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Angus Place Colliery
Mine Extension Project
Noise Impact Assessment

Report Number 630.10123.01030-R1

24 January 2014

Centennial Angus Place Pty Ltd
Wolgan Road
Lidsdale NSW 2790

Version: Revision 3

Angus Place Colliery

Mine Extension Project

Noise Impact Assessment

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Level 1, 14 Watt Street Newcastle NSW 2300 Australia

(PO Box 1768 Newcastle NSW 2300 Australia)
T: 61 2 4908 4500 F: 61 2 4908 4501
E: newcastleau@slrconsulting.com www.slrconsulting.com

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
630.10123.01030-R1	Revision 3	24 January 2014	Nathan Archer	Katie Teyhan	Katie Teyhan
630.10123.01030-R1	Revision 2	24 October 2013	Nathan Archer	Katie Teyhan	Katie Teyhan
630.10123.01030-R1	Revision 1	26 July 2013	Nathan Archer	Katie Teyhan	Katie Teyhan
630.10123.01030-R1	Revision 0	27 May 2013	Nathan Archer	Katie Teyhan	Katie Teyhan

Executive Summary

PROPOSED ANGUS PLACE MINE EXTENSION PROJECT

Centennial Angus Place Pty Ltd (Centennial Angus Place) proposes to extend its mining operations, using longwall mining techniques to the east of its existing operations at the Angus Place Colliery (Angus Place), located 15km northwest of the city of Lithgow, NSW. The additional infrastructure associated with the proposed Angus Place Mine Extension Project (APMEP) is located in the Newnes State Forest, approximately 7 km east of the existing Angus Place pit top.

PROJECT SPECIFIC NOISE LEVELS

Project specific noise levels have been established for the APMEP in accordance with the NSW Industrial Noise Policy (INP) (EPA, 2000) and associated Application Notes (OEH, 2011) for the noise impact assessment for the modification of existing industrial premises. The project specific noise levels provide guidance for future noise reduction and are non-mandatory.

The INP Application Notes state that where noise levels from the existing operations already exceed the project specific noise levels, the proposed modification shall not significantly increase the existing noise emissions.

OPERATIONAL NOISE IMPACT ASSESSMENT

Noise monitoring of existing Angus Place pit top operations has been conducted by SLR in accordance with the Angus Place Noise Monitoring Program (NMP) from May 2008 to present. Noise monitoring results show that noise levels associated with existing Angus Place pit top operations have been measured to be at or below the relevant project specific noise levels since January 2009.

Since no changes are proposed at the Angus Place pit top due to the APMEP, there will be no change to the noise emissions from existing Angus Place operations.

Noise modelling has indicated that the noise emissions from existing Angus Place pit top and the proposed operation of the APMEP will be at or below the relevant noise criteria. The addition of the proposed APMEP plant and equipment will result in a negligible noise level increase at the nearest potentially affected residential receiver locations.

No noise level changes are predicted at the nearest noise sensitive residential locations due to the additional infrastructure associated with the APMEP.

The operational noise criteria for the Newnes State Forest recreational area is predicted to be met at distances of approximately 550 m to 700 m from the APC-VS2 area and less than 100 m from the proposed borehole locations.

CONSTRUCTION NOISE IMPACT ASSESSMENT

Noise modelling has indicated that the noise emissions from the construction of the proposed APMEP are significantly below the relevant noise criteria at the nearest potentially affected receiver locations.

Executive Summary

CUMULATIVE NOISE IMPACT ASSESSMENT

Cumulative noise levels from the existing, approved and proposed operations with the APMEP are predicted to be at or below the relevant noise amenity criteria at the nearest potentially affected residential receivers. No changes to the cumulative noise levels are predicted at the nearest noise sensitive residential locations due to the additional plant associated with the APMEP.

VIBRATION IMPACT ASSESSMENT

Given the separation distance between vibration generating activities and the nearest potentially affected residential locations vibration levels from the APMEP are predicted to be negligible and below levels of human perception at the nearest residential receivers.

ROAD TRAFFIC NOISE IMPACT ASSESSMENT

Traffic noise generated by the construction and operation of the proposed APMEP is predicted to be within the NSW Road Noise Policy (RNP) criteria at all receiver locations.

NOISE MITIGATION AND MANAGEMENT RECOMMENDATIONS

While noise modelling has indicated that there will be negligible noise impacts associated with the APMEP, the following noise management measures have been recommended for consideration:

- Continued noise monitoring on site and within the community in accordance with the Angus Place Noise Monitoring Program (refer SLR Report 30-1942-R2 *Angus Place Colliery Noise Monitoring Program* dated 15 December 2008).
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Incorporate clear signage at the site including relevant contact numbers for community enquiries.
- Prompt response to any community issues of concern.
- Adoption of “quiet” work practices at the vent fan and borehole compounds.

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1 INTRODUCTION

Centennial Angus Place Pty Ltd (Centennial Angus Place) proposes to extend its mining operations, using longwall mining techniques to the east of its existing operations at the Angus Place Colliery (Angus Place), located 15km northwest of the city of Lithgow, NSW. The Project Application Area boundary is shown in **Figure 1**.

Angus Place's development consent (06_0021) will lapse on 18 August 2024. However, longwall mining at Angus Place in accordance with the current mine plan will end in March 2016. Accordingly, Centennial Angus Place is seeking approval for the continuation of longwall mining at Angus Place to the east of the current workings within its Mining Lease (ML) 1424 lease boundary (refer **Figure 1**) beyond March 2016.

The objective of this assessment was to identify the potential impacts of noise associated with the Angus Place Mine Extension Project (APMEP), the cumulative impacts of the APMEP with approved Angus Place mining operations and the cumulative impacts of the modified Angus Place with other activities/operations in the proximity of Angus Place.

The noise assessment has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with the Environment Protection Agency (EPA) *NSW Industrial Noise Policy* (INP) (and associated Application Notes), *Interim Construction Noise Guideline* (ICNG), *NSW Road Noise Policy* (RNP) and the *Environmental Noise Management – Assessing Vibration: A Technical Guide*. Reference has also been made to the Blue Mountains Conservation Society and Colong Foundation for Wilderness *"Places to Visit on the Newnes Plateau"* (June 2009) with respect to sensitive receiver locations.

2 PROJECT OBJECTIVES AND OVERVIEW

The overall objective of the APMEP is to obtain approval for the continuation of mining at Angus Place. The objectives of the APMEP are as follows:

- Design of the extension project in accordance with ecological sustainable principles.
- Coal production of a total of up to 4 million tonnes per annum (Mtpa) of coal from the Lithgow coal seam.
- Extraction of coal using longwall mining techniques from an area identified as Angus Place East within the APMEP Application Area (refer **Figure 1**).
- Construction and operation of the following facilities to support the APMEP:
 - A ventilation facility (APC-VS3) consisting of a single downcast (intake) shaft.
 - Dewatering borehole sites to deliver water into the existing Springvale-Delta Water Transfer Scheme.
 - Water management structures.
 - Shaft spoil emplacement area.
- Upgrade of access track from Sunnyside Ridge Road to the proposed ventilation facility (APC-VS3) and dewatering borehole sites; and
- Continue to provide employment of a full time workforce of 225 persons and up to 75 contractors.

The location of the proposed surface infrastructure is shown in **Appendix A**.

Angus Place's coal processing and distribution network is being proposed to be amalgamated into the existing Springvale Coal Services Facility. The Springvale Coal Services Facility is in the process of submitting an application for the upgrade of their facilities, and as part of this proposed upgrade, the coal processing and distribution logistics of Angus Place will be transferred into Springvale Coal Services operations. This is an administrative transfer of the existing infrastructure between three of Centennial's business units.

The scope of the noise assessment was designed to address the Director-Generals Requirements (DGRs) for the Project (issued 6 November 2012) with regard to noise. A synopsis of these requirements is provided in **Table 1**.

Table 1 Director-General's Requirements

Director-General's Requirement	Section Addressed
Noise and Vibration	
Noise and Vibration – including a quantitative assessment of potential:	
- Construction, operational and off-site transport noise impacts	Sections 6, 9, 11, 12 and 14
- Reasonable and feasible mitigation measures, including evidence that there are no such measures available other than those proposed; and	Section 16
- Monitoring and management measures, in particular real time and attended noise monitoring.	Sections 16 and 17
Attachment 1 Technical & Policy Guidelines	
Noise and Blasting	
- NSW Industrial Noise Policy (EPA, 2000)	Section 6, 11 and 13
- Environmental Noise Management – Assessing Vibration : a technical guide (DEC, 2006)	Section 15
- NSW Road Noise Policy (DECCW, 2011)	Sections 6 and 14
- Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC, 1990)	Not Applicable

3 PROJECT DESCRIPTION

3.1 Background

Angus Place is an underground mining operation located 5 km north of the village of Lidsdale, 8 km northeast of the township of Wallerawang and approximately 15 km northwest of the city of Lithgow. Angus Place is situated in the Lithgow local government area (LGA). The mine's regional location is shown in **Figure 1**.

Mount Piper Power Station is located 6 km to the west and Wallerawang Power Station is located 5.5 km south-southwest.

Angus Place is bordered by Baal Bone Colliery (Xstrata Coal Pty Ltd) and Invincible Colliery (CET Resources Pty Ltd) to the north, Springvale Colliery (Centennial Springvale Pty Ltd) to the south and the Wolgan Valley and Newnes State Forest to the north-east. Collectively, existing land uses in the vicinity of the colliery include pastoral farming, open cut and underground coal mining, power generation and commercial forestry.

A number of residential communities surround the Angus Place Colliery including Lidsdale approximately 5 km to the south and Blackmans Flat approximately 3.5 km to the west. A small number of rural residential properties are also located along Wolgan Road and in the Upper Wolgan Valley in the vicinity of the colliery. The nearest affected residential receivers to the APMEP are detailed in **Section 4**.

The additional infrastructure associated with the APMEP is located in the Newnes State Forest, approximately 7 km east of the existing Angus Place pit top. The additional infrastructure is presented in **Appendix A** along with the location of the nearest surrounding residential receivers. The APMEP Application Area is shown in **Figure 1**.

Angus Place is located within a region of significant topographical variation as shown in **Figure 2**. The boundary of the colliery lies along the western edge of the Great Dividing Range and is situated at an altitude of between approximately 900 m to 1100 m AHD. It is bordered by the Wolgan Valley to the north and the Newnes Plateau to the east.

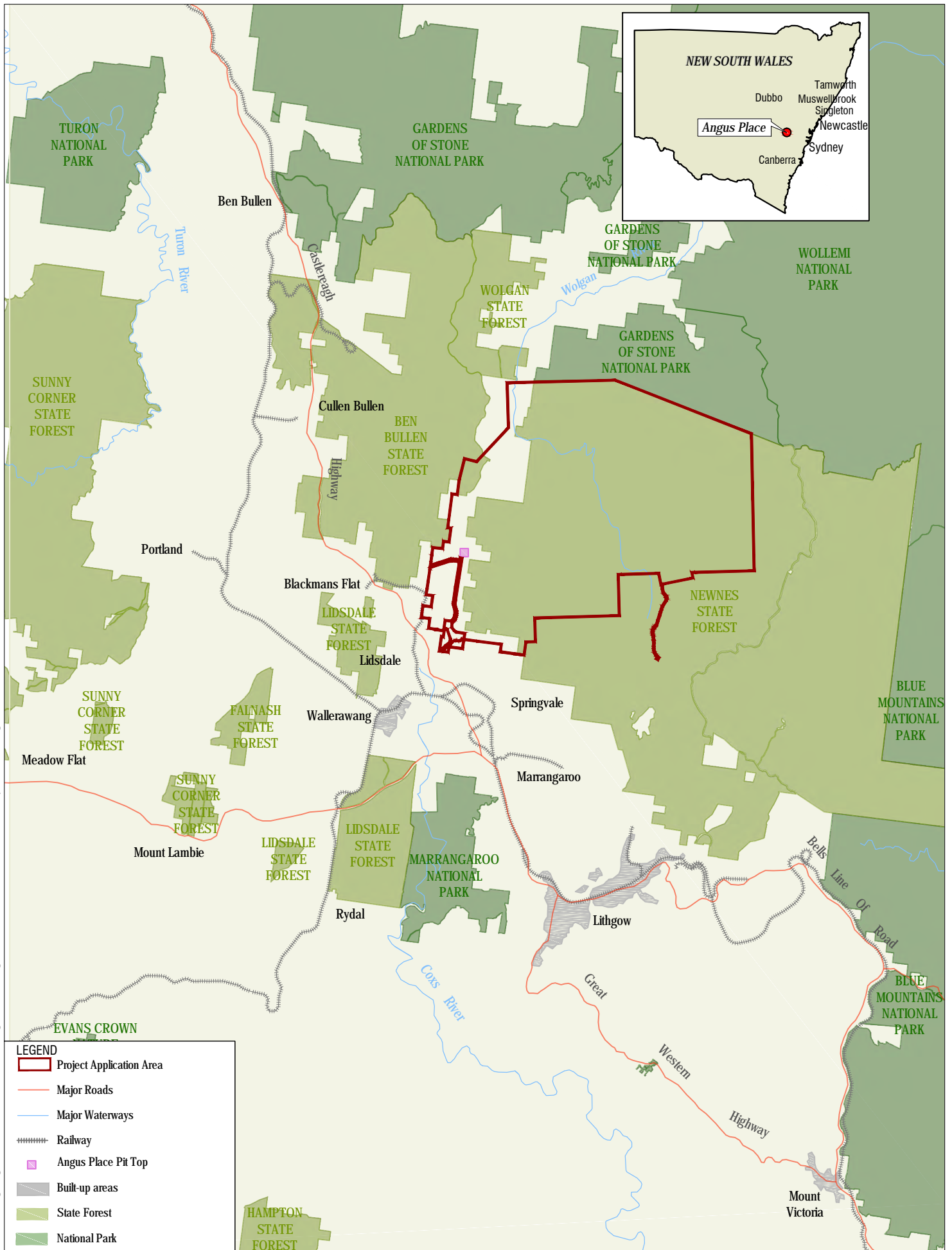
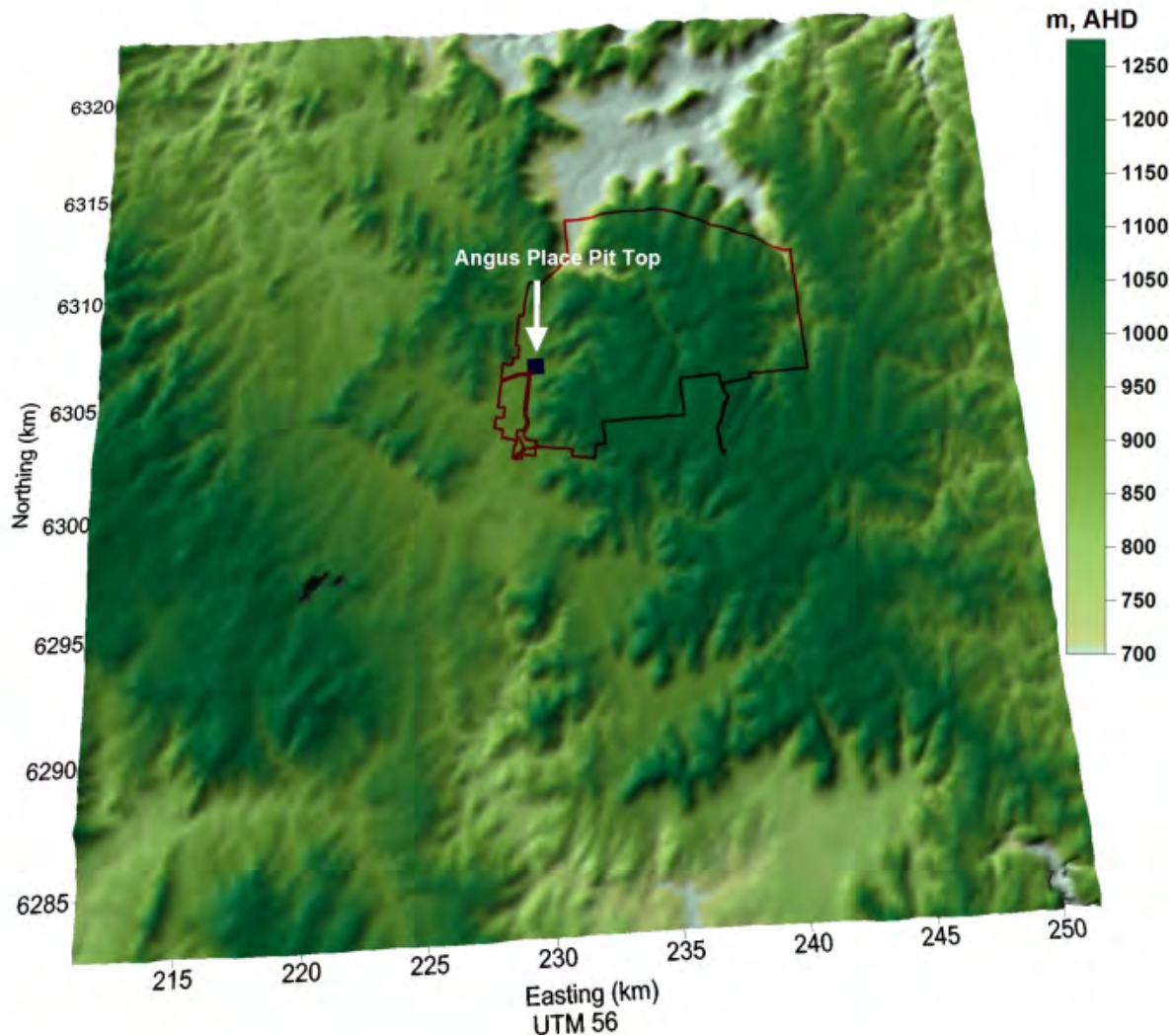


Figure 2 Illustration of Regional Scale Topography Surrounding Angus Place Colliery



Note: Vertical exaggeration of two applied.

3.2 Current Operations and Approvals

Angus Place commenced production in 1979, after being developed as an extension of the Newcom Mine at Kerosene Vale. Coal is extracted from the Lithgow seam using longwall mining techniques. The main components of the development are an underground longwall mine and development panels, supporting surface infrastructure (within the Angus Place pit top area and on the Newnes State Forest), a coal stockpile area (Kerosene Vale) and dedicated haul roads to Delta Electricity's Wallerawang and Mount Piper power stations.

Project Approval (PA) 06_0021 is applicable to Angus Place, which was approved by the then Department of Planning (DoP) pursuant to Part 3A of the EP&A Act. PA 06_0021 was granted on 13 September 2006 to expand the mining area and increase the production limit to 3.5 million tonnes per annum. PA 06_0021 is currently due to lapse on 18 August 2024.

During 2010, Angus Place submitted an application to the DoP requesting to modify PA 06_0021 pursuant to Section 75W of the EP&A Act. This Project proposed an extension to Angus Place's operations through the development and extraction of two additional longwall panels (910 and 900W), as well as development of supporting surface infrastructure. The Project additionally provisioned to increase the annual production limit from 3.5 Mtpa to 4 Mtpa. PA 06_0021 Modification 1 was approved on 29 August 2011.

On 22 December 2011, Angus Place lodged a request to modify its existing PA with the Department of Planning and Infrastructure (DP&I) regarding the construction and operation of a ventilation facility and supporting infrastructure in accordance with section 75W of the EP&A Act. The DGRs for the modification project were received on 18 January 2012. An Environmental Assessment in support of the modification was submitted to DP&I in September 2012.

3.3 Acoustically Significant Plant and Equipment

3.3.1 Construction

Construction activities associated with the APMEP will involve site preparation and clearance, drilling of the ventilation shaft and dewatering boreholes, construction of the foundations, installation of the borehole infrastructure and commissioning within the proposed site compounds.

Additional construction activities will involve the clearance and excavations for the proposed trenched power supply along Sunnyside Ridge Road in order to operate the proposed dewatering borehole sites.

The proposed remote location of the ventilation facility and dewatering boreholes will minimise any construction related impacts on the regional community.

Sound power levels of the acoustically significant items of construction plant and equipment considered in this assessment are provided in **Appendix B1**.

3.3.2 Operations

Angus Place Pit Top

No modifications are proposed to the existing Angus Place pit top as part of the APMEP. The annual production of 4 Mtpa will remain as per PA 06_0021 Modification 2. Therefore, there will be no changes to noise emissions from the existing Angus Place pit top associated with the APMEP.

Wallerawang Haul Road

As stated in **Section 2** the Wallerawang Haul Road operations are being amalgamated into the Springvale Coal Services Facility operations. Therefore, the Wallerawang Haul Road no longer forms part of Angus Place operations.

Ventilation Facilities

APC-VS3 will consist of a single downcast ventilation shaft. Once constructed, APC-VS3 will not require any supporting infrastructure such as a fan or electric power.

Dewatering Borehole Facilities

Dewatering boreholes will be used for the management of mine inflows as part of safety and operational requirements.

The APMEP has considered the operation of a number of dewatering boreholes as presented in **Appendix A**.

The proposed plant and equipment associated with each borehole facility is as follows:

- Submersible pump(s) (four (4) at each site)
- 11kV to 3.3kV transformers (ODAF¹).
- High Voltage switching and control equipment.

Sound power levels of the acoustically significant items of operational plant and equipment considered in this assessment are provided in **Appendix B2**.

4 SENSITIVE RECEIVERS

All noise sensitive receivers located within and in the vicinity of the PAA are shown in **Appendix A**. The nearest residential receiver locations with respect to the Angus Place Colliery are detailed in **Table 2**. As presented in **Appendix A**, residential receiver areas are also located in Wallerawang (W1 and W2), Blackmans Flat (B1 to B18) and Springvale (S1 to S5); however, these receivers are significantly further from Angus place operations than those detailed in **Table 2**.

Table 2 Locations of Nearest Residential Receivers and distance to Angus Place Colliery Mine Extension Project

Receptor ¹	Easting	Northing	Zone	Elevation	Approximate Distance to Nearest Site Component
WR1 (Sharpe) ²	229,408 mE	6,305,100 mS	56H	905 m	1.1 km (APC Pit Top)
WR2 (Mason) ²	229,351 mE	6,304,614 mS	56H	910 m	1.6 km (APC Pit Top)
WR3	229,990 mE	6,307,652 mS	56H	930 m	1.7 km (APC Pit Top)
WR4	231,748 mE	6,311,673 mS	56H	780 m	4.8 km (APC-VS3)
WR5	232,286 mE	6,311,814 mS	56H	760 m	4.4 km (APC-VS3)
L1	229,078 mE	6,302,626 mS	56H	890 m	3.4 km (APC Pit Top)
L2 (Neubeck) ²	229,028 mE	6,301,777 mS	56H	905 m	4.3 km (APC Pit Top)

1 – WR refers to Wolgan Road receptors. L refers to Lidsdale Village receptors

2 – Property names in accordance with the Angus Place Project Approval (PA 06_0021).

In addition to the residential locations identified in **Table 2**, the proposed APMEP is located within the Newnes State Forest. This is an area of the Newnes State Forest that 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) and are provided in **Table 3**.

It should also be noted that any of the roads or tracks within or surrounding the PAA could potentially be utilised for recreational purposes.

¹ ODAF – Oil Directed Air Forced (high noise level operational mode only used during periods of high load under high ambient air temperatures)

Table 3 Approximate Location of Nearest Sensitive Receiver and distance to Newnes Plateau sites

Receptor	Easting	Northing	Zone	Elevation	Approximate Distance to Nearest Site Component
NF1	239,483 m E	6,300,390 m S	56H	1165 m	5.9 km (APC-VS2)
NF2	237,015 m E	6,298,782 m S	56H	1030 m	7.0 km (APC-VS2)
NF3	243,358 m E	6,295,836 m S	56H	1100 m	10.9 km (LW 1004 TG)
NF4	245,304 m E	6,297,921 m S	56H	970 m	9.9 km (LW 1004 TG)
NF5	242,528 m E	6,303,041 m S	56H	1080 m	4.1 km (LW 1004 TG)
NF6	243,182 m E	6,304,671 m S	56H	1045 m	3.8 km (LW 1004 TG)
NF7	242,516 m E	6,307,266 m S	56H	925 m	2.8 km (LW 1001 TG)
NF8	238,709 m E	6,308,496 m S	56H	1110 m	2.0 km (LW 1001 TG)
NF9	235,079 m E	6,309,656 m S	56H	1030 m	950 m (APC-VS3)

5 EXISTING MINE APPROVAL CONDITIONS

PA 06_0021 was granted on 13 September 2006 for the Angus Place Colliery Extension Project under Part 3A of the *Environmental Planning and Assessment Act 1979* by the then Minister for Planning. Subsequently two (2) modifications to this approval have been approved under Section 75W of Part 3A Major Projects as follows:

- PA 06_0021 Mod1 approved on 29 August 2011.
- PA 06_0021 Mod2 approved on 22 April 2013.

Angus Place is also licensed under the *Protection of the Environment Operations Act 1997*: Environment Protection Licence (EPL) No. 467.

5.1 Project Approval (06_0021)

PA 06_0021 states the following with regard to noise emissions:

NOISE

Impact Assessment Criteria

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) LAeq(15minute)

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

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 Director-General 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 LAeq(15 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.

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) LAeq(15minute)

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

Note: The notes under Table 6 also apply under Table 7.

Operating Hours – Wallerawang Power Station Haul Road

19. The Proponent shall not use the Wallerawang power station haul road at night.

Note: Night is defined as the period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and public holidays.

No additional requirements with respect to noise were included within the modified project approvals granted on 29 August 2011 or 22 April 2013.

5.2 Environment Protection Licence (EPL No: 467)

Condition L6 of the EPL specifies the following limit conditions with respect to noise emissions.

L6.1 Noise from the premises must not exceed:

- a) 42 dBA Leq(15minute) during the day (7am to 6pm); and
- b) 38 dBA dBA Leq(15minute) during the evening (6pm to 10pm); and
- c) at all other times 36 dBA Leq(15minute) except as expressly provided by this licence
at the Sharpe residence;
- d) 41 dBA Leq(15minute) during the day (7am to 6pm); and
- e) 37 dBA dBA Leq(15minute) during the evening (6pm to 10pm); and
- f) at all other times 35 dBA Leq(15minute) except as expressly provided by this licence
at the Mason (west) residence and other Wolgan Road properties; and;
- g) 44 dBA Leq(15minute) during the day (7am to 6pm); and
- h) 40 dBA dBA Leq(15minute) during the evening (6pm to 10pm); and
- i) at all other times 35 dBA Leq(15minute) except as expressly provided by this licence

at Lidsdale Village residences;

Where LAeq means the equivalent continuous noise level - the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

Note: The above noise limits were established under project approval 06_0021 by the Department of Planning.

- L6.2 *Noise from the premises is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 m of a dwelling (rural situations) where the dwelling is more than 30 m from the boundary, to determine compliance with condition L6.1.*

The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy).

- L6.3 *The noise emission limits identified in this licence apply under meteorological conditions of:*
a) wind speeds of up to 3 m/s at 10 metres above ground level; or
b) temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.

The noise limits specified in EPL 467 are consistent with those outlined in PA 06_0021 and have been determined in accordance with the NSW Industrial Noise Policy (INP). The consented noise criteria apply to the cumulative operation of Angus Place Colliery and the Angus Place to Wallerawang haul road.

5.3 Existing Compliance Assessment

In accordance with Schedule 3, Condition 22 of the Angus Place Colliery PA 06_0021 a Noise Monitoring Program (NMP) (dated May 2007) was prepared by Angus Place. In accordance with this document, Atkins Acoustics conducted quarterly noise monitoring between September 2007 and February 2008.

In May 2008 SLR conducted a review of the NMP (refer SLR Report 30-1942-R1 *Angus Place Noise Monitoring Peer Review*). Based on this review, SLR subsequently prepared a revised operational Noise Monitoring Program for the site (refer SLR Report 30-1942-R2 *Angus Place Colliery Noise Monitoring Program* dated December 2008).

In accordance with the Angus Place NMP, SLR has conducted quarterly noise monitoring at the Angus Place Colliery from May 2008 to present (refer SLR Reports 30-1942 QR01 2008 May Qtr 20080627 dated July 2008 to 630.01942 QR19 20121218 dated 8 January 2013).

Relevant results of the quarterly noise monitoring and existing Angus Place pit top noise emissions are discussed in **Section 8**.

6 IMPACT ASSESSMENT PROCEDURES

6.1 General Objectives

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the EPA. The Industrial Noise Policy (INP) was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licenses that will enable the EPA to regulate premises that are scheduled under the POEO Act.

The INP and associated application notes (dated 12 July 2012) provide non-mandatory procedures for assessing noise impacts from the modification, expansion or upgrade of existing industrial premises (refer **Appendix C**) that form the basis of the APMEP operational noise assessment procedure.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from the premises scheduled under the Act.

The INP provides two forms of noise criteria with the aim of achieving environmental noise objectives; one to account for intrusive noise which involves setting a noise goal objective relative to the existing acoustic environment and the other to protect the amenity of particular land uses.

6.2 Assessing Intrusiveness

For assessing intrusiveness, the background noise needs to be measured. The rating background level (RBL) is then determined for each assessment period (day/evening/night). The RBL is the single figure background noise level representing each assessment period over the noise monitoring period and is determined as being the median value of the measured assessment background levels (ABLs).

The intrusiveness criterion essentially means that the equivalent continuous noise level of the source over any 15 minute period ($LA_{eq}(15\text{minute})$) should not be more than five (5) decibels above the RBL(LA_{90}) for the relevant assessment period.

6.3 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 or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion.

An extract from the INP that relates to the amenity criteria is given in **Table 4**.

Table 4 Amenity Criteria – Recommended LAeq Noise levels from industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended LAeq(Period) Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards - internal - external	All	Noisiest 1 hour period	35	40
			50	55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am, On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
 The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

If the measured exiting noise level from industry approaches the criterion value, then the noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. In this case, the amenity criteria provided in **Table 4** would need to be adjusted in accordance with the INP as per **Table 5**.

Table 5 Modification to Acceptable Noise level (ANL)* to Account for Existing Levels of industrial Noise

Total Existing LAeq noise level from Industrial Noise Sources	Maximum LAeq Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is <i>likely to decrease</i> in future acceptable noise level minus 10 dBA If existing noise level is <i>unlikely to decrease</i> in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable LAeq noise level for the specific receiver, area and time of day from **Table 4**.

6.4 'Modifying Factor' Adjustments

The INP states that where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same level.

Therefore the INP outlines the correction factors to be applied to the noise level at the receiver before comparison with the criteria specified in **Sections 6.2** and **6.3** to account for the additional annoyance caused by these modifying factors.

Table 6 Modifying Factor Corrections and Definitions

Factor	Definition	Correction¹
Tonal Noise	Containing a prominent frequency and characterised by a definite pitch.	5 dB ²
Low-frequency noise	Containing major components within the low-frequency range (20 Hz to 250 Hz) of the frequency spectrum.	5 dB ²
Impulsive noise	Having a high peak of short duration or sequence of such peaks.	Apply the difference in measured levels as the correction up to a maximum of 5 dB.
Intermittent noise	The level suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dB.	5 dB
Duration	Applied where a single event noise is continuous for a period of less than 2.5 hours in any 24 hour period. This adjustment is designed to account for unusual and one-off events and does not apply to regular high noise levels that occur more frequently than once per day.	0 to -20 dB
Maximum Adjustment	The maximum correction to be applied to the criteria or the measured noise level where two or more modifying factors are present (excludes the duration correction).	Maximum correction of 10 dB (excluding duration correction)

Notes: 1. Corrections to be added to the measured or predicted levels.
 2. Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range.

6.5 Applying the Policy to Existing Industrial Premises

The INP states that where there is a proposal to upgrade or expand an existing industrial operation there may be a need to establish achievable noise limits and, if necessary, implement a noise reduction plan. The approach is designed to allow established industries to adapt to changes in the noise expectations of the community while remaining economically viable.

The INP recognises that many existing industrial sources were designed for higher noise emission levels than those set out in the policy and that in some cases industries may have been in existence before neighbouring noise sensitive developments or even noise legislation were introduced.

Where noise emissions from the site exceed the project specific noise levels, the regulatory authorities and the noise source manager need to negotiate achievable noise limits for the site. Therefore, the project specific noise levels should not be applied as mandatory noise limits but, rather, should supply the initial target levels and drive the process of assessing all feasible and reasonable control measures. For sites with limited noise mitigation options the achievable noise levels may sometimes be above the project specific noise levels.

Efforts should be aimed at achieving a reduction in noise in a manner that provides the greatest benefit to residents without undue impact on the existing business.

Appendix C presents the INP Application Note which provides guidance with regard to the assessment of noise from the modification of existing industrial premises.

6.6 Assessing Sleep Disturbance

The INP Application Notes (last updated 12 July 2012) guideline recognises that the current LA1(1minute) sleep disturbance criteria of 15 dBA above the prevailing LA90(15minute) level is not ideal. The assessment of potential sleep disturbance is complex and poorly understood and the EPA believes that there is insufficient information to determine a suitable alternative criteria.

In the interim, the INP guideline suggests that the LA1(1minute) level of 15 dBA above the RBL is a suitable screening criteria for sleep disturbance for the night-time period.

Where the screening criterion cannot be met, the additional analysis should consider the number of potential sleep disturbance events during the night, the level of exceedance and noise from other events. It may also be appropriate to consider other guidelines including the RNP which contains additional guidance relating to the potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

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

It is generally accepted that internal noise levels in a dwelling, with the windows open, are 10 dBA lower than external noise levels. Based on a worst case minimum attenuation, with windows open, of 10 dBA, the first conclusion above suggests that short term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

6.7 Construction Noise

The EPA has prepared an interim guideline covering construction noise. The ICNG sets out noise management levels, in relation to construction type activities, for residential and other sensitive receivers and how they are to be applied. A summary of the noise management levels from the ICNG is contained in **Table 7** and **Table 8**.

Table 7 Construction Noise Goals

Time of Day	Management Level	How to apply
Recommended standard hours : Monday to Friday 7:00am to 6:00pm Saturday 8:00am to 1:00pm No work on Sundays or public holidays	Noise affected RBL ¹ + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq,(15mins) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. 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.
	Highly noise affected 75 dBA	The highly affected noise level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise levels of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL ¹ + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

¹Rating Background Level as described by the NSW INP

Table 8 Interim Construction Noise Guideline at Sensitive Land Uses (other than residences)

Land Use	Management Level LAeq(15minute)
Active Recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion).	External Noise Level 65 dBA When in use
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation).	External Noise Level 60 dBA When in use

6.8 Road Traffic Noise

The NSW RNP presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments, as well as criteria for other sensitive land uses. Further detail is provided in **Section 9.4**

Table 38 and **Table 39** present the most relevant RNP criteria for the APMEP which has the potential to increase road traffic noise levels.

Table 9 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria - dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 dBA (external)	LAeq(9hour) 55 dBA(external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 dBA (external)	LAeq(1hour) 50 dBA(external)

Day 7:00 am to 10:00 pm, Night 10:00 pm to 7:00 am

Table 10 Road traffic noise assessment criteria for non-residential land uses affected by proposed road projects and traffic generating developments

Existing sensitive land use	Assessment Criteria - dBA		Additional Considerations
	Day (7am to 10pm)	Night (10pm to 7am)	
Open space (active use)	LAeq(15hour) 60 (external) When in use	-	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion. Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. playing chess, reading. In determining whether areas are used for active or passive recreation, the type of activity that occurs in that area and its sensitivity should be established. For areas where there may be a mix of passive and active recreation, e.g. school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.

7 METEOROLOGY

7.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration (in accordance with the INP). Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The INP provides two methods to assess wind effects; analysis of relevant weather data to determine whether wind is a feature based on the frequency of occurrence and wind speed (*detailed approach*) or simply assume that wind is a feature of the area (*simple approach*).

As stated in the INP Application Notes: *“The EPA has previously accepted (and will accept) noise predictions based on modelling noise emissions using long term weather data, as it can present a higher level of analysis than that required under the INP”*. Furthermore, the Australian Government Department of Resources, Energy and Tourism (RET) best practice document (Airborne Contaminants, Noise and Vibration – Leading Practice Sustainable Development Program for the Mining Industry dated October 2009) states that a noise model should require data on meteorological conditions over several years.

7.1.1 Previously Assessed Meteorological Conditions

The Environmental Assessment for PA 06_0021 and the PA06_0021 Modifications used the methods specified in the INP to predict noise levels from the development. The noise assessments predicted noise levels from prevailing winds as determined from previous studies. Section 3.2 (INP Assessment of Prevailing Weather Conditions) within the *Transportation Noise Impact Assessment* report by Heggies Pty Ltd in 2003 analysed meteorological data from Mount Piper Power Station and identified prevailing wind conditions for Angus Place. The results are presented in **Table 11**.

Table 11 Prevailing Wind Conditions in accordance with NSW INP

Season	Winds $\pm 45^\circ \leq 3$ m/s with Frequency of Occurrence $\geq 30\%$		
	Daytime	Evening	Night
Annual	-	SW, WSW, W	SW, WSW, W
Summer	-	SW, WSW, W	SW, WSW, W
Autumn	-	SSW, SW, WSW, W	SSW, SW, WSW, W
Winter	-	SW, WSW, W	SW, WSW
Spring	-	SW, WSW, W	SW, WSW, W

Table 11 identifies predominant wind directions ranging from westerly to south-south-westerly for wind speeds less than 3 m/s (within the wind speed range set in the PA).

7.1.2 INP Assessment of Prevailing Weather Conditions

Synthetically generated meteorological data was produced for the site using the CALMET meteorological model as part of the Angus Place Air Quality and Greenhouse Gas Assessment (refer SLR Consulting report 670.10168-R1 *Angus Place Colliery Ventilation Facility Project Air Quality and Greenhouse Gas Assessment* dated March 2012). The modelling process provided a meteorological dataset for the 2006 to 2008 calendar years, centred over the Project Application Area. Since this assessment, additional meteorological data has been produced for the 2009 and 2010 calendar years. This data has been used to supplement the previously assessed data to provide a comprehensive and up to date assessment of long term prevailing meteorological conditions in accordance with the “best practice guidance for assessing meteorological conditions.

Wind speed and direction data produced by the CALMET run for the period January 2006 to December 2010 was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for daytime, evening and night in each season.

A summary of the most frequently occurring winds is contained within **Table 12**, **Table 13** and **Table 14**.

Table 12 Seasonal Frequency of Occurrence of Wind Speed Intervals – Daytime

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	0.5%	NE±45	3.2%	7.4%	10.7%
Autumn	1.1%	ENE±45	4.5%	8.5%	13.0%
Winter	0.6%	W±45	2.6%	6.6%	9.2%
Spring	0.7%	NE±45	3.0%	5.4%	8.4%

Table 13 Seasonal Frequency of Occurrence of Wind Speed Intervals – Evening

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	0.9%	E±45	3.6%	16.0%	19.6%
Autumn	1.5%	ESE±45	7.2%	16.9%	24.1%
Winter	0.8%	SW±45	3.6%	11.5%	15.0%
Spring	0.9%	E±45	3.4%	13.6%	17.0%

Table 14 Seasonal Frequency of Occurrence of Wind Speed Intervals – Night

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	2.0%	E±45	9.6%	18.0%	27.6%
Autumn	2.2%	S±45	12.7%	12.4%	25.1%
Winter	0.9%	SSW±45	8.5%	10.2%	18.8%
Spring	1.9%	E±45	7.7%	9.6%	17.3%

Long term seasonal wind records indicate that prevailing conditions, in accordance with the INP assessment methodology, are not a feature of the area. Therefore wind conditions have not been considered as part of this assessment.

It is considered that the use of five (5) years of meteorological data provides a more comprehensive assessment of long term prevailing meteorological conditions and is more up to date than the 2003 data previously assessed at the project site.

7.2 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months.

The INP Section 5.2, Temperature Inversions, states:

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

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

An assessment of atmospheric stability conditions has also been prepared from the meteorological data set described in **Section 7.1.2**. The annualised evening and night-time frequency of occurrence of atmospheric stability classes are presented in **Table 15**, together with estimated Environmental Lapse Rates (ELR).

Table 15 Winter Night-time Atmospheric Stability Frequency of Occurrence

Stability Class	Occurrence Percentage Night-time	Estimated ELR ¹ °C/100 m	Qualitative Description
A	0.0%	<-1.9	Lapse
B	0.0%	-1.9 to -1.7	Lapse
C	1.6%	-1.7 to -1.5	Lapse
D	35.9%	-1.5 to -0.5	Neutral
E	25.8%	-0.5 to 1.5	Weak Inversion
F	36.6%	1.5 to 4.0	Moderate Inversion
G	0.0%	>4.0	Strong Inversion

Note 1: ELR (Environmental Lapse Rate).

In accordance with the INP, the frequency of occurrence of moderate or F Class (ie 1.5 °C/100 m up to 4.0°C/100 m) temperature inversions is greater than 30% during the winter night-time period and therefore, this weather condition is included in the assessment.

It is noted that the inclusion of temperature inversion conditions provides generally “worst case” meteorological assessment conditions from an acoustic perspective and will provide a conservative assessment approach during the night-time period.

7.3 Suitability of Meteorological Data

The data set utilised for the purpose of the Noise Impact Assessment may differ to that utilised in other environmental impact assessments including, but not limited to, air quality. Whilst the starting point for each assessment may be similar, the requirements for meteorological data vary, as stated in guidance documentation from the appropriate regulatory authorities.

The factors considered in selecting the meteorological data for use in an air quality impact assessment can be considerably different to those that need to be considered when compiling data for a noise impact assessment.

Worst case noise impacts tend to occur under conditions of low wind speeds when there is little atmospheric turbulence to dissipate the noise emissions. Impacts resulting from particulate emissions tend to be greatest under moderate to strong wind speeds, when wind-blown dust is generated and particulate matter can be carried significant distances before settling out of the air.

Dust impacts are also assessed based on longer term averages (24-hour and annual averages), whereas noise and odour nuisance impacts are more likely to be associated with peak events.

Furthermore, the weather dataset as a whole is required to contain different meteorological parameters to assess the noise impacts or air quality impacts. For example, for air quality impacts, the mixing heights in the dataset are required to assess the vertical dispersion of pollutants which can have a significant impact on the resultant ground level concentration at the discrete receptors. Whereas for noise impacts, the mixing heights do not directly influence the noise levels experienced.

For these reasons, the meteorological data used in the noise impact assessment is likely to differ from that used in the assessment of air quality impacts from the Project.

8 EXISTING ACOUSTIC ENVIRONMENT

8.1 Background Noise Measurements - Wolgan Road Receivers

Background noise measurements were conducted at WR1 during July 2010. An ARL Type 215 noise logger was used to monitor the ambient noise levels. The noise logger was programmed to record statistical noise level indices continuously in 15 minute intervals, including LA_{max}, LA₁, LA₅₀, LA₉₀, LA₉₉, LA_{min} and LA_{eq}. Precautions were taken to minimise influences from extraneous noise sources and reflections from adjacent buildings.

Details of the monitoring location and logger are provided in **Table 18**.

Table 16 Noise Loggers and Noise Monitoring Locations

Location Number ¹	Serial Number	Residential Details
WR1	194535	Sharpe Residence

1 – Refer **Appendix A**.

The ambient noise level at this location included natural sources, some minor traffic, the Angus Place pit top and haul truck movements on the Wallerawang and Mount Piper private haul roads.

Operator attended noise monitoring carried out between 2008 and present has determined that the contribution of the Angus Place pit top to the nearest Wolgan Road residence is approximately 33 dBA. Background noise levels have therefore been reduced to account for the contribution of the Angus Place pit top in order to obtain a representative background noise level in the absence of the Project.

The background noise levels for Wolgan Road receptors are contained within **Table 17**.

Table 17 Summary of Existing Ambient Noise Levels Wolgan Road (excluding the Project)

Location	Period	Rating Background Level (excluding Angus Place Pit Top) (RBL dBA)	Estimated Existing Industrial Contribution LA _{eq} dBA (excluding the Angus Place Pit Top)
WR1	Day	33	38
	Evening	33	37
	Night	30	<30

8.2 Background Noise Measurements – Lidsdale Receivers

Background noise levels were monitored at in Lidsdale village, at a location considered to be representative of the nearest potentially affected residential receivers, from 18 March 2009 to 30 March 2009. An ARL Type 215 noise logger was used to monitor the ambient noise levels. The noise logger was programmed to record statistical noise level indices continuously in 15 minute intervals, including LA_{max}, LA₁, LA₅₀, LA₉₀, LA₉₉, LA_{min} and LA_{eq}. Precautions were taken to minimise influences from extraneous noise sources and reflections from adjacent buildings.

Details of the monitoring locations and loggers are provided in **Table 18**.

Table 18 Noise Loggers and Noise Monitoring Locations

Location Number ¹	Serial Number	Residential Details
L1	194561	Corner of Wolgan Road and Maddox Lane
L2	194538	East of Wolgan Road

1 – Refer **Appendix A**.

At Location L1 noise levels are dominated by road traffic noise from Wolgan Road and residential noise such as lawn mowers. Noise from Mount Piper Power Station, Kerosene Vale Ash Dam were occasionally just audible during periods of no traffic but were not measureable.

Ambient noise levels at Location 2 are dominated by noise from operations taking place at the existing Kerosene Vale Ash Repository and haul truck movements on the Wallerawang private haul road. Natural noise sources such as birds, insects and vegetation noise also contribute to the ambient noise environment.

There is no impact from the Angus Place pit top in Lidsdale and therefore no adjustments to the measurements were undertaken in order to obtain a representative background noise level in the absence of the Project

A summary of the results of the background surveys is given in **Table 19**.

Table 19 Summary of Existing Ambient Noise Levels Lidsdale Village (excluding the Project)

Location	Period	Rating Background Level (RBL dBA)	Estimated Existing Industrial Contribution LAeq
L1	Day	35	<35
	Evening	34	<35
	Night	32	<35
L2	Day	35	39
	Evening	40	37
	Night	38	<35

9 PROJECT SPECIFIC NOISE CRITERIA

9.1 Operational Project Specific Noise Criteria

The background noise measurements presented in **Section 8** were used to derive the project specific operational noise levels for the APMEP at locations WR1, WR2, L1 and L2 in accordance with the INP Application Note guidance for the noise impact assessment for the modification of existing industrial premises.

Rural receivers WR3, WR4 and WR5 are located a significant distance from any noise generating developments or major roads. In accordance with the INP, project specific noise criteria of 35 dBA have been adopted at these residences for the day, evening and night-time to provide a conservative assessment approach.

Table 20 Project Specific Noise Levels

Location	Period	Adopted RBL	Intrusive Criteria LAeq(15minute) dBA	Amenity Criteria LAeq(period) dBA	Project Specific Noise Criteria LAeq(15minute) (dBA)
WR1	Day	33	38	55	38
	Evening	33	38	45	38
	Night	30	35	40	35
WR2	Day	33	38	55	38
	Evening	33	38	45	38
	Night	30	35	40	35
WR3	Day	30	35	50	35
	Evening	30	35	45	35
	Night	30	35	40	35
WR4	Day	30	35	50	35
	Evening	30	35	45	35
	Night	30	35	40	35
WR5	Day	30	35	50	35
	Evening	30	35	45	35
	Night	30	35	40	35
L1	Day	35	40	55	40
	Evening	34	39	45	39
	Night	32	37	40	37
L2	Day	35	40	55	40
	Evening	35	40	45	40
	Night	35	40	40	40

The proposed APMEP is located within the Newnes State Forest. This is an area of the Newnes State Forest that is used for recreational purposes such as walking and camping. It should also be noted that any of the roads or tracks within or surrounding the Project Application Area could potentially be utilised for recreational purposes.

The acceptable amenity criterion of 50 dBA for a passive recreational area has been adopted for these receivers in accordance with the INP.

Table 21 Project Specific Noise Criteria – Newnes State Forest

Location	Period	Project Specific Noise Criteria (LAeq,(period))
NF1 to NF8	When in use	50

9.2 Sleep Disturbance Criteria

The relevant sleep disturbance noise goals are provided in **Table 22**.

Table 22 Night-time Sleep Disturbance Criteria

Location	Period	Adopted RBL	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
WR1 to WR5	Night	30	45
L1		32	47
L2		35	50
NF1 to NF9		-	N/A

9.3 Project Specific Construction Noise Goals

The project specific construction noise goals, presented in **Table 23** are applicable for the APMEP.

Table 23 Project Specific Construction Noise Goals

Location	Period	Construction Noise Goal LAeq(15minute)	
		Noise Affected	Highly Noise Affected
WR1	Day	43	75
	Evening	38	N/A
	Night	35	N/A
WR2	Day	43	75
	Evening	38	N/A
	Night	35	N/A
WR3	Day	40	75
	Evening	35	N/A
	Night	35	N/A
WR4	Day	40	75
	Evening	35	N/A
	Night	35	N/A
WR5	Day	40	75
	Evening	35	N/A
	Night	35	N/A
L1	Day	45	75
	Evening	39	N/A
	Night	37	N/A
L2	Day	45	75
	Evening	40	N/A
	Night	40	N/A
NF1 to NF9	When in use	60	N/A

9.4 Road Traffic Noise Goals

The NSW RNP presents guidelines for road traffic noise assessment. **Table 38** and **Table 39** present the most relevant RNP criteria for the APMEP which has the potential to increase road traffic noise levels.

Table 24 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria - dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 dBA (external)	LAeq(9hour) 55 dBA(external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 dBA (external)	LAeq(1hour) 50 dBA(external)

Day 7:00 am to 10:00 pm, Night 10:00 pm to 7:00 am

Table 25 Road traffic noise assessment criteria for non-residential land uses affected by proposed road projects and traffic generating developments

Existing sensitive land use	Assessment Criteria - dBA		Additional Considerations
	Day (7am to 10pm)	Night (10pm to 7am)	
Open space (active use)	LAeq(15hour) 60 (external) When in use	-	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion. Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. playing chess, reading. In determining whether areas are used for active or passive recreation, the type of activity that occurs in that area and its sensitivity should be established. For areas where there may be a mix of passive and active recreation, e.g. school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.

10 EXISTING ANGUS PLACE COLLIERY NOISE EMISSIONS

As stated in **Section 5.3**, SLR has conducted quarterly noise monitoring at the Angus Place Colliery in accordance with the Angus Place NMP from May 2008 to present (refer SLR Reports *30-1942 QR01 2008 May Qtr 20080627* dated July 2008 to *630.01942 QR19 20121218* dated 8 January 2013).

The quarterly noise monitoring reports have provided the noise levels from Angus Place operations from attended noise measurements at the nearest affected receivers, namely the Sharpe (Location WR1), Mason (Location WR2) and Neubeck (Location L2) residences.

10.1 Noise Monitoring Results – Angus Place Colliery Pit Top

A summary of the results of the quarterly noise monitoring conducted by SLR since May 2008 are provided in **Table 26** to **Table 28** for the operation of the Angus Place Pit Top only together with the project specific noise levels (PSNLs) presented in **Table 20** and the existing Consent Conditions presented in **Section 3.2**.

Table 26 Daytime Quarterly Noise Monitoring Results – Angus Place Pit Top Only

Loc	PSNL / Existing Consent	Angus Place Colliery Contributed Noise Level LAeq (15 minute) dBA																		
		Dec 12	Sept 12	Jul 12	Apr 12	Dec 11	Sep 11	Jul 11	Apr 11	Dec 10	Sep 10	Jul10	Apr 10	Dec 09	Sep 09	Jul09	Apr 09	Jan 09	Sep 08	May 08
WR1	38 / 42	37	<30	<30	30	33	33	30	<30	<30	33	34	<30	33	<30	35	36	37	<35	<35
WR2	38 / 41	32	<30	<30	30	30	32	<30	<30	<30	<30	30	<30	30	<30	30	<30	33	<35	<35
L2	40 / 44	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table 27 Evening Quarterly Noise Monitoring Results – Angus Place Pit Top Only

Loc	PSNL / Existing Consent	Angus Place Colliery Contributed Noise Level LAeq (15 minute) dBA																		
		Dec 12	Sept 12	Jul 12	Apr 12	Dec 11	Sep 11	Jul 11	Apr 11	Dec 10	Sep 10	Jul10	Apr 10	Dec 09	Sep 09	Jul09	Apr 09	Jan 09	Sep 08	May 08
WR1	38 / 38	35	33	33	34	<30	34	30	<30	32	32	31	<30	30	<30	34	33	37	38	<35
WR2	38 / 37	33	30	32	32	<30	33	<30	32	35	32	32	<30	<30	30	31	<30	33	<35	<33
L2	39 / 40	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

Table 28 Night-time Quarterly Noise Monitoring Results – Angus Place Pit Top Only

Loc	PSNL / Existing Consent	Angus Place Colliery Contributed Noise Level LAeq (15 minute) dBA																		
		Dec 12	Sept 12	Jul 12	Apr 12	Dec 11	Sep 11	Jul 11	Apr 11	Dec 10	Sep 10	Jul10	Apr 10	Dec 09	Sep 09	Jul09	Apr 09	Jan 09	Sep 08	May 08
WR1	35 / 36	34	31	<30	34	<30	30	32	32	33	31	<30	30	30	<30	33	35	37	38	38
WR2	35 / 35	<30	<30	<30	31	<30	30	30	30	34	32	<30	<30	<30	<30	<30	<30	33	35	37
L2	37 / 35	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30

As presented **Table 26** to **Table 28**, results of the quarterly noise monitoring since May 2008 show that noise levels associated with Angus Place pit top operations have been measured to be at or below the relevant PSNLs and existing consent conditions since January 2009.

No noise monitoring has been conducted at receiver WR3 (refer **Table 2**) at the north of Wolgan Road. This receiver location is further from the Angus Place pit top than location WR2. Therefore, Angus Place pit top contributed noise levels at this location are likely to be similar or less than those measured at location WR2 and would be compliant with the relevant noise criteria.

At all other receiver locations the contribution of Angus Place pit top would be negligible.

Since no changes are proposed at the Angus Place pit top due to the APMEP, there will be no change to the noise emissions from existing Angus Place operations.

11 OPERATIONAL NOISE IMPACT ASSESSMENT

11.1 Noise Modelling Methodology

A computer model was used to predict noise emissions from operation of the project. The operational noise modelling was undertaken using SoundPLAN v7.1 software, developed by Braunstein and Berndt GmbH in Germany. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. The model used this map, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

Topographic contours and drawings of the proposed site were supplied by Centennial Coal for the purpose of modelling noise from the proposed APMEP. Prediction of noise under calm and prevailing atmospheric conditions was conducted. Atmospheric parameters under which noise predictions were made are given in **Table 29**.

Table 29 Meteorological Parameters for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction (degrees from north)	Temperature Inversion
Calm (All periods)	20°C	65%	N/A	N/A	N/A
Inversion (Night-time)	10°C	90%	N/A	N/A	F Class

11.2 APMEP Operational Noise Modelling Scenario

Noise levels from the additional infrastructure associated with the APMEP have been modelled under the meteorological parameters identified in **Table 29**.

The scenario modelled during each period is summarised in **Table 30**. A tick (✓) indicates that the equipment is in operation during the relevant period.

Table 30 Operational Noise Modelling Scenario

Plant and Equipment	Day	Evening	Night
Existing Angus Place Pit Top			
CHPP	✓	✓	✓
Compressor House	✓	✓	✓
Winding Building	✓	✓	✓
Site Conveyors	✓	✓	✓
Stockpile Dozer	✓	✓	✓
Coal Bin	✓	✓	✓
Trucks loading	✓	✓	✓
Stockpile discharge	✓	✓	✓
Ventilation shaft 2 site (APC-VS2) ¹			
Ventilation fan	✓	✓	✓
Substation	✓	✓	✓
Diesel Generator	✓	✓	✓
Compressors (2 off)	✓	✓	✓
Ventilation shaft 3 site (APC-VS3)			
Ventilation shaft is downcast only. No acoustically significant equipment is anticipated at APC-VS3 during operations			
Dewatering Bore Sites (plant at each borehole location)			
Submersible pump (4 off)	✓	✓	✓
11kV to 3.3kV transformer (ODAF ²) (2 off)	✓	✓	✓
High Voltage switching and control equipment	✓	✓	✓
Notes	<p>1 - as presented and assessed in SLR Consulting Report 670.10168.00100-R1R3 Angus Place Colliery Ventilation Facility Project – Noise and Vibration Impact Assessment dated July 2012.</p> <p>2 - ODAF – Oil Directed Air Forced (high noise level operational mode only used during periods of high load under high ambient air temperatures)</p>		

11.3 Sound Power Levels

Noise measurements of the acoustically significant items of plant and equipment operating at the existing Angus Place pit top have been conducted by SLR during the quarterly Noise Monitoring Program (NMP) and other investigative studies. SWLs of this plant and equipment have been determined and utilised for the purpose of this noise assessment.

SWLs of additional plant and equipment associated with the APMEP have been sourced from an SLR database of similar plant and equipment. In order to provide a conservative assessment of the potential impacts of noise from the upgrade, likely maximum SWLs of similar plant and equipment have been adopted for all proposed additional plant.

Detailed equipment SWLs used in the noise model are presented in **Appendix B2**.

11.4 Noise Model Validation and Calibration

The Australian Government Department of Resources, Energy and Tourism (RET) best practice document (Airborne Contaminants, Noise and Vibration – Leading Practice Sustainable Development Program for the Mining Industry dated October 2009) states the following with regard to noise modelling and model validation:

“At the start of a planning process, a noise model cannot predict with a high degree of accuracy (1-2 dBA) what the noise level will be at a particular residence over a 15-minute period for a specific operational scenario. Over time (several years), with enough validation during the detailed design phases and the operational phases, the noise model should evolve such that it becomes very site specific and more accurate”.

As presented in **Section 10**, numerous operator-attended and unattended noise surveys have been conducted across the study area during the quarterly Noise Monitoring Program (NMP) and other investigative studies. These measurements have been utilised to calibrate and validate the noise model.

Predicted noise levels due to the existing Angus Place pit top activities are consistent with the existing Angus Place pit top noise contribution measured during the operator attended noise surveys conducted by SLR.

11.5 Operational Noise Modelling Results & Discussion

Table 31 presents the predicted existing Angus Place pit top noise emissions together with the proposed APMEP (only) noise emissions and the total noise emissions from existing and proposed operations. Calm and worst case (night-time temperature inversion) operational noise contours are provided in **Appendices D1** and **D2** respectively.

Table 31 Predicted Operational Noise Levels

Location	Period	Predicted Noise Level LAeq(15minute) (dBA)						Project Specific Noise Criteria (LAeq,15min)
		Calm			Temperature Inversion			
		Existing pit top	APMEP plant only	Total APMEP	Existing pit top	APMEP plant only	Total APMEP	
WR1	Day	32	<20	32	N/A	N/A	N/A	38
	Evening	32	<20	32	N/A	N/A	N/A	38
	Night	32	<20	32	35	<20	35	35
WR2	Day	30	<20	30	N/A	N/A	N/A	38
	Evening	30	<20	30	N/A	N/A	N/A	38
	Night	30	<20	30	34	<20	34	35
WR3	Day	29	<20	29	N/A	N/A	N/A	38
	Evening	29	<20	29	N/A	N/A	N/A	38
	Night	29	<20	29	34	<20	34	35
WR4	Day	<20	<20	<20	N/A	N/A	N/A	35
	Evening	<20	<20	<20	N/A	N/A	N/A	35
	Night	<20	<20	<20	<20	<20	<20	35
WR5	Day	<20	<20	<20	N/A	N/A	N/A	35
	Evening	<20	<20	<20	N/A	N/A	N/A	35
	Night	<20	<20	<20	<20	<20	<20	35
L1	Day	<20	<20	<20	N/A	N/A	N/A	40
	Evening	<20	<20	<20	N/A	N/A	N/A	39
	Night	<20	<20	<20	<20	<20	<20	37
L2	Day	<20	<20	<20	N/A	N/A	N/A	40
	Evening	<20	<20	<20	N/A	N/A	N/A	40
	Night	<20	<20	<20	<20	<20	<20	40
NF1 to NF8	Day	<20	<20	<20	N/A	N/A	N/A	50
	Evening	<20	<20	<20	N/A	N/A	N/A	
	Night	<20	<20	<20	<20	20	20	

Noise predictions presented in **Table 31** indicate the noise emissions from the existing Angus Place pit top will be at or below the project specific noise levels at the nearest potentially affected receivers under calm and prevailing meteorological conditions. This is consistent with the existing Angus Place pit top noise contribution measured during the operator attended noise surveys conducted by SLR (refer **Section 10**).

As indicated in **Table 31**, noise emissions from the additional infrastructure associated with the proposed APMEP are predicted to be negligible at the nearest potentially affected receivers under calm and prevailing meteorological conditions. Given the predicted noise levels of less than 20 dBA due to the additional APMEP at the nearest affected receivers, any overall increase to the existing Angus Place noise levels is predicted to be negligible (less than 0.5 dBA).

Total cumulative Angus Place noise levels including the existing Angus Place pit top and proposed APMEP plant are predicted to be at or below the relevant project specific noise criteria at all assessed receiver locations.

As presented in **Appendix D1** and **Appendix D2**, noise impacts from the Angus Place pit top and additional plant associated with the APMEP will be negligible at all other residential receiver locations in Springvale (locations S1 to S5), Blackmans Flat (locations B1 to B18) and Wallerawang (locations W1 and W2).

As indicated in **Appendices D1** and **D2**, the acceptable amenity criterion of 50 dBA for a passive recreational area will be met at distances of approximately 550 m and 700 m from the APC-VS2 site under calm and prevailing meteorological conditions respectively.

As indicated in **Appendix D2**, there is a small area of Sunnyside Ridge Road to the east of the APC-VS2 area which is predicted to experience small exceedences of the project specific noise criteria for a passive recreational area. It is noted, however, that Sunnyside Ridge Road is promoted for use as a 4wd track and noise impacts on potential users are considered insignificant.

Notwithstanding the above, noise mitigation and management strategies are recommended in **Section 15** to further minimise potential noise impacts on Sunnyside Ridge Road.

Noise levels in the vicinity of the proposed dewatering boreholes are predicted to meet the acceptable amenity criterion of 50 dBA for a passive recreational area at distances of less than 100 m from the boreholes and therefore potential noise impacts on recreational users are considered insignificant.

11.6 Sleep Disturbance

As presented in **Section 10**, SLR has conducted quarterly noise monitoring at the Angus Place Colliery from May 2008 to present. During this time, maximum external noise levels from the Angus Place pit top have ranged from less than 30 dBA to 48 dBA at WR1 and less than 30 dBA to 43 dBA at WR2.

Maximum measured noise levels have been identified to be due to either dozer operation or trucks loading at the coal bin.

While a maximum external noise level of 48 dBA would represent a minor exceedence of the recommended sleep disturbance noise goal of 45 dBA, it is noted that the use of the L_{Amax} noise level provides a worst-case assessment since the L_{A1(1minute)} noise level of a noise event is likely to be less than the L_{Amax}. Furthermore, the external maximum noise level of 48 dBA is well below 55 dBA and is therefore unlikely to cause awakening reactions (refer **Section 6.6**).

Since no changes to Angus Place pit top operations are proposed as part of the APMEP, there will be no change to maximum noise emissions at the nearest affected receivers.

At all other locations, maximum noise levels will be well below the recommended sleep disturbance noise goal of 45 dBA.

No maximum noise level increases are predicted at the nearest residential receivers due to any proposed additional infrastructure associated with the APMEP.

12 CONSTRUCTION NOISE ASSESSMENT

12.1 Construction Activities

A summary of the construction noise modelling scenario is provided in **Table 32**. A tick (✓) indicates that the equipment is in operation during the relevant period.

Table 32 Construction Noise Modelling Scenario

Plant and Equipment	Day	Evening	Night
Dozer	✓	✓	✓
Compactor	✓	✓	✓
Excavator	✓	✓	✓
Grader	✓	✓	✓
Water Cart	✓	✓	✓
Truck	✓	✓	✓
All Terrain Forklift	✓	✓	✓
Drill Rig	✓	✓	✓
Generator	✓	✓	✓
Compressor	✓	✓	✓
Mud Pump	✓	✓	✓
Transit Mixer	✓	✓	✓
Crane	✓	✓	✓
Hand Tools (Grinder)	✓	✓	✓
Hammering	✓	✓	✓

Construction noise modelling has assumed that all the plant and equipment detailed in **Table 32** are operating simultaneously at all the additional infrastructure locations (refer **Appendix A**) for a 15 minute period. As such, this provides a conservative assessment approach; actual noise levels are likely to be lower than predicted for much of the time.

Construction noise modelling has been carried out under the meteorological parameters identified in **Table 29**.

12.2 Sound Power Levels (SWLs)

The SWLs of the proposed construction plant and equipment have been obtained from an SLR database of similar plant and equipment and are provided in **Appendix B1**.

12.3 Construction Noise Assessment

The predicted intrusive $L_{Aeq}(15 \text{ minute})$ construction noise levels at the nearest potentially affected receivers are presented in **Table 33** together with the construction noise goals. It has been assumed that construction activities will be undertaken at the 24 hours a day, seven (7) days a week.

Table 33 Predicted Construction Noise Levels

Location	Period	Predicted Noise Level LAeq(15minute) (dBA)		Construction Noise Goal LAeq(15minute)	
		Calm	Temperature Inversion	Noise Affected	Highly Noise Affected
WR1 to WR2	Day	<20	N/A	43	75
	Evening	<20	N/A	38	N/A
	Night	<20	<20	35	N/A
WR3 to WR5	Day	<20	N/A	40	75
	Evening	<20	N/A	35	N/A
	Night	<20	<20	35	N/A
L1	Day	<20	N/A	45	75
	Evening	<20	N/A	39	N/A
	Night	<20	<20	37	N/A
L2	Day	<20	N/A	45	75
	Evening	<20	N/A	40	N/A
	Night	<20	<20	40	N/A
NF1	Day	<20	N/A	60	N/A
	Evening	<20	N/A		
	Night	<20	<20		
NF2	Day	<20	N/A		
	Evening	<20	N/A		
	Night	<20	<20		
NF3	Day	<20	N/A		
	Evening	<20	N/A		
	Night	<20	<20		
NF4	Day	<20	N/A		
	Evening	<20	N/A		
	Night	<20	<20		
NF5	Day	<20	N/A		
	Evening	<20	N/A		
	Night	<20	28		
NF6	Day	21	N/A		
	Evening	21	N/A		
	Night	21	30		
NF7	Day	24	N/A		
	Evening	24	N/A		
	Night	24	32		
NF8	Day	31	N/A		
	Evening	31	N/A		
	Night	31	38		
NF9	Day	40	N/A		
	Evening	40	N/A		
	Night	40	46		

As indicated in **Table 33** the predicted construction noise levels are significantly below the respective construction noise goals at the nearest potentially affected receivers and any potential construction noise impacts are negligible.

13 CUMULATIVE NOISE IMPACT ASSESSMENT

13.1.1 Existing Industry and Mining Operations

The INP prescribes detailed calculation routines for establishing “Project-specific” $L_{Aeq}(15\text{minute})$ intrusive criteria and $L_{Aeq}(\text{period})$ amenity criteria at potentially affected receivers for a development (in isolation).

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise amenity levels for residences.

Potential sources of noise surrounding the Project have been identified as the Wallerawang and Mount Piper private haul roads, the Wallerawang Power Station, the Mt Piper Power Station, the Kerosene Vale Ash Repository, the Springvale Colliery and overland conveyors, Blackmans Flat Waste Management Facility and the Pine Dale Coal Mine.

The noise contribution of industrial noise sources to the existing acoustic environment has been discussed in **Sections 8** and the cumulative noise impacts of the site with existing industrial noise sources has been assessed in the determination of the amenity levels as presented in **Section 9**.

13.1.2 Approved and Proposed Developments

A review of major approved and proposed industrial developments in the vicinity of the APMEP was conducted and is presented in **Table 34**.

Table 34 Approved or Proposed Industrial Developments in the Vicinity of the Project

Development Site	Approval Date	Development Status	Source of Noise Data
Springvale Mine Extension Project	N/A	Proposed	SLR 2013
Western Coal Services*	N/A	Proposed	SLR 2013
Lidsdale Siding Upgrade project	May 2013	Approved	PA 08_0223

* It is noted that the Western Coal Services project includes continued use of all existing private haul roads and the overland conveyor from the Springvale pit top. As such, these sources are included in the noise predictions from the Western Coal Services project and have been considered in the cumulative noise assessment.

Other projects in the general area include the Pine Dale Coal Mine Extension, Mount Piper Power Station Ash Placement Project, Mount Piper Power Station, Western Coal Loader and Mount Piper Power Station Base Load Power Station. These projects are all located at least 2.5 km from the nearest assessed noise sensitive receivers and therefore are considered to be sufficient distance from the site to not impact on the cumulative noise from the APMEP.

The anticipated operating noise levels from each of these developments have been established by reviewing the project approvals or environmental assessments (refer **Table 34**) and then used for the purposes of the cumulative noise amenity assessment.

13.2 Cumulative Noise Amenity Assessment

The potential for the simultaneous operation of the Project and other approved and proposed developments can be assessed on a worst case scenario basis by adding the predicted noise levels from the proposed and approved operations together. The cumulative intrusive level is then adjusted (by -3 dBA) to the equivalent amenity level for comparison with the relevant amenity criteria for each location.

It should be noted that, for each of the developments assessed, the likelihood of the existing, future approved and proposed developments as well as the Project emitting simultaneous maximum noise emissions is remote due to the range of development locations and differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

The daytime, evening and night-time cumulative noise levels, together with the acceptable and maximum LAeq(period) noise amenity criteria for representative receivers are presented in **Table 35**, **Table 36** and **Table 37** respectively. The cumulative assessment considers the highest noise emission predictions of operation of the APMEP during each period (refer **Table 31**).

Table 35 Cumulative Daytime Noise Amenity Levels

Location	Existing Industry (Excluding Angus Place pit top) ¹	Angus Place Mine Extension Project	Centennial Coal Western Coal Services	Springvale Mine Extension Project	Lidsdale Siding	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
WR1	38	32	40	<30	<30	43	40	55 to 60
WR2	38	30	37	<30	<30	41	38	
WR3	<30	29	<30	<30	<30	<30	<30	50 to 55
WR4	<30	<20	<30	<30	<30	<30	<30	
WR5	<30	<20	<30	<30	<30	<30	<30	55 to 60
L1	<30	<20	42	<30	43	46	43	
L2	39	<20	40	<30	43	46	43	

1 – Refer **Section 8**.

Table 36 Cumulative Evening Noise Amenity Levels

Location	Existing Industry (Excluding Angus Place pit top) ¹	Angus Place Mine Extension Project	Centennial Coal Western Coal Services	Springvale Mine Extension Project	Lidsdale Siding	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
WR1	37	32	36	<30	<30	40	37	45 to 50
WR2	37	30	36	<30	<30	40	37	
WR3	<30	29	<30	<30	<30	<30	<30	50 to 55
WR4	<30	<20	<30	<30	<30	<30	<30	
WR5	<30	<20	<30	<30	<30	<30	<30	55 to 60
L1	<35	<20	35	<30	43	44	41	
L2	37	<20	39	<30	43	45	42	

1 – Refer **Section 8**.

Table 37 Cumulative Night-time Noise Amenity Levels

Location	Existing Industry (Excluding Angus Place pit top) ¹	Angus Place Mine Extension Project	Centennial Coal Western Coal Services	Springvale Mine Extension Project	Lidsdale Siding	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
WR1	<30	35	33	<30	<30	37	34	40 to 45
WR2	<30	34	29	<30	<30	35	32	
WR3	<30	34	<30	<30	<30	34	31	
WR4	<30	<20	<30	<30	<30	<30	<30	
WR5	<30	<20	<30	<30	<30	<30	<30	
L1	<35	<20	<30	<30	43	43	40	
L2	<35	<20	<30	<30	43	43	40	

1 – Refer **Section 8**.

As presented in **Table 35**, **Table 36** and **Table 37** the predicted cumulative amenity noise levels from existing, approved and proposed mining and industrial noise sources and the APMEP are at or below the relevant acceptable amenity levels for at all locations during the daytime, evening and night-time periods.

14 OFF-SITE ROAD TRAFFIC NOISE ASSESSMENT

14.1 Transport and Personnel Movements

Access to the proposed infrastructure sites on Newnes Plateau by heavy vehicles will be via the Old Bells Line of Road at the Zig Zag Railway, Clarence. It is proposed that light vehicles and water trucks will access these sites either by the Old Bells Line of Road from Clarence or via the State Mine Gully Road from Lithgow. Both routes then converge with final access to the site off Maiyigu Marragu Trail (formerly Blackfellows Hand Road) on the Newnes State Forest.

There will be an increase in traffic (along public roads and Forest NSW tracks) and personnel during the construction period. The peak construction traffic generation will occur between approximately November 2014 and April 2015 and between February 2016 and July 2016 and will consist of approximately 16 daily trips, being 8 truck trips and 8 light vehicle trips (refer *Angus Place Colliery Mine Extension Project Traffic Impact Assessment* by ARC Traffic and Transport dated March 2013).

Outside of this period traffic and personnel movements associated with the dewatering sites are minimal with the occasional light vehicle trip required for maintenance and inspection purposes only.

14.2 Nearest Noise Sensitive Receivers

The nearest noise sensitive residential receiver to any of the proposed transportation routes are located approximately 100 m from the Old Bells Line of Road in Clarence and approximately 5m from the State Mine Gully Road in Lithgow. As stated in **Section 4** any of the roads or tracks surrounding the proposed APMEP area could potentially be utilised for recreational purposes. Therefore, traffic movements on the forest tracks have been considered against the passive recreation criteria as outlined in **Section 14.3**.

14.3 Road Traffic Noise Criteria

The Road Noise Policy (RNP) presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments, as well as criteria for other sensitive land uses.

Table 38 and **Table 39** present the most relevant RNP criteria for the APMEP which has the potential to increase road traffic noise levels.

Table 38 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria - dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 dBA (external)	LAeq(1hour) 50 dBA(external)
Day 7:00 am to 10:00 pm, Night 10:00 pm to 7:00 am			

Table 39 Road traffic noise assessment criteria for non-residential land uses affected by proposed road projects and traffic generating developments

Existing sensitive land use	Assessment Criteria - dBA		Additional Considerations
	Day (7am to 10pm)	Night (10pm to 7am)	
Open space (active use)	LAeq(15hour) 60 (external) When in use	-	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
Open space (passive use)	LAeq(15hour) 55 (external) When in use	-	Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. playing chess, reading. In determining whether areas are used for active or passive recreation, the type of activity that occurs in that area and its sensitivity should be established. For areas where there may be a mix of passive and active recreation, e.g. school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.

14.4 Road Traffic Noise Assessment

Old Bells Line of Road

Based upon the expected road traffic movements presented in **Section 14.1** it has been assumed that eight (8) light vehicle movements and eight (8) heavy vehicle movements may occur on the Old Bells Line of Road during a “worst case” hourly period during ventilation shaft sinking. Typical L_{Amax} passby noise levels of heavy and light vehicles were used to predict road traffic noise levels from the roadway.

The calculated LAeq(1hour) noise level at the nearest receiver (approximately 100 m from the Old Bells Line of Road) is 42 dBA. This is significantly below the numerical criteria detailed in the RNP (refer **Table 38**).

State Mine Gully Road

Based upon the expected road traffic movements presented in **Section 14.1** it has been assumed that eight (8) light vehicle movements and two (2) heavy vehicle movements (water trucks) may occur on the State Mine Gully Road and associated local roads in Lithgow during a “worst case” hourly period. Typical L_{Amax} passby noise levels of light vehicles were used to predict road traffic noise levels from the roadway.

The calculated $L_{Aeq}(1\text{hour})$ noise level at the nearest roadside receivers (assumed to be approximately 5 m from the edge of the road) is 50 dBA. This is below the numerical criteria detailed in the RNP (refer **Table 38**).

Forest NSW Tracks

Based upon the road traffic noise criteria for a passive recreational area presented in **Table 39**, the Forest NSW tracks could accommodate up to 120 heavy vehicle movements during the 15 hour daytime period (7 am to 10 pm) without exceeding the criteria. This is significantly in excess of the anticipated number of vehicle movements (up to 16 vehicles per day) and therefore, road traffic noise levels will be significantly below the relevant noise criteria.

14.5 Operational Road Traffic Noise Assessment

During the operation phase of the APMEP, an average of less than 10 vehicles per day would be generated to/from the site compounds. These trips would primarily be light vehicle trips, but a small number of truck trips would likely be generated each week.

Due to the small number of anticipated vehicle movements, there will not be any significant road traffic noise impacts associated with the operation of the boreholes and road traffic noise levels will be significantly less than for the construction phase of the Project.

15 VIBRATION ASSESSMENT

The main vibration generating activities will occur during the construction phase of the project including the operation of mobile equipment such as the dozer and trucks. Given the minimum separation distance of approximately 4.4 km between construction operations 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 Angus Place pit top coal handling plant and the stockpile dozer. Given the minimum separation distance of approximately 1.1 km between the Angus Place pit top and the nearest potentially affected locations, vibration levels from these activities is predicted to be negligible and below levels of human perception at the nearest receivers.

Furthermore, vibration levels from the Angus Place pit top will be unchanged as a result of the APMEP.

16 NOISE MITIGATION AND MANAGEMENT RECOMMENDATIONS

Noise measurements and predictions indicate the noise levels associated with existing Angus Place pit top activities will be at or below the relevant project specific noise levels at the nearest potentially affected receivers. No changes to the existing Angus Place pit top are proposed as part of the APMEP and therefore there will be no change to pit top noise levels.

Noise predictions indicate that noise levels associated with the construction and operation of the APMEP will be negligible at the nearest potentially affected residential receivers and will result in negligible noise increases from the existing Angus Place Colliery and other mining and industrial operations in the area.

Notwithstanding this, the following noise mitigation and management measures should be considered:

- Continued noise monitoring on site and within the community in accordance with the Angus Place Noise Monitoring Program (refer **Section 17**).

- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Incorporate clear signage at the site including relevant contact numbers for community enquiries.
- Prompt response to any community issues of concern.

In addition to the above mitigation and management measures, the following “quiet” work practices are recommended at the vent fan and borehole compounds to minimise any potential noise impacts to recreational users of Sunnyside Ridge Road and surrounding areas:

- Regularly train workers (ie toolbox talks) to use equipment in ways to minimise noise.
- Operate mobile plant in a quiet, efficient manner.
- Switching off vehicles and plant when not in use.
- Keep plant and equipment well maintained including:
 - Regular inspection and maintenance of equipment to ensure it is in good working order.
 - Equipment not to be operated until it is maintained or repaired.
- For equipment with enclosures (ie compressor rooms) ensure door and seals are well maintained and kept closed when not in use.

17 NOISE MONITORING

As stated in **Section 10**, operational noise monitoring has been conducted on a quarterly basis since May 2008 in accordance with the Angus Place Noise Monitoring Program (refer SLR Report 30-1942-R2 *Angus Place Colliery Noise Monitoring Program* dated December 2008). Noise monitoring has consisted of continuous, unattended noise logging and operator attended noise surveys. It is proposed that the noise impact from the Site would continue to be monitored on a quarterly basis with operator attended noise monitoring being conducted at relevant nearest potentially affected receiver locations (namely WR1, WR2 and L2).

In the event of a non-compliance or a substantiated complaint being received from the community, additional monitoring may be undertaken.

Due to the presence of other noise sources in the area, it is considered that operator attended noise monitoring remains the most effective method of determining compliance with the relevant project specific noise levels. Other methods, including long term and real time noise monitoring, would be less effective at distinguishing noise emissions from APMEP operations from other noise sources in the area.

18 CONCLUSION

SLR has prepared a noise impact assessment for the APMEP associated with Angus Place. The objectives were to identify the potential impacts of noise and vibration due to the proposed construction and operation of the APMEP on the nearest surrounding noise sensitive receivers including consideration of cumulative impacts with existing Angus Place operations and other mining and industrial noise sources in the area.

Project specific noise levels have been established for the APMEP in accordance with the INP Application Note guidance for the noise impact assessment for the modification of existing industrial premises. The project specific noise levels provide guidance for future noise reduction and are non-mandatory.

The INP Application Notes state that where noise levels from the existing operations already exceed the project specific noise levels, the proposed modification shall not significantly increase the existing noise emissions.

Noise monitoring of existing Angus Place pit top operations has been conducted by SLR in accordance with the Angus Place Noise Monitoring Program (NMP) from May 2008 to present. Noise monitoring results show that noise levels associated with existing Angus Place pit top operations have been measured to be at or below the relevant project specific noise levels since January 2009.

Since no changes are proposed at the Angus Place pit top due to the APMEP, there will be no change to the noise emissions from existing Angus Place operations.

Noise modelling has indicated that the noise emissions from existing Angus Place pit top and the proposed operation of the APMEP will be at or below the relevant noise criteria. The addition of the proposed APMEP plant and equipment will result in a negligible noise level increase at the nearest potentially affected residential receiver locations.

No noise level changes are predicted at the nearest noise sensitive residential locations due to the additional infrastructure associated with the APMEP.

The operational noise criteria for the Newnes State Forest recreational area is predicted to be met at distances of approximately 550 m to 700 m from the APC-VS2 area and less than 100 m from the proposed borehole locations.

Noise modelling has indicated that the noise emissions from the proposed construction of the APMEP will be significantly below the relevant noise criteria.

Cumulative noise levels from the existing, approved and proposed operations with the APMEP are predicted to be at or below the relevant noise amenity criteria at the nearest potentially affected residential receivers. No changes to the cumulative noise levels are predicted at the nearest noise sensitive residential locations due to the additional plant associated with the APMEP.

Traffic noise generated by the construction and operation of the proposed APMEP is predicted to be below the relevant criteria at all receiver locations.

Given the separation distance between vibration generating activities and the nearest potentially affected residential locations vibration levels from the APMEP are predicted to be negligible and below levels of human perception at the nearest residential receivers.

While noise modelling has indicated that there will be negligible noise impacts associated with the APMEP, the following noise management measures have been recommended for consideration:

- Continued noise monitoring on site and within the community in accordance with the Angus Place Noise Monitoring Program (refer SLR Consulting Report 30-1942-R2 *Angus Place Colliery Noise Monitoring Program* dated 15 December 2008).
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Incorporate clear signage at the site including relevant contact numbers site for community enquiries.
- Prompt response to any community issues of concern.
- Adoption of “quiet” work practices at the vent fan and borehole compounds.

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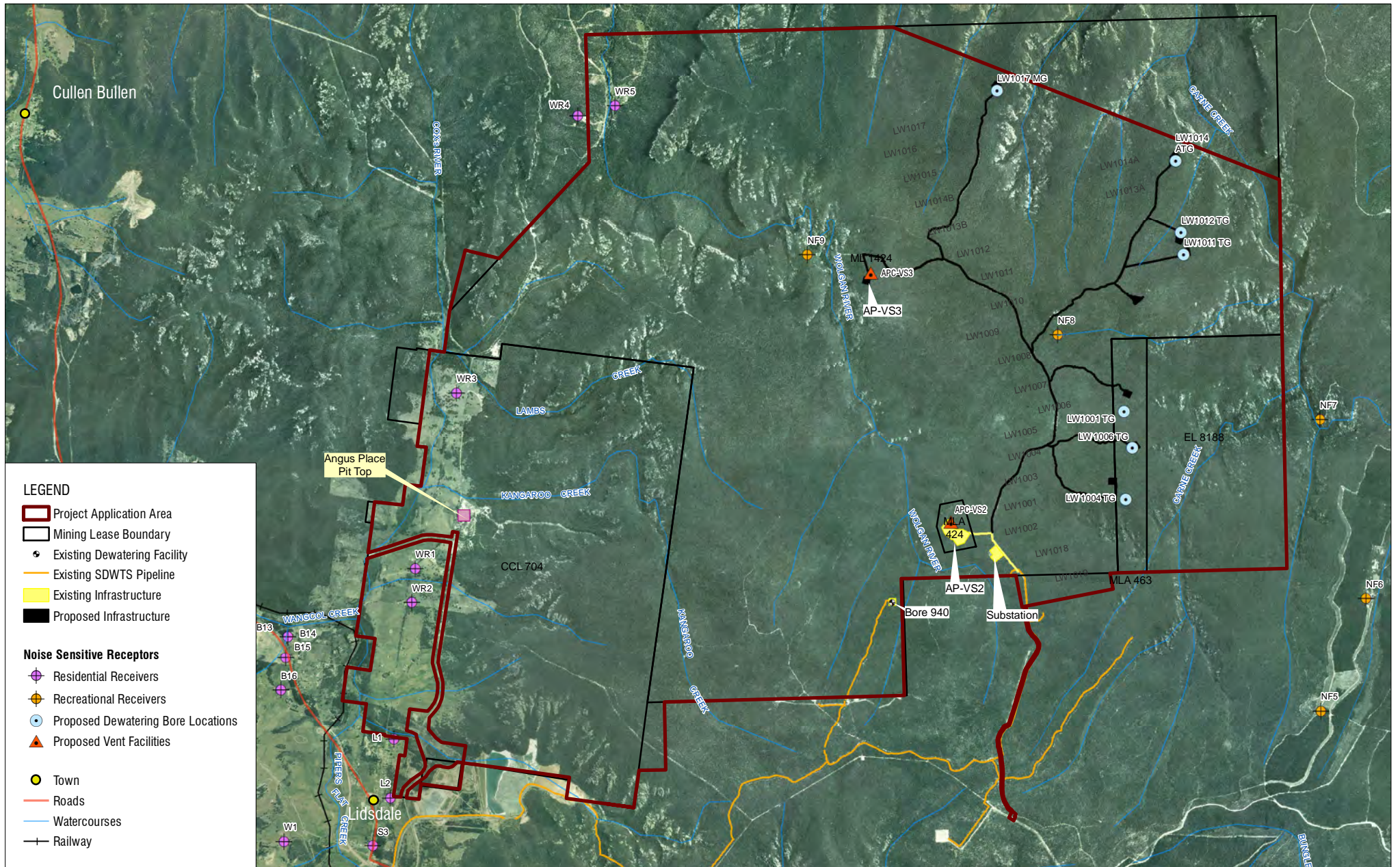
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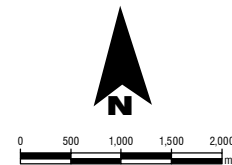
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Project No.:	630.10123.01030
Date:	22/01/2014
Drawn by:	LH
Scale:	1:75,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56



Centennial Angus Place Pty Ltd

ANGUS PLACE EXTENSION NOISE

Noise Sensitive Receptors

APPENDIX A

Appendix B1

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Construction Sound Power Levels

Source Description	Octave Band Centre Frequency (Hz) – dB re 1pW								dBL	dBA
	63	125	250	500	1000	2000	4000	8000		
Dozer	112	109	113	116	113	111	108	98	121	118
Compactor	104	109	112	107	105	102	96	90	116	110
Excavator	105	116	108	111	107	105	100	93	119	113
Grader	100	109	104	108	109	106	103	103	116	113
Water Cart	105	102	104	101	99	98	91	86	111	105
Truck	104	106	99	100	98	92	85	77	110	102
All Terrain Forklift	102	113	107	105	101	98	90	84	115	107
Drill Rig	108	102	102	100	100	98	92	82	111	104
Generator	100	95	90	91	86	91	73	69	107	95
Compressor	90	87	89	85	83	79	70	65	97	88
Mud Pump	81	91	96	93	96	92	83	75	101	99
Transit Mixer	112	107	109	104	104	101	97	88	116	109
Crane	112	106	102	102	101	97	97	77	114	106
Hand tools (grinder)	67	65	67	75	84	95	100	100	104	104
Hammering	107	87	93	89	94	93	88	94	111	98

Appendix B2

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Operational Sound Power Levels

Source Description	Octave Band Centre Frequency (Hz) - dBL re 1pW								dBL	dBA
	63	125	250	500	1000	2000	4000	8000		
Angus Place Pit Top										
CHPP	115	114	107	108	101	96	90	80	120	108
Compressor House	107	115	109	105	107	102	95	84	118	110
Ventilation Fan	116	111	102	86	76	85	93	90	117	100
Winding Building	102	94	86	91	89	83	86	79	106	94
Site Conveyors	110	104	101	106	106	102	96	81	115	109
Dozer (each)	112	117	112	110	111	103	97	92	121	114
Coal Bin	98	96	92	90	93	96	91	76	105	100
Trucks loading	102	98	97	94	97	98	94	83	107	103
Stockpile discharge	87	85	85	87	89	90	89	84	99	96
Ventilation shaft 2 site (APC-VS2) ¹										
Ventilation fan	121	123	124	118	111	110	105	99	129	120
Diesel Generator	106	113	110	104	98	97	92	88	116	107
Compressor	93	90	87	89	85	83	79	70	97	88
Substations	80	96	92	79	71	66	63	56	97	85
Dewatering borehole sites										
Submersible pump	75	85	90	87	90	86	77	69	95	93
11kV to 3.3kV transformer (ODAF ²)	88	95	86	77	74	70	65	61	96	83
High Voltage switching and control equipment	82	89	80	71	68	64	59	55	90	77

1 - As presented and assessed in SLR Consulting Report 670.10168.00100-R1R3 Angus Place Colliery Ventilation Facility Project – Noise and Vibration Impact Assessment dated July 2012.

2 - ODAF – Oil Directed Air Forced (high noise level operational mode only used during periods of high load under high ambient air temperatures)

NSW INP Application Note – Modification of Existing Industrial Premises

Noise impact assessment for the modification of existing industrial premises

Background

(see INP Section 10)

Section 10 of the NSW Industrial Noise Policy (INP) outlines the application of the policy to existing industrial premises.

As well as being used to assess noise emissions from new industrial premises, the INP is also applied to situations where existing industrial premises are modified, expanded or upgraded.

Where a modification is proposed, the noise level targets for the premises (termed Project Specific Noise Levels) are to be determined firstly excluding any noise from the subject premises. The noise from the existing premises is then assessed against these targets to determine if there is a need to consider noise mitigation for existing operations. The predicted noise level from the proposed modification is then assessed, both in isolation and in combination with noise from the existing premises.

The total noise emissions from the modified premises should ideally not exceed the Project Specific Noise Levels. If the existing premises cannot achieve these targets, the allowable noise emissions from the proposed modification will be set so that the modification does not significantly increase the existing noise emissions.

Recommended approach

This application note outlines these processes together with the degree of information required to support a proper assessment of modifications to an existing industrial premises.

A noise impact assessment for the modification of existing industrial premises should include, as a minimum:

- existing noise criteria contained in consents, approvals or licences, that are applicable to the premises;
- Project Specific Noise Levels (PSNLs) for the premises determined in accordance with the INP and relevant application notes (see, for example, Appendix A4 of the INP). Note: care should be taken to exclude noise from the existing premises when quantifying background and existing industrial noise levels (further guidance is in the INP in Section 11.1.2);
- where application of the INP results in a PSNL more stringent than existing noise criteria, the PSNL should be adopted for noise assessment purposes. Note: the INP acknowledges that the PSNL is a goal sought to be achieved through the application of feasible and reasonable noise mitigation measures and is not necessarily applied as a statutory limit by default.
- measured or predicted noise levels from the existing premises at noise sensitive receiver locations;
- predicted noise contribution from the proposed modification, in isolation, at noise sensitive receiver locations; and
- cumulative noise levels from the entire premises (i.e. combined level from existing and proposed modification) compared to the PSNL.

Where noise from the existing premises exceeds the PSNL

Where it can be determined that noise from the existing premises alone is currently exceeding the PSNL, a preliminary analysis of potential noise mitigation measures, and conceptual noise reductions, needs to be undertaken for the existing premises. Note: this does not mean that in all circumstances noise mitigation to existing premises will be required as part of a modification. Decisions of this nature will be determined on a case by case basis, taking into account various factors, for example, feasible and reasonable mitigation options, the absolute level of noise and existing measures of community impact, including complaints.

Once the conceptual mitigated level of noise performance of the existing premises (i.e. what can be achieved) has been determined, the contribution noise level goal for the modification can be determined. The noise level goal for the modification should be set at least 10dB below the PSNL, or where it has been determined that the existing premises cannot achieve the PSNL, it should be set at least 10dB below the conceptual mitigated noise performance of the existing premises.

This approach is designed to ensure that noise from the modification does not become the limiting factor in noise from the entire premises potentially meeting the PSNL.

