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Centennial Western Coal Services Project Noise and Vibration Impact Assessment

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Centennial Coal Company Limited
PO Box 1000
Toronto NSW 2283

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Centennial Western Coal Services Project

Noise and Vibration Impact Assessment

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Executive Summary

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by Centennial Coal Company Limited (Centennial) to undertake a Noise Impact Assessment (NIA) for the Centennial Western Coal Services Project (the Project).

The key elements of this Project include:

- Upgrading the existing washery, workshops and infrastructure within the Springvale Coal Services site by constructing a new washery adjacent to the existing facility that will remain operational to provide a total processing capacity of up to 7 Mtpa.
- Construction of processing infrastructure such as additional conveyors, transfer points and other coal handling requirements to cater for the upgraded washery facility within the existing disturbance footprint of the Springvale Coal Services site.
- Extending and enlarging an existing reject emplacement area to enable sufficient reject disposal capacity for a 25 year life.
- Increasing the utilisation of the return side of the existing overland conveyor system to enable up to 6.3 Mtpa of coal to be delivered to Lidsdale Siding.
- Constructing a private haul road, approximately 1.3 km in length, linking the Springvale Coal Services site with the existing private haul road from Angus Place Colliery to Mt Piper Power Station. This private road will cross a section of the existing Pine Dale Mine operation and over the Castlereagh Highway. The preferred location of the new private haul road has been identified.
- Improving the current water management systems on the Springvale Coal Services site by separating clean and dirty water streams prior to either reuse or discharge off site.
- Integrating the existing approved transport and processing of coal at Springvale Coal Mine and Angus Place Colliery into the one consent.
- Integrating the remaining rehabilitation, monitoring, water management and reporting requirements associated with the Lamberts Gully Mine which occupies the Springvale Coal Services Site.
- Continued use of all existing approved infrastructure, facilities and activities associated with the transport and processing of coal from each mine gate and the point of delivery to the Springvale Coal Services site. This infrastructure includes the existing conveyors, private haul roads, Kerosene Vale Stockpile Area, reject emplacement areas, services, access roads, car parks and buildings.

Findings of the NIA are summarised as follows:

OPERATIONAL NOISE IMPACTS

Blackmans Flat

Noise predictions indicate that there will be likely residual noise impacts above the INP project specific noise criteria at some receptors surrounding the Project site.

Depending on the degree of residual noise impact, noise mitigation and management measures have been suggested to control the effect of noise from the Project at these receptors.

Executive Summary

Wallerawang

Noise predictions indicate that the Project will meet the noise criteria set out in the project approval for the Lidsdale Siding Upgrade Project PA 08_0223 under all operating conditions.

Lidsdale

Noise predictions indicate that the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions.

Wolgan Road

Predicted noise emission levels from the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions.

Springvale

Predicted noise emission levels from the Project will meet the project specific noise criteria for Springvale derived in accordance with the INP. For locations S1, S2, S4 and S5 the noise levels predicted for the existing overland conveyor are low when compared to the entire Springvale Colliery operation. This means that the noise impact at these receptors will be insignificant in relation to noise from Springvale Colliery.

SLEEP DISTURBANCE

The results of sleep disturbance modelling indicates that maximum noise levels generated by the Project will comply with sleep disturbance goals at the closest, potentially most affected receptors in Wallerawang, Lidsdale and Springvale.

Predicted maximum noise levels from the Project at Blackmans Flat and Wolgan Road receptors show potential exceedance of the noise goals but are below a level that is considered to cause awakening reactions. Mitigation measures considered for operation impacts will also attenuate the maximum noise levels from activities at night.

Executive Summary

CUMULATIVE IMPACT ASSESSMENT

Potential sources of noise surrounding the Project have been identified as the Wallerawang Power Station, the Mt Piper Power Station, the Angus Place underground coal mine, the Springvale Coal Mine, Blackmans Flat Waste Management Facility and Pine Dale Coal Mine. The predicted cumulative amenity noise levels from existing, approved and proposed mining and industrial noise sources and the Project are at or below the relevant acceptable amenity levels for suburban receivers at all locations during the daytime and evening periods.

During the night period the cumulative amenity noise level exceeds the acceptable level of 40 dBA at Locations B2 and B17 but is below the maximum noise level of 45 dBA.

CONSTRUCTION NOISE ASSESSMENT

The results of construction modelling indicate that noise emission from construction will comply with the noise affected management level at all residential locations with the exception of B2, B4 B5 and B6. It should be noted that the predicted construction noise levels are below the highly noise affected level for the scenarios considered.

ROAD TRAFFIC NOISE ASSESSMENT

The predicted impact from Project related traffic, during construction and operation, due to an increase in road traffic noise from the Castlereagh Highway is considered to be negligible.

VIBRATION

Construction blasting noise and vibration impacts have been assessed and a minimum safe blasting distance has been provided.

Monitoring of blasts would be conducted in order to derive a site law for the Project to validate predicted vibration levels.

Predicted vibration levels for the construction and operation of the Project are significantly below damage and annoyance risk criteria at all times.

NOISE MITIGATION AND MANAGEMENT

The mitigation considered in the assessment to reduce the impact of noise emissions from the Project includes the following:

- Removal of the eastern reject emplacement areas at the Springvale Coal Services Site.
- The proposed link road was relocated to the west of the initial proposed route (Option 2 Haul Road).
- A reduction in material haulage on the internal haul roads during periods of prevailing, noise enhancing weather conditions. The default haulage level will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the project specific noise criteria during these conditions.
- The Kerosene Vale Stockpile Area will not be operated during evening and night periods.

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by Centennial Coal Company Limited (Centennial) to undertake a Noise Impact Assessment (NIA) for the Centennial Western Coal Services Project (the Project). This report presents the results and findings of the NIA.

The NIA has been prepared with reference to Australian Standards (AS) 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with the New South Wales (NSW) Environment Protection Authority (EPA) *NSW Industrial Noise Policy* (INP), *Environmental Noise Control Manual* (ENCM), *NSW Road Noise Policy* (RNP) and *NSW Interim Construction Noise Guideline* (ICNG).

The scope of the assessment was also designed to address the Director-Generals Requirements (DGR's) for the project with regard to noise. A synopsis of these requirements is provided in **Table 1**.

Table 1 Director-Generals Requirements

Director General's Requirement	Section Addressed
Noise and Vibration – including a quantitative assessment of potential:	
- Construction, operational (including coal and reject truck haulage movements on the site) and off-site transport noise impacts, particularly for residents of Blackmans Flat.	Section 7 and Section 9
- Reasonable, and feasible mitigation measures, including evidence that there are no such measures available other than those proposed.	Section 7.6
Relevant Policies and Guidelines – Noise and Blasting	Section 3, Section 4, Section 5 Section 6 and Section 7
- NSW Industrial Noise Policy (EPA)	
- Environmental Noise Management – Assessing Vibration: a technical guideline (EPA)	Section 9
- NSW Road Noise Policy (EPA)	Section 3.7 and Section 8
- Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC)	Section 9
Traffic and Transport	
- A consideration of alternative locations for haul road access to the site, including alternative locations for the proposed haul road bridge crossing the Castlereagh Highway and noise and dust impacts for residents of Blackmans Flat.	Section 7.3

2 PROJECT OVERVIEW

Centennial has developed a long term strategy for its future operations in the Western Coalfield. This strategy is in response to future marketing opportunities for both domestic and export coal sales. The strategy centres on the transport and processing of coal from both Springvale Coal Mine and Angus Place Colliery but also facilitates receipt of coal supplies from other areas.

In line with the Centennial strategy the Project will involve building a new additional washery adjacent to the existing washery within the Springvale Coal Services site, linking the facility to the Angus Place Colliery via a new haul road link and separating the transport and logistics function of the facility away from the source mines.

Maximum coal that could be received by the Project is 9.5 million tonnes per annum (Mtpa) representing coal supplied from Springvale Coal Mine, Angus Place Colliery and other potential Centennial sources. The design of the Project enables up to 7.0 Mtpa to be washed with up to 6.3 Mtpa of export coal delivered to Lidsdale Siding via the existing overland conveyor system.

2.1 Project Location

The Project is located to the west of the Blue Mountains in NSW, approximately 4 km north-west of the village of Lidsdale which is located approximately 15 km north of Lithgow. Wallerawang is located approximately 5 km to the south of the site.

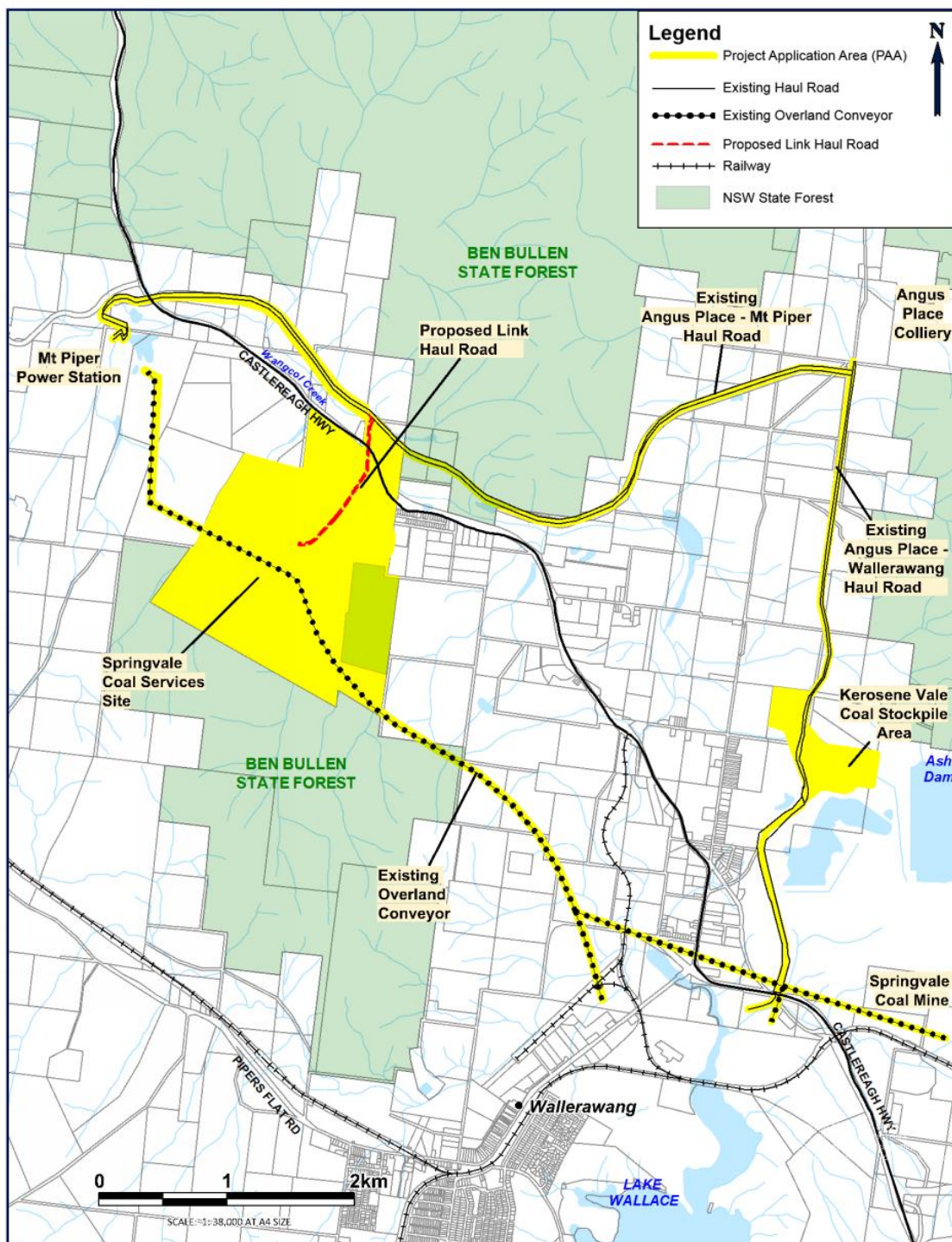
The Project Application Area (PAA) includes those existing approved activities that are proposed to be incorporated into the development consent issued for this Project as well as those areas covering the physical works included as part of the Project. The PAA includes the Wallerawang Haul Road which links Angus Place Colliery to Wallerawang Power Station and the Mt Piper Haul Road which links Angus Place Colliery to Mt Piper Power Station. The PAA also includes the Springvale Overland Conveyor which links Springvale Coal Mine to Mt Piper Power Station, with off takes to Wallerawang Power Station and the Springvale Coal Services Site.

In summary, the PAA includes the following:

- Springvale Coal Services site including all existing and proposed infrastructure on Consolidated Coal Lease 773 and Mining Lease 1448;
- The existing private haul roads between Angus Place Colliery and Mount Piper and Wallerawang Power Stations referred to as the Angus Place – Mount Piper Haul Road and the Angus Place – Wallerawang Haul Road respectively ;
- A proposed haul road link between the Springvale Coal Services site and the Angus Place – Mt Piper private haul road with an overpass of the Castlereagh Highway;
- The existing overland conveyors linking Springvale Coal Mine, Wallerawang and Mount Piper Power Stations, the Springvale Coal Services Site and Lidsdale Siding; and
- The existing Kerosene Vale Coal Stockpile Area located along the Wallerawang Haul Road.

The location of the PAA is shown in **Figure 1**.

Figure 1 Location of Project Application Area



TITLE: FIGURE 3: PROJECT APPLICATION AREA PLAN	LOCATION: MOUNT PIPER WALLERAWANG	DATUM: (GDA 94) PROJECTION: MGA ZONE 56	DATE: 21/03/2013 PURPOSE: PLANNING	LAYOUT REF: \\centennial\all_jobs\110910 Coal Services VERSION (PLAN BY) A4 (RD-NW)
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CLIENT: CENTENNIAL COAL
JOB REF: 110910

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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2.2 Project Description

The key elements of the Project are as follows:

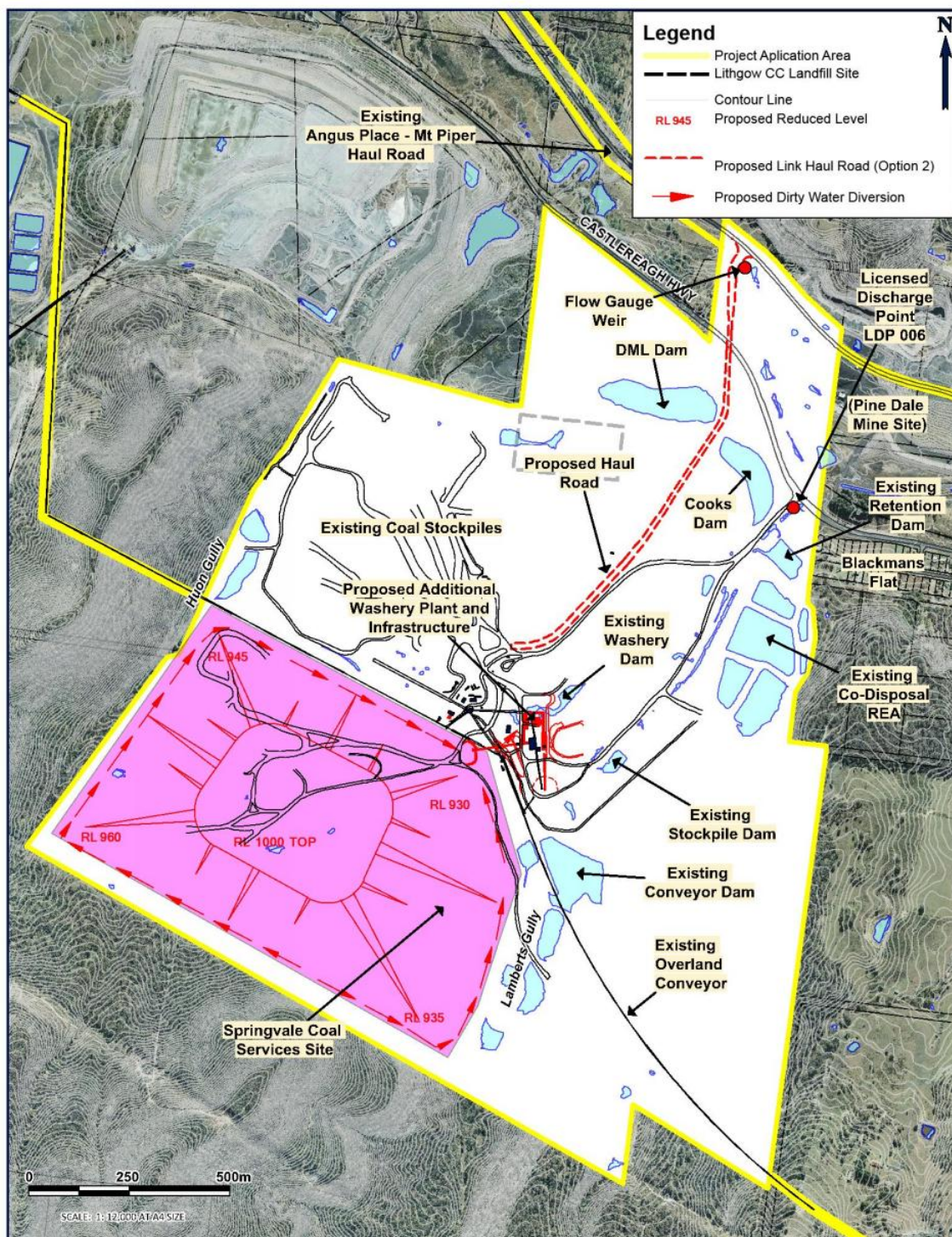
- Upgrading the existing washery, workshops and infrastructure within the Springvale Coal Services site by constructing a new washery adjacent to the existing facility that will remain operational to provide a total processing capacity of up to 7 Mtpa.
- Construction of processing infrastructure such as additional conveyors and transfer points and other coal handling requirements to cater for the upgraded washery facility within the existing disturbance footprint of the Springvale Coal Services site.
- Extending and enlarging an existing reject emplacement area to enable sufficient reject disposal capacity for a 25 year life.
- Increasing the utilisation of the return side of the existing overland conveyor system to enable up to 6.3 Mtpa of coal to be delivered to Lidsdale Siding.
- Constructing a private haul road, approximately 1.3 km in length, linking the Springvale Coal Services site with the existing private haul road from Angus Place Colliery to Mt Piper Power Station. This private road will cross a section of the existing Pine Dale Mine operation and over the Castlereagh Highway. The preferred location of the new private haul road is identified on **Figure 2**.
- Improving the current water management systems on the Springvale Coal Services site by separating clean and dirty water streams prior to either reuse or discharge off site
- Integrating the existing approved transport and processing of coal at Springvale Coal Mine and Angus Place Colliery into the one consent.
- Integrating the remaining rehabilitation, monitoring, water management and reporting requirements associated with the Lamberts Gully Mine which occupies the Springvale Coal Services Site.
- Continued use of all existing approved infrastructure, facilities and activities associated with the transport and processing of coal from each mine gate and the point of delivery to the Springvale Coal Services site. This infrastructure includes the existing conveyors, private haul roads, Kerosene Vale Stockpile area, reject emplacement areas, services, access roads, car parks and buildings.

The Project will enable a total of 7 Mtpa of coal to be processed on the Springvale Coal Services Site, yielding up to 6 Mtpa of product coal available for export. The delivery capacity of the overland conveyor system to Lidsdale Siding is 6.3 Mtpa which can be used for both processed and unprocessed coal. The factors that have been considered in reaching this future production level include:

- The physical limitations of the existing overland conveyor system to Lidsdale Siding.
- A planned increase of coal production at Springvale Coal Mine up to 4.5 Mtpa.
- Approved production at Angus Place Colliery of up to 4.0 Mtpa.
- The ability to export coal from Angus Place Colliery to overseas markets.
- The ability to export coal from other local resources.

The proposed layout of the Springvale Coal Services Site is shown in **Figure 2** including the preferred location of the proposed private haul road.

Figure 2 Springvale Coal Services Site Layout



TITLE: FIGURE PROPOSED INFRASTRUCTURE SPRINGVALE COAL SERVICES SITE	LOCATION: MOUNT PIPER WALLERAWANG	DATUM: (GDA 94) PROJECTION: MGA ZONE 56	DATE: 28/03/2013 PURPOSE: PLANNING	LAYOUT REF: J:\0851\Centennial\all jobs\110910 Coal Services VERSION (PLAN BY) B A4 (RD-NW)
CLIENT: CENTENNIAL COAL JOB REF: 110910		RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762) 241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303 T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au		RPS

2.3 Noise Sensitive Receptors

A number of residences have been identified as sensitive receptors within the PAA. The locations of the identified sensitive receptors have been categorised depending on location and in relation to the source of noise from the Project eg. Springvale Coal Services Site, private haul, overland conveyor etc. The receiver categories are shown in **Table 2** along with the potential source of noise associated with the Project.

Table 2 Noise Receiver Categories

Designation	Receiver Area	Potential Noise Source
B	Blackmans Flat	Coal processing and handling, haul road
W	Wallerawang	Overland conveyor
L	Lidsdale	Overland conveyor, haul road
WR	Wolgan Road	Haul road
S	Springvale	Overland conveyor

2.3.1 Blackmans Flat Receptors

A number of residential receivers are located off the Castlereagh Highway and Noon Street Blackmans Flat. These residences are near the Springvale Coal Services Site and the Mt Piper Haul Road. Details of the closest potentially most affected receivers are contained **Table 3** and presented in **Figure 3** and **Figure 4**. It should be noted that the impact of noise at Centennial owned receptors have not been considered in the NIA.

Table 3 Noise Sensitive Receptors Blackmans Flat

Receiver ID	Receiver Type	Receiver Location	
		Easting	Northing
B1	Residential (Centennial Owned)	226372	6304438
B2	Residential	226403	6304381
B3	Residential (Centennial Owned)	226441	6304370
B4	Residential	226585	6304402
B5	Residential	226642	6304400
B6	Residential	226661	6304395
B7	Residential	226681	6304392
B8	Residential	226719	6304386
B9	Residential	226655	6304339
B10	Residential	226670	6304336
B11	Residential	226690	6304333
B12	Residential	226809	6304166
B13	Residential	226918	6304210
B14	Residential	227543	6304120
B15	Residential	227514	6303808
B16	Residential	227440	6303341
B17	Residential	226497	6302883
B18	Residential	224510	6302004
Cemetery	Passive	226760	6304369

Figure 3 Noise Sensitive Receptors Blackmans Flat

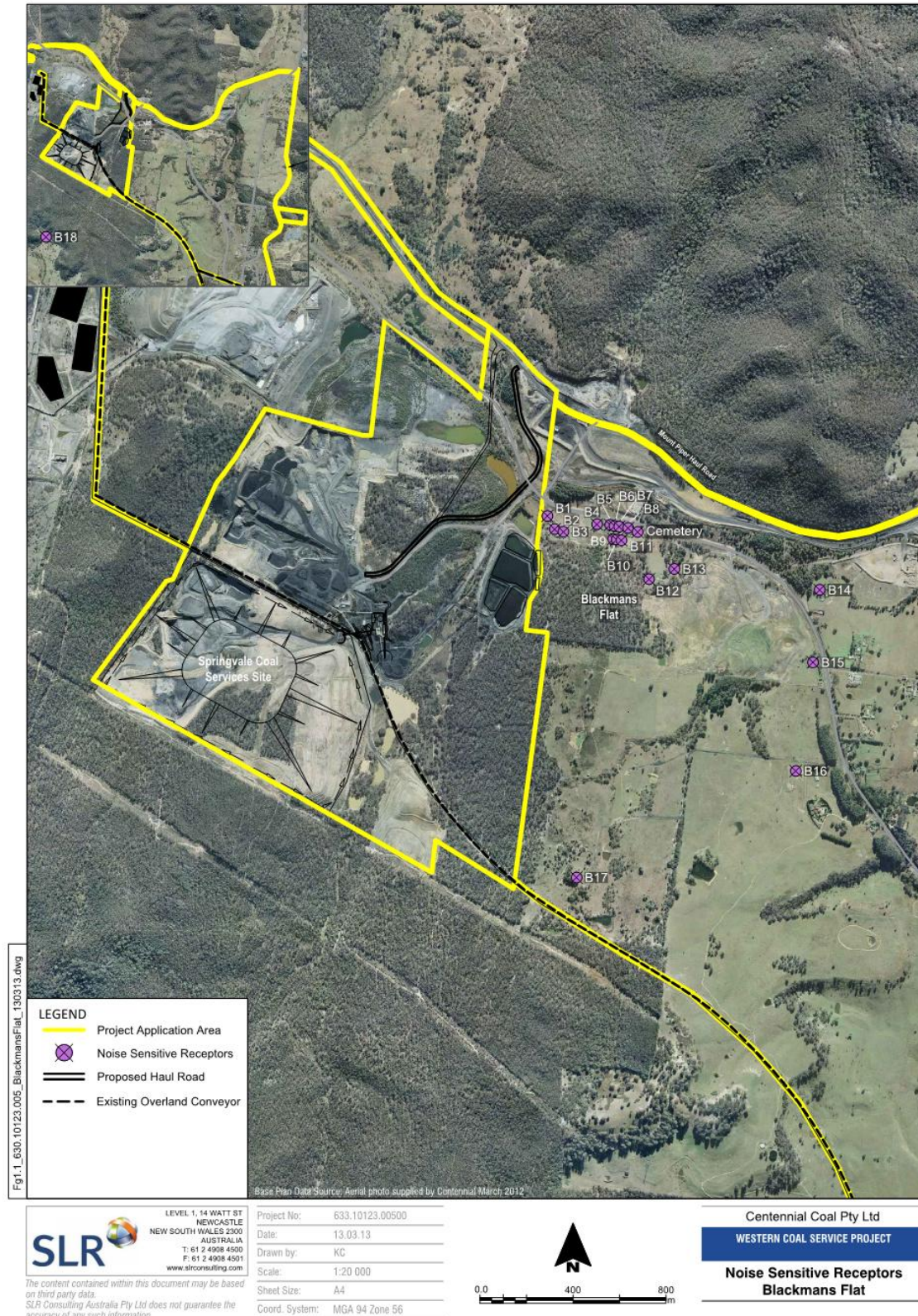
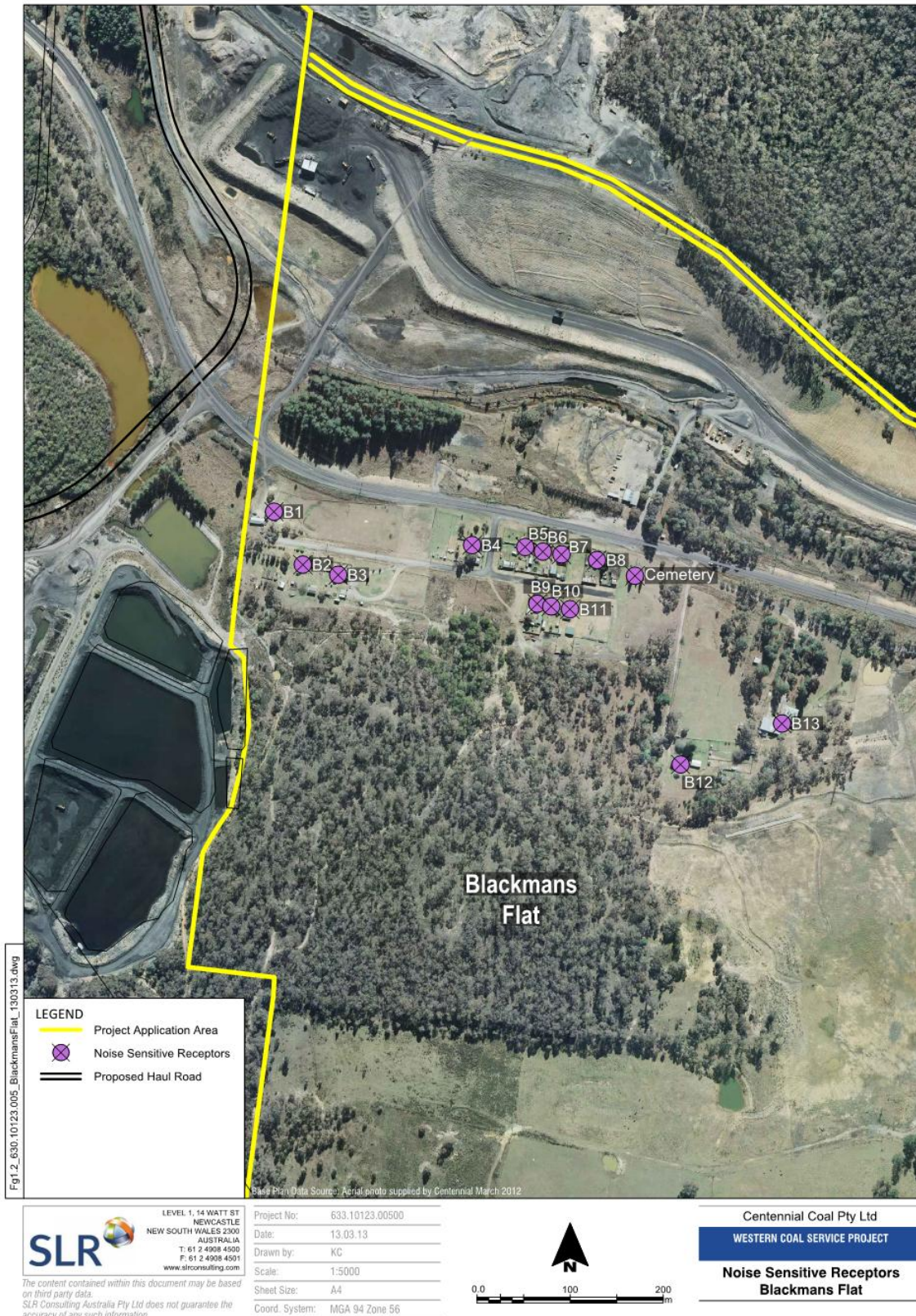


Figure 4 Noise Sensitive Receptors Blackmans Flat Detailed



2.3.2 Wallerawang Receptors

There are residences located off Bray's Lane Wallerawang which are adjacent to the overland conveyor that runs between the Springvale Coal Services Site and Lidsdale Siding.

Details of the closest potentially most affected receivers are contained in **Figure 4** and presented in **Figure 5**.

Table 4 Noise Sensitive Receptors Wallerawang

Receiver ID	Receiver Type	Receiver Location	
		Easting	Northing
W1	Residential	227484	6301148
W2	Residential	227420	6300654

Figure 5 Noise Sensitive Receptors Wallerawang



2.3.3 Lidsdale Receptors

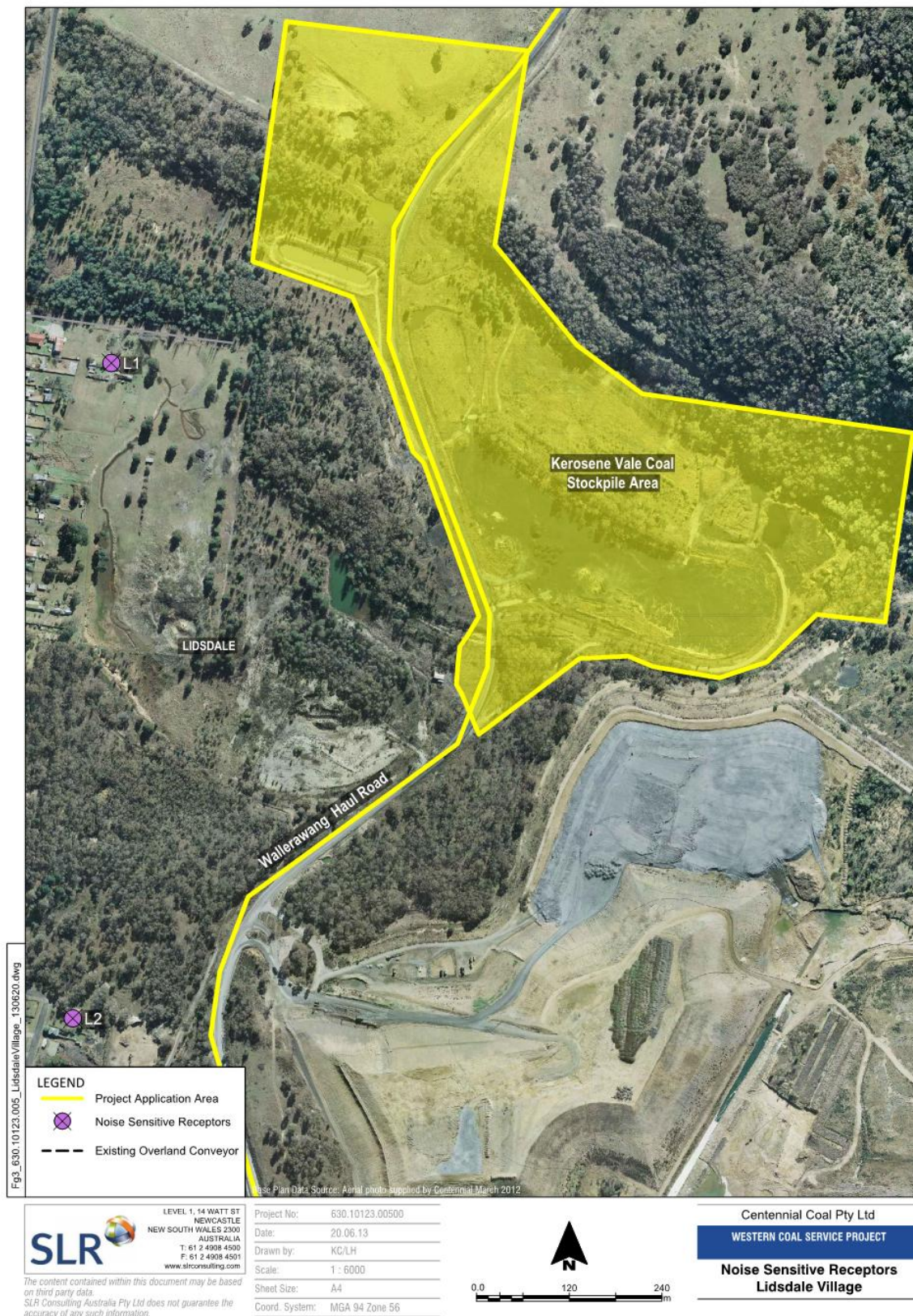
The village of Lidsdale is located to the north east of Wallerawang. The majority of residences are accessed via Wolgan Road. The village is situated to the west of the Wallerawang Haul Road. Residences to the north of the village are positioned to the west of the Kerosene Vale Coal Stockpile Area.

Details of the closest potentially most affected are contained in **Table 5** and presented in **Figure 6**

Table 5 Noise Sensitive Receptors Lidsdale Village

Receiver ID	Receiver Type	Receiver Location	
		Easting	Northing
L1	Residential	229078	6302626
L2	Residential	229028	6301777

Figure 6 Noise Sensitive Receptors Lidsdale



2.3.4 Wolgan Road Receptors

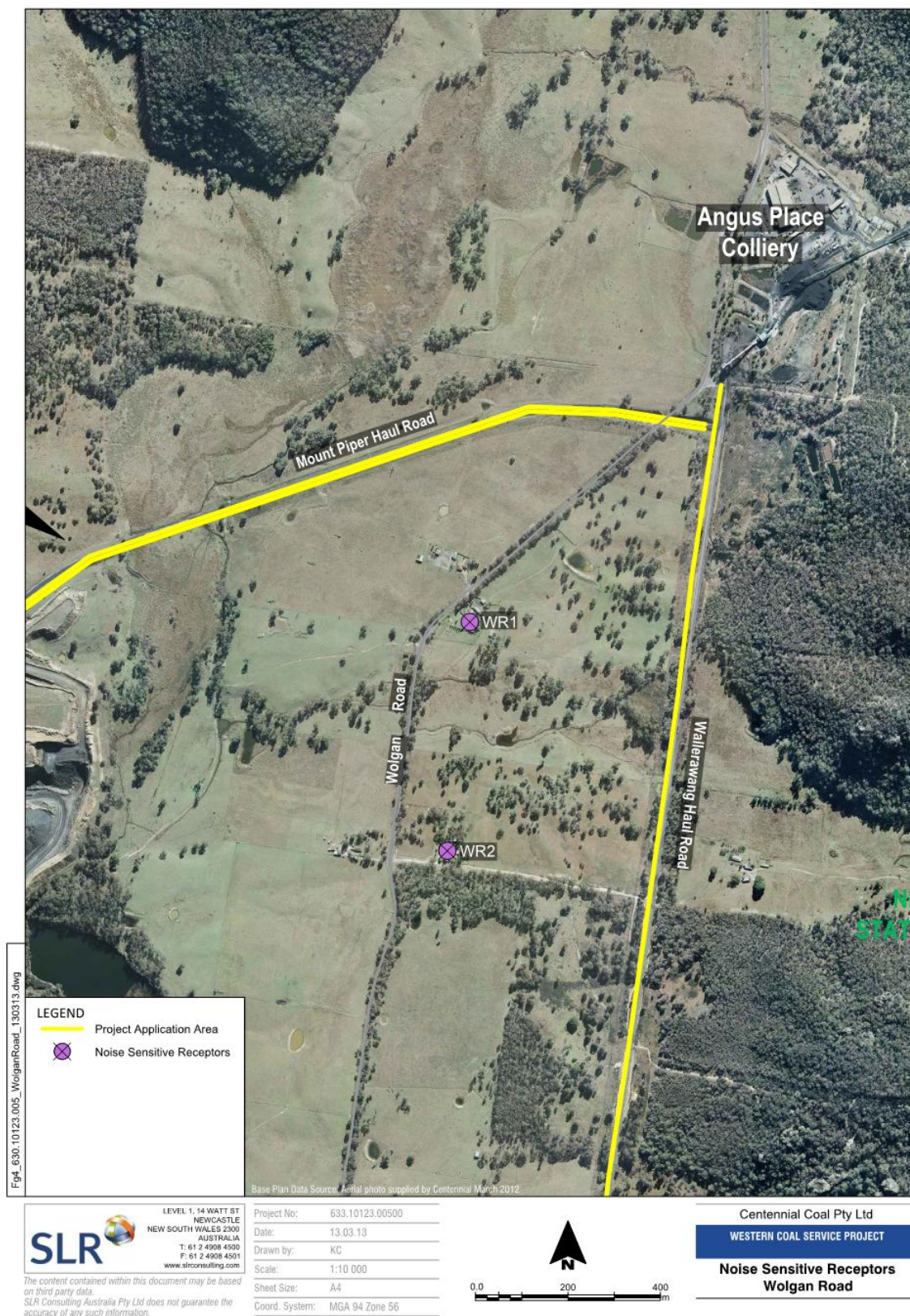
There are several residences to the north of Lidsdale village off Wolgan Road. These receptors are situated near the intersection of the Angus Place to Wallerawang haul road and the Mt Piper Haul Road.

Details of the closest potentially most affected receptors are contained in **Table 6** and presented in Error! Reference source not found..

Table 6 Noise Sensitive Receptors Wolgan Road

Receiver ID	Receiver Type	Receiver Location	
		Easting	Northing
WR1	Residential	229391	6305106
WR2	Residential	229342	6304611

Figure 7 Noise Sensitive Receptors Wolgan Road



2.3.5 Springvale Receptors

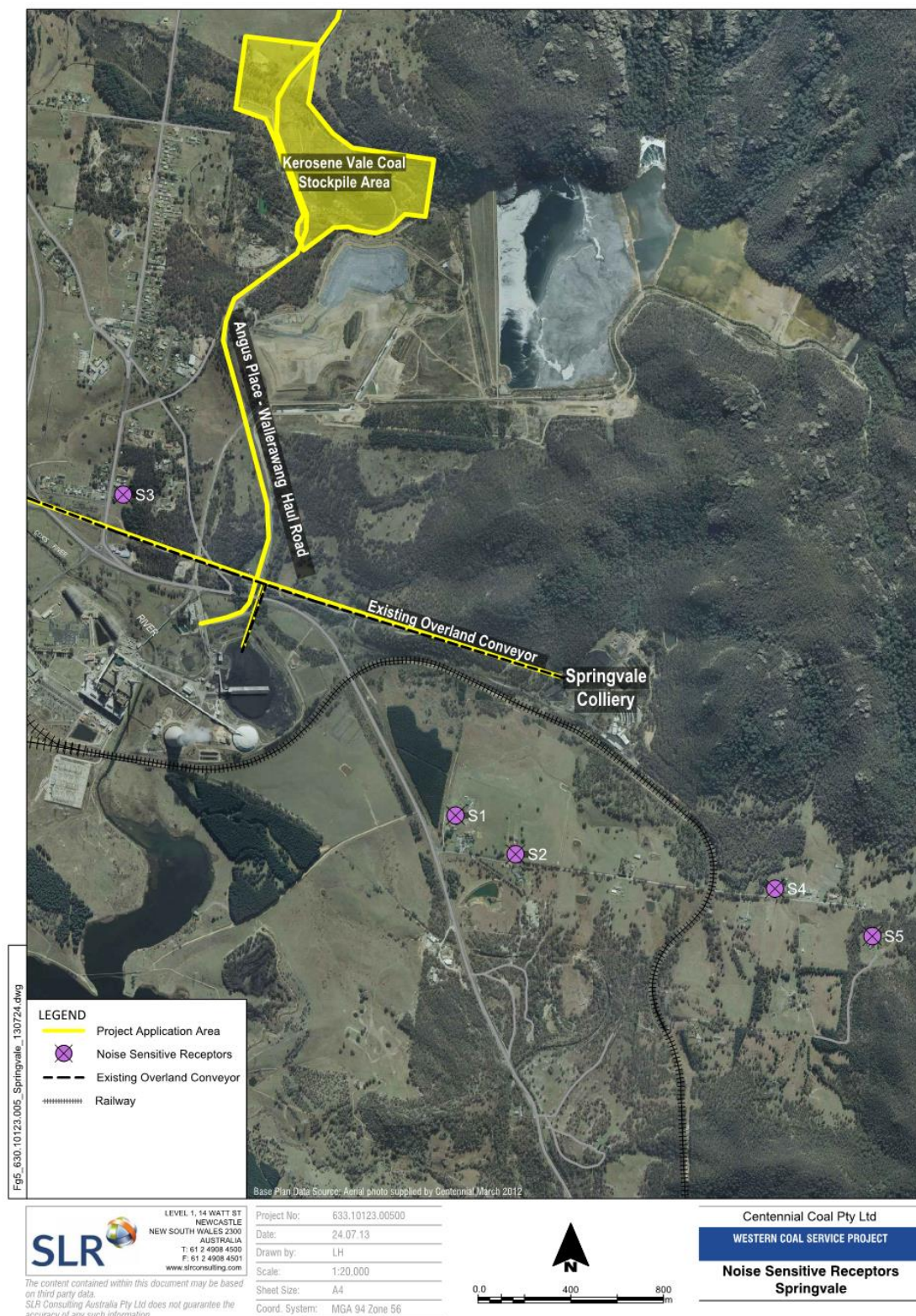
There are some residences to the south of Springvale Colliery off Springvale Lane and further west to the south of Lidsdale village. These receptors have the potential to be affected by noise from the overland conveyor from Springvale.

Details of the closest potentially most affected receptors are contained in **Table 7** and presented in **Figure 8**.

Table 7 Noise Sensitive Receptors Springvale

Receiver ID	Receiver Type	Receiver Locations	
		Easting	Northing
S1	Residential	230210	6299703
S2	Residential	230469	6299536
S3	Residential	228775	6301089
S4	Residential	231589	6299387
S5	Residential	232009	6299182

Figure 8 Noise Sensitive Receptors Springvale



3 IMPACT ASSESSMENT PROCEDURES

3.1 General Objectives

Two methods were used to assess noise emission from the Project. The methods are outlined as follows:

- INP Assessment - where modifications to an existing operation are planned (eg Springvale Coal Services site) the assessment was carried out in accordance with the INP.
- Existing Project Approval – where the operation of existing infrastructure remains unchanged and project approval noise conditions are in place the Project was assessed against the relevant project approvals. The determination and application of noise limits in accordance with the INP are typically triggered by new developments or modifications to existing developments (INP Section 10).

3.2 INP Assessment

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the EPA. The 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 Protection of the Environment Operations Act, 1997.

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.

3.3 Assessing Intrusiveness

For assessing intrusiveness, the background noise level must be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

3.4 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 8**.

Table 8 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)	
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 (e.g. National Park)	All	When in use	50	55
Active recreation area (e.g. 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.

Table 9 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 8**.

3.5 INP Project Specific Criteria

The INP Project Specific Noise Criteria are the more stringent of either the amenity or intrusive criteria. The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the INP project specific assessment criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the INP project specific assessment criteria can be generally described as follows:

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

In view of the foregoing, **Table 10** presents the methodology for assessing noise levels which may exceed the INP project specific noise assessment criteria.

Table 10 Noise Impact Assessment Methodology

Assessment Criteria	Project Specific Criteria	Noise Management Zone	Noise Affection Zone
Intrusive	Rating background level plus 5 dBA	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria
Amenity	INP based on existing industrial level	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria

For the purposes of assessing the potential noise impacts the project specific, management and affection criteria are further defined as follows:

3.5.1 Project Specific Criteria

Most people in the broader community would generally consider exposure to noise levels corresponding to this zone acceptable.

3.5.2 Noise Management Zone

Depending on the degree of exceedance of the project specific criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is recommended that management procedures be implemented including:

- Prompt response to any community issues of concern.
- Noise monitoring on site and within the community.
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Consideration of acoustical mitigation at receivers.
- Consideration of negotiated agreements with property holders.

3.5.3 Noise Affection zone

Exposure to noise levels exceeding the project-specific criteria by more than 5 dBA may be considered unacceptable by some property holders and the INP recommends that the proponent explore the following:

- Discussions with relevant property holders to assess concerns and provide solutions.
- Implementation of acoustical mitigation at receivers.
- Negotiated agreements with property holders, where required.

3.6 Assessing Sleep Disturbance

The EPA's current approach to assessing potential sleep disturbance is to apply an initial screening criterion of background plus 15 dBA (as described in the Application Notes to the INP), and to undertake further detailed analysis if the screening criterion cannot be achieved. The sleep disturbance screening criterion applies outside bedroom windows during 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.

3.7 Construction Noise

The EPA has prepared an interim guideline covering construction noise. The ICNG sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts. **Table 11** and **Table 12** sets out the noise management levels and how they are to be applied. The approach is intended to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

Table 11 Construction Noise Goals - Residences

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 + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15minute) 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 + 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.

Table 12 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

3.8 Road Traffic Noise

The 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 13 presents the most relevant RNP criteria for the Project which has the potential to increase road traffic noise levels on the Castlereagh Highway.

Table 13 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria	
		Day	Night
Freeway/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)

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

4 EXISTING ACOUSTICAL ENVIRONMENT

4.1 Blackmans Flat

In order to determine existing ambient noise levels at Blackmans Flat, a background noise monitoring survey was undertaken. The background noise monitoring consisted of continuous, unattended noise logging and an operator attended noise survey. The operator attended noise survey was used to define existing noise sources and the character of noise in the area and also used to qualify unattended noise logging results. Background noise monitoring was conducted at the southern boundary of Location B1 (refer to **Figure 2**).

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS 1259.2-1990, "Sound Level Meters" and carry current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ± 0.5 dBA.

4.1.1 Operator Attended Noise Monitoring

Two (2) operator attended noise surveys were conducted at the monitoring location.

The monitoring survey was conducted over a 15 minute period using a B&K 2270 integrating sound level meter (S/N 2679354). Results of the operator attended noise measurement are given **Table 14**. Ambient noise levels given in the table include all noise sources such as road, insects, birds, as well as any industrial/commercial operations.

Table 14 Operator Attended Noise Survey Results

Location	Date/ Start time/ Period/ Weather	Primary Noise Descriptor (dBA re 20 Pa)					Description of Noise Emission, Typical Maximum Levels L _{Amax} (dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
B1 Southern Boundary	20/02/2012 10:11 AM Day Wind 1 m/s WSW Temp 22 °C	56	51	45	38	43	Dog barking 41 to 43 Birdsong 42 to 56 Road traffic 38 to 55 Insects 30 to 35 Dozer 35 to 45 Washery 30 to 35 Estimated Springvale Coal Services Site L _{Aeq} (15minute) contribution 38 dBA
	20/02/2012 10:39 AM Day Wind 1.5 m/s W Temp 22 °C	56	51	45	36	42	Aeroplane to 56 Birdsong 42 to 51 Road traffic 38 to 51 Insects 30 to 35 Washery 30 to 35 Estimated Springvale Coal Services Site L _{Aeq} (15minute) contribution 34 dBA

It was noted during the measurement commencing at 10:39 AM the dozer on the coal stockpile was not operating leading to a significant reduction in the Springvale Coal Services Site related noise at the monitoring location.

4.1.2 Unattended Continuous Noise Monitoring

The objective of the unattended background monitoring survey was to measure L_{A90}(15minute) and L_{Aeq}(15minute) noise levels at the nearest potentially affected receptor during proposed operational periods to determine the intrusiveness and amenity criteria for the development.

An environmental noise logger was placed at the nearest noise sensitive receiver. The logger location, type and serial number are provided in **Table 15**.

Table 15 Logger Location, Serial Number and Type

Location	Logger Type	Serial Number
B1 Southern Boundary	ARL Type EL-316	16-203-531

Weather data for the survey period was obtained from the automatic weather station located at Lidsdale Siding approximately 4 km south-east of the monitoring location. Data recorded during wind speeds greater than 5 m/s and/or periods of rainfall were excluded in accordance with INP data exclusion methodology.

An operator attended noise survey was conducted to determine the extent of industrial noise at the noise monitoring location. The industrial noise contribution was assessed during operator attended noise surveys at the noise monitoring locations.

A summary of the continuous noise monitoring is given in **Table 15**. Results are displayed graphically on a daily basis in **Appendix A**. It should be noted that the background noise level includes existing contribution from the existing Springvale Coal Services Site.

The Springvale Coal Services Site was conducting typical operational activities throughout the unattended noise monitoring period, with the exception of Saturday 25 February 2012 during the evening and night-time where minimal operations were conducted including the shut-down of the existing washery. During this period it is noted that ambient noise levels at the logging location decreased.

Table 16 Summary of Existing Ambient Noise Levels – Daily

Date	Daytime ¹ Ambient Noise Levels (dBA)		
	LA90 ABL ²	LAeq ³	LA10 ⁴
Monday-20-Feb-12	(36)	(46)	(47)
Tuesday-21-Feb-12	35	46	48
Wednesday-22-Feb-12	37	56	48
Thursday-23-Feb-12	36	45	47
Friday-24-Feb-12	37	48	50
Saturday-25-Feb-12	35	47	50
Sunday-26-Feb-12	(33)	(47)	(49)
Monday-27-Feb-12	43	49	51
Tuesday-28-Feb-12	43	50	53
Wednesday-29-Feb-12	(40)	(48)	(50)
Evening ¹ Ambient Noise Levels (dBA)			
Monday-20-Feb-12	34	50	46
Tuesday-21-Feb-12	36	45	48
Wednesday-22-Feb-12	35	46	48
Thursday-23-Feb-12	38	53	50
Friday-24-Feb-12	37	52	51
Saturday-25-Feb-12	30	50	48
Sunday-26-Feb-12	34	53	49
Monday-27-Feb-12	40	52	49
Tuesday-28-Feb-12	38	51	47
Night-time ¹ Ambient Noise Levels			
Monday-20-Feb-12	(34)	(43)	(43)
Tuesday-21-Feb-12	34	44	46
Wednesday-22-Feb-12	37	43	46
Thursday-23-Feb-12	39	45	47
Friday-24-Feb-12	30	45	47
Saturday-25-Feb-12	27	40	41
Sunday-26-Feb-12	34	42	44
Monday-27-Feb-12	38	45	47
Tuesday-28-Feb-12	38	44	46

Notes: Calculated noise levels in brackets are those which have been derived from an incomplete data set for the assessment period.

¹Daytime 7.00 am to 6.00 pm Monday to Saturday, Sundays and public holidays daytime 8.00 am to 6.00 pm.

²The ABL is the Assessment Background Level as described by the NSW INP.

³The LAeq represents the equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

⁴The LA10 is the median LA10 noise level during the monitoring period

The background noise measurements conducted at Blackmans Flat were influenced by existing noise contribution from the Springvale Coal Services Site. In order to obtain a representative background noise level in the absence of the Springvale Coal Services Site the background noise measurements were adjusted to remove the contribution of the site. During the evening and night periods when noise from the Castlereagh Highway decreased background noise levels at and below 30 dBA were recorded in the absence of noise from the Springvale Coal Services Site. The adjusted ambient noise levels for Blackmans Flat are contained within **Table 17**

Table 17 Summary of Existing Ambient Noise Levels Blackmans Flat (excluding the Project)

Location	Period	Rating Background Level (RBL)	Estimated Existing Industrial Contribution LAeq
B1 Southern Boundary	Day	37 dBA	<49 dBA
	Evening	30 dBA	<39 dBA
	Night	30 dBA	<34 dBA

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am
The LA90 represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.
The LAeq represents the equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

4.2 Wallerawang

An environmental assessment has recently been completed for the Lidsdale Siding Upgrade Project. As part of this assessment a noise impact assessment was prepared by Hatch Associates in August 2012. Approval for the Lidsdale Siding Upgrade Project was granted on 3 May 2013 (PA 08_0223). As the operation of the overland conveyor will not change as a result of the Project the noise limits provided in PA 08_0223 have been utilised for the purpose of this assessment.

4.3 Lidsdale

Angus Place Colliery currently operates under Project Approval 06_0021 (PA 06_0021) which provides noise criteria for residences in Lidsdale village. The noise criteria specified in PA 06_0021 have been established following an INP assessment at the Lidsdale village. The operation of the Wallerawang Haul Road and overland conveyor are consented and approved operations and these operations will not change as a result of the Project. The noise limits provided in PA 06_0021 are, therefore, deemed appropriate and have been utilised at Lidsdale village receptors for the purpose of this assessment.

4.4 Wolgan Road

Angus Place Colliery currently operates under PA 06_0021 which provides noise criteria for residences in Wolgan Road. The noise criteria specified in PA 06_0021 have been established following an INP assessment at the Wolgan Road locations. The operation of the Wallerawang Haul Road and Mt Piper Haul Road are consented and approved operations and these operations will not change as a result of the Project. The noise limits provided in PA 06_0021 are, therefore, deemed appropriate and have been utilised at Wolgan Road residences for the purpose of this assessment.

4.5 Springvale

In order to determine existing ambient noise levels at Springvale, SLR has conducted background noise monitoring on a quarterly basis at Springvale since December 2010. The background noise monitoring consisted of continuous, unattended noise logging and operator attended noise surveys. The operator attended noise surveys were used to define existing noise sources (including Springvale Mine) and the character of noise in the area and also used to qualify unattended noise logging results. Background noise monitoring was conducted at locations S1, S2 and S3 refer **Figure 8**.

4.5.1 Unattended Continuous Noise Monitoring

Background noise monitoring at Springvale consisted of continuous, unattended noise logging for a period of at least seven (7) days and operator attended noise surveys each quarter at locations S1, S2 and S3 (refer **Figure 8**). The operator attended noise surveys were used to define existing noise sources (including Springvale Mine) and the character of noise in the area and also used to qualify unattended noise logging results.

The daytime, evening and night-time RBLs at locations S1, S2 and S3 in the absence of existing Springvale operations have been established by determining the *typical minimum background noise level*. It has been assumed that the typical minimum background noise levels are representative of the periods which are not impacted by Springvale operations.

The typical minimum level of all the measured background noise levels was determined for each assessment period based on the lowest 10th percentile of all Assessment Background Levels (ABLs), determined in accordance with the INP, measured between December 2010 and September 2012. The typical minimum daily measured background noise levels are presented in **Table 18**.

For residential receivers further from the Castlereagh Highway, Wallerawang Power Station and mining operations (receiver locations S4 and S5), a minimum RBL of 30 dBA has been adopted in accordance with Section 3.1.2 of the INP.

Table 18 Typical Minimum Measured Background - Springvale

Receiver Area	Typical Minimum Measured LA ₉₀ ¹ All Noise Sources		
	Day	Evening	Night
S1	40	39	37
S2	38	38	38
S3	42	44	45
S4	30	30	30
S5	30	30	30

1 – Typical Measured LA₉₀: This is the typical minimum background noise level during all measurement surveys. This is taken to be the lower 10th percentile of the ABLs during the relevant periods.

The levels presented in **Table 18** have been assumed to be representative of the Rating Background Level at location S1 and S2 in the absence of Springvale operations.

At location S3 there are significant industrial noise contributions from the Wallerawang Power Station and the Castlereagh Highway which influence the ambient noise levels at the site. Operator attended monitoring at location S3 have identified an industrial noise contribution in the absence of the Project (overland conveyor) of LA_{eq}(15minute) of 51 dBA. The controlling criteria at this location will be based on amenity levels.

5 INP ASSESSMENT OF PREVAILING WEATHER CONDITIONS

5.1 Blackmans Flat

5.1.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the noise source. 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. 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 seasonal assessment period (ie day, evening or night), then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

A published detailed analysis of weather data has been conducted for a noise impact assessment in close proximity to the project site (refer Heggies Pty Ltd Report No. 613/14 Pine Dale Coal Mine Yarraboldy Extension Noise Assessment dated June 2010). This assessment analysed weather data from Pine Dale automatic weather station for CY2006 in order to determine the frequency occurrence of winds of speeds up to 3 m/s in each season during the day, evening and night-time periods. The results of the wind analysis for daytime, evening, and night-time winds are presented in **Table 19**, **Table 20** and **Table 21** respectively. In each table, the wind directions and percentage occurrence are those dominant during each season.

Table 19 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	4.1%	ESE±45°	12.7%	16.5%	29.1%
Autumn	10.6%	ESE±45°	11.2%	8.6%	19.8%
Winter	14.4%	SE±45°	15.3%	9.2%	24.5%
Spring	1.7%	ESE±45°	10.5%	9.7%	20.2%

Table 20 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	9.7%	ESE±45°	33.3%	18.6%	51.9%
Autumn	24.2%	WNW±45°	23.5%	6.8%	30.3%
Winter	33.3%	WNW±45°	28.0%	3.4%	31.4%
Spring	20.9%	ESE±45°	21.4%	9.5%	30.9%

Table 21 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	33.8%	ESE±45°	29.0%	6.7%	35.7%
Autumn	44.3%	WNW±45°	21.0%	4.5%	25.5%
Winter	45.9%	WNW±45°	24.0%	1.6%	25.6%
Spring	39.3%	WNW±45°	18.9%	2.8%	21.7%

Seasonal wind records indicate that significant winds (of up to 3 m/s) are a feature of the area since the 30% threshold is exceeded during the evening period in all seasons and the summer night-time period. Therefore, prevailing winds have been considered as part of this assessment for receivers located in Blackmans Flat.

5.1.2 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. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter or about two nights per week.

The INP states that temperature inversions need only be considered for the night-time noise assessment period (10.00 pm to 7.00 am). Temperature inversion data was not available for the site. Therefore, in accordance with the INP, operational noise levels representing a worst case scenario were modelled using the INP default temperature inversion value of 3°C/100 m for the night-time period.

5.2 Angus Place

5.2.1 Wind

Due to the different topographical setting of Angus Place, Lidsdale and Springvale weather data has been based on synthetically generated wind data from CALMET centred on Kerosene Vale automatic weather station. Wind speed and direction data produced by CALMET 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 22**, **Table 23** and **Table 24**.

Table 22 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	3.3%	6.9%	10.2%
Autumn	1.2%	ENE±45	4.3%	8.2%	12.5%
Winter	0.6%	W±45	2.3%	6.3%	8.6%
Spring	0.6%	NE±45	2.8%	5.0%	7.8%

Table 23 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	0.6%	E±45	3.3%	13.6%	16.9%
Autumn	1.7%	E±45	7.3%	16.4%	23.7%
Winter	1.0%	SW±45	3.6%	10.6%	14.2%
Spring	1.0%	E±45	2.9%	11.8%	14.7%

Table 24 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	1.8%	E±45	8.8%	17.5%	26.2%
Autumn	3.2%	SE±45	11.4%	10.9%	22.3%
Winter	1.1%	S±45	8.9%	8.1%	17.0%
Spring	1.9%	E±45	7.3%	9.2%	16.6%

Long terms seasonal wind data indicate that prevailing conditions, in accordance with the INP assessment methodology, are not a feature of the area. Therefore prevailing wind conditions have not been considered as part of this assessment for receivers located in Angus Place, Lidsdale and Springvale.

5.2.2 Temperature Inversion

An assessment of atmospheric stability conditions has also been conducted based on the meteorological data set described above. The annualised evening and night-time frequency of occurrence of atmospheric stability classes are presented in **Table 25**, together with estimated Environmental Lapse Rates (ELR).

Table 25 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	1.8%	-1.7 to -1.5	Lapse
D	35.1%	-1.5 to -0.5	Neutral
E	25.5%	-0.5 to 1.5	Weak Inversion
F	37.5%	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 has been considered in the noise impact assessment.

6 PROJECT SPECIFIC NOISE EMISSION CRITERIA

6.1 Operational Noise Criteria

The project specific noise criteria for the Project have been established with reference to the following:

- The INP outlined in **Section 3** of this report.
- Existing Project Approval noise conditions where relevant.

6.1.1 Blackmans Flat

The locality of Blackmans Flat contains 11 dwellings located on small urban sized holdings, noted as B1 to B11 on **Figure 4**. For the purposes of this assessment other receptors in the vicinity have been designated as B12 to B18 for simplicity. The existing acoustical environment is influenced by traffic noise from the Castlereagh Highway, existing mining operations and Mt Piper power station. The existing ambient environment at Blackmans Flat is has characteristics of both the suburban and urban categories provided in the INP. During the daytime the ambient environment is controlled by industrial and road traffic noise. However, in the late evening and at night as traffic levels decrease and in the absence of noise from the Springvale Coal Services site natural sources control the background noise levels. For this reason as a conservative measure, the residences in the general area have been assessed as “suburban” receiver types.

The background noise measurements conducted at Location B1 were used to derive project specific noise criteria for Blackmans Flat.

For residential receivers more remote from the highway and mining operations a minimum background noise level of 30 dBA has been adopted.

It has been deemed that visitors to the cemetery would have similar acoustic expectations to that of a passive recreation area (eg national park).

Table 26 presents the adopted project specific noise criteria for all Blackmans Flat receptors.

Table 26 Project Specific Noise Criteria – Blackmans Flat

Location	Period	Adopted RBL	Intrusive Criteria LAeq(15minute) dBA	Amenity Criteria LAeq(period) dBA	Project Specific Noise Criteria LAeq(15minute) (dBA)
B1 to B15	Day	37	42	55	42
	Evening	30	35	45	35
	Night	30	35	40	35
B16 to B18	Day	30	35	50	35
	Evening	30	35	45	35
	Night	30	35	40	35
Cemetery	When in use	N/A	N/A	50	50 (LAeq(period))

6.1.2 Wallerawang

The proposed Lidsdale Upgrade Project has conditions of consent, contained in the project approval (PA 08_0223), that relate to residential receptors surround the site. These consented levels, to be adopted for the Project, are contained in **Table 27**.

Table 27 Project Specific Noise Criteria – Wallerawang

Location	Period	Project Specific Noise Criteria LAeq(15minute) (dBA)
W1	Day	43
	Evening	43
	Night	43
W2	Day	47
	Evening	47
	Night	47

6.1.3 Lidsdale

The noise criteria adopted for the Lidsdale village are in accordance with Angus Place Colliery PA 06_0021. A summary of the relevant criteria are contained in **Table 28**. Although the consented noise criteria apply to the cumulative operation of Angus Place Colliery and the Wallerawang Haul Road. The contribution of Angus Place Colliery is negligible at Lidsdale village.

Table 28 Project Specific Noise Criteria – Lidsdale

Location	Period	Project Specific Noise Criteria LAeq(15minute) (dBA)
L1	Day	44
	Evening	40
	Night	35
L2	Day	44
	Evening	40
	Night	35

6.1.4 Wolgan Road Residences

The noise criteria adopted for the Wolgan Road residences are in accordance with Angus Place Colliery PA 06_0021. The consented noise criteria apply to the cumulative operation of Angus Place Colliery and the Angus Place to Wallerawang haul road and are given in **Table 29**.

Table 29 Project Specific Noise Criteria – Wolgan Road

Location	Period	Project Specific Noise Criteria LAeq(15minute) (dBA)
WR1	Day	42
	Evening	38
	Night	36
WR2	Day	41
	Evening	37
	Night	35

6.1.5 Springvale Residences

The background noise measurements conducted at S1, S2 and S3 were used to derive project specific noise criteria for residences near the Springvale overland conveyor. Minimum background noise levels were assumed at S4 and S5. The resulting noise criteria are shown in **Table 30**

Table 30 Project Specific Noise Criteria – Springvale

Location	Period	Adopted RBL	Intrusive Criteria LAeq(15minute) dBA	Amenity Criteria LAeq(period) dBA	Project Specific Noise Criteria LAeq(15minute) (dBA)
S1	Day	40	45	55	45
	Evening	39	44	45	44
	Night	37	42	40	40 LAeq(Period)
S2	Day	38	43	55	43
	Evening	38	43	45	43
	Night	38	43	40	40 LAeq(Period)
S3	Day	42	47	53 ²	47
	Evening	42 ¹	47	41 ²	41 LAeq(Period)
	Night	42 ¹	47	41 ²	41 LAeq(Period)
S4	Day	30	35	55	35
	Evening	30	35	45	35
	Night	30	35	40	35
S5	Day	30	35	55	35
	Evening	30	35	45	35
	Night	30	35	40	35

Note 1 - Background noise levels adjusted in accordance with the INP Application notes to reflect community expectations that background noise levels will not be higher than daytime during evening and night periods.

Note 2 - Amenity criteria adjusted for existing industrial contribution as per INP

6.2 Sleep Disturbance Criteria

6.2.1 Blackmans Flat

The relevant sleep disturbance noise goals for Blackmans Flat are provided in **Table 31**.

Table 31 Sleep Disturbance Noise Criteria - Blackmans Flat

Location	Period	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
B1 to B18	Night	45

6.2.2 Wallerawang

The relevant sleep disturbance noise goals for Wallerawang receptors are provided in **Table 32**.

Table 32 Sleep Disturbance Criteria - Wallerawang

Location	Period	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
W1	Night	51
W2	Night	51

6.2.3 Lidsdale

The relevant sleep disturbance noise goals for Lidsdale receptors are provided in **Table 33**.

Table 33 Sleep Disturbance Criteria - Lidsdale

Location	Period	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
L1	Night	45
L2	Night	45

6.2.4 Wolgan Road

The relevant sleep disturbance noise goals for Wolgan Road receptors are provided in **Table 34**.

Table 34 Sleep Disturbance Criteria – Wolgan Road

Location	Period	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
WR1	Night	46
WR2	Night	45

6.2.5 Springvale

The relevant sleep disturbance noise goals for Springvale residential receptors are provided in **Table 35**.

Table 35 Sleep Disturbance Criteria - Springvale.

Location	Period	Sleep Disturbance Noise Goal LA1(1minute) (dBA)
S1	Night	52
S2	Night	53
S3	Night	57
S4	Night	45
S5	Night	45

6.3 Construction Noise Goals

As construction activity will only occur in the vicinity of the Springvale Coal Services Site, construction noise goals have been set for the Blackmans Flat receptors only. Construction noise goals have been set for with reference to the ICNG. **Table 36** presents the noise goals for construction associated with the Project.

Table 36 Construction Noise Goals

Location	Period	Adopted RBL	Management Level LAeq(15minute) (dBA)	
			Noise Affected	Highly Noise Affected
B2 to B15	Day	37	47	75
B16 to B18		30	40	75

Construction may only occur between the hours of 7.00 am and 6.00 pm Monday to Friday. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

7 ASSESSMENT OF NOISE IMPACTS

7.1 Noise Modelling

Noise modelling of the project area was carried out using the CONCAWE algorithms incorporated into the SoundPLAN 7.1 noise modelling software package. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. Additionally the model uses relevant noise source data, ground type, shielding such as barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

7.1.1 Haul Roads

Road truck noise sources include engines, exhausts and road-tyre interaction. Therefore, for the purpose of this project, the SoundPLAN traffic noise “strings” have been modified to incorporate the three (3) effective noise sources (and heights) for the haul road. These comprise three (3) truck sources at three separate heights representing truck tyres (0.5m), truck engines (1.5m) and truck exhausts (3.6m).

The truck sources have relative sound power emission levels (compared to total truck sound power) of -5.4 dBA, -2.4 dBA and -8.5 dBA for tyres, engines and exhausts respectively. These modifications ensure that the noise predictions (particularly in the presence of noise barriers) address the significance of the different heights of truck noise emissions.

The road trucks hauling to and from the Project will use internal haul roads and an overpass linking the Springvale Coal Services Site with the existing Mount Piper Haul Road. Trucks will also use the existing Wallerawang Haul Road.

In order to reduce noise levels from the transport of coal on the internal haul roads Centennial plan to reduce the amount of coal transported during, prevailing noise enhancing weather conditions. This reduction will occur specifically during summer, autumn and winter evening under prevailing WNW and ENE wind conditions and at night, in winter during temperature inversions. The default level of haulage will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the project specific noise criteria during these conditions.

7.1.2 Conveyors

The overland conveyors linking Springvale Coal Mine, Lidsdale Siding and Springvale Coal Services are assumed to run continuously in any given 15 minute period.

7.1.3 Other Plant and Equipment

Other assumptions made in modelling the proposed operation include the following:

- All acoustically significant plant and equipment operates simultaneously.
- Mobile noise sources, such as dozers, were modelled at typical locations and assumed to operate in repetitive cycles.

7.2 Meteorological Parameters

Noise levels were predicted at the residences which represent the nearest, most potentially affected locations.

Noise levels have been predicted under the meteorological parameters shown in **Table 37**

Table 37 Noise Modelling Parameters

Assessment Condition	Temperature	Wind Speed / Direction	Relative Humidity	Temperature Gradient
Day – Calm	20°C	n/a	65%	n/a
Evening – Calm	10°C	n/a	90%	n/a
Evening – Prevailing Wind	10°C	3 m/s E, ESE, SE ENE, WNW	90%	n/a
Night – Calm	10°C	-	90%	-
Night – Inversion	10°C	-	90%	3°C/100 m
Night – Inversion + Draining Flow	10°C	2 m/s WSW	90%	3°C/100 m
Night – Prevailing Wind	10°C	3 m/s SE	90%	-

7.3 Operational Noise Modelling Scenarios

The operational scenario modelled for the Project is provided in **Table 38**

Equipment considered in operation is marked with a 'tick' (✓) and those not considered to be in operation are marked with a 'cross' (×). Where a 'tick' or 'cross' are separated by a slash indicates whether the selected equipment is operational during the day, evening and night-time period respectively. For instance ✓/✓/× would indicate that the equipment is operational during the day and evening periods but not during the night-time period. Details of equipment sound power levels are contained within **Appendix B**.

Table 38 Modelled Operational Noise Sources

Activity	Scenario				
	1	2	3	4	5
Existing Washery	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Additional Washery Module	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Conveyors	✓/✓/✓ (multiple)	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Option 1 Haul Road (movements per hour)	Non enhancing ✓(48)/✓(12)/✓(12)	Non enhancing x/x/x	Non enhancing x/x/x	Non enhancing x/x/x	Non enhancing x/x/x
	Enhancing ✓(48)/✓(8)/✓(8)	Enhancing x/x/x	Enhancing x/x/x	Enhancing x/x/x	Enhancing x/x/x
Option 2 Haul Road (movements per hour)	Non enhancing x/x/x	Non enhancing ✓(48)/✓(12)/✓(12)	Non enhancing ✓(8)/✓(8)/✓(12)	Non enhancing ✓(8)/✓(8)/✓(12)	Non enhancing ✓(8)/✓(8)/✓(12)
	Enhancing x/x/x	Enhancing ✓(48)/✓(8)/✓(8)	Enhancing ✓(8)/✓(8)/✓(8)	Enhancing ✓(8)/✓(8)/✓(8)	Enhancing ✓(8)/✓(8)/✓(8)
Coal stockpile dozer	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Reject Emplacement Area dozer	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Refuse truck	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Pump	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓	✓/✓/✓
Surge bins	✓/✓/✓(2)	✓/✓/✓(2)	✓/✓/✓(2)	✓/✓/✓(2)	✓/✓/✓(2)
Transfer stations	✓/✓/✓ (multiple)	✓/✓/✓ (multiple)	✓/✓/✓ (multiple)	✓/✓/✓ (multiple)	✓/✓/✓ (multiple)
Mt Piper Haul Road	Non enhancing ✓(40)/✓(8)/✓(8)	Non enhancing ✓(40)/✓(8)/✓(8)	Non enhancing x/x/8	Non enhancing x/x/8	Non enhancing x/x/8
	Enhancing ✓(40)/x/x	Enhancing ✓(40)/x/x	Enhancing x/x/x	Enhancing x/x/x	Enhancing x/x/x
Kerosene Vale stockpiling (2x FEL)	x/x/x	x/x/x	x/x/x	✓/x/x	x/x/x
Wallerawang Haul Road (movements per hour)	x/x/x	x/x/x	✓(20)/✓(16)/x	✓(20)/✓(16)/x	✓(20)/✓(16)/x
Kerosene Vale loading (2x FEL)	x/x/x	x/x/x	x/x/x	x/x/x	✓/x/x

Scenario 1

This scenario is representative of operations utilising the Option 1 Link Haul Road and the resultant impacts on the main residential area of Blackmans Flat. It includes the operation of the upgraded Springvale Coal Services site, existing overland conveyors and with coal haulage from Angus Place on the Mt Piper Haul Road. This scenario does not include activities at Kerosene Vale or Wallerawang Haul Road as these activities do not contribute to noise impacts at Blackmans Flat. This scenario is also used for receptors near Wallerawang, Wolgan Road and residents near Springvale Mine although the main influence on noise in these locations is the overland conveyor and/or Mt Piper Haul Road.

Scenario 2

This scenario is representative of operations utilising the Option 2 Link Haul Road and the resultant impacts on the main residential area of Blackmans Flat. This is the preferred Link Haul Road route and this scenario includes the operation of the upgraded Springvale Coal Services site, existing overland conveyors and with coal haulage from Angus Place on the Mt Piper Haul Road. This scenario does not include activities at Kerosene Vale or the Wallerawang Haul Road as these activities do not contribute to noise impacts at Blackmans Flat. This scenario is also used for receptors near Wallerawang, Wolgan Road and residents near Springvale Mine although the main influence on noise in these locations is the overland conveyor and/or Mt Piper Haul Road.

Scenario 3

This scenario, during the day and evening, is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the preferred Link Haul Road (Option 2) for rejects dispatch, coal haulage from a future project only and coal haulage from Angus Place on the Wallerawang Haul Road to Wallerawang Power Station. During the night-time period this scenario is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the Link Haul Road (Option 2) with coal haulage from Angus Place on the Mt Piper Haul Road. This scenario is relevant to Lidsdale and Wolgan Road receptors.

Scenario 4

This scenario, during the day, is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the Link Haul Road (Option 2) road for rejects dispatch, coal haulage from a future project only and coal haulage from Angus Place on the Wallerawang Haul Road to the Kerosene Vale Coal Stockpile Area. During the evening the Kerosene Vale Stockpile Area will not operate. During the night-time period this scenario is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the Link Haul Road (Option 2) with coal haulage from Angus Place on the Mt Piper Haul Road. This scenario is also relevant to Lidsdale receptors as it includes the option of transporting coal to the Kerosene Vale Coal Stockpile Area.

Scenario 5

This scenario, during the day, is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the Link Haul Road (Option 2) for rejects dispatch, coal haulage from a future project only and coal haulage from the Kerosene Vale Coal Stockpile Area on the Wallerawang Haul Road. During the evening the Kerosene Vale Stockpile Area will not operate. During the night-time period this scenario is representative of operations of the upgraded Springvale Coal Services Site, existing overland conveyors, the Link Haul Road (Option 2) with coal haulage from Angus Place on the Mt Piper Haul Road. This scenario relevant to receptors at Lidsdale as it includes loading coal from the Kerosene Vale Coal Stockpile Area.

7.4 Predicted Operational Noise Levels

7.4.1 Predicted Operational Noise Levels

Predicted Operational Noise Levels – Blackmans Flat - Scenario 1

Predicted noise emission levels from the Project utilising the Option 1 haul route at the nearest most potentially affected residential receptors are provided in **Table 39**. Please note that figures in **bold** represent noise levels above the respective project specific noise criteria.

Table 39 Predicted Operational Noise Levels – Blackmans Flat - Scenario 1

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)					
	Day	Evening		Night		
	Calm	Calm	Wind ¹	Calm	Wind ¹	Inversion ²
B2	48	43	44	43	40	44
B4	45	39	41	39	37	41
B5	44	39	40	39	36	40
B6	44	39	40	39	36	40
B7	44	38	40	38	36	39
B8	43	38	39	38	36	39
B9	43	38	40	38	35	40
B10	43	38	40	38	35	39
B11	43	38	39	38	36	39
B12	40	34	34	34	32	33
B13	42	36	37	36	34	36
B14	41	35	33	35	32	33
B15	37	33	35	33	<30	35
B16	33	32	36	32	<30	36
B17	42	42	44	42	43	45
B18	<30	<30	<30	<30	<30	<30
Cemetery	43	38	39	N/A	N/A	N/A
Project Specific Noise Criteria	42 (B2-B14) 35 (B15-B18) 50 Cemetery	35 (B2-B18) 50 Cemetery		35 (B2 to B18)		

1 Results shown are from the highest predicted noise level under prevailing winds.

2 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Predicted Operational Noise Levels – Blackman Flat - Scenario 2

Predicted noise emission levels from the Project utilising the Option 2 haul route at the nearest most potentially affected residential receptors are provided in **Table 40**. Please note that figures in **bold** represent noise levels above the respective project specific noise criteria.

Table 40 Predicted Operational Noise Levels – Blackmans Flat - Scenario 2

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)					
	Day	Evening		Night		
	Calm	Calm	Wind ¹	Calm	Wind ¹	Inversion ²
B2	42	38	42	38	36	42
B4	42	37	39	37	35	39
B5	42	37	39	37	36	39
B6	42	37	39	37	36	39
B7	42	37	38	37	36	38
B8	42	37	38	37	36	38
B9	41	37	39	37	35	39
B10	41	37	38	37	35	38
B11	41	37	38	37	35	38
B12	40	34	32	34	32	31
B13	41	36	36	36	34	36
B14	41	35	33	35	32	32
B15	36	32	35	32	<30	35
B16	33	32	35	32	<30	36
B17	42	42	44	42	43	45
B18	<30	<30	<30	<30	<30	<30
Cemetery	42	37	38	N/A	N/A	N/A
Project Specific Noise Criteria	42 (B2-B14) 35 (B15-B18) 50 Cemetery	35 (B2-B18) 50 Cemetery	35 (B2-B18)			

1 Results shown are from the highest predicted noise level under prevailing winds.

2 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Discussion of Results Blackmans Flat

The results contained in **Table 39** and **Table 40** show that significant exceedances of the project specific noise criteria are predicted, predominantly during the evening and night period at the majority of residential receivers surrounding the project. The noise predictions for the Option 2 haul road are lower than that for Option 1 typically by between 2 dBA and 6 dBA. Therefore, Option 2 is deemed to be the preferred route.

Predicted noise levels at B17 are above the project specific noise criteria. This is due to the existing overland conveyer. Centennial have a negotiated agreement with this resident.

7.4.2 Wallerawang

Predicted noise emission levels from the Project at the nearest most potentially affected residential receptors are provided in **Table 41** for scenario 2. Please note that figures in **bold** represent noise levels above the respective project specific noise criteria.

Table 41 Predicted Operational Noise Levels – Wallerawang - Scenario 2

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)			
	Day	Evening	Night	
	Calm	Calm	Calm	Inversion ¹
W1	37	37	37	41
W2	31	32	32	36
Project Specific Noise Criteria	43 (W1) 47 (W2)	43 (W1) 47 (W2)	43 (W1) 47 (W2)	

1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Discussion of Results Wallerawang

The results contained in **Table 41** show that noise levels from the Project are predicted to meet the noise conditions set out in the project approval for the Lidsdale Siding Upgrade Project PA 08_0223 under all operating conditions.

Noise impact assessment conducted by Hatch for the Lidsdale Siding Upgrade Project has demonstrated that the cumulative operation of the Lidsdale Siding Upgrade Project and the overland conveyor will meet the noise condition set out in PA 08_0223.

7.4.3 Lidsdale

Predicted noise emission levels from the Project at the nearest most potentially affected residential receptors are provided in **Table 42**, **Table 43** and **Table 44** for the modelled scenarios 3, 4 and 5. Please note that figures in **bold** represent noise levels above the respective project specific noise criteria.

Table 42 Predicted Operational Noise Levels – Lidsdale - Scenario 3

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)			
	Day	Evening	Night	
	Calm	Calm	Calm	Inversion ¹
L1	36	35	<30	30
L2	40	39	<30	31
Project Specific Noise Criteria	44	40	35	

1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Table 43 Predicted Operational Noise Levels – Lidsdale – Scenario 4

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)			
	Day	Evening	Night	
	Calm	Calm	Calm	Inversion ¹
L1	42	35	<30	30
L2	29	30	<30	31
Project Specific Noise Criteria	44	40	35	

1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Table 44 Predicted Operational Noise Levels – Lidsdale – Scenario 5

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)			
	Day	Evening	Night	
	Calm	Calm	Calm	Inversion ¹
L1	42	35	<30	30
L2	40	39	<30	31
Project Specific Noise Criteria	44	40	35	

1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.

Discussion of Results - Lidsdale

The results contained in **Table 42**, **Table 43** and **Table 44** show that noise levels from the Project are predicted to meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions.

7.4.4 Wolgan Road

Predicted noise emission levels from the Project at the nearest most potentially affected residential receptors are provided in **Table 45** and **Table 46** for operation of either the Mt Piper Haul Road or the Wallerawang Haul Road. The cumulative impact of the haul roads and Angus Place Colliery has been considered in the analysis.

Table 45 Predicted Operational Noise Levels - Wolgan Road – Scenario 2

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)				
		Day	Evening	Night	
		Calm	Calm	Calm	Inversion ¹
WR1	Haulage Only	40	33	33	N/A ²
	Haulage & Angus Place	41	36	36	N/A ²
WR2	Haulage Only	33	<30	<30	N/A ²
	Haulage & Angus Place	35	32	32	N/A ²
Project Specific Noise Criteria		42 (WR1) 41 (WR2)	38 (WR1) 37 (W2R)	36 (W1) 35 (W2)	

- 1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.
2 The Project will reduce truck movements along Mt Piper Haul Road during adverse weather conditions.

Table 46 Predicted Operational Noise Levels - Wolgan Road – Scenario 3

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)				
		Day	Evening	Night	
		Calm	Calm	Calm	Inversion ¹
WR1	Haulage Only	36	36	33	N/A ²
	Haulage & Angus Place	38	38	36	N/A ²
WR2	Haulage Only	37	36	29	N/A ²
	Haulage & Angus Place	38	37	32	N/A ²
Project Specific Noise Criteria		42 (WR1) 41 (WR2)	38 (WR1) 37 (W2R)	36 (W1) 35 (W2)	

- 1 Results shown are from the highest predicted result under a temperature inversion with or without a drainage flow.
2 The Project will reduce truck movements along Mt Piper Haul Road during adverse weather conditions

Discussion of Results Wolgan Road

The results contained in **Table 45** and **Table 46** show that noise levels from the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions with reduced truck movements during prevailing noise enhancing weather conditions. The default level of haulage will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the project specific noise criteria during these conditions.

7.4.5 Predicted Operational Noise Levels – Springvale

Predicted noise emission levels from the Project at the nearest most potentially affected residential receptors are provided in **Table 47** for scenario 3.

Table 47 Predicted Operational Noise Levels – Springvale – Scenario 3

Location	Predicted Intrusive Noise Level LAeq(15minute) (dBA)			
	Day	Evening	Night	
	Calm	Calm	Calm	Inversion ¹
S1	<30	<30	<30	32
S2	<30	<30	<30	30
S3	36	36	36	39
S4	<30	<30	<30	<30
S5	<30	<30	<30	<30
Project Specific Noise Criteria	45 (S1)	44 (S1)	40 (S1)	
	43 (S2)	43 (S2)	40 (S2)	
	47 (S3)	41 (S3)	41 (S3)	
	35(S4 &S5)	35(S4 &S5)	35(S4 &S5)	

Discussion of Results - Springvale

The results contained in **Table 47** show that noise levels from the Project are predicted to meet the project specific noise criteria for Springvale receptors derived in accordance with the INP. At S1, S2, S4 and S5 noise levels predicted for the existing overland conveyor are low when compared to the entire Springvale Colliery operation. This means that the noise impact of the Project will be insignificant in relation to noise from Springvale Colliery at these locations.

7.5 Sleep Disturbance

In assessing sleep disturbance from typical night-time activities associated with the Project, L_{Amax} noise levels of acoustically significant plant and equipment to be used were used as input to the noise model. L_{Amax} noise level predictions were made at the nearest residential areas under worst case weather conditions at night. The use of the L_{Amax} noise level provides a worst-case prediction since the LA1(1minute) noise level of a noise event is likely to be less than the L_{Amax}.

7.5.1 Blackmans Flat

Maximum noise levels from the site are likely to be associated with trucks using the internal haul road. The representative maximum sound power level for a truck operating on the internal haul road is provided in **Table 48**

Table 48 Maximum Sound Power Levels

Source	Maximum Sound Power Level dBA
Trucks on internal Haul Road	124

The predicted maximum noise levels from the Project under calm atmospheric conditions (worst case) are contained in **Table 49**

Table 49 Predicted Sleep Disturbance Noise Levels – Blackmans Flat

Location	Predicted Maximum Noise Level LAmax (dBA)		Sleep Disturbance Noise Goal LA1(1minute) (dBA)
	Scenario 1	Scenario 2	
B2	68	56	45
B4	62	57	45
B5	60	58	45
B6	60	58	45
B7	59	59	45
B8	59	59	45
B9	59	57	45
B10	58	57	45
B11	58	57	45
B12	56	56	45
B13	59	59	45
B14	64	64	45
B15	53	53	45
B16	45	45	45
B17	39	39	45
B18	<30	<30	45

Discussion of Sleep Disturbance Results - Blackmans Flat

The results of sleep disturbance modelling indicate that maximum noise levels generated by both haul road options are predicted to exceed the sleep disturbance noise goal at all residential locations with the exception of Location B16, B17 and B18. It should be noted that the external maximum noise levels (for the preferred Option 2 haul route) at all receptors are below 65 dBA. This infers that internal levels (assuming a 10 dBA reduction outside to inside with windows normally open) will be below 55 dBA and are therefore unlikely to cause awakening reactions.

7.5.2 Wallerawang

Maximum noise levels from the Project are likely to be associated with the existing overland conveyor. These conveyors are relatively continuous in operation, however, a maximum noise level for the overland conveyor is provided in **Table 50**

Table 50 Maximum Sound Power Levels

Source	Maximum Sound Power Level dBA/m
Conveyors	79

The predicted maximum noise levels from the Project under worst case atmospheric conditions are contained in **Table 51**.

Table 51 Predicted Sleep Disturbance Noise Levels – Wallerawang

Location	Predicted Maximum Noise Level L _{Amax} (dBA)	Sleep Disturbance Noise Goal L _{A1} (1minute) (dBA)
W1	45	51
W2	40	51

Discussion of Sleep Disturbance Results - Wallerawang

The results of sleep disturbance modelling indicates that maximum noise levels generated by the Project will comply with sleep disturbance goals at the nearest affected receptors.

7.5.3 Lidsdale

Maximum noise levels from the Project are likely to be associated with the existing overland conveyor. The predicted maximum noise levels from the Project under worst case atmospheric conditions are contained in **Table 52**

Table 52 Predicted Sleep Disturbance Noise Levels – Lidsdale

Location	Predicted Maximum Noise Level L _{Amax} (dBA)	Sleep Disturbance Noise Goal L _{A1} (1minute) (dBA)
L1	34	45
L2	35	45

Discussion of Sleep Disturbance Results - Lidsdale

The results of sleep disturbance modelling indicates that maximum noise levels generated by the Project will comply with sleep disturbance goals at the nearest affected receptors.

7.5.4 Wolgan Road

Maximum noise levels from the site are likely to be associated with trucks using the internal haul road. The predicted maximum noise levels from the Project under calm atmospheric conditions (worst case) are contained in **Table 53**

Table 53 Predicted Sleep Disturbance Noise Levels – Wolgan Road

Location	Predicted Maximum Noise Level L _{Amax} (dBA)	Sleep Disturbance Noise Goal L _{A1} (1minute) (dBA)
WR1	57	46
WR2	48	45

Discussion of Sleep Disturbance Results – Wolgan Road

The results of sleep disturbance modelling indicates that maximum noise levels generated from vehicle movements on the Mt Piper Haul Road are predicted to exceed the sleep disturbance noise goal at the closest affected residential locations. It should be noted that the external maximum noise levels at all receptors are below 65 dBA. This infers that internal levels (assuming a 10 dBA reduction outside to inside windows open) will be below 55 dBA and are therefore unlikely to cause awakening reactions.

7.5.5 Springvale

Maximum noise levels from the Project are likely to be associated with the existing overland conveyor. The predicted maximum noise levels from the Project under worst case atmospheric conditions are contained in **Table 54**

Table 54 Predicted Sleep Disturbance Noise Levels – Springvale

Location	Predicted Maximum Noise Level L _{Amax} (dBA)	Sleep Disturbance Noise Goal L _{A1} (1minute) (dBA)
S1	36	52
S2	34	53
S3	43	57
S4	31	45
S5	<30	45

Discussion of Sleep Disturbance Results - Springvale

The results of sleep disturbance modelling indicates that maximum noise levels generated by the Project will comply with sleep disturbance goals at the nearest affected receptors.

7.6 Noise Mitigation and Management

The following outlines the mitigation and management strategies that have been considered for the project.

Principles for Noise Mitigation and Management

Selecting appropriate noise management strategies for the Project involved the following steps:

- Modelling of the proposed activities in the absence of mitigation.
- Determining the noise reduction required to achieve the project specific noise levels at surrounding receivers.
- Identifying the specific activities and equipment which could be altered to provide the most feasible and significant reduction in noise levels.
- Examining the mitigation strategies chosen by similar industries on similar sites with similar requirements for noise reduction; and considering that strategy's appropriateness for the Project.
- Considering community preferences for particular strategies.
- Re-running the noise modelling taking into account the specific noise mitigation and management strategies.

The preference ranking (from most preferred to least preferred) used for consideration of the noise mitigation strategies was as follows:

- Control at the source - Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA). These strategies serve to reduce the noise output of the source so that the surrounding environment is protected against noise.
- Control in transmission – The next strategy considered involved control in the transmission of noise such as through the use of noise barriers. This serves to reduce the noise level at the receiver but not necessarily the environment surrounding the source.
- Receiver controls – was the least-preferred option, as it protects only the internal environment of the receiver and not the external noise environment.

The above steps and considerations were used as a guide in assessing the potential mitigation and management options. In accordance with the INP, where the proposed mitigation and management strategy would not achieve compliance with the project specific noise criteria the exceedance would be resolved by negotiation with the land owner and/or regulating authority.

7.6.1 Blackmans Flat

Noise modelling indicated that trucks using the overpass linking the Springvale Coal Services Project Site with the existing Mount Piper Haul Road are a major contributor to predicted noise levels at residences in Blackmans Flat.

The mitigation options used in the modelling are as follows:

- Removal of the eastern reject emplacement areas at the Springvale Coal Services Site.
- The proposed link road was relocated to the west of the initial proposed route (Option 2 Haul Road).
- A reduction in material haulage on the internal haul roads during periods of prevailing, noise enhancing weather conditions. The default level of haulage will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the project specific noise criteria during these conditions.

Receptors where residual noise impacts are predicted have been identified and classified into zones based on the predicted level of exceedance for Scenario 1 and Scenario 2 and are shown in **Table 55** and **Table 56**

Table 55 Noise Zones of Receivers – Option 1 Haul Road

Period	Project Specific Criteria	Noise Management Zone		Noise Affection Zone
	INP Compliance	≤ 2 dBA above project specific criteria	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria
Day	B12 to B14, B16 B18, Cemetery	B15	B3,B4	B17
Evening	B12, B14 B15,B18, Cemetery	B13,B16	B5 to B11	B2,B4,B17
Night	B12, B14,B15, B18, Cemetery	B13,B16	B5 to B11	B2,B4,B17

Table 56 Noise Zones of Receivers – Option 2 Haul Road

Period	Project Specific Criteria	Noise Management Zone		Noise Affection Zone
	INP Compliance	≤ 2 dBA above project specific criteria	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria
Day	B2 to B14,B16, B18, Cemetery	B15		
Evening	B12, B14 B15, B16,B18, Cemetery	B13	B4 to B11	B2,B17
Night	B12, B14,B15, B18, Cemetery	B13,B16	B4 to B11	B2,B17

It should be noted that for Option 2 in **Table 56** noise from the Project at receptors B13, B15 and B16 are predicted to exceed the INP criteria by 1 dBA. This predicted exceedance is negligible and is unlikely to be detected by most people.

To manage the residual noise impacts, above the INP project specific noise criteria, the following is suggested:

Noise Management Zone

Depending on the degree of exceedance of the project specific criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is suggested that management procedures be implemented including:

- Prompt response to any community issues of concern.
- Noise monitoring on site and within the community.
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Consideration of acoustical mitigation at receivers.

Noise Affection Zone

Exposure to noise levels exceeding the project specific criteria by more than 5 dB(A) may be considered unacceptable by some property holders. The noise mitigation and management recommendations (in addition to those outlined in the noise management zone) are as follows:

- Discussions with relevant property holders to assess concerns and provide solutions.
- Consider implementation of acoustical mitigation at receivers.

7.6.2 Wallerawang

Noise modelling indicates that noise levels from the Project will meet the noise criteria set out in the project approval for the Lidsdale Siding Upgrade Project PA 08_0223 under all operating conditions. Further mitigation measures may be considered as part of the Lidsdale Siding Upgrade Project.

7.6.3 Lidsdale

Predicted noise emission levels from the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions. It has been assumed in the noise model that the Kerosene Vale Stockpile Area will not operate during the evening or night period.

7.6.4 Wolgan Road

Predicted noise emission levels from the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions with reduced truck movements during prevailing noise enhancing weather conditions. The default level of haulage will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the Project Specific Noise Criteria during these conditions.

No further mitigation measures are considered warranted at this time.

7.6.5 Springvale

Predicted noise emission levels from the Project will meet the project specific noise criteria for Springvale receptors derived in accordance with the INP. At S1 and S2 noise levels predicted for the existing overland conveyor are low when compared to the entire Springvale Colliery operation. This means that the noise impact of the Project will be insignificant in relation to noise from Springvale Colliery at these locations.

7.7 Construction Noise Assessment

Construction activities associated with the Project would include:

- Construction of the upgrade to the washery.
- Construction of the internal haul road.

Construction activities will include any works which involve interactions with the current operation of the washery, conveyors, stockpiles or the Mt Piper haul road or the Castlereagh Highway.

The construction scenarios modelled for the upgrade to the washery and construction of the internal haul road are contained within **Table 57**. The construction noise modelling assumes that all the equipment is operating simultaneously at the closest location of construction to each residential location. This scenario represents a worst case which may only occur infrequently and for relatively short time periods.

Table 57 Construction Washery and Internal Haul Road

Plant and Equipment	Day
Excavator	✓(2)
Backhoe	✓(2)
Grader	✓
Crane	✓(2)
Concrete truck	✓(3)
Compactor flat	✓

As the Springvale Coal Services Site operates 24 hours per day, 7 days per week, and needs to continue to do so during the construction period, some construction activities will need to occur outside normal construction hours. However activities that may generate noise above normal operating noise levels will occur during standard construction hours (7.00 am to 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays).

The results of the construction noise modelling are contained within **Table 58**.

Table 58 Predicted Construction Noise levels

Location	Predicted Construction Noise Level LAmax (dBA)	Management Level LAeq(15minute) (dBA)	
		Day	Noise Affected
B2	61	47	75
B4	56	47	
B5	53	47	
B6	49	47	
B7	47	47	
B8	46	47	
B9	45	47	
B10	45	47	
B11	45	47	
B12	45	47	
B13	44	47	
B14	40	47	
B15	39	47	
B16	30	47	
B17	<30	47	
B18	<30	40	
Cemetery	45	47	

7.7.1 Discussion of Construction Noise Results

The results of construction noise modelling indicates that the noise affected management level is predicted to be achieved at all residential locations with the exception of B2, B4 B5 and B6 where an exceedance of from 2 dBA to 14 dBA is predicted to occur. It should be noted that the predicted construction noise levels are below the highly noise affected level for the scenarios considered.

Exceedance of the construction noise management level is typical for construction sites in close proximity to receivers and highlights the need for appropriate noise management and planning.

The following recommendations are made with the aim of minimising construction noise impacts at nearby noise sensitive receivers:

- An important aspect of the mitigation of noise impacts during all construction phases will be adherence to the standard daytime construction hours.
- Noisy plant operating simultaneously to be avoided wherever possible.
- Maintenance work on all construction plant will be carried out away from noise sensitive areas and confined to standard daytime construction hours, where practicable.
- Site noisy equipment behind structures that act as barriers or at the greatest distance from the noise-sensitive area or orient the equipment so that noise emissions are directed away from any sensitive areas.
- Keep equipment well maintained.
- Employ “quiet” practices when operating equipment (eg positioning and unloading of trucks in appropriate areas).

With regard to potentially offensive noise events associated with construction activities AS 2436-1981 "Guide to noise control on construction, maintenance and demolition sites" provides the following:

If noisy operations must be carried out, then a responsible person should maintain liaison between the neighbouring community and the contractor. This person should inform the public at what time to expect noisy operations and also inform the contractor of any special needs of the public.

Consultation and cooperation between the contractor and his neighbours and the removal of uncertainty and rumour can help to reduce the adverse reaction to noise.

7.8 Road Traffic Noise Assessment

7.8.1 Project Related Traffic Generation

The existing and project related traffic flows on the Castlereagh Highway are provided in **Table 59**.

Table 59 Existing and Project Related Traffic Volumes

Location	Time Period	Existing Traffic Flows ¹	Construction Peak (including existing operational staff)	Operational
Castlereagh Highway	Daytime (7:00 am to 10:00 pm)	4300	140	24
	Night (10:00 pm to 7:00 am)	592	130	12

1 – Existing road traffic flows sourced from *Traffic Impact Assessment – Western Coal Services Project* prepared by Barnson Pty Ltd. Assumed night-time volume 12% AADT

Based upon the expected road traffic movements, during construction, presented in **Table 59** road traffic noise from the Castlereagh Highway is predicted to increase by 0.1 dBA in the daytime period and 0.9 dBA at night.

During operation of the Project road traffic noise levels are predicted to increase by less than 0.1dBA during the day and night-time period.

As detailed in the RNP, an increase of up to 2 dBA represents a minor impact that is considered barely perceptible for the average person, and on this basis, the predicted impact due to an increase in road traffic noise from the Castlereagh Highway from Project related traffic is considered to be negligible.

7.9 Cumulative Noise Assessment

7.9.1 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 Power Station, the Mt Piper Power Station, the Angus Place Colliery, the Springvale Colliery, Blackmans Flat Waste Management Facility and Pine Dale Coal Mine.

As the operation of the existing haul roads and overland conveyors will not change as part of this Project the greatest potential for cumulative impact will be in the vicinity of the Springvale Coal Services Site.

During the operator-attended noise surveys at the Springvale Coal Services Site, no significant contribution was detected from either of the two local power stations. The Mt Piper Power Station is significantly distanced from the area and was inaudible during the operator attended noise surveys. The Wallerawang Power Station was also inaudible during the operator attended noise surveys.

Therefore, the cumulative noise impacts of the site with existing industrial noise sources has been assessed in the determination of the amenity levels.

7.9.2 Approved and Proposed Developments

A review of major approved and proposed industrial developments in the vicinity of the Project was conducted and is presented in **Table 60**.

Other projects in the general area include the Lidsdale Siding Upgrade project, the proposed Angus Place Mine Extension Project and the Springvale Mine Extension Project. These projects due to their respective locations do not impact on the cumulative noise from the Project at the assessed noise sensitive receptors.

Table 60 Approved or Proposed Industrial Developments in the Vicinity of the Project

Development Site	Approval Date	Development Status	Source of Noise Data
Mount Piper Power Station Ash Placement Project	February 2012	Approved	Project Approval 09_0186
Mount Piper Power Station Wester Coal Loader	June 2009	Approved	Project Approval 06_0271
Mount Piper Power Station Base Load Power Station	January 2010	Approved	Project Approval 09_0119
Blackmans Flat Waste Management Facility	August 2006	Approved	Geolyse 2006
Pine Dale Coal Mine Yarraboldy	February 2011	Approved	Project Approval 10_0041
Pine Dale Coal Mine Stage 2 Extension	N/A	Proposed	Assumed same criteria as Pine Dale Yaraboldy

The anticipated operating noise levels from each these developments have been established by reviewing the project approvals or environmental assessments (refer **Table 60**) and then used for the purposes of the 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 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. Given the significant intervening topography and distance of B18 from the approved or proposed developments provided in **Table 60**, B18 has not been considered as part of this cumulative assessment as cumulative noise levels are likely to be below the relevant amenity criteria.

The daytime, evening and night-time cumulative noise levels, together with the acceptable and maximum LAeq(period) noise amenity criteria for representative receivers B2 to B17 are presented in **Table 61**, **Table 62** and **Table 63** respectively.

Table 61 Cumulative Daytime Noise Amenity Levels

Location	Centennial Coal Springvale Coal Services	Mount Piper Power Station Ash Placement Project	Mount Piper Power Station Wester Coal Loader	Mount Piper Power Station Base Load Power Station	Blackmans Flat Waste Management Facility	Pine Dale Yarraboldy & Stage 2	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
B2	42	42	35	36	40	42	48	45	55 to 60
B4	42	42	35	36	40	42	48	45	
B5	42	42	35	36	40	42	48	45	
B6	42	42	35	36	40	42	48	45	
B7	42	42	35	36	40	42	48	45	
B8	42	42	35	36	40	42	48	45	
B9	41	42	35	36	40	42	48	45	
B10	41	42	35	36	40	42	48	45	
B11	41	42	35	36	40	42	48	45	
B12	40	42	35	36	40	42	48	45	
B13	41	42	35	36	40	42	48	45	
B14	41	42	35	36	40	42	48	45	
B15	36	42	35	36	40	42	47	44	
B16	33	42	35	36	40	42	47	44	
B17	42	42	35	36	40	42	48	45	

Table 62 Cumulative Evening Noise Amenity Levels

Location	Centennial Springvale Coal Services Site	Mount Piper Power Station Ash Placement Project	Mount Piper Power Station Wester Coal Loader	Mount Piper Power Station Base Load Power Station	Blackmans Flat Waste Management Facility	Pine Dale Yarraboldy & Stage 2	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
B2	42	38	35	36	N/A	39	46	43	45 to 50
B4	39	38	35	36	N/A	39	45	42	
B5	39	38	35	35	N/A	39	45	42	
B6	39	38	35	35	N/A	39	45	42	
B7	38	38	35	35	N/A	39	44	41	
B8	38	38	35	35	N/A	39	44	41	
B9	39	38	35	35	N/A	39	45	42	
B10	38	38	35	35	N/A	39	44	41	
B11	38	38	35	35	N/A	39	44	41	
B12	32	38	35	35	N/A	35	42	39	
B13	36	38	35	35	N/A	35	43	40	
B14	33	38	35	35	N/A	35	43	40	
B15	35	38	35	35	N/A	35	43	40	
B16	35	38	35	35	N/A	35	43	40	
B17	44	38	35	35	N/A	35	46	43	

Table 63 Cumulative Night-time Noise Amenity Levels

Location	Centennial Coal – Coal Services Project	Mount Piper Power Station Ash Placement Project	Mount Piper Power Station Wester Coal Loader	Mount Piper Power Station Base Load Power Station	Blackmans Flat Waste Management Facility	Pine Dale Yarraboldy & Stage 2	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
B2	42	35	35	35	N/A	35	45	42	40 to 45
B4	39	35	35	35	N/A	35	43	40	
B5	39	35	35	35	N/A	35	43	40	
B6	39	35	35	35	N/A	35	43	40	
B7	38	35	35	35	N/A	35	43	40	
B8	38	35	35	35	N/A	35	43	40	
B9	39	35	35	35	N/A	35	43	40	
B10	38	35	35	35	N/A	35	43	40	
B11	38	35	35	35	N/A	35	43	40	
B12	31	35	35	35	N/A	35	41	38	
B13	36	35	35	35	N/A	35	42	39	
B14	32	35	35	35	N/A	35	42	39	
B15	35	35	35	35	N/A	35	42	39	
B16	36	35	35	35	N/A	35	42	39	
B17	45	35	35	35	N/A	35	46	43	

As presented in **Table 61**, **Table 62** and **Table 63** the predicted cumulative amenity noise levels from existing, approved and proposed mining and industrial noise sources and the Project are at or below the relevant acceptable amenity levels for suburban receivers at all locations during the daytime and evening period.

During the night period the cumulative amenity noise level exceeds the acceptable level of 40 dBA at Locations B2 and B17 but is below the maximum noise level of 45 dBA.

8 VIBRATION

8.1 Construction Blasting

The use of explosives may be required to dislodge and fracture rock to enable its extraction and removal during the construction of the proposed haul road. To achieve this, holes would be drilled into the rock in a designed pattern giving strict attention to their angle, depth and spacing. These holes are then filled with an explosive charge and initiated with the aid of primers and detonators. The detonation of holes would be delayed in a pre-designed sequence to ensure that holes are fired in quick succession. A delayed firing technique improves the efficiency of the blast and also reduces its environmental impacts.

The infrastructure and properties potentially affected by the construction blasting, should it be required, includes:

- Suspended transmission lines.
- Blackmans Flat residences

8.1.1 Blast Emission Criteria

Residential Disturbance

The Australian and New Zealand Environment Conservation Council (ANZECC) guidelines are the most commonly used guideline for assessing potential residential disturbance arising from blast emissions. The ANZECC guidelines provide assessment criteria with the aim of minimising annoyance from noise and vibrations caused by blasting activities and are as follows:

- The recommended maximum level for airblast is 115 dB Linear. This level may be exceeded for up to 5% of the total number of blasts over a 12 month period but should not exceed 120dB Linear at any time.
- The recommended maximum for ground vibration is a Peak Vector Sum (PVS) vibration velocity of 5 millimetres per second (mm/s). This level may be exceeded for up to 5% of the total number of blasts over a 12 month period but should not exceed 10 mm/s at any time.
- Blasting should generally only be permitted during the hours of 9.00 am to 5.00 pm Monday to Saturday. Blasting should not take place on Sundays and public holidays.
- Blasting should generally take place no more than once per day.
- The ground vibration and airblast levels which cause concern or discomfort to residents are generally lower than the relevant building damage limits.

Surface Infrastructure

British Standard 7385: Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2* provides criteria against which the likelihood of building damage from ground vibration can be assessed.

Sources of vibration which are considered in the standard include blasting (carried out during mineral extractions or construction excavation), demolition, piling, ground treatments (compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to commercial and residential buildings are presented numerically in **Table 64**

Table 64 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage (BS 7385.2)

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures - Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures - Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note: Values referred to are at the base of the building being considered.
Hz = hertz.

The standard states that the guide values in **Table 64** relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in **Table 64** may need to be reduced by up to 50%.

German Standard 4150-3 1999 *Structural Vibration Part 3: Effects of Vibration on Structures* also provides guideline criteria for evaluating the short and long-term effects of vibration on structures. The relevant vibration damage criteria are summarised in **Table 65**

Table 65 Vibration Velocity Damage Risk Criteria (mm/s)

Receiver Area	Damage Risk (mm/s) (DIN4150-3)	
	Horizontal	Vertical
Residential/Dwellings	15	5
Commercial/Offices	40	20
Industrial/Workshops	40	20
Mechanical (On/Off)	20/5	20/5
Electronic/Computers	5	5
Subsurface Infrastructure/Pipework	50-100	50-100

8.1.2 Prediction of Blasting Impacts

Site law formulas provide specific relationships between the level of blast emissions and scaled distance. The scaled distance is a fundamental relationship between distance and the maximum instantaneous explosive charge mass (MIC). Normally in blast analysis large amounts of recorded blast events are statistically analysed to obtain the site law formulas.

Methodology

In this case no detailed blasting information was available. In the absence of field data it is possible to predict ground vibration using generic site law models developed by the ICI (now Orica) following extensive research into the area of blast transmission.

Ground Vibration

The charge weight scaling law for ground vibration is:

$$PPV = K \left(\frac{D}{\sqrt{m}} \right)^{-1.6}$$

Where:

PPV = Peak Particle Velocity (mm/s)

m = Maximum Instantaneous Charge mass (kilogram [kg] MIC)

D = Distance (m)

K = Site constant

The K value is dependent on the blast interface and the type of rock the blast is being transferred to. For free face blasting of hard or highly structured rock a K value of 500 is typical, for a free face of average rock approximately 1,140 and for nearfield heavily confined blasting values of up to 5,000 are not uncommon.

A K value of 1140 for average rock is considered to be an appropriate K factor for the assessment of surface vibration levels from blasting for the Project.

Airblast

The charge weight scaling law for airblast is:

$$dBL = -24 \text{Log} \left(\frac{D}{\sqrt[3]{m}} \right) + 164.2$$

Where:

dBL = Linear decibels

m = Maximum Instantaneous Charge mass (kilogram [kg] MIC)

D = Distance (m)

Predicted Impacts

The levels of ground vibration and airblast have been predicted from the nearest potential blasting location to the surface infrastructure for various MIC values. The locations have been identified based on the location of the proposed haul road and the locations of surface infrastructure. Predicted results are given in **Table 66**.

Table 66 Predicted Blast Emission Levels

Infrastructure	MIC (kg)	Distance (m)	Predicted Airblast Level (dBL)	Recommended Airblast Level (dBL)	Predicted Surface Vibration Level PPV (mm/s)	Recommended Vibration Limit PPV (mm/s)
B2 (Residence)		120	115	115	0.6	5
Suspended Transmission Lines		15	-	-	50	50-100

As can be seen the limiting criteria for blasting is controlled by airblast levels at the nearest residential receiver to the potential blasting. The minimum safe blasting distance for various MIC values are presented in **Table 67**

Table 67 Minimum Safe Blasting Distance for Various MIC

Distance	MIC (kg)	Predicted Surface Vibration Level PPV (mm/s)	Predicted Airblast Level (dBL)
100	0.7	0.5	115
150	2.4	0.8	115
200	5.8	1	115
250	11.3	1.2	115
300	19.7	1.3	115

Monitoring

Should blasting be required for the Project, monitoring would be conducted to ensure compliance with relevant criteria, and validate the blasting predictions presented above.

8.2 Construction Vibration

Energy from construction equipment is transmitted into the ground and transformed into vibration, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment).
- The frequency content.
- The stiffness of the medium (ground).
- The type of wave (surface or body).
- The ground type and topography.

Due to the above factors, there is inherent variability in ground vibration predictions without site-specific measurement data.

The NSW EPA has released an interim guideline “*Assessing Vibration: A Technical Guideline*” which provides guideline building vibration levels associated with a low probability of annoyance from occupants. The range of applicable annoyance risk vibration velocity criteria are provided in **Table 68**

Table 68 Vibration Velocity Annoyance Risk Criteria (mm/s)

Receiver Area	Annoyance Risk (mm/s)	
	Horizontal	Vertical
Residential/Dwellings	1.2	0.45

Vibratory rollers are anticipated to be used during the construction of the proposed haul road. Buffer distances predicted to achieve compliance with the vertical vibration damage criteria are presented in

Table 69 Predicted Buffer Distance Vibratory Rolling

Receiver Area/Type	Damage Risk (m)	Annoyance Risk (m)
Residential/Dwellings	18	43
Industrial/Workshops	1	37
Subsurface/Pipework	<1	n/a

Based on the predicted buffer distances vibration levels are predicted to be significantly below the relevant damage and annoyance risk criteria at all residential receivers as the closest residential receiver (B1) is located approximately 120 metres from vibratory rolling activities.

8.3 Vibration from Coal Trucks

Trucks travelling to and from the Project have the potential to generate ground borne vibration.

Previous assessments of truck vibration levels (refer Heggies report 10-5055-R1 Metropolitan Coal Project Noise Impact Assessment dated 31 July 2008) have indicated that haulage trucks travelling at 80 km/hr or less were predicted to generate vibration levels well below the vibration damage criteria of 5 mm/s at residences a distance of 7.5 m or greater from the road.

These conclusions are consistent with the description of the potential impacts from ground borne traffic vibration detailed in the RNP, which states:

Vehicles operating on a roadway are unlikely to cause a perceptible level of vibration unless there are significant road irregularities, particularly if the affected receiver is more than 20 metres from the roadway.

As noted above, receivers are located at a distance of greater than 20 metres from the coal haulage route and as such no road traffic vibration impacts are predicted at the nearest residential receivers.

9 CONCLUSION

SLR Consulting has conducted a Noise Impact Assessment (NIA) for Centennial Western Coal Services Project (the Project). A summary of the Project is contained within **Section 2**.

Findings of the NIA are summarised as follows:

9.1 Operational Noise Impacts

Blackmans Flat

Noise predictions indicate that there will be likely residual noise impacts above the INP project specific noise criteria at some receptors surrounding the Project site.

Depending on the degree of residual noise impact, noise mitigation and management measures have been suggested to control the effect of noise from the Project at these receptors.

Wallerawang

Noise predictions indicate that the Project will meet the noise criteria set out in the project approval for the Lidsdale Siding Upgrade Project PA 08_0223 under all operating conditions.

Lidsdale

Noise predictions indicate that the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions.

Wolgan Road

Predicted noise emission levels from the Project will meet the noise criteria set out in Angus Place PA06_0021 under all operating conditions.

Springvale

Predicted noise emission levels from the Project will meet the project specific noise criteria for Springvale derived in accordance with the INP. For locations S1, S2, S4 and S5 the noise levels predicted for the existing overland conveyor are low when compared to the entire Springvale Colliery operation. This means that the noise impact at these receptors will be insignificant in relation to noise from Springvale Colliery.

9.2 Sleep Disturbance

The results of sleep disturbance modelling indicates that maximum noise levels generated by the Project will comply with sleep disturbance goals at the closest, potentially most affected receptors in Wallerawang, Lidsdale and Springvale.

Predicted maximum noise levels from the Project at Blackmans Flat and Wolgan Road receptors show potential exceedance of the noise goals but are below a level that is considered to cause awakening reactions. Mitigation measures considered for operation impacts will also attenuate the maximum noise levels from activities at night.

9.3 Cumulative Impact Assessment

Potential sources of noise surrounding the Project have been identified as the Wallerawang Power Station, the Mt Piper Power Station, the Angus Place underground coal mine, the Springvale Coal Mine, Blackmans Flat Waste Management Facility and Pine Dale Coal Mine. The predicted cumulative amenity noise levels from existing, approved and proposed mining and industrial noise sources and the Project are at or below the relevant acceptable amenity levels for suburban receivers at all locations during the daytime and evening periods.

During the night period the cumulative amenity noise level exceeds the acceptable level of 40 dBA at Locations B2 and B17 but is below the maximum noise level of 45 dBA.

9.4 Construction Noise Assessment

The results of construction modelling indicate that noise emission from construction will comply with the noise affected management level at all residential locations with the exception of B2, B4 B5 and B6. It should be noted that the predicted construction noise levels are below the highly noise affected level for the scenarios considered.

9.5 Road Traffic noise Assessment

The predicted impact from Project related traffic, during construction and operation, due to an increase in road traffic noise from the Castlereagh Highway is considered to be negligible.

9.6 Vibration

Construction blasting noise and vibration impacts have been assessed and a minimum safe blasting distance has been recommended.

Monitoring of blasts would be conducted in order to derive a site law for the Project to validate predicted vibration levels.

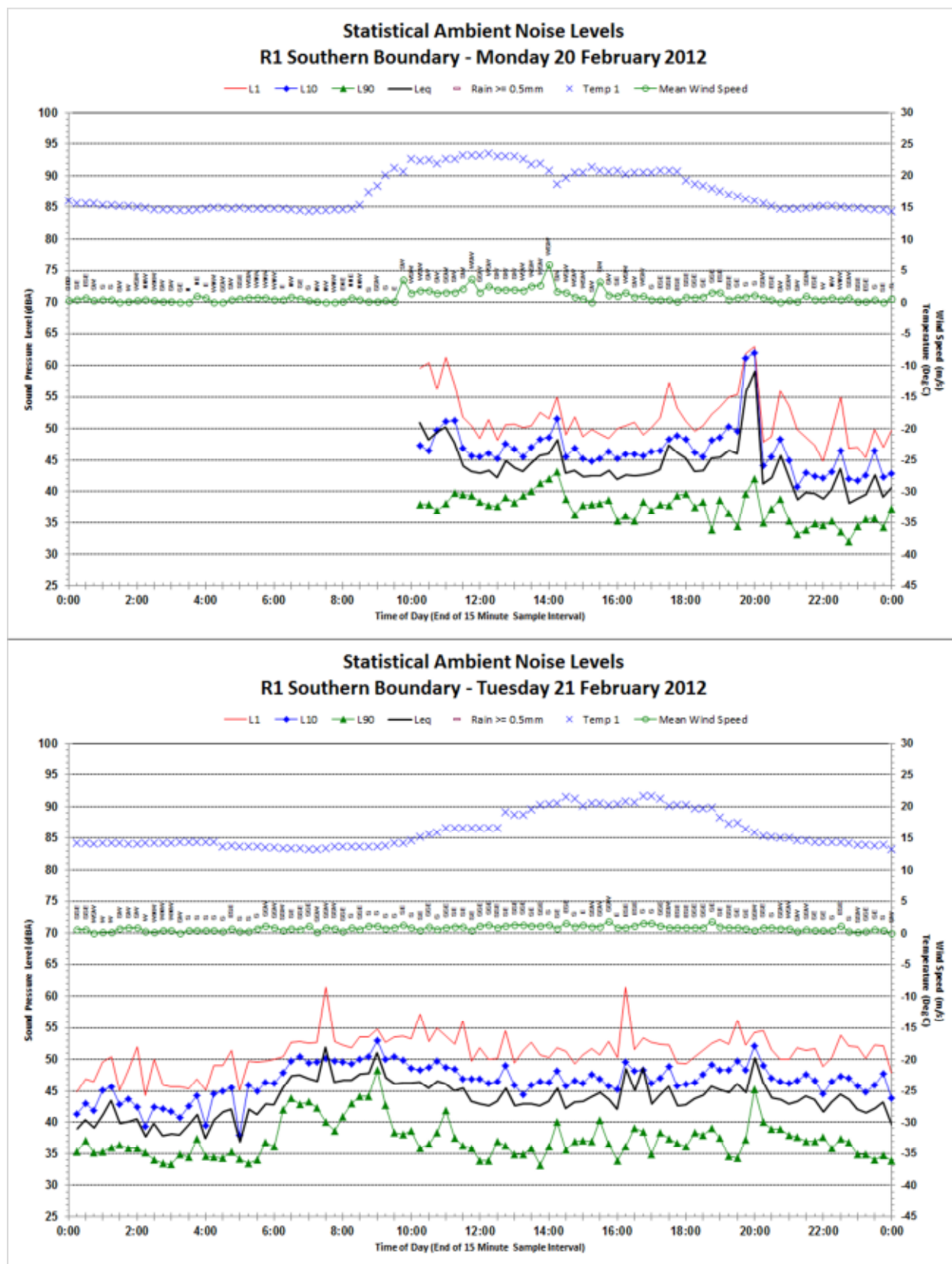
Predicted vibration levels for the construction and operation of the Project are significantly below damage and annoyance risk criteria at all times.

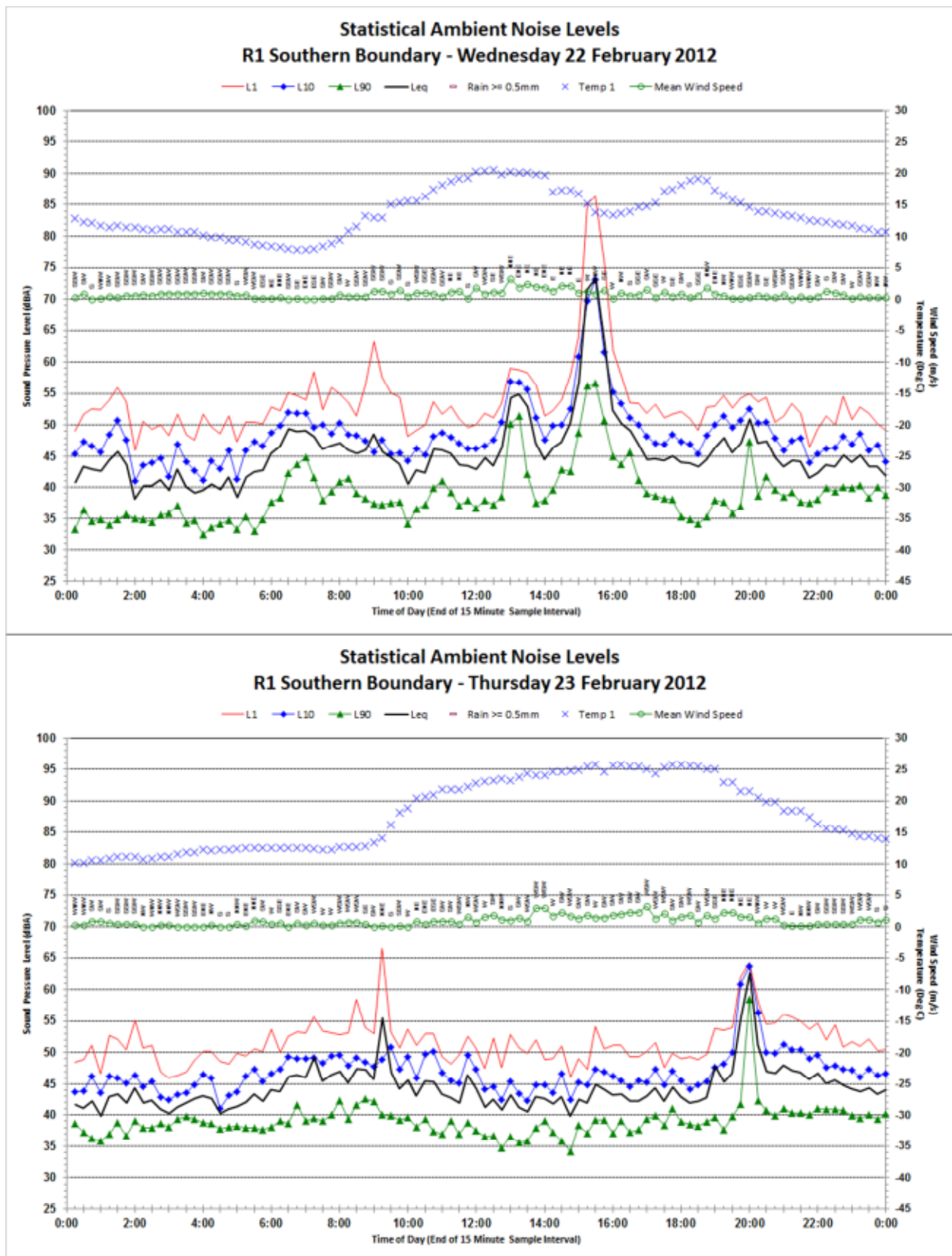
9.7 Noise Mitigation and Management

The mitigation considered in the assessment to reduce the impact of noise emissions from the Project includes the following:

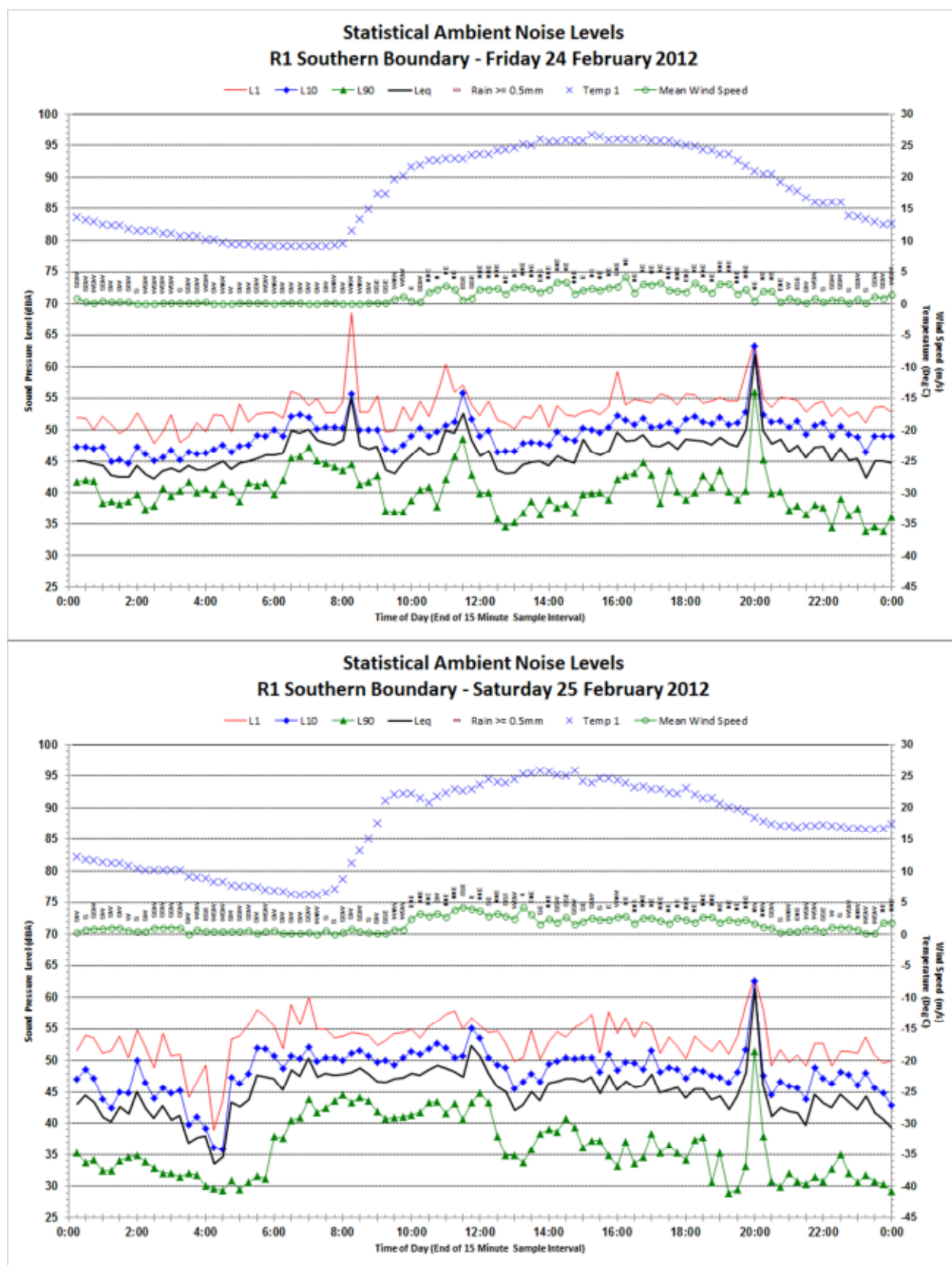
- Removal of the eastern reject emplacement areas at the Springvale Coal Services Site.
- The proposed link road was relocated to the west of the initial proposed route (Option 2 Haul Road).

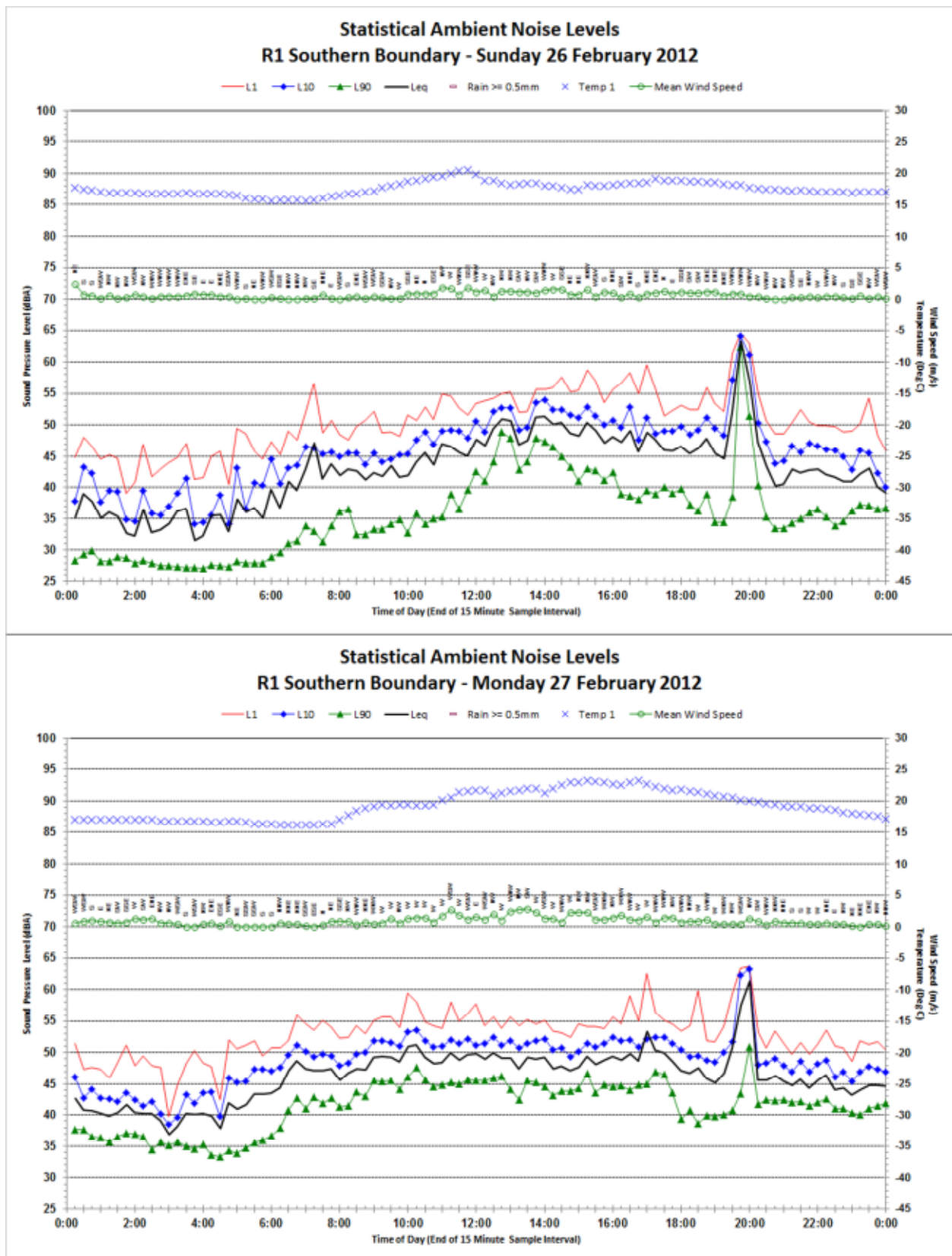
- A reduction in material haulage on the internal haul roads during periods of prevailing, noise enhancing weather conditions. The default level of haulage will be zero trucking during these prevailing conditions until such time as noise monitoring confirms the truck movements required to meet the project specific noise criteria during these conditions.
- The Kerosene Vale Stockpile Area will not be operated during evening and night periods.



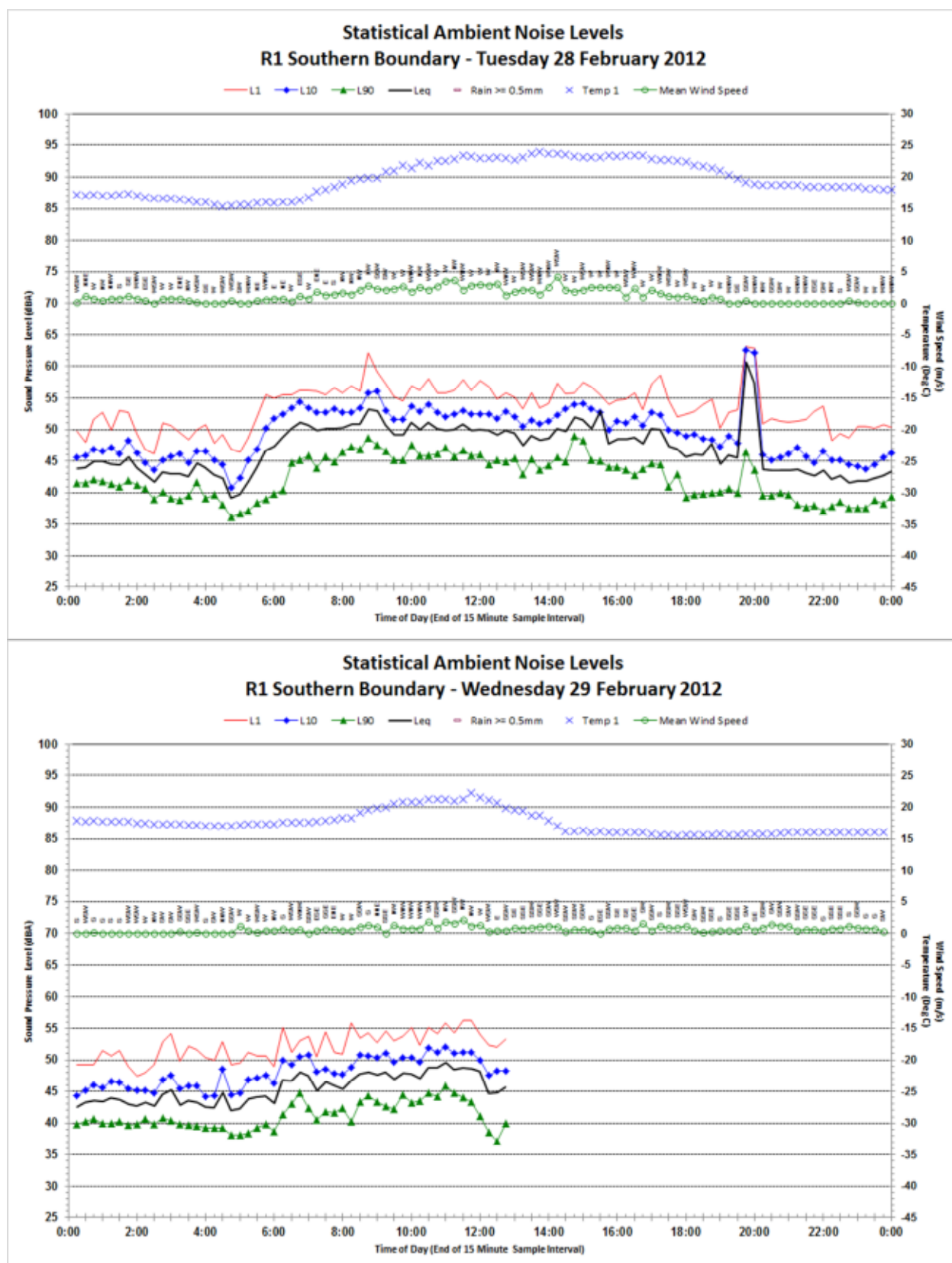


Statistical Ambient Noise Levels





Statistical Ambient Noise Levels



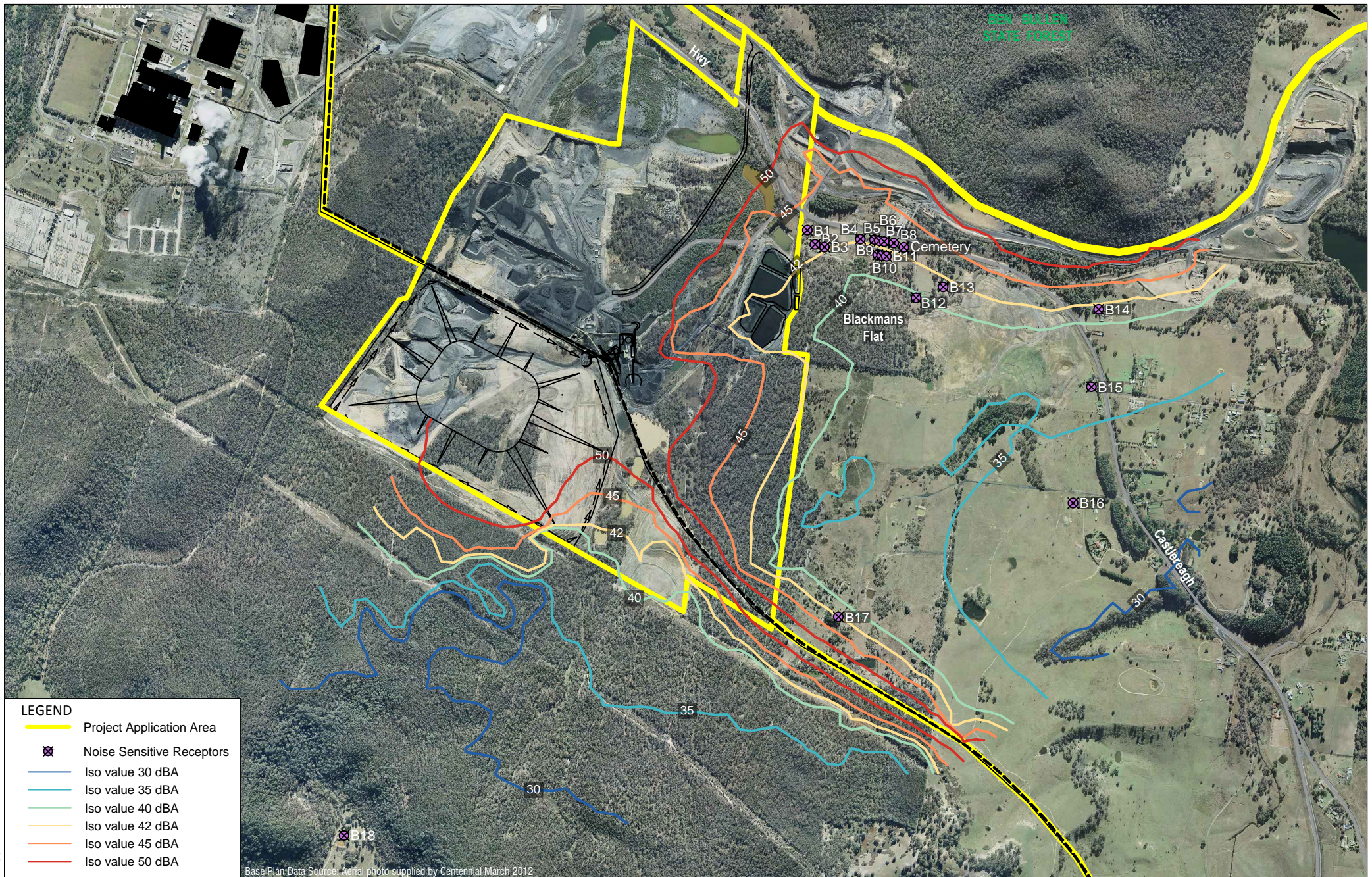
Appendix B

Report 630.10123

Page 1 of 1

Equipment Sound Power Levels

Equipment Description	Octave Band Centre Frequency (Hz) – dB re 1pW										dB Lin	dBA
	32	63	125	250	500	1000	2000	4000	8000	16000		
Washery	123	115	109	108	107	106	103	98	91	80	124	111
Stockpile/reject Emplacement Dozer	106	112	108	110	113	106	105	104	94	85	118	113
Pump	101	106	98	93	94	101	97	94	87	81	109	104
Refuse truck	106	115	102	109	104	102	99	100	92	92	117	108
Import/Export Conveyor – per m	76	74	72	70	73	69	69	61	55	44	81	75
Internal conveyor – per m	71	69	67	65	68	64	64	56	50	39	76	70
Surge bin	106	101	97	95	96	94	92	90	84	71	108	99
Transfer Station	112	105	101	101	101	97	91	83	77	72	113	102
Haul truck	103	106	108	100	107	108	100	92	82	73	114	110
FEL – Cat 988 Kerosene Vale	109	109	114	110	111	111	109	100	92	85	119	115



- LEGEND**
- Project Application Area
 - X Noise Sensitive Receptors
 - Iso value 30 dBA
 - Iso value 35 dBA
 - Iso value 40 dBA
 - Iso value 42 dBA
 - Iso value 45 dBA
 - Iso value 50 dBA

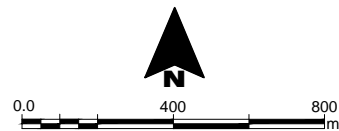
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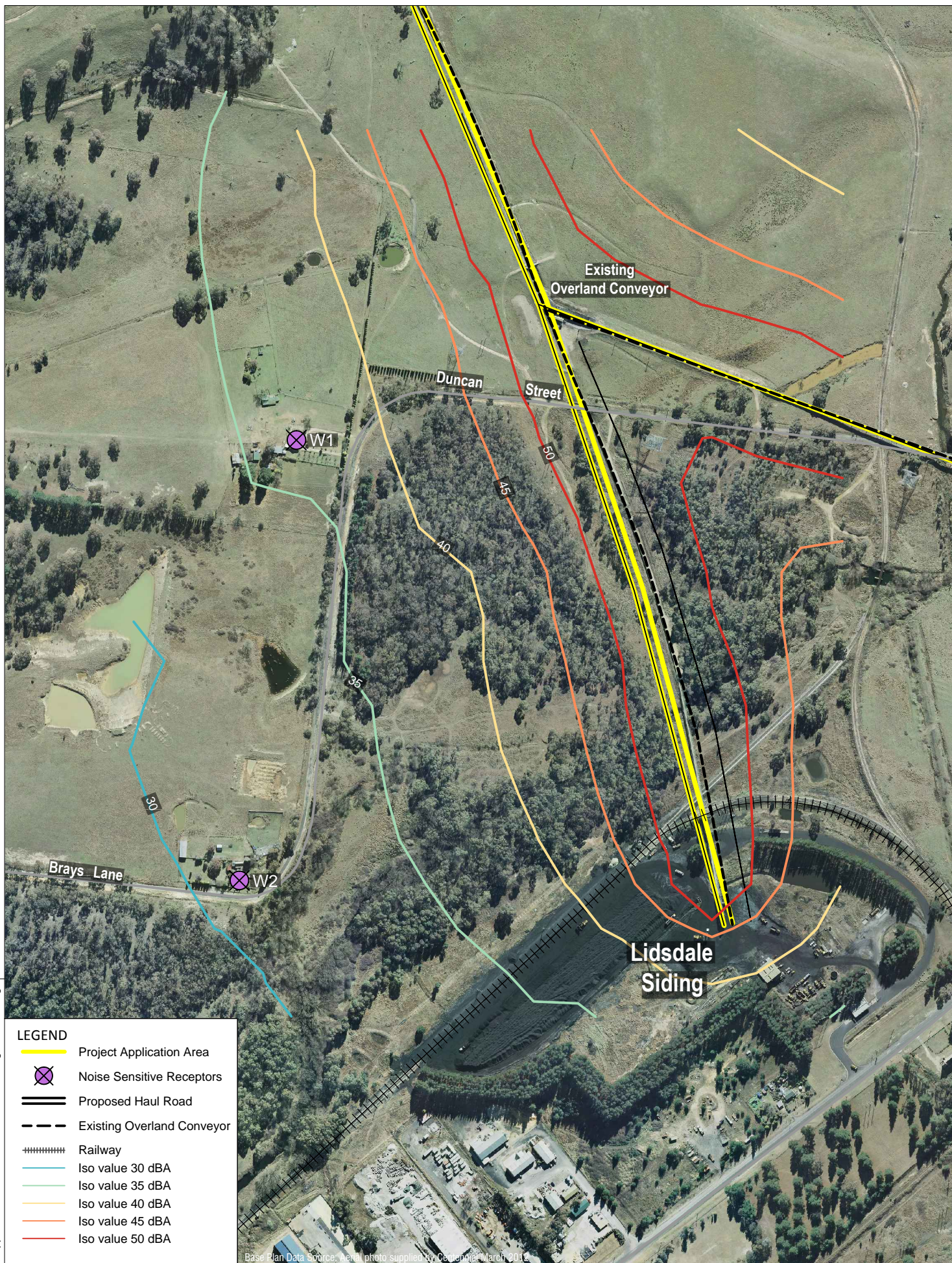


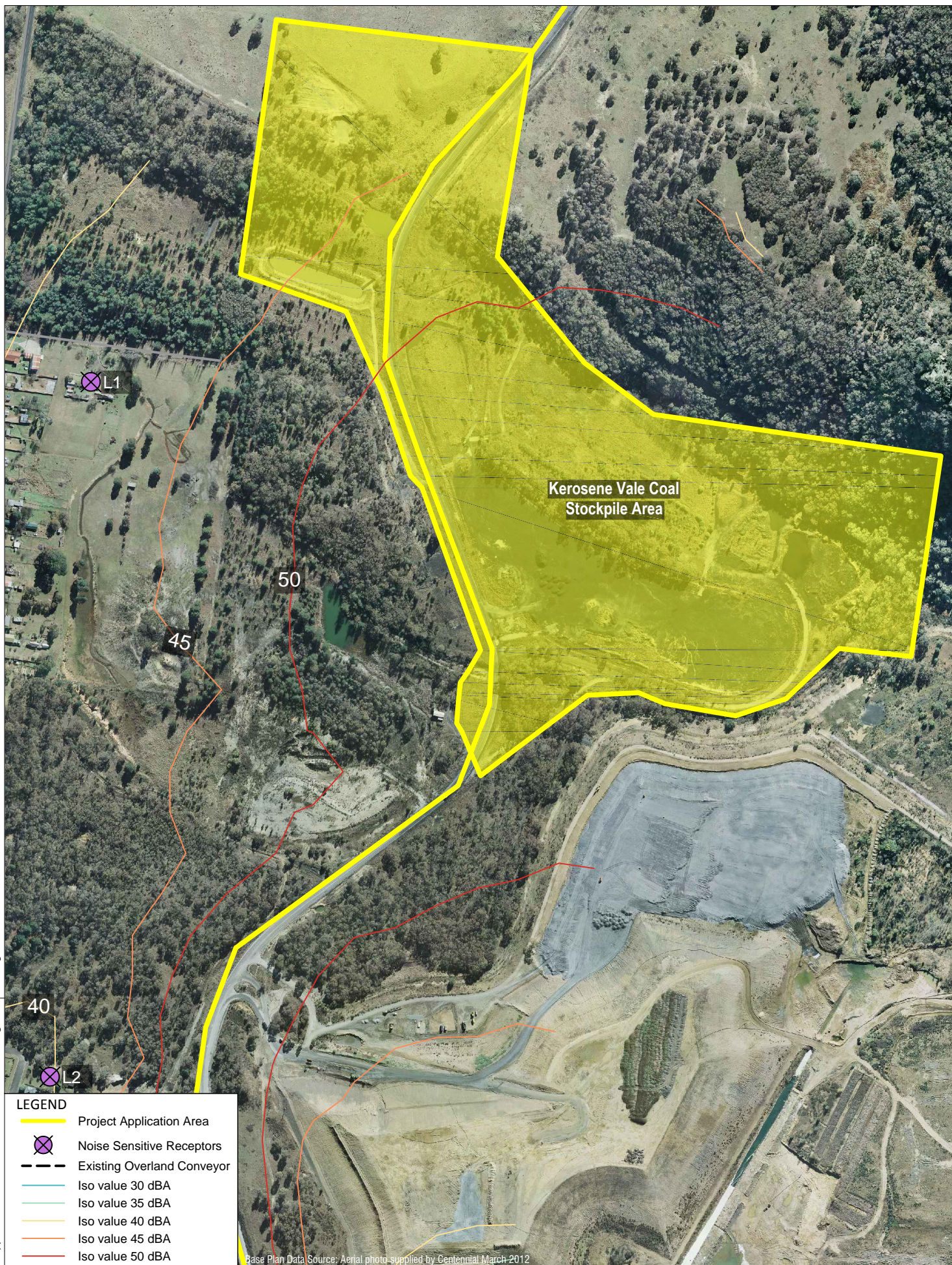
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WESTERN COAL SERVICE PROJECT

**Blackmans Flat
Scenario 2 - Day Calm**

APPENDIX C1





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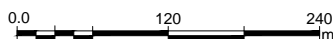
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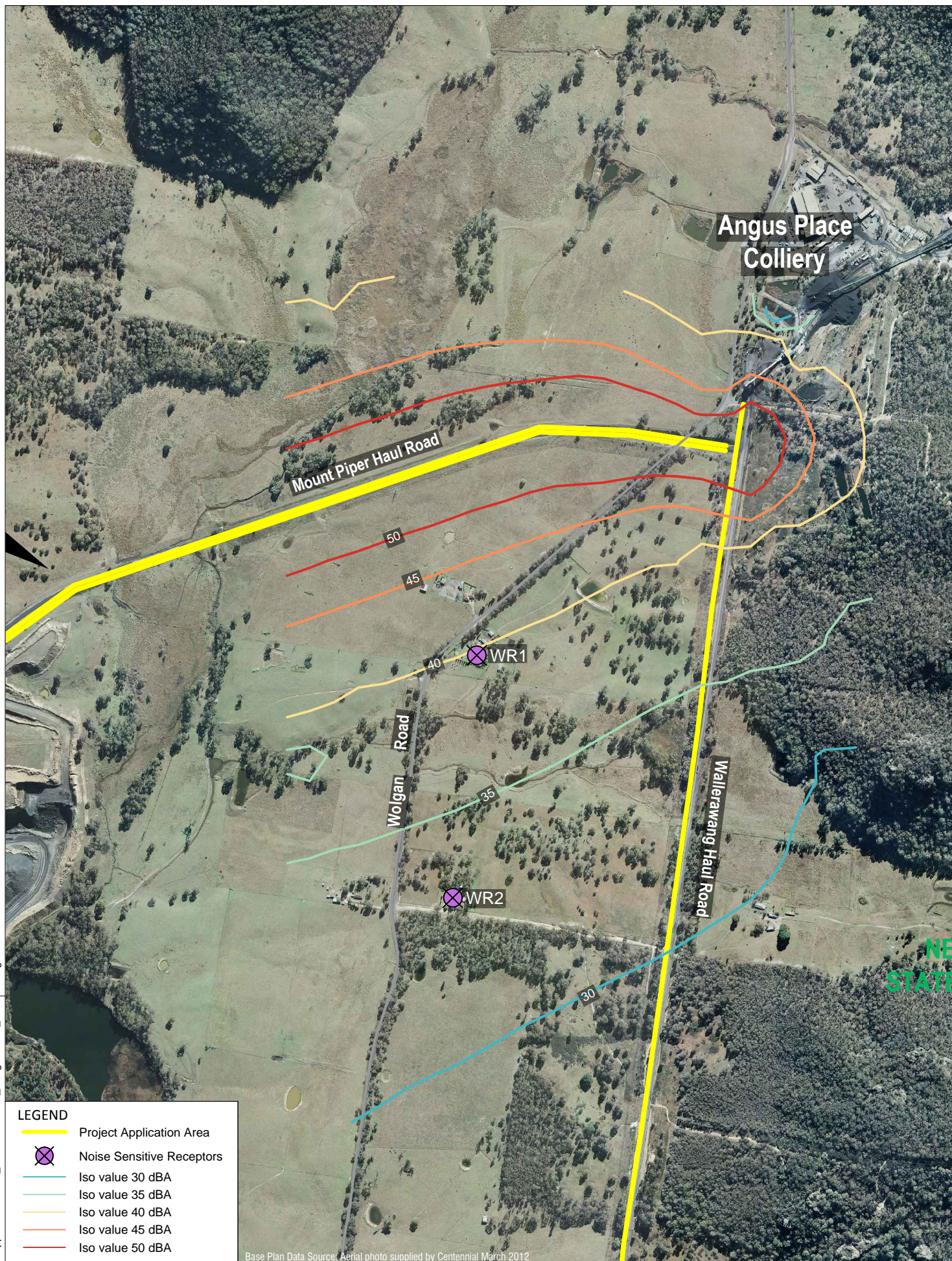


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WESTERN COAL SERVICE PROJECT

**Lidsdale Village
Scenario 5 - Day Calm**

APPENDIX C3



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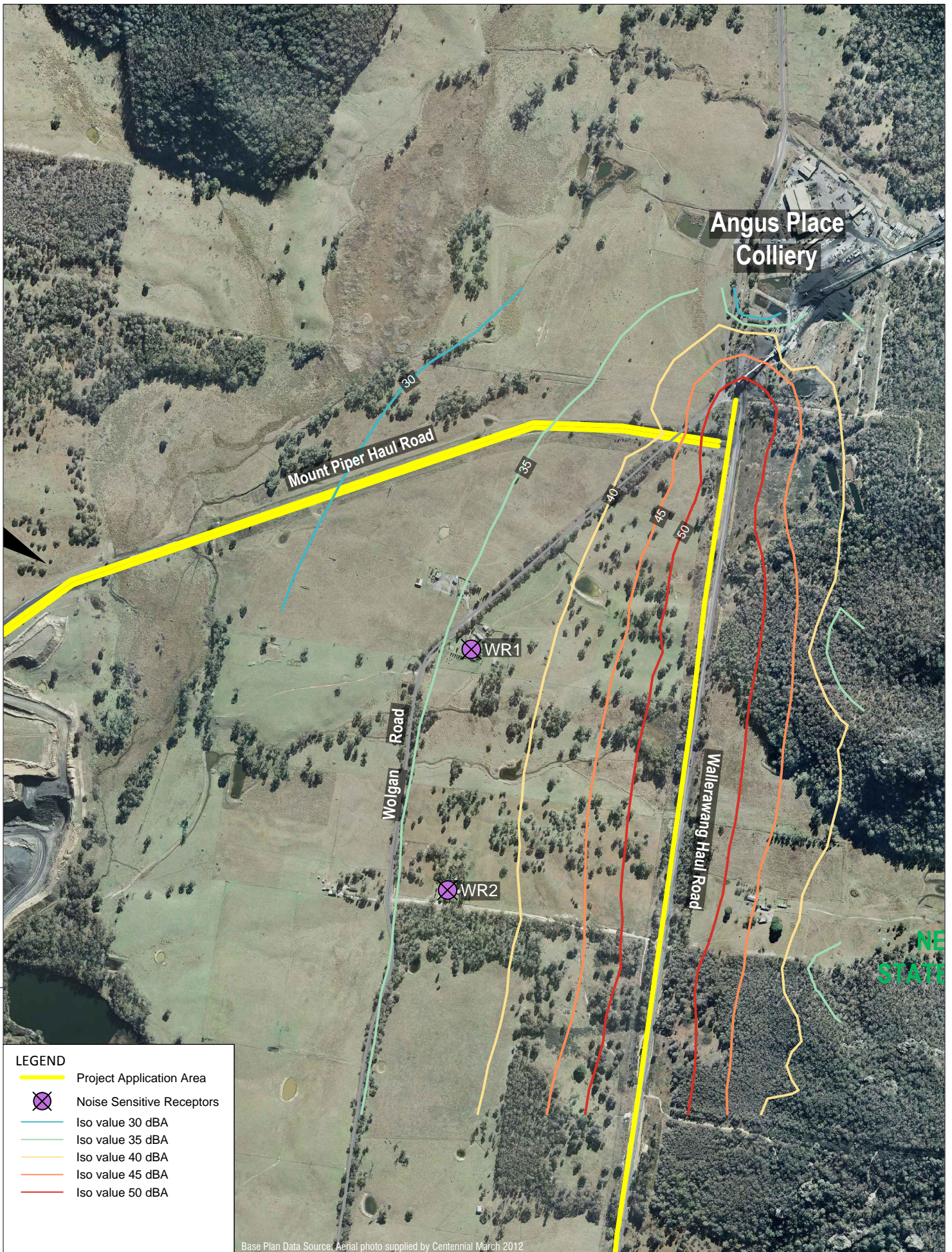
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WESTERN COAL SERVICE PROJECT

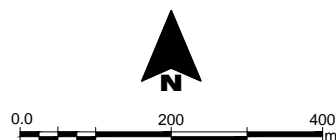
**Wolgan Road
Scenario 2 - Day Calm**

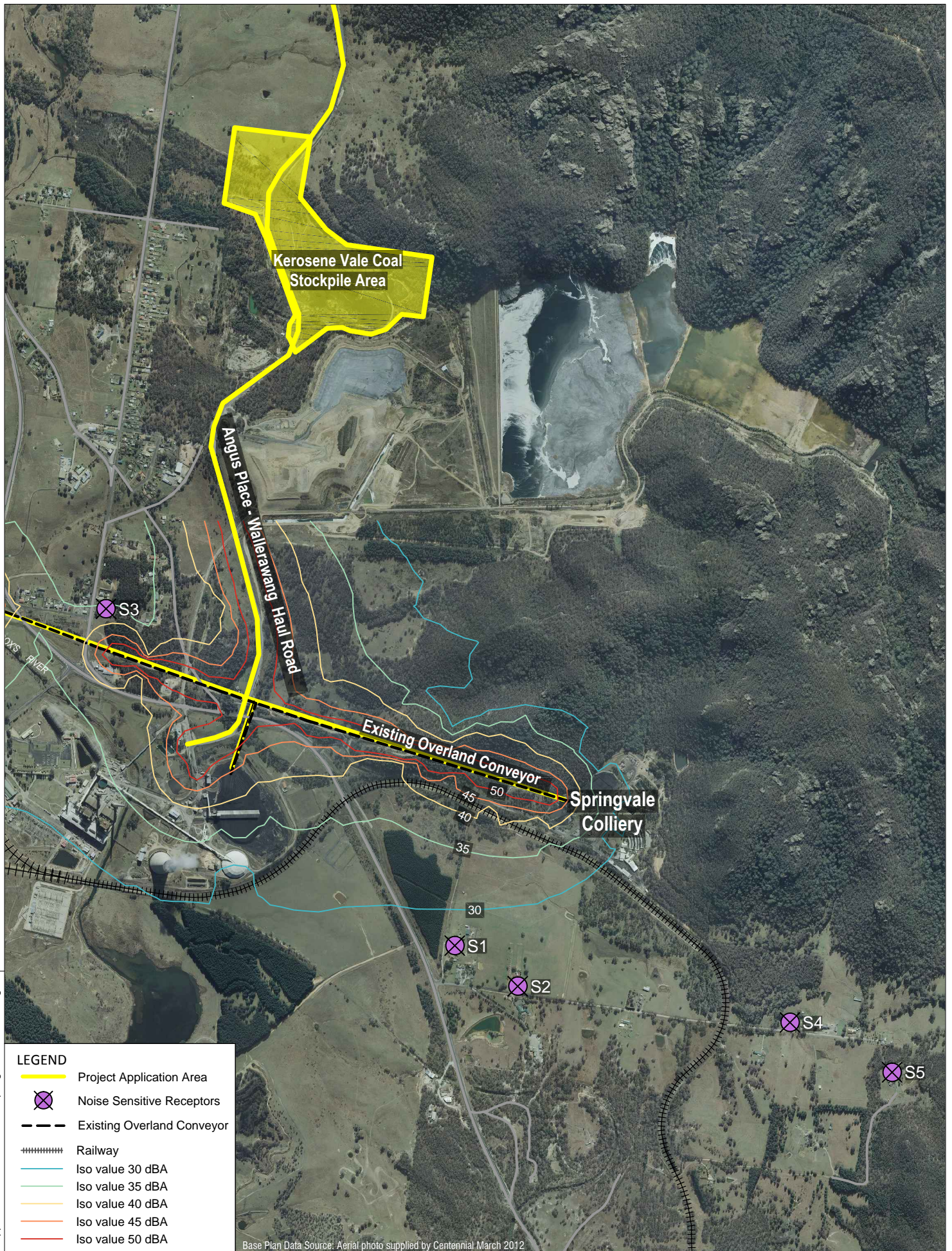
APPENDIX C4

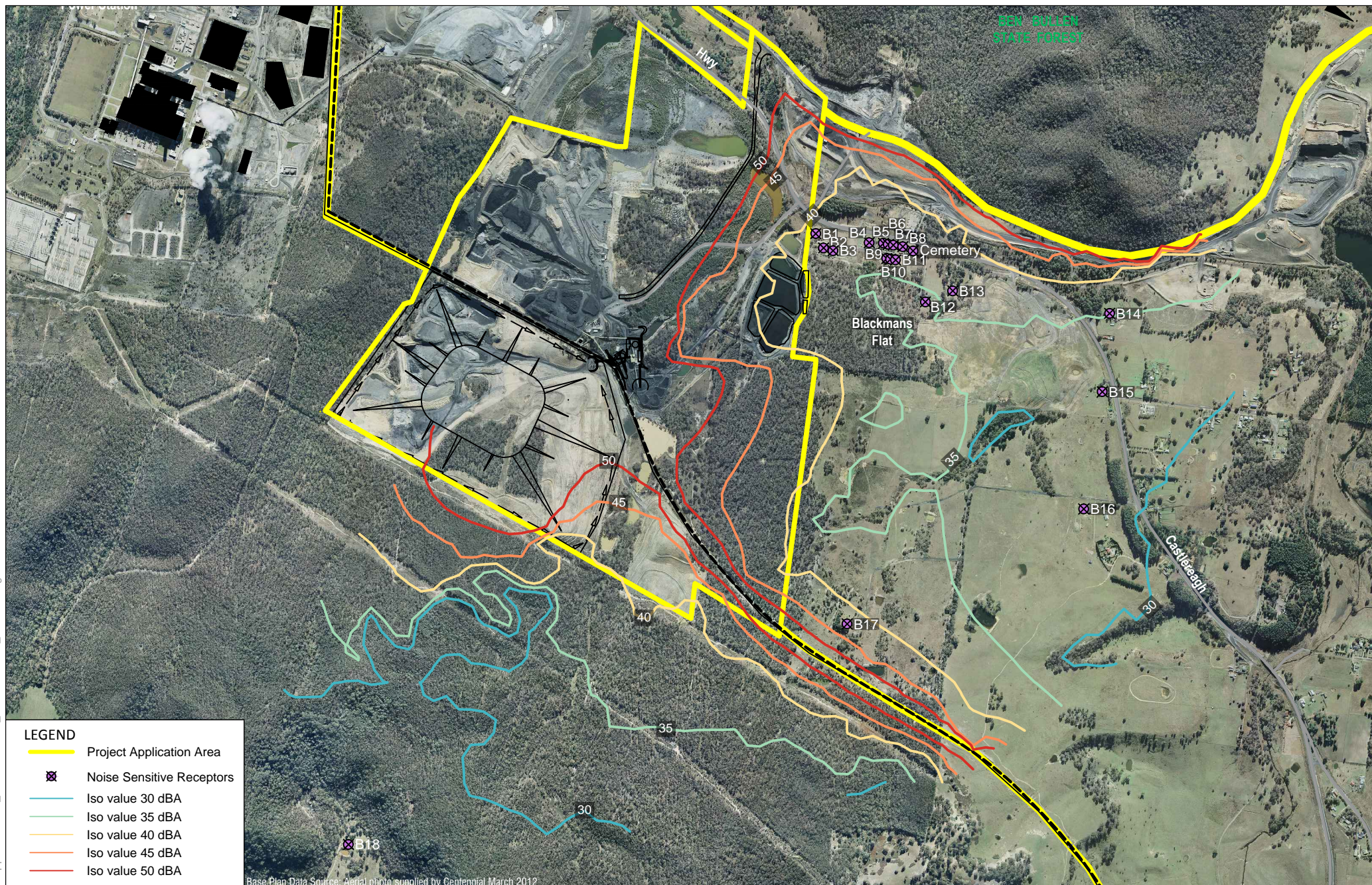


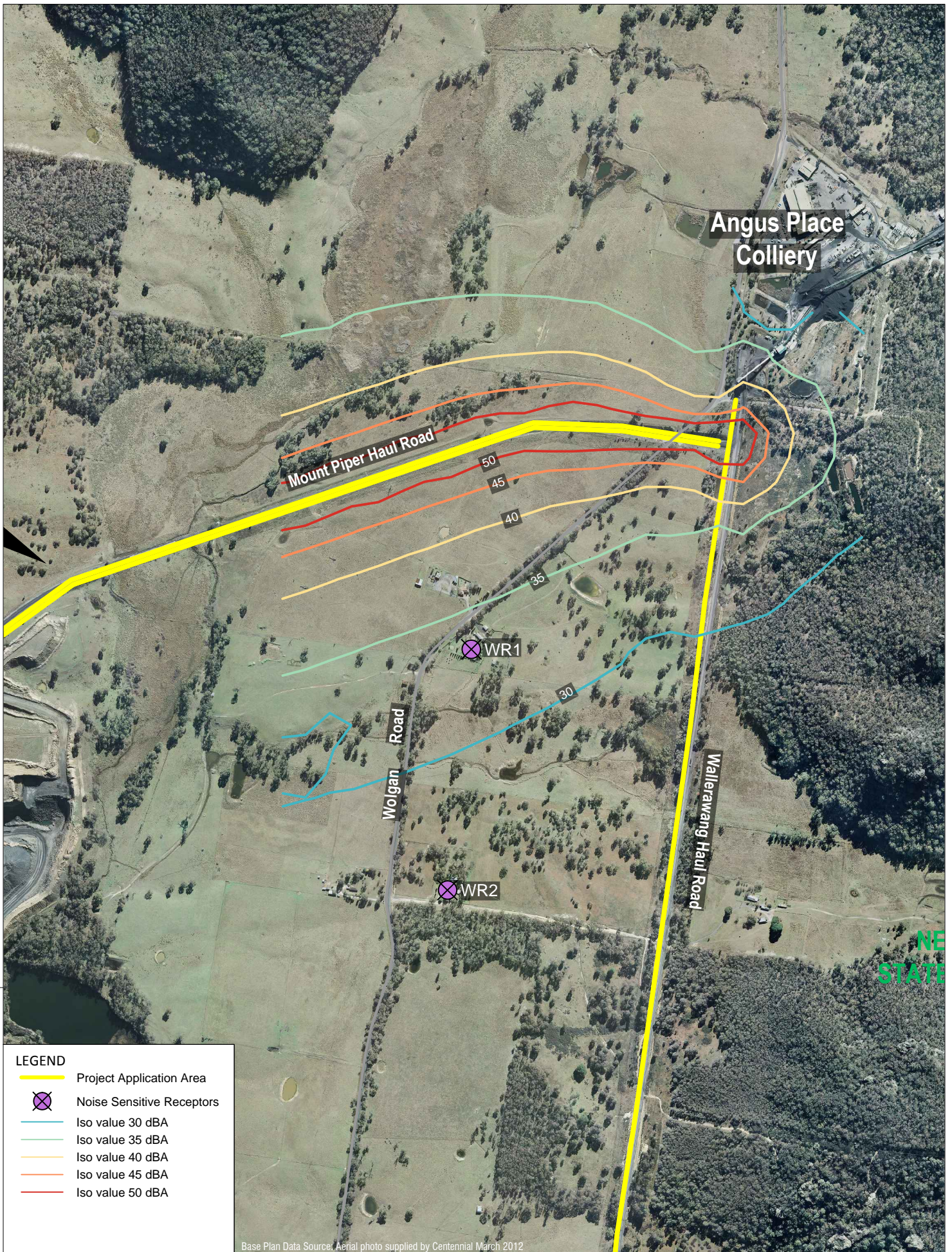
- LEGEND**
- Project Application Area
 - X Noise Sensitive Receptors
 - Iso value 30 dBA
 - Iso value 35 dBA
 - Iso value 40 dBA
 - Iso value 45 dBA
 - Iso value 50 dBA

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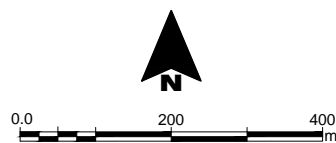


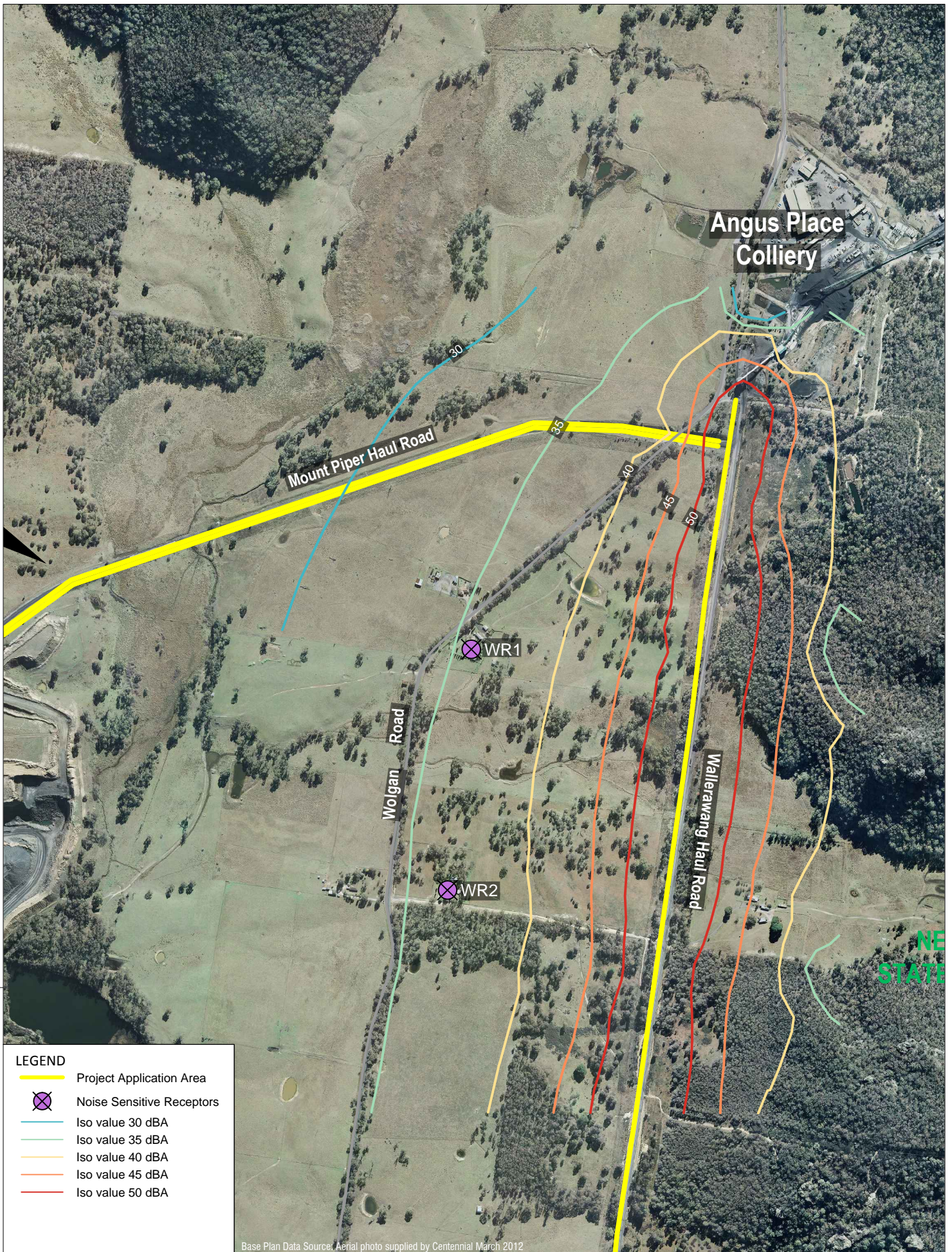


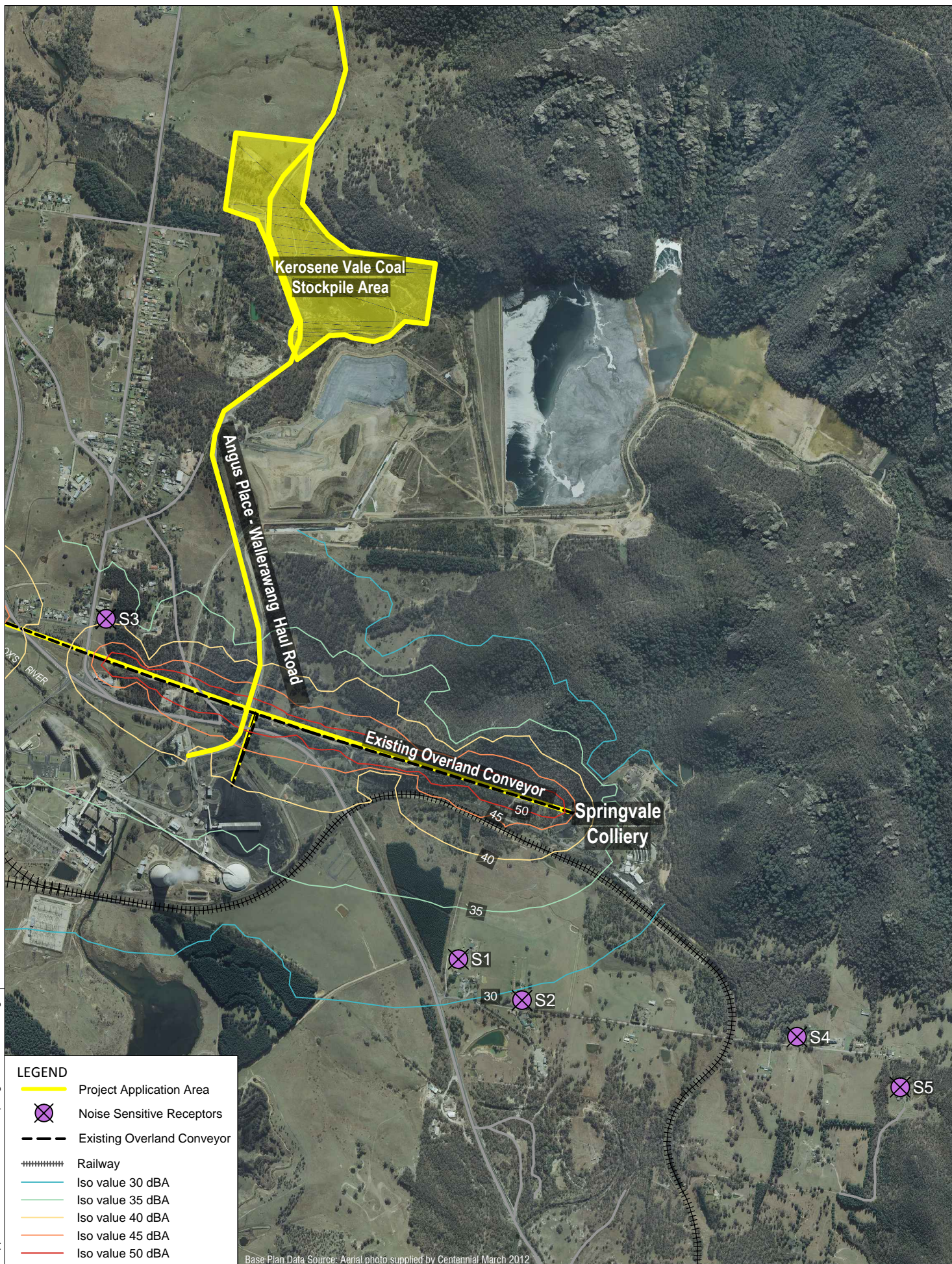


- LEGEND**
- Project Application Area
 - ⊗ Noise Sensitive Receptors
 - Iso value 30 dBA
 - Iso value 35 dBA
 - Iso value 40 dBA
 - Iso value 45 dBA
 - Iso value 50 dBA

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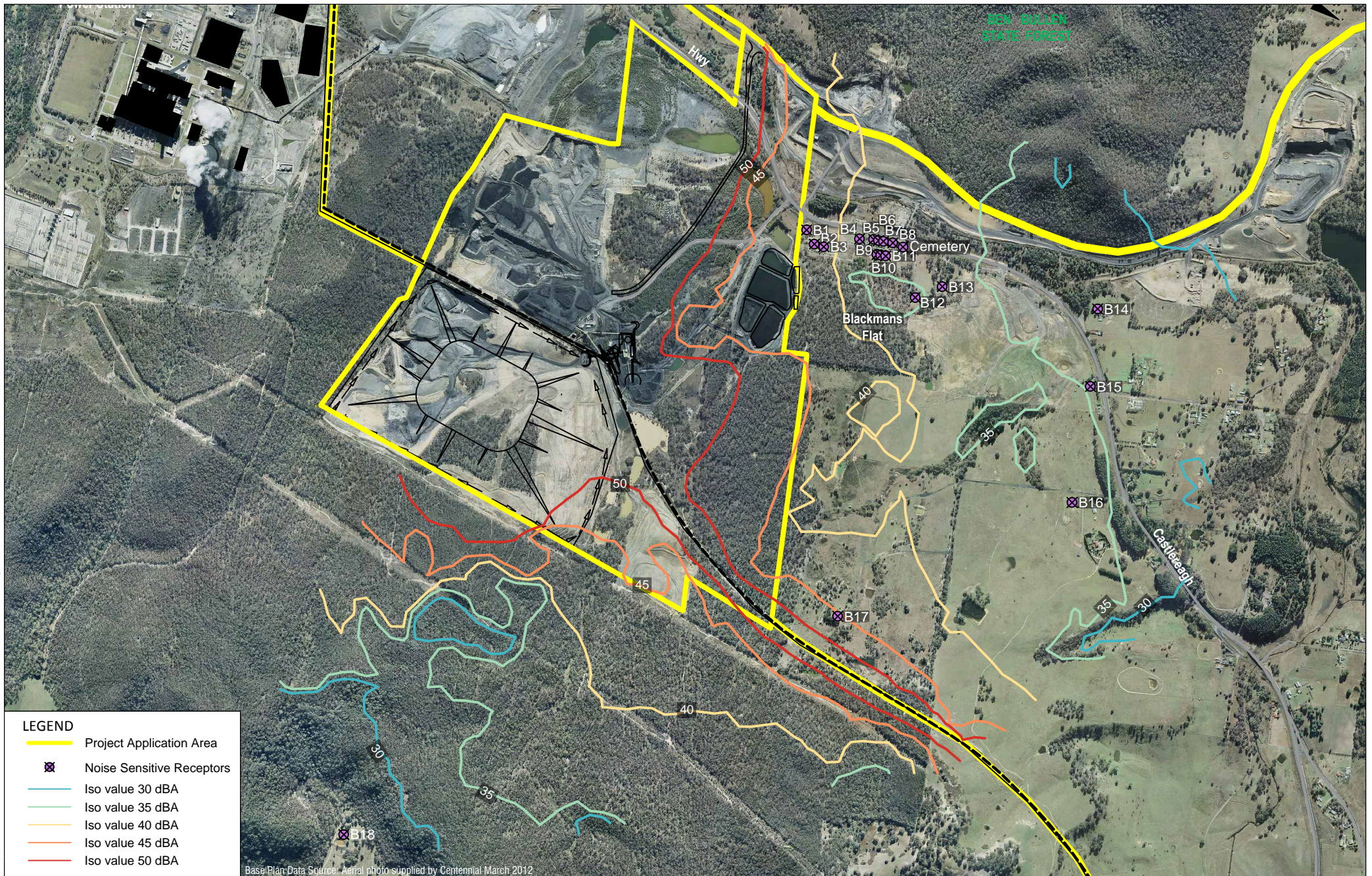
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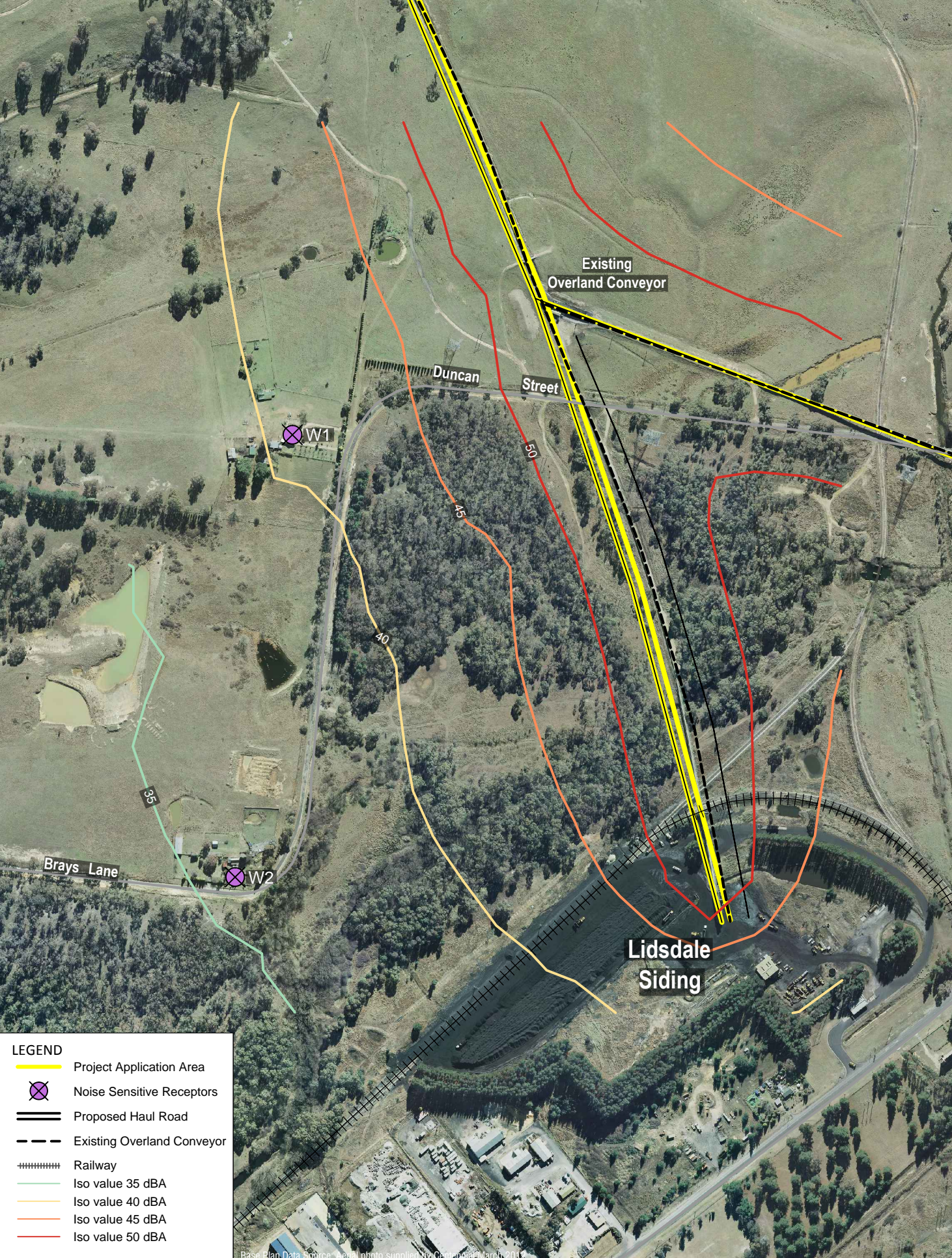
WESTERN COAL SERVICE PROJECT

**Springvale Scenrio 2 -
Night Temperature Inversion**

APPENDIX C10



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LEGEND

- Project Application Area
- Noise Sensitive Receptors
- Proposed Haul Road
- Existing Overland Conveyor
- Railway
- Iso value 35 dBA
- Iso value 40 dBA
- Iso value 45 dBA
- Iso value 50 dBA

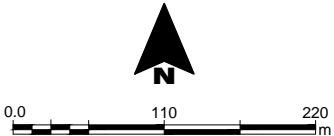
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**Wallerawang Scenario 2 -
Night Temperature Inversion**

APPENDIX C12