

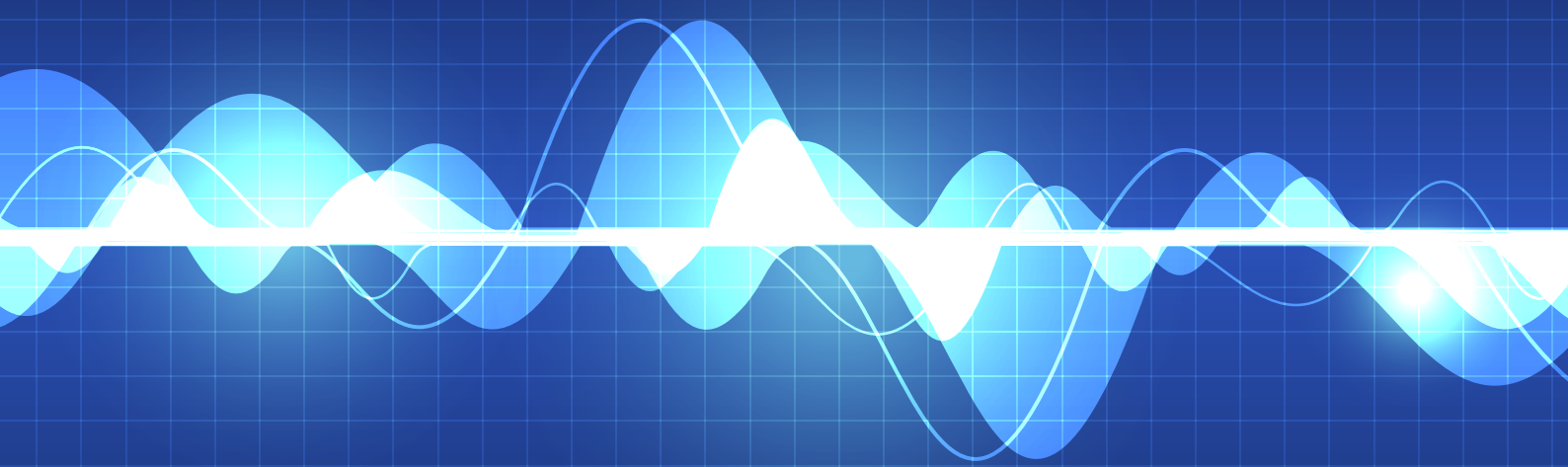
## **APPENDIX L    REVISED NOISE IMPACT ASSESSMENT**

# Angus Place Mine Extension Project

Noise and vibration impact assessment

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Prepared for Centennial Angus Place Pty Ltd  
November 2019





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# Angus Place Mine Extension Project

## Noise and vibration impact assessment

### Report Number

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J190316 RP1

### Client

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Centennial Angus Place Pty Ltd

### Date

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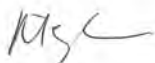
### Version

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Final

### Prepared by

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21 November 2019

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21 November 2019

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# Executive Summary

Angus Place Colliery (the mine) is an existing underground coal mining operation within the Western Coalfields of New South Wales (NSW). The mine produces high quality thermal coal for domestic markets, predominantly to the Mount Piper Power Station. It is located 15 kilometres (km) to the north-west of the regional city of Lithgow and 120 km west-north-west of Sydney.

The mine's existing development consent (Project Approval PA\_06\_0021) will expire in August 2024 and a new consent is required to ensure the mine is operational beyond this date. A new SSD application and supporting Environmental Impact Statement (EIS) was submitted to the NSW Department of Planning and Environment (DPE) (now the Department of Planning, Industry and Environment (DPIE) in April 2014 for the Angus Place Mine Extension Project (APMEP) (SSD 5602).

In response to a prolonged downturn in international coal markets, a decision was made by Centennial Coal in March 2015 to place the mine into care and maintenance following the completion of secondary extraction within Longwall 900W. At this time, the assessment of the APMEP was placed on hold.

Centennial Angus Place Pty Limited (Centennial Angus Place) now propose to prepare and submit an Amended Project Report to DPIE to highlight the proposed changes to the APMEP since the submission of the EIS and to enable DPIE to recommence their assessment and determination of the project. This noise and vibration impact assessment (NVIA) has been prepared to accompany the Amended Project Report. A quantitative assessment of noise emissions associated with operation, construction and off-site traffic has been undertaken.

Operational noise emissions from the APMEP are predicted to result in negligible residual noise impacts at all assessment locations. Predicted maximum noise levels from the APMEP are below the maximum screening criteria and generally consistent with the results of previous noise compliance monitoring. Hence, as per the *Noise Policy for Industry* (NPfI) (EPA 2017) requirements, a detailed maximum noise level event assessment is not required, and the likelihood of sleep disturbance is predicted to be minimal.

Notwithstanding the preceding, since the mine is currently in care and maintenance it was not possible to validate the adopted sound power levels or the relevance (or not) of modifying factors to account for annoying noise characteristics. Hence, Centennial Angus Place has made a commitment to limit evening and night operations until sound power levels of on-site plant and equipment and off-site noise emissions can be verified. Full operation of the site will not be undertaken during evening and night-time periods until compliance with relevant noise limits can be demonstrated.

Noise emissions from the mine including the APMEP will continue to be managed in accordance with the existing Noise Management Plan, which describes the monitoring program for the mine including both attended and real-time, unattended noise monitoring. The NMP will be updated upon approval of the APMEP.

Centennial Angus Place are not seeking approval for fixed locations of the additional downcast ventilation facility or dewatering borehole sites to provide the necessary flexibility during construction. As such, the construction noise assessment has provided a predicted area of affection rather than predicting likely impacts at individual assessment locations.

Given the significant separation distance between likely locations of construction activity and residential assessment locations (minimum of 4 km) the likelihood of construction noise impacts at these locations is negligible and has not been considered in further detail. Based on a likely acoustically worst-case construction scenario, areas up to 250 m from the construction activity will experience noise levels above the noise management level of 60 dB for passive recreation areas.

Off-site road traffic noise levels are predicted to satisfy the relevant noise limits at the nearest residential locations for both construction and operational APMEP-related traffic.

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# 1 Introduction

## 1.1 Overview

Angus Place Colliery (the mine) is an existing underground coal mining operation within the Western Coalfields of NSW. The mine produces high quality thermal coal for domestic markets, predominantly to the Mount Piper Power Station. It is located 15 kilometres (km) to the north-west of the regional city of Lithgow and 120 km west-north-west of Sydney.

The mine's existing development consent (Project Approval PA\_06\_0021) will expire in August 2024 and a new consent is required to ensure the mine is operational beyond this date. A new SSD application and supporting Environmental Impact Statement (EIS) was submitted to the NSW Department of Planning and Environment (DPE) (now the Department of Planning, Industry and Environment (DPIE) in April 2014 for the Angus Place Mine Extension Project (APMEP) (SSD 5602).

The exhibition period for the EIS commenced on 12 April 2014 and ended on 26 May 2014. A Response to Submissions (RTS) report was lodged on 1 October 2014 to respond to submissions received during the public exhibition period. A supplementary RTS was lodged with DPE in December 2014. The EIS and associated RTS reports are available on the Department's Major Project website.

In response to a prolonged downturn in international coal markets, a decision was made by Centennial Coal in March 2015 to place the mine into care and maintenance following the completion of secondary extraction within Longwall 900W. At this time, the assessment of the Angus Place Mine Extension Project was placed on hold.

Centennial Angus Place Pty Limited (Centennial Angus Place) now propose to prepare and submit an Amended Project Report to DPIE to highlight the proposed changes to the APMEP since the submission of the EIS and to enable DPIE to recommence their assessment and determination of the project.

This noise and vibration impact assessment (NVIA) has been prepared to accompany the Amended Project Report.

## 1.2 Assessment guidelines and requirements

This NVIA has been prepared in accordance with the Director General's Environmental Assessment Requirements (EARs) issued 6 November 2012. Table 1.1 lists the matters relevant to this assessment and where they have been addressed in this report.

**Table 1.1 Noise-related Director General's Environmental Assessment Requirements**

Requirement	Section addressed
The EIS must address the following specific issues:	-
<b>Noise</b> – including a quantitative assessment of potential:	
- construction, operational and off-site transport noise impacts;	Chapters 6, 7 and 8
- reasonable and feasible mitigation measures, including evidence that there are no such other available measures; and	Section 6.4
- monitoring and management measures, in particular real-time and attended noise monitoring;	Section 6.4

Attachment 1 of the DGRs outlines technical and policy guidelines that may assist in the preparation of the NVIA. Given the time that has passed since the EARs were issued, some policies relevant to the assessment of noise and vibration have been updated, replaced or other policies have become relevant.

The technical and policy guidelines recommended for use in the DGRs are listed in Table 1.2 together with the policy and guidelines that have been utilised for the purpose of this NVIA and justifications for any differences.

**Table 1.2      Technical and policy guidelines**

DGRs	NVIA
NSW Industrial Noise Policy (INP) (DECC)	INP has been superseded and replaced by the <i>Noise Policy for Industry</i> (NPfI) (EPA 2017).  NSW Government 2018, <i>Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments</i> (VLAMP) has also been referenced.
NSW Road Noise Policy (RNP) (DECCW)	RNP (DECCW 2011) still current.
Environmental Noise Management – Assessing Vibration: a technical guideline (DEC)	This guideline is still relevant and has been referenced in the assessment of vibration from construction activity associated with the APMEP.
Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC)	Blasting will not be undertaken as part of the APMEP; hence this policy is not applicable to this NVIA.
-	NSW Department of Environment Climate Change (DECC) 2009, <i>Interim Construction Noise Guideline</i> (ICNG).

## 2 Project and site description

### 2.1 Project overview

The mine is an existing underground coal mine producing high quality thermal coal for domestic markets, predominantly to the Mount Piper Power Station. It is located 15 km to the north-west of the regional city of Lithgow and 120 km west-north-west of Sydney in NSW.

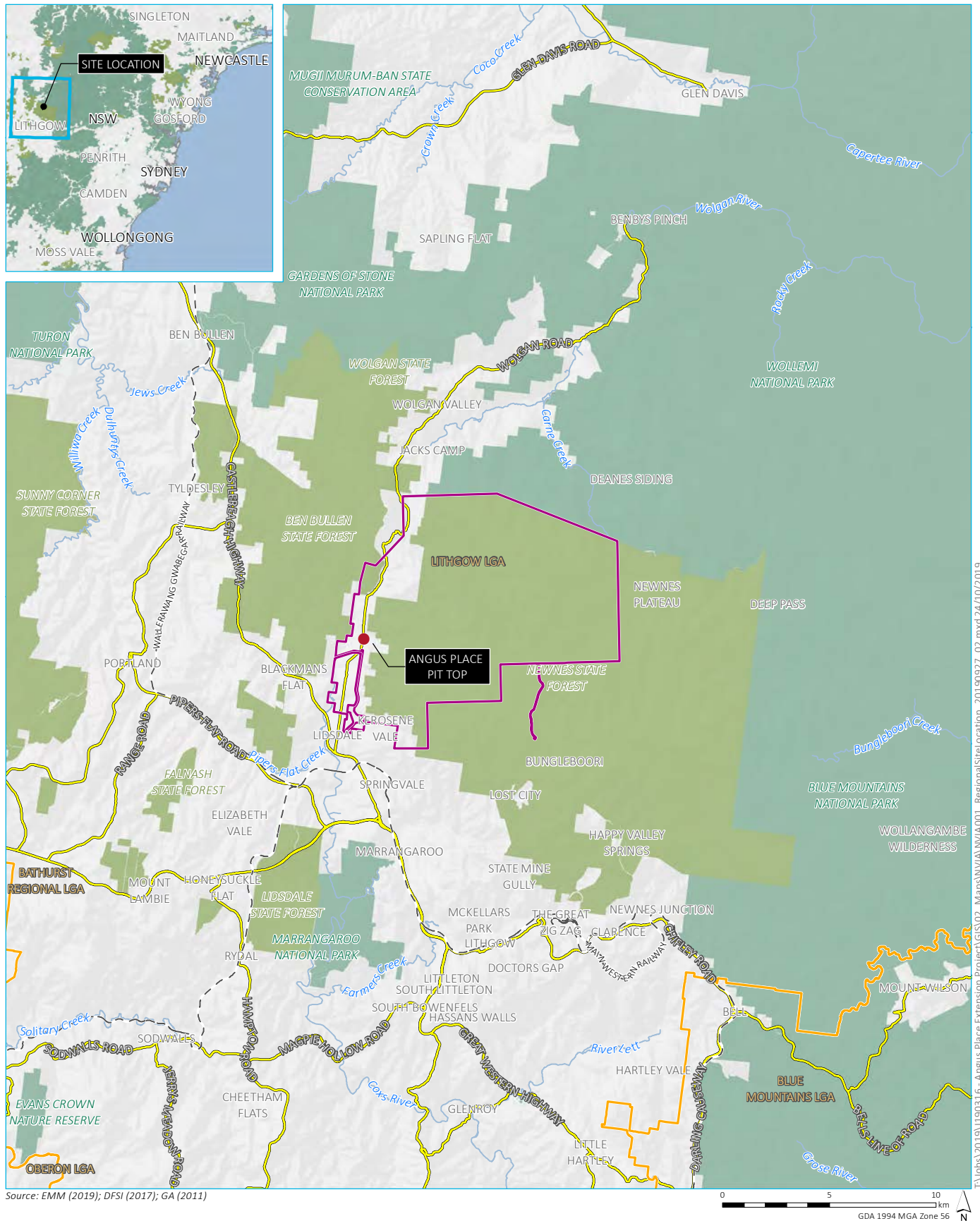
The components of the mine's existing operations are an underground longwall mine, accessed via the Angus Place pit top, and supporting surface infrastructure within the pit top area and on Newnes Plateau within the Newnes State Forest. A regional and locality map is shown in Figure 2.1.

The APMEP as amended will, in general, include all currently approved operations, facilities and infrastructure of the mine, except as otherwise indicated or noted below:

- extend the life of the mine to 31 December 2053;
- increase in Project Application Area from 10,460 ha to 10,551 ha;
- increase in full time equivalent (FTE) personnel from 300 to 450;
- increase extraction from 4 Mtpa to up to 4.5 Mtpa of run of mine (ROM) coal from the Lithgow Seam underlying the Project Application Area;
- continued development of new roadways to enable access to the proposed 1000 panel longwall mining area;
- extraction of existing approved longwall 910;
- development and extraction of 15 longwalls (LW1001-1015) with void widths of 360 m;
- development of underground roadway connections between the Angus Place Colliery underground mine workings and the Springvale Mine underground mine workings;
- transfer up to 4 Mtpa of ROM coal to the Angus Place Colliery pit top for processing and handling before being transported off site in accordance with the Western Coal Services Project development consent (SSD 5579);
- transfer up to 4.5 Mtpa of ROM coal by underground conveyor to the Springvale Mine pit top via proposed new underground connection roadways for handling and processing in accordance with the Springvale Mine Extension Project development consent (SSD 5594);
- enlargement of the ROM coal stockpile at the Angus Place Colliery pit top from 90,000 t to 110,000 t capacity;
- construction and operation of the approved but not yet constructed 4.5 m diameter shaft and ventilation fan at the Angus Place Colliery ventilation facility (APC-VS2) on the Newnes Plateau;
- construction and operation of one additional downcast shaft and mine services boreholes within the proposed Angus Place Colliery ventilation facility (APC-VS3) on the Newnes Plateau to support mining in the 1000 panel area;

- construction and operation of additional dewatering facilities and associated infrastructure on the Newnes Plateau to support mining in the 1000 panel area to facilitate the transfer of mine water into the Springvale Delta Water Transfer Scheme (SDWTS);
- transfer of mine inflows from the existing and proposed workings at Angus Place Colliery to the Springvale Water Treatment Project (SSD 7972) for treatment and beneficial reuse at the MPPS;
- operation of the Angus Place Colliery 930 Bore and associated infrastructure for raw mine water transfer from the SDWTS to the underground mining area; and
- connection to the Lithgow City Council main sewer line prior to the commencement of longwall extraction (subject to a separate development application through Lithgow City Council).

In summary, there will be no change to surface infrastructure and no additional disturbance required at the mine's pit top apart from the increase in the capacity of the ROM coal stockpile. Additional surface infrastructure is limited to the construction and operation of an additional downcast shaft and additional dewatering bore facilities and ancillary infrastructure including access tracks, all within the 1000 Panel Area on the Newnes Plateau.



## KEY

- Project application area
- Mine access intersection
- Rail line
- Main road
- Watercourse/drainage line
- NPWS reserve
- State forest
- Local government area

## Regional and site location

Angus Place Mine Extension Project  
Noise & vibration impact assessment  
Figure 2.1

## 2.2 Site description and assessment locations

The mine is an underground mining operation located 5 km north of the village of Lidsdale, 8 km north-east of the township of Wallerawang and approximately 15 km north-west of the city of Lithgow. The mine is situated in the Lithgow local government area (LGA). Collectively, existing land uses in the vicinity of the mine include pastoral farming, open cut and underground coal mining, power generation and commercial forestry.

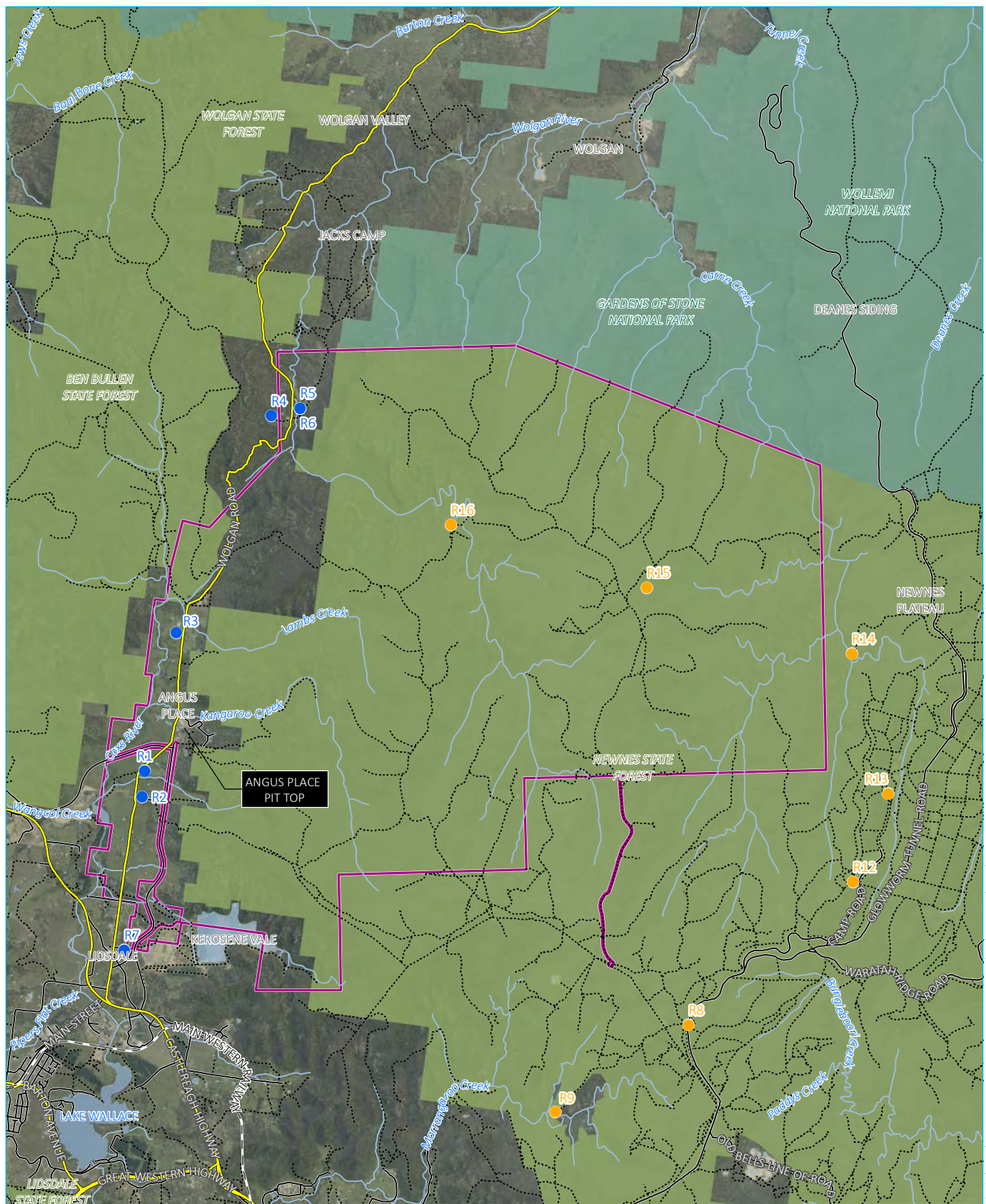
A relatively small number of rural residential properties are located along Wolgan Road and in the Upper Wolgan Valley in the vicinity of the mine. Some parts of the APMEP are located within the Newnes State Forest which is used for recreational purposes such as walking and camping. The locations of the nearest sensitive areas have been identified with reference to the Blue Mountains Conservation Society and Colong Foundation for Wilderness “Places to Visit on the Newnes Plateau” (June 2009). It should also be noted that any of the roads or tracks within or surrounding the APMEP could potentially be utilised for recreational purposes.

The nearest noise sensitive receptors (herein referred to as assessment locations) are shown in Figure 2.2 and described in Table 2.1.

**Table 2.1**      **Assessment locations**

Receptor	Figure ID	Type	Easting	Northing
WR1 (Sharpe)	R1	Residential – rural	229408	6305100
WR2 (Mason)	R2	Residential – rural	229351	6304614
WR3	R3	Residential – rural	229990	6307652
WR4	R4	Residential – rural	231748	6311673
WR5	R5	Residential – rural	232286	6311814
L1	R6	Residential – suburban	229078	6302626
L2 (Nuebeck)	R7	Residential – suburban	229028	6301777
NF1	R8	Recreation	239483	6300390
NF2	R9	Recreation	237015	6298782
NF3	R10	Recreation	243358	6295836
NF4	R11	Recreation	245299	6297921
NF5	R12	Recreation	242528	6303041
NF6	R13	Recreation	243182	6304671
NF7	R14	Recreation	242516	6307266
NF8	R15	Recreation	238709	6308496
NF9	R16	Recreation	235079	6309656





# KEY

- Project application area
- Recreation receptor
- Residential receptor
- Waterbody
- NPWS reserve
- State forest
- Rail line
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line

Assessment locations

Angus Place Mine Extension Project  
Noise & vibration impact assessment  
Figure 2.2

## 3 Assessment methodology

### 3.1 Applying the NPfI to existing sites

The NPfI provides a methodology for the assessment of noise from existing industrial sites. The NPfI acknowledges that some industrial sites were designed for higher allowable noise emissions than those outlined in current NSW noise policy and may have been in existence before neighbouring noise-sensitive developments. The range of mitigation options available for such sites can be limited or costly.

Section 6.1 of the NPfI states that, *“The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.”*

Where noise emissions from the existing site exceed the project noise trigger levels (PNTLs) as defined in the NPfI, the relevant regulatory authorities and proponent will determine achievable noise limits for the site through negotiation and discussion with relevant stakeholders as required.

The process for applying the NPfI to existing sites is outlined in Section 6.1.1 of the NPfI and is summarised as follows as applicable to the APMEP:

1. Undertake an initial evaluation, including whether approvals/licences include noise limits and whether they are being met.
2. Establish relevant PNTLs, in accordance with the NPfI, to establish a benchmark level to assess the need to consider noise mitigation.
3. Measure/predict the noise levels produced by the source in question, having regard to meteorological effects such as wind and temperature inversions.
4. Compare the measured/predicted noise level with the PNTLs.
5. Where the PNTLs are exceeded, assess feasible and reasonable noise mitigation strategies.
6. Develop and refine achievable noise limits that will become goals for the project. This may involve interaction between the regulator and proponent as well as consultation with the community.
7. Monitor compliance with the agreed noise limits, and review and amend the noise performance of the site as required.

### 3.2 Operational noise limits -NPfI

Noise from industrial sites or processes in NSW are regulated by the local council, DPIE and/or the EPA and usually have a licence and/or development consent conditions stipulating noise limits. These limits are normally derived from operational noise levels applied at assessment locations. They are based on EPA guidelines (ie NPfI) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

The reaction to noise is highly subjective. Hence, it is not possible to adopt noise levels that will guarantee that no one will experience an impact. Adherence with the PNTLs should not be interpreted to mean that industrial noise will be inaudible, or that all members of the community will find the noise acceptable. The PNTLs for industry provide a benchmark for assessing a proposed or existing industrial development.



Both the increase in noise level above background levels (ie the intrusiveness of a source) as well as the absolute level of noise are important factors in how a community will respond to noise from industrial sources. To ensure both of these factors are considered, the EPA provides two separate noise trigger levels: intrusiveness and amenity. The fundamental difference being intrusiveness noise levels apply over 15 minutes in any period (day, evening or night), whereas the amenity noise levels apply to the entire assessment period (day, evening or night).

### 3.2.1 Assessing intrusiveness

The intrusive noise trigger levels require that  $L_{Aeq,15\text{ minute}}$  noise levels from the site during the relevant operational periods (ie day, evening and night) do not exceed the rating background level (RBL) by more than 5 dB. The NPfI recommends that the intrusive noise trigger level for evening be set at no greater than the intrusive noise level for daytime and that the intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening.

Minimum assumed RBLs have need adopted in accordance with the NPfI and, in turn, result in minimum intrusiveness noise levels for each period. These are outlined in Table 3.1.

**Table 3.1 Minimum assumed RBLs and project intrusiveness noise levels**

Time of day	Minimum assumed RBL (dB)	Minimum project intrusiveness noise level (dB)
Day	35	40
Evening	30	35
Night	30	35

Source: NPfI (EPA 2017)

Intrusive noise trigger levels are applicable at residential assessment locations only.

### 3.2.2 Assessing amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail and/or community noise. Where the measured existing industrial noise approaches recommended amenity noise level, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that total industrial noise levels remain within the recommended amenity noise levels for an area, the project amenity noise level for the subject development is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

The Wolgan Road residential assessment locations have been categorised in the NPfI 'rural' amenity category as per the definitions provided in the NPfI, since they were deemed to be in "an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels."

The assessment locations within Lidsdale village have been categorised in the NPfI 'suburban' amenity category, since they were deemed to be in "an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry." Suburban areas will often have evening ambient noise levels defined by the natural environment and human activity.

An extract from the NPfI that relates to the amenity noise criteria relevant to the APMEP is given in Table 3.2.

**Table 3.2**      **Amenity noise levels - Recommended  $L_{Aeq}$  noise levels from industrial noise sources**

Type of receptor	Noise amenity area	Time of day <sup>1</sup>	Recommended $L_{Aeq(Period)}$ noise level, dB
Residence	Rural	Day	50
		Evening	45
		Night	40
Area specifically reserved for passive recreation (eg national park)	All	When in use	50

Notes: Daytime 7 am to 6 pm; Evening 6 pm to 10 pm; Night-time 10 pm to 7 am. On Sundays and Public Holidays, Daytime 8 am - 6 pm; Evening 6 pm - 10 pm; Night-time 10 pm - 8 am. The  $L_{Aeq}$  index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

### 3.2.3 Project noise trigger levels

PNTLs are the lower of the derived intrusiveness and amenity criteria.

It is commonly acknowledged and accepted amongst regulators and industry that average noise levels are typically 3 dB higher over a 15-minute worst case assessment period when compared to an entire day (11 hour), evening (4 hour) and night (8 hour) assessment period. This assumption is outlined in the NPfI and has been used in this assessment to standardise the time periods for the intrusive and amenity noise levels.

### 3.2.4 Low frequency noise

Fact sheet C of the NPfI (EPA 2017) provides guidelines for applying modifying factor corrections to account for low frequency noise emissions. The NPfI specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values in Table C2 of the NPfI (EPA 2017), which has been reproduced in Table 3.3 below.

**Table 3.3**      **One-third octave low-frequency noise thresholds**

	One-third octave $L_{Zeq,15\text{ minute}}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more and:

- where any of the one-third octave noise levels in Table 3.3 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or

- where any of the one-third octave noise levels in Table 3.2 are exceeded by more than 5 dB and cannot be mitigated, a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2 dB positive adjustment applies for the daytime period.

### 3.2.5 Sleep disturbance

The difficulty in establishing an absolute noise level criterion that would correlate to an acceptable level of sleep disturbance is acknowledged by relevant governing authorities.

Historic operations at the mine occurred during the night-time period (10 pm to 7 am) as will the proposed operations. Hence, an assessment of the potential for sleep disturbance is required.

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where night-time noise levels at a residential location exceed:

- $L_{Aeq,15\text{ minute}}$  40 dB or the prevailing RBL plus 5 dB (whichever is the greater); and/or
- $L_{Amax}$  52 dB or the prevailing RBL plus 15 dB (whichever is the greater).

Guidance regarding potential for sleep disturbance is also provided in the RNP. The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels ( $L_{Amax}$ ) below 50 to 55 dB are unlikely to awaken people from sleep; and
- one or two noise events per night, with maximum internal noise levels ( $L_{Amax}$ ) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external noise levels in the order of 60–65 dB calculated at the facade of a residence is unlikely to awaken people according to the RNP.

If noise levels over the screening criteria are identified, then additional analysis would consider factors such as:

- how often the events would occur;
- the time the events would occur;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current scientific literature available regarding the impact of maximum noise level events at night.

## 3.3 Voluntary Land Acquisition and Mitigation Policy

VLAMP describes the NSW Government's policy for voluntary mitigation and land acquisition actions undertaken to address noise (and dust) impacts from State significant mining, petroleum and extractive industry developments. The VLAMP states:

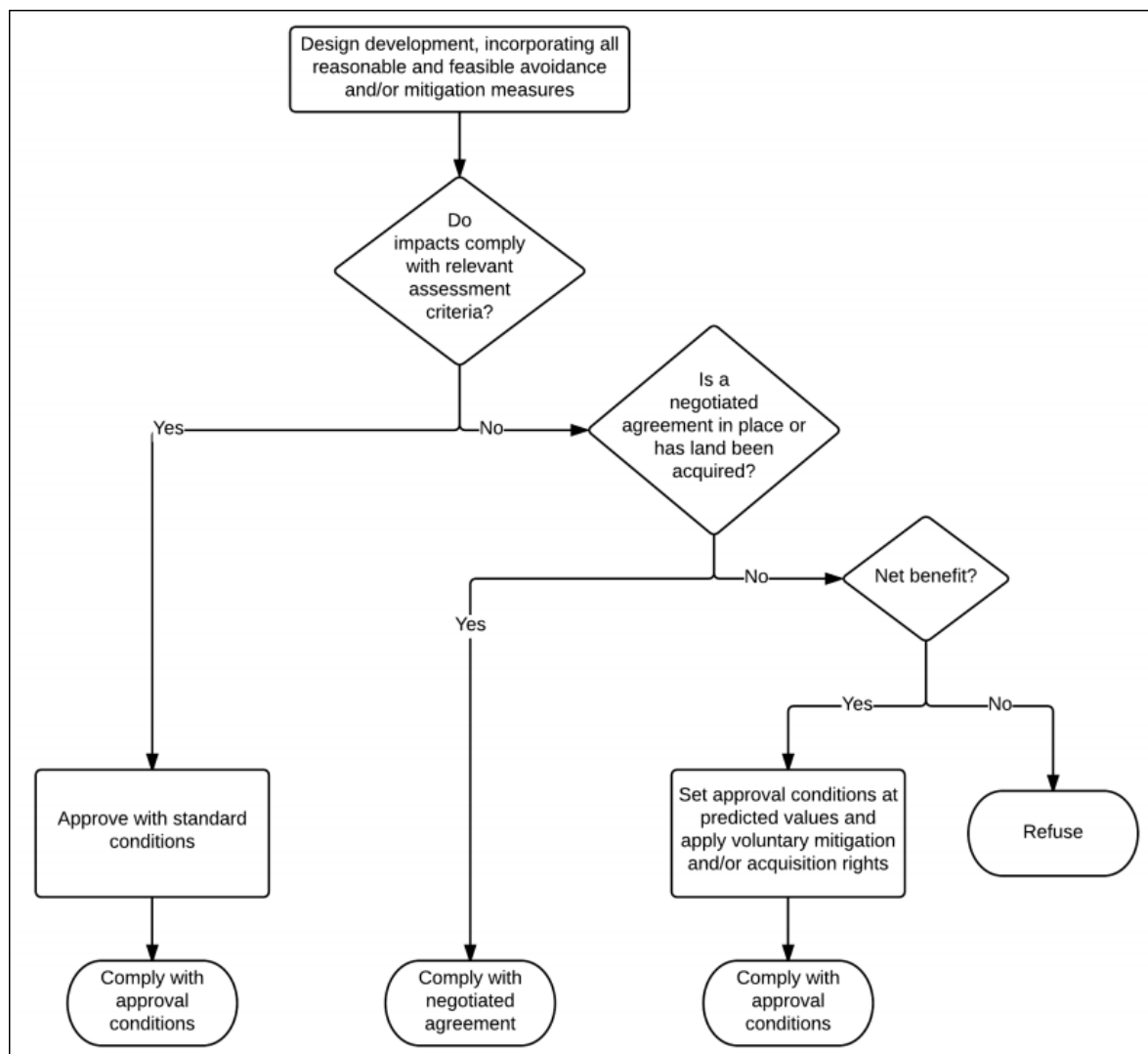
The NSW Government has established a range of policies and guidelines to guide the assessment of the potential impacts of mining, petroleum and extractive industry developments in NSW. These policies and guidelines include assessment criteria to protect the amenity, health and safety of people. They typically require applicants to implement all reasonable and feasible avoidance and/or mitigation measures to minimise the impacts of a development.

In some circumstances, it may not be possible to comply with these assessment criteria even with the implementation of all reasonable and feasible avoidance and/or mitigation measures. This can occur with large resource projects – such as large open cut mines - where the resources are at a fixed location.

However, it is important to recognise that:

- not all exceedances of the relevant assessment criteria equate to unacceptable impacts;
- a consent authority may decide that it is in the public interest to allow the development to proceed, even though there would be exceedances of the relevant assessment criteria, because of the broader social and/or economic benefits of the development; and
- some landowners may be prepared to accept higher impacts on their land, subject to entering into suitable negotiated agreements with applicants, which may include the payment of compensation.

Figure 3.1 provides the general decision-making process that will be applied by consent authorities at the development application stage when assigning voluntary land acquisition and mitigation obligations.



**Figure 3.1** VLAMP (Figure 1) – General approach to decision making during the assessment process

Voluntary land acquisition and mitigation rights in VLAMP are assigned to privately-owned dwellings based on the level of predicted noise above the NPfI project noise target (ie the PNTLs).

The characterisation of the noise impacts (as outlined in VLAMP) are generally based around the human perception to changes in noise levels as explained in the glossary of the acoustic terms. For example, a change in noise level of 1–2 dB is typically indiscernible to the human ear. The characterisation of a residual noise impact of 0–2 dB above the PNTL is therefore considered negligible. This characterisation of residual noise impacts is outlined further in Table 3.4.

**Table 3.4 Characterisation of noise impacts and potential treatments**

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

Source: VLAMP (NSW Government, 2018)

A consent authority should only apply voluntary land acquisition rights where, even with the implementation of best practice management:

- the noise generated by the development would be characterised as significant, according to Table 3.4, at any residence on privately-owned land; or
- the noise generated by the development would contribute to exceedances of the acceptable noise levels plus 5 dB in Table 2.2 of the NPfI on more than 25% of any privately-owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls.

### 3.4 Construction noise

The ICNG (DECC 2009) has been jointly developed by NSW Government agencies including the EPA and DPIE. The objectives of the guideline relevant to the planning process are to promote a clear understanding of ways to identify and minimise noise from construction and to identify ‘feasible’ and ‘reasonable’ management and mitigation measures where required. The guideline recommends standard construction hours where noise from construction activities is audible at residential premises (ie assessment locations):

- Monday to Friday 7 am to 6 pm;
- Saturday 8 am to 1 pm; and
- No construction work is to take place on Sundays or public holidays.

The ICNG acknowledges that works outside standard hours may be necessary; however, justification should be provided to the relevant authorities.

DPIE generally requires that noise emissions from construction associated with mining projects be assessed under the operational noise policy. This is normally because noise from construction activity associated with such projects is similar in nature to that generated by the operation of the project particularly for open-cut mining operations.

In the case of the APMEP, noise from construction activities (ie additional downcast shaft and additional dewatering bore facilities and ancillary infrastructure) will be different in nature to the operations. Further, the location of the proposed construction activity is physically separated from typical operational activity (ie the mine’s pit top). Thus, it is considered appropriate to apply construction noise criteria in accordance with the ICNG.

The ICNG provides a qualitative or quantitative methodology to assess construction noise emissions. The quantitative approach is suited to major construction projects with a typical duration of more than three weeks and has been adopted for the purpose of this assessment. This method requires noise emission predictions from construction activities at the nearest assessment locations and assessment against ICNG recommended noise levels.

Table 3.5 provides noise management levels for residential assessment locations which have been adopted for the quantitative construction noise assessment.

**Table 3.5 ICNG construction noise management levels for residential land uses**

Time of day	Management level <small>L<sub>Aeq(15 minute)</sub></small>	Application
Recommended standard hours: Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm, No work on Sundays or public holidays	Noise-affected RBL + 10 dB	<p>The noise-affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> <li>Where the predicted or measured L<sub>Aeq(15-min)</sub> is greater than the noise-affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</li> </ul>
	Highly noise affected 75 dB	<p>The highly noise-affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> <li>Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> <li>i) times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences);</li> <li>ii) if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ul> </li> </ul>
Outside recommended standard hours	Noise-affected RBL + 5 dB	<ul style="list-style-type: none"> <li>A strong justification would typically be required for works outside the recommended standard hours.</li> <li>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise-affected level, the proponent should negotiate with the community.</li> <li>For guidance on negotiating agreements see Section 7.2.2 of the ICNG.</li> </ul>

Source: ICNG (DECC 2009).

Noise from construction activity associated with the APMEP will have the largest potential to impact users of the recreation areas within the Newnes Plateau. The ICNG provides a noise management level of L<sub>Aeq,15min</sub> 60 dB for passive recreation areas.

### 3.5 Road traffic noise

Assessment of potential noise impact is required from the predicted increase in construction and operational related road traffic. The principle guidance for the assessment of road traffic noise impact on assessment locations is in the RNP. Traffic routes for construction and operational traffic related to the APMEP consist of Castlereagh Highway, Wolgan Road, Ian Holt Drive, Old Bells Line Road, State Mine Gully Road, Glowworm Tunnel Road, Blackfellows Hand Track and Sunnyside Ridge Road. These are categorised as either arterial/sub-arterial or local roads as per the categories provided in the RNP.

Table 3.6 presents the road traffic noise assessment criteria for noise sensitive receptors reproduced from Table 3 and Table 4 of the RNP for road categories relevant to the construction and operation of the APMEP.

**Table 3.6 Road traffic noise assessment criteria for residential land uses**

Receiver type	Road category	Type of project/development	Assessment criteria – dB	
			Day (7 am to 10 pm)	Night (10 pm to 7 am)
Residence	Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	L <sub>Aeq,15hr</sub> 60 (external)	L <sub>Aeq,9hr</sub> 55 (external)
	Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	L <sub>Aeq,1hr</sub> 55 (external)	L <sub>Aeq,1hr</sub> 50 (external)
Open space (passive use)	All	Characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion	L <sub>Aeq,15hr</sub> 55 (external) when in use	n/a

Source: RNP (DECCW 2011)

### 3.6 Operational and construction vibration

The major vibration generating activities will occur during the construction phase of the APMEP including the operation of mobile equipment such as trenching machine, dozer and trucks. Given the minimum separation distance in the order of 4 km between construction activity and the nearest potentially affected residential locations, vibration levels from these activities are predicted to be negligible and below levels of human perception at the nearest residential receivers.

The main vibration generating activities from operations will be the existing pit top coal handling plant and the stockpile dozer. Given the minimum separation distance of approximately 680 m between the mine's pit top and the nearest potentially affected locations, vibration levels from these activities are predicted to be negligible and below levels of human perception at the nearest receivers. Furthermore, vibration levels from the mine's pit top will be unchanged as a result of the APMEP.

Given the preceding, a detailed assessment of vibration has not been provided as part of this report.



## 4 Existing mine noise

### 4.1 Existing mine noise criteria

PA 06\_0021 was granted on 13 September 2006 for the mine under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) by the then Minister for Planning. Subsequently, five modifications to this approval have been approved under Section 75W of Part 3A Major Projects the most recent being Modification 5 approved on 14 September 2018.

The mine is also licensed under the NSW *Protection of the Environment Operations Act 1997* (POEO Act) through Environment Protection Licence (EPL) 467.

#### 4.1.1 Project Approval (06\_0021)

Schedule 3 Condition 17 contains the current noise limits relevant to the mine and is reproduced as follows:

17. From no later than 28 February 2007, the Proponent shall ensure that the noise generated by the project, including the Proponent's operation of the haul road to the Wallerawang power station, does not exceed the noise impact assessment criteria presented in Table 6 at any residence on privately-owned land.

Table 6 Noise impact assessment criteria dB(A)  $L_{Aeq}(15\text{minute})$

Land	Day	Evening	Night
Sharpe	42	38	36
Mason (West) and other Wolgan Road rural properties	41	37	35
Lidsdale village residents	44	40	35

Notes:

a) For more information on the references to land in this condition, see 'Property Details' figure of the EA.

b) The noise criteria do not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and EPA.

c) Noise from the project is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with the  $L_{Aeq}(15\text{ minute})$  noise limits in the above table. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

d) The noise emission limits identified in the above table apply under meteorological conditions of:

- Wind speeds of up to 3 m/s at 10 metres above ground level; or
- Temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.

Schedule 3, Conditions 18, 19 and 20 contain details of land acquisition noise criteria, operating hours of the Wallerawang Power Station Haul Road and additional noise mitigation measures.

It is noted that operation of the Wallerawang and Mt Piper haul roads are now approved under the Western Coal Services Project (SSD-5579). Hence, these haul roads no longer form part of the mine's operations.

Conditions 18 and 20 are reproduced as follows:

#### Land Acquisition Criteria

18. If, after 31 August 2007, the noise generated by the project, including the operation of the haul road to the Wallerawang power station, exceeds the criteria in Table 7, the Proponent shall, upon receiving a written request for acquisition from the landowner (excluding the landowners listed in Table 1), acquire the land in accordance with the procedures in conditions 7-9 of schedule 4.

Table 7: Land acquisition criteria dB(A)  $L_{Aeq}(15 \text{ minute})$

Land	Day	Evening	Night
Sharpe, Mason (West) and other Wolgan Road rural properties	44	40	40
Lidsdale village residents	47	43	43

#### Additional Noise Mitigation Measures

20. Upon receiving a written request from a landowner in Table 8 (unless that landowner has acquisition rights and has requested acquisition) the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, and/or air conditioning at any residence on the land in consultation with the landowner. These additional mitigation measures must be reasonable and feasible. If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Table 8: Land subject to additional noise mitigation

Property
Mason (east)
Sharpe

## 4.2 Existing mine noise emissions

As previously stated, the mine has been in care and maintenance since March 2015. A review of noise compliance monitoring reports undertaken from December 2010 through to December 2014 was undertaken to gain an understanding of noise emissions from the mine prior to when it was placed into care and maintenance.

A summary of results is provided in Table 4.1. Results of quarterly noise monitoring show that the mine's noise emission levels are at or below (ie comply with) relevant noise limits in accordance with PA 06\_0021 and EPL 467.

**Table 4.1**      **Quarterly noise monitoring results summary**

Location	Angus Place Colliery noise emission summary
WR1 (Sharpe)	<p>Angus Place noise emissions generally range between &lt;30 and 37 dB with a maximum <math>L_{Aeq,15min}</math> noise contribution of 39 dB measured in December 2014.</p> <p>The individual monitoring noted noise levels up to 53 dB <math>L_{Amax}</math> from truck loading activities on one occasion, 39 dB from a dozer and 37 dB from general pit-top noise.</p>
WR2 (Mason)	<p>Angus Place noise emissions generally range between &lt;30 and 32 dB with a maximum <math>L_{Aeq,15min}</math> noise contribution of 35 dB measured in December 2010.</p> <p>The individual monitoring noted noise levels up to <math>L_{Amax}</math> 49 dB from truck loading activities on one occasion, 44 dB from a dozer and 34 dB from general pit-top noise.</p>
L2	<p>Angus Place noise emissions were generally inaudible and determined to be &lt;30 dB during all compliance noise surveys at this location.</p>

It is noted that low frequency noise or tonality has not been identified to be associated with the mine's noise emissions at the noise monitoring locations.

## 5 Operational noise criteria

### 5.1 Project noise trigger levels

#### 5.1.1 Intrusiveness

The intrusiveness criteria require that  $L_{Aeq,15min}$  noise levels from site during the relevant operational periods (ie day, evening and night) do not exceed the relevant RBL by more than 5 dB. Previous observations at the nearest residential locations on Wolgan Road indicate that ambient noise levels are dominated by natural sounds with some limited contribution from road traffic. Hence, it is considered appropriate to adopt minimum RBLs as per the NPfI.

Results of previous ambient noise monitoring at Lidsdale, as presented in the previous *Angus Place Colliery Mine Extension Project Noise Impact Assessment* prepared by SLR Consulting Australia Pty Ltd dated January 2014, indicate RBLs ranging from 32 dB to 40 dB in Lidsdale village. Notwithstanding, given the low risk of noise impact at Lidsdale from the mine's operations, a conservative approach has also been applied here with minimum RBLs assumed.

#### 5.1.2 Amenity

Assessment locations within Lidsdale have been categorised in the suburban amenity category in accordance with the NPfI definition of a suburban receiver type (ie an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry).

All other residential assessment locations have been categorised in the NPfI rural amenity category (ie an area with an acoustical environment that is dominated by natural sounds and generally characterised by low background noise levels).

Due to the potential for other industrial developments to contribute to noise emissions in the area, the project amenity noise level for the subject development is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

#### 5.1.3 Summary

The PNTLs determined for the project are summarised in Table 5.1.

**Table 5.1 Project noise trigger levels**

Receptor	Type	Period <sup>1</sup>	Adopted RBL (dB)	Project intrusive noise level, $L_{Aeq,15min}$ (dB)	Project amenity noise level <sup>2</sup> , $L_{Aeq,15min}$ (dB)	Project noise trigger level, $L_{Aeq,15min}$ (dB)
WR1 – WR5	Residential – rural	Day	35	40	48	40
		Evening	30	35	43	35
		Night	30	35	38	35
L1 – L2	Residential – suburban	Day	35	40	53	40
		Evening	30	35	43	35
		Night	30	35	38	35
NF1						
NF2						
NF3						
NF4						
NF5	Recreation	When in use	n/a	n/a	48	48
NF6						
NF7						
NF8						
NF9						

1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am.

2. The project amenity noise level has been determined from the recommended amenity minus 5dB and has also been adjusted by 3dB, as per the NPfl, to convert from  $L_{Aeq,period}$  to  $L_{Aeq,15min}$

## 5.2 VLAMP

If required, residual noise impacts associated with the APMEP will be characterised in accordance with VLAMP as outlined in Table 3.4 to determine the relevance of voluntary land acquisition and mitigation rights.

## 5.3 Sleep disturbance

Table 5.2 provides the noise level event screening criteria for the residential assessment locations.

**Table 5.2 Sleep disturbance screening criteria at residences**

Assessment location	Adopted Night RBL, dB	Night time noise level event screening criteria, dB	
		$L_{Aeq,15\text{ minute}}$	$L_{Amax}$
All residential assessment locations	30	40	52

## 6 Operational noise assessment

### 6.1 Noise modelling methodology and assumptions

This section presents the methods and assumptions used to model noise emissions from the approved pit-top operations including the effects of noise-enhancing meteorological conditions. It is noted that operational noise emissions from the mine are not predicted to change as a result of the APMEP at the nearest residential assessment locations.

Noise predictions were carried out using the Brüel & Kjær Predictor software. ‘Predictor’ calculates total noise levels at assessment locations from concurrent operation of multiple noise sources. The model considers factors such as the lateral and vertical location of plant, source-to-receptor distances, ground effects, atmospheric absorption, topography of the site and surrounding area and applicable meteorological conditions.

Acoustically significant fixed and mobile equipment items considered in the noise model are provided for expected day, evening and night operations in Table 6.1. Equipment sound power levels have been adopted from those provided in the previous *Angus Place Colliery Mine Extension Project Noise Impact Assessment* prepared by SLR Consulting Australia Pty Ltd dated January 2014 which were based on measurements undertaken on-site or taken from a database of similar equipment. It is noted that the ventilation shaft 3 (APC-VS3) is downcast only and will not be a significant source of noise.

Since the results of historical operator-attended noise compliance surveys have not identified that modifying factors are applicable to noise emissions from the mine in relation to low frequency noise or tonality they have not been applied here to noise predictions.

Since the mine is currently in care and maintenance it was not possible to validate the adopted sound power levels or the relevance (or not) of modifying factors to account for annoying noise characteristics. Centennial Angus Place have made a commitment to limit evening and night operations until sound power levels of on-site plant and equipment and off-site noise emissions can be verified.

**Table 6.1 Acoustically significant plant and equipment for noise modelling**

Item (location)	Sound power level per item (dBA)	Operating during this period		
		Day	Evening	Night
Angus Place Pit Top				
CHPP	108	✓	x	x
Compressor house	110	✓	✓	✓
Ventilation fan	100	✓	✓	✓
Winding building	94	✓	✓	✓
Site conveyors	82/m	✓	✓	✓
Dozer	114	✓	x	x
Coal bin	100	✓	x	x
Trucks loading	103	✓	x	x
Stockpile discharge	96	✓	✓	✓
Ventilation shaft 2 site (APC-VS2)				

**Table 6.1      Acoustically significant plant and equipment for noise modelling**

Item (location)	Sound power level per item (dBA)	Operating during this period		
		Day	Evening	Night
Ventilation fan	120	✓	✓	✓
Compressors (x3)	91	✓	✓	✓
Substation	85	✓	✓	✓
<b>Dewatering bore sites (plant at each site)</b>				
Submersible pump (x4)	93	✓	✓	✓
Transformer	83	✓	✓	✓
High voltage switching and control equipment	77	✓	✓	✓

The operational noise model considered a representative snapshot of surface operations with equipment placed at locations representing a realistic operational scenario. Adopted locations of plant and equipment at the pit-top and ventilation shaft 2 site are provided in Appendix A. Locations of the dewatering bore sites are not yet known; however, there is an estimated minimum separation distance of 4 km from the proposed sites to any residential assessment location. Given the preceding and the relatively low sound power levels of equipment at the bore sites, these operations are not expected to contribute to total noise from the APMEP at any residential assessment location. Consideration has been given to potential noise impacts from operation of the dewatering bore sites on recreation areas within the Newnes State Forest.

Operation of the additional downcast shaft and additional dewatering bore facilities within the 1000 Panel Area on the Newnes Plateau are not expected to be significant sources of noise. Operation of the dewatering bore facilities is expected to include a submersible pump, transformer and high voltage switching and control equipment. Given the separation distance to residential receptors, noise impacts are expected to be negligible from these sites.

Typical maximum noise level events at the mine's pit top include trucks being loaded or dozer operations. A typical maximum sound power level of  $L_{Amax}$  126 dB has been assumed for all such events and is based on EMM's measurements of similar activities. These events represent the likely highest maximum noise level events from the mine's pit top.

Standard and noise-enhancing meteorological conditions have been considered in the noise model as per the requirements of the NPfl. Meteorological parameters assumed for the purpose of noise modelling are provided in Table 6.2.

**Table 6.2** Summary of meteorological conditions assumed for noise modelling

Description	Period	Temperature	Relative humidity	Wind speed	Wind direction	Stability class
Standard	Day, evening and night	10°C	90%	0 m/s	n/a	D
Winds	Day, evening and night	10°C	90%	3 m/s	Source to receptor	D
Temperature inversion	Night only	10°C	90%	2 m/s	Source to receptor	F

## 6.2 Operational noise assessment

Predicted noise levels for operation of the APMEP (excluding dewatering bore sites) are presented in Table 6.3 for all assessment locations. Standard and noise-enhancing weather conditions have been considered as per Table 6.2 and the highest predicted noise level is presented for each period.

**Table 6.3** Predicted operational noise levels

Assessment locations	Period	Predicted $L_{Aeq,15min}$ noise level (dB)		PNTL $L_{Aeq,15min}$ (dB)
		Standard	Noise-enhancing	
WR1	Day	38	<b>42</b>	40
	Evening	<30	32	35
	Night	<30	33	35
WR2	Day	<35	35	40
	Evening	<30	<30	35
	Night	<30	<30	35
WR3	Day	<30	32	40
	Evening	<30	<30	35
	Night	<30	<30	35
WR4	Day	<30	<30	40
	Evening	<30	<30	35
	Night	<30	<30	35
WR5	Day	<30	<30	40
	Evening	<30	<30	35
	Night	<30	<30	35
L1	Day	<30	<30	40
	Evening	<30	<30	35
	Night	<30	<30	35
L2	Day	<30	<30	40
	Evening	<30	<30	35



**Table 6.3 Predicted operational noise levels**

Assessment locations	Period	Predicted $L_{Aeq,15min}$ noise level (dB)		PNTL $L_{Aeq,15min}$ (dB)
		Standard	Noise-enhancing	
NF1-9	Night	<30	<30	35
	When in use	<35	<35	48

Operational noise emissions are predicted to satisfy the PNTLs at most assessment locations with the exception being WR1 during the daytime where APMEP noise emissions are predicted to be up to 2 dB above the PNTL. In accordance with the NPfI and VLAMP, this is a negligible exceedance and would not trigger the need to consider additional feasible and reasonable noise mitigation measures. Further, the predicted daytime noise emission at WR1 complies with the current noise limit as per PA 06\_0021. In addition, this residence (Sharpe) is entitled to mitigation rights as per the existing approval and described in Schedule 3, Condition 20 of PA 06\_0021.

Regarding operation of the dewatering bore sites, noise from these sites are not expected to contribute to total APMEP noise levels at any of the residential assessment locations (refer Section 6.1). The total sound power level of all equipment expected to operate at each bore site is 99 dB. Based on this level and assuming reduction due to distance only (ie a conservative approach), noise emissions from the bore sites are expected to be below the relevant criteria for a passive recreation area at a distance of approximately 140 m. Hence, potential noise impacts from the bore sites on recreation areas within the Newnes State Forest will be restricted to a relatively small area surrounding each site.

### 6.3 Sleep disturbance

Although operations will be limited during the evening and night-time periods until noise emissions can be validated, consideration has been given to likely maximum noise event levels at the nearest residential assessment locations. It is noted that pit-top operations are not proposed to change to that currently approved and, hence, maximum noise levels from pit top operations are expected to be the same as those prior to the mine going into care and maintenance.

Based on the review of noise compliance reports (refer Section 4.2), the highest  $L_{Amax}$  noise level measured at WR1 was 53 dB from truck loading activities on one occasion with maximum noise events generally recorded at below  $L_{Amax}$  50 dB.

Based on the assumptions outlined in Section 6.1, maximum noise levels from operation of the dozer or truck loading activities during the night are predicted to be up to  $L_{Amax}$  50 dB under noise-enhancing weather conditions (ie temperature inversion with winds up to 2 m/s) at the nearest residential assessment location (ie WR1). This is below the relevant sleep disturbance maximum screening criteria and generally consistent with the results of previous noise compliance monitoring. Hence, as per the NPfI requirements, a detailed maximum noise level event assessment is not required.

### 6.4 Noise mitigation, management and monitoring

Noise emissions from the mine including the APMEP will continue to be managed in accordance with the existing *Noise Management Plan - Western Region June 2018* (NMP).

The NMP clearly outlines the noise mitigation and management measures common to all Centennial operations within the western region, where applicable, as well as those specific to the mine. The measures applicable to the mine are summarised as follows:

- a combination of partial and fully enclosed conveyors and conveyor drives;

- regular inspection of conveyor idlers and prompt replacement of damaged or highly worn idlers during maintenance;
- regular maintenance of plant and equipment in accordance with the manufacturer's specifications to ensure optimal operating conditions;
- installation of frequency modulated reversing alarms or "quakers" on mobile plant;
- switching off vehicles and plant when not in use;
- operate mobile plant in a quiet, efficient manner and regular training for relevant personnel;
- selecting low noise plant for operation on-site;
- installing acoustic enclosures around processing plants and sealing all unnecessary openings; and
- speed limits on haul routes.

The NMP also describes the short-term and long-term monitoring program for the mine including both attended and real-time, unattended noise monitoring. The NMP will be updated upon approval of the APMEP.

In addition, Centennial Angus Place will undertake a noise monitoring program to validate the assumptions made in this assessment including the sound power level of on-site plant and equipment and off-site noise emissions. Further, operations during the evening and night-time will be limited until it can be demonstrated that operation of the site can comply with the relevant noise limits at the nearest assessment locations.

# 7 Construction noise assessment

## 7.1 Proposed construction activity

Proposed activities associated with construction of the bore pumps and downcast shaft are summarised in Table 7.1 and Table 7.2 together with the sound power level of acoustically significant plant and equipment associated with each phase of construction. Sound power level data has been obtained from an EMM database of similar equipment.

Centennial Angus Place is not seeking approval for fixed locations of this infrastructure. This is to afford flexibility to operations and to allow confirmation of locations nearer to the time when they are required. As such, the construction noise assessment has provided a predicted area of affection from each phase of construction rather than predicting likely impacts at individual assessment locations.

Given the significant separation distance between likely locations of construction activity and residential assessment locations (minimum of 4 km) the likelihood of construction noise impacts at these locations is negligible and has not been considered in further detail.

Proposed construction activity will generally occur during standard construction hours as per the ICNG with the exception of bore hole drilling and activities associated with vent fan construction which will occur 24 hours per day, 7 days per week due to the requirement for continuous drilling activity. It is expected that there would be minimal overlap in timing of the proposed phases of construction.

**Table 7.1 Proposed construction activity – bore pump construction**

Construction phase and approximate duration	Description	Acoustically significant plant and equipment	
		Type	Sound power level L <sub>Aeq,15minute</sub> (dB) per item
Services installation 6 months	Installation of 11 kV supply, fibre communications and pump line from vent facility to first borehole.	Trenching machine	104
		Excavator	105
		Water cart	96
		Delivery trucks (x2)	103
		Franna crane (x2)	99
		<b>TOTAL</b>	<b>111</b>
Site preparation 2 months	Clearing and levelling of area and installation of temporary fencing.	Excavator	105
		Water cart	96
		<b>TOTAL</b>	<b>106</b>
Drilling 2 months	Drill four holes - required to be conducted continuously (ie over 24 hours per day, 7 days per week) and line with steel casings.	Specialist drill rig	114
		<b>TOTAL</b>	<b>114</b>
Site finishing 2 months	Install concrete slab, transformer and permanent fencing. Surface control (geo-fabric and ballast) and final sediment controls.	Excavator	105
		Water cart	96
		100T slewing crane	99
		Concrete delivery trucks (x2)	105
		<b>TOTAL</b>	<b>111</b>

**Table 7.1 Proposed construction activity – bore pump construction**

Construction phase and approximate duration	Description	Acoustically significant plant and equipment	
		Type	Sound power level L <sub>Aeq,15minute</sub> (dB) per item
Bore pump installation 1 month	Two pumps installed initially with two more in subsequent years. Installation conducted by specialist over approximately five days per pump.	100T slewing crane	99
		Franna crane	99
		Delivery trucks (x2)	103
		<b>TOTAL</b>	<b>106</b>

**Table 7.2 Proposed construction activity – Downcast shaft**

Construction phase and approximate duration	Description	Acoustically significant plant and equipment	
		Type	Sound power level L <sub>Aeq,15minute</sub> (dB)
Site preparation 2 months	Clearing and levelling of an area approximately 11.5 ha. Construct new access roads (if required), ponds and tailings storage area.	Dozer	114
		Excavator	105
		Water cart	96
		Grader	106
		<b>TOTAL</b>	<b>116</b>
Site mobilisation 1 month	Mobilisation of equipment to prepare for shaft drilling activity.	100T slewing crane	99
		Franna crane	99
		Delivery trucks (x2)	103
		Generator	99
		<b>TOTAL</b>	<b>108</b>
Site establishment 1 month	Establish drilling equipment on-site.	Crane	99
		Front-end loader	104
		Excavator	105
		Delivery trucks (x2)	103
		Air compressor	75
		Generator	99
		Lighting plants (x2)	75
		Water pumps	89
		Mud mixing plant	92
		Workshop	99
Shaft pre-sink works 60 days	Install fencing and shaft pre-sink cap to prevent inadvertent access. Establish shaft collar and concrete foundation and set up and commissioning of blind boring.	<b>TOTAL</b>	<b>111</b>
		Crane	99
		Delivery trucks (x2)	103
		Concrete delivery truck	105
		Hand tools	99
		<b>TOTAL</b>	<b>110</b>

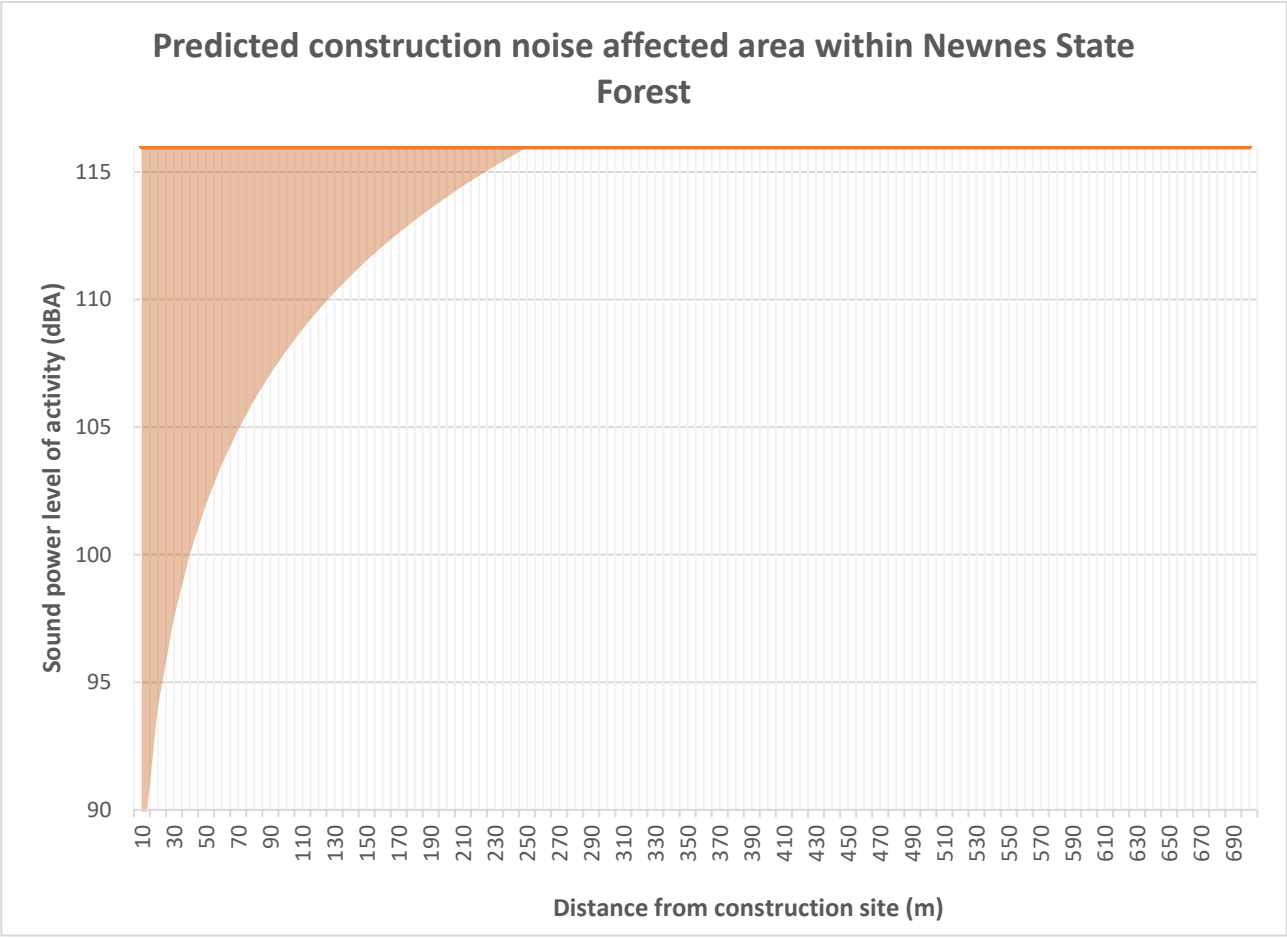
**Table 7.2 Proposed construction activity – Downcast shaft**

Construction phase and approximate duration	Description	Acoustically significant plant and equipment	
		Type	Sound power level $L_{Aeq,15\text{minute}}$ (dB)
Blind boring ~9 months	Blind bore to final depth.	Crane	99
		Drill rig	104
		Generator	99
		Lighting plants (x2)	75
		Air compressor	75
		Water pumps	89
		Mud mixing plant	90
		Workshop	99
		<b>TOTAL</b>	<b>107</b>
Shaft lining 2 months	Installation of steel/composite liner.	Cranes	99
		Hand tools	99
		<b>TOTAL</b>	<b>102</b>
Grouting 9 days	Grouting of the shaft liner.	Welder	99
Shaft dewatering 3 months	Dewater the shaft and transport water off-site.	Water pumps	89
		Trucks (x2)	103
		<b>TOTAL</b>	<b>106</b>
Site rehabilitation 1-2months	Decommission and remove construction equipment and site rehabilitation including ponds and dams.	Excavator	105
		Grader	106
		<b>TOTAL</b>	<b>109</b>

## 7.2 Assessment of construction noise impacts

The construction noise management level for a passive recreation area is  $L_{Aeq,15\text{min}}$  60 dB when the facility is in use. This construction noise assessment has considered the acoustically worst-case scenario for both standard and out-of-standard-hours construction activity, as outlined in Table 7.1 and Table 7.2; ie a sound power level of 116 dB for site preparation for the proposed downcast shaft.

Figure 7.1 shows the potential area of construction noise impacts within the Newnes State Forest. The orange shaded area indicates the area predicted to be affected by construction noise levels above 60 dB for activities of different sound power levels. The figure shows that, for the likely worst-case total construction sound power level of 116 dB (orange line), an area of up to 250 m from the construction activity would experience noise levels above the noise management level of 60 dB for passive recreation areas.



**Figure 7.1**      **Construction noise affected area**

## 8 Road traffic noise assessment

### 8.1 Overview

Proposed road traffic volumes and routes associated with construction and operation of the APMEP are described in the traffic impact assessment prepared for the APMEP (EMM 2019).

The Federal Highway Traffic Noise Model (FHWA) (US Department of Transportation) method was used to predict road traffic noise levels along routes associated with the APMEP. Relative to other algorithms, the FHWA method provides a higher level of accuracy in predictions for relatively low traffic volumes (ie less than 200 movements per hour). This prediction method considers traffic flow volume, average speed, percentage of heavy vehicles and road gradient to establish noise source strength, and includes attenuation due to distance, ground absorption and screening from buildings or barriers.

### 8.2 Construction

Construction-related traffic will primarily be to and from Glowworm Tunnel Road via Old Bells Line of Road and State Mine Gully Road on the Newnes Plateau.

The predicted daily construction traffic generation for the APMEP is provided in Table 8.1.

**Table 8.1** Project-related daily construction traffic

Construction activity	Light vehicles (LV)	Heavy vehicles (HV)	LV/HV movements
Bore pump construction	37	15.5	74/31
Downcast shaft construction	20	66	40/132
<b>Total</b>	<b>57</b>	<b>81.5</b>	<b>114/163</b>

The proposed construction traffic routes and distribution of light and heavy vehicles are described as follows:

- 50% of light vehicles will travel via State Mine Gully Road and Glowworm Tunnel Road;
- 50% of light vehicles via Old Bells Line of Road and Glowworm Tunnel Road; and
- 100% of heavy vehicles via Old Bells Line of Road and Glowworm Tunnel Road.

The nearest potentially affected residential façade locations on State Mine Gully Road are situated approximately 7 m from the road kerb/edge. Existing daily traffic on State Mine Gully Road is estimated at 53 light vehicle movements.

Based on the above traffic volumes, the predicted road traffic noise levels at the nearest potentially affected residence on State Mine Gully Road are provided in Table 8.2.

**Table 8.2 Road traffic noise results**

Road	Receiver type (distance from road)	Existing noise levels $L_{Aeq,1hour}$ , dB		Future <sup>1</sup> noise levels $L_{Aeq,1hour}$ , dB		Criteria $L_{Aeq,1hour}$ , dB		Increase between existing and future, dB	
		Day <sup>2</sup>	Night <sup>2</sup>	Day	Night	Day	Night	Day	Night
State Mine Gully Road	Residence (7 m)	51.0	44.2	54.2	47.6	55	50	+3.2	+3.4

Notes: 1. Levels inclusive of the predicted APMEP construction traffic.  
 2. Day and night traffic noise levels have been predicted based on the assumption that 90% of total daily traffic movements occur during the day period and 10% during the night-time period.  
 3. Hourly traffic volumes for the daytime have been assumed to be half the total daily traffic. Total night-time traffic volumes have been assumed to occur during a one hour period. This provides a conservative assessment of road traffic noise levels.

Construction road traffic noise levels are predicted to satisfy the relevant noise criteria for the nearest residential locations.

### 8.3 Operation

During operations, light vehicles will predominantly require access to the mine’s pit top area via Wolgan Road.

The nearest residential façade locations potentially affected by operational traffic are located on Wolgan Road at a minimum distance of approximately 13 m from the road kerb/edge.

Existing daily traffic on Wolgan Road is estimated at 240 light vehicle movements and includes minimal existing traffic to/from the pit-top since the mine is currently in care and maintenance.

The proposed project-related light vehicle movements for each shift (including a 10% carpooling ratio) are shown in Table 8.3. The total daily light vehicle movements are therefore 502.

**Table 8.3 Predicted daily light vehicle movements (include 10% carpooling)**

Vehicle movements	Weekday shifts (Monday – Thursday)		
	Morning shift	Afternoon shift	Night shift
Light vehicle numbers (assumes 10% carpooling)	107	72	72
<b>Total light vehicle movements</b>	<b>214</b>	<b>144</b>	<b>144</b>

Based on the above operational and existing traffic volumes, the predicted road traffic noise levels at the nearest potentially affected residence on Wolgan Road are provided in Table 8.4.



**Table 8.4 Road traffic noise results**

Road	Receiver type (distance from road)	Existing noise levels $L_{Aeq,period}$ , dB		Future <sup>1</sup> noise levels $L_{Aeq,period}$ , dB		Criteria $L_{Aeq,period}$ , dB		Increase between existing and future, dB	
		Day <sup>2</sup>	Night <sup>2</sup>	Day	Night	Day	Night	Day	Night
Wolgan Road	Residence (13 m)	52.1	41.5	53.1	45.9	60	55	+1.0	+4.4

Notes:

1. Levels inclusive of the predicted APMEP operations traffic.
2. Existing day and night traffic noise levels have been predicted based on the assumption that 90% of total daily traffic movements occur during the day period and 10% during the night-time period.
3. Day and night future traffic volumes have considered the proposed shift times and expected arrival and departure time of employees.

Operational road traffic noise levels are predicted to satisfy the relevant noise criteria for the nearest residential locations.

It is noted that traffic associated with the ongoing operation of the boreholes and downcast ventilation shaft will be minimal and therefore potential noise from associated road traffic along the route assessed in Section 8.2 will be negligible.

## 9 Conclusion

EMM has prepared this NVIA to accompany the Amended Project Report for the APMEP. A quantitative assessment of noise emissions associated with operation, construction and off-site traffic has been undertaken.

Operational noise emissions from the APMEP are predicted to result in negligible residual noise impacts at all assessment locations. Predicted maximum noise levels from the APMEP are below the maximum screening criteria and generally consistent with the results of previous noise compliance monitoring. Hence, as per the NPfI requirements, a detailed maximum noise level event assessment is not required, and the likelihood of sleep disturbance is predicted to be minimal.

Notwithstanding the preceding, since the mine is currently in care and maintenance it was not possible to validate the adopted sound power levels or the relevance (or not) of modifying factors to account for annoying noise characteristics. Hence, Centennial Angus Place has made a commitment to limit evening and night operations until sound power levels of on-site plant and equipment and off-site noise emissions can be verified. Full operation of the site will not be undertaken during evening and night-time periods until compliance with relevant noise limits can be demonstrated.

Noise emissions from the mine including the APMEP will continue to be managed in accordance with the existing NMP, which describes the monitoring program for the mine including both attended and real-time, unattended noise monitoring. The NMP will be updated upon approval of the APMEP.

Centennial Angus Place are not seeking approval for fixed locations of the additional downcast ventilation facility or dewatering borehole sites to provide the necessary flexibility during construction. As such, the construction noise assessment has provided a predicted area of affection rather than predicting likely impacts at individual assessment locations.

Given the significant separation distance between likely locations of construction activity and residential assessment locations (minimum of 4 km) the likelihood of construction noise impacts at these locations is negligible and has not been considered in further detail. Based on a likely acoustically worst-case construction scenario, areas up to 250 m from the construction activity will experience noise levels above the noise management level of 60 dB for passive recreation areas.

Off-site road traffic noise levels are predicted to satisfy the relevant noise limits at the nearest residential locations for both construction and operational APMEP-related traffic.

# Glossary

Technical terms typically utilised in a noise assessment report are explained in Table 9.1.

**Table 9.1** Glossary of acoustic terms and abbreviations

Abbreviation or term	Definition
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured $L_{A90}$ statistical noise levels.
Amenity noise criteria	The amenity noise criteria relate to the overall level of industrial noise. Where existing levels of industrial noise (excluding the subject development) approach the acceptable amenity noise criteria, then noise levels from new industries need to demonstrate that they will not be an additional contributor to existing industrial noise.
A-weighting	There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempts to closely approximate the frequency response of the human ear.
Day period	Monday–Saturday: 7.00 am to 6.00 pm, on Sundays and public holidays: 8.00 am to 6.00 pm.
dB	Noise is measured in units called decibels (dB).
DPIE	NSW Department of Planning, Industry and Environment
EA	Environmental assessment
EMM	EMM Consulting Pty Limited
EP&A Act	NSW <i>Environmental and Planning Assessment Act 1979</i> (NSW)
EPA	NSW Environment Protection Authority (formerly the Department of Environment, Climate Change and Water).
Evening period	Monday–Saturday: 6.00 pm to 10.00 pm, on Sundays and public holidays
ICNG	Interim Construction Noise Guideline
Intrusive noise criteria	The intrusive noise criteria refers to noise that intrudes above the background level by more than 5 dB.
$L_{A1}$	The A-weighted noise level exceeded for 1% of the time.
$L_{A10}$	The A-weighted noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
$L_{A90}$	The A-weighted noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
$L_{Aeq}$	The A-weighted energy average noise level. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq(15\text{-minute})}$ descriptor refers to an $L_{Aeq}$ noise level measured over a 15 minute period.
$L_{Amax}$	The maximum A-weighted sound pressure level received during a measurement interval.
Night period	Monday–Saturday: 10.00 pm to 7.00 am, on Sundays and public holidays: 10.00 pm to 8.00 am.
NMP	Noise management plan
PNTL	The project noise trigger levels (PNTLs) are criteria for a particular industrial noise source or industry. The PNTLs are the lower of either the intrusive noise criteria or amenity noise criteria.
POEO Act	NSW <i>Protection of the Environment Operations Act 1997</i> (NSW)
RBL	The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels.
RNP	Road Noise Policy

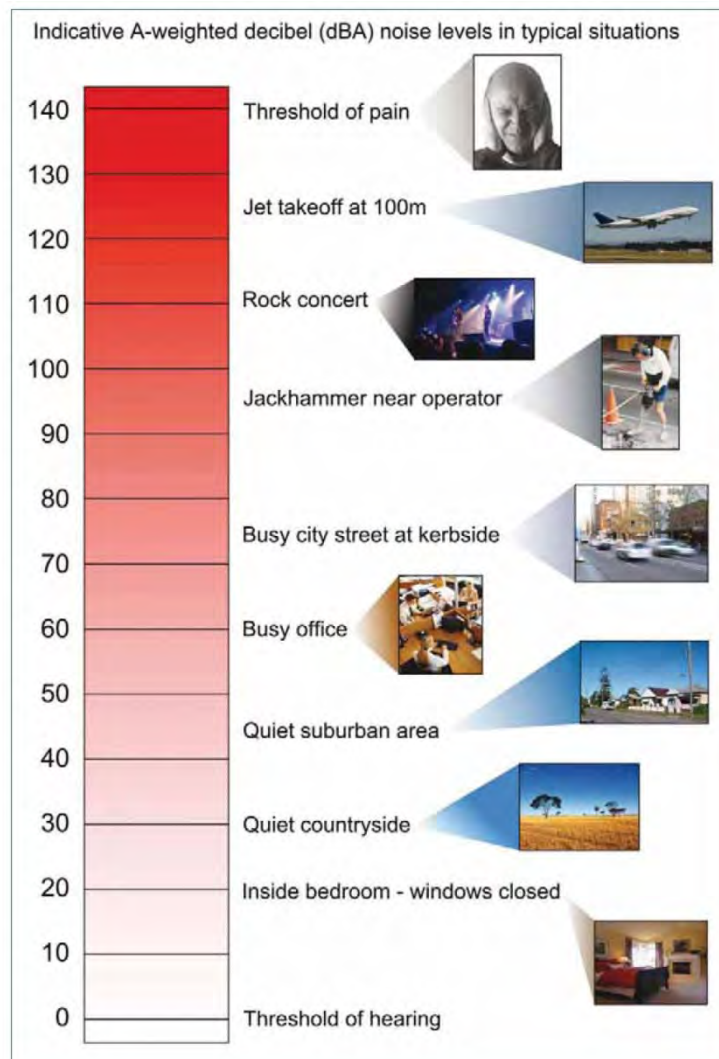
**Table 9.1**      **Glossary of acoustic terms and abbreviations**

Abbreviation or term	Definition
Sound power level ( $L_w$ )	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table 9.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure 9.1.

**Table 9.2**      **Perceived change in noise**

Change in sound level (dB)	Perceived change in noise
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud



Source: Road Noise Policy (Department of Environment, Climate Change and Water 2011)

**Figure 9.1** Common noise levels

# References

Australian Standard AS 1055-1997, *Acoustics - Description and Measurement of Environmental Noise*.

EMM 2019, *Angus Place Mine Extension Project – Traffic Impact Assessment*. Report prepared by EMM for Centennial Angus Place.

NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy*.

NSW Environmental Protection Authority (EPA) 2009, *Interim Construction Noise Guideline*.

NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry*.

NSW Government 2015, *Voluntary Land Acquisition and Mitigation Policy*.

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Appendix A

## Noise model assumptions

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