6435063
159	3	JE & MS DUCEY	299127	6435011
169	4	L GREENSILL and J WATTUS	298868	6436638

Receiver ID	NAG	Landholders	Easting	Northing
171	4	L GREENSILL and J WATTUS	299038	6436955
172	4	RL & CE THOMPSON	299157	6437224
173	4	TL KING and JA WARD	298878	6437773
174	4	TJ & ML POWER	298908	6437676
175	4	TJ & ML POWER	298928	6437622
176	4	JAF & LA ALLAN	298988	6437509
177	4	FW & HM & SA WHEATLEY	298731	6438046
178	4	PA NEELY	299347	6438053
179	4	FW WHEATLEY	299191	6438159
180	4	F.A. WHEATLEY & SON PTY LTD	299230	6438233
180b	4	F.A. WHEATLEY & SON PTY LTD	299562	6438055
180c	n/a	F.A. WHEATLEY & SON PTY LTD	299444	6438872
181	4	K.L. & H.R. DAY PTY LTD	300474	6437756
181c	4	K.L. & H.R. DAY PTY LTD	300023	6437409
182	5	JG & AJ SADLER	300849	6437839
182b	5	JG & AJ SADLER	300843	6437724
189	5	OB O'BRIEN	301236	6434698
190	5	OB O'BRIEN	301113	6434682
191	5	JA & JE FIBBINS	301421	6434533
192	5	IG & CW INGLE	301290	6434531
193	5	GM & KL SMITH	301529	6434365
193c	5	GM & KL SMITH	302406	6433964
194	5	TC & JBA HARRIS	302021	6433456
195	5	T & RK YOUNG	302121	6432949
196	n/a	T & RK YOUNG	302234	6432240
197	5	T & RK YOUNG	302117	6432365
195d	5	T & RK YOUNG	302170	6432128
198	6	TJ & NP GOLDRICK	301994	6431847
199	6	NA BURLING	302094	6431842
200	5	R EASTON	302258	6431847
202	6	DN RAPHAEL	301546	6431292
204	6	DN RAPHAEL	301940	6431205
203	6	RF & MA MILLARD	301451	6431324
206	8	WJ HARDES	299806	6427069
207	8	SW & KL BARKLEY	299389	6426888
207b	8	SW & KL BARKLEY	299537	6426696
212	8	DR & CJ TUBB	299568	6426381
212b	8	DR & CJ TUBB	299544	6426341
213	8	ENGLEBRECHT RACING STABLES PTY LTD	299175	6426554
214	8	AL THOMSON-WEIR and RC WEIR	299183	6426574
215	8	WJ & CB MCINTOSH	299184	6426607
216	8	NJ KEEVERS	299187	6426634
217	8	RRA FARNSWORTH	299192	6426663
218	8	SY JOHNSON	299137	6426583
219	8	GL & KL ANDREWS	299139	6426600
220	8	RA BYRNES and MA MOLLER	299144	6426635

Receiver ID	NAG	Landholders	Easting	Northing
221	8	TD BARRON	299150	6426680
222	8	ML & EA SWEENEY	299154	6426716
223	8	MC & LJ DOBIE	299125	6426722
224	8	DL ROBINSON	299097	6426732
225	8	MR CRANFIELD and JR GLEESON	299204	6426692
249	10	TW ROOTS	290948	6423468
252	1	RM & KF MERRICK	289457	6424899
252b	1	RM & KF MERRICK	289575	6424546
257	1	PG & CM LANE	291302	6426071
258a	1	NJ & RY ELLIS	291000	6426441
258b	1	NJ & RY ELLIS	290584	6426756
259	1	MR PEEL	290868	6426152
260	1	PSJ MURRAY	291002	6426002
261	1	PR ELLIS	290650	6425665
266	1	RB PARKINSON	289024	6427910
267	1	JE & JL LONERGAN	289455	6428815
271	2	DE KILGANNON and DS MACDOUGALL	289009	6434418
272	2	GC SPARRE	290603	6433696
272b	2	GC SPARRE	290597	6433720
273	2	IJ & CM RICHARDS	289237	6435180
283	9	SRP & RF RAY	299633	6425990
288	8	LA & JM WEBSTER	300479	6427545
288b	8	LA & JM WEBSTER	300493	6427559
289	8	RA & EA LAWMAN	300328	6428692
292	10	GR & MK WALSH	290611	6422527
296a	11	JM WILD	291746	6422103
296b	11	JM WILD	291623	6422133
298	11	MG & LJ LATHAM	291487	6421945
300	11	MG & LJ LATHAM	291365	6421702
302a	11	MJ & MJ DUNCAN	290914	6421267
302b	11	MJ & MJ DUNCAN	290695	6421456
302c	11	MJ & MJ DUNCAN	290718	6421463
310	4	RL & CE THOMPSON	299130	6437280
311	5	GM & KL SMITH	301388	6434419
401	n/a	JL & DG DAY	289649	6437858
402	n/a	PC BRITTAN	290201	6438459
407	n/a	AD LONERGAN	291736	6437533
413a	n/a	MJH LUMBY	288634	6436895
413b	n/a	MJH LUMBY	288465	6437096
415	n/a	SJ FRANKLAND	288448	6436265
416	n/a	RV MITCHELL	287602	6434882
417	n/a	M & JA CASTELLANA	288300	6435593
418	n/a	PB WATTS	287814	6435336
419	n/a	KM BATES and TG WOODS	288703	6436630
421	2	GW RICHARDS	289314	6435713
422a	n/a	ME DANIELS	297505	6438903

Receiver ID	NAG	Landholders	Easting	Northing
422b	n/a	ME DANIELS	297482	6438920
434	n/a	GJ & RL JONES	299588	6438940
436	4	MEDEGATE PTY LTD	299863	6438778
437	4	BG & S CANVIN	299729	6438830
453a	n/a	SC & ME DEVER	288345	6434693
453b	n/a	SC & ME DEVER	288307	6434751
454	n/a	AP & PE MCMANUS	287912	6434470
456	n/a	GT KEAST	286641	6434111
458	n/a	HJ WRIGHT	288254	6433349
462a	n/a	SH JENNAR	286648	6429789
462b	n/a	SH JENNAR	286662	6429918
463	n/a	IV & CA INGOLD	286574	6429559
464	1	KL BALMER and JL SMITH	289097	6428232
465	n/a	FN & WL GOOGE	288366	6427931
466	1	GT MCNEILL	289103	6426847
467	1	MWJ & LC WALTON	290367	6427991
468a	n/a	S.R. & J.W. LAWSON (LINDISFARNE) PTY LTD	288665	6422488
468b	n/a	S.R. & J.W. LAWSON (LINDISFARNE) PTY LTD	288416	6422514
468c	n/a	S.R. & J.W. LAWSON (LINDISFARNE) PTY LTD	288743	6422667
470	n/a	JI & PJ BROWN	289351	6423345
471	n/a	PJ BROWN	289165	6423423
472a	n/a	JDM MARKHAM	289360	6423043
472b	n/a	JDM MARKHAM	289390	6423191
474	n/a	AA & BT MEYER	289062	6422372
475	11	EJ & CA DENTON	290869	6421541
476	n/a	LA & CA MACPHERSON	289424	6420978
477a	11	MW TURNER	290064	6421064
477b	11	MW TURNER	290021	6421067
481	n/a	RL WILKS	288731	6420218
482	n/a	DJ PHILLIPS	288291	6420169
483	n/a	RW JONES	287961	6420256
484	n/a	TR & KM PAULSEN	288865	6419989
485a	n/a	PR & M BURGMANN	288070	6419004
485b	n/a	PR & M BURGMANN	288065	6419050
485c	n/a	PR & M BURGMANN	287991	6419081
485d	n/a	PR & M BURGMANN	287936	6419095
485e	n/a	PR & M BURGMANN	287940	6419101
487a	11	E RANKIN	292323	6421876
487b	11	E RANKIN	292203	6422343
488a	n/a	E & WJ RANKIN	292981	6421910
488b	10	E & WJ RANKIN	292667	6422644
526	7	DL Wicks	300537	6429477
527	8	DJ & GH CORK	300600	6428695
528	8	AS CHICK	300622	6428693
529	8	TH HAMILTON and AM SMITH	300641	6428693
530	8	SC & NJ BULLARD and JM HARRISON	300678	6428689

Receiver ID	NAG	Landholders	Easting	Northing
531	8	GJ & EA MUNZENBERGER	300678	6428670
532	8	VL ROSE	300677	6428649
533	8	MJ BROWN	300673	6428627
534	8	EE MARKS	300673	6428611
535	8	GL & DN HORTON	300665	6428593
536	8	LJ CUMMINS	300665	6428573
537	8	TJ D'HERVILLE	300664	6428556
538	8	KD POWER and T VERO	300511	6427651
539	8	PH CURTAIN and CA SINGLETON	300540	6427645
541	8	JG HINDER and VG MATHEWS	300560	6427606
542	8	PE & GJ CHAPMAN	300550	6427597
543	8	KD CLOSE	300534	6427590
544	8	DS & RM NEWTON	300523	6427578
545	8	JA GREEN	300509	6427568
547	5	LA & FK & G BRYANT	302122	6433354

**Table B-2 Generic Privately Owned Dwellings**

Receiver ID	NAG	Landholder	Easting	Northing
286c	8	MUSWELLBROOK SHIRE COUNCIL	299871	6426726

**Table B-3 Generic Privately Owned Dwellings**

Receiver ID	NAG	Township	Easting	Northing
A	n/a	Muswellbrook	302102	6430586
B	6	Muswellbrook	301213	6429518
C	8	Muswellbrook	300746	6428837
D	8	Muswellbrook	300102	6427193
E	8	Muswellbrook	299763	6426870
F	8	Muswellbrook	300871	6428333
G	8	Muswellbrook	300716	6427800
H	6	Muswellbrook	301710	6430134
I	4	Aberdeen	300579	6437917
J	6	Muswellbrook	301420	6429816
K	8	Muswellbrook	301411	6428853
L	8	Muswellbrook	301463	6429196
M	8	Muswellbrook	301381	6428637

**Table B-4 Mine Owned Dwellings**

Receiver ID	Landholders	Easting	Northing
1aa	COAL & ALLIED OPERATIONS PTY LTD*	297760	6434394
1ab	COAL & ALLIED OPERATIONS PTY LTD*	299084	6434398
1ac	COAL & ALLIED OPERATIONS PTY LTD*	299171	6427655
1ad	COAL & ALLIED OPERATIONS PTY LTD*	293038	6436801
1ae	COAL & ALLIED OPERATIONS PTY LTD*	298783	6428442
1af	COAL & ALLIED OPERATIONS PTY LTD*	299585	6428763
1ag	COAL & ALLIED OPERATIONS PTY LTD*	299664	6428876

Receiver ID	Landholders	Easting	Northing
1ah	COAL & ALLIED OPERATIONS PTY LTD*	299928	6429225
1ai	COAL & ALLIED OPERATIONS PTY LTD*	299941	6429237
1aj	COAL & ALLIED OPERATIONS PTY LTD*	299957	6429246
1ak	COAL & ALLIED OPERATIONS PTY LTD*	299970	6429257
1al	COAL & ALLIED OPERATIONS PTY LTD*	299984	6429267
1am	COAL & ALLIED OPERATIONS PTY LTD*	300113	6429779
1an	COAL & ALLIED OPERATIONS PTY LTD*	299662	6429937
1ao	COAL & ALLIED OPERATIONS PTY LTD*	299585	6430014
1ap	COAL & ALLIED OPERATIONS PTY LTD*	299957	6430106
1aq	COAL & ALLIED OPERATIONS PTY LTD*	299951	6430122
1ar	COAL & ALLIED OPERATIONS PTY LTD*	299932	6430141
1as	COAL & ALLIED OPERATIONS PTY LTD*	299935	6430177
1at	COAL & ALLIED OPERATIONS PTY LTD*	299909	6430242
1au	COAL & ALLIED OPERATIONS PTY LTD*	299892	6430283
1av	COAL & ALLIED OPERATIONS PTY LTD*	299868	6430351
1aw	COAL & ALLIED OPERATIONS PTY LTD*	299796	6430380
1ax	COAL & ALLIED OPERATIONS PTY LTD*	299851	6430393
1ay	COAL & ALLIED OPERATIONS PTY LTD*	299812	6430453
1az	COAL & ALLIED OPERATIONS PTY LTD*	299792	6430458
1ba	COAL & ALLIED OPERATIONS PTY LTD*	299775	6430463
1h	COAL & ALLIED OPERATIONS PTY LTD*	299751	6430465
1i	COAL & ALLIED OPERATIONS PTY LTD*	299682	6430469
1j	COAL & ALLIED OPERATIONS PTY LTD*	299662	6430475
1k	COAL & ALLIED OPERATIONS PTY LTD*	299624	6430483
1l	COAL & ALLIED OPERATIONS PTY LTD*	299647	6430484
1m	COAL & ALLIED OPERATIONS PTY LTD*	299491	6430502
1n	COAL & ALLIED OPERATIONS PTY LTD*	299591	6430533
1o	COAL & ALLIED OPERATIONS PTY LTD*	291505	6430779
1p	COAL & ALLIED OPERATIONS PTY LTD*	299901	6430903
1q	COAL & ALLIED OPERATIONS PTY LTD*	299508	6431522
1r	COAL & ALLIED OPERATIONS PTY LTD*	298205	6432838
1s	COAL & ALLIED OPERATIONS PTY LTD*	298547	6432870
1t	COAL & ALLIED OPERATIONS PTY LTD*	296360	6432912
1u	COAL & ALLIED OPERATIONS PTY LTD*	296125	6432941
1v	COAL & ALLIED OPERATIONS PTY LTD*	296249	6432975
1w	COAL & ALLIED OPERATIONS PTY LTD*	297943	6432993
1x	COAL & ALLIED OPERATIONS PTY LTD*	297436	6433106
1y	COAL & ALLIED OPERATIONS PTY LTD*	296351	6433138
1z	COAL & ALLIED OPERATIONS PTY LTD*	299218	6434300
2aa	BENGALLA MINING COMPANY PTY LTD	298331	6426589
2ab	BENGALLA MINING COMPANY PTY LTD	298490	6426604
2ac	BENGALLA MINING COMPANY PTY LTD	297160	6426689
2ad	BENGALLA MINING COMPANY PTY LTD	298534	6426700
2ae	BENGALLA MINING COMPANY PTY LTD	297138	6426742
2af	BENGALLA MINING COMPANY PTY LTD	298640	6426782
2ah	BENGALLA MINING COMPANY PTY LTD	298721	6426869



Receiver ID	Landholders	Easting	Northing
2ai	BENGALLA MINING COMPANY PTY LTD	297630	6426965
2aj	BENGALLA MINING COMPANY PTY LTD	298760	6427327
2ak	BENGALLA MINING COMPANY PTY LTD	297826	6427710
2al	BENGALLA MINING COMPANY PTY LTD	297792	6427732
2b	BENGALLA MINING COMPANY PTY LTD	297852	6427737
2c	BENGALLA MINING COMPANY PTY LTD	300562	6428120
2d	BENGALLA MINING COMPANY PTY LTD	300480	6428149
2e	BENGALLA MINING COMPANY PTY LTD	298361	6428430
2f	BENGALLA MINING COMPANY PTY LTD	297839	6428516
2g	BENGALLA MINING COMPANY PTY LTD	297798	6428624
2h	BENGALLA MINING COMPANY PTY LTD	297465	6428703
2i	BENGALLA MINING COMPANY PTY LTD	299426	6428718
2j	BENGALLA MINING COMPANY PTY LTD	297292	6428728
2k	BENGALLA MINING COMPANY PTY LTD	297649	6428770
2l	BENGALLA MINING COMPANY PTY LTD	297486	6428841
2m	BENGALLA MINING COMPANY PTY LTD	292759	6429036
2n	BENGALLA MINING COMPANY PTY LTD	293017	6423526
2o	BENGALLA MINING COMPANY PTY LTD	292327	6423973
2p	BENGALLA MINING COMPANY PTY LTD	292261	6423976
2q	BENGALLA MINING COMPANY PTY LTD	292187	6424053
2r	BENGALLA MINING COMPANY PTY LTD	292257	6424062
2s	BENGALLA MINING COMPANY PTY LTD	292211	6424104
2t	BENGALLA MINING COMPANY PTY LTD	293595	6424750
2u	BENGALLA MINING COMPANY PTY LTD	294390	6425005
2v	BENGALLA MINING COMPANY PTY LTD	294658	6425080
2w	BENGALLA MINING COMPANY PTY LTD	291605	6425845
2x	BENGALLA MINING COMPANY PTY LTD	298374	6426394
2y	BENGALLA MINING COMPANY PTY LTD	298380	6426499
2z	BENGALLA MINING COMPANY PTY LTD	298456	6426569
3a	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301401	6434809
3b	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301340	6434861
3c	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	299283	6435042
3d	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301334	6435087
3e	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301328	6435119
3f	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301318	6435356
3g	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	299242	6435789
3i	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	300387	6436168
3j	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	301316	6436179
3k	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	298996	6436300
3l	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297899	6436391
3m	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297973	6436398
3n	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	299587	6436753
3o	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297890	6436905
3p	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297515	6436960
3q	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297714	6436969
3r	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297666	6438671

Receiver ID	Landholders	Easting	Northing
3s	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	297229	6438705
5	COAL OPERATIONS AUSTRALIA LTD	299157	6425521
5aa	COAL OPERATIONS AUSTRALIA LTD	299058	6424990
5ab	COAL OPERATIONS AUSTRALIA LTD	299687	6425010
5ac	COAL OPERATIONS AUSTRALIA LTD	299155	6425038
5ad	COAL OPERATIONS AUSTRALIA LTD	299776	6425222
5ae	COAL OPERATIONS AUSTRALIA LTD	298482	6426106
5f	COAL OPERATIONS AUSTRALIA LTD	298437	6426197
5g	COAL OPERATIONS AUSTRALIA LTD	298396	6426283
5h	COAL OPERATIONS AUSTRALIA LTD	289883	6421305
5i	COAL OPERATIONS AUSTRALIA LTD	291557	6421390
5j	COAL OPERATIONS AUSTRALIA LTD	289652	6421415
5k	COAL OPERATIONS AUSTRALIA LTD	291647	6421569
5l	COAL OPERATIONS AUSTRALIA LTD	291885	6422030
5m	COAL OPERATIONS AUSTRALIA LTD	293829	6422109
5n	COAL OPERATIONS AUSTRALIA LTD	290201	6422253
5o	COAL OPERATIONS AUSTRALIA LTD	290884	6422545
5p	COAL OPERATIONS AUSTRALIA LTD	293237	6422604
5q	COAL OPERATIONS AUSTRALIA LTD	294513	6422770
5r	COAL OPERATIONS AUSTRALIA LTD	295707	6423944
5s	COAL OPERATIONS AUSTRALIA LTD	295980	6424187
5t	COAL OPERATIONS AUSTRALIA LTD	296636	6424340
5u	COAL OPERATIONS AUSTRALIA LTD	297868	6424610
5v	COAL OPERATIONS AUSTRALIA LTD	290216	6424813
5w	COAL OPERATIONS AUSTRALIA LTD	290173	6424829
5x	COAL OPERATIONS AUSTRALIA LTD	290260	6424898
5y	COAL OPERATIONS AUSTRALIA LTD	298996	6424939
5z	COAL OPERATIONS AUSTRALIA LTD	299118	6424976
7	COAL OPERATIONS AUSTRALIA LTD	298474	6426128
7b	MUSWELLBROOK COAL COMPANY LTD	287608	6421748
7c	MUSWELLBROOK COAL COMPANY LTD	287636	6421806
7d	MUSWELLBROOK COAL COMPANY LTD	288584	6426059
7e	MUSWELLBROOK COAL COMPANY LTD	287898	6427950
7f	MUSWELLBROOK COAL COMPANY LTD	286867	6428574
7g	MUSWELLBROOK COAL COMPANY LTD	287944	6432756
7h	MUSWELLBROOK COAL COMPANY LTD	288913	6434308
7i	MUSWELLBROOK COAL COMPANY LTD	288166	6434615
7j	MUSWELLBROOK COAL COMPANY LTD	289298	6434616
7k	MUSWELLBROOK COAL COMPANY LTD	289566	6436695
8a	MANGOOLA COAL OPERATIONS PTY LTD	286721	6420297
8b	MANGOOLA COAL OPERATIONS PTY LTD	286950	6420594
8c	MANGOOLA COAL OPERATIONS PTY LTD	286885	6420606
8d	MANGOOLA COAL OPERATIONS PTY LTD	287322	6421776
8e	MANGOOLA COAL OPERATIONS PTY LTD	286763	6422241
8f	MANGOOLA COAL OPERATIONS PTY LTD	287200	6425415
8g	MANGOOLA COAL OPERATIONS PTY LTD	287670	6427813

Receiver ID	Landholders	Easting	Northing
8h	MANGOOLA COAL OPERATIONS PTY LTD	287584	6427890
8i	MANGOOLA COAL OPERATIONS PTY LTD	286574	6428569
101	MACH ENERGY AUSTRALIA PTY LTD	299841	6430413
107	COAL & ALLIED OPERATIONS PTY LTD*	299733	6430469
129	COAL & ALLIED OPERATIONS PTY LTD*	298060	6432528
130	COAL & ALLIED OPERATIONS PTY LTD*	298497	6432215
135	COAL & ALLIED OPERATIONS PTY LTD*	299992	6432182
231	COAL & ALLIED OPERATIONS PTY LTD*	300494	6429496
246	BENGALLA MINING COMPANY PTY LTD	292872	6423435
263	COAL & ALLIED OPERATIONS PTY LTD*	291463	6427224
211	COAL OPERATIONS AUSTRALIA LTD	299511	6426190
274	MUSWELLBROOK COAL COMPANY LTD	288803	6435159
299	COAL OPERATIONS AUSTRALIA LTD	291514	6421734
309	COAL & ALLIED OPERATIONS PTY LTD*	299946	6432340

\* The ownership of this land is subject to the acquisition of the Mount Pleasant Operation by MACH Energy Australia Pty Ltd.

**Table B-5 Commercial Receivers**

Receiver ID	Landholders	Easting	Northing
2ag	BENGALLA MINING COMPANY PTY LTD	298505	6426785
3h	ANGLO COAL (DARTBROOK MANAGEMENT) PTY LTD	298907	6435815
5e	COAL OPERATIONS AUSTRALIA LTD	298433	6426136
6	MUSWELLBROOK RACE CLUB LTD	298605	6426135
83b	LG & CM KELMAN	300909	6429329
183	K.L. & H.R. DAY PTY LTD	300857	6437446
195e	T & RK YOUNG	302034	6432899
205	DAPKOS PTY LTD	301126	6431439
208	FK & WDG ALMOND and PW HUME	299174	6426781
212c	DR & CJ TUBB	299539	6426270
280	MONADELPHOUS PROPERTIES PTY LTD	299773	6426105
281	JR & JA BUCKLEY	299691	6426050
282	JE ANDERSON and KL & J CAMPBELL and MV & DJ & SE & TP HALLETT	299620	6425915
285	THE NEW SOUTH WALES GREYHOUND BREEDERS OWNERS & TRAINERS ASSOCIATION LTD	300280	6427411
285b	THE NEW SOUTH WALES GREYHOUND BREEDERS OWNERS & TRAINERS ASSOCIATION LTD	300172	6427476
285c	THE NEW SOUTH WALES GREYHOUND BREEDERS OWNERS & TRAINERS ASSOCIATION LTD	300136	6427524
286	MUSWELLBROOK SHIRE COUNCIL	300360	6427448
286d	MUSWELLBROOK SHIRE COUNCIL	300709	6429052
287	TELSTRA CORPORATION LTD	300454	6427537
291	MUSWELLBROOK SHIRE COUNCIL	299972	6426608
305	RH ENGLEBRECHT	299173	6426508
308	DL & PA MOORE	299667	6430746
315	FK & WDG ALMOND and PW HUME	299208	6426836
540	GRENTILL PTY LTD	300569	6427621
546	SJ SCOTT	300302	6427587

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## APPENDIX C

### OPERATIONAL NOISE PREDICTIONS

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
Privately Owned Residential Receivers																	
4	9	27	20	35	36	36	<20	<20	32	34	34	23	<20	34	35	34	39 / 38 / 37
19	8	32	24	40	38 <sup>2</sup>	37 <sup>2</sup>	21	20	36	39	38	26	21	38	39	38	41 / 39 / 39
20	8	33	24	41	39 <sup>2</sup>	37 <sup>2</sup>	21	20	36	39	38	26	21	38	39 <sup>2</sup>	39	41 / 39 / 39
21	8	33	24	41	39 <sup>2</sup>	38 <sup>2</sup>	21	20	36	39	38	26	21	38	39 <sup>2</sup>	39	41 / 39 / 39
23	8	35	26	40 <sup>2</sup>	40 <sup>2</sup>	38 <sup>2</sup>	22	22	37	39 <sup>2</sup>	39	28	22	39	39 <sup>2</sup>	40	40 / 40 / 40
35	8	34	27	41	41	40	26	22	38	41	40	30	23	40	41	39	42 / 41 / 41
35b	8	34	27	41	41 <sup>3</sup>	41 <sup>3</sup>	26	22	38	41 <sup>3</sup>	40 <sup>3</sup>	30	23	40	40 <sup>3</sup>	39	41 / 39 / 39
43	1	32	32	37	42	41	34	32	39	41	40	32	32	37	42	40	Acquisition
44	1	25	25	34	39	38	29	24	36	39	38	25	25	34	39	38	Acquisition
45	1	25	25	31	35	34	28	25	34	35	34	25	25	31	35	34	Acquisition
47	1	23	23	38	41	40	28	22	38	41	40	23	23	37	41	40	Acquisition
67	7	35	27	42	41	40	27	23	39	43	41	31	23	42	40	40	Acquisition
68	7	35	27	42	41	40	27	23	39	41 <sup>2</sup>	41	30	23	41	40	39	43 / 42 / 42
74	7	35	27	41	40	39	26	23	39	41 <sup>2</sup>	41	31	23	42	40	39	43 / 42 / 42
77	7	33	26	40	39	38	28	23	39	40	39	30	23	41	39	38	42 / 41 / 41
79	7	33	25	40	39	38	27	22	38	40	39	29	22	39	39	38	41 / 41 / 41
80	7	33	25	40	39	38	27	22	38	40	39	29	22	40	39	38	41 / 41 / 41
82	8	30	24	38	37	36	26	21	37	39	38	27	21	38	38	37	41 / 39 / 39
83	7	31	24	38	37	36	26	21	37	39 <sup>3</sup>	39 <sup>3</sup>	28	21	38	38 <sup>3</sup>	37	40 / 37 / 37
84	8	32	24	39	38	37	27	22	37	40	39	28	22	39	38	37	40 / 40 / 40
84b	n/a	<20	<20	21	23	22	<20	<20	24	25	24	<20	<20	23	25	24	35 / 35 / 35
86	7	34	26	41	40	39	28	23	39	40	39	30	23	41	40	39	42 / 42 / 42
86b	6	26	21	33	34	34	28	20	37	36	35	25	20	36	36	35	37 / 37 / 37

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018						Year 2021						Year 2025			
		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>					
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
96	7	34	28	43	40	39	31	26	42	37	35	31	24	40	41	39	Acquisition
102	7	34	27	41	38	38	31	26	42	36	34	30	25	39	40	38	Acquisition
108	7	33	27	40	36	35	31	26	43	34	33	30	25	39	41	38	Acquisition
112	7	33	27	39	33	33	30	27	40	34	33	30	25	38	38	36	Acquisition
118	7	33	26	40	36	36	32	27	42	34	33	30	25	38	38	35	Acquisition
120	7	33	26	39	37	37	32	27	42	35	34	29	25	38	38	35	Acquisition
120c	7	33	25	39	37	37	32	27	42	35	34	29	25	38	38	35	Acquisition
121	7	33	25	39	37	37	32	27	42	34	33	30	25	37	37	34	Acquisition
136	3	26	23	36 <sup>3</sup>	37 <sup>3</sup>	37 <sup>3</sup>	34	25	41 <sup>3</sup>	41 <sup>3</sup>	40 <sup>3</sup>	30	25	39 <sup>3</sup>	41 <sup>3</sup>	40 <sup>3</sup>	35 / 35 / 35
139	3	24	22	33	34	34	29	24	38	34	33	27	24	35	37	36	40 / 40 / 40
140	3	24	21	34	35	35	29	23	37 <sup>3</sup>	36 <sup>3</sup>	36 <sup>3</sup>	26	23	35	36 <sup>3</sup>	36 <sup>3</sup>	35 / 35 / 35
140c	6	27	22	35	36	36	30	22	39 <sup>3</sup>	37	36	27	21	38 <sup>3</sup>	38 <sup>3</sup>	37	37 / 37 / 37
143	3	<20	<20	29	31	31	27	21	39	40	40	24	21	37	38	38	Acquisition
147	3	<20	<20	28	31	31	25	<20	38	37	37	22	20	37	39	39	Acquisition
153	3	<20	<20	32	34	33	25	20	38	39	38	23	20	37	39	38	Acquisition
154	3	<20	<20	29	31	31	26	20	39	38	38	22	20	36	38	38	40 / 40 / 40
156	3	<20	<20	29	31	31	26	20	38	39	39	22	20	37	39	39	Acquisition
157	3	<20	<20	29	32	32	25	<20	39	41	41	21	<20	37	40	40	Acquisition
158	3	<20	<20	29	31	31	26	20	38	40	40	22	20	36	38	38	Acquisition
159	3	<20	<20	29	31	31	25	<20	39	40	40	21	<20	36	38	38	Acquisition
161	3	<20	<20	28	31	31	26	20	38	39	39	22	20	36	38	38	Acquisition
169	4	<20	<20	24	26	26	21	<20	34	33	33	<20	<20	30	30	30	36 / 36 / 36
171	4	<20	<20	26	27	27	21	<20	34	33	33	<20	<20	31	32	32	35 / 35 / 35
172	4	<20	<20	27	28	28	21	<20	33	33	33	<20	<20	31	32	32	35 / 35 / 35

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
173	4	<20	<20	26	27	27	<20	<20	32	31	31	<20	<20	30	31	31	35 / 35 / 35
174	4	<20	<20	26	27	27	<20	<20	32	32	32	<20	<20	30	31	31	35 / 35 / 35
175	4	<20	<20	26	27	27	<20	<20	32	32	32	<20	<20	30	31	31	35 / 35 / 35
176	4	<20	<20	26	26	26	20	<20	32	32	32	<20	<20	29	31	31	35 / 35 / 35
177	4	<20	<20	24	25	25	<20	<20	31	31	31	<20	<20	28	29	29	35 / 35 / 35
178	4	<20	<20	26	26	26	<20	<20	31	31	31	<20	<20	30	30	30	35 / 35 / 35
179	4	<20	<20	26	26	26	<20	<20	31	30	30	<20	<20	30	30	30	35 / 35 / 35
180	4	<20	<20	25	26	26	<20	<20	31	30	30	<20	<20	29	30	30	35 / 35 / 35
180b	4	<20	<20	25	26	26	<20	<20	31	30	30	<20	<20	29	30	30	35 / 35 / 35
180c	n/a	<20	<20	25	25	25	<20	<20	29	29	29	<20	<20	28	29	29	35 / 35 / 35
181	4	<20	<20	26	27	27	20	<20	31	31	31	<20	<20	30	30	31	35 / 35 / 35
181c	4	<20	<20	26	27	27	21	<20	32	32	32	<20	<20	30	31	32	35 / 35 / 35
182	5	<20	<20	25	26	26	20	<20	30	30	30	<20	<20	29	30	30	41 / 40 / 39
182b	5	<20	<20	25	26	26	20	<20	30	30	30	<20	<20	29	30	30	41 / 40 / 39
189	5	<20	<20	27	29	29	27	20	35	35	35	23	20	33	34	34	41 / 40 / 39
190	5	<20	<20	27	29	29	27	20	35	36	36	23	20	33	34	34	41 / 40 / 39
191	5	<20	<20	27	29	29	27	20	35	35	35	23	20	33	34	34	41 / 40 / 39
192	5	<20	<20	27	29	29	27	20	35	35	35	23	20	33	34	34	41 / 40 / 39
193	5	<20	<20	28	29	29	26	<20	34	35	35	22	<20	33	33	33	41 / 40 / 39
193c	5	20	<20	30	30	30	25	<20	32	34	33	22	<20	32	32	32	41 / 40 / 39
194	5	21	<20	31	32	32	25	<20	34	34	34	22	<20	33	34	34	41 / 40 / 39
195	5	22	<20	32	32	32	26	20	35	36	36	23	20	34	34	34	41 / 40 / 39
195d	n/a	24	20	32	33	33	27	20	36 <sup>3</sup>	36 <sup>3</sup>	35	24	<20	35	34	34	35 / 35 / 35
196	5	24	<20	32	33	33	27	20	36	36	35	24	<20	35	34	34	41 / 40 / 39



Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018						Year 2021						Year 2025			
		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>					
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
197	5	23	<20	32	33	33	27	20	36	36	35	24	20	35	35	34	41 / 40 / 39
198	6	26	20	33	34	34	27	20	37	36	35	25	20	36	35	35	37 / 37 / 37
199	6	25	20	33	34	34	27	20	36	36	35	24	20	35	35	34	37 / 37 / 37
200	5	24	20	32	33	33	27	20	36	35	34	24	<20	35	34	34	41 / 40 / 39
202	6	27	22	35	35	35	29	21	38	36	35	26	21	37	37	36	39 / 39 / 39
203	6	27	22	35	36	35	29	21	38	37	36	27	21	37	37	36	40 / 40 / 40
204	6	26	22	34	35	35	27	20	37	36	35	25	20	36	36	35	38 / 38 / 38
206	8	32	25	39	37 <sup>2</sup>	39	22	20	36	38	37	27	21	38	38	37	41 / 39 / 39
207	8	33	25	40	38 <sup>2</sup>	36 <sup>2</sup>	21	20	36	39	38	27	21	38	39	38	41 / 39 / 39
207b	8	32	24	39	37 <sup>2</sup>	39	21	20	35	38	37	27	20	37	38	37	41 / 39 / 39
212	8	30	23	38	39	38	20	<20	34	37	36	26	20	36	37	36	41 / 39 / 39
212b	8	30	23	37	39	38	20	<20	34	37	36	26	20	36	37	36	41 / 39 / 39
213	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	20	<20	35	38	37	26	20	37	38	37	41 / 39 / 39
214	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	20	20	35	38	37	26	20	37	39	38	41 / 39 / 39
215	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	35	38	37	26	20	37	39	38	41 / 39 / 39
216	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	35	38	37	27	21	37	39	38	41 / 39 / 39
217	8	32	24	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	36	38	37	27	21	37	39	38	41 / 39 / 39
218	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	35	38	37	26	20	37	39	38	41 / 39 / 39
219	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	36	38	37	27	20	37	39	38	41 / 39 / 39
220	8	32	23	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	36	38	37	25	21	37	39	38	41 / 39 / 39
221	8	32	24	39	38 <sup>2</sup>	36 <sup>2</sup>	21	20	36	38	37	26	21	37	39	38	41 / 39 / 39
222	8	32	24	39	38 <sup>2</sup>	36 <sup>2</sup>	21	20	36	39	38	26	21	38	39	38	41 / 39 / 39
223	8	32	24	39	38 <sup>2</sup>	37 <sup>2</sup>	21	20	36	39	38	26	21	38	39	38	41 / 39 / 39
224	8	32	24	40	38 <sup>2</sup>	37 <sup>2</sup>	21	20	36	39	38	26	21	38	39	38	41 / 39 / 39

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
225	8	32	24	39	37 <sup>2</sup>	36 <sup>2</sup>	21	20	36	38	37	27	21	37	39	38	41 / 39 / 39
249	10	<20	<20	26	27	27	<20	<20	25	26	26	<20	<20	25	27	27	35 / 35 / 35
252	1	<20	<20	24	25	25	<20	<20	24	25	25	<20	<20	24	25	25	35 / 35 / 35
252b	1	<20	<20	21	24	24	<20	<20	21	24	24	<20	<20	21	24	24	35 / 35 / 35
257	1	23	22	32	34	34	24	22	32	33	33	23	22	32	34	34	35 / 35 / 35
258a	1	21	21	32	34	34	21	20	31	32	32	22	21	31	33	33	35 / 35 / 35
258b	1	<20	<20	28	30	30	<20	<20	29	30	30	<20	<20	29	30	30	35 / 35 / 35
259	1	21	20	32	33	33	21	20	31	32	32	21	21	31	33	33	39 / 39 / 39
260	1	21	21	32	33	33	21	20	31	32	32	21	21	31	33	33	37 / 37 / 37
261	1	20	20	31	32	32	21	<20	30	31	31	21	20	30	32	32	37 / 37 / 37
266	1	<20	<20	25	30	29	<20	<20	26	30	29	<20	<20	26	30	29	35 / 35 / 35
267	1	<20	<20	30	33	32	<20	<20	30	33	32	<20	<20	30	33	32	35 / 35 / 35
271	2	<20	<20	27	29	28	<20	<20	29	29	28	<20	<20	28	30	29	35 / 35 / 35
272	2	<20	<20	29	32	31	<20	<20	33	32	31	<20	<20	29	32	31	36 / 36 / 36
272b	2	<20	<20	29	32	31	<20	<20	33	32	31	<20	<20	29	32	31	35 / 35 / 35
273	2	<20	<20	27	28	27	<20	<20	29	29	28	<20	<20	27	29	28	35 / 35 / 35
283	9	29	22	36	38	37	<20	<20	34	36	35	25	<20	35	36	35	39 / 38 / 37
288	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
288b	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
289	8	33	26	40	40	39	26	22	38	39 <sup>2</sup>	39	29	22	39	40	39	41 / 40 / 40
292	10	<20	<20	23	25	25	<20	<20	23	25	25	<20	<20	23	25	25	35 / 35 / 35
296a	11	<20	<20	25	27	26	<20	<20	25	26	26	<20	<20	25	27	26	37 / 36 / 35
296b	11	<20	<20	25	27	26	<20	<20	25	26	26	<20	<20	25	27	26	37 / 36 / 35
298	11	<20	<20	25	26	26	<20	<20	25	26	25	<20	<20	25	27	26	37 / 36 / 35

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
300	11	<20	<20	25	26	25	<20	<20	24	26	25	<20	<20	25	26	26	37 / 36 / 35
302a	11	<20	<20	23	25	24	<20	<20	23	25	24	<20	<20	24	26	25	37 / 36 / 35
302b	11	<20	<20	24	25	25	<20	<20	23	25	24	<20	<20	23	25	25	37 / 36 / 35
302c	11	<20	<20	24	25	25	<20	<20	23	25	24	<20	<20	24	25	25	37 / 36 / 35
310	4	<20	<20	27	28	28	20	<20	33	33	33	<20	<20	31	32	32	35 / 35 / 35
311	5	<20	<20	27	29	29	26	20	35	35	35	22	<20	33	34	34	41 / 40 / 39
401	n/a	<20	<20	<20	20	<20	<20	<20	21	23	22	<20	<20	21	23	22	35 / 35 / 35
402	n/a	<20	<20	23	24	23	<20	<20	24	25	24	<20	<20	24	26	25	35 / 35 / 35
407	n/a	<20	<20	20	22	21	<20	<20	22	25	24	<20	<20	21	24	23	35 / 35 / 35
413a	n/a	<20	<20	<20	22	21	<20	<20	<20	21	20	<20	<20	<20	21	20	35 / 35 / 35
413b	n/a	<20	<20	<20	22	21	<20	<20	<20	20	<20	<20	<20	<20	20	<20	35 / 35 / 35
415	n/a	<20	<20	24	26	25	<20	<20	26	26	25	<20	<20	25	27	26	35 / 35 / 35
416	n/a	<20	<20	24	25	24	<20	<20	25	25	24	<20	<20	24	26	25	35 / 35 / 35
417	n/a	<20	<20	<20	21	<20	<20	<20	20	21	<20	<20	<20	<20	20	<20	35 / 35 / 35
418	n/a	<20	<20	24	26	25	<20	<20	25	26	25	<20	<20	24	26	25	35 / 35 / 35
419	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
421	2	<20	<20	26	28	27	<20	<20	28	28	27	<20	<20	27	29	28	35 / 35 / 35
422a	n/a	<20	<20	21	23	23	<20	<20	25	27	27	<20	<20	25	27	27	35 / 35 / 35
422b	n/a	<20	<20	21	23	23	<20	<20	25	27	27	<20	<20	24	27	27	35 / 35 / 35
434	n/a	<20	<20	24	25	25	<20	<20	29	29	29	<20	<20	28	28	28	35 / 35 / 35
436	4	<20	<20	24	25	25	<20	<20	29	29	29	<20	<20	28	29	29	35 / 35 / 35
437	4	<20	<20	25	25	25	<20	<20	29	29	29	<20	<20	28	29	29	35 / 35 / 35
453a	n/a	<20	<20	25	26	25	<20	<20	27	27	26	<20	<20	26	28	27	35 / 35 / 35
453b	n/a	<20	<20	25	26	25	<20	<20	27	27	26	<20	<20	26	28	27	35 / 35 / 35

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
454	n/a	<20	<20	26	27	26	<20	<20	27	27	26	<20	<20	26	28	27	35 / 35 / 35
456	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
458	n/a	<20	<20	27	29	28	20	<20	29	29	28	<20	<20	28	29	28	35 / 35 / 35
462a	n/a	<20	<20	20	24	23	<20	<20	23	24	23	<20	<20	20	24	23	35 / 35 / 35
462b	n/a	<20	<20	20	23	22	<20	<20	23	24	22	<20	<20	21	24	23	35 / 35 / 35
463	n/a	<20	<20	21	25	24	<20	<20	23	25	24	<20	<20	21	25	24	35 / 35 / 35
464	1	<20	<20	24	29	27	<20	<20	26	29	27	<20	<20	24	29	27	35 / 35 / 35
465	n/a	<20	<20	28	30	29	<20	<20	29	30	29	<20	<20	28	30	29	35 / 35 / 35
466	1	<20	<20	<20	20	20	<20	<20	23	20	<20	<20	<20	20	20	<20	35 / 35 / 35
467	1	<20	<20	24	30	28	20	<20	25	29	28	<20	<20	25	29	28	35 / 35 / 35
468a	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
468b	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
468c	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
470	n/a	<20	<20	23	24	24	<20	<20	23	24	24	<20	<20	23	24	24	35 / 35 / 35
471	n/a	<20	<20	23	24	24	<20	<20	23	24	24	<20	<20	23	24	24	35 / 35 / 35
472a	n/a	<20	<20	22	24	24	<20	<20	23	23	23	<20	<20	22	24	24	35 / 35 / 35
472b	n/a	<20	<20	23	24	24	<20	<20	23	24	24	<20	<20	23	24	24	35 / 35 / 35
474	n/a	<20	<20	<20	20	20	<20	<20	<20	20	20	<20	<20	<20	20	20	35 / 35 / 35
475	11	<20	<20	24	25	25	<20	<20	23	25	25	<20	<20	23	25	25	37 / 36 / 35
476	n/a	<20	<20	22	23	23	<20	<20	21	22	22	<20	<20	21	23	22	35 / 35 / 35
477a	11	<20	<20	23	24	24	<20	<20	22	23	23	<20	<20	22	24	24	37 / 36 / 35
477b	11	<20	<20	23	24	24	<20	<20	22	24	23	<20	<20	22	24	24	37 / 36 / 35
481	n/a	<20	<20	21	22	22	<20	<20	20	21	21	<20	<20	21	22	22	35 / 35 / 35
482	n/a	<20	<20	21	22	22	<20	<20	21	22	22	<20	<20	21	22	22	35 / 35 / 35

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
483	n/a	<20	<20	21	22	22	<20	<20	20	21	21	<20	<20	21	22	22	35 / 35 / 35
484	n/a	<20	<20	21	23	22	<20	<20	21	22	22	<20	<20	22	23	23	35 / 35 / 35
485a	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
485b	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
485c	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
485d	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
485e	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	35 / 35 / 35
487a	11	<20	<20	26	27	27	<20	<20	25	27	26	<20	<20	26	28	27	37 / 36 / 35
487b	11	<20	<20	26	28	27	<20	<20	26	27	27	<20	<20	26	28	27	37 / 36 / 35
488a	n/a	<20	<20	27	28	28	<20	<20	26	27	27	<20	<20	27	28	28	35 / 35 / 35
488b	10	<20	<20	27	29	29	<20	<20	27	28	28	<20	<20	28	29	29	35 / 35 / 35
526	7	33	25	40	39 <sup>3</sup>	38 <sup>3</sup>	27	23	38	40 <sup>3</sup>	39 <sup>3</sup>	29	22	40	39 <sup>3</sup>	38 <sup>3</sup>	40 / 37 / 37
527	8	32	25	39	38	38	25	21	38	38 <sup>2</sup>	38	28	22	38	39	38	41 / 39 / 39
528	8	32	25	39	38	38	25	21	38	38 <sup>2</sup>	38	28	22	38	39	38	41 / 39 / 39
529	8	32	25	39	38	38	25	21	38	38 <sup>2</sup>	38	28	22	38	39	38	41 / 39 / 39
530	8	32	25	38	38	38	25	21	38	39	38	28	22	38	39	38	41 / 39 / 39
531	8	32	25	38	38	38	25	21	38	39	38	28	22	38	38	38	41 / 39 / 39
532	8	32	25	38	38	38	25	21	38	39	38	28	22	38	39	38	41 / 39 / 39
533	8	32	25	38	38	38	25	21	38	39	38	28	22	38	39	38	41 / 39 / 39
534	8	32	25	38	38	38	25	21	38	39	38	28	22	38	39	38	41 / 39 / 39
535	8	32	25	38	38	38	25	21	38	39	38	28	22	38	39	38	41 / 39 / 39
536	8	32	25	38	38	38	25	21	38	39	38	28	22	38	38	38	41 / 39 / 39
537	8	32	25	38	38	38	25	21	38	39	38	28	22	38	38	38	41 / 39 / 39
538	8	31	25	38	39	38	24	21	36	38	37	28	22	37	38	37	41 / 39 / 39

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
539	8	31	25	38	39	38	24	21	36	38	37	28	22	36	38	37	41 / 39 / 39
541	8	31	25	38	38	38	24	21	35	38	37	28	22	36	38	37	41 / 39 / 39
542	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
543	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
544	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
545	8	31	25	38	39	38	24	21	35	38	37	28	22	37	38	37	41 / 39 / 39
547	5	21	<20	31	32	32	25	<20	34	35	35	22	<20	33	34	34	41 / 40 / 39
Generic Residential Receivers																	
A	n/a	27	22	34	35	34	27	20	35 <sup>2</sup>	35	35	26	20	35	35	34	35 / 35 / 35
B	6	31	24	37	37	36	27	21	37	37 <sup>2</sup>	36 <sup>2</sup>	27	21	37 <sup>2</sup>	37	37	37 / 37 / 37
C	8	32	25	38	38	38	26	21	37	38 <sup>2</sup>	38	28	22	38	38	38	41 / 39 / 39
D	8	31	24	38	36 <sup>2</sup>	38	23	20	35	38	37	28	22	37	38	37	41 / 39 / 39
E	8	32	24	39	37 <sup>2</sup>	39	22	20	35	38	37	27	21	37	38	37	41 / 39 / 39
F	8	31	24	37	38	37	25	21	37	38	37	29	21	37	37	37	41 / 39 / 39
G	8	30	24	38	38	37	24	21	36	38	37	28	22	36	38	37	41 / 39 / 39
H	6	29	22	36	36	35	27	20	36	37	36	27	20	36	36	35	37 / 37 / 37
I	4	<20	<20	25	26	26	20	<20	30	30	30	<20	<20	29	30	30	35 / 35 / 35
J	6	30	23	37	36	35	27	21	36	36 <sup>2</sup>	37	27	21	37	37	36	37 / 37 / 37
K	8	30	24	36	36	35	26	22	36	38	37	27	22	36	36	36	41 / 39 / 39
L	8	28	24	36	36	35	26	21	36	37	37	27	22	36	37	36	41 / 39 / 39
M	8	29	24	36	36	35	25	21	36	37	37	27	22	36	36	36	41 / 39 / 39
Council Owned Residential Receiver																	
286c	8	31	24	38	37 <sup>2</sup>	38	22	20	35	37	36	26	21	37	37	36	41 / 39 / 39

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
Mine Owned Residential Receivers <sup>4</sup>																	
1aa	n/a	<20	<20	31	33	33	29	23	44	44	44	25	23	38	39	39	n/a <sup>4</sup>
1ab	n/a	<20	<20	25	26	26	23	<20	31	32	32	21	20	32	34	34	n/a <sup>4</sup>
1ac	n/a	36	27	43	44	42	23	22	38	41	40	29	23	40	41	40	n/a <sup>4</sup>
1ad	n/a	<20	<20	25	27	26	<20	<20	28	29	28	<20	<20	27	28	27	n/a <sup>4</sup>
1ae	n/a	41	30	46	46	45	25	25	40	44	42	35	26	43	43	42	n/a <sup>4</sup>
1af	n/a	36	28	43	43	42	25	23	39	43	41	31	24	41	41	40	n/a <sup>4</sup>
1ag	n/a	36	28	42	42	42	26	23	39	42	41	31	23	41	41	40	n/a <sup>4</sup>
1ah	n/a	35	27	42	40	40	27	23	39	43	41	31	23	42	40	40	n/a <sup>4</sup>
1ai	n/a	35	27	42	40	40	27	23	39	43	41	31	23	42	40	40	n/a <sup>4</sup>
1aj	n/a	35	27	42	40	40	27	23	40	43	41	31	23	42	40	40	n/a <sup>4</sup>
1ak	n/a	35	27	42	40	39	26	23	40	43	41	31	23	42	40	40	n/a <sup>4</sup>
1al	n/a	35	27	42	40	39	26	23	39	43	41	31	23	42	40	40	n/a <sup>4</sup>
1am	n/a	35	27	42	40	39	28	24	39	40	39	31	23	42	40	40	n/a <sup>4</sup>
1an	n/a	38	28	45	41	40	28	26	41	40	38	33	25	41	42	41	n/a <sup>4</sup>
1ao	n/a	38	29	46	41	40	28	26	40	39	36	33	25	41	42	41	n/a <sup>4</sup>
1ap	n/a	35	27	43	40	39	30	25	41	39	38	31	24	41	41	40	n/a <sup>4</sup>
1aq	n/a	35	27	43	40	39	30	25	41	39	38	31	24	41	41	40	n/a <sup>4</sup>
1ar	n/a	35	27	43	40	39	30	25	41	39	38	31	24	41	41	40	n/a <sup>4</sup>
1as	n/a	35	27	43	40	39	30	25	41	39	37	31	24	41	41	40	n/a <sup>4</sup>
1at	n/a	35	28	43	40	39	30	25	41	38	37	31	24	41	41	40	n/a <sup>4</sup>
1au	n/a	35	28	43	40	39	30	25	41	38	36	31	24	40	41	40	n/a <sup>4</sup>
1av	n/a	34	27	42	39	39	31	26	42	36	35	30	25	40	41	40	n/a <sup>4</sup>
1aw	n/a	34	27	41	39	39	31	26	42	36	34	30	25	39	41	40	n/a <sup>4</sup>

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
1ax	n/a	34	27	42	39	39	31	26	42	36	35	30	25	40	41	40	n/a <sup>4</sup>
1ay	n/a	33	27	40	37	37	31	26	42	36	34	30	25	39	39	38	n/a <sup>4</sup>
1az	n/a	33	27	40	37	36	31	26	42	35	34	30	25	39	39	38	n/a <sup>4</sup>
1ba	n/a	33	27	40	37	36	31	26	42	34	33	30	25	39	39	37	n/a <sup>4</sup>
1h	n/a	33	27	40	37	36	31	26	42	34	33	30	25	39	39	37	n/a <sup>4</sup>
1i	n/a	33	27	40	35	34	31	26	43	34	33	30	25	38	41	38	n/a <sup>4</sup>
1j	n/a	33	27	40	35	34	31	26	43	34	33	30	25	38	40	38	n/a <sup>4</sup>
1k	n/a	33	26	39	34	34	31	27	43	33	33	30	25	38	40	37	n/a <sup>4</sup>
1l	n/a	33	26	39	34	34	31	26	43	34	33	30	25	38	40	38	n/a <sup>4</sup>
1m	n/a	33	26	38	32	32	30	27	36	33	32	30	26	34	34	32	n/a <sup>4</sup>
1n	n/a	33	26	39	34	34	32	27	44	33	32	30	25	38	39	36	n/a <sup>4</sup>
1o	n/a	<20	<20	30	35	33	43	<20	46	35	33	<20	<20	30	35	33	n/a <sup>4</sup>
1p	n/a	33	25	40	38	37	33	26	41	36	35	30	25	39	39	37	n/a <sup>4</sup>
1q	n/a	31	24	40	40	40	35	29	45	36	36	33	27	40	35	34	n/a <sup>4</sup>
1r	n/a	34	29	41	42	41	59	42	62	55	55	47	41	53	52	52	n/a <sup>4</sup>
1s	n/a	33	29	40	41	41	55	38	57	51	51	45	38	50	50	50	n/a <sup>4</sup>
1t	n/a	22	21	35	39	39	29	26	42	45	44	28	27	41	45	43	n/a <sup>4</sup>
1u	n/a	21	20	33	36	36	29	26	38	43	40	27	26	37	41	40	n/a <sup>4</sup>
1v	n/a	22	21	35	39	39	29	26	43	45	44	28	27	41	44	43	n/a <sup>4</sup>
1w	n/a	25	24	33	36	36	41	32	47	46	45	36	34	42	45	44	n/a <sup>4</sup>
1x	n/a	26	23	35	36	36	39	32	51	51	50	35	32	47	48	47	n/a <sup>4</sup>
1y	n/a	20	<20	34	38	38	27	24	41	45	44	26	25	40	44	43	n/a <sup>4</sup>
1z	n/a	<20	<20	25	27	26	24	<20	32	32	32	22	21	33	35	35	n/a <sup>4</sup>
2aa	n/a	31	23	40	42	41	20	<20	36	39	38	25	21	38	40	39	n/a <sup>4</sup>



Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
2ab	n/a	32	23	40	42	41	21	<20	36	39	38	25	21	38	40	39	n/a <sup>4</sup>
2ac	n/a	20	<20	31	36	35	<20	<20	30	35	34	<20	<20	29	38	35	n/a <sup>4</sup>
2ad	n/a	33	24	41	43	41	21	<20	36	39	38	26	21	38	40	39	n/a <sup>4</sup>
2ae	n/a	21	20	28	35	34	<20	<20	28	35	34	<20	<20	28	36	34	n/a <sup>4</sup>
2af	n/a	33	24	41	43	41	21	20	37	40	39	26	21	38	40	39	n/a <sup>4</sup>
2ah	n/a	33	24	41	43	41	21	20	37	40	39	26	21	39	40	39	n/a <sup>4</sup>
2ai	n/a	32	24	41	43	41	21	20	36	41	39	26	22	38	41	39	n/a <sup>4</sup>
2aj	n/a	36	26	43	44	42	22	21	38	41	40	28	22	39	41	40	n/a <sup>4</sup>
2ak	n/a	36	30	45	45	43	24	24	37	41	40	30	27	38	40	38	n/a <sup>4</sup>
2al	n/a	37	30	45	45	43	24	24	36	40	38	30	27	39	42	40	n/a <sup>4</sup>
2b	n/a	37	30	45	44	43	24	24	38	41	40	30	27	39	39	37	n/a <sup>4</sup>
2c	n/a	32	25	38	39	38	25	21	36	39	38	29	22	37	38	38	n/a <sup>4</sup>
2d	n/a	32	25	38	39	38	25	21	37	39	38	30	22	38	39	38	n/a <sup>4</sup>
2e	n/a	44	31	49	47	45	25	25	39	44	42	35	28	44	44	43	n/a <sup>4</sup>
2f	n/a	48	34	51	45	43	25	26	39	43	41	35	31	43	42	41	n/a <sup>4</sup>
2g	n/a	49	33	51	40	38	26	26	36	40	39	35	30	42	37	36	n/a <sup>4</sup>
2h	n/a	48	44	50	50	49	28	28	35	37	36	46	36	49	43	42	n/a <sup>4</sup>
2i	n/a	37	29	43	44	43	24	24	39	43	42	31	24	42	41	40	n/a <sup>4</sup>
2j	n/a	58	58	60	62	61	31	31	38	41	39	51	41	52	47	46	n/a <sup>4</sup>
2k	n/a	60	41	61	46	45	28	29	39	40	39	37	33	42	38	37	n/a <sup>4</sup>
2l	n/a	61	57	62	61	60	33	34	39	41	40	45	39	48	46	45	n/a <sup>4</sup>
2m	n/a	41	41	47	51	50	41	41	46	50	49	41	41	47	50	49	n/a <sup>4</sup>
2n	n/a	<20	<20	28	30	30	<20	<20	26	29	28	<20	<20	27	29	29	n/a <sup>4</sup>
2o	n/a	22	22	30	31	31	22	21	29	31	31	22	22	30	32	32	n/a <sup>4</sup>

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)			
		Year 2018						Year 2021						Year 2025						
		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>		Calm Isothermal		P10 <sup>1</sup>								
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night				
2p	n/a	22	22	30	32	32	23	22	30	31	31	22	22	30	32	32	n/a <sup>4</sup>			
2q	n/a	23	23	30	32	32	23	22	30	31	31	23	23	31	32	32	n/a <sup>4</sup>			
2r	n/a	23	23	31	32	32	23	22	30	31	31	23	23	31	32	32	n/a <sup>4</sup>			
2s	n/a	23	23	31	32	32	23	22	30	31	31	23	23	31	32	32	n/a <sup>4</sup>			
2t	n/a	<20	<20	30	32	32	<20	<20	30	32	31	<20	<20	30	32	31	n/a <sup>4</sup>			
2u	n/a	21	21	33	35	34	22	21	33	35	34	22	22	33	35	34	n/a <sup>4</sup>			
2v	n/a	26	26	34	36	35	26	25	34	36	35	26	26	34	35	35	n/a <sup>4</sup>			
2w	n/a	27	27	34	35	35	27	26	33	35	35	27	27	34	35	35	n/a <sup>4</sup>			
2x	n/a	31	23	40	42	40	20	<20	36	39	38	25	20	38	40	39	n/a <sup>4</sup>			
2y	n/a	31	23	40	42	41	20	<20	36	39	38	25	20	38	40	39	n/a <sup>4</sup>			
2z	n/a	32	23	40	42	41	20	<20	36	39	38	25	21	38	40	39	n/a <sup>4</sup>			
3a	n/a	<20	<20	27	29	29	26	21	35	35	35	23	20	33	34	34	n/a <sup>4</sup>			
3b	n/a	<20	<20	27	29	29	26	20	35	35	35	23	20	33	34	34	n/a <sup>4</sup>			
3c	n/a	<20	<20	28	31	31	25	<20	38	38	38	21	<20	36	38	38	n/a <sup>4</sup>			
3d	n/a	<20	<20	27	29	29	26	20	35	35	35	22	<20	32	34	34	n/a <sup>4</sup>			
3e	n/a	<20	<20	27	29	29	25	<20	35	34	34	22	<20	32	34	34	n/a <sup>4</sup>			
3f	n/a	<20	<20	27	29	29	25	<20	35	34	34	22	<20	32	33	33	n/a <sup>4</sup>			
3g	n/a	<20	<20	27	30	30	23	<20	37	38	37	20	<20	34	36	36	n/a <sup>4</sup>			
3i	n/a	<20	<20	27	28	28	23	<20	34	34	34	20	<20	33	34	34	n/a <sup>4</sup>			
3j	n/a	<20	<20	26	28	28	23	<20	33	33	33	20	<20	31	32	32	n/a <sup>4</sup>			
3k	n/a	<20	<20	21	24	24	22	<20	27	29	28	<20	<20	26	29	28	n/a <sup>4</sup>			
3l	n/a	<20	<20	29	30	30	23	<20	36	36	36	21	<20	35	36	36	n/a <sup>4</sup>			
3m	n/a	<20	<20	29	30	30	23	<20	36	36	36	21	<20	35	36	36	n/a <sup>4</sup>			
3n	n/a	<20	<20	27	28	28	22	<20	33	34	34	<20	<20	32	33	33	n/a <sup>4</sup>			

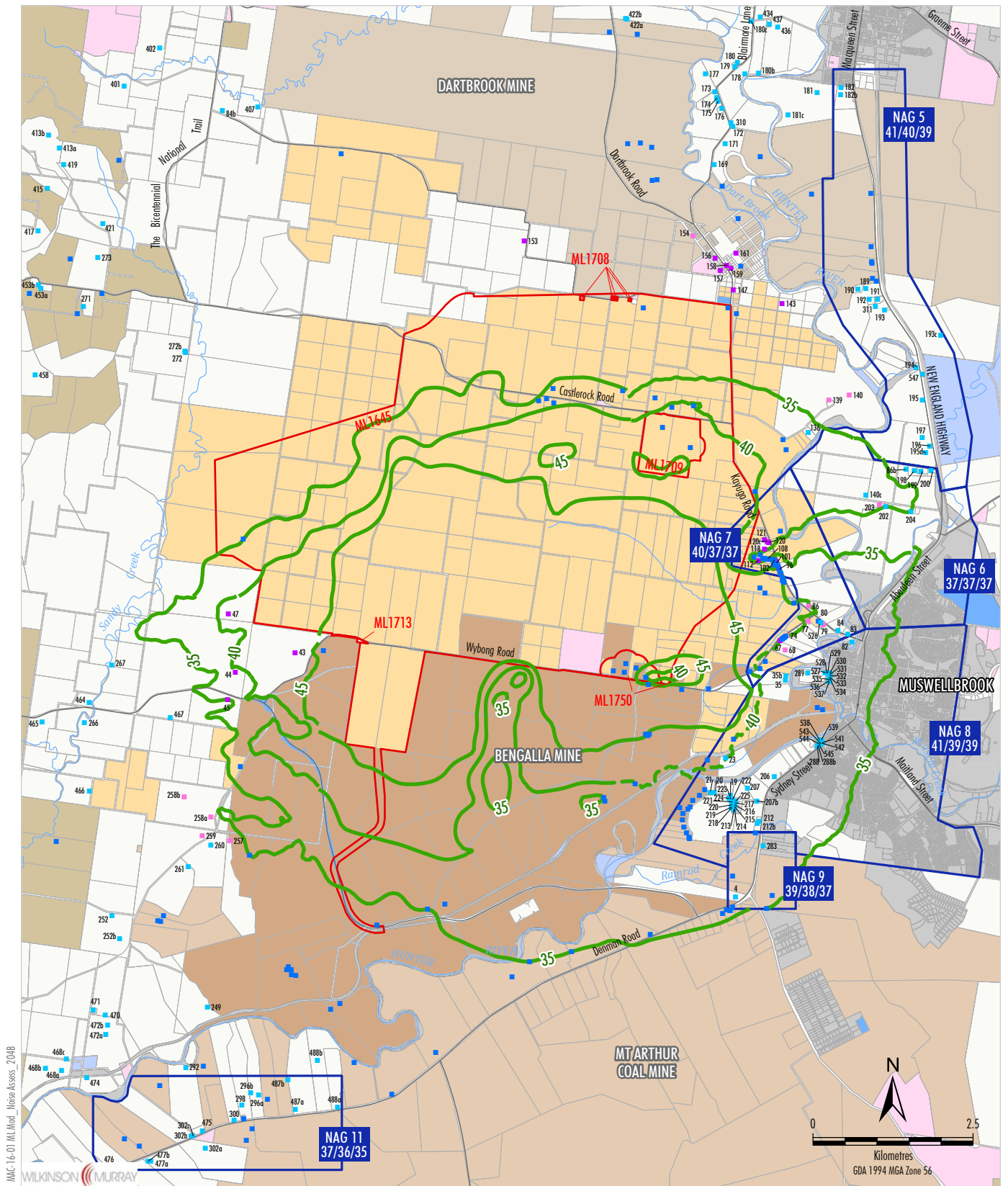
Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
3o	n/a	<20	<20	<20	20	20	<20	<20	21	22	22	<20	<20	20	21	21	n/a <sup>4</sup>
3p	n/a	<20	<20	<20	20	20	<20	<20	21	24	24	<20	<20	20	22	22	n/a <sup>4</sup>
3q	n/a	<20	<20	<20	21	20	<20	<20	21	24	24	<20	<20	20	22	22	n/a <sup>4</sup>
3r	n/a	<20	<20	22	24	24	<20	<20	25	28	28	<20	<20	24	27	27	n/a <sup>4</sup>
3s	n/a	<20	<20	21	24	24	<20	<20	26	28	27	<20	<20	24	26	26	n/a <sup>4</sup>
5	9	28	21	36	38	37	<20	<20	33	35	35	24	<20	35	36	35	n/a <sup>4</sup>
5aa	n/a	26	20	35	36	35	<20	<20	32	34	33	22	<20	33	35	34	n/a <sup>4</sup>
5ab	n/a	26	20	34	35	34	<20	<20	31	33	33	22	<20	33	34	33	n/a <sup>4</sup>
5ac	n/a	26	20	35	36	35	<20	<20	32	34	33	23	<20	33	35	34	n/a <sup>4</sup>
5ad	n/a	26	20	34	36	35	<20	<20	32	34	33	23	<20	33	34	33	n/a <sup>4</sup>
5ae	n/a	30	22	39	40	39	20	<20	35	38	37	24	20	37	39	38	n/a <sup>4</sup>
5f	n/a	30	22	39	41	40	20	<20	35	38	37	24	20	37	39	38	n/a <sup>4</sup>
5g	n/a	30	23	39	41	40	20	<20	36	38	37	24	20	37	39	38	n/a <sup>4</sup>
5h	n/a	<20	<20	23	24	24	<20	<20	22	23	23	<20	<20	22	24	23	n/a <sup>4</sup>
5i	n/a	<20	<20	24	26	25	<20	<20	24	25	25	<20	<20	25	26	26	n/a <sup>4</sup>
5j	n/a	<20	<20	22	24	23	<20	<20	22	23	22	<20	<20	22	23	23	n/a <sup>4</sup>
5k	n/a	<20	<20	25	26	26	<20	<20	25	26	26	<20	<20	25	27	26	n/a <sup>4</sup>
5l	n/a	<20	<20	25	27	26	<20	<20	25	26	26	<20	<20	26	27	27	n/a <sup>4</sup>
5m	n/a	21	21	28	29	29	21	20	27	29	29	21	21	28	29	29	n/a <sup>4</sup>
5n	n/a	<20	<20	23	25	24	<20	<20	23	24	24	<20	<20	23	24	24	n/a <sup>4</sup>
5o	n/a	<20	<20	23	26	25	<20	<20	24	25	25	<20	<20	23	25	25	n/a <sup>4</sup>
5p	n/a	<20	<20	24	26	26	<20	<20	24	26	26	<20	<20	24	26	26	n/a <sup>4</sup>
5q	n/a	22	22	30	31	31	22	21	29	30	30	22	22	30	31	31	n/a <sup>4</sup>
5r	n/a	27	27	33	34	34	27	26	31	33	33	27	26	32	34	33	n/a <sup>4</sup>

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
5s	n/a	26	26	33	35	34	25	25	32	34	33	25	25	33	35	34	n/a <sup>4</sup>
5t	n/a	24	23	34	35	35	23	23	32	34	33	24	23	33	35	34	n/a <sup>4</sup>
5u	n/a	26	<20	34	36	35	20	<20	32	34	33	22	<20	33	35	34	n/a <sup>4</sup>
5v	n/a	<20	<20	25	27	27	<20	<20	25	26	26	<20	<20	25	27	27	n/a <sup>4</sup>
5w	n/a	<20	<20	25	27	27	<20	<20	25	26	26	<20	<20	25	26	26	n/a <sup>4</sup>
5x	n/a	<20	<20	25	26	26	<20	<20	24	26	26	<20	<20	25	26	26	n/a <sup>4</sup>
5y	n/a	26	20	35	36	35	<20	<20	32	34	33	22	<20	33	35	34	n/a <sup>4</sup>
5z	n/a	26	20	34	36	35	<20	<20	32	34	33	22	<20	33	35	34	n/a <sup>4</sup>
7	8	30	22	39	41	40	20	<20	35	38	37	24	20	37	39	38	n/a <sup>4</sup>
7b	n/a	<20	<20	20	21	21	<20	<20	20	20	20	<20	<20	20	21	21	n/a <sup>4</sup>
7c	n/a	<20	<20	20	21	21	<20	<20	20	20	20	<20	<20	<20	21	21	n/a <sup>4</sup>
7d	n/a	<20	<20	<20	22	21	<20	<20	21	21	21	<20	<20	20	22	21	n/a <sup>4</sup>
7e	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	n/a <sup>4</sup>
7f	n/a	<20	<20	<20	20	<20	<20	<20	20	<20	<20	<20	<20	<20	20	<20	n/a <sup>4</sup>
7g	n/a	<20	<20	26	28	27	20	<20	28	27	26	<20	<20	26	28	27	n/a <sup>4</sup>
7h	n/a	<20	<20	26	28	27	<20	<20	29	28	27	<20	<20	27	29	28	n/a <sup>4</sup>
7i	n/a	<20	<20	26	27	26	<20	<20	27	28	27	<20	<20	26	28	27	n/a <sup>4</sup>
7j	n/a	<20	<20	27	29	28	<20	<20	29	29	28	<20	<20	27	30	29	n/a <sup>4</sup>
7k	n/a	<20	<20	25	27	26	<20	<20	26	27	26	<20	<20	26	27	26	n/a <sup>4</sup>
8a	n/a	<20	<20	20	21	21	<20	<20	20	20	20	<20	<20	20	21	21	n/a <sup>4</sup>
8b	n/a	<20	<20	20	21	21	<20	<20	20	20	20	<20	<20	20	21	21	n/a <sup>4</sup>
8c	n/a	<20	<20	20	21	21	<20	<20	20	20	20	<20	<20	20	21	21	n/a <sup>4</sup>
8d	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	n/a <sup>4</sup>
8e	n/a	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	n/a <sup>4</sup>

Receiver ID	NAG	L <sub>Aeq,15min</sub> Noise Level (dBA)															Consent Noise Criteria D / E / N (dBA)
		Year 2018					Year 2021					Year 2025					
		Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			Calm Isothermal		P10 <sup>1</sup>			
		Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	Day	Eve / Night	Day	Eve	Night	
8f	n/a	<20	<20	21	23	23	<20	<20	22	23	22	<20	<20	22	23	23	n/a <sup>4</sup>
8g	n/a	<20	<20	<20	21	20	<20	<20	<20	20	<20	<20	<20	<20	21	20	n/a <sup>4</sup>
8h	n/a	<20	<20	<20	20	<20	<20	<20	<20	20	<20	<20	<20	<20	21	<20	n/a <sup>4</sup>
8i	n/a	<20	<20	<20	23	22	<20	<20	21	23	21	<20	<20	<20	23	22	n/a <sup>4</sup>
101	7	34	27	42	39	38	31	26	42	36	34	30	25	39	40	38	n/a <sup>4</sup>
107	7	33	26	40	37	35	31	26	43	34	33	30	25	38	41	38	n/a <sup>4</sup>
129	3	36	30	43	43	42	66	50	67	60	59	59	54	61	58	58	n/a <sup>4</sup>
130	3	38	31	43	44	44	68	57	68	61	61	72	57	71	59	59	n/a <sup>4</sup>
135	3	28	24	37	38	38	36	27	45	41	41	32	26	42	43	43	n/a <sup>4</sup>
211	9	30	22	37	39	38	20	<20	34	37	36	25	<20	36	37	36	n/a <sup>4</sup>
231	7	33	25	40	39	38	28	23	38	40	39	29	22	40	39	38	n/a <sup>4</sup>
246	10	<20	<20	26	29	28	<20	<20	27	29	28	<20	<20	27	29	28	n/a <sup>4</sup>
263	1	28	28	34	36	36	29	28	36	36	36	28	28	34	36	36	n/a <sup>4</sup>
274	2	<20	<20	<20	20	<20	<20	<20	22	20	<20	<20	<20	<20	20	<20	n/a <sup>4</sup>
299	11	<20	<20	25	26	26	<20	<20	24	26	25	<20	<20	25	26	26	n/a <sup>4</sup>
309	3	28	24	37	38	38	37	28	45	42	41	32	27	42	43	43	n/a <sup>4</sup>

Notes: D = Day, E = Evening, N = Night.

- Noise levels predicted to result under 10<sup>th</sup> percentile meteorological conditions as described in Section 4.3 (indicated by 'P10').
- P10 noise level predicted to result with integrated pro-active and reactive management measures in place. Note that a mitigated level is only presented for receivers where exceedances of the relevant criteria were predicted in the absence of pro-active and reactive management measures. The implementation of pro-active and reactive management measures would also benefit other receivers surrounding the Mount Pleasant Operation. For presentation purposes, the mitigated contours presented in Figures C-1 to C-3 extend further than the individual receivers with mitigated results presented in this table.
- Receiver would comply with proposed noise criteria summarised in Table 5-6 of report.
- Consent noise criteria do not apply to mine-owned residences.



#### LEGEND

- Mining Lease Boundary
- Mine-owned Dwelling
- Privately-owned Residence - MPO Acquisition on Request
- Privately-owned Residence - MPO Mitigation on Request
- Other Privately-owned Residence
- 35 dBA Revised Noise Assessment Group (NAG)
- Default NAG Noise Criteria
- Evening P10 Intrusive  $L_{Aeq}$  (15 minute) Noise Contour
- Evening P10 Intrusive  $L_{Aeq}$  (15 minute) Noise Contour (with implementation of pro-active and reactive mitigation measures)

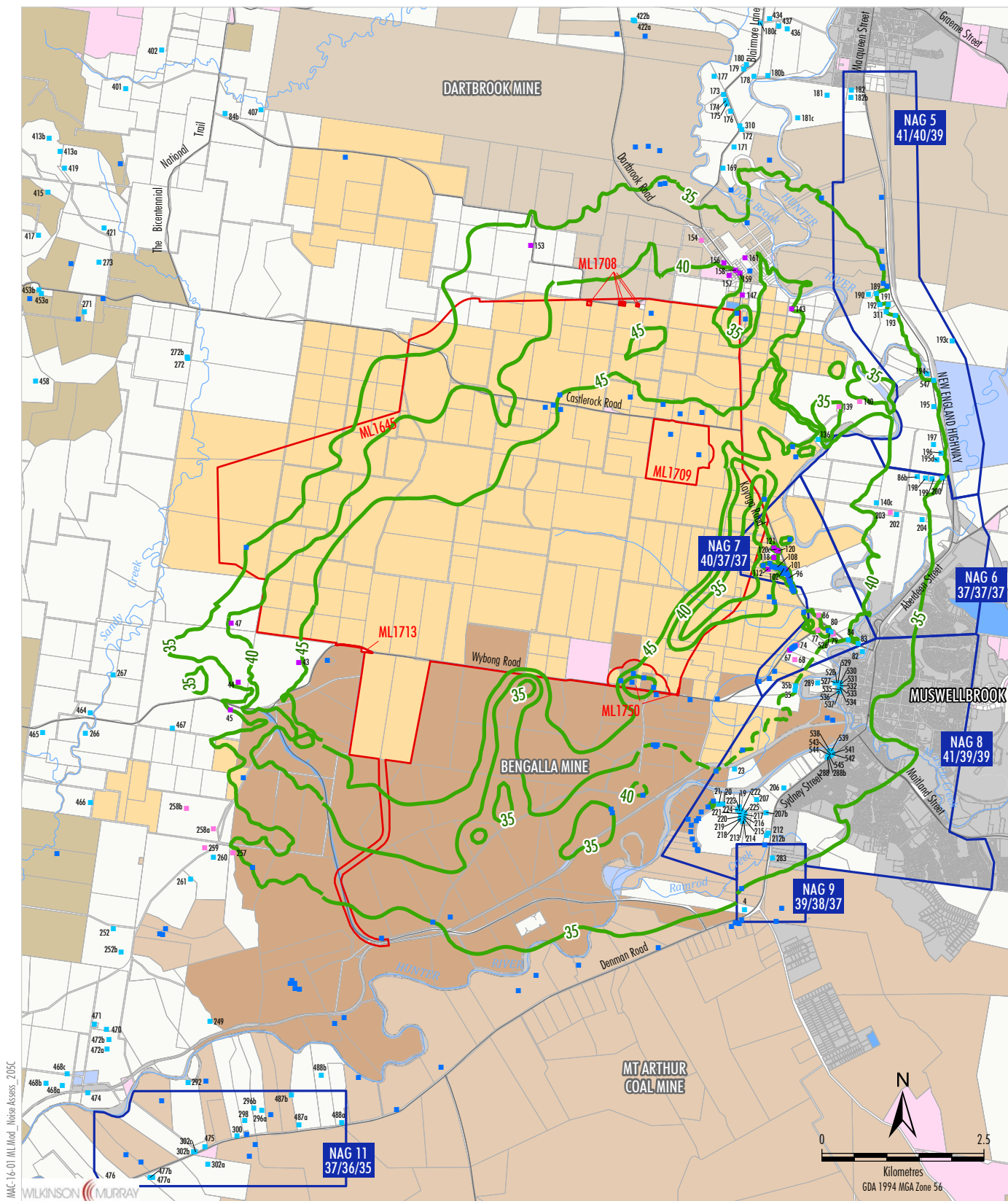
- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Crown
- The State of NSW
- Muswellbrook Shire Council
- Upper Hunter Shire Council
- Mount Pleasant Controlled
- Bengalla Controlled
- Dartbrook Controlled
- Mt Arthur Controlled
- Other Mining/Resource Company Controlled
- Privately Owned Land

Source: NSW Land & Property Information (2016); NSW Division of Resources & Energy (2017)

**MACHEnergy**  
MOUNT PLEASANT OPERATION  
Evening P10 Intrusive  
 $L_{Aeq}$  (15 minute) Noise Contours -  
2018 and Revised Noise Assessment Groups

Figure C-1





#### LEGEND

- Mining Lease Boundary
- Mine-owned Dwelling
- Privately-owned Residence - MPO Acquisition on Request
- Privately-owned Residence - MPO Mitigation on Request
- Other Privately-owned Residence
- Revised Noise Assessment Group (NAG)
- Default NAG Noise Criteria
- Evening P10 Intrusive  $L_{Aeq}$  (15 minute) Noise Contour (with implementation of pro-active and reactive mitigation measures)
- Evening P10 Intrusive  $L_{Aeq}$  (15 minute) Noise Contour

- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Crown
- Crown/State of NSW
- The State of NSW
- Muswellbrook Shire Council
- Upper Hunter Shire Council
- Mount Pleasant Controlled
- Bengalla Controlled
- Dartbrook Controlled
- Mt Arthur Controlled
- Other Mining/Resource Company Controlled
- Privately Owned Land

Source: NSW Land & Property Information (2016); NSW Division of Resources & Energy (2017)

**MACHEnergy**  
MOUNT PLEASANT OPERATION  
Evening P10 Intrusive  
 $L_{Aeq}$  (15 minute) Noise Contours -  
2021 and Revised Noise Assessment Groups

Figure C-2





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## APPENDIX D

### CUMULATIVE NOISE PREDICTIONS

**Table D-1 Predicted Daytime Cumulative  $L_{Aeq,11hr}$  Operational Noise from the Mount Pleasant Operation incorporating the Modification, Mt Arthur Coal Mine, Bengalla Mine & Dartbrook Mine (dBA)**

Rec ID	NAG	Daytime L <sub>Aeq,11hr</sub> Noise Levels <sup>1</sup>											Cumulative Noise			Daytime Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Dartbrook Mine					
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15		2018	2021	2025		
4	9	32	28	30	29	24	25	27	27	27	⁻²	34	31	32	55	
19	8	36	32	34	26	23	21	32	30	28	⁻²	38	34	35	55	
20	8	37	32	34	26	23	21	33	31	28	⁻²	39	35	35	55	
21	8	37	32	34	26	24	21	33	31	29	⁻²	39	35	35	55	
23	8	39	33	36	25	22	20	33	31	28	⁻²	40	35	36	55	
35	8	38	34	36	22	<20	<20	33	31	29	⁻²	39	36	37	55	
35b	8	38	34	36	22	<20	<20	33	31	29	⁻²	39	36	37	55	
43	1	35	37	35	<20	<20	<20	38	38	42	⁻²	40	40	43	50	
44	1	31	33	31	<20	<20	<20	34	34	34	⁻²	36	36	36	50	
45	1	29	31	29	<20	22	<20	35	35	35	⁻²	36	37	36	50	
47	1	32	34	32	<20	<20	<20	35	34	38	⁻²	37	37	39	50	
182	5	22	26	26	⁻²	⁻²	⁻²	⁻²	⁻²	⁻²	47	47	47	47	50	
182b	5	22	27	26	⁻²	⁻²	⁻²	⁻²	⁻²	⁻²	47	47	47	47	50	
189	5	24	31	29	⁻²	⁻²	⁻²	⁻²	⁻²	⁻²	44	44	44	44	50	
190	5	24	32	29	⁻²	⁻²	⁻²	⁻²	⁻²	⁻²	44	44	44	44	50	
191	5	23	31	29	⁻²	⁻²	⁻²	⁻²	⁻²	⁻²	41	41	41	41	50	
206	8	36	31	34	25	22	20	30	30	27	⁻²	37	34	34	55	
207	8	36	32	34	25	22	20	31	30	27	⁻²	38	34	35	55	
207b	8	35	31	33	25	22	20	31	30	27	⁻²	37	34	34	55	
212	8	34	30	32	26	22	22	29	28	27	⁻²	36	32	34	55	
212b	8	34	30	32	26	22	22	29	28	27	⁻²	36	32	34	55	
213	8	36	31	33	26	23	21	32	30	28	⁻²	37	34	34	55	
214	8	36	31	33	26	23	21	32	30	28	⁻²	37	34	34	55	
215	8	36	31	33	26	23	21	32	30	28	⁻²	37	34	34	55	

Rec ID	NAG	Daytime L <sub>Aeq,11hr</sub> Noise Levels <sup>1</sup>											Daytime Cumulative Noise Criteria		
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Dartbrook Mine	Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15		2018		2021	2025
216	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	35	55
217	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	35	55
218	8	36	31	33	26	23	21	32	30	28	⁻²	37	34	34	55
219	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	34	55
220	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	34	55
221	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	35	55
222	8	36	31	34	26	23	21	32	30	28	⁻²	38	34	35	55
223	8	36	31	34	26	23	21	32	30	28	⁻²	38	34	35	55
224	8	36	31	34	26	23	21	32	30	28	⁻²	38	34	35	55
225	8	36	31	33	26	23	21	32	30	28	⁻²	38	34	35	55
249	10	22	22	22	26	20	20	23	23	23	⁻²	29	27	26	50
252	1	20	20	20	20	24	<20	26	27	27	⁻²	28	29	28	50
252b	1	<20	18	<20	20	24	<20	26	26	27	⁻²	27	29	27	50
257	1	28	29	28	23	<20	<20	36	37	39	⁻²	37	38	39	50
258a	1	28	27	27	23	23	<20	35	35	39	⁻²	36	36	40	50
258b	1	24	25	24	23	23	<20	32	31	36	⁻²	33	33	36	50
259	1	28	27	27	23	24	<20	35	35	38	⁻²	36	36	39	50
260	1	28	27	28	22	20	<20	35	35	37	⁻²	36	36	38	50
261	1	27	26	27	24	<20	<20	33	33	36	⁻²	34	34	36	50
266	1	22	23	22	<20	23	<20	30	30	32	⁻²	31	31	32	50
267	1	25	26	25	<20	23	<20	31	30	33	⁻²	32	32	34	50
283	9	33	29	31	27	22	22	28	28	27	⁻²	35	32	33	55
288	8	35	31	33	25	22	20	30	30	27	⁻²	36	34	34	55
288b	8	35	31	33	25	22	20	30	30	27	⁻²	36	34	34	55
292	10	20	20	20	24	24	<20	<20	20	20	⁻²	26	26	24	50
296a	11	22	22	22	26	27	20	23	23	23	⁻²	29	29	27	50
296b	11	22	22	22	26	27	20	23	23	23	⁻²	29	29	27	50

Rec ID	NAG	Daytime L <sub>Aeq,11hr</sub> Noise Levels <sup>1</sup>													Daytime Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Dartbrook Mine	Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15		2018	2021	2025	
298	11	22	21	22	24	25	<20	22	22	23	⁻²	27	28	26	50
300	11	21	21	22	25	26	<20	22	23	23	⁻²	28	28	26	50
302a	11	20	20	21	24	24	<20	21	22	22	⁻²	27	27	25	50
302b	11	20	20	20	22	22	<20	20	21	21	⁻²	26	26	24	50
302c	11	20	20	20	22	22	<20	20	21	21	⁻²	26	26	24	50
464	1	21	23	21	<20	23	<20	30	30	32	⁻²	31	32	33	50
465	n/a	23	25	24	<20	<20	<20	29	29	31	⁻²	30	31	32	50
466	1	<20	20	<20	<20	21	<20	27	27	28	⁻²	28	29	28	50
467	1	22	23	22	<20	<20	<20	32	31	35	⁻²	33	32	36	50
468a	n/a	<20	13	<20	21	<20	<20	<20	<20	<20	⁻²	23	21	20	50
468b	n/a	<20	14	<20	21	<20	<20	<20	<20	<20	⁻²	23	21	20	50
468c	n/a	<20	13	<20	21	<20	<20	<20	<20	<20	⁻²	23	21	20	50
470	n/a	<20	19	<20	24	23	<20	23	23	22	⁻²	27	27	24	50
471	n/a	<20	20	20	23	21	<20	23	23	22	⁻²	27	26	25	50
472a	n/a	<20	19	<20	24	31	<20	21	20	20	⁻²	26	32	23	50
472b	n/a	<20	19	<20	24	31	<20	22	22	21	⁻²	27	32	24	50
474	n/a	<20	13	<20	22	<20	<20	<20	<20	<20	⁻²	24	21	20	50
476	n/a	<20	18	<20	21	21	<20	<20	<20	<20	⁻²	24	24	22	50
477a	11	<20	19	<20	22	21	<20	<20	20	20	⁻²	25	25	23	50
477b	11	<20	19	<20	22	21	<20	<20	20	20	⁻²	25	25	23	50
487a	11	22	22	23	26	27	21	25	25	25	⁻²	29	30	28	50
488a	n/a	24	23	24	29	30	24	26	26	27	⁻²	32	32	30	50
488b	10	24	24	24	28	28	23	26	26	26	⁻²	31	31	29	50
538	8	35	32	33	25	22	20	30	30	27	⁻²	36	34	34	55
539	8	35	32	33	25	22	20	30	30	27	⁻²	36	34	34	55
541	8	35	31	33	25	22	20	30	30	27	⁻²	36	34	34	55
542	8	35	31	33	25	22	20	30	30	27	⁻²	36	34	34	55

Rec ID	NAG	Daytime L <sub>Aeq,11hr</sub> Noise Levels <sup>1</sup>													Daytime Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Dartbrook Mine	Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15		2018	2021	2025	
543	8	35	31	33	25	22	20	30	30	27	- <sup>2</sup>	36	34	34	55
544	8	35	31	33	25	22	20	30	30	27	- <sup>2</sup>	36	34	34	55
545	8	35	31	33	25	22	20	30	30	27	- <sup>2</sup>	36	34	34	55
I	4	22	27	26	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	47	47	47	47	50

Notes: 1.  $L_{Aeq,11hr}$  refers to the  $L_{eq}$  noise level measured over the entire daytime period (7.00am - 6.00pm).  
2. No noise predictions were available as this receiver is not considered to be impacted by the mine.

**Table D-2 Predicted Evening Cumulative  $L_{Aeq,4hr}$  Operational Noise from the Mount Pleasant Operation incorporating the Modification, Mt Arthur Coal Mine & Bengalla Mine (dBA)**

Rec ID	NAG	Evening $L_{Aeq,4hr}$ Noise Levels <sup>1</sup>												Evening Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021	2025	
4	9	34	32	33	36	34	35	27	27	27	38	37	37	45
19	8	38	36	36	35	35	34	32	30	28	41	39	39	45
20	8	39	36	37	36	35	34	33	31	28	41	39	39	45
21	8	39	36	37	36	35	35	33	31	29	42	39	39	45
23	8	40	38	38	35	34	34	33	31	28	42	40	39	45
35	8	39	37	37	33	32	32	33	31	29	40	39	39	45
35b	8	39	37	37	33	32	32	33	31	29	41	39	39	45
43	1	40	39	40	24	24	25	38	38	42	42	41	44	45
44	1	37	37	37	24	24	25	34	34	34	39	39	39	45
45	1	33	33	33	26	26	26	35	35	35	37	37	38	45
47	1	38	38	38	24	24	25	35	34	38	40	39	41	45
206	8	37	35	35	34	33	33	30	30	27	40	38	38	45
207	8	38	36	36	35	35	34	31	30	27	40	39	38	45
207b	8	37	35	35	35	35	34	31	30	27	40	39	38	45
212	8	36	34	35	34	34	34	29	28	27	39	38	38	45
212b	8	36	34	35	34	34	34	29	28	27	39	38	38	45
213	8	38	35	36	35	35	34	32	30	28	40	39	38	45
214	8	38	35	36	35	35	34	32	30	28	40	39	38	45
215	8	38	35	36	35	35	34	32	30	28	40	39	38	45
216	8	38	35	36	35	35	34	32	30	28	40	39	38	45
217	8	38	35	36	35	35	34	32	30	28	40	39	38	45
218	8	38	35	36	35	35	34	32	30	28	40	39	38	45
219	8	38	35	36	35	35	34	32	30	28	40	39	38	45

Rec ID	NAG	Evening L <sub>Aeq,4hr</sub> Noise Levels <sup>1</sup>												Evening Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021	2025	
220	8	38	35	36	35	35	34	32	30	28	40	39	38	45
221	8	38	35	36	35	35	34	32	30	28	40	39	38	45
222	8	38	36	36	35	35	34	32	30	28	40	39	38	45
223	8	38	36	36	35	35	34	32	30	28	40	39	39	45
224	8	38	36	36	35	35	34	32	30	28	40	39	39	45
225	8	38	36	36	35	35	34	32	30	28	40	39	38	45
249	10	26	25	26	35	34	35	23	23	23	36	35	36	45
252	1	25	24	24	27	28	28	26	27	27	31	31	31	45
252b	1	23	22	22	27	28	28	26	26	27	30	31	31	45
257	1	33	33	33	30	29	30	36	37	39	38	39	40	45
258a	1	33	32	32	30	29	29	35	35	39	38	37	40	45
258b	1	29	29	29	30	29	29	32	31	36	35	35	37	45
259	1	32	31	32	30	30	31	35	35	38	38	37	40	45
260	1	33	32	32	29	30	30	35	35	37	38	38	39	45
261	1	31	31	31	30	32	31	33	33	36	36	37	38	45
266	1	28	27	28	25	24	24	30	30	32	33	32	34	45
267	1	31	30	31	25	24	24	31	30	33	34	34	35	45
283	9	35	34	34	35	33	34	28	28	27	39	37	37	45
288	8	37	35	35	34	33	33	30	30	27	39	38	38	45
288b	8	36	35	35	34	33	33	30	30	27	39	38	37	45
292	10	24	23	23	33	33	33	<20	20	20	34	34	34	45
296a	11	25	24	25	35	36	35	23	23	23	36	36	36	45
296b	11	25	24	25	35	36	35	23	23	23	36	36	36	45
298	11	25	24	25	34	32	33	22	22	23	35	33	34	45
300	11	24	24	25	34	34	35	22	23	23	35	35	36	45
302a	11	23	23	24	34	33	34	21	22	22	35	34	35	45
302b	11	23	23	24	31	30	31	20	21	21	32	31	32	45

Rec ID	NAG	Evening L <sub>Aeq,4hr</sub> Noise Levels <sup>1</sup>												Evening Cumulative Noise Criteria
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021	2025	
302c	11	24	23	24	31	30	31	20	21	21	32	31	32	45
464	1	26	26	26	25	24	24	30	30	32	32	32	34	45
465	n/a	28	28	29	24	24	24	29	29	31	32	32	33	45
466	1	<20	18	<20	23	24	24	27	27	28	29	29	30	45
467	1	27	27	27	24	24	25	32	31	35	34	33	36	45
468a	n/a	<20	18	<20	31	30	31	<20	<20	<20	31	31	31	45
468b	n/a	<20	18	<20	31	30	31	<20	<20	<20	31	31	31	45
468c	n/a	<20	17	<20	31	30	31	<20	<20	<20	31	31	31	45
470	n/a	23	23	23	32	32	32	23	23	22	33	33	33	45
471	n/a	24	23	24	32	31	32	23	23	22	33	32	33	45
472a	n/a	23	23	23	32	32	32	21	20	20	33	33	33	45
472b	n/a	23	23	23	32	32	32	22	22	21	33	33	33	45
474	n/a	<20	18	<20	31	30	31	<20	<20	<20	31	31	31	45
476	n/a	22	21	21	30	30	30	<20	<20	<20	31	31	31	45
477a	11	23	22	23	31	31	31	<20	20	20	32	32	32	45
477b	11	23	22	23	31	31	31	<20	20	20	32	32	32	45
487a	11	26	25	26	35	36	35	25	25	25	36	37	36	45
488a	n/a	26	26	27	39	38	38	26	26	27	39	39	39	45
488b	10	27	27	28	37	39	38	26	26	26	38	39	39	45
538	8	36	35	35	34	33	33	30	30	27	39	38	38	45
539	8	36	35	35	34	33	33	30	30	27	39	38	37	45
541	8	36	35	35	34	33	33	30	30	27	39	38	37	45
542	8	36	35	35	34	33	33	30	30	27	39	38	37	45
543	8	36	35	35	34	33	33	30	30	27	39	38	37	45
544	8	36	35	35	34	33	33	30	30	27	39	38	38	45
545	8	36	35	35	34	33	33	30	30	27	39	38	37	45

Note: 1.  $L_{Aeq,4hr}$  refers to the  $L_{eq}$  noise level measured over the entire evening period (6.00pm - 10.00pm).



**Table D-3 Predicted Night Time Cumulative  $L_{Aeq,9hr}$  Operational Noise from the Mount Pleasant Operation incorporating the Modification, Mt Arthur Coal Mine & Bengalla Mine (dBA)**

Rec ID	NAG	Night Time L <sub>Aeq,9hr</sub> Noise Levels <sup>1</sup>											Night Time Cumulative Noise Criteria	
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021		2025
4	9	34	32	33	36	34	35	31	33	32	39	38	38	40
19	8	38	36	36	35	35	34	29	31	31	40	39	39	40
20	8	39	36	36	36	35	34	29	31	31	41	39	39	40
21	8	39	36	36	36	35	35	29	31	31	41	39	39	40
23	8	39	37	37	35	34	34	28	30	30	41	39	39	40
35	8	38	37	37	33	32	32	28	30	30	39	39	39	40
35b	8	38	37	37	33	32	32	28	30	30	39	39	38	40
43	1	38	37	38	24	24	25	31	36	34	39	40	40	40
44	1	35	34	35	24	24	25	26	31	26	36	36	36	40
45	1	32	31	31	26	26	26	27	32	29	34	35	34	40
47	1	36	36	37	24	24	25	28	32	30	37	38	38	40
206	8	37	35	35	34	33	33	28	31	30	39	38	38	40
207	8	38	36	36	35	35	34	28	31	30	40	39	39	40
207b	8	37	35	35	35	35	34	28	31	30	39	39	38	40
212	8	36	34	34	34	34	34	29	31	31	39	38	38	40
212b	8	36	34	34	34	34	34	29	31	31	39	38	38	40
213	8	37	35	35	35	35	34	29	31	31	40	39	38	40
214	8	37	35	35	35	35	34	29	31	31	40	39	39	40
215	8	37	35	35	35	35	34	29	31	31	40	39	39	40
216	8	38	35	36	35	35	34	29	31	31	40	39	39	40
217	8	38	35	36	35	35	34	29	31	31	40	39	39	40
218	8	38	35	36	35	35	34	29	31	31	40	39	39	40
219	8	38	35	36	35	35	34	29	31	31	40	39	39	40
220	8	38	35	36	35	35	34	29	31	31	40	39	39	40

Rec ID	NAG	Night Time L <sub>Aeq,9hr</sub> Noise Levels <sup>1</sup>											Night Time Cumulative Noise Criteria	
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021		2025
221	8	38	35	36	35	35	34	29	31	31	40	39	39	40
222	8	38	36	36	35	35	34	29	31	31	40	39	39	40
223	8	38	36	36	35	35	34	29	31	31	40	39	39	40
224	8	38	36	36	35	35	34	29	31	31	40	39	39	40
225	8	38	36	36	35	35	34	29	31	31	40	39	39	40
249	10	26	25	26	35	34	35	34	35	36	38	38	39	40
252	1	25	24	24	27	28	28	25	28	27	30	32	31	40
252b	1	23	22	22	27	28	28	26	29	28	30	32	32	40
257	1	33	33	33	30	29	30	34	37	36	37	39	38	40
258a	1	33	31	32	30	29	29	34	35	37	37	37	38	40
258b	1	29	29	29	30	29	29	27	31	30	34	34	34	40
259	1	32	31	32	30	30	31	33	35	36	37	37	38	40
260	1	33	32	32	29	30	30	33	35	34	37	37	37	40
261	1	31	31	31	30	32	31	32	34	34	36	37	37	40
266	1	26	26	26	25	24	24	25	28	27	30	31	31	40
267	1	29	29	29	25	24	24	25	29	27	32	32	32	40
283	9	35	34	34	35	33	34	29	32	31	39	38	38	40
288	8	36	35	35	34	33	33	28	31	30	39	38	38	40
288b	8	36	35	34	34	33	33	28	31	30	38	38	38	40
292	10	24	23	24	33	33	33	33	34	34	36	37	37	40
296a	11	26	25	26	35	36	35	36	37	37	39	39	39	40
296b	11	26	25	26	35	36	35	36	37	37	39	39	39	40
298	11	25	25	26	34	32	33	34	35	35	37	37	38	40
300	11	25	25	25	34	34	35	35	36	36	38	38	39	40
302a	11	24	24	24	34	33	34	33	34	35	37	37	37	40
302b	11	24	23	24	31	30	31	32	33	34	35	35	36	40
302c	11	24	23	24	31	30	31	32	33	34	35	35	36	40

Rec ID	NAG	Night Time L <sub>Aeq,9hr</sub> Noise Levels <sup>1</sup>											Night Time Cumulative Noise Criteria	
		Mount Pleasant Operation incorporating the Modification			Mt Arthur Coal Mine			Bengalla Mine			Cumulative Noise			
		2018	2021	2025	2016	2022	2026	Year 4	Year 8	Year 15	2018	2021		2025
464	1	24	24	24	25	24	24	26	29	28	30	31	31	40
465	n/a	27	27	28	24	24	24	25	28	27	31	32	31	40
466	1	<20	18	<20	23	24	24	21	26	22	26	29	27	40
467	1	25	24	24	24	24	25	24	30	27	29	32	31	40
468a	n/a	<20	18	<20	31	30	31	26	28	29	32	32	33	40
468b	n/a	<20	18	<20	31	30	31	26	28	29	32	32	33	40
468c	n/a	<20	17	<20	31	30	31	26	28	29	32	32	33	40
470	n/a	23	23	23	32	32	32	29	30	31	34	35	35	40
471	n/a	24	23	24	32	31	32	28	30	30	34	34	35	40
472a	n/a	23	23	23	32	32	32	28	30	31	34	34	35	40
472b	n/a	23	23	23	32	32	32	29	31	32	34	35	35	40
474	n/a	<20	18	<20	31	30	31	28	29	29	33	33	33	40
476	n/a	22	21	22	30	30	30	30	31	32	33	34	34	40
477a	11	23	22	23	31	31	31	31	32	34	34	35	36	40
477b	11	23	22	23	31	31	31	31	32	34	34	35	36	40
487a	11	26	26	27	35	36	35	37	37	38	39	40	40	40
488a	n/a	27	27	27	39	38	38	39	39	38	42	41	41	40
488b	10	28	27	28	37	39	38	38	39	40	41	42	42	40
538	8	36	35	35	34	33	33	28	31	30	38	38	38	40
539	8	36	35	34	34	33	33	28	31	30	38	38	38	40
541	8	36	35	34	34	33	33	28	31	30	38	38	38	40
542	8	36	35	34	34	33	33	28	31	30	38	38	38	40
543	8	36	35	34	34	33	33	28	31	30	38	38	38	40
544	8	36	35	35	34	33	33	28	31	30	38	38	38	40
545	8	36	35	34	34	33	33	28	31	30	38	38	38	40

- Notes:
1. L<sub>Aeq,9hr</sub> refers to the L<sub>eq</sub> noise level measured over the entire night period (10.00pm - 7.00am).
  2. Levels highlighted in yellow indicate exceedances of night time 40 dBA L<sub>Aeq,period</sub> cumulative noise criterion at privately-owned receivers.

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## APPENDIX E

### SLEEP AROUSAL NOISE PREDICTIONS

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			
	Year 2018	Year 2021	Year 2025	Consent Criterion
Privately Owned Residential Receivers				
4	37	36	36	45
19	42	40	40	45
20	42	40	40	45
21	42	40	40	45
23	43	41	41	45
35	42	42	41	45
35b	42	42	41	45
43	43	41	42	45
44	41	40	41	45
45	36	35	37	45
47	40	41	41	45
67	43	43	41	45
68	42	43	41	45
74	42	42	41	45
77	41	41	40	45
79	41	41	40	45
80	41	40	40	45
82	39	40	39	45
83	39	40	39	45
84	40	40	39	45
84b	24	25	26	45
86	42	41	41	45
86b	36	37	37	45
96	42	40	41	45
102	41	39	40	45
108	38	39	39	45
112	36	37	37	45
118	39	37	37	45
120	40	37	38	45
120c	41	37	38	45
121	40	36	37	45
136	39	42	42	45
139	36	36	37	45
140	36	38	38	45
140c	38	38	39	45
143	33	41	39	45
147	32	38	40	45
153	35	40	40	45
154	33	39	39	45
156	33	40	40	45
157	34	42	41	45
158	33	41	39	45
159	33	41	39	45
161	33	40	39	45

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			
	Year 2018	Year 2021	Year 2025	Consent Criterion
169	28	35	33	45
171	30	35	34	45
172	30	35	34	45
173	29	33	33	45
174	29	34	33	45
175	29	34	33	45
176	29	34	33	45
177	28	32	31	45
178	29	33	32	45
179	29	33	32	45
180	28	33	32	45
180b	29	33	32	45
180c	28	31	31	45
181	29	33	33	45
181c	30	34	33	45
182	29	32	32	45
182b	29	32	32	45
189	31	36	35	45
190	31	37	35	45
191	31	36	35	45
192	31	36	35	45
193	31	36	35	45
193c	33	35	34	45
194	34	36	35	45
195	34	37	36	45
195d	35	37	36	45
196	35	37	36	45
197	35	37	37	45
198	36	37	37	45
199	36	37	37	45
200	35	36	36	45
202	37	37	38	45
203	37	38	38	45
204	37	37	37	45
206	41	39	39	45
207	42	40	40	45
207b	41	39	39	45
212	40	38	38	45
212b	40	38	38	45
213	41	39	39	45
214	41	39	39	45
215	41	39	39	45
216	41	39	39	45
217	41	39	39	45
218	41	39	39	45

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			
	Year 2018	Year 2021	Year 2025	Consent Criterion
219	41	39	39	45
220	41	39	39	45
221	41	39	40	45
222	42	40	40	45
223	42	40	40	45
224	42	40	40	45
225	41	39	40	45
249	29	28	29	45
252	26	26	26	45
252b	25	26	25	45
257	36	35	36	45
258a	35	34	35	45
258b	31	31	31	45
259	35	34	35	45
260	35	34	35	45
261	34	33	34	45
266	30	30	30	45
267	33	34	34	45
271	30	31	31	45
272	32	32	32	45
272b	32	32	32	45
273	30	31	31	45
283	39	37	37	45
288	40	39	39	45
288b	39	39	39	45
289	41	41	40	45
292	27	26	27	45
296a	29	28	29	45
296b	29	28	29	45
298	28	28	29	45
300	28	28	28	45
302a	27	27	28	45
302b	27	27	27	45
302c	27	27	27	45
310	30	35	34	45
311	31	36	35	45
401	20	24	24	45
402	26	27	28	45
407	23	25	25	45
413a	22	21	21	45
413b	23	22	22	45
415	27	28	28	45
416	27	28	29	45
417	20	20	20	45

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			Consent Criterion
	Year 2018	Year 2021	Year 2025	
418	27	28	28	45
419	<20	<20	<20	45
421	29	30	30	45
422a	25	28	28	45
422b	25	28	28	45
434	27	31	31	45
436	27	31	31	45
437	28	31	31	45
453a	28	29	30	45
453b	28	29	30	45
454	29	29	30	45
456	<20	<20	<20	45
458	30	31	31	45
462a	23	24	24	45
462b	22	23	24	45
463	24	25	25	45
464	29	29	29	45
465	31	31	32	45
466	21	20	22	45
467	29	29	29	45
468a	20	20	21	45
468b	22	20	22	45
468c	20	21	22	45
470	26	26	26	45
471	26	27	27	45
472a	25	26	26	45
472b	26	26	26	45
474	21	20	21	45
475	27	27	27	45
476	25	24	25	45
477a	26	26	26	45
477b	26	26	26	45
481	24	24	24	45
482	24	25	24	45
483	24	23	24	45
484	25	25	25	45
485a	<20	<20	<20	45
485b	<20	<20	<20	45
485c	<20	<20	<20	45
485d	<20	<20	<20	45
485e	<20	<20	<20	45
487a	29	29	29	45
487b	29	29	29	45
488a	30	30	30	45



Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			
	Year 2018	Year 2021	Year 2025	Consent Criterion
488b	30	30	31	45
526	41	40	40	45
527	40	40	40	45
528	40	40	40	45
529	40	40	40	45
530	40	40	40	45
531	40	40	39	45
532	40	40	40	45
533	40	40	40	45
534	40	40	40	45
535	40	40	40	45
536	40	40	40	45
537	40	40	40	45
538	40	39	39	45
539	39	39	39	45
541	39	39	39	45
542	39	39	39	45
543	39	39	39	45
544	39	39	39	45
545	39	39	39	45
547	34	36	35	45
Generic Residential Receivers				
A	37	37	37	45
B	39	39	38	45
C	40	40	39	45
D	40	39	39	45
E	41	39	39	45
F	39	39	39	45
G	39	39	39	45
H	37	38	38	45
I	29	32	32	45
J	38	39	38	45
K	38	38	38	45
L	38	38	38	45
M	37	38	38	45
Council Owned Residential Receiver				
286c	40	38	38	45
Mine Owned Residential Receivers <sup>1</sup>				
1aa	35	44	41	n/a <sup>1</sup>
1ab	27	34	35	n/a <sup>1</sup>
1ac	44	42	42	n/a <sup>1</sup>
1ad	28	30	29	n/a <sup>1</sup>
1ae	45	44	44	n/a <sup>1</sup>
1af	44	43	42	n/a <sup>1</sup>

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			
	Year 2018	Year 2021	Year 2025	Consent Criterion
1ag	43	43	41	n/a <sup>1</sup>
1ah	42	43	41	n/a <sup>1</sup>
1ai	42	43	41	n/a <sup>1</sup>
1aj	42	43	41	n/a <sup>1</sup>
1ak	42	43	41	n/a <sup>1</sup>
1al	42	42	41	n/a <sup>1</sup>
1am	42	41	42	n/a <sup>1</sup>
1an	43	41	42	n/a <sup>1</sup>
1ao	43	39	42	n/a <sup>1</sup>
1ap	42	41	42	n/a <sup>1</sup>
1aq	42	41	42	n/a <sup>1</sup>
1ar	42	41	42	n/a <sup>1</sup>
1as	42	40	42	n/a <sup>1</sup>
1at	41	40	41	n/a <sup>1</sup>
1au	42	40	41	n/a <sup>1</sup>
1av	42	39	41	n/a <sup>1</sup>
1aw	42	39	41	n/a <sup>1</sup>
1ax	42	39	41	n/a <sup>1</sup>
1ay	41	39	40	n/a <sup>1</sup>
1az	40	39	39	n/a <sup>1</sup>
1ba	39	39	39	n/a <sup>1</sup>
1h	39	39	39	n/a <sup>1</sup>
1i	38	38	39	n/a <sup>1</sup>
1j	37	38	39	n/a <sup>1</sup>
1k	37	37	38	n/a <sup>1</sup>
1l	37	38	39	n/a <sup>1</sup>
1m	34	36	35	n/a <sup>1</sup>
1n	36	37	37	n/a <sup>1</sup>
1o	33	34	34	n/a <sup>1</sup>
1p	40	40	39	n/a <sup>1</sup>
1q	43	39	39	n/a <sup>1</sup>
1r	44	55	53	n/a <sup>1</sup>
1s	43	52	51	n/a <sup>1</sup>
1t	40	44	44	n/a <sup>1</sup>
1u	37	41	41	n/a <sup>1</sup>
1v	40	45	44	n/a <sup>1</sup>
1w	38	46	45	n/a <sup>1</sup>
1x	38	51	48	n/a <sup>1</sup>
1y	38	44	44	n/a <sup>1</sup>
1z	29	34	36	n/a <sup>1</sup>
2aa	42	41	41	n/a <sup>1</sup>
2ab	43	40	40	n/a <sup>1</sup>
2ac	36	35	36	n/a <sup>1</sup>
2ad	42	40	40	n/a <sup>1</sup>

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			Consent Criterion
	Year 2018	Year 2021	Year 2025	
2ae	35	35	35	n/a <sup>1</sup>
2af	42	41	41	n/a <sup>1</sup>
2ah	42	41	41	n/a <sup>1</sup>
2ai	42	41	40	n/a <sup>1</sup>
2aj	43	42	42	n/a <sup>1</sup>
2ak	44	42	41	n/a <sup>1</sup>
2al	44	41	42	n/a <sup>1</sup>
2b	44	42	40	n/a <sup>1</sup>
2c	40	40	40	n/a <sup>1</sup>
2d	40	40	40	n/a <sup>1</sup>
2e	45	45	47	n/a <sup>1</sup>
2f	44	44	43	n/a <sup>1</sup>
2g	40	41	39	n/a <sup>1</sup>
2h	50	45	47	n/a <sup>1</sup>
2i	44	44	42	n/a <sup>1</sup>
2j	64	61	<b>61</b>	n/a <sup>1</sup>
2k	47	43	42	n/a <sup>1</sup>
2l	63	58	58	n/a <sup>1</sup>
2m	51	50	50	n/a <sup>1</sup>
2n	31	30	30	n/a <sup>1</sup>
2o	33	33	33	n/a <sup>1</sup>
2p	33	33	33	n/a <sup>1</sup>
2q	33	33	34	n/a <sup>1</sup>
2r	33	33	34	n/a <sup>1</sup>
2s	34	33	34	n/a <sup>1</sup>
2t	32	33	32	n/a <sup>1</sup>
2u	35	35	35	n/a <sup>1</sup>
2v	36	36	36	n/a <sup>1</sup>
2w	37	37	37	n/a <sup>1</sup>
2x	42	40	40	n/a <sup>1</sup>
2y	42	40	40	n/a <sup>1</sup>
2z	43	40	40	n/a <sup>1</sup>
3a	31	37	35	n/a <sup>1</sup>
3b	31	36	35	n/a <sup>1</sup>
3c	33	39	39	n/a <sup>1</sup>
3d	31	36	35	n/a <sup>1</sup>
3e	31	36	35	n/a <sup>1</sup>
3f	31	36	35	n/a <sup>1</sup>
3g	32	38	37	n/a <sup>1</sup>
3i	31	36	35	n/a <sup>1</sup>
3j	30	35	34	n/a <sup>1</sup>
3k	27	30	31	n/a <sup>1</sup>
3l	32	37	37	n/a <sup>1</sup>
3m	32	37	37	n/a <sup>1</sup>

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			Consent Criterion
	Year 2018	Year 2021	Year 2025	
3n	30	35	35	n/a <sup>1</sup>
3o	22	24	23	n/a <sup>1</sup>
3p	22	25	23	n/a <sup>1</sup>
3q	22	25	23	n/a <sup>1</sup>
3r	26	29	28	n/a <sup>1</sup>
3s	26	29	28	n/a <sup>1</sup>
5	39	37	37	n/a <sup>1</sup>
5aa	37	36	36	n/a <sup>1</sup>
5ab	36	35	35	n/a <sup>1</sup>
5ac	37	36	36	n/a <sup>1</sup>
5ad	37	35	35	n/a <sup>1</sup>
5ae	41	39	39	n/a <sup>1</sup>
5f	41	39	39	n/a <sup>1</sup>
5g	42	39	40	n/a <sup>1</sup>
5h	26	26	26	n/a <sup>1</sup>
5i	28	28	28	n/a <sup>1</sup>
5j	25	24	25	n/a <sup>1</sup>
5k	28	28	29	n/a <sup>1</sup>
5l	29	28	29	n/a <sup>1</sup>
5m	31	31	31	n/a <sup>1</sup>
5n	26	26	26	n/a <sup>1</sup>
5o	27	27	27	n/a <sup>1</sup>
5p	27	27	27	n/a <sup>1</sup>
5q	32	32	33	n/a <sup>1</sup>
5r	35	35	35	n/a <sup>1</sup>
5s	36	35	36	n/a <sup>1</sup>
5t	36	35	35	n/a <sup>1</sup>
5u	37	36	36	n/a <sup>1</sup>
5v	29	27	29	n/a <sup>1</sup>
5w	29	27	28	n/a <sup>1</sup>
5x	29	28	29	n/a <sup>1</sup>
5y	37	36	36	n/a <sup>1</sup>
5z	37	36	36	n/a <sup>1</sup>
7	41	39	39	n/a <sup>1</sup>
7b	23	23	24	n/a <sup>1</sup>
7c	23	23	24	n/a <sup>1</sup>
7d	24	23	24	n/a <sup>1</sup>
7e	<20	<20	20	n/a <sup>1</sup>
7f	<20	<20	20	n/a <sup>1</sup>
7g	29	30	30	n/a <sup>1</sup>
7h	29	31	31	n/a <sup>1</sup>
7i	28	29	30	n/a <sup>1</sup>
7j	30	31	31	n/a <sup>1</sup>
7k	28	29	29	n/a <sup>1</sup>

Receiver ID	L <sub>Amax</sub> Noise Level (dBA)			Consent Criterion
	Year 2018	Year 2021	Year 2025	
8a	23	22	23	n/a <sup>1</sup>
8b	23	23	23	n/a <sup>1</sup>
8c	23	22	23	n/a <sup>1</sup>
8d	<20	<20	<20	n/a <sup>1</sup>
8e	<20	<20	<20	n/a <sup>1</sup>
8f	25	25	26	n/a <sup>1</sup>
8g	21	20	23	n/a <sup>1</sup>
8h	20	20	22	n/a <sup>1</sup>
8i	22	22	23	n/a <sup>1</sup>
101	42	39	40	n/a <sup>1</sup>
107	38	39	39	n/a <sup>1</sup>
129	45	60	61	n/a <sup>1</sup>
130	46	62	62	n/a <sup>1</sup>
135	40	42	44	n/a <sup>1</sup>
211	39	38	38	n/a <sup>1</sup>
231	41	41	40	n/a <sup>1</sup>
246	29	29	29	n/a <sup>1</sup>
263	38	37	38	n/a <sup>1</sup>
274	21	22	21	n/a <sup>1</sup>
299	28	28	28	n/a <sup>1</sup>
309	40	43	44	n/a <sup>1</sup>

Note: 1. Consent noise criteria do not apply to mine-owned residences.

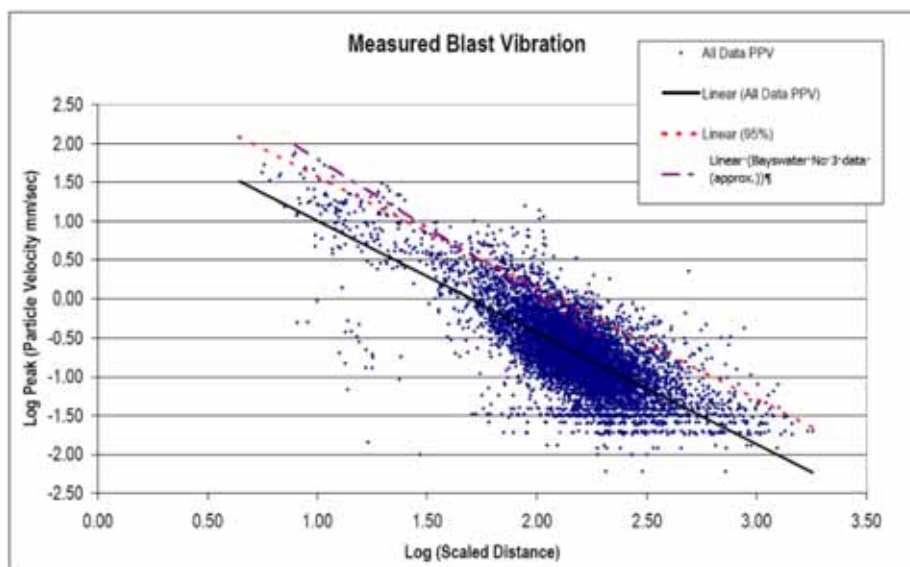
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## APPENDIX F

### BLASTING PREDICTION CURVES

For this study, Wilkinson Murray has derived predictive equations for vibration and overpressure using measurement data from approximately 7,000 blasts. Figure F.1 illustrates the measured data and associated linear trend lines for vibration.

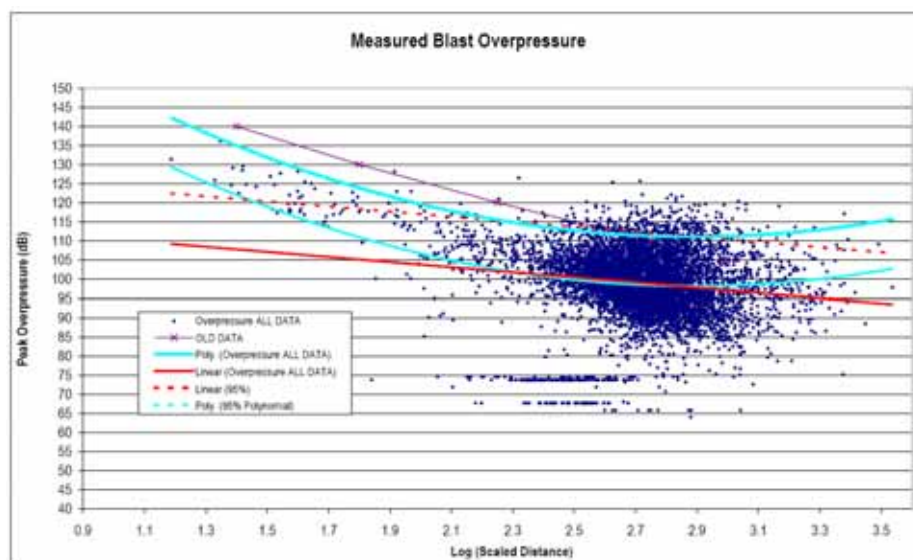
**Figure F.1 Measured Peak Particle Velocity from blasts at Mt Arthur North (logarithmic scale) and Comparison with Data from Bayswater No 3**



The figure shows a revised best fit line, a 95 percentile line, and also the previously-adopted 95 percentile based on 1999 data from Bayswater No 3. The correlation with the old data is close, although the new 95 percentile shows slightly lower vibration levels at shorter scaled distance – in the order of 0.2 to 0.3 millimetres per second (mm/s).

Figure F.2 shows data for overpressure. Analysis of these data showed that the relationship between measured peak overpressure and scaled distance is better defined with a polynomial equation (blue) at close range rather than a standard linear equation (red). At relatively low values of scaled distance, the new polynomial 95 percentile curve is approximately 5 decibels (dB) lower than the linear trend line derived from the previous Bayswater No 3 data.

**Figure F.2 Measured Peak Overpressure from blasts at Mt Arthur North, and Comparison with Data from Bayswater No 3**



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## APPENDIX G

### PREDICTED OVERPRESSURE & VIBRATION LEVELS AT MINE-OWNED RESIDENCES

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Based on the predictive equations outlined in Section 8.2 of the report, Table G-1 indicates the range of 5% exceedance overpressure and ground vibration levels expected at the nearest mine-owned residences resulting from the proposed maximum blast MIC of 1,600 kg. The 5% exceedance levels are then compared to the structural damage criteria of 133 dBLinear (dBL) for overpressure and 10 mm/s for vibration.

**Table G-1 Predicted Overpressure & Vibration<sup>(1)</sup> Levels Resulting from Blasting (5% Exceedance Levels)**

Direction & Closest Receiver ID	Years 2017-2019		Years 2020-2022		Years 2023-2026	
	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)	Peak Overpressure (dBL)	PPV Ground Vibration (mm/s)
Dir- W ID- 2m	111.8 to 112.8	1 to 1.6	111.3 to 112.3	0.7 to 1.3	111.3 to 113.3	0.7 to 1.9
Dir- W ID- 1t	112.2 to 113.3	1.2 to 1.9	112.9 to 116.4	1.6 to 4.4	112.4 to 117.8	1.3 to 5.8
Dir- N ID- 1w	112.1 to 113.5	1.2 to 2	113 to 122.1	1.7 to <b>12</b>	112 to 130.9	1.1 to <b>38.1</b>
Dir- N ID- 1r	112.1 to 113.6	1.2 to 2.1	113.1 to 123.5	1.8 to <b>14.8</b>	112.1 to 132.4	1.1 to <b>44.9</b>
Dir- N ID- 1s	112 to 113.5	1.1 to 2	113 to 122.8	1.7 to <b>13.4</b>	111.9 to 126.7	1.1 to <b>22.9</b>
Dir- NE ID- 1q	112.3 to 114.8	1.3 to 3	113.4 to 123	1.9 to <b>13.8</b>	112.2 to 121.8	1.2 to <b>11.6</b>
Dir- E ID- 1m	112.9 to 116.6	1.6 to 4.5	114.1 to 120.8	2.4 to 9.9	112.6 to 117.5	1.4 to 5.4
Dir- SE ID- 2l	120 to <b>153.1</b>	8.6 to <b>294.5</b>	113 to 123.9	1.7 to <b>15.8</b>	112.7 to 121.4	1.5 to <b>10.8</b>
Dir- SE ID- 2h	119.2 to <b>146.7</b>	7.6 to <b>174.9</b>	112.9 to 122.2	1.6 to <b>12.4</b>	112.6 to 121	1.4 to <b>10.1</b>

Note: 1. Overpressure and ground vibration levels likely to result from maximum MIC of 1,600 kg.  
2. Values that are above the criterion are highlighted in bold.

Based on the proposed maximum blast MIC of 1,600 kg, there are a range of exceedances of both overpressure and/or vibration criteria when blasting within 1,010 m of the mine-owned receivers, with the exceedances expected during all years at the south-east receivers (receivers 2l and 2h), and during years 2020-2022 and 2023-2026 at the north and north-east receivers (receivers 1w, 1r, 1s and 1q).

To meet the relevant criteria when blasting within 1,010 m of the above receivers, the MIC would need to be reduced as per Table G-2.

**Table G-2 Required MIC to Comply with Airblast Overpressure & Vibration Criteria**

Direction & Closest Receiver ID	Years 2017-2019		Years 2020-2022		Years 2023-2026	
	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance	Approx. Minimum Distance	Required MIC to Comply at Minimum Distance
Dir- N ID- 1w	n/a <sup>(1)</sup>	n/a <sup>(1)</sup>	890 m	1,200 kg	399 m	250 kg
Dir- N ID- 1r	n/a <sup>(1)</sup>	n/a <sup>(1)</sup>	771 m	900 kg	356 m	200 kg
Dir- N ID- 1s	n/a <sup>(1)</sup>	n/a <sup>(1)</sup>	824 m	1,050 kg	569 m	500 kg
Dir- NE ID- 1q	n/a <sup>(1)</sup>	n/a <sup>(1)</sup>	808 m	1,000 kg	914 m	1,300 kg
Dir- SE ID- 2l	95 m <sup>(2)</sup>	250 kg <sup>(2)</sup>	737 m	850 kg	957 m	1,400 kg
Dir- SE ID- 2h	138 m <sup>(2)</sup>	250 kg <sup>(2)</sup>	873 m	1,150 kg	1002 m	1,550 kg

Notes: 1. Not relevant as blasting using proposed maximum blast MIC of 1,600 kg is expected to comply with relevant criteria.  
2. Required MIC calculated for blasts at least 400 m from the receiver.

For blasts closer than 1,010 m of any mine-owned residences, on-site blast monitoring data would be used to inform blast design so that the structural damage criteria are not exceeded. Compliance at the receivers presented in Table G-2 is expected to result in compliance at all mine-owned residences.