



APPENDIX A NOISE AND BLASTING IMPACT ASSESSMENT





global environmental solutions

Wilpinjong Coal Mine Modification Noise and Blasting Impact Assessment

Report Number 610.10806.00200-R1

5 July 2013

Wilpinjong Coal Pty Ltd
c/- Resource Strategies Pty Ltd
PO BOX 1842
MILTON QLD 4064

Version: Revision 1

Wilpinjong Coal Mine Modification

Noise and Blasting Impact Assessment

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street Lane Cove NSW 2066 Australia

(PO Box 176 Lane Cove NSW 1595 Australia)
T: 61 2 9428 8100 F: 61 2 9427 8200
E: sydney@slrconsulting.com www.slrconsulting.com

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Wilpinjong Coal Pty Ltd. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.10806.00200-R1	Revision 1	5 July 2013	Glenn Thomas	Yang Liu	Glenn Thomas

Table of Contents

1	INTRODUCTION	1
1.1	Background	1
1.2	Assessment Requirements	1
1.3	Other Relevant Approved or Proposed Projects	2
2	EXISTING WILPINJONG COAL MINE	2
2.1	Overview	2
2.2	Existing Approvals	3
2.3	Noise Management Plan	3
2.4	Noise Management Strategy	4
2.4.1	General Noise Management Measures	4
2.4.2	Continuous Real-time Noise Monitoring	5
2.5	Compliance Monitoring Results	7
2.5.1	Operator-attended Noise Compliance Results 2011 and 2012	7
2.6	Blast Management Plan	8
2.6.1	Blast Emission Compliance Results 2011	8
2.6.2	Blast Emission Results 2012	9
2.7	Noise Complaints Summary	9
3	MODIFICATION	10
3.1	Approved and Proposed Hours of Operation	10
3.2	General Operation	11
3.3	Construction	12
3.4	On-site Blasting	12
3.5	Off-site Rail Transport	12
3.6	Off-site Road Transport	12
3.7	Project Site and Land Ownership	12
4	EXISTING METEOROLOGICAL AND NOISE ENVIRONMENT	13
4.1	Meteorological Environment	13
4.2	Noise Environment	13
4.3	Road Traffic Noise	16
5	NOISE ASSESSMENT CRITERIA	16
5.1	Construction Assessment Criteria	16
5.2	Project Operating Assessment Criteria	16
5.3	Low Frequency Noise Modifying Adjustment Factors	18
5.4	Project Sleep Disturbance Assessment Criteria	18
5.5	Modification Cumulative Noise Impact Assessment Methodology	20
6	NOISE MODELLING METHODOLOGY	21
6.1	Noise Mitigation and Management Measures	21
6.2	WCM Mobile Equipment and Fixed Plant Sound Power Levels	22
6.3	WCM Noise Model Validation	24
6.4	Noise Modelling Scenarios	24
6.5	Preliminary Noise Modelling	27

Table of Contents

7	OPERATING NOISE IMPACT ASSESSMENT	28
7.1	Daytime Operating Intrusive Noise Levels	29
7.2	Evening Operating Intrusive Noise Levels	30
7.3	Night-time Operating Intrusive Noise and Sleep Disturbance	30
7.4	Impact Assessment Summary	32
7.5	Privately Owned Vacant Land Impact Assessment	33
7.6	Elevated In-Pit Waste Emplacement	33
7.7	Comparison with Previous Noise Impact Assessment (Modification 3)	34
7.8	Review of Existing WCM Noise Management Plan	34
8	CUMULATIVE NOISE AMENITY ASSESSMENT	34
8.1	LAeq(Period) Noise Amenity Criteria	34
8.2	Modification Operating Noise Amenity Levels	35
8.2.1	Privately Owned Receivers Impact Assessment	35
8.2.2	Consideration of other Land Uses Impact Assessment	36
8.3	Existing, Approved and Proposed Industrial Developments	36
8.4	Cumulative Evening Noise Amenity Assessment	36
8.5	Cumulative Night-time Noise Amenity Assessment	37
8.6	Privately Owned Receivers Impact Assessment	38
8.7	Consideration of other Land Uses Impact Assessment	38
9	ROAD TRAFFIC NOISE IMPACT ASSESSMENT	39
9.1	Traffic Noise Criteria	39
9.2	Ulan Road 2012 Traffic Noise	40
9.3	Ulan Road Traffic Noise Impact Assessment	41
10	BLASTING IMPACT ASSESSMENT	43
10.1	Blasting Assessment Criteria	43
10.1.1	Australian Standard Criteria	43
10.1.2	Human Comfort Noise and Vibration Criteria	43
10.1.3	Livestock Comfort Noise and Vibration Criteria	43
10.1.4	Building Damage Airblast Criteria	44
10.1.5	Building Damage Vibration Criteria	44
10.1.6	Railway Line and Roadway Culvert Vibration Damage Criteria	45
10.1.7	Archaeological/Geological Vibration Damage Criteria	46
10.2	Proposed Open Pit Blasting Practices	46
10.3	Predicted Ground Vibration and Airblast Levels	47
10.4	Blasting Impact Assessment	49
10.4.1	Privately Owned Receivers Impact Assessment	49
10.4.2	Livestock, Aboriginal Heritage Sites and Infrastructure Impact Assessment	49
10.5	Review of Existing Blast Management Plan	49
11	SUMMARY OF FINDINGS	50
11.1	Construction Impact Assessment	50
11.2	Noise Assessment Criteria	50
11.3	Modification and Cumulative Mine Operating Noise Impact Assessment	52
11.4	Road Transport Impact Assessment	53
11.5	Blasting Impact Assessment	54
11.6	Review of Existing Management Measures	54

Table of Contents

TABLES

Table 1	Impact Assessment Procedure Guidelines	1
Table 2	Other Relevant Approved or Proposed Projects	2
Table 3	Recent Noise Monitoring Programme Summary	3
Table 4	Blast Emissions Monitoring Programme Summary	8
Table 5	Blast Emission Monitoring Results Summary 2011 ¹	8
Table 6	Blast Emission Monitoring Results Summary 2012	9
Table 7	Approved WCM and Proposed Modification Hours of Operation	11
Table 8	INP Assessable Meteorological Noise Modelling Parameters	13
Table 9	Unattended Noise Monitoring Results 2004	14
Table 10	Operator-Attended Ambient Noise Survey Results 2012	15
Table 11	Unattended Noise Ambient Monitoring Results 2012	15
Table 12	Background Noise and Amenity Levels for Assessment Purposes	15
Table 13	Unattended Road Traffic Noise Monitoring Results - December 2012	16
Table 14	INP Acceptable and Maximum Noise Amenity Levels	17
Table 15	Project-specific Noise Levels and Assessment Criteria	17
Table 16	Night-time LA1(1minute) Sleep Disturbance Criteria	19
Table 17	Measured Night-time LAeq(15minute) and LA1(1minute) Noise Levels	19
Table 18	Modification and Cumulative Noise Impact Assessment	20
Table 19	Fixed and Mobile Equipment for Modification 3 and Existing WCM 24 hours per day	23
Table 20	Year 2015 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution	25
Table 21	Year 2018 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution	26
Table 22	Year 2021 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution	27
Table 23	Years 2015, 2018 and 2021 Daytime Intrusive LAeq(15minute) Noise	29
Table 24	Years 2015, 2018 and 2021 Evening Intrusive LAeq(15minute) Noise	30
Table 25	Night-time Intrusive LAeq(15minute) Noise Years 2015, 2018 and 2021	31
Table 26	Privately Owned Receivers with Intrusive PSNL Exceedances	32
Table 27	Privately Owned Receivers with Night-time LA1(1minute) SDNL Exceedances	32
Table 28	Privately Owned Vacant Land with Intrusive LAeq(15minute) PSNL Exceedances	33
Table 29	Noise Amenity LAeq(period) Years 2015, 2018 and 2021	35
Table 30	Existing, Approved or Proposed Developments in the Vicinity of the WCM	36
Table 31	Evening Cumulative (LAeq(4hour)) Noise Amenity Levels	37
Table 32	Cumulative Night-time (LAeq(9hour)) Noise Amenity Levels	38
Table 33	Road Traffic Noise Assessment Criteria for Residential Land Uses	39
Table 34	Ulan Road Adjacent Residential Dwellings	40
Table 35	Unattended Road Traffic Noise Monitoring Results - December 2012	40
Table 36	Nominal Off-set Distance to Meet the Total Traffic Noise Criteria - December 2012	40
Table 37	Ulan Road 2012 and 2014 Traffic Flows (Between Cope Road and Wollar Road)	41
Table 38	Nominal Off-set Distance to Meet the Total Traffic Noise Criteria	42
Table 39	Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage	44
Table 40	Guideline Values for Vibration - Effects of Short-Term Vibration on Buried Pipework	46
Table 41	Indicative WCM Blast Design Parameters	47
Table 42	Predicted Resultant Ground Vibration and Peak Airblast Levels	48
Table 43	Predicted Safe Working Distances	49
Table 44	Project Specific Noise Levels and Assessment Criteria	50
Table 45	Night-time LA1(1minute) Sleep Disturbance Noise Levels	51
Table 46	Modification and Cumulative Mine Noise Impact Assessment	51
Table 47	Summary of Criteria Exceedances at Privately Owned Receivers and Vacant Land	52
Table 48	Road Traffic Noise Assessment Criteria for Residential Land Uses	53
Table 49	Predicted Safe Working Distances	54

Table of Contents

FIGURES

Figure 1	Sample 24 Hour Real-time Noise Monitoring Chart	4
Figure 2	Real-time Noise Management Example and Recorded Mine Noise Levels	6
Figure 3	Machinery Lost Hours due to Noise Trigger Investigations 2012	7
Figure 4	Noise and Blasting Complaints Register Summary 2006 to 2012	10
Figure 5	Graph of Transient Vibration Guide Values for Cosmetic Damage	45

APPENDICES

Appendix A1	Extract NSW Department of Planning and Infrastructure Project Approval
Appendix A2	Extract EPA Environment Protection Licence No 12425
Appendix B1	Environmental Noise and Blast Monitoring Sites
Appendix B2	Environmental Noise and Blast Monitoring Sites - Wollar
Appendix C1	Dwelling Location Plan
Appendix C2a	Land Ownership Plan
Appendix C2b	Wollar Inset and Relevant Land Ownereship List
Appendix C3	Receiver Locations
Appendix C4	Land Zoning Plan
Appendix D1	Indicative Mining Sequence Plan
Appendix D2	CHPP and Materials Handling Area
Appendix E	Site Meteorological Measurement Methodology
Appendix F1	Site Noise Measurement Methodology
Appendix F2	Ambient Noise Results December 2012 - Receiver 160B (Wollar)
Appendix F3	Ambient Noise Results December 2012 - Receiver 102 (Mogo)
Appendix F4	Ambient Noise Results December 2012 - Receiver 1_155 (Tochilar)
Appendix F5	Ambient Noise Results December 2012 - Coggan
Appendix F6	Ambient Noise Results December 2012 - Ulan Road
Appendix G1	NSW EPA INP Application Notes - Sleep Disturbance
Appendix G2	NSW EPA Road Noise Policy Application Notes
Appendix H1	2015 Intrusive Noise Contours – Night – Adverse Weather Conditions
Appendix H2	2021 Intrusive Noise Contours – Night – Adverse Weather Conditions
Appendix H3	2015 and 2021 Intrusive Noise Contours – Night – Adverse Weather Conditions - Wollar
Appendix I1	Resource-Company Owned Recievers - Years 2015, 2018 and 2021 Daytime Intrusive Noise
Appendix I2	Resource-Company Owned Recievers - Years 2015, 2018 and 2021 Evening Intrusive Noise
Appendix I3	Resource-Company Owned Recievers - Years 2015, 2018 and 2021 Night-time Intrusive Noise
Appendix I4	Resource-Company Owned Receivers - Years 2015, 2018 and 2021 Intrusive Noise Impact
Appendix J1	Resource-Company Owned Receivers - Years 2015, 2018 and 2021 Noise Amenity Levels
Appendix J2	Resource-Company Owned Receivers - Years 2015, 2018 and 2021 Noise Amenity Impact
Appendix J3	Resource-Company Owned Receivers - Evening Cumulative Noise Amenity Levels
Appendix J4	Resource-Company Owned Receivers - Cumulative Night-time Noise Amenity Levels
Appendix J5	Resource-Company Owned Receivers - Cumulative Night-time Noise Amenity Impact
Appendix K	Resource-Company Owned Receivers - Predicted Ground Vibration and Airblast Impact

1 INTRODUCTION

1.1 Background

Wilpinjong Coal Pty Ltd (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody Energy), owns and operates the Wilpinjong Coal Mine (WCM). In 2006, WCPL was granted approval to develop the WCM (Project Approval 05_0021), with production involving conventional open cut operations commencing in late 2006. The WCM is situated approximately 40 kilometres (km) north-east of Mudgee, near the village of Wollar, within the Mid-Western Regional Local Government Area, in central New South Wales (NSW).

WCPL is seeking approval for a modification to Project Approval 05_0021 (the Modification) to facilitate minor incremental extensions to the existing open cuts to access additional run-of-mine (ROM) coal and associated alteration of the open cut mining sequence and increased waste rock production rates. However, there will be no increase to the approved maximum ROM coal mining rate of 15 million tonnes per annum (Mtpa) and saleable product rate of 12.5 Mtpa, the approved 21 year mine life or the existing owner-operator mobile fleet equipment.

SLR Consulting Australia Pty Ltd (SLR) has been engaged by WCPL to evaluate and assess the potential noise and blasting impacts associated with the Modification.

1.2 Assessment Requirements

The noise and blasting impacts for the Modification have been guided by the assessment guidelines presented in **Table 1**.

Table 1 Impact Assessment Procedure Guidelines

Assessment Guideline	Criteria	Impact
Construction Noise Guided by the requirements the <i>Interim Construction Noise Guideline</i> (ICNG) (DECC, 2009).	Section 5.1	N/A
Operating Noise Guided by the requirements of the NSW <i>Industrial Noise Policy</i> (INP) (EPA, 2000) and associated Application Notes dated 15 February 2013 in relation to setting acceptable project specific noise levels (PSNLs) and assessing any impacts.	Section 5	Section 7
Noise Amenity Cumulative Guided by the requirements of the INP in relation to existing and successive industrial development by setting acceptable (and maximum) cumulative equivalent continuous noise level (LAeq(period)) amenity levels for all industrial (ie non-transport related) noise in a receiver area.	Section 5	Section 8
Road Traffic Noise Guided by the requirements of the NSW <i>Road Noise Policy</i> (RNP) (DECCW, 2011) and associated Application Notes dated 15 February 2013 in relation to setting acceptable LAeq(period) noise levels for sub-arterial roads and assessing any impacts.	Section 9	Section 9
Blast Emission Guided by the requirements of the Australian and New Zealand Environment Council's <i>Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration</i> (ANZEC, 1990) in relation to setting acceptable blast emission levels which cause human discomfort.	Section 10	Section 10

Note: The Environment Protection Authority (EPA) existed as a legal entity and operated within the NSW Office of Environment and Heritage (OEH) which came into existence in 2011. The EPA became a separate statutory authority on 29 February 2012. The OEH was previously part of the NSW Department of Environment, Climate Change and Water (DECCW). The DECCW was also recently known as the NSW Department of Environment and Climate Change (DECC), and prior to that the NSW Department of Environment and Conservation (DEC).

1.3 Other Relevant Approved or Proposed Projects

Other relevant approved or proposed projects in the vicinity of the WCM are summarised in **Table 2**.

Table 2 Other Relevant Approved or Proposed Projects

Proponent	Project	Status
Moolarben Coal Mines Pty Ltd (MCMPL)	Moolarben Coal Project Stage 1	Project Approval (MP 05_0117) dated 6 September 2007 (as modified).
	Moolarben Coal Project Stage 2	A Major Project Application for the Moolarben Coal Project Stage 2 was lodged with the NSW Minister for Planning on 1 May 2008. Subsequently, MCMPL prepared and exhibited the Stage 2 Preferred Project Report (PPR) dated January 2012 and more recently the Stage 2 PPR Response to Submissions dated June 2012. Yet to be determined.
Ulan Coal Mines Ltd (UCML)	Ulan Coal Mine Stage 4	Development Consent (DA-113-12-98) dated 20 December 1999 (as modified).
	Ulan Continued Operations Project	Project Approval (MP 08_0184) dated 15 November 2010 (as modified).
Mt Penny Coal Pty Ltd	Mt Penny Coal Project	Director-General's Requirements issued.

The Ulan Continued Operations Project and the Moolarben Coal Project Stage 2 are considered cumulatively for operational noise (refer to **Section 8**) and for road traffic noise (refer to **Section 9**) in this assessment.

In addition, it is noted that the *Moolarben Coal Project Stage 1 Optimisation Modification Environmental Assessment* (EMGA Mitchell McLennan, 2013) was placed on public exhibition in June 2013. Review of predicted noise impacts, as described in the Environmental Assessment (EA) indicates that the Modified Stage 1 operations would not have the potential to increase noise in the vicinity of Wilpinjong above the levels identified in the PPR for the Stage 2 operations.

As no information is publicly available in regard to predicted noise emissions from Mt Penny Coal Project which is located some 20 km east of the WCM, cumulative assessment has not been conducted. It is expected that any EA for Mt Penny would include a cumulative noise assessment and would consider the WCM if relevant to potential cumulative noise assessment.

2 EXISTING WILPINJONG COAL MINE

2.1 Overview

The WCM has an approved ROM coal mining rate of 15 Mtpa and saleable product rate of 12.5 Mtpa and operates 24 hours a day.

Mining of ROM coal involves conventional drill and blast, truck and shovel open cut extractive methods with on-site coal handling, washing and stockpiling. Mining operations are supported by existing on-site facilities including a Coal Handling and Preparation Plant (CHPP), infrastructure area, water management storages and rail loading facilities.

All product coal from the WCM is transported by rail to domestic electricity generation customers and to the Port of Newcastle for export.

2.2 Existing Approvals

With respect to noise and blasting emissions, WCPL has consent to operate in accordance with the following approval requirements and licence conditions:

- NSW Department of Planning and Infrastructure Project Approval (05_0021) dated 1 February 2006 (as modified) with the relevant sections attached as **Appendix A1**.
- EPA Environment Protection Licence (EPL) No 12425 anniversary date 8 February with the relevant sections attached as **Appendix A2**.

It is noted that the Project Approval daytime noise limit in Wollar Village is 36 A-weighted decibels (dBA), whereas the EPL nominates 35 dBA. The Project Approval evening and night-time noise limits in Wollar Village are both 35 dBA, the same as the EPL.

In addition, NSW Work Cover Dangerous Goods Licences and/or Occupational Health and Safety legislation describe noise specifications for individual equipment, for health and safety purposes.

2.3 Noise Management Plan

The approved WCM Noise Management Plan (NMP) dated September 2011 describes the current noise management regime for the WCM, which consists of five off-site operator-attended monitoring sites, three off-site continuous real-time monitors together with the new on-site Automatic Weather Station (AWS) and 60 metres (m) high Permanent Temperature Tower (PTT) as shown on the Environmental Monitoring Site Plan **Appendix B**. In accordance with the NMP Section 5, operator-attended noise monitoring is used for demonstrating compliance with noise criteria, whilst continuous real-time monitoring is used as a noise management tool to assist WCPL to take pre-emptive noise management actions to avoid potential non-compliances.

A summary of recent noise monitoring sites and associated monitoring frequency are presented in **Table 3** together with a cross reference to the land ownership details introduced in **Section 3.7** and **Appendix C**. The three real-time monitors are periodically relocated (ie hence more than three sites are listed in **Table 3**).

Table 3 Recent Noise Monitoring Programme Summary

Locality	Receiver ID ¹	Site	Parameter	Frequency
Cumbo	1_WF	N4 "Hillview", Cumbo Road	Operator-attended monitoring	Every 2 months
Wollar	900	N6 St Laurence O'Toole Catholic Church		
Araluen	1_45	N7 Smith, Ulan-Wollar Road		
Slate Gully	1_58	N9 Maher, Slate Gully Road		
Moolarben	32_32C	N12 Ulan Coal Mine, Ulan-Wollar Road	Real-time monitoring	Continuous
Araluen	1_143	SentineX 30 ("Araluen Road")		
Slate Gully	1_58	SentineX 31 ("Maher" 58)		
	1_53	SenineX 31 ("Conrad" 31)		
Wollar	1_WR	SentineX 31 ("Wandoona")		
	942	SentineX 33 ("Wollar Central")		

Note 1: Refer **Section 3.7** and **Appendix C**.

ID = Identification.

Due to recent property acquisitions, Peabody Energy now owns previous privately held landholdings where operator-attended monitoring is conducted (ie N4, N7 and N9), while N12 is owned by Ulan Coal Mines (refer **Appendix B**). WCPL also owns the land on which the real-time monitoring is undertaken.

2.4 Noise Management Strategy

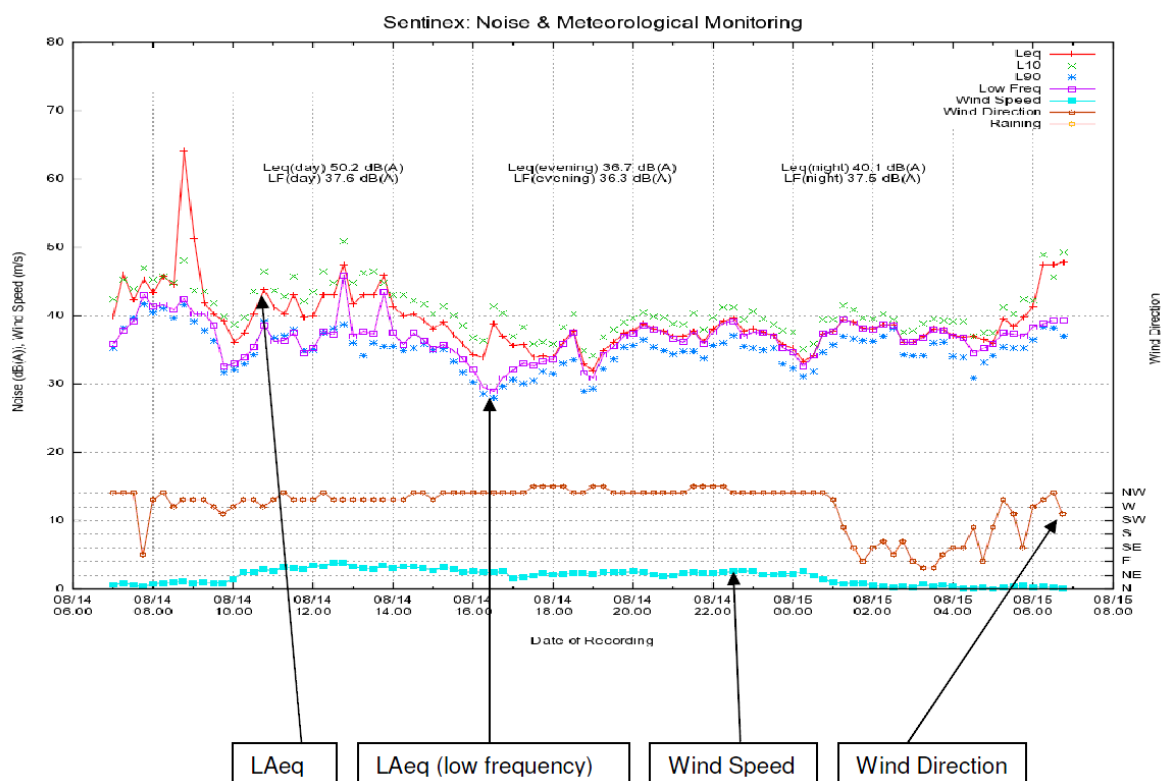
WCPL implements a noise management strategy at the WCM that includes general noise management measures, continuous real-time noise monitoring, implementation of noise investigation triggers and modification of operations as required.

2.4.1 General Noise Management Measures

WCPL implements general noise management measures as part of typical operations at the WCM, including:

- Developing an awareness and understanding of noise issues through site inductions for all staff and contractors at the WCM.
- Avoiding the simultaneous use of significant noise generating equipment wherever possible.
- Preferentially scheduling the noisiest activities to the least sensitive times of the day.
- Maintaining all machinery and plant used on site, in order to minimise noise generation.
- Using the results of continuous real-time noise monitoring to assist in the implementation of pre-emptive management actions to avoid potential non-compliances. A graphical summary of the previous 24 hours noise levels (**Figure 1**) is sent to key WCM staff at 0700 hours each morning for review and follow-up investigation (as required).
- Monitoring weather conditions via the on-site AWS and PTT and where adverse conditions are experienced or predicted operational changes are made to avoid or reduce noise impacts.

Figure 1 Sample 24 Hour Real-time Noise Monitoring Chart



Source: WCPL

2.4.2 Continuous Real-time Noise Monitoring

Continuous real-time noise monitoring is used by WCPL as an ongoing noise management tool to maintain noise levels from the WCM below relevant noise criteria.

Noise Investigation Triggers

Noise investigation triggers are set at a level 2 dBA below the approved noise limit, and are used between the hours of 2000 hours and 1000 hours (to minimise false triggers). As described above the real-time monitoring is not used for compliance monitoring. The focus of real-time monitoring is therefore on the periods when adverse weather conditions that increase noise propagation (eg temperature inversions) are likely to occur, and sources of extraneous noise are less prevalent.

The noise investigation trigger sample period is conservatively set at 5 minutes (ie one third of the compliance noise measurement period), which allows the operations to be modified in time to achieve compliance with the 15 minute noise limits, as required.

In the event of noise, as recorded by the real-time noise monitors, exceeding a noise investigation trigger, an SMS message is sent to the Control Room Operator, who will then implement the response protocol described in the NMP, as summarised below:

- Step 1: Download audio file from relevant noise monitor to determine noise source.
- Step 2: If found to be extraneous noise then no further action is taken.
- Step 3: If found to be mine noise then monitor noise levels.
- Step 4: If mine noise equals noise limits systematically stand-down machinery.
- Step 5: Continue to stand-down machinery until mine noise reduces to at least 2 dBA below noise limits.
- Step 6: Continue to monitor situation and repeat Steps 1 to 5 if re-triggered.
- Step 7: Record details of the investigation, type of response and real-time noise monitor level response.
- Step 8: Review of data and response by Environmental Manager (or delegate).

The relevant trigger and response measures in the NMP are periodically updated to reflect any relevant improvements to site operating procedures.

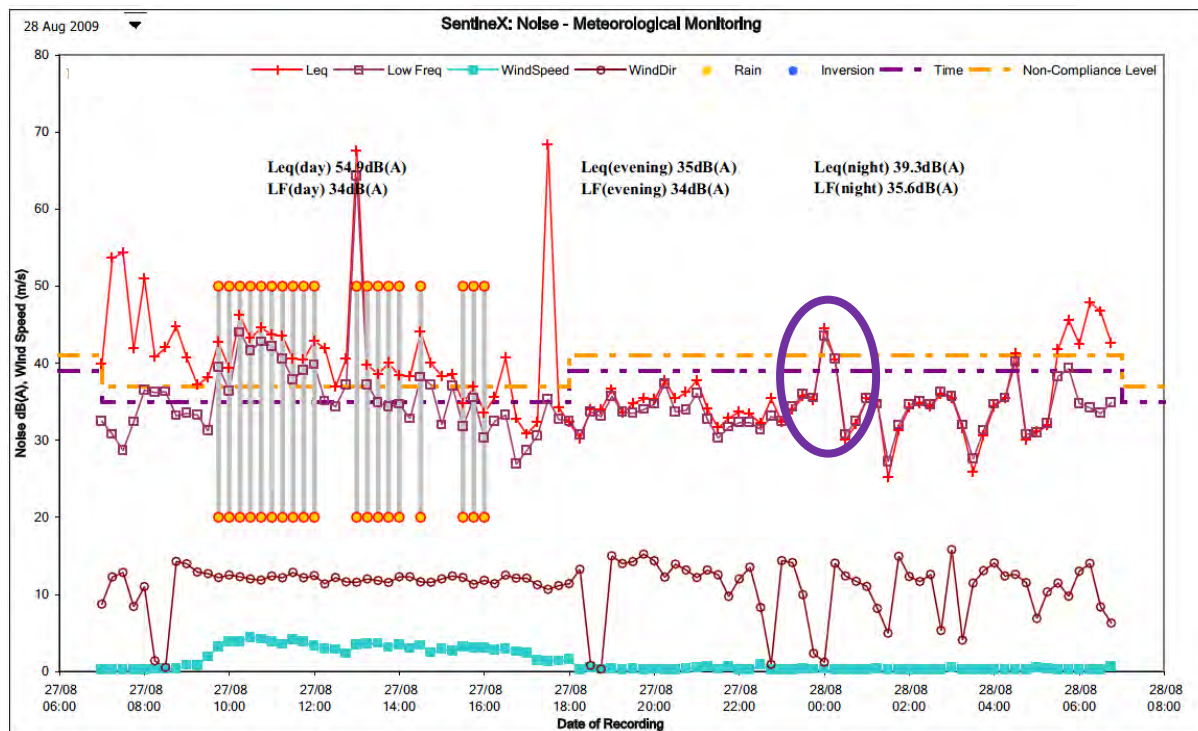
Response Protocol Example

Figure 2 presents a sample period (27-28 August 2009) which demonstrates the effectiveness of the WCM noise management strategy in maintaining mine noise below the approved noise limits. This example is from real-time monitoring in Slate Gully. The approximate sequence of events can be summarised as follows:

- Around midnight the noise investigation trigger was triggered and a consequent SMS message sent to the Open Cut Examiner (OCE) notifying of the exceedance.
- Having listened the real-time audio recording, the OCE confirmed that the trigger was due to WCM activities.
- The OCE stood-down mobile equipment operating in Pit 2, including one excavator, three haul trucks and one dozer, plus one dozer operating on a waste emplacement area.
- The next noise level update indicates that the ambient noise level has reduced to just below the noise limit (of 39 dBA) for the nearby private receiver, but is still above the trigger level (of 37 dBA). Subjectively, the real-time audio stream indicates that the ambient noise level is controlled by WCM activities.
- The OCE proceeds to stand-down all mobile equipment.

- The next noise level update indicates that the ambient noise level has reduced to 30 dBA and only the WCM washery mine hum is discernible on the real-time audio.
- The OCE gradually brings equipment back on-line starting with equipment operating in Pit 5 and ROM area, followed by Pit 2 and dozer fleets.
- Both the real-time audio and ambient noise levels are monitored by the OCE for the remainder of the night-time period, with equipment turned-off and on (primarily equipment in Pit 2 and dozers on waste in Pit 5), as required, throughout the period based on both subjective and objective observations by the OCE.

Figure 2 Real-time Noise Management Example and Recorded Mine Noise Levels



Source: WCPL

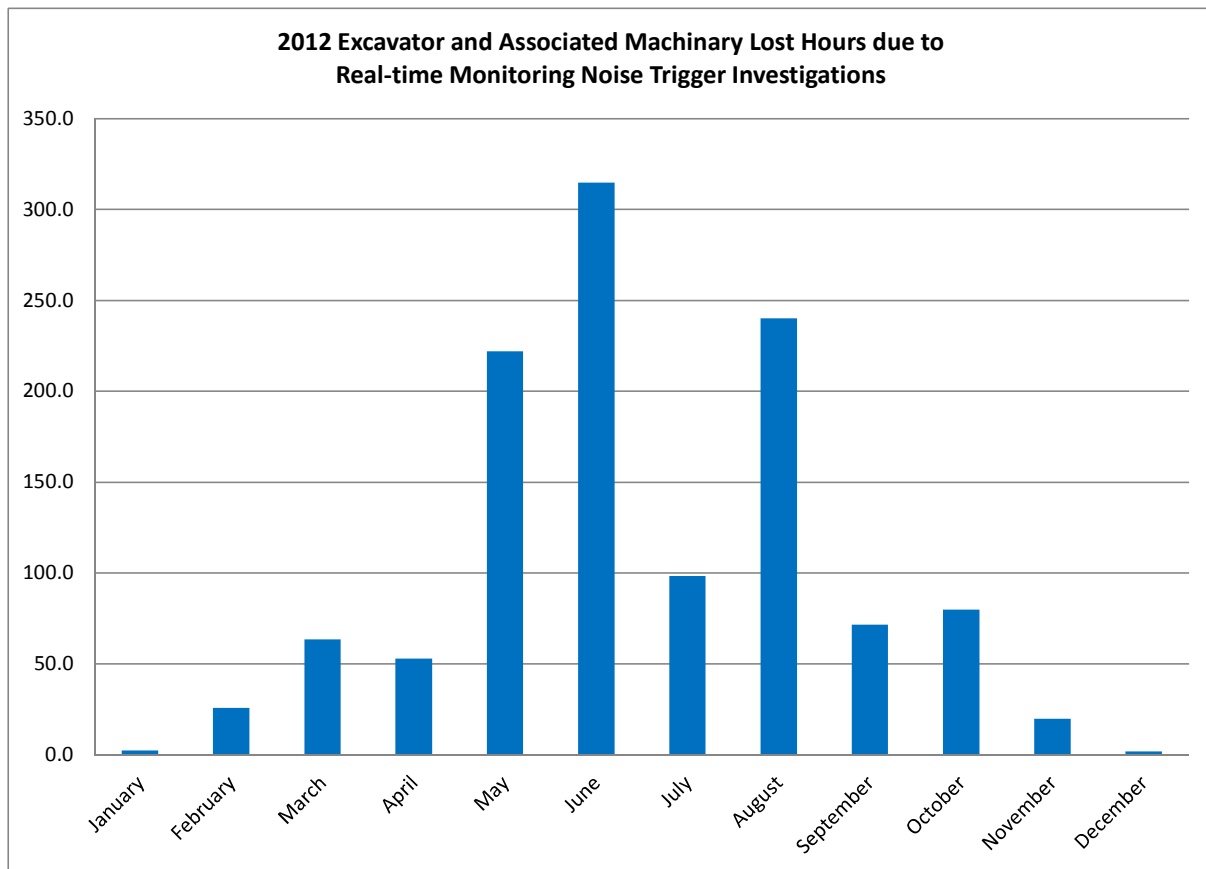
The above example demonstrates how the WCM noise levels are actively managed to maintain mine noise below approved noise limits including when weather conditions are outside those nominated in the WCM approvals.

Equipment Stand-downs during Implementation of Response Protocols

As described above, in response to noise from the WCM exceeding noise investigation triggers, equipment is stood-down as required.

During the 2012 reporting period a total of 1,193 excavator and associated machinery hours were lost as a direct response of noise investigation triggers being exceeded. **Figure 3** presents the monthly machinery hours lost due to noise investigation triggers and associated stand-downs (between 2000 hours and 1000 hours).

Figure 3 Machinery Lost Hours due to Noise Trigger Investigations 2012



Source: WCPL

Figure 3 shows the concentration of lost excavator and associated machinery hours during the 2012 winter season (ie 653 hours) coinciding with the increased strength and frequency of temperature inversions. It is noted that at the end of 2012, there were no longer any private landholdings in Slate Gully. The real-time monitor in Slate Gully was therefore relocated in November 2012. The Slate Gully real-time noise monitoring was previously a large contributor to the above excavator lost hour totals.

2.5 Compliance Monitoring Results

2.5.1 Operator-attended Noise Compliance Results 2011 and 2012

Due to the implementation of the WCM noise management strategy, as described **Section 2.4**, WCPL has maintained a strong record of recent compliance with the noise criteria specified in Project Approval 05_0021, with no exceedances at privately owned receivers recorded during the 2011 and 2012 reporting periods.

The *2011 Wilpinjong Coal Mine - Annual Environmental Management Report (AEMR)* (WCPL, 2012) states, in relation to bi-monthly operator-attended noise monitoring and compliance during the 12 month reporting period to December 2011:

Attended noise monitoring was undertaken on a bi-monthly basis at five locations, including the Langshaw (6) dwelling (N4), St Laurence O'Toole Catholic Church (Wollar – Residential) (N6), Ulan-Wollar Road (East) (N7), Maher dwelling (Slate Gully Road – Wollar) (N9) and Ulan-Wollar Road (west) (Ulan Coal Mines – N12).

Attended monitoring at these locations indicated that the mine “complied with noise consent limits at all monitoring locations” during the reporting period.

Similarly, the 2012 Annual Review and Environmental Management Report dated April 2013 states, in relation to compliance during the 12 month reporting period to December 2012:

Attended monitoring at these locations [ie N4, N6, N7, N9 and N12 as per Tables 40 and 41 of the AEMR] indicated that the mine complied with noise consent limits at all private monitoring locations during the 2012 review period, and accordingly did not exceed the noise land acquisition criteria.

2.6 Blast Management Plan

The approved Blast Management Plan (BMP) dated September 2011 describes the current blast management regime for the WCM, which consists of blast emission monitoring at a range of locations as presented in **Table 4** and shown on the Environmental Monitoring Site Plan **Appendix B**. In accordance with the BMP Section 5, blast emission monitoring is used for demonstrating compliance with relevant ground vibration and airblast limits.

Table 4 Blast Emissions Monitoring Programme Summary

Monitoring Parameter	Monitoring Sites ¹	Frequency
Ground vibration	• Aboriginal Rock Art sites 72 (V1), 152 (V2) and 153 (V3)	• Every blast within 1 km of sites
	• Power poles	• Every blast within 350 m of sites
	• Railway culverts	
	• Railway bridge	
Ground vibration and airblast	• Privately owned residences	• All blasts within 3 km of residences

Source: WCPL

Note 1: Refer to Environmental Monitoring Site Plan **Appendix B**.

In addition, blast emission monitoring is conducted at the Wollar Primary School in accordance with Condition M8 of EPL 12425.

2.6.1 Blast Emission Compliance Results 2011

Based on the 2011 AEMR dated February 2012, the information presented in **Table 5** relates to blast emission monitoring and management during the 12 month reporting period to December 2011.

Table 5 Blast Emission Monitoring Results Summary 2011¹

	Rock Art Site 72 (V1) ²		Wilpinjong Rail Loop (R5) ²		Jim Smith House/Boundary		Jim Smith 2 Cattle Yard	
	Vibration ³ (mm/s)	Airblast ⁴ (dBLpk)	Vibration ³ (mm/s)	Airblast ⁴ (dBLpk)	Vibration ³ (mm/s)	Airblast ⁴ (dBLpk)	Vibration ³ (mm/s)	Airblast ⁴ (dBLpk)
Maximum	3.8	n/a	7.8	n/a	0.7	125	3.3	124
Minimum	0.4	n/a	0.1	n/a	0.1	-	0.1	-
50% ⁵ Exceedance	1.4	n/a	0.2	n/a	0.1	99	0.3	101
5% Exceedance	3.7	n/a	3.3	n/a	0.4	113	1.3	116

Source: WCPL

Note 1: Ground vibration below threshold of 0.1 millimetres per second (mm/s) at locations R1 (Pit 1 Main Rail Culvert), R2 (Pit 1 Main Rail Embankment), R3 (Concrete) and R4 (Pit 2 Main Rail) and therefore not detected.

Note 2: Airblast limit not applicable (n/a).

Note 3: Vibration (mm/s) - Peak Particle Velocity (PPV).

Note 4: dBLpk (decibels linear peak) re 20 microPascals (µPa).

Note 5: % = percent.

One exceedance of the maximum airblast limit of 120 dBL was recorded in the 2011 reporting period (note that the airblast limit of 120 dBL does not apply to the Jim Smith Cattle Yard). This was a maximum air blast of 125 dBL recorded at the Jim Smith house boundary (**Table 5**) recorded on 19 August 2011. This exceedance was subsequently reported to the EPA. It is noted that this property is now owned by WCPL.

There were no exceedances of the relevant ground vibration limits at the respective monitoring sites during 2011.

2.6.2 Blast Emission Results 2012

The information presented in **Table 6** relates to more recent blast emissions monitoring during the 12 month period to December 2012.

Table 6 Blast Emission Monitoring Results Summary 2012

	V1 - Rock Art (Site 72) ¹		Wilpinjong Rail Loop (R5) ¹		Sandy Hollow Railway ¹		Sandy Hollow Railway Culvert ¹	
	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)
Maximum	5.2	n/a	24.3	n/a	65.2	n/a	33.9	n/a
Minimum	0.4	n/a	0.1	n/a	65.2	n/a	16.9	n/a
50% Exceedance	1.5	n/a	0.8	n/a	65.2	n/a	25.4	n/a
5% Exceedance	4.9	n/a	4.2	n/a	65.2	n/a	33.0	n/a
	Pit 4 Culvert ¹		Jim Smith House/Boundary		Jim Smith 2 Cattle Yard		Wollar Public School	
	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)	Vibration ² (mm/s)	Airblast ³ (dBLpk)
Maximum	-	n/a	2.0	119	17.2	119	0.1	98
Minimum	-	n/a	0.1	79	0.1	77	0.1	93
50% Exceedance	-	n/a	0.1	96	0.3	104	0.1	95
5% Exceedance	-	n/a	0.7	111	2.2	114	0.1	98

Source: WCPL

Note 1: Airblast limit not applicable (n/a).

Note 2: Vibration (mm/s) - PPV.

Note 3: dBLpk re 20 µPa.

As described in the 2012 AEMR, there were no exceedances of the relevant ground vibration and airblast limits at the respective blast emission monitoring sites during the 2012 reporting period.

2.7 Noise Complaints Summary

WCPL maintains a complaints register in accordance with Project Approval 05_0021. A summary of the complaint records from 2006 to 2012 are presented in **Figure 4** including operating noise and blast emissions.

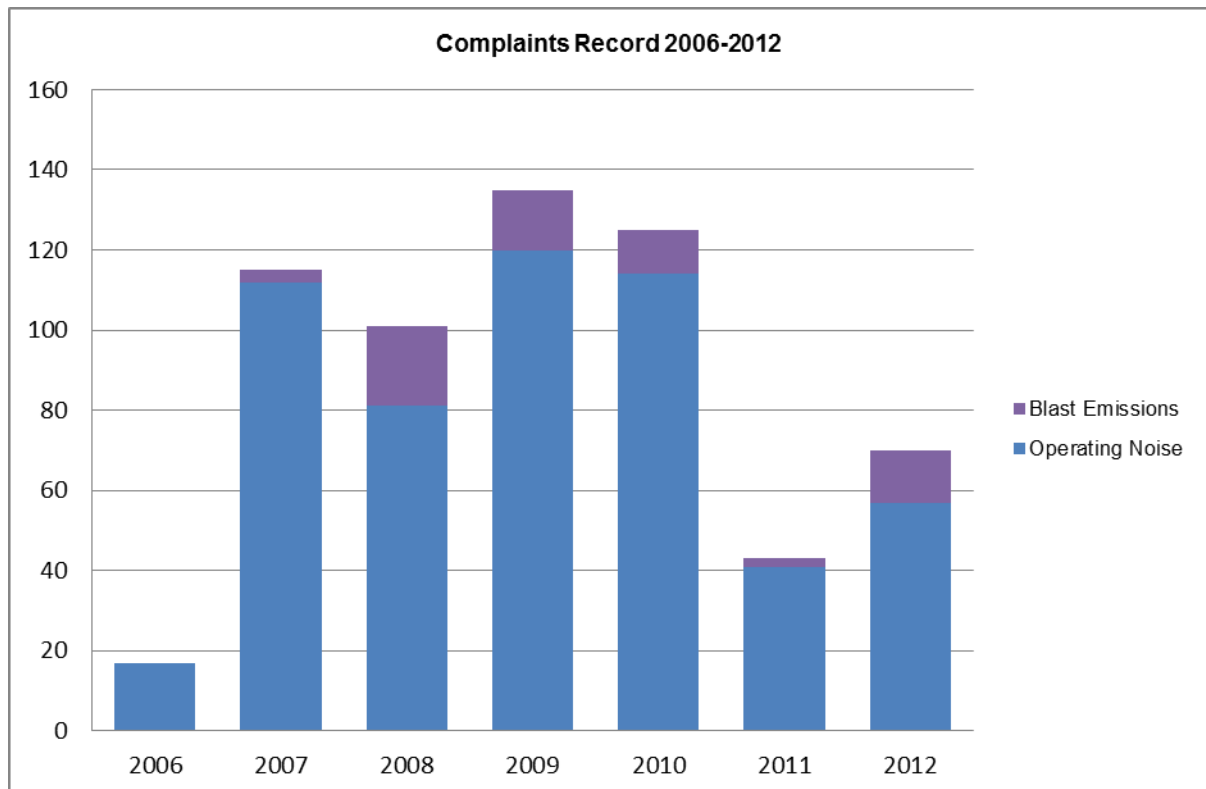
Figure 4 shows the number of noise related complaints has diminished significantly in 2011/2012 in comparison with the preceding years. The reduction in noise-related complaints coincides with the continued implementation of WCPL's proactive noise management strategy.

All complaints received by WCPL relating to noise or blasting were responded to in accordance with the Complaint Response Protocol detailed in both the NMP and BMP.

Following each noise related complaint the source and noise levels were determined or verified. In some instances, mining operations were altered in response to a complaint lodged with WCPL during adverse weather conditions. However, there were no reportable environmental incidents relating to noise in the 2011 or 2012 reporting periods.

Similarly, all blasting complaints were responded to, and investigations undertaken. As described in **Section 2.6**, there was one relevant reportable environmental incident relating to blasting in the 2011 period. There were no reportable incidents relating to blasting in the 2012 reporting period.

Figure 4 Noise and Blasting Complaints Register Summary 2006 to 2012



Source: WCPL

3 MODIFICATION

3.1 Approved and Proposed Hours of Operation

There would be no change in the approved operating hours of the WCM due to the Modification (**Table 7**).

Table 7 Approved WCM and Proposed Modification Hours of Operation

Operation	Description	Currently Approved WCM ¹	Modification
On-Site Operation	Construction works	Generally daytime (0700 hours to 1800 hours, 7 days per week)	Unchanged
	Mine maintenance, operation, coal handling	24 hours, 7 days per week	Unchanged
	Blasting Operations	0900 hours to 1700 hours A maximum of 2 blasts per day and 5 blasts per week on average over any 12 month period	Unchanged
Off-Site Operation	Train Traffic	24 hours, 7 days per week	Unchanged
	Road Traffic	WCM main access road via Ulan-Wollar Road 24 hours, 7 days per week	Unchanged

Note 1: As per Project Approval 05-0021 dated 1 February 2006 (as modified) refer **Appendix A1**.

3.2 General Operation

The Modification would use the existing infrastructure and service facilities at the WCM, including the CHPP. Relevant to this assessment, the main activities associated with the Modification would include:

- Development of incremental extensions to the existing open cut pits (as show on the Indicative Mining Sequence Plan **Appendix D1**) that would extend the open cuts by approximately 70 hectares and would result in the recovery of approximately 3 million tonnes of additional ROM coal.
- Alteration of the sequence of open cut mining.
- Higher rates of annual waste rock production (from 28 million bank cubic metres [Mbcm] to approximately 33.3 Mbcm) in order to maintain approved ROM coal production.
- Minor CHPP upgrades to improve fine coal reject management (installation of a belt press filter) and an increase in the rate of ROM coal beneficiation in the CHPP to approximately 9 Mtpa.
- Upgrade of the existing Reverse Osmosis Plant to a Water Treatment Facility with the addition of pre-filtration and flocculation/dosing facilities to improve plant efficiency.
- Amendment of the waste emplacement strategy to include:
 - development of an elevated waste rock emplacement landform (up to approximately 450 m Australian Height Datum) within the footprint of Pit 2;
 - disposal of some inert building and demolition waste that is produced from off-site building demolition in the approved mine waste rock emplacements; and
 - co-disposal of fine coal reject material produced by the belt press filter with coarse rejects.
- Operation of a light vehicle servicing workshop at an existing farm shed that is located in the north of the Project area.

There would be no change to the currently approved maximum ROM coal mining rate (15 Mtpa) and saleable product rate (12.5 Mtpa) due to the Modification. In addition, there would be no change to the existing approved 21 year mine life.

It is noted that the Modification open cut extensions would not bring the mining operations significantly closer to any private receivers).

The indicative mining sequence (refer **Appendix D1**) may be varied over the life of the mine to take account of localised geological features, coal market volume and quality requirements, mining economics and detailed engineering design. Such variations would be documented in the relevant Mining Operations Plan that is approved by NSW Trade and Investment (Division of Resources and Energy).

3.3 Construction

Construction works would be limited for the Modification as shown on the figure in **Appendix D2**, and would include only the construction of the fine reject circuit (ie belt press filter) and associated dewatered tailings conveyor and upgrade of the existing Reverse Osmosis Plant to a Water Treatment Facility. Conservatively, typical construction equipment for such augmentation could comprise front-end loaders (2), bobcats (2), cranes (2), concrete trucks (2), semi-trailers (2) and related support machinery and conservatively up to six items of plant in operation at any one time. On-site construction-related activities would generally be restricted to daylight hours (ie 0700 hours to 1800 hours) up to seven days a week. Construction of the belt press filter and augmentation of the existing Reverse Osmosis Plant may require a temporary construction workforce of up to 20 people at times in 2014.

3.4 On-site Blasting

The method of hard rock overburden material removal at the WCM is by drill and blasting techniques. A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blends (wet holes) are used.

There would be no change to the range of blast sizes at the WCM for the Modification. However, potential impacts associated with blasting in the areas of the minor incremental extensions to the existing open cut pits (**Appendix D1**) are assessed in this report.

The number of blasts in any week would be dependent on mine production. Blasting would only occur between the hours of 0900 hours and 1700 hours, 7 days per week (excluding public holidays or Sundays). Consideration of the potential frequency of blasts is provided in the Main Report of the EA.

3.5 Off-site Rail Transport

The Modification would not change currently approved rail movements at the WCM, which are approximately six movements per day when averaged over an annual period. Daily maximum train movements would also remain unchanged at ten trains per day. Train loading would continue to be conducted 24 hours per day, 7 days per week.

Given there would be no change to currently approved rail movements or rail loading hours at the WCM, off-site rail transport is not further considered in this report.

3.6 Off-site Road Transport

The existing access road off Ulan-Wollar Road would remain the primary site access. The WCM has an existing workforce of approximately 550 people (including Peabody/WCPL employees and contractors). The Modification would not alter these staffing requirements.

During construction of the belt press filter and upgrade of the Reverse Osmosis Plant, a short-term construction workforce of up to 20 people may be required.

The additional construction personnel would result in additional light vehicle movements on the local road network and there would also be a slight increase in the delivery of materials and consumables.

3.7 Project Site and Land Ownership

The Dwelling Location Plan (**Appendix C1**) identifies the nearest receivers together with the Land Ownership Plan (**Appendix C2**) and Receiver Locations (**Appendix C3**) including a list of property ID numbers, landowners and dwelling co-ordinates.

The Mid Western Regional Council Land Zoning Plan (**Appendix C4**) shows the land use zones in the vicinity of the WCM being dominated by Primary Production and Environmental Management zones. In addition, Wollar Village is zoned Village, and there are a large number of passive recreation areas including the Goulburn River National Park and Munghorn Gap Nature Reserve.

4 EXISTING METEOROLOGICAL AND NOISE ENVIRONMENT

4.1 Meteorological Environment

An assessment of the Site Meteorological Measurement Methodology is presented in **Appendix E** based on the analysis of the wind velocity and temperature gradients derived from the (new) on-site AWS and PTT. The INP assessable meteorological noise modelling parameters are presented in **Table 8**. The INP assessable wind conditions for the Modification are very similar to the INP assessable wind conditions adopted for the Mining Rate Modification 2010 (Modification 3).

The introduction of the PTT and associated direct temperature gradient measurements (refer **Appendix E**) has provided additional data regarding the characterisation of temperature gradients that occur in the WCM area.

Based on analysis of available data, it was determined that noise impacts and temperature gradients up to 5.5 degrees Celsius ($^{\circ}\text{C}$)/100 m were assessable, in accordance with the INP, as these temperature inversions occur greater than 10% of the time during the evening/night periods during winter. In comparison, Modification 3 assessed noise impacts during temperature inversions up to $3^{\circ}\text{C}/100\text{ m}$. The local temperature inversion data gathered from the PTT has, therefore, introduced more noise enhancing temperature inversion conditions for noise modelling.

Table 8 INP Assessable Meteorological Noise Modelling Parameters

Period	Meteorological Parameter	Air Temperature	Relative Humidity	Wind Velocity	Temperature Gradient
Daytime	Calm	17°C	56%	0 m/s^2	$0^{\circ}\text{C}/100\text{ m}$
Evening	Calm	16°C	62%	0 m/s	$0^{\circ}\text{C}/100\text{ m}$
	Summer Wind 30% (occurrence)	22°C	53%	ESE 3 m/s	$0^{\circ}\text{C}/100\text{ m}$
Night-time	Calm	11°C	80%	0 m/s	$0^{\circ}\text{C}/100\text{ m}$
	Summer Wind > 30 % (occurrence)	18°C	69%	ESE, SE, E 3 m/s ,	$0^{\circ}\text{C}/100\text{ m}$
	Strong Inversion (10% exceedance) ¹	5°C	87%	0 m/s	$5.5^{\circ}\text{C}/100\text{ m}$

Note 1: Winter evening/night-time 10% exceedance temperature gradient in accordance with INP Appendix E Table E5.

Note 2: m/s = metres per second.

4.2 Noise Environment

The existing WCM operations have an effect on local noise levels and, therefore, it is appropriate to review the pre-mining background noise data (from 2004) to determine the relevant Rating Background Levels (RBLs) and noise amenity levels ($\text{LA}_{\text{eq}}(\text{period})$) in accordance with the INP procedures. In addition, supplementary ambient noise monitoring was conducted in December 2012 as well as measurement of existing road traffic noise off Ulan Road.

Background Noise August - September 2004

Comprehensive background noise surveys to characterise and quantify the pre-mine noise environment in the area surrounding the WCM were conducted in August and September 2004. The measurement methodology and analysis procedures are described in the Wilpinjong Coal Project Environmental Impact Statement (EIS). The unattended background noise logger data from each monitoring location, together with the on-site weather conditions are presented graphically on a daily basis in Report 30-1313R1 *Wilpinjong Coal Project, Construction, Operation and Transportation Noise and Blasting Impact Assessment* (Heggies Pty Ltd, 2005). The ambient noise data was then processed in accordance with the requirements of the INP to derive the ambient noise levels presented in **Table 9**.

The pre-mine background noise levels are summarised in **Table 9** where daytime, evening and night-time are defined as 0700 hours to 1800 hours, 1800 hours to 2200 hours and 2200 hours to 0700 hours respectively.

Table 9 Unattended Noise Monitoring Results 2004 (dBA re 20 µPa)

Locality	Project EIS Reference/ Landowner	Rating Background Level ^{1,2} All Noise Sources			LAeq(period) ³ All Noise Sources		
		Daytime	Evening	Night-time	Daytime	Evening	Night-time
Cumbo	6 Langshaw (dwelling)	27	22	22	51	41	41
	6 Langshaw (25 m from road)	27	23	23	51	44	41
Wollar	900 St Laurence O'Toole Catholic Church (boundary)	31	26	27	64	42	50
Araluen	139 Woolford (dwelling)	25	24	24	43	39	41
Slate Gully	WG Cumbo Pty Ltd (potential dwelling site)	25	22	22	50	44	40
Wilpinjong	WB Cumbo Pty Ltd (dwelling)	27	28	23	52	41	39
Wilpinjong	WF Cumbo Pty Ltd (75 m from Railway)	28	34 ⁴	27	53	51	51
Murrumbidgee	42 Little/Salter (dwelling)	26	24	24	54	38	42
	34 Birt/Hayes (dwelling)	28	43 ⁴	23	46	49	30

Note 1: Measured noise levels less than 31 dBA may have a signal to noise ratio less than 5 dBA.

Note 2: In accordance with the NSW INP (2000), if the RBL is below 30 dBA, then 30 dBA shall be the assumed RBL.

Note 3: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 4: Affected by insect noise or diesel generator in the evening period.

Ambient Noise December 2012

Supplementary noise surveys to quantify ambient noise levels (ie all noise sources) and to estimate industrial noise only (ie in the absence of transport, natural and domestic noise) were conducted in December 2012. Four unattended noise loggers were positioned at 160 Private, 102 Private, 1_155 Peabody and 32_32 Cascade properties for periods of up to 14 days.

In order to supplement the unattended logger and to assist in identifying the character and duration of the noise sources, operator-attended night-time measurements were also conducted in the vicinity of the logging locations. The Site Noise Measurement Methodology and analysis procedures are described in **Appendix F1**. The operator-attended measurement results are summarised in **Table 10**.

Table 10 Operator-Attended Ambient Noise Survey Results 2012 (dBA re 20 µPa)

Locality	Modification Reference/ Landowner	Measured LA90(15minute) ¹ All Noise Sources			Measured LAeq(period) ¹ All Noise Sources			Estimated LAeq(period) ¹ Industrial Noise Only		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Wollar	160 Private	-	-	21	-	-	54	-	-	<34
Mogo	102 Private	-	-	34	-	-	48	-	-	<34
Tichular	1_155 Peabody	-	-	21	-	-	58	-	-	<34
Coggan	32_32 Cascade	-	-	26	-	-	47	-	-	<34

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours and Night-time 2200 hours to 0700 hours.

The unattended ambient noise logger data from each monitoring location and the on-site weather conditions were analysed on a daily basis and presented graphically as statistical 24 hour ambient noise profiles in **Appendices F2 to F5**. The ambient noise data were then processed in accordance with the requirements of the INP to derive the ambient noise levels presented in **Table 11**.

Table 11 Unattended Noise Ambient Monitoring Results 2012 (dBA re 20 µPa)

Locality	Modification Reference/ Landowner	Measured RBL ^{1,2} All Noise Sources			Measured LAeq(period) ² All Noise Sources			Estimated LAeq(period) ² Industrial Noise Only		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Wollar	160 Private	13	23	12	57	56	46	<44	<39	<34
Mogo	102 Private	22	30	12	41	51	45	<44	<39	<34
Tichular	1_155 Peabody	23	22	18	44	43	45	<44	<39	<34
Coggan	32_32 Cascade	19	24	13	54	53	52	<44	<39	<34

Note 1: In accordance with the NSW INP (2000), if the RBL is below 30 dBA, then 30 dBA shall be the assumed RBL.

Note 2: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

During the monitoring period, existing WCM noise was either barely audible or inaudible; however the INP data analysis procedure tends to minimise the potential for very low level intrusive mine noise to influence resultant RBLs. Moreover, insect noise was common and likely to be a regular seasonal feature of the noise environment, particularly in the warmer months.

Background Noise and Amenity Levels for INP Assessment Purposes

The RBLs adopted for assessment purposes are representative of the background noise environment, with all RBLs at 30 dBA, except for Wollar which has a daytime RBL of 31 dBA. Furthermore, industrial noise amenity levels (ie non-transport related noise) from other mines in the locality are minimal at non-mine owned residences. The RBLs are typical for a rural environment where there is minimal industrial noise and relatively low use transport corridors. In view of the foregoing, the RBLs and noise amenity levels (LAeq(period)) are presented in **Table 12**, which form the basis of establishing the Project-specific noise assessment criteria (**Section 5.2**).

Table 12 Background Noise and Amenity Levels for Assessment Purposes

Locality	Estimated RBL ^{1,2} All Noise Sources			Estimated LAeq(period) ^{1,2} Industrial Noise Only		
	Daytime	Evening	Night-time	Daytime	Evening	Night-time
Wollar Village Residential	31	30	30	<44	<39	<34
All other Privately Owned Land	30	30	30	<44	<39	<34

Note 1: Estimated RBLs and noise amenity levels in the absence of WCM operation.

Note 2: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours and Night-time 2200 hours to 0700 hours.

The established background noise levels presented in **Table 12** are consistent with the two localities of Wollar Village Residential and other Privately Owned Land contained in the WCM Project Approval.

4.3 Road Traffic Noise

A road traffic noise survey was conducted in December 2012 to quantify the near-field road traffic noise adjacent to Ulan Road. The measurement methodology and analysis procedures are described in **Appendix F1**. The unattended noise logger data and the on-site weather conditions were analysed on a daily basis and graphically as statistical 24 hour ambient noise profiles in **Appendix F6**. The data was then processed in accordance with the requirements of the RNP to derive the road traffic noise levels presented in **Table 13** and further assessed in **Section 9**.

Table 13 Unattended Road Traffic Noise Monitoring Results - December 2012 (dBA re 20 µPa)

Location	Position ¹	Leq(15hour)	Leq(9hour)
Corner of Ulan and Lagoons Roads	50 m from centre of Ulan Road	52	50

Note 1: Free field offset distance.

5 NOISE ASSESSMENT CRITERIA

5.1 Construction Assessment Criteria

As discussed in **Section 3.3**, the Modification construction works in 2014 would be limited in extent, but would include belt press filter and associated conveyor, as shown on the figure in **Appendix D2**, and upgrade of the existing Reverse Osmosis Plant. In accordance with the EPA's ICNG, the Modification construction works are generally considered integral with the general mining operations. Therefore the construction works associated with the Modification have been conservatively included in modelled daytime 2015 mine operations (refer to **Section 6.4**).

While the construction activity would take place in 2014, evaluation of the construction activity in the 2015 operational scenario has been undertaken to demonstrate that construction activities would have no material effect at private receivers.

5.2 Project Operating Assessment Criteria

The EPA has regulatory responsibility for the control of noise from "scheduled premises" under the *Protection of the Environment Operations Act, 1997*. In implementing the INP, the EPA has two broad objectives:

- controlling intrusive noise levels in the short-term; and
- maintaining noise amenity levels for particular land uses over the medium to long-term.

The INP prescribes detailed calculation routines for establishing PSNLs (ie LAeq[15minute] intrusive criteria and LAeq[period] amenity criteria) at potentially affected receivers for an industrial development. Ideally, the intrusive noise level should not exceed the background level by more than 5 dBA. Similarly, the noise amenity level should not exceed the specified INP "acceptable" or "maximum" noise level appropriate for the particular land use. The applicable acceptable and maximum noise amenity levels for receivers in the vicinity of the WCM are shown in **Table 14**.

Table 14 INP Acceptable and Maximum Noise Amenity Levels (dBA re 20 µPa)

Locality	LEP Zone ¹	INP Noise Amenity Zone	Amenity LAeq(period) ² Acceptable			Amenity LAeq(period) ² Maximum		
			Day	Evening	Night	Day	Evening	Night
Wollar Village	Village	Rural Residential	50	45	40	55	50	45
Other Privately Owned Land	Primary Production, Large Lot Residential, Environmental Management	Rural Residential	50	45	40	55	50	45
Any	Village	School, Hall ³	External 45 when in use			External 50 when in use		
Any	Primary Production	Church ³	External 50 when in use			External 55 when in use		
Any	National Parks and Nature Reserves	Passive Recreation	External 50 when in use			External 55 when in use		

Note 1: LEP = Local Environmental Plan.

Note 2: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 3: External criteria equivalent to internal criteria plus 10 dBA.

In accordance with the INP's Chapter 2 Industrial Noise Criteria and associated Application Notes (15 February 2013), the PSNLs for the residential and other localities in the vicinity of the WCM are presented in **Table 15** for both intrusive noise and amenity. These criteria are nominated for the purposes of assessing potential noise impacts from the WCM incorporating the Modification.

Table 15 Project-specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive LAeq(15minute) ¹			Amenity LAeq(period) ¹		
		Day	Evening	Night	Day	Evening	Night
Wollar Village	Rural Residential ²	36	35	35	50	45	40
	Rural Vacant Land ³						
Other Privately Owned Land	Rural Residential ²	35	35	35	50	45	40
	Rural Vacant Land ³						
Any	School ⁴	Intrusive noise criteria not applicable			External 45 when in use		
Any	Church, Hall ⁴	Intrusive noise criteria not applicable			External 50 when in use		
Any	Passive Recreation	Intrusive noise criteria not applicable			External 50 when in use		

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 2: At the most-affected point within 30 m of the residential area.

Note 3: Where exceedances are predicted over 25% of the vacant land area.

Note 4: External criteria equivalent to internal criteria plus 10 dBA.

The Wollar Village and Other Privately Owned Land amenity criteria nominated in **Table 15** are reflective of the general rural area following review of the Mid-Western Regional Council LEP (**Appendix C4**). The intrusiveness criterion is met if the LAeq(15minute) is less than or equal to the RBL plus 5 dBA, where the RBL is determined from monitoring data following the INP procedures discussed in **Section 4.2**. Thus, the most stringent PSNLs for the WCM incorporating the Modification at rural residential receivers (and vacant land) would be the LAeq(15minute) intrusiveness criterion.

As the INP Acceptable noise level sets the maximum total noise level from all industrial noise sources, cumulative impacts from the WCM incorporating the Modification are assessed against the amenity LAeq(period) acceptable noise levels specified in **Table 14**.

The INP states that the PSNLs are based on preserving the amenity of 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 PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs 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 PSNLs can be 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.

5.3 Low Frequency Noise Modifying Adjustment Factors

In accordance with the INP's Chapter 4 Modifying factor adjustments, where a noise source contains certain characteristics, such as a dominant low frequency content, the INP states that there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. The modifying factors (if applicable) are to be applied to the measured or predicted noise level at the receiver and then assessed against the PSNLs. In the case of low frequency (20 hertz [Hz] to 250 Hz) noise, the INP requires a 5 decibel (dB) correction to be applied to the measured or predicted noise levels where the difference between the A and C weighted level is 15 dB (or more) at the receiver.

Targeted low frequency noise measurements of current WCM noise emissions in Wollar Village (coinciding with temperature inversions) were conducted by SLR in December 2012 using a full spectrum noise monitor located at receiver 900 (St Laurence O'Toole Catholic Church - representative of Wollar Village).

The noise data were then analysed in accordance with the INP requirements to derive the intrusive $Leq(15\text{minute})$ A and C weighted noise levels of WCM operations and this coincided with strong temperature inversions (up to approximately 5.5°C/100 m) between 0000 hours to 0500 hours.

The measurement results at receiver 900 (St Laurence O'Toole Catholic Church) show a mean difference of 12.6 dB between the (mine-contributed) intrusive $LAeq(15\text{minute})$ and the $LCeq(15\text{minute})$ noise levels (ie below the INP's low frequency modifying threshold of 15 dB). On review of this data and previous attended noise monitoring summaries, it is concluded that current WCM noise emissions do not contain "dominant low frequency content" in accordance with the INP's assessment procedures.

5.4 Project Sleep Disturbance Assessment Criteria

The EPA's INP Application Notes dated 15 February 2013 (refer **Appendix G1**) recognise that the current $LA1(1\text{minute})$ sleep disturbance criterion of 15 dBA above the prevailing $LA90(15\text{minute})$ level is not ideal. The assessment of potential sleep disturbance is complex and not fully understood; however the EPA believes that there is insufficient information to determine a suitable alternative criterion.

Appendix B (Technical Background to Road Traffic Noise Criteria) of the *Environmental Criteria for Road Traffic Noise* (EPA, 1999) contains a comprehensive review of research into to sleep disturbance and traffic noise. The review has been more recently updated in The NSW RNP (DECCW, 2011) (Section 5.3 Sleep Disturbance) however the EPA's conclusion remains unchanged as follows:

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

It is noteworthy that conditions of approval generally include external noise limits. The internal noise levels (presented above) can be conservatively transposed to an external noise level by adding 10 dBA (or 12.5 dBA when measured 1 m from the dwelling facade). It follows, that an external LA1(1minute) noise criteria of 60 dBA would appear to be consistent with the current research in relation to this matter.

The EPA continues to review research on sleep disturbance as it becomes available and in the interim, the EPA suggests that the LA1(1minute) level of 15 dBA above the RBL is a suitable screening criterion for sleep disturbance for the night-time period. This approach is generally consistent with the existing WCM Project Approval (05_0021) (**Appendix A1**). The Modification night-time LA1(1minute) Sleep Disturbance Noise Levels (SDNLs) are presented in **Table 16** together with the comparable approved LA1(1minute) noise limit.

Table 16 Night-time LA1(1minute) Sleep Disturbance Criteria (dBA re 20 µPa)

Locality	Approved LA1(1minute) WCM Night-time ¹ Limit	Modification LA1(1minute) Night-time ¹ Criteria
Wollar Village	45	45
Other Privately Owned Land	45	45

Note 1: Monday to Saturday 2200 hours to 0700 hours; Sundays and Public Holidays 2200 hours to 0800 hours.

The proposed night-time operation of the Modification is anticipated to involve a larger proportion of the mobile equipment being operated in repeatable routines and a relatively smaller proportion of continuous fixed plant. Noise emissions from the mobile equipment are typically variable, whereas fixed plant noise emissions are relatively continuous (or steady) levels. When mobile equipment and fixed plant operate simultaneously, some noise sources (including the operation of trains on the rail loop) have the potential to emerge audibly above the overall mine noise.

The bi-monthly operator-attended noise monitoring reports prepared by Global Acoustics comprising monitoring locations N4, N6, N7, N9 and N12 have been examined to determine the mean difference between the intrusive LAeq(15minute) and the corresponding LA1(1minute) noise levels. The results of night-time noise monitoring for the 12 month period ending December 2012 are summarised in **Table 17** including the measured mean (mine-contributed) intrusive LAeq(15minute) and the LA1(1minute) noise levels.

Table 17 Measured Night-time LAeq(15minute) and LA1(1minute) Noise Levels (dBA re 20 µPa)

Locality	Receiver ID ¹	Site	Mean LAeq(15minute)	Mean LA1(1minute)	Mean Difference
Cumbo	1_WF	N4 "Hillview", Cumbo Road	31 dBA	39 dBA	8.0 dB
Wollar	900	N6 St Laurence O'Toole Catholic Church	25 dBA	33 dBA	8.0 dB
Araluen	1_45	N7 Smith, Ulan-Wollar Road	34 dBA	42 dBA	7.2 dB
Slate Gully	1_58	N9 Maher, Slate Gully Road	33 dBA	40 dBA	7.0 dB
Moolarben	32_32C	N12 Ulan Coal Mines, Ulan-Wollar Road	29 dBA	36 dBA	6.4 dB
Overall			30 dBA	38 dBA	7.3 dB

Note 1: Refer **Section 3.7** and **Appendix C**.

The measured results at locations N4, N6, N7, N9 and N12 show a mean difference of 7 dBA between the (mine-contributed) intrusive LAeq(15minute) and the LA1(1minute) noise levels and are therefore consistent with similar mining operations where the difference is typically <10 dBA. Hence, if the intrusive PSNLs (refer **Section 5.2** ie RBL plus 5 dBA) are achieved, then the SDNLs (ie RBL plus 15 dBA) would also be met. This relationship enables the noise assessment process to focus on the setting and assessment of INP-based intrusive noise and amenity levels which aim to minimise annoyance at noise sensitive receiver locations.

Notwithstanding the foregoing, the predicted LA1(1minute) night-time noise levels are presented in **Section 7** together with an assessment of potential sleep disturbance impacts from the WCM incorporating the Modification.

5.5 Modification Cumulative Noise Impact Assessment Methodology

In view of the foregoing, **Table 18** presents the methodology for assessing the Modification operating noise levels against the intrusive and amenity PSNLs (**Table 15**) and the LA1(1minute) SDNLs (**Table 16**) together with cumulative amenity noise levels (**Table 14**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of the WCM.

Table 18 Modification and Cumulative Noise Impact Assessment (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone ¹		Noise Affection Zone
			Marginal	Moderate	
Modification	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria ²
	PSNL Amenity	INP acceptable			
	SDNL LA1(1minute)	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria ³

- Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).
- Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.
- Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

For the purposes of assessing any potential the Modification noise impacts, the noise management and affection zones are further defined as follows.

Project Noise Management Zone

Depending on the degree of predicted exceedance of the PSNL and or SDNL (1 to 5 dBA), potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase). In addition to the noise mitigation measures included in the predictive modelling (**Section 6**), noise management procedures would include:

- Noise monitoring on-site and within the community.
- Prompt response to any community issues of concern.
- Refinement of on-site noise mitigation measures and operating procedures where practicable.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are 3 to 5 dBA above the relevant criteria.

Project Noise Affection Zone

Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners. These landowners are typically afforded rights for acquisition upon request in the relevant approval documentation.

Management procedures for the Noise Affectionation Zone would include:

- Discussions with relevant land owners to assess concerns and define responses.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are >5 dBA above the relevant criteria.
- Negotiated agreements with land owners where required.

6 NOISE MODELLING METHODOLOGY

6.1 Noise Mitigation and Management Measures

Previous Assessment (Modification 3)

WCPL is obligated to manage noise levels from the WCM in accordance with the noise limits specified in Project Approval 05_0021 using reasonable and feasible mitigation measures.

The Noise Impact Assessment prepared for Modification 3 identified that it was reasonable and feasible to replace some existing unattenuated mobile plant items at the WCM with attenuated mobile plant, as required, in order to comply with noise limits at privately owned receivers.

WCPL has not been required to introduce attenuated plant at the WCM, as the obligation to meet the noise limits specified in Project Approval 05_0021 has been achieved through a combination of the following:

- Property acquisition which has had the effect of reducing the number of privately owned receivers that could potentially be affected by noise impacts from WCM operations.
- For the remaining privately owned receivers, the implementation of the noise management strategy as per the NMP, including the use of real-time noise monitoring to manage noise levels during the night.

Further detail regarding the WCM noise management strategy and WCPL's recent compliance with the noise limits specified in Project Approval 05_00136 is provided in **Section 2**, including:

- A description of real-time noise investigation triggers and the response protocol (**Section 2.4**).
- An example of when a response protocol was implemented to reduce noise levels from the WCM following an exceedance of the noise investigation trigger level (**Section 2.4**).
- Demonstration that WCPL is altering its operations to reduce noise levels from the WCM, (ie the stand-down of machinery as a direct response to noise investigation triggers) (**Section 2.4**).
- A summary of attended monitoring results that show WCPL was in compliance with the noise limits specified in Project Approval 05_0031 in 2011 and 2012 reporting periods (ie since Modification 3) (**Section 2.5**).
- A summary of complaints received by WCPL, showing that noise-related complaints significantly reduced in 2011 and 2012 in comparison to the period 2007 to 2010 (**Section 2.7**).

Current and Future Operations Incorporating the Modification

WCPL would continue to meet its obligation to comply with the noise limits specified in Project Approval 05_0021 through the continued implementation of the noise management strategy.

This would include the continuation of real-time monitoring (eg at Wollar), and the stand-down of equipment, as required, as part of the response to an exceedance of noise investigation triggers. On this basis, the noise modelling for the Modification incorporates real-time noise controls under particular adverse meteorological conditions (eg equipment stand-downs) in accordance with this commitment, and to reflect existing operations at the WCM.

Given the successful implementation of the noise management strategy for the existing operations, WCPL does not propose to attenuate the existing owner-operated fleet to comply with Project Approval noise limits.

Further details regarding the existing owner-operated fleet and the implementation of real-time noise controls are provided in **Sections 6.2** and **6.5**, respectively.

6.2 WCM Mobile Equipment and Fixed Plant Sound Power Levels

The potential for machinery to emit noise is quantified as the sound power level (SWL). At the receptor, the received noise is quantified as the sound pressure level (SPL). In general terms, any variation in the on-site plant and equipment SWLs will produce a similar variation in the off-site SPL at the receiver (eg an increase of 5dBA in the SWL of equipment operating at a site may result in a corresponding 5dBA increase in SPL of intrusive noise at the receiver, when averaged over the same 15 minute period).

Comparative mobile equipment, fixed plant and total SWLs are shown in **Table 19** for Modification 3 (noise un-attenuated 2011 and noise attenuated Year 2014) as well as the existing WCM owner-operated fleet (noise un-attenuated).

The LAeq SWLs given for each item of mobile equipment do not include noise emissions which emanate from alarms or communication “horns”. It is noted that WCPL have installed broad-band “quacker” reversing alarms on the majority of the WCM mobile equipment fleet. Further, implementation of positive radio communication is being progressed in place of horns, where safe to do so.

Previous Assessment (Modification 3)

As shown in **Table 19**, the Modification 3 Noise Impact Assessment established that the un-attenuated total site SWL was approximately 141 dBA (in 2011). This was anticipated to reduce by approximately 6 dBA to 135 dBA following the replacement of some items of the contractor fleet with attenuated plant items (**Table 19**).

Existing Owner-operated Fleet

For the period 2013 to 2018, the estimated total site SWL of the existing owner-operated fleet is approximately 141 dBA. This is the same total SWL as the Modification 3 noise un-attenuated total site SWL in 2011 **Table 19**.

From 2019 onwards, the total number of plant items would decrease, and the associated total site SWL would decrease to 140 dBA **Table 19**. This would happen irrespective of the Modification.

Table 19 Fixed and Mobile Equipment for Modification 3 and Existing WCM 24 hours per day

Equipment Description	Modification 3 Year 2011 Un-attenuated		Modification 3 Year 2014 Attenuated		Existing Year 2013 - Year 2018 Un-attenuated		Existing Year 2019 - Year 2026 Un-attenuated	
	No of Items	Total ¹	No of Items	Total ¹	No of Items	Total ¹	No of Items	Total ¹
Drills	2	122 dBA	2	122 dBA	4	126 dBA	3	125 dBA
Excavator (EX2500)	1	117 dBA	3 ⁴	122 dBA	-	-	-	-
Excavator (EX1900)	2	121 dBA	1	118 dBA	-	-	-	-
Excavator (R9350)	-	-	-	-	4	127 dBA	2	124 dBA
Excavator (R9400)	-	-	-	-	1	121 dBA	1	121 dBA
Haul Truck (CAT 777)	-	-	-	-	-	-	-	-
Haul Truck (CAT 785)	15	140 dBA	18 ²	128 dBA	-	-	-	-
Haul Truck (CAT 789)	-	-	-	-	22	138 dBA	16	137 dBA
Dozer (CAT D8/D9)	-	-	-	-	-	-	-	-
Dozer (CAT D10)	1	123 dBA	1	123 dBA	6		5	129 dBA
Dozer (CAT D10T)	-	-	-	-	1	122 dBA	-	-
Dozer (CAT D11- In-pit)	6	134 dBA	6 ³	132 dBA	5	132 dBA	6	133 dBA
Dozer (CAT D11 - Bulk Push))	-	-	-	-	5	132 dBA	-	-
Dozer (CAT D11 - Stockpile)	2	120 dBA	2	120 dBA	2	128 dBA	4	131 dBA
Grader	3	120 dBA	3	118 dBA	5	122 dBA	3	120 dBA
Water Truck	3	121 dBA	3	119 dBA	4	121 dBA	3	121 dBA
Front End Loader (CAT 992K)	2	118 dBA	2	118 dBA	-	-	-	-
Front End Loader (CAT 993K)	-	-	-	-	1	118 dBA	1	114 dBA
Front End Loader (CAT 994K)	-	-	-	-	1	120 dBA	1	115 dBA
Total Mobile Equipment	37	141 dBA	39	135 dBA	61	141 dBA	45	140 dBA
Coal Preparation Plant	1	118 dBA	1	120 dBA	1	120 dBA	1	120 dBA
ROM Bin and Feeder	1	106 dBA	2	109 dBA	2	109 dBA	2	109 dBA
Reject Bin	1	109 dBA	1	109 dBA	1	109 dBA	1	109 dBA
Sizer and Crushers	1	116 dBA	2	119 dBA	2	119 dBA	2	119 dBA
Stockpile Discharge	2	103 dBA	4	106 dBA	4	106 dBA	4	106 dBA
Transfer Station	3	105 dBA	4	106 dBA	4	106 dBA	4	106 dBA
Train Loadout Bin	1	113 dBA	1	113 dBA	1	113 dBA	1	113 dBA
Locos	3	105 dBA	3	105 dBA	3	105 dBA	3	105 dBA
Raw Coal Conveyors	3	106 dBA	5	109 dBA	5	109 dBA	5	109 dBA
Reject Conveyor	1	97 dBA	1	99 dBA	1	99 dBA	1	99 dBA
Product Conveyors	2	100 dBA	4	108 dBA	4	108 dBA	4	108 dBA
Reclaim Conveyor	0	-	1	106 dBA	1	106 dBA	1	106 dBA
Train Loadout Conveyor	1	108 dBA	1	108 dBA	1	108 dBA	1	108 dBA
Total Fixed Plant		122 dBA		124 dBA		124 dBA		124 dBA
Total SWL		141 dBA		135 dBA		141 dBA		140dBA

Note 1: Total SWL based on multiple items (ie the un-attenuated total SWL of 22 CAT 789 haul trucks is 138 dBA).

6.3 WCM Noise Model Validation

The noise model for the WCM was prepared using RTA Software's Environmental Noise Model (ENM for Windows, Version 3.06), a commercial software system developed in conjunction with the NSW EPA. The acoustical algorithms utilised by this software have been endorsed by the ANZEC and all State Environmental Authorities throughout Australia as representing one of the most appropriate predictive methodologies currently available. ENM has been used for all major noise assessments at the WCM including the *Wilpinjong Coal Project Construction, Operation and Transportation Noise and Blasting Impact Assessment* (Heggies Pty Ltd, 2005) and the *Wilpinjong Coal Mine - 75W Noise Impact Assessment* (Heggies Pty Ltd, 2010).

SLR conducted a noise investigation survey in December 2012 to update and validate the WCM noise model and reflect as-built noise emissions, as follows:

- On-site noise measurements to determine fixed plant SWLs installed since Modification 3 including upgraded CHPP, new conveyors and drives (CV104, CV105, CV202, CV605, CV606, and CV802), ROM Bin 2, Sizing Station as well as locomotives operating on the rail loop.
- The digital terrain was updated to extend receiver area coverage as well as incorporating the proposed Modification mine plans and significant mobile equipment and fixed plant.
- Additional noise sources were added into the model to more accurately reflect the number of as-built noise emitting sources located at the CHPP and materials handling area.
- Far-field operator-attended noise surveys (2 validation locations) were conducted to determine the WCM noise level contribution at each location. For each survey the ambient weather conditions and the location of operating plant and equipment were recorded.
- The outcome of the validation exercise resulted in no change to the previous noise model calibration factor (of 1.8 dBA) which has been included in the Modification assessment (while noting that the validation outcomes are generally consistent with field measurement and modelling results from similar large scale resource developments).

The three operational noise modelling scenarios (described below) include all existing and proposed plant items operating concurrently to simulate the overall maximum energy equivalent (ie LAeq(15minute)) intrusive noise level. A large proportion of the mobile equipment is operated in repeatable routines and a relatively smaller proportion of the emissions emanate from continuous fixed plant items.

6.4 Noise Modelling Scenarios

In accordance with INP requirements, the Modification description was reviewed to determine representative scenarios to assess potential noise impacts. Scenarios representing typical operations of the WCM incorporating the Modification in 2015, 2018 and 2021 were selected. Justification for these scenarios is provided below.

Year 2015 Scenario

The 2015 scenario represents potential worst case noise impacts at Wollar Village and other privately owned receivers to the east of the WCM, as in this year WCM operations for WCM incorporating the Modification would:

- have an eastern and south-eastern focus (ie towards Wollar Village);
- be at the maximum ROM coal production rate (15 Mtpa); and
- involve the operation of the maximum number of mobile equipment items (**Table 20**) in addition to CHPP, coal stockpiling, rail loading and maintenance operations.

Table 20 Year 2015 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution

Pit 2	Pit 3	Pit 4	Pit 5	CHPP/ROM Area	Maintenance (Out of Service)
Waste Fleet: 1 x D11TQ 1 x CAT 789D Haul Truck (reject) 1 x D10 (reject)	Coal Fleet: 1 x Liebherr Excavators R9350 2 x D11 4 x CAT 789D Haul Trucks	Coal Fleet: 1 x Liebherr Excavators R9350 2 x D11 3 x CAT 789D Haul Trucks	Waste Fleet 1: 1 x Liebherr Excavators R9350 2 x D11 3 x CAT 789D Haul Trucks 2x Atlas Copco PitViper235 Drills	2 x D10 (S/Pile) (ROM) 2 x D11 (S/Pile) (Product) 1 x 993K Wheel Loader (general) 1 x 994K Wheel Loader (ROM) 2 x CAT 789D haul trucks (ROM) 1 x Handler	1 x D11 1 x D10 2 x CAT 789D Haul Trucks 1 x Handler
Waste Fleet 2¹: 2 x CAT 789D Haul Trucks 1 x D11 1 x Haulmax 3900 Water Cart	Waste Fleet: 1 x Liebherr Excavators R9400 1 x D11 2 x CAT 789D Haul Trucks 2 x Atlas Copco ROC65 Drills 1 x D10	Contractor Fleet: (Top Soil Removal - daytime only) 1 x Front-end loader 1 x Scraper 3 x MOXY Trucks	Waste Fleet 2: 1 x Liebherr Excavators R9350 3 x CAT 789D Haul Trucks 1 x D10	Construction Fleet: (Belt Press Filter - daytime only) 1 x Front-end loader 1 x Bobcat 2 x Crane 1 x Concrete truck 1 x Semi-trailer	
Support Fleet: 1 x Volvo Water Cart (Day and Evening only) 1 x CAT 16M Grader	Support Fleet: 1 x Haulmax 3900 Water Cart 2 x CAT 16M Grader	Support Fleet: 1 x Haulmax 3900 Water Cart (Day and Evening only) 1 x CAT 16M Grader	Support Fleet: 1 x Haulmax 3900 Water Cart 1 x CAT 16M Grader		

Source: WCPL

Note: Conservative fleet for 2014 construction activities included to demonstrate no material effect at private receivers.

Year 2018 Scenario

The 2018 scenario represents potential worst case noise impacts at privately owned receivers to the south-west of the WCM, as in this year WCM operations incorporating the Modification would:

- have a western and south-western focus;
- be at the maximum ROM coal production rate (approximately 15 Mtpa);
- be at the maximum waste production (approximately 33 Mbcm); and
- involve the operation of the maximum mobile equipment fleet (**Table 21**) in addition to CHPP, coal stockpiling, rail loading and maintenance operations.

Table 21 Year 2018 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution

Pit 1	Pit 3	Pit 5	Pit 6	CHPP/ROM Area	Maintenance (out of service)
Waste Fleet: 1 x D10 (reject) 1 x CAT 789D Haul Trucks	Waste Fleet: 1 x Liebherr Excavators R9350 1 x D11 3 x CAT 789D Haul Trucks 2 x D10	Coal Fleet: 1 x Liebherr Excavators R9350 2 x D10 4 x CAT 789D Haul Trucks	Coal Fleet: 1 x Liebherr Excavators R9350 1 x D10 4 x CAT 789D Haul Trucks 2 x Atlas Copco ROC65 Drills	2 x D11 (S/Pile) (ROM) 2 x D11 (S/Pile) (Product) 1 x 993K Wheel Loader (general) 1 x 994K Wheel Loader (ROM)	1 x D11 2 x CAT 789D Haul Trucks
Contractor Fleet: (Top Soil Removal – daytime only) 1 x Front-end loader 1 x Scraper 3 x MOXY Trucks		Waste Fleet: 2x Atlas Copco PitViper235 Drills 1 x Liebherr Excavators R9350 2 x D11 3 x CAT 789D Haul Trucks 1 x D10	Waste Fleet: 1 x Liebherr Excavators R9350 2 x D11 4 x CAT 789D Haul Trucks 2 x D10	2 x CAT 789D haul trucks (ROM) 2 x Handler	
	Support Fleet: 1 x Volvo Water Cart	Support Fleet: 1 x Haulmax 3900 Water Cart 2 x CAT 16M Grader	Support Fleet: 1 x Haulmax 3900 Water Cart 1 x CAT 16M Grader		

Source: WCPL

Year 2021 Scenario

The 2021 scenario also represents potential worst case noise impacts at privately owned receivers to the east and north-east of the WCM, as in this year WCM incorporating the Modification would involve:

- concentrated mining operations in the eastern and north-eastern sections of the WCM;
- a ROM coal production rate of approximately 7.6 Mtpa (ie below the maximum ROM coal production rate of 15 Mtpa); and
- the operation of the reduced mobile equipment fleet (**Table 22**) (ie due to the reduction in ROM coal production), in addition to CHPP, coal stockpiling, rail loading and maintenance operations.

Table 22 Year 2021 Scenario Typical Owner-operated Mobile Equipment Fleet Distribution

Pit 1	Pit 3	CHPP/ROM Area	Maintenance (out of service)
Waste Fleet: 1x Atlas Copco PitViper235 Drills 1 x Liebherr Excavators R9350 3 x D11 1 x D10 2 x CAT 789D Haul Trucks	Coal Fleet: 1 x Liebherr Excavators R9350 2 x D10 5 x CAT 789D Haul Trucks	1 x D11 (S/Pile) (ROM) 2 x D11 (S/Pile) (Product) 1 x 993K Wheel Loader (general) 1 x 994K Wheel Loader (ROM) 3 x CAT 789D haul trucks (ROM) 2 x Handler	1 x D11 1 x D10 2 x CAT 789D Haul Trucks
Contractor Fleet: (Top Soil Removal – daytime only) 1 x Front-end loader 1 x Scraper 3 x MOXY Trucks	Waste Fleet: 1 x Liebherr Excavators R9400 3 x D11 1 x D10 4 x CAT 789D Haul Trucks 2 x Atlas Copco ROCD65 Drills		
Support Fleet: 1 x Haulmax 3900 Water Cart 1 x CAT 16M Grader	Support Fleet: 2 x Haulmax 3900 Water Cart 2 x CAT 16M Grader		

Source: WCPL

6.5 Preliminary Noise Modelling

Preliminary noise modelling conducted by SLR for the WCM incorporating the Modification indicated that if no real-time noise response controls were implemented, exceedances of the PSNL of 35 dBA LAeq(15minute) of up to 3 dBA could occur at some private receivers in Wollar Village in Year 2015 during the night-time under the worst-case adverse weather conditions assessable under INP based on recent PTT monitoring (ie temperature inversions of 5.5°C/100m).

As such, the stand-down of some equipment is expected to be required during worst-case weather conditions to reduce noise levels such that compliance with the PSNL is achieved at Wollar Village.

The preliminary modelling indicated that compliance with the PSNL could be achieved at Wollar Village through the implementation of various responses protocols, including the following alternative measures:

- stand-down of the ROM coal haulage fleet (ie haul trucks);
- stand-down of the ROM coal excavation fleet (ie excavators and supporting equipment); or
- stand-down of the waste rock excavation fleet (ie excavators and supporting equipment).

Actual fleet items stood-down by WCPL during operations to achieve the PSNL in Wollar Village would be determined, as required, in accordance with the existing response protocol for exceedances of the noise investigation trigger and relevant operational priorities at the time (refer to **Section 2.4.2**).

The preliminary modelling indicated that exceedances of the PSNL at private receivers in Wollar Village (in the absence of real-time noise controls) would occur during approximately 12% of all night-time periods (2200 hours to 0700 hours) in 2015. This represents approximately 5% of all available operating hours in 2015.

The preliminary modelling indicated that private receivers in Wollar Village would experience elevated noise levels under the same conditions (ie the same mining operations and adverse weather conditions would be expected to affect them) given their proximity to each other. Implementation of real-time controls would therefore reduce noise levels at all private receivers in Wollar Village.

The implementation of the existing real-time noise control protocols (ie stand-down of equipment) to comply with noise limits at Wollar Village during conditions that potentially affect private receivers in Wollar Village is an operational cost to WCPL. WCPL considers this operational cost to be reasonable as the stand-down of equipment during the implementation of a particular response protocol directly benefits a number (up to nine) private receivers in Wollar Village at the same time. Benefits may also be felt at other receivers in Wollar (eg churches) if they were to be in use at night.

Given the above, and consistent with existing operations, WCPL considers it is both reasonable and feasible to stand-down equipment, as required, in order to continue to comply with PSNLs at private receivers in Wollar Village.

Therefore, the night-time intrusive and SDNL for 2015 presented in **Section 7** incorporate the implementation of real-time noise controls under worst-case adverse weather conditions for receivers in Wollar Village.

The preliminary modelling also indicated that exceedances of 1 dBA to 3 dBA may occur at four other individual private receivers located outside of Wollar Village (69, 135, 137 and 129) under adverse weather conditions. It is noted that receiver 129 is currently not occupied and has the same owner as 135.

Due to various influences, including the indicative mine sequence and topographic effects, exceedances at these receivers were predicted to occur during different conditions. For example:

- A 1 dBA exceedance was predicted at receiver 69 (located to the south-west of the WCM) during the 2018 scenario under adverse weather conditions, with no other exceedances at private receivers predicted under this scenario.
- A 3 dBA exceedance was predicted at receiver 135 and a 1 dBA exceedance was predicted at receiver 129 (located to the east of the WCM) during the 2021 scenario under adverse weather conditions, with no other exceedance at private receivers predicted under this scenario.

WCPL does not propose to implement real-time noise controls to meet PSNLs at private receivers 69, 135, 137 and 129 that are located outside of Wollar Village, based on the following:

- The predicted exceedances are marginal or moderate (ie 1 to 3 dBA). Therefore, exceedances of PSNLs of this magnitude are not likely to be noticeable, or noticeable to only some people.
- The implementation of real-time noise controls to meet PSNLs at these additional receivers would require the stand-down of equipment for each additional condition that may cause exceedances. The additional operational cost associated with this additional stand-down of equipment (ie additional to the operational cost associated with the commitment to meet PSNLs at Wollar Village) is not considered to be reasonable by WCPL, as the benefit of the equipment stand-down for each condition would only be realised at a small number (eg one or two) private receivers.

Notwithstanding the above, receivers 135, 137 and 129 are likely to benefit from the stand-down of equipment to meet PSNLs at Wollar Village, under some adverse meteorological conditions. In addition, in accordance with Condition 4, Schedule 3 of the Project Approval, some private receivers with predicted exceedances of the PSNL may be afforded rights to reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence.

7 OPERATING NOISE IMPACT ASSESSMENT

This section provides an assessment of potential noise impacts at privately owned receivers and privately owned land for the Modification 2015, 2018 and 2021 scenarios, and describes predictions for:

- daytime intrusive noise levels (**Section 7.1**);
- evening intrusive noise levels (**Section 7.2**); and
- night-time intrusive noise levels and potential sleep disturbance impacts (**Section 7.3**).

As described in **Section 4** the assessable meteorological conditions have been updated as a result of data from the PTT, and hence direct comparisons cannot be made with previous noise assessments for the WCM, as more noise enhancing temperature inversion conditions have been adopted for the operational noise modelling.

A summary of potential noise impacts associated with the WCM incorporating the Modification is presented in **Section 7.4**. The outer envelope night-time $L_{Aeq}(15\text{minute})$ intrusive noise contours for Years 2015 and 2021 are presented in **Appendices H1** and **H2**, respectively. The influence of topography on the noise contours can be seen to the east of the mine, where the topographic effects of two ridgelines located between the mine and the Village of Wollar have an influence on noise propagation, whereas topographic effects are less marked to the south-east of the mine.

Section 7.5 presents an assessment of potential noise impacts to privately owned vacant land.

Predicted intrusive noise levels at resource-company owned receivers are provided in **Appendix I**. An assessment of potential cumulative noise impacts assessed against amenity criteria is provided in **Section 8**.

7.1 Daytime Operating Intrusive Noise Levels

The predicted daytime intrusive $L_{Aeq}(15\text{minute})$ levels for the 2015, 2018 and 2021 operating scenarios are presented in **Table 23** for privately owned receivers.

Table 23 Years 2015, 2018 and 2021 Daytime Intrusive $L_{Aeq}(15\text{minute})$ Noise (dBA re 20 μPa)

ID No and Landholder	Modification Year 2015 Calm	Modification Year 2018 Calm	Modification Year 2021 Calm
Privately Owned Receivers (excluding Wollar Village)			
69	14	15	13
102	19	19	17
129	19	17	17
135	19	17	17
137	18	16	16
153	13	10	9
157	7	6	5
160A	8	7	6
160B	7	6	5
Wollar Village			
903	23	20	16
908	19	16	14
914	19	16	14
921	18	15	14
933	18	15	14
942	18	15	14
947	18	15	15
952	18	15	15
953	18	15	15

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

Note 2: Predicted $L_{Aeq}(15\text{minute})$ noise level complies with the intrusive PSNL.

No exceedances of the PSNL are predicted at any privately owned receiver during the day in 2015, 2018 or 2021 (**Table 23**).

The predicted daytime intrusive noise levels at resource-company owned receivers are presented in **Appendix I1** and summarised in **Appendix I4**.

7.2 Evening Operating Intrusive Noise Levels

The predicted evening intrusive LAeq(15minute) levels for the 2015, 2018 and 2021 operating scenarios are presented in **Table 24** for privately owned receivers.

Table 24 Years 2015, 2018 and 2021 Evening Intrusive LAeq(15minute) Noise (dBA re 20 µPa)

ID No and Landowner	Modification Yr 2015		Modification Yr 2018		Modification Yr 2021	
	Calm	Wind	Calm	Wind	Calm	Wind
Privately Owned Receivers (excluding Wollar Village)						
69	14	30	15	30	13	29
102	19	15	19	15	17	13
129	19	15	17	12	17	13
135	19	15	17	12	17	12
137	18	14	16	11	16	11
153	13	9	10	6	9	6
157	7	4	6	2	5	1
160A	8	4	7	2	6	1
160B	7	3	6	2	5	1
Wollar Village						
903	23	19	20	15	16	12
908	20	15	16	11	14	10
914	19	15	16	11	14	10
921	18	14	15	10	14	9
933	18	14	15	10	14	9
942	18	14	15	10	14	10
947	18	14	15	10	15	10
952	19	14	15	11	15	10
953	18	14	15	10	15	10

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

No exceedances of the PSNL are predicted at any privately owned receiver during the evening in 2015, 2018 or 2021 (**Table 24**).

The predicted evening intrusive noise levels at resource-company owned receivers are presented in **Appendix I2** and summarised in **Appendix I4**.

7.3 Night-time Operating Intrusive Noise and Sleep Disturbance

The predicted night-time intrusive LAeq(15minute) levels for the 2015, 2018 and 2021 operating scenarios for privately owned receivers are presented in **Table 25** together with the sleep disturbance LA1(1minute) noise levels.

Table 25 Night-time Intrusive LAeq(15minute) Noise Years 2015, 2018 and 2021 (dBA re 20 µPa)

ID No and Landowner	Modification Year 2015			Modification Year 2018			Modification Year 2021		
	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)
Privately Owned Receivers (excluding Wollar Village)									
69	15	34	41	15	36	43	13	31	39
102	19	35	42	19	33	40	17	34	42
129	20	37	45	17	35	42	18	36	43
135	20	37	45	17	35	42	17	38	46
137	18	37	45	16	34	41	16	35	43
153	13	34	41	10	30	37	10	29	36
157	8	26	33	6	24	32	5	24	31
160A	8	27	35	7	26	33	6	26	33
160B	7	27	34	6	26	33	5	25	33
Wollar Village									
903	24	34	41	20	35	42	17	35	42
908	20	32	39	16	33	40	15	33	40
914	20	32	40	16	33	40	15	33	41
921	19	33	40	16	33	41	15	33	40
933	19	34	41	15	35	42	15	35	42
942	19	35	42	15	35	43	15	35	43
947	19	34	42	15	35	43	15	35	43
952	19	34	41	16	35	43	16	35	42
953	19	34	41	15	35	42	16	35	42

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

Note 2: Predicted LAeq(15minute) noise level complies with the intrusive PSNL.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.

Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.

The results in **Table 25** show:

- Marginal exceedances (2 dBA) of the PSNL of 35 dBA LAeq(15minute) are predicted at receivers 129, 135 and 137 in 2015.
- A marginal exceedance (1 dBA) of the PSNL of 35 dBA LAeq(15minute) is predicted at receiver 69 in 2018.
- A moderate exceedance (3 dBA) of the PSNL of 35 dBA LAeq(15minute) and marginal (1dBA) exceedance of the SDNL of 45dBA LA(1minute) is predicted at receiver 135 in 2021, as well as a marginal exceedance (1 dBA) at receiver 129. It is noted that the properties containing receivers 129 and 135 are both owned by K & R Roser and property 129 is not currently occupied.

Exceedances of the PSNL are not predicted at any other privately owned receiver, including those at Wollar Village. As described in **Section 6.5**, the night-time noise levels presented in **Table 25** for the 2015 scenario incorporate the implementation of real-time noise controls to achieve compliance with the PSNL at private residences in Wollar Village during the night-time when mining activities are in particularly close proximity to Wollar Village.

The predicted night-time intrusive and SDNL at resource-company owned receivers are presented in **Appendix I3** and summarised in **Appendix I4**.

Night-time Intrusive Noise Contours

The outer envelope night-time LAeq(15minute) intrusive noise contours for Years 2015 and 2021 are presented in **Appendices H1** and **H2** respectively. The noise contour presented for 2015 incorporates the implementation of real-time noise controls to achieve PSLNs in Wollar Village.

The calculation of the noise contours involves numerical interpolation of a noise level array with a graphical accuracy of up to approximately ± 2 dBA. This means that in some cases the noise contours will differ slightly from the values in **Table 25**.

7.4 Impact Assessment Summary

In summary, the predicted noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions (refer **Table 8**) that occur at night.
- During the daytime and evening, no privately owned receivers are predicted to exceed the intrusive PSNL.
- During the night-time a marginal noise exceedances (1 to 2 dBA above PSNL) are predicted at privately owned receivers 69, 129 and 137, and a moderate noise exceedance (3 dBA above PSNLs) is predicted at privately owned receiver 135.
- A marginal exceedance of the SDNL is also predicted at receiver 135 (1 dBA above SDNL) during 2021 operations.

Given the above, four receivers (69, 129, 135 and 137) are identified as being in the Noise Management Zone due to the WCM incorporating the Modification. No receivers were identified as being in the Noise Affection Zone.

Table 26 and **Table 27** present the privately owned receivers with predicted intrusive $L_{Aeq}(15\text{minute})$ noise level exceedances of the PSNLs and predicted $LA_{1(1\text{minute})}$ exceedances of the SDNLs respectively.

Table 26 Privately Owned Receivers¹ with Intrusive PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	3 dBA to 5 dBA above PSNL	> 5 dBA above PSNL
Daytime	-	-	-
Evening	-	-	-
Night-time	69, 129, 137	135	-

Note 1: Refer to **Appendix C2** for land ownership details.

Table 27 Privately Owned Receivers¹ with Night-time $LA_{1(1\text{minute})}$ SDNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above SDNL	3 dBA to 5 dBA above SDNL	> 5 dBA above SDNL
Night-time	135	-	-

Note 1: Refer to **Appendix C2** for land ownership details.

As described in **Section 5.4**, the sleep disturbance criteria are not considered by the EPA to be ideal, because the research into disturbance of sleep remains inconclusive and therefore it is not possible to develop noise level criteria for sleep disturbance that would have the equivalent level of confidence as those criteria used for annoyance reactions. For example, the highest predicted night-time $LA_{1(1\text{minute})}$ at receiver 135 is 46 dBA and according to current research (refer **Section 5.4**) is unlikely to cause awakening reactions.

Notwithstanding the above, receiver 135 has been identified in the Noise Management Zone due to a predicted exceedance of the PSNL, and as such, would be expected to be offered reasonable and feasible acoustical mitigation, which may include enhanced glazing, insulation and/or air-conditioning.

7.5 Privately Owned Vacant Land Impact Assessment

The noise impacts on vacant land have been assessed in accordance with **Section 5.2** (refer **Table 15**) and consistent with the WCM Project Approval. **Table 28** identifies those properties for all scenarios where exceedances of the intrusive LAeq(15 minute) noise level is predicted for more than 25% of a vacant land.

It is predicted that two privately owned properties (IDs 30 and 146) would experience noise levels exceeding the PSNL on greater than 25% of the property. It should be noted that property ID 30 has existing acquisition upon request rights in accordance with the conditions of Project Approval 05_0021.

Table 28 Privately Owned Vacant Land¹ with Intrusive LAeq(15minute) PSNL Exceedances

Period	Noise Management Zone	Noise Affection Zone
	1 dBA to 5 dBA above PSNL	> 5 dBA above PSNL
Daytime	-	-
Evening	-	-
Night-time	146	30 ²

Note 1: Refer to **Appendix C2** for land ownership details.

Note 2: Property 30 has existing acquisition upon request rights in Project Approval 05_0021.

7.6 Elevated In-Pit Waste Emplacement

As described in **Section 3.2**, an elevated in-pit waste rock emplacement would be developed in Pit 2 during 2014. Noise modelling has been conducted to predict the potential impacts associated with the development of the elevated landform.

While the development of the elevated in-pit waste emplacement in Pit 2 is expected to occur in two short campaigns in 2014, the noise modelling conservatively considered the short term development of the in-pit waste rock emplacement (at its upper elevation of RL 450 m during the second campaign) coinciding with Year 2015 operations, which were identified as representing potential worst-case noise levels for private receivers located in Wollar Village.

It is predicted that the development (of the upper levels) of the elevated in-pit waste rock emplacement under adverse meteorological conditions would increase the operational night-time intrusive LAeq(15minute) noise levels by up to 1 dBA at the nearest private receivers (ie dwellings) and up to 2 dBA at all other receivers (in the absence of the implementation of real-time noise controls). This indicates that the elevated in-pit waste rock emplacement in Pit 2 may potentially marginally increase (ie 1 dBA) operational intrusive noise levels at some private receivers during the upper levels of development.

However, the development of the elevated in-pit waste emplacement would be conducted over two short campaign periods in 2014, and is not representative of typical mine operations. Notwithstanding, WCPL would implement real-time noise controls during the short term development of the elevated in-pit waste emplacement to meet its obligation to comply with the noise limits specified in Project Approval 05_0021 (eg equipment stand-downs would continue to occur, when necessary, to maintain noise levels at or below relevant Project Approval noise limits at private receivers). This may result in a temporary increase in the frequency (or duration) of equipment stand-downs during the development of the upper levels of the waste rock emplacement, depending on meteorological conditions and the other mining operations that occur at the time of the construction campaign.

The existing WCM NMP would be reviewed for the Modification (**Section 7.8**) and updated as required in consideration of any revisions to the noise monitoring program required to target compliance with the Project Approval noise limits during the development of the elevated in-pit waste emplacement.

7.7 Comparison with Previous Noise Impact Assessment (Modification 3)

The Noise Impact Assessment prepared for Modification 3 predicted that:

- 13 private receivers would be within the Noise Management Zone; and
- 2 private receivers would be within the Noise Affection Zone.

All of the private receivers predicted to be in either the Noise Management or Affection Zone for Modification 3 have been purchased by WCPL since Modification 3.

For the WCM incorporating this Modification, it is predicted that:

- four private receivers (69, 129, 135 and 137) would be within the Noise Management Zone, with three of these being marginal exceedances of 1 to 2 dBA; and
- no private receivers would be within the Noise Affection Zone.

As described in **Section 4.1**, the introduction of the PTT and associated direct temperature gradient measurements has provided additional data regarding the characterisation of temperature gradients that occur in the WCM area, and consequently, has introduced more noise enhancing temperature inversion conditions for noise modelling (ie temperature gradients up to 5.5°C/100 m) in comparison to those assessed for Modification 3.

Due to these more noise enhancing temperature inversions assessed more the Modification, as well as changes in the mining sequence and noise attenuation status of mobile equipment, the 4 private receivers predicted to be within the Noise Management Zone for the Modification are additional receivers that were not predicted to be within the Noise Management Zone for Modification 3.

7.8 Review of Existing WCM Noise Management Plan

It is recommended that the existing WCM NMP be reviewed and if necessary, revised for WCM incorporating the Modification to include:

- Updated noise monitoring network to reflect current land ownership.
- Updated noise trigger investigation protocols to reflect current site procedures.
- Revise operator-attended and continuous real-time monitoring locations representative of privately owned receivers.
- Where continuous monitors are located at compliance locations (eg private receivers), conduct a review of the identification/characterization of mine-related noise by the real-time monitoring system at that location by comparing observed mine-related noise identified during operator attended monitoring (ie validate the identification of mine related noise and filtering of extraneous noise sources by the real-time system).

8 CUMULATIVE NOISE AMENITY ASSESSMENT

8.1 LAeq(Period) Noise Amenity Criteria

The INP provides non-mandatory cumulative noise assessment guidelines that address existing and successive industrial development by setting acceptable (and maximum) cumulative LAeq(period) noise amenity levels for all industrial noise sources only (ie non-transport related) for a particular land use. It is noted that the INP does not set acceptable cumulative LAeq(15minute) intrusive criteria for all industrial noise sources, but rather seeks to control cumulative noise via the LAeq(period) noise amenity criterion (refer **Section 5.2**).

8.2 Modification Operating Noise Amenity Levels

The predicted daytime, evening and night-time LAeq(period) noise amenity levels for the operating scenarios in Years 2015, 2018 and 2021 are presented in **Table 29** for privately owned receivers.

Table 29 Noise Amenity LAeq(period) Years 2015, 2018 and 2021 (dBA re 20 µPa)

ID No and Landowner	Modification Year 2015			Modification Year 2018			Modification Year 2021		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Privately Owned Receivers (excluding Wollar Village)									
69	12	27	31	12	27	32	10	26	29
102	16	18	30	15	17	28	14	16	29
129	19	19	37	17	17	35	17	17	36
135	16	18	32	13	15	29	13	15	33
137	14	16	32	12	14	29	12	14	30
153	9	11	28	6	8	25	6	8	23
157	4	6	21	2	4	19	2	4	19
160A	4	6	22	3	5	21	2	4	20
160B	4	6	22	2	4	21	2	4	20
Wollar Village									
903	19	21	30	16	18	30	13	15	29
908	16	18	28	12	14	27	10	13	27
914	16	18	29	12	14	28	10	13	27
921	15	17	29	12	13	28	10	12	27
933	14	16	30	11	13	29	10	12	29
942	15	17	31	11	13	30	11	13	30
947	15	17	31	11	13	30	11	13	30
952	15	17	31	12	13	30	11	13	30
953	15	17	31	11	13	30	11	13	30
Wollar									
901 School	15	17	31	11	13	30	11	13	30
944 School	15	17	31	11	13	30	11	13	30
900 St Laurence O'Tools Catholic Church	15	17	26	11	13	25	9	12	22
150A St Lukes Anglican Church	17	19	34	14	17	33	12	14	30
935 Community Hall	14	16	31	11	13	30	11	13	30

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

Note 2: Predicted LAeq(period) noise level complies with the amenity (INP acceptable) PSNL.

A summary of potential noise impacts at privately owned receivers and other land uses is presented in **Sections 8.2.1** and **8.2.2** respectively. The predicted noise amenity levels at resource-company owned receivers are presented in **Appendix J1** and summarised in **Appendix J2**.

8.2.1 Privately Owned Receivers Impact Assessment

In summary, the predicted LAeq(period) amenity noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions (refer **Table 8**) that occur at night.
- No receiver exceeds the amenity criteria PSNLs during daytime, evening or night-time.

8.2.2 Consideration of other Land Uses Impact Assessment

The receiver 901 (School), 944 (School), 900 St Laurence O'Tools Catholic Church, 150A St Lukes Anglican Church and 935 Community Hall were all assessed as noise amenity receivers (**Table 29**). The predicted noise levels at all five receivers are below the relevant INP amenity criteria (**Table 15**).

A review of the noise contours presented in **Appendices H1** and **H2** indicated that the LAeq 50 dBA noise criterion may be exceeded at both the Goulburn River National Park and the Munghorn Gap Nature Reserve in the vicinity of the WCM. However, the WCM noise emission levels in these areas would be generally comparable to those assessed for Modification 3.

8.3 Existing, Approved and Proposed Industrial Developments

A summary of the major existing, approved and proposed industrial developments in the vicinity of the WCM are presented in **Table 30**. In addition, predicted noise levels from the Moolarben Coal Project Stage 2 and Ulan Continued Operations Project were also conservatively considered. The estimated mine operating evening and night-time LAeq(period) noise amenity levels from each these developments have been established by reviewing the EA (where available). These are then used for the purposes of the cumulative evening and night-time noise amenity assessment.

Table 30 Existing, Approved or Proposed Developments in the Vicinity of the WCM

Development Site	Approval Date	Consent	Status	Source of Noise Data
WCM ¹	26 November 2010	DA 23-98/99	Existing/Approved	Wilpinjong Coal Mine - 75W Noise Impact Assessment (Heggies Pty Ltd, 2010)
WCM incorporating the Modification	-	-	Proposed	Refer Table 29
Ulan Continued Operations Project	15 November 2010	MP 08_0184	Existing/Approved	Ulan Coal Continued Operations Environmental Assessment (Umwelt, 2009)
Moolarben Coal Project Stage 2*	-	-	Proposed	Moolarben Coal Mine Stage 2 Preferred Project Report (EMGA Mitchell McLennan, 2012)

Note 1: The existing WCM operations to be modified by the Modification.

* Incorporating Stage 1 noise predictions.

In addition, it is noted that the Moolarben Coal Project Stage 1 Optimisation Modification EA was placed on public exhibition in June 2013. Review of predicted noise impacts, as described in the EA indicates that the Modified Stage 1 operations would not have the potential to increase noise in the vicinity of Wilpinjong above the levels identified in the PPR for the Stage 2 operations.

As described in **Section 1.3**, no noise modelling results are publicly available for the Mt Penny Coal Project.

8.4 Cumulative Evening Noise Amenity Assessment

In accordance with the INP Chapter 2 Industrial Noise Criteria, the evening cumulative sum of the existing, approved and proposed developments LAeq(4hour) noise amenity levels have been determined as presented in **Table 31** for privately owned receivers.

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

Table 31 Evening Cumulative (LAeq(4hour)) Noise Amenity Levels (dBA re 20 µPa)

ID No and Landowner	WCM Modification	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
Privately Owned Receivers (excluding Wollar Village)				
69	27	18	7	28
102	18	9	1	18
129	18	11	2	19
135	18	10	1	19
137	16	10	1	17
153	11	8	0	13
157	6	5	0	9
160A	6	6	0	10
160B	6	6	0	9
Wollar Village				
903	21	11	2	22
908	18	11	2	19
914	18	11	2	19
921	17	11	2	18
933	16	11	2	18
942	17	11	2	18
947	17	11	2	18
952	17	11	2	18
953	17	11	2	18
Wollar Village				
901 School	17	11	2	18
944 School	17	11	2	18
900 St Laurance O'Tools Catholic Church	17	11	2	18
150A St Lukes Anglican Church	19	11	1	20
935 Community Hall	16	11	2	18

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

Note 2: Predicted cumulative LAeq(period) amenity noise level complies with 45 dBA (Evening) amenity noise level.

8.5 Cumulative Night-time Noise Amenity Assessment

The night-time cumulative sum of the existing, approved and proposed developments LAeq(9hour) noise amenity levels have been determined as presented in **Table 32** for privately owned receivers.

As mentioned in **Section 8.4**, the likelihood of the existing, approved and proposed developments emitting simultaneous maximum noise emissions is remote due to the range of development locations and directional and other differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

Table 32 Cumulative Night-time (LAeq(9hour)) Noise Amenity Levels (dBA re 20 µPa)

ID No and Landowner	WCM Modification	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
Privately Owned Receivers (excluding Wollar Village)				
69	32	15	4	32
102	30	6	0	30
129	32	7	0	32
135	33	7	0	33
137	32	6	0	32
153	28	5	0	28
157	21	2	0	21
160A	22	3	0	22
160B	22	3	0	22
Wollar Village				
903	30	8	0	31
908	28	8	0	28
914	29	8	0	29
921	29	8	0	29
933	30	8	0	30
942	31	8	0	31
947	31	8	0	31
952	31	8	0	31
953	31	8	0	31
Wollar Village				
901 School	31	8	0	31
944 School	31	8	0	31
900 St Laurence O'Tools Catholic Church	26	8	0	26
150A St Lukes Anglican Church	34	7	0	34
935 Community Hall	31	8	0	31

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 8** for each receiver.

Note 2: Predicted cumulative LAeq(period) amenity noise level complies with 40 dBA (Night-time) amenity noise level.

A summary of potential cumulative noise impacts on privately owned receivers and other land uses are presented in **Sections 8.6** and **8.7** respectively. The predicted noise amenity levels at resource-company owned receivers are summarised in **Appendix J2**.

8.6 Privately Owned Receivers Impact Assessment

In summary, the predicted cumulative LAeq(period) noise amenity levels show that no relevant receiver is predicted to exceed the INP recommended acceptable amenity level during evening or night-time.

8.7 Consideration of other Land Uses Impact Assessment

The receiver 901 (School), 944 (School), 900 St Laurence O'Tools Catholic Church, 150A St Lukes Anglican Church and 935 Community Hall were all modelled as amenity noise receivers (**Table 31** and **Table 32**). The predicted noise levels at all five receivers are below INP recommended acceptable amenity level during evening or night-time (**Table 14**).

9 ROAD TRAFFIC NOISE IMPACT ASSESSMENT

The detailed assessment of the road transport impacts are presented in the *Wilpinjong Coal Mine Modification Road Transport Assessment* (Appendix H of the EA) (GTA Consultants, 2013) and includes consideration of the WCM traffic generation incorporating the Modification in 2014 and 2024. This road traffic noise assessment focuses on Ulan Road (MR 214) as no private receivers remain on Ulan-Wollar Road.

9.1 Traffic Noise Criteria

Ulan Road is classified as a main road (MR 208/214) (GTA Consultants, 2013), which is essentially a sub-arterial road. The RNP and associated Application Notes dated 15 February 2013 (refer **Appendix G2**) is the relevant policy for the assessment of road noise in NSW. The RNP adopts a classification scheme for assessing noise impacts on an existing road network from additional traffic generated by the Modification as presented in **Table 33**.

Table 33 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Road	Type of Project and Land Use	Total Traffic Noise Criteria ¹	Relative Increase Criteria
Ulan Road	Land use developments generating additional traffic on existing sub-arterial roads	Daytime 60 LAeq(15hour)	Existing LAeq(15hour) plus 12 dBA
		Night-time 55 LAeq(9hour)	Existing LAeq(9hour) plus 12 dBA

Note 1: Daytime 0700 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

It is noted that the NSW RNP Application Notes state that the relative increase criteria are primarily intended to protect existing quiet areas, being areas that are 12 dB or more below the relevant noise assessment criterion that applies day or night, from excessive changes in amenity due to noise from additional traffic.

In relation to situations where exceedances of the road traffic noise assessment criteria are predicted, the NSW RNP relevantly provides:

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

...

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

In practice, noise level increases of less than 2 dBA are generally achieved when the percentage increase to the existing light and heavy traffic is no greater than 60%. The RNP describes a number of steps for applying the criteria. In general accordance with these steps, this assessment has:

- Identified a study area, defined as the portion of the Ulan Road (south of the Cope Road in the vicinity of Cooks Gap) with the adjacent residential dwellings presented in **Table 34**.
- Tabulated road traffic flows within the study area, due to 2012 traffic, projected cumulative sources and the WCM incorporating the Modification.
- Determined the relative increase in total traffic noise from the WCM incremental traffic in comparison to the (measured) traffic in 2012.
- Determined the relative increase in total traffic noise from the WCM incremental traffic in comparison to the projected 2014 traffic.

It is noted that residential dwellings are also located adjacent to Ulan Road south of the study area, however, total traffic flows also increase with distance south on Ulan Road. Hence the section of Ulan Road south of the Cope Road and in the vicinity of Cooks Gap was adopted as the study area, as WCPL's traffic as a proportion of total traffic is the highest in this section of Ulan Road.

Table 34 Ulan Road Adjacent Residential Dwellings

Dwelling No	Chainage (km)	Distance from Dwelling Façade (m)
1	25.859	108
2	26.891	78
3	27.061	106
4	27.392	73
5	27.613	67
6	27.959	28
7	30.294	82
8	30.655	44
9	32.169	81
10	32.339	26
11	32.946	84

Source: *Ulan Road Strategy* (ARRB Group, 2012)

9.2 Ulan Road 2012 Traffic Noise

As presented in **Section 4.3**, a road traffic noise survey was conducted in December 2012 to quantify the near-field road traffic noise adjacent to Ulan Road. The data were then processed in accordance with the requirements of the RNP to derive the 2012 road traffic noise levels presented in **Table 35**.

Table 35 Unattended Road Traffic Noise Monitoring Results - December 2012 (dBA re 20 µPa)

Location	Position ¹	Leq(15hour)	Leq(9hour)
Corner of Ulan and Lagoons Roads	50 m from centre of Ulan Road	52	50

Note 1: Free field offset distance.

The 2012 traffic noise levels have been used to calculate the nominal off-set distances from the centre of the Ulan Road to meet the daytime and night-time total traffic noise criteria (refer **Table 13**) as presented in **Table 36**.

Table 36 Nominal Off-set Distance to Meet the Total Traffic Noise Criteria - December 2012

Location	Off-set Distance	Day Leq(15hour) ¹	Night Leq(9hour) ¹
Corner of Ulan and Lagoons Roads	20.5 m from centre of Ulan Road	60 dBA	-
	35.0 m from centre of Ulan Road	-	55 dBA

Note 1: Total traffic noise level inclusive of 2.5 dBA facade correction.

Based on the 2012 traffic noise levels, two residential dwellings in the study area (ie numbers 6 and 10) are within 35 m of the Ulan Road and therefore receiving night-time Leq(9hour) traffic noise levels above the total traffic noise criteria of 55 dBA. All receivers in the study area were below daytime Leq(15hour) traffic noise criteria of 60 dBA.

9.3 Ulan Road Traffic Noise Impact Assessment

The 2012 and the cumulative 2014 traffic flows on the Ulan Road (south of the Cope Road and north of Wollar Road) are presented in **Table 37**, along with the incremental WCM traffic (ie the increment in comparison to WCM traffic in 2012). For the purposes of noise impact assessment, the daytime and night-time 2012 and the cumulative 2014 traffic flows are shown, with the relative percentage increase associated with WCM traffic in parentheses.

Table 37 Ulan Road 2012 and 2014 Traffic Flows (Between Cope Road and Wollar Road)

Time Period	2012 ¹	WCM Increment (2014) ²	Cumulative 2014 ³	WCM Increment (Cumulative 2014) ⁴
Ulan Road Light Vehicles				
Daytime 15 hour traffic	1374	55 (4.0%)	2110	55 (2.7%)
Night-time 9 hour traffic	572	31 (5.4%)	911	31 (3.5%)
Ulan Road Heavy Vehicles				
Daytime 15 hour traffic	265	10 (3.8%)	351	10 (2.9%)
Night-time 9 hour traffic	86	7 (8.1%)	103	7 (7.3%)
Ulan Road Total Vehicles				
Daytime 15 hour traffic	1639	65 (4.0%)	2461	65 (2.7%)
Night-time 9 hour traffic	658	38 (5.8%)	1014	38 (3.9%)

Note 1: 2012 traffic flow inclusive of WCM traffic.

Note 2: WCM increment 2014 in comparison to 2012 traffic - values in parentheses represent the WCM Increment as a percentage of 2012.

Note 3: Cumulative 2014 traffic flow includes existing WCM and Modification traffic, traffic from the approved Ulan Continued Operations Project and proposed Moolarben Coal Project Stage 2 and non-mining related traffic.

Note 4: WCM increment 2014 in comparison to 2012 traffic - values in parentheses represent the WCM Increment as a percentage of the cumulative 2014.

The base traffic (**Table 37**) has been estimated from traffic counts conducted in 2012. The Year 2014 represents the year where traffic generated by the WCM is expected to peak, as the current maximum number of WCM operational employees and a relatively small construction workforce required for the Modification (**Section 3.3**) would be required in this year.

The WCM incremental traffic incorporates traffic associated the Modification as well as an increase in WCM traffic movements which occurred between the traffic counts in December 2012 and 2013. While only a portion of the 2012 to 2014 WCM increment is traffic directly associated with the Modification (with the remaining portion associated with the increases in operational workforce that occurred between 2012 and 2013), potential road noise impacts associated with all incremental WCM traffic relative to the WCM traffic in 2012 has been conservatively assessed.

It is noted that WCM traffic generation is expected to fall later in the mine life (in comparison to existing WCM traffic generation) and hence 2024 traffic noise levels do not require quantification.

Traffic Noise - 2012 plus WCM Increment

The daytime 2012 traffic is predicted to increase by approximately 4% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in daytime LAeq(15 hour) traffic noise levels. The night-time 2012 traffic is predicted to increase by approximately 6% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in night-time LAeq(9 hour) traffic noise levels.

Hence, the relative increase in traffic noise arising from the WCM in 2014 in comparison to 2012 is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible.

The relative increases in the daytime and night-time traffic noise have been used to update the nominal minimum off-set distances from the centre of the Ulan Road required to meet the daytime and night-time total traffic noise criteria (refer **Table 36**) as presented in **Table 38**.

Table 38 Nominal Off-set Distance to Meet the Total Traffic Noise Criteria

Scenario	Off-set Distance ¹	Leq(15hour) ²	Leq(9hour) ²
2012	20.5 m	60 dBA	-
	35.0 m	-	55 dBA
2012 plus WCM Increment	21.0 m	60 dBA	-
	36.0 m	-	55 dBA
Cumulative 2014 (excluding WCM Increment)	26.5 m	60 dBA	-
	45.5 m	-	55 dBA
Cumulative 2014 plus WCM Increment	27.0 m	60 dBA	-
	46.5 m	-	55 dBA

Note 1: Off-set distance from the centre of Ulan Road

Note 2: Total traffic noise level inclusive of 2.5 dBA facade correction.

As mentioned above, two residential dwellings in the study area (ie numbers 6 and 10) are within 35 m of the Ulan Road and therefore currently receiving night-time Leq(9hour) traffic noise levels above the total traffic noise criteria of 55 dBA. All receivers in the study area are currently below daytime Leq(15hour) traffic noise criteria of 60 dBA.

Based on the off-set distances presented in **Table 38** for 2012 traffic plus the WCM increment, no additional dwellings are predicted to exceed the total road traffic noise criteria due to the WCM incremental traffic within the study area.

Traffic Noise – Cumulative 2014 plus WCM Increment

The daytime cumulative 2014 traffic is predicted to increase by approximately 3% due to the incremental WCM 2014 traffic and result in a negligible 0.1 dBA increase in daytime LAeq(15 hour) traffic noise levels. The night-time cumulative 2014 traffic is predicted to increase by approximately 4% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in night-time LAeq(9 hour) traffic noise levels.

Hence, the relative increase in traffic noise arising from the WCM in 2014 is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible.

The cumulative 2014 traffic has been used to estimate the nominal minimum offset distances from the centre of Ulan Road required to meet the daytime and night-time total traffic noise criteria (refer **Table 36**) as presented in **Table 38**. The relative increases in the daytime and night-time traffic noise from the WCM incremental traffic have been used to update these nominal minimum off-set distances (**Table 38**).

Based on the off-set distances presented in **Table 38** a total of three residential dwelling in the study area (ie numbers 6, 8 and 10) are within 45.5 m of the Ulan Road and therefore likely to receive night-time Leq(9hour) traffic noise levels above the total traffic noise criteria of 55 dBA due to the predicted cumulative 2014 traffic excluding the WCM incremental traffic. Based on the off-set distances presented in **Table 38** one residential dwelling in the study area (ie number 10) is within 26.5 m of the Ulan Road and therefore likely to receive daytime Leq(15hour) traffic noise levels above the total traffic noise criteria of 60 dBA due to the cumulative 2014 traffic excluding the WCM incremental traffic.

Based on the off-set distances presented in **Table 38** for the cumulative 2014 traffic plus the WCM increment, no additional dwellings are predicted to exceed the total road traffic noise criteria due to the WCM incremental traffic within the study area.

Based on the above results, and the fact that Modification traffic increases would peak in 2014 and are modest in comparison to traffic baseline levels, no traffic noise evaluation for dwellings located on Ulan Road and south of the study area is warranted.

10 BLASTING IMPACT ASSESSMENT

10.1 Blasting Assessment Criteria

10.1.1 Australian Standard Criteria

AS 2187: Part 2-2006 *Explosives - Storage and Use - Part 2: Use of Explosives* provides guidance in assessing blast-induced ground (and structural) vibration and airblast effects on buildings and their occupants and details are presented in Appendix J of AS 2187.

Recommended vibration limits are based on international standards (or studies) as presented in Appendix J Tables J4.5(A) and J4.5(B) of AS 2187, for human comfort and structural building damage respectively. Similarly, recommended human comfort and structural damage airblast limits are presented in Appendix J Tables J5.4(A) and J5.4(B) AS 2187, respectively.

The guideline *Assessing Vibration: A Technical Guideline* (DEC, 2006) specifically does not consider blasting-induced vibration and, therefore, this guideline is not discussed further.

10.1.2 Human Comfort Noise and Vibration Criteria

Ground vibration and airblast levels which cause human discomfort are lower than recommended structural damage limits. Therefore, compliance with the lowest applicable human comfort criteria generally ensures that the potential to cause structural damage is negligible. The OEH currently adopts the ANZEC *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* dated September 1990 for assessing potential annoyance from blasting during daytime hours, as follows:

- The recommended maximum level for airblast is 115 dB Linear.
- The level of 115 dB Linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dB Linear at any time.
- The recommended maximum for ground vibration is 5 mm/s, Peak Vector Sum (PVS) vibration velocity. It is recommended however, that 2 mm/s (PVS) be considered as the long-term regulatory goal for the control of ground vibration.
- The PVS level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

The ANZEC criteria are generally consistent with AS 2187: Part 2-2006 Appendix J Tables J4.5(A) and J5.4(A) with respect to vibration and airblast human comfort respectively.

10.1.3 Livestock Comfort Noise and Vibration Criteria

In a study by Casaday and Lehmann (1967) (*Responses of Farm Animals to Sonic Booms*) animal installations were selected for observations on animal behaviour under sonic boom conditions. The number of animals observed in this study included approximately 10,000 commercial feedlot beef cattle, 100 horses, 150 sheep and 320 lactating dairy cattle. Booms during the test period were scheduled at varying intervals during the morning hours Monday to Friday of each week.

Results of the study showed that the reactions of the sheep and horses to sonic booms were slight. Dairy cattle were little affected by sonic booms (125 dB to 136 dB). Only 19 of 104 booms produced even a mild reaction, as evidenced by a temporary cessation of eating, rising of heads, or slight startle effects in a few of those being milked. Milk production was not affected during the test period, as evidenced by total and individual milk yield. The researchers developed a summary by species and farms indicating that the few abnormal behavioural changes observed were well within the range of activity variation within a group of animals. They defined these changes as horses jumping up and galloping around the paddock, bellowing of dairy cattle, and increased activity by beef cattle (Casaday and Lehmann, 1967). In order to provide for a conservative assessment, the lowest airblast exposure studied (125 dB) was adopted as a criterion for the purposes of assessment of livestock impacts.

Similarly, an investigation (Heggies Pty Ltd, 2006) was conducted to determine the vibration levels experienced by cattle during typical short-term road transportation together with any vibration-induced health affects as observed by a registered veterinary surgeon. The study concluded that cattle are commonly exposed to vibration levels in excess of 200 mm/s during road transportation with no adverse effects on the cattle's health including levels of stress and contentment. It was consequently presumed that there would only be an effect on the cattle's health at vibration levels well in excess of 200 mm/s.

10.1.4 Building Damage Airblast Criteria

In relation to building damage airblast criteria, AS 2187: Part 2-2006 Appendix J J5.4(B) recommends a maximum airblast of 133 dB Linear Peak.

10.1.5 Building Damage Vibration Criteria

The applicable building damage vibration criteria AS 2187: Part 2-2006 Appendix J J4.5(B) is derived from British Standard 7385: Part 2-1993 *Evaluation and Measurement for Vibration in Buildings Part 2. Guideline to damage levels from ground borne vibration*. The standard sets guideline values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels have been established to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

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

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 39** and graphically in **Figure 5**.

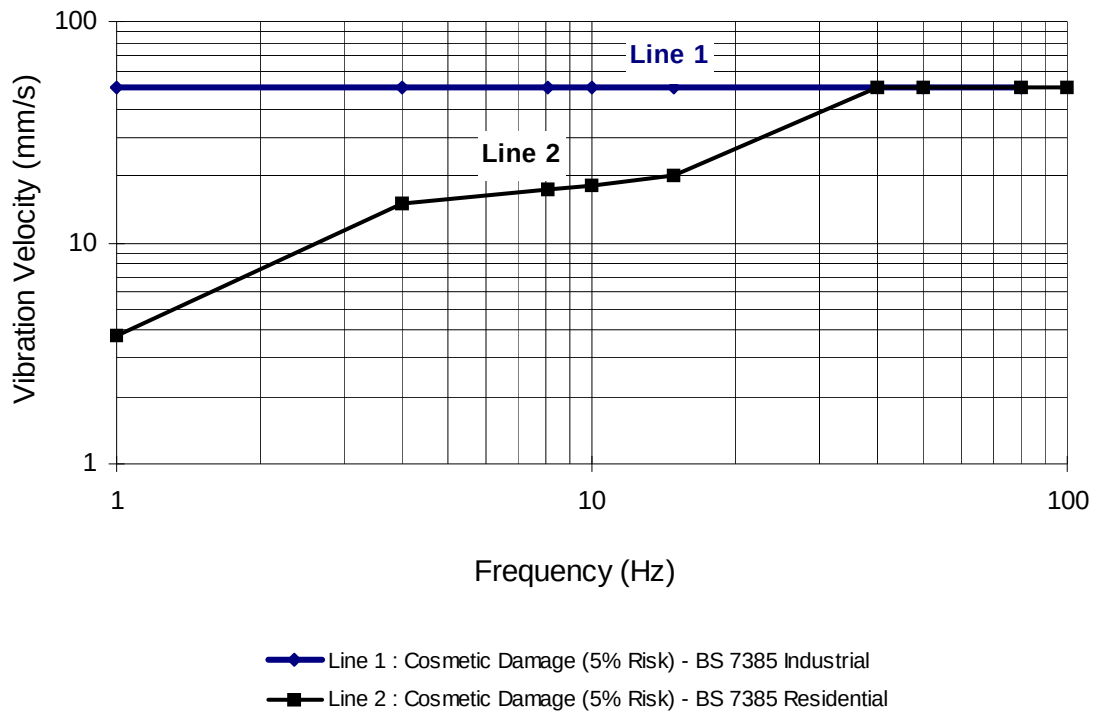
Table 39 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage

Line	Type of Building	PCPV in Frequency Range of Predominant Pulse ¹	
		4 to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	-
2	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 1: Peak Component Particle Velocity - PCPV.

The standard states that the guide values in **Figure 5** relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings.

Figure 5 Graph of Transient Vibration Guide Values for Cosmetic Damage



The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 39** and major damage to a building structure may occur at values greater than four times the tabulated values. It is noteworthy that extra to the guide values nominated in **Table 39**, the standard states that:

Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.

Also that:

A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.

Based on the foregoing discussion a conservative vibration damage assessment criterion of 12.5 mm/s (PCPV) would be applicable to all privately owned residential dwellings.

10.1.6 Railway Line and Roadway Culvert Vibration Damage Criteria

Infrastructure located outside of existing mining tenements includes the railway (line) and roadway (culverts) to the north of the WCM mine lease areas. Accordingly, consideration has been given to potential vibration effects on such infrastructure.

The German Standard DIN 4150-3:1999 *Structural Vibration Part 3: Effects of vibration in structures* provides guideline values for evaluating the effect of vibration on buried pipework. The values are based on the assumption that pipes have been manufactured and laid using current technology. Additional considerations may be required at junctions. The recommended limits for short-term vibration to ensure minimal risk of damage are presented in **Table 40**.

Table 40 Guideline Values for Vibration - Effects of Short-Term Vibration on Buried Pipework

Pipe Material	Vibration Measured on the Pipe (PCPV)
Steel (including welded pipes)	100 mm/s
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80 mm/s
Masonry, plastic	50 mm/s

Note: The current WCM BMP (refer **Section 2.6**) nominates similar infrastructure vibration criteria.

The railway infrastructure comprises mainly steel with concrete and similar materials and based on the foregoing a vibration damage assessment criterion of 100 mm/s (PCPV) would be applicable. Similarly, roadway infrastructure comprises mainly concrete and similar materials and a vibration damage assessment criterion of 80 mm/s (PCPV) would be applicable.

10.1.7 Archaeological/Geological Vibration Damage Criteria

Three Aboriginal rock art sites of significance have been identified during Aboriginal cultural heritage assessment conducted for the WCM, as shown on Environmental Monitoring Site Plan (**Appendix B**). The three Aboriginal rock art sites are located outside of the Modification disturbance areas and range from approximately 270 m from the nearest (Pit 2) extension area to approximately 3,330 m from the furthest (Pit 5) extension area.

There are no regulatory criteria nominated in Australia for the assessment of damage to archaeological/geological structures from vibration. Research, however, has been undertaken by the US Army Corps of Engineers into the effects of large surface blasts on the dynamic stability of nearby unlined tunnels of various diameters in sandstone and granite (*Blast Vibration Monitoring and Control* [Dowding, 1985]). The results of the research indicated that intermittent rock fall or observable damage was not observed until vibration levels exceeded 460 mm/s.

The German Standard DIN 4150-3:1999 *Structural Vibration Part 3: Effects of vibration in structures* does not specifically include criteria for assessing the “short-term” (ie blasting) effects of vibration on geological structures. However as mentioned above, the DIN 4150-3 does include guideline vibration velocity of 80 mm/s (PCPV) for evaluating the effects of “short-term” vibration on buried clay and concrete pipework. The application of this criterion to geological structures is considered conservative and introduces a five-fold safety factor by comparison to the observable damage value of 460 mm/s.

10.2 Proposed Open Pit Blasting Practices

Assessment of the potential ground vibration and airblast emissions arising from overburden (ie waste rock) blasting has been based on the indicative WCM blast design parameters presented in **Table 41** which generally represent a continuation of the currently approved blasting practices that would also be employed in the Modification open cut extension areas. As discussed in **Section 3.4**, blast sizes would generally remain unchanged by the Modification. However, potential blast impacts associated with the minor incremental extensions to the existing open cut pits (**Appendix D1**) are assessed.

Table 41 Indicative WCM Blast Design Parameters

Parameter	Typical Ranges
Bench Height	Typically 5 to 49 m
Burden and Spacing	Typically 4 m x 8 m
Stemming	Typically 3.5 m (aggregate)
Hole Diameter	Typically 125 to 229 mm
Number of Holes	Typically 1050 holes
Charge Mass per Hole	Typically 150 to 800 kilograms (kg)
Holes per Delay	Typically 1 to 6 holes
Maximum Instantaneous Charge (MIC)	Typically 3,000 kg (5% exceedance)
Explosive Type	Typically ANFO/Powergel
Effective Powder Factor	Typically 0.3 to 0.6 kg/m ³

To determine the blasting emissions levels at the nearest potentially affected receivers, the measured ground vibration and airblast levels from the WCM blasting monitoring programme were collated and analysed. The data was distilled to determine the 50% and 5% exceedance ground vibration and airblast site laws, as follows:

$$\begin{aligned}
 \text{PVS (50\%)} &= 95 \cdot (R/Q^{1/2})^{-1.08} \\
 \text{PVS (5\%)} &= 311 \cdot (R/Q^{1/2})^{-1.08} \\
 \text{SPL (50\%)} &= 146 - 16 \cdot (\log(R) - \frac{1}{3} \log(Q)) \\
 \text{SPL (5\%)} &= 159 - 16 \cdot (\log(R) - \frac{1}{3} \log(Q))
 \end{aligned}$$

where,

$$\begin{aligned}
 \text{PVS} &= \text{Peak (Vector Sum) vibration velocity (mm/s)} \\
 \text{SPL} &= \text{Peak airblast noise level (dB Linear)} \\
 R &= \text{Distance between charge and receiver (m)} \\
 Q &= \text{Charge mass per delay (kg)}
 \end{aligned}$$

10.3 Predicted Ground Vibration and Airblast Levels

Using the ground vibration and airblast site laws described above, ground vibration and airblast emissions were predicted at the nearest privately owned receivers, as presented **Table 42**, for the Modification extension areas (refer **Appendix D1**) for a typical (5% exceedance) overburden MIC 3,000 kg and a smaller MIC 70 kg adjacent to the railway infrastructure.

Table 42 Predicted Resultant Ground Vibration and Peak Airblast Levels

ID No and Landowner	Ground Vibration ¹ (mm/s)		Airblast ² (dB Lpk re 20 µPa)		Ground Vibration ¹ (mm/s)		Airblast ² (dB Lpk re 20 µPa)	
	MIC 3,000 kg		MIC 3,000 kg		MIC 70 kg		MIC 70 kg	
	50%	5%	50%	5%	50%	5%	50%	5%
Privately Owned Receivers (excluding Wollar Village)								
69	0.6	1.4	102	109	0.0	0.1	95	101
102	0.5	1.1	101	107	0.0	0.1	94	100
129	1.2	3.0	106	112	0.1	0.2	98	104
135	1.0	2.5	105	111	0.1	0.2	97	103
137	0.8	2.1	104	110	0.1	0.1	96	102
153	0.4	1.0	101	107	0.0	0.1	93	99
157	0.2	0.4	97	103	0.0	0.0	90	96
160A	0.3	0.6	99	105	0.0	0.0	91	97
160B	0.3	0.6	99	105	0.0	0.0	91	97
Wollar Village								
903	1.8	4.5	107	113	0.1	0.3	100	106
908	1.7	4.1	107	113	0.1	0.3	99	105
914	1.6	3.9	107	113	0.1	0.3	99	105
921	1.6	4.0	107	113	0.1	0.3	99	105
933	1.6	3.9	107	113	0.1	0.3	99	105
942	1.6	3.9	107	113	0.1	0.3	99	105
947	1.6	3.9	107	113	0.1	0.3	99	105
952	1.6	4.0	107	113	0.1	0.3	99	105
953	1.6	3.9	107	113	0.1	0.3	99	105
Wollar Village								
901 School	1.7	4.1	107	113	0.1	0.3	99	105
944 School	1.7	4.1	107	113	0.1	0.3	99	105
900 St Laurence O'Tools Catholic Church	1.8	4.4	107	113	0.1	0.3	100	106
150A St Lukes Anglican Church	1.5	3.7	106	112	0.1	0.3	99	105
935 Community Hall	1.6	3.9	107	113	0.1	0.3	99	105
Livestock, Aboriginal Heritage and Infrastructure								
Stockyard – Livestock	5.1	12.4	112	118	0.3	0.9	104	110
Aboriginal – Rock Art 72 ⁴	35.0	85.8	-	-	2.4	5.9	-	-
Aboriginal – Rock Art 152 ⁴	4.2	10.4	-	-	0.3	0.7	-	-
Aboriginal – Rock Art 153 ⁴	6.0	14.7	-	-	0.4	1.0	-	-
Roadway – Culvert ⁴	7.4	18.0	-	-	0.5	1.2	-	-
Railway – On-site Rail Loop ⁴	7.1	17.4	-	-	0.5	1.2	-	-
Railway – Off-site Rail Line ⁴	586	1436	-	-	40.4	99.0	-	-
Note 1: PVS (mm/s). Note 2: dB Lpk re 20 µPa. Note 3: Predicted blast emission level complies with the human comfort criteria of 5 mm/s and 115 dB Lpk. Note 4: Receiver not relevant to human comfort criteria.								

A summary of potential blast emission impacts on privately owned receivers and other land uses are presented in **Sections 10.4.1** and **10.4.2** respectively. The predicted blast emissions to resource-company owned receivers are presented in **Appendix K** together with an assessment of impacts.

10.4 Blasting Impact Assessment

10.4.1 Privately Owned Receivers Impact Assessment

With a blast MIC of 3,000 kg, the relevant ground vibration and airblast criteria are not predicted to be exceeded at any privately owned receiver.

10.4.2 Livestock, Aboriginal Heritage Sites and Infrastructure Impact Assessment

The highest predicted vibration level at the nearest Aboriginal rock art (Site 72) is 86 mm/s, which is well below the (observable damage) ground vibration criteria of 460 mm/s and very marginally above the conservative 80 mm/s criteria. The highest predicted vibration levels Aboriginal rock art sites 152 and 153 are considerably lower and range from 10 mm/s to 15 mm/s (**Table 42**).

With a blast MIC of 3,000 kg, no exceedances of relevant ground vibration criteria are predicted at roadway culverts, stockyards or the on-site rail loop (**Table 42**).

Table 42 indicates that a blast size of 70 kg or less would be required to meet the ground vibration criteria when blasting at the WCM occurs in close proximity to the off-site rail line.

Predicted vibration safe working distances to the Aboriginal rock art sites, roadway culvert and railway line/loop are presented in **Table 43** together with stockyard livestock vibration and airblast safe working distances.

Table 43 Predicted Safe Working Distances

Blast MIC	Aboriginal Rock Art Vibration ¹ 80 mm/s	Roadway Culvert Vibration ¹ 80 mm/s	Railway Line/Loop Vibration ¹ 100 mm/s	Stockyard Livestock Vibration ¹ 200 mm/s	Stockyard Livestock Airblast ² 125 dBLpk
3,000 kg	388 m (5%)	388 m (5%)	332 m (5%)	204 m (5%)	204 m (5%)
70 kg	59 m (5%)	59 m (5%)	51 m (5%)	31 m (5%)	122 m (5%)

Note 1: PVS (mm/s).

Note 2: dBLpk re 20 µPa.

Potential blasting impacts would continue to be managed and monitored in accordance with the requirements of Project Approval 05_0021 and the WCM BMP.

The management of any flyrock (ie solid material ejected from the blast site) will continue to be managed in accordance with the WCM BMP with regard to nearby railway and roadway infrastructure.

10.5 Review of Existing Blast Management Plan

It is recommended that the existing WCM BMP be reviewed and if necessary, revised for the WCM incorporating the Modification to include:

- Updated blast monitoring network to reflect current land ownership.
- Updated livestock, Aboriginal art site and infrastructure vibration impact criteria. In particular, a review of the blast management protocol for any blasting within 500 m of Aboriginal rock art sites (in particular Site 72) such that potential blast impacts are managed such that the structural integrity of sites is maintained.
- Development and ongoing review of “site laws” (ie site based prediction equations) for ground vibration and airblast.

11 SUMMARY OF FINDINGS

11.1 Construction Impact Assessment

The Modification construction works in 2014 would be limited in extent, but would include the fine reject circuit (ie belt press filter) and associated conveyor and augmentation of the Reverse Osmosis Plant. In accordance with the EPA's ICNG, the Modification construction works are generally considered integral with the general mining operations. Therefore the construction works associated with the Modification have been conservatively included in modelled daytime 2015 mine operations.

11.2 Noise Assessment Criteria

Operating Assessment Criteria

The NSW EPA has regulatory responsibility for the control of noise from "scheduled premises" under the *Protection of the Environment Operations Act 1997*. In implementing the INP, the EPA has two broad objectives.

- controlling intrusive noise levels in the short-term; and
- maintaining noise amenity levels for particular land uses over the medium to long-term.

In accordance with the INP's Chapter 2 Industrial Noise Criteria and associated Application Notes (15 February 2013), the PSNLs for the residential, industrial and other localities are presented in **Table 44** for intrusive noise and amenity levels. These criteria are nominated for the purposes of assessing potential noise impacts from the Modification.

Table 44 Project Specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive LAeq(15minute) ¹			Amenity LAeq(period) ¹		
		Day	Evening	Night	Day	Evening	Night
Wollar Village	Rural Residential ²	36	35	35	50	45	40
	Rural Vacant Land ³						
Other Privately Owned Land	Rural Residential ²	35	35	35	50	45	40
	Rural Vacant Land ³						
Any	School ⁴	Intrusive noise criteria not applicable			External 45 when in use		
Any	Church, Hall ⁴	Intrusive noise criteria not applicable			External 50 when in use		
Any	Passive Recreation	Intrusive noise criteria not applicable			External 50 when in use		

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Note 2: At the most-affected point within 30 m of the residential area.

Note 3: Where exceedances are predicted over 25% of the vacant land area.

Note 4: External criteria equivalent to internal criteria plus 10 dBA.

The INP states that the PSNLs have been selected to preserve the amenity of 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 PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable.

Sleep Disturbance Assessment Criteria

The INP Application Notes dated 9 June 2011 suggest that the LA1(1minute) level of 15 dBA above the RBL is a suitable criterion for assessing sleep disturbance for the night-time period. The Modification night-time LA1(1minute) SDNLs are presented in **Table 45** together with the comparable approved LA1(1minute) noise limit.

Table 45 Night-time LA1(1minute) Sleep Disturbance Noise Levels (dBA re 20 µPa)

Locality	Approved LA1(1minute) WCM Night-time ¹ Limit	Modification LA1(1minute) Night-time ¹ Criteria
Wollar Village	45	45
Other Privately Owned Land	45	45

Note 1: Monday to Saturday 2200 hours to 0700 hours; Sundays and Public Holidays 2200 hours to 0800 hours.

INP Assessable Meteorological Conditions

An assessment of the INP assessable meteorological conditions has been conducted based on the analysis of the wind velocity and temperature gradients derived from the (new) on-site AWS and PTT.

The INP assessable wind conditions for the Modification are very similar to the INP assessable wind conditions adopted for Modification 3, however, the introduction of the PTT and associated direct temperature gradient measurements (refer **Appendix E**) has provided additional data regarding the characterisation of temperature gradients that occur in the WCM area.

Based on analysis of available data, it was determined that noise impacts and temperature gradients up to 5.5°C/100 m were assessable, in accordance with the INP, as these temperature inversions occur greater than 10% of the time during the evening/night periods during winter. In comparison, Modification 3 assessed noise impacts during temperature inversions up to 3°C/100 m.

The local temperature inversion data gathered from the PTT has, therefore, introduced more noise enhancing temperature inversion conditions for WCM noise modelling.

Noise Impact Assessment Methodology

Table 46 presents the methodology for assessing the Modification operating noise levels against the intrusive and amenity PSNLs and the LA1(1minute) SDNLs together with cumulative amenity noise levels (refer **Table 14**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of the Modification.

Table 46 Modification and Cumulative Mine Noise Impact Assessment (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone ¹		Noise Affection Zone
			Marginal	Moderate	
Modification	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria ²
	PSNL Amenity	INP acceptable			
	SDNL LA1(1minute)	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria ³

Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).

Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.

Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

Noise Mitigation Measures

WCPL is obligated to manage noise levels from the WCM in accordance with the noise limits specified in Project Approval 05_0021 using reasonable and feasible mitigation measures. This has been achieved through a combination of the following:

- Property acquisition which has had the effect of reducing the number of privately owned receivers that could potentially be affected by noise impacts from WCM operations.
- For the remaining privately owned receivers, the implementation of the noise management strategy as per the NMP, including the use of real-time noise monitoring and response protocols (ie standing down of equipment) as required to manage noise levels during the night.

WCPL would continue to meet its obligation to comply with the noise limits specified in Project Approval 05_0021 for the Modification through the continued implementation of the noise management strategy.

This would include the continuation of real-time monitoring (eg at Wollar), and the standing down of equipment, as required, as part of the response to an exceedance of noise investigation triggers. On this basis, the noise modelling for the Modification incorporates real-time noise controls under particular adverse meteorological conditions (eg equipment stand-downs) in accordance with this commitment, and to reflect existing operations at the WCM.

11.3 Modification and Cumulative Mine Operating Noise Impact Assessment

Privately Owned Receivers and Vacant Land

A summary of the exceedances at privately owned receivers and vacant land of the PSNLs, SDNLs and INP's acceptable noise amenity levels are presented in **Table 47**.

Table 47 Summary of Criteria Exceedances at Privately Owned Receivers¹ and Vacant Land

Exceedance Range	1 to 2 dBA above PSNL	3 to 5 dBA above PSNL	> 5 dBA above PSNL
Intrusive LAeq(15minute)	69, 129, 137	135	-
Exceedance Range	1 to 2 dBA above SDNL	3 to 5 dBA above SDNL	> 5 dBA above SDNL
Sleep Disturbance LA1(1minute)	135	-	-
Exceedance Range	1 to 2 dBA above PSNL	3 to 5 dBA above PSNL	> 5 dBA above PSNL
Amenity LAeq(period)	-	-	-
Exceedance Range	1 to 2 dBA above INP Acceptable	3 dBA above INP Acceptable	> 3 dBA above INP Acceptable
Cumulative Amenity LAeq(period)	-	-	-
Exceedance Range	1 to 5 dBA above PSNL		> 5 dBA above PSNL
Vacant Land Intrusive LAeq(15minute)	146		30 ²

Note 1: Refer to **Appendix C1** for land ownership details.

Note 2: Property 30 has existing acquisition upon request rights in Project Approval 05_0021.

It is relevant to note that receiver 135 with predicted night-time LA1(1minute) SDNL exceedance would fall within the noise management zone for intrusive noise impacts. Therefore, it is expected that receiver 135 would be offered reasonable and feasible acoustical mitigation which may include measures such as enhanced glazing, insulation and/or air-conditioning.

11.4 Road Transport Impact Assessment

The Ulan Road is a main road (MR 208/214) (GTA Consultants, 2013), which is essentially a sub-arterial road. The RNP (and associated Application Notes dated 15 February 2013) is the relevant policy for the assessment of road noise in NSW. The RNP adopts a classification scheme for assessing noise impacts on an existing road network from additional traffic generated by the Modification as presented in **Table 48**.

Table 48 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Road	Type of Project and Land Use	Total Traffic Noise Criteria ¹	Relative Increase Criteria
Ulan Road	Land use developments generating additional traffic on existing sub-arterial roads	Daytime 60 LAeq(15hour)	Existing LAeq(15hour) plus 12 dBA
		Night-time 55 LAeq(9hour)	Existing LAeq(9hour) plus 12 dBA

Note 1: Daytime 0700 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

Where the total traffic noise levels are above the relevant criteria, the primary objective is to reduce the levels through feasible and reasonable noise mitigation to meet the relevant criteria. A secondary objective is to protect against excessive decreases in the amenity as a result of the Modification by applying the relative increase criteria. In accordance with the NSW RNP (associated Application Notes dated 15 February 2013), in assessing feasible and reasonable noise mitigation, a total traffic noise level increase of up to 2 dBA represents a minor impact that is considered barely perceptible and is generally achieved when the Modification related percentage increase to the existing light and heavy traffic is no greater than 60%.

Ulan Road (south of the Cope Road and north of Wollar Road) - 2012 plus WCM Increment

The daytime 2012 traffic is predicted to increase by approximately 4% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in daytime LAeq(15 hour) traffic noise levels. The night-time 2012 traffic is predicted to increase by approximately 6% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in night-time LAeq(9 hour) traffic noise levels. Hence, the relative increase in traffic noise arising from the WCM in 2014 in comparison to 2012 traffic is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible.

Ulan Road (south of the Cope Road and north of Wollar Road) - Cumulative 2014 plus WCM Increment

The daytime cumulative 2014 traffic is predicted to increase by approximately 3% due to the incremental WCM 2014 traffic and result in a negligible 0.1 dBA increase in daytime LAeq(15 hour) traffic noise levels. The night-time cumulative 2014 traffic is predicted to increase by approximately 4% due to the incremental WCM 2014 traffic and result in a negligible 0.2 dBA increase in night-time LAeq(9 hour) traffic noise levels. Hence, the relative increase in traffic noise arising from the WCM in 2014 in comparison to predicted cumulative 2014 traffic is much less than 2 dBA and in accordance with the RNP therefore represents a minor impact that is considered barely perceptible.

11.5 Blasting Impact Assessment

Privately Owned Receivers Impact Assessment

Relevant ground vibration and airblast criteria were not predicted to be exceeded at any private receiver.

Livestock, Aboriginal Heritage Sites and Infrastructure Impact Assessment

The highest predicted vibration level at the nearest Aboriginal rock art (site 72) is 86 mm/s and therefore very marginally above the conservative 80 mm/s criteria and well below the (observable damage) ground vibration criteria of 460 mm/s. The highest predicted vibration levels Aboriginal rock art sites 152 and 153 are considerably lower and range from 10 mm/s to 15 mm/s.

The predicted vibration safe working distances to the Aboriginal rock art sites, roadway culvert and railway line/loop are presented in **Table 49** together with stockyard livestock vibration and airblast safe working distances.

Table 49 Predicted Safe Working Distances

Blast MIC	Aboriginal Rock Art Vibration ¹ 80 mm/s	Roadway Culvert Vibration ¹ 80 mm/s	Railway Line/Loop Vibration ¹ 100 mm/s	Stockyard Livestock Vibration ¹ 200 mm/s	Stockyard Livestock Airblast ² 125 dBLpk
3,000 kg	388 m (5%)	388 m (5%)	332 m (5%)	204 m (5%)	204 m (5%)
70 kg	59 m (5%)	59 m (5%)	51 m (5%)	31 m (5%)	122 m (5%)

Note 1: PVS (mm/s).

Note 2: dBLpk re 20 µPa.

The management of any flyrock (ie solid material ejected from the blast site) will continue to be managed in accordance with the WCM BMP (Section 8.5) with regard to nearby railway and roadway infrastructure.

11.6 Review of Existing Management Measures

Noise Management Plan

It is recommended that the existing WCM NMP be reviewed and if necessary, revised for WCM incorporating the Modification to include:

- Updated noise monitoring network to reflect current land ownership.
- Updated noise trigger investigation protocols to reflect current site procedures.
- Revise operator-attended and continuous real-time monitoring locations representative of privately owned receivers.
- Where continuous monitors are located at compliance locations (eg private receivers), conduct a review of the identification/characterization of mine-related noise by the real-time monitoring system at that location by comparing observed mine-related noise identified during operator attended monitoring (ie validate the identification of mine related noise and filtering of extraneous noise sources by the real-time system).

Blast Management Plan

It is recommended that the existing WCM BMP be reviewed and if necessary, revised for the WCM incorporating the Modification to include:

- Updated blast monitoring network to reflect current land ownership.
- Updated livestock, Aboriginal art site and infrastructure vibration impact criteria. In particular, a review of the blast management protocol for any blasting within 500 m of Aboriginal rock art sites (particularly Site 72) such that potential blast impacts are managed such that the structural integrity of sites is maintained.
- Development and ongoing review of “site laws” (ie site based prediction equations) for ground vibration and airblast.

EXTRACT NSW DEPARTMENT OF PLANNING AND INFRASTRUCTURE PROJECT APPROVAL

SCHEDULE 3

SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

- Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 6 – 7 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note:

- To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Impact Assessment Criteria

- Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land, or on more than 25 per cent of any privately-owned land.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{A1}(1 minute)</i>
31A – Conradt	35	37	37	45
31B – Conradt	35	36	36	45
Wollar Village – Residential	36	35	35	45
All other privately owned land	35	35	35	45
901 – Wollar School		35(internal) 45 (external) When in use		-
150A – St Luke's Anglican Church		40 (internal) When in use		-
900 – St Laurence O'Toole Catholic Church				
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7.
- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Noise Acquisition Criteria

- If the noise generated by the project exceeds the criteria in Table 3 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6 – 7 of schedule 4.

Table 3: Land acquisition criteria dB(A)

Day/Evening/Night <i>L_{Aeq}(15 minute)</i>	Land
40	All privately owned land, excluding the land listed in Table 1

Note:

- Noise generated by the project is to be measured in accordance with the notes presented below Table 2. For the condition to apply, the exceedances must be systemic.

EXTRACT NSW DEPARTMENT OF PLANNING AND INFRASTRUCTURE PROJECT APPROVAL

Additional Noise Mitigation Measures

4. Upon receiving a written request from the owner of any residence:
 - (a) on the land listed in Table 1; Or
 - (b) on the land listed 23B, 25, 52A, 52B, 53, or 58 in the applicable figures in Appendix 7; or
 - (c) where subsequent noise monitoring shows that the noise generated by the project is greater than, or equal to, $L_{Aeq}(15 \text{ minute})$ 38 dB(A),

the Proponent shall implement reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner.

If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.
5. By 30 November 2010, or within 1 month of obtaining monitoring results showing an exceedance of the relevant criteria listed in condition 4(c) above, the Proponent shall notify all applicable owners that they are entitled to ask for additional noise mitigation measures to be installed at their residence.

Operating Conditions

6. The Proponent shall:
 - (a) implement all reasonable and feasible noise mitigation measures;
 - (b) ensure that the real-time noise monitoring and meteorological forecasting data are assessed regularly, and that operations on site are relocated, modified, and/or stopped to ensure compliance with the relevant criteria in conditions 2 to 4 of this schedule; and
 - (c) regularly investigate ways to reduce the operational, low frequency, rail, and road traffic noise generated by the project; and report on these investigations in the annual review (see condition 2 of schedule 5),

to the satisfaction of the Director-General.

Rail Noise

- 6A. The Proponent shall:
 - (a) seek to ensure that its rail loop is only accessed by locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208) and ARTC's EPL (No. 3142) or a Pollution Control Approval issued under the former *Pollution Control Act 1970*; and
 - (b) co-operate with RailCorp, ARTC and/or rail operators in the implementation of any Noise Abatement Program established under these instruments, to the satisfaction of the Director-General.

Noise Management Plan

7. The Proponent shall prepare and implement a Noise Management Plan for the project, in consultation with OEH, and to the satisfaction of the Director-General. This plan must:
 - (a) describe the noise mitigation measures that would be implemented to ensure compliance with the relevant noise impact assessment criteria in this approval, including the proposed real-time noise management system and associated meteorological forecasting; and
 - (b) include a noise monitoring program, that uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the project, and includes a protocol for determining exceedances with the relevant conditions of this approval.

EXTRACT NSW DEPARTMENT OF PLANNING AND INFRASTRUCTURE PROJECT APPROVAL

BLASTING**Blast Impact Assessment Criteria**

8. The Proponent shall ensure that blasting on the site does not cause exceedances of the criteria in Table 4.

Table 4: Blasting impact assessment criteria

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Residence on privately owned land	115	5	5% of the total number of blasts over a period of 12 months
	120	10	0%

Blasting Hours

9. The Proponent shall only carry out blasting on the site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.

Blasting Frequency

10. The Proponent shall comply with the following blasting restrictions on site:
- (a) a maximum of 2 blasts per day;
 - (b) a maximum of 5 blasts per week, averaged over any 12 month period;
 - (c) a maximum of 2 blasts per week where the maximum instantaneous charge (MIC) is greater than 400kg; and
 - (d) a maximum of 1 blast per week where the MIC is greater than 400kg, when averaged over any 12 month period.
- However the Director-General may approve minor variations to these restrictions for short periods of time.

Property Inspections

11. If the Proponent receives a written request for a property inspection from any landowner within 3 km of the project, the Proponent shall within 2 months of receiving this request:
- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to:
 - establish the baseline condition of any building or structures on the land;
 - inspect the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and
 - (b) give the landowner a copy of the property inspection report.

Property Investigations

12. If any landowner of privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting associated with the project, then within 3 months of receiving this request, the Proponent shall:
- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate the claim; and
 - (b) give the landowner a copy of the property investigation report.

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damages to the satisfaction of the Director-General.

If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.

EXTRACT NSW DEPARTMENT OF PLANNING AND INFRASTRUCTURE PROJECT APPROVAL

Operating Conditions

13. During mining operations on the site, the Proponent shall:
 - (a) implement best blasting practice to:
 - protect the safety of people and livestock in the area surrounding blasting operations;
 - protect public or private infrastructure/property and Aboriginal cultural heritage sites in the area surrounding blasting operations from blasting damage; and
 - minimise the dust and fume emissions from blasting at the project;
 - (b) limit temporary blasting-related road closures to 1 per day;
 - (c) co-ordinate the timing of blasting on site with the timing of blasting at the adjoining Moolarben and Ulan coal mines to minimise the potential cumulative blasting impacts of the three mines, and
 - (d) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General.
14. Prior to carrying out any blasting within 500 metres of a public road or railway on the site, the Proponent shall obtain approval from Council (in respect of public roads) and ARTC (in respect of the Gulgong-Sandy Hollow railway).

Blast Management Plan

15. The Proponent shall prepare and implement a Blast Management Plan for the project, in consultation with OEH, and to the satisfaction of the Director-General. This program must:
 - (a) describe the blast mitigation measures that would be implemented to ensure compliance with the relevant conditions of this approval; and
 - (b) include a blast monitoring program to evaluate the performance of the project.

METEOROLOGICAL MONITORING

22. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station operating in the vicinity of the site that:
 - (a) complies with the requirements in *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
 - (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Industrial Noise Policy*, to the satisfaction of the Director-General.

Note:

- A system to measure temperature lapse rate at the site must be established in accordance with condition 22(b) by 31 December 2010, or as otherwise agreed by the Director-General.

EXTRACT EPA ENVIRONMENT PROTECTION LICENCE NO 12425

L5 Noise limits

- L5.1 Noise generated at the premises must not exceed the noise limits presented in the table below. The locations referred to in the table below are indicated by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

Note: The above noise limits do not apply at properties where the licensee has a written agreement with the landowner to exceed the noise limits.

- L5.2 For the purpose of condition L5.1;

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.
- Evening is defined as the period 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays.

- L5.3 The noise limits set out in condition L5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

- L5.4 For the purpose of condition L5.3:

- a) The meteorological data to be used for determining meteorological conditions is the data recorded by the meteorological weather station identified as EPA identification Point 21 in condition P1.1; and
- b) Temperature inversion conditions (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 of Appendix E to the NSW Industrial Noise Policy.

- L5.5 To determine compliance:

- a) With the Leq(15 minute) noise limits in condition L5.1, the noise measurement equipment must be located:
 - i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
 - ii) within 30 metres of a dwelling façade, but not closer than 3 metres where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
 - iii) within approximately 50 metres of the boundary of a National Park or Nature Reserve

EXTRACT EPA ENVIRONMENT PROTECTION LICENCE NO 12425

- b) With the LA1(1 minute) noise limits in condition L5.1, the noise measurement equipment must be located within 1 metre of a dwelling façade.
- c) With the noise limits in condition L5.1, the noise measurement equipment must be located:
- i) at the most affected point at a location where there is no dwelling at the location; or
 - ii) at the most affected point within an area at a location prescribed by conditions L5.5(a) or L5.5(b).
- L5.6 A non-compliance of condition L5.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:
- a) at a location other than an area prescribed by conditions L5.5(a) and L5.5(b); and/or
 - b) at a point other than the most affected point at a location.
- L5.7 For the purpose of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.
- L6 Blasting**
- L6.1 The overpressure level from blasting operations at the premises must not exceed 115 dB (Lin Peak) at any noise sensitive location for more than five percent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L6.2 The overpressure level from blasting operations at the premises must not exceed 120 dB (Lin Peak) at any noise sensitive at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L6.3 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5 mm/sec at any noise sensitive locations for more than five percent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L6.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10 mm/sec at any noise sensitive location at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- Note: "Noise sensitive locations" includes buildings used as a residence, hospital, school, child care centre, place of public worship and nursing homes. A noise sensitive location includes the land within 30 metres of the building.
- L6.5 Blasting operations at the premises may only take place between 9:00am – 5:00pm Monday to Saturday. Blasting outside the hours specified in this condition can only take place with the written approval of the EPA.
- L6.6 Blasting at the premises is limited to the following:
- a) a maximum of 2 blasts per day;
 - b) a maximum of 5 blasts per week, on average over a 12 month period;
 - c) a maximum of 2 blasts per week where the maximum instantaneous charge is greater than 400 kg; and
 - d) a maximum of 1 blast per week where the maximum instantaneous charge is greater than 400 kg, when averaged over a 12 month period.

EXTRACT EPA ENVIRONMENT PROTECTION LICENCE NO 12425

M4 Weather monitoring

- M4.1 The meteorological weather station must be maintained so as to be capable of continuously monitoring the parameters specified in condition M4.2.
- M4.2 For each monitoring point specified in the table below the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The licensee must use the sampling method, units of measure, averaging period and sample at the frequency specified opposite in the other columns.

Point 21

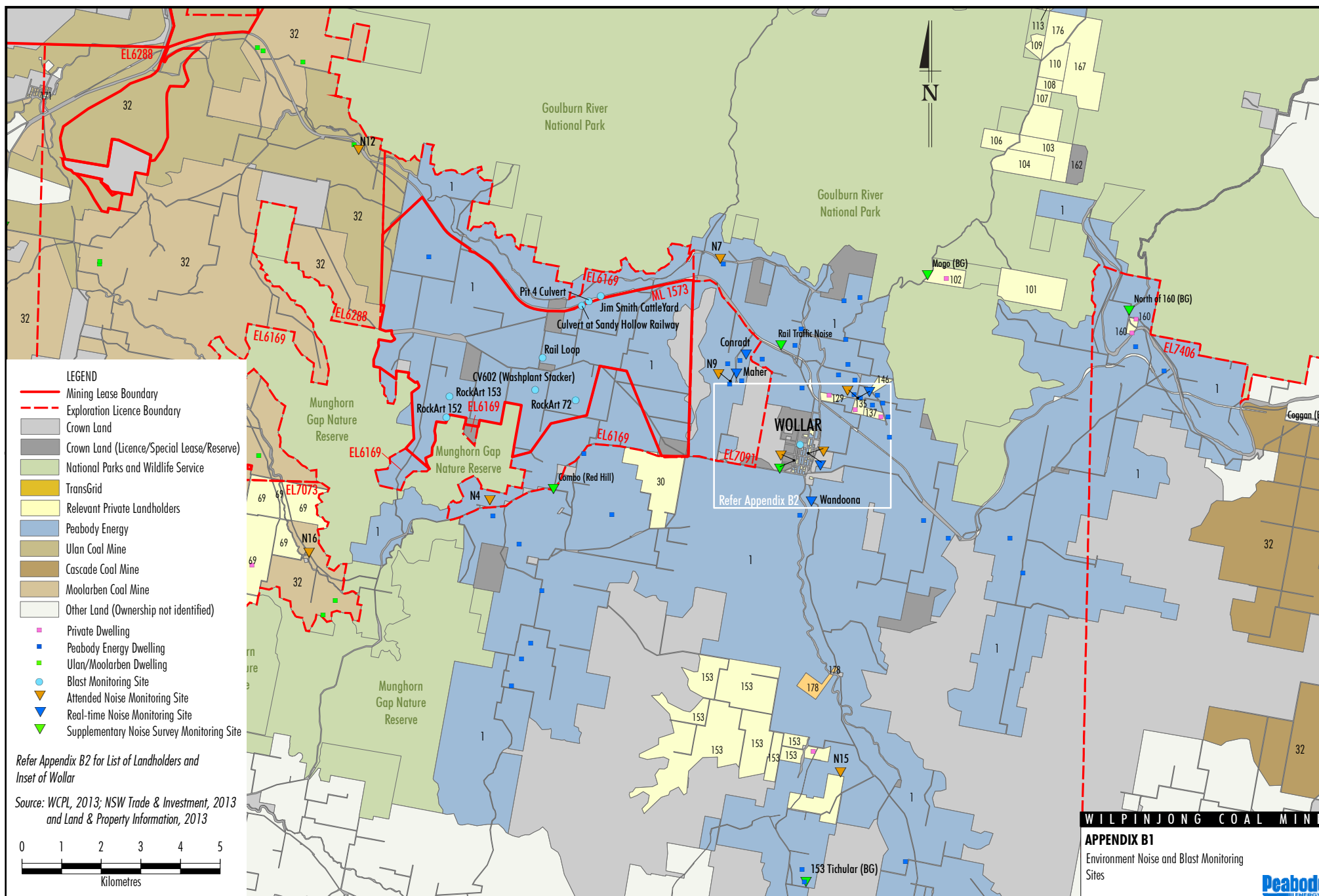
Parameter	Unit of Measure	Frequency	Averaging Period	Sampling Method
Air temperature	Degress celsius	Continuous	1 hour	AM-4
Wind direction	Degrees	Continuous	15 minute	AM-2 & AM-4
Wind speed	m/s	Continuous	15 minute	AM-2 & AM-4
Temperature lapse rate	Degrees	Continuous	15 minute	Part E2 & E4 of the Nsw Industrial Noise Policy
Rainfall	mm	Continuous	24 hour	AM-4
Relative humidity	%	Continuous	1 hour	AM-4

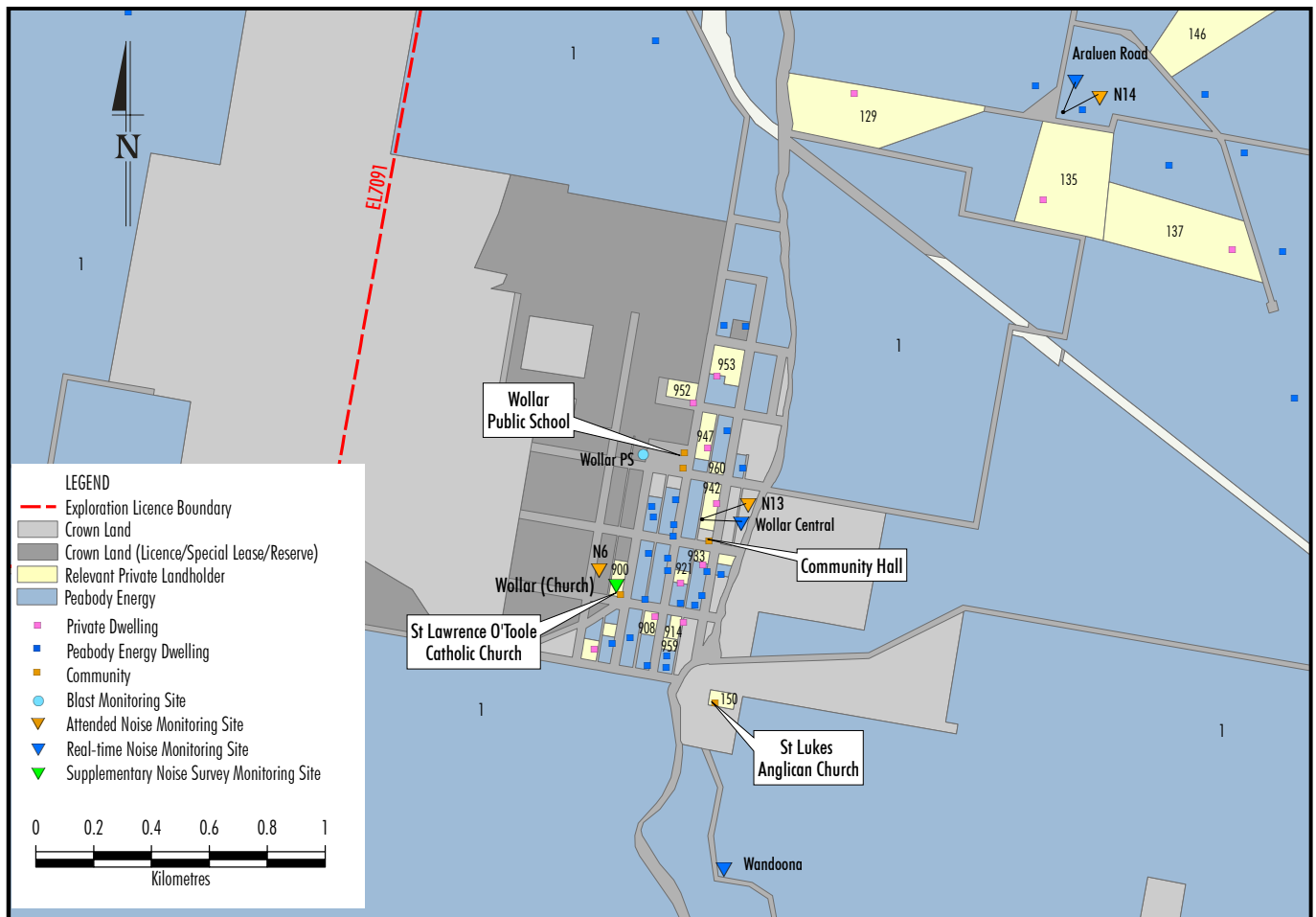
M8 Blasting

- M8.1 To determine compliance with condition(s) L6.1 to L6.4:

- a) Airblast overpressure and ground vibration levels experienced at the following noise sensitive locations must be measured and recorded for all blasts carried out on the premises;
 - approximately 50m west of the Wollar Primary School grounds - E 777403 N6416219 (MGA94, Zone 55)
- b) Instrumentation used to measure and record the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.

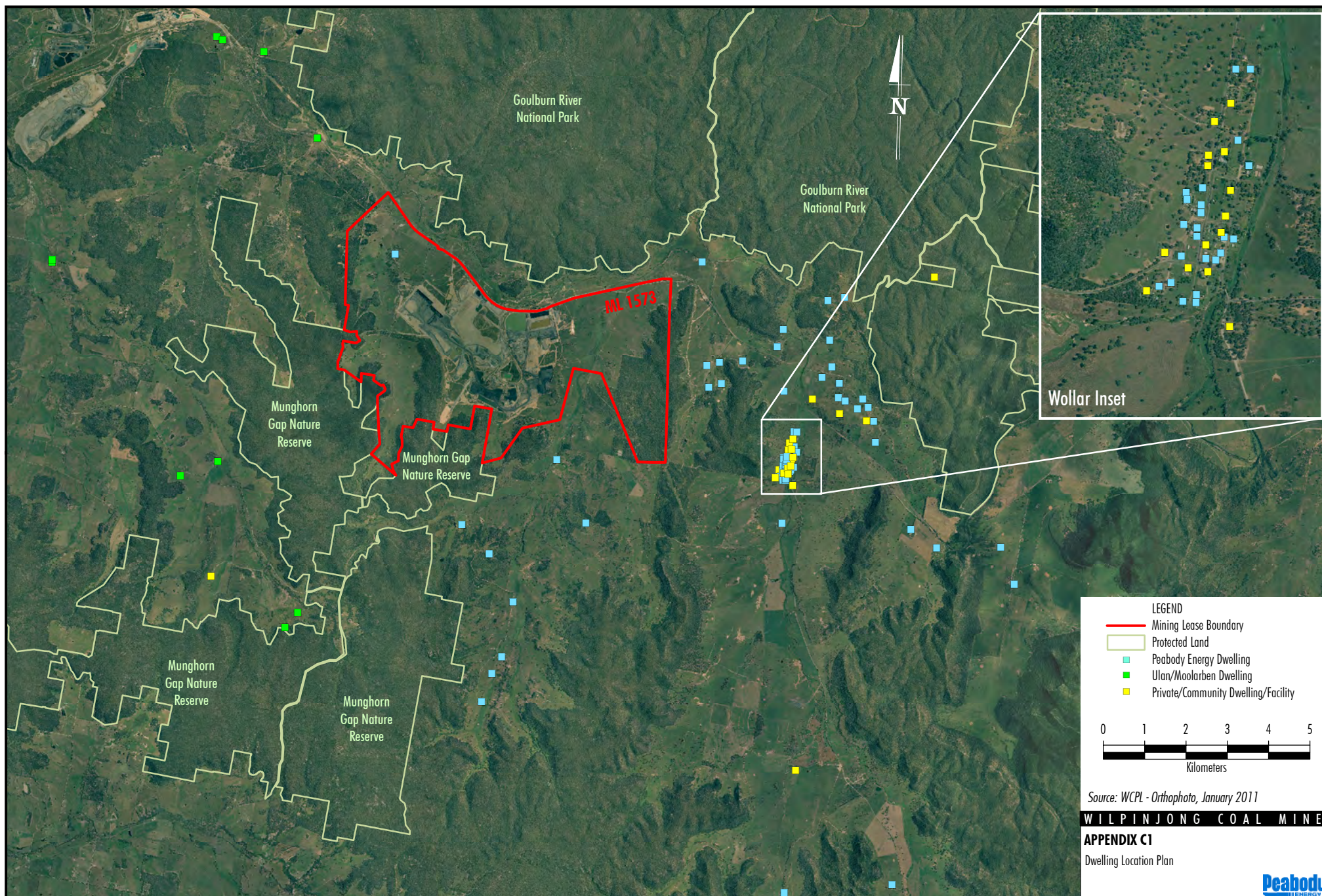
Note: A breach of the licence will still occur where airblast overpressure or ground vibration levels from the blasting operations at the premises exceeds the limit specified in conditions L6.1 to L6.4 at any "noise sensitive locations" other than the locations identified in the above condition.

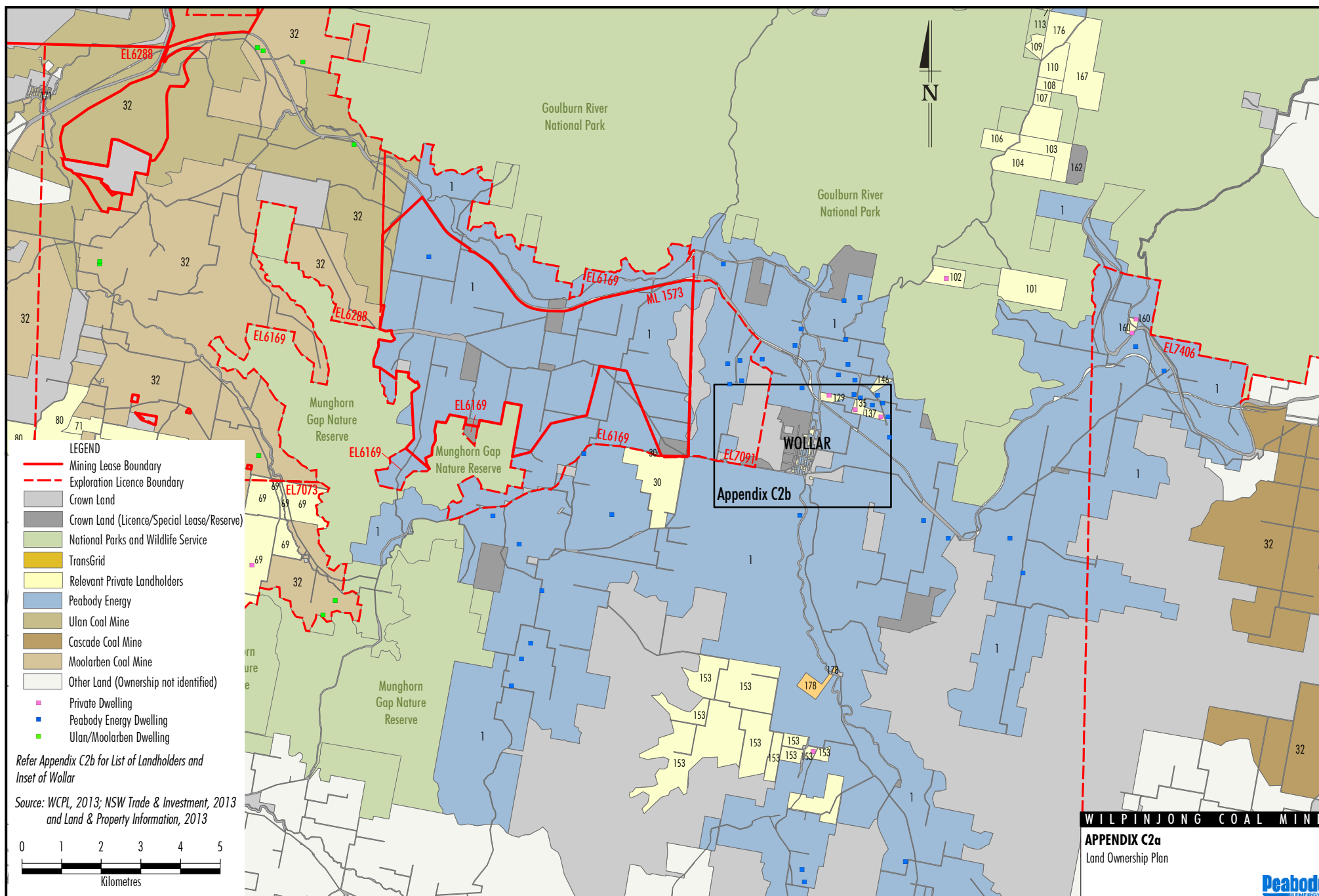




Ref No.	Landholder	Ref No.	Landholder
1	Peabody Energy	162	Special lease 1969/7 Daniel Ponton
30	William Gaffney	167	G Jaques
32	Ulan/Moolarben/Cascade Coal Controlled Land	169	J Asztalos
69	DJ & JG Stokes	170	MB Cox
80	RB Cox	110	Patricia Ann Crosse
101	NAB Pierce	175	SF & MR Andrews
102	W Filipczyk	176	Shaun Rayner
103	MR Molloy	178	TransGrid
104	J & I Hartig	900	Catholic Church
106	JA Sales	903	M Hardiman & D Hogan
107	RJ Lee	908	A & A Lynch
108	Crosse	914	Paul Warwick Nicod & Philip John Slade
109	MO Vaisey	921	EH Toombs
113	AJ Brett & S & D Hilt	933	CR Faulkner
114	C Ware & N Parker	942	Robert & Susan Schneider
129	K & R Roser	947	Scott & Jane Lillis
135	K & R Roser	952	B & D O'Hara
137	A & C Chetcuti	953	B Marshall & R Muller
146	D & B Spearpoint	959	CJ Clarke
150	Edmund Tindale, Alexander McDonald, Will	960	Scott Lillis
153	Terrence William Marskell	961	Jaques Family Investments P/L
160	B Smiles & A Smiles-Schmidt		

Source: WCPL, 2013; NSW Trade & Investment, 2013 and Land & Property Information, 2013







Ref No.	Landholder	Ref No.	Landholder
1	Peabody Energy	162	Special lease 1969/7 Daniel Ponton
30	William Gaffney	167	G Jaques
32	Ulan/Moolarben/Cascade Coal Controlled Land	169	J Asztalos
69	DJ & JG Stokes	170	MB Cox
80	RB Cox	110	Patricia Ann Crosse
101	NAB Pierce	175	SF & MR Andrews
102	W Filipczyk	176	Shaun Rayner
103	MR Molloy	178	TransGrid
104	J & I Hartig	900	Catholic Church
106	JA Sales	903	M Hardiman & D Hogan
107	RJ Lee	908	A & A Lynch
108	Crosse	914	Paul Warwick Nicod & Philip John Slade
109	MO Vaisey	921	EH Toombs
113	AJ Brett & S & D Hilt	933	CR Faulkner
114	C Ware & N Parker	942	Robert & Susan Schneider
129	K & R Roser	947	Scott & Jane Lillis
135	K & R Roser	952	B & D O'Hara
137	A & C Chetcuti	953	B Marshall & R Muller
146	D & B Spearpoint	959	CJ Clarke
150	Edmund Tindale, Alexander McDonald, Will	960	Scott Lillis
153	Terrence William Marskell	961	Jaques Family Investments P/L
160	B Smiles & A Smiles-Schmidt		

Source: WCPL, 2013; NSW Trade & Investment, 2013 and Land & Property Information, 2013

WILPINJONG COAL MINE

APPENDIX C2b

Wollar Inset and Relevant Land Ownership List
(refer to Appendix C2a for Land Ownership Plan)



Appendix C3

Report Number 610.10806.00200

Page 1 of 3

RECEIVER LOCATIONS

DWELLING ID (September 2012)	Easting	Northing	Elevation	Occupation Building Status (September 2012)	Ownership (September 2012)
Privately Owned					
Moorlarben,Mogo, Araluen, Tochilar, Barigan, Wollar					
69	763579	6413175	545	Occupied	Private
102	781087	6420412	440	Occupied	Private
129	778134	6417466	374	Occupied	Peabody Energy
135	778787	6417102	390	Occupied	Private
137	779441	6416929	375	Occupied	Private
153	777729	6408478	403	Occupied	Private
157	779778	6401722	452	Occupied	Private
160A	785872	6419380	238	Occupied	Private
160B	785768	6419042	235	Occupied	Private
Wollar Village					
903	777235	6415547	370	Occupied	Private
908	777444	6415660	365	Occupied	Private
914	777544	6415640	362	Occupied	Private
921	777533	6415777	365	Occupied	Private
933	777611	6415840	362	Occupied	Private
942	777658	6416052	362	Occupied	Private
947	777628	6416245	364	Occupied	Private
952	777578	6416399	365	Occupied	Private
953	777660	6416492	363	Occupied	Private
Wollar Village - School					
901	777547	6416227	365	School	Private
944	777543	6416175	366	School	Private
Wollar Village - Church					
900	777326	6415738	369	Church	Private
150A	777654	6415365	364	Church	Private
Wollar Village - Community - Hall					
935	777633	6415922	363	Hall	Community
Reource-company Owned					
Moolarben Coal Mines Pty Ltd					
32_12	763719	6426239	442	Occupied	Moolarben
32_13	763859	6426158	438	Occupied	Moolarben
32_14	764861	6425876	420	Occupied	Moolarben
32_29A	763746	6415947	500	Occupied	Moolarben
32_29B	762841	6415592	528	Occupied	Moolarben
32_48A	765370	6411929	580	Occupied	Moolarben
32_48B	765680	6412292	555	Occupied	Moolarben
32_32C	766154	6423779	412	Occupied	Moolarben

Appendix C3

Report Number 610.10806.00200

Page 2 of 3

RECEIVER LOCATIONS

DWELLING ID (September 2012)	Easting	Northing	Elevation	Occupation Building Status (September 2012)	Ownership (September 2012)
32_33A	759734	6420774	450	Occupied	Moolarben
32_33B_5	759740	6420835	450	Occupied	Moolarben
Peabody Energy					
1_100B	781139	6413853	419	Occupied	Peabody Energy
1_127	778549	6418884	368	Renovate	Peabody Energy
1_131	778786	6417847	375	Occupied	Peabody Energy
1_133	778761	6417492	388	Occupied	Peabody Energy
1_136	779222	6417219	375	Occupied	Peabody Energy
1_140	779656	6416414	379	Renovate	Peabody Energy
1_142	779616	6416921	372	Occupied	Peabody Energy
1_143	778924	6417412	390	Occupied	Peabody Energy
1_145	779348	6417464	370	Occupied	Peabody Energy
1_151	770124	6410133	465	Occupied	Peabody Energy
1_152	779484	6417262	371	Occupied	Peabody Energy
1_154	777451	6405506	437	Occupied	Peabody Energy
1_155	777507	6405187	446	Occupied	Peabody Energy
1_156	780057	6405697	440	Occupied	Peabody Energy
1_158	782693	6413867	349	Occupied	Peabody Energy
1_159	783017	6412974	315	Occupied	Peabody Energy
1_162	785864	6418687	248	Occupied	Peabody Energy
1_163	786574	6418088	237	Occupied	Peabody Energy
1_164	771950	6415993	398	Occupied	Peabody Energy
1_18	778908	6419926	450	Occupied	Peabody Energy
1_19	778509	6419848	420	Occupied	Peabody Energy
1_25	777277	6418726	375	Occupied	Peabody Energy
1_26	777427	6419148	355	Occupied	Peabody Energy
1_26	778340	6418222	360	Renovate	Peabody Energy
1_28C	777447	6417650	375	Occupied	Peabody Energy
1_30	778369	6417986	360	Occupied	Peabody Energy
1_31	776448	6418380	390	Occupied	Peabody Energy
1_45	775463	6420780	356	Occupied	Peabody Energy
1_49	772652	6414452	455	Occupied	Peabody Energy
1_52A	775932	6417838	408	Occupied	Peabody Energy
1_53	775883	6418356	397	Occupied	Peabody Energy
1_55	775576	6418269	392	Occupied	Peabody Energy
1_58	775624	6417748	400	Occupied	Peabody Energy
1_83	778608	6418243	360	Occupied	Peabody Energy
1_905	777297	6415569	369	Occupied	Peabody Energy
1_907	777359	6415587	367	Occupied	Peabody Energy

Appendix C3

Report Number 610.10806.00200

Page 3 of 3

RECEIVER LOCATIONS

DWELLING ID (September 2012)	Easting	Northing	Elevation	Occupation Building Status (September 2012)	Ownership (September 2012)
1_910	777418	6415491	365	Occupied	Peabody Energy
1_912	777486	6415527	363	Occupied	Peabody Energy
1_913	777483	6415485	362	Occupied	Peabody Energy
1_915	777410	6415720	368	Occupied	Peabody Energy
1_916	777533	6415707	364	Occupied	Peabody Energy
1_917	777584	6415700	362	Commercial	Peabody Energy
1_920	777608	6415735	362	Occupied	Peabody Energy
1_923	777489	6415820	367	Occupied	Peabody Energy
1_926	777626	6415817	362	Occupied	Peabody Energy
1_927	777674	6415806	361	Occupied	Peabody Energy
1_929	777490	6415863	367	Occupied	Peabody Energy
1_931	777422	6415880	368	Occupied	Peabody Energy
1_934	777509	6415939	366	Occupied	Peabody Energy
1_937	777510	6415979	366	Occupied	Peabody Energy
1_938	777439	6416006	368	Occupied	Peabody Energy
1_939	777435	6416041	369	Occupied	Peabody Energy
1_941	777517	6416064	367	Occupied	Peabody Energy
1_946	777750	6416175	360	Occupied	Peabody Energy
1_950	777696	6416304	361	Renovate	Peabody Energy
1_956	777684	6416665	361	Occupied	Peabody Energy
1_957	777759	6416664	360	Occupied	Peabody Energy
1_W88A	770376	6410814	453	Occupied	Peabody Energy
1_W88B	770611	6411217	449	Occupied	Peabody Energy
1_WA	768038	6420964	423	Occupied	Peabody Energy
1_WF	769652	6414414	445	Occupied	Peabody Energy
1_WJ	770312	6413714	472	Occupied	Peabody Energy
1_WK	770890	6412538	431	Occupied	Peabody Energy
1_WR	777395	6414444	370	Occupied	Peabody Energy
1_WT	780517	6414297	402	Occupied	Peabody Energy
Livestock, Aboriginal Heritage and Infrastructure					
Stockyard - Livestock	14379	975	375	NA	-
Aboriginal - RockArt 72	13739	7366	433	NA	-
Aboriginal - RockArt 152	10479	6911	475	NA	-
Aboriginal - RockArt 153	10560	7441	480	NA	-
Roadway – Culvert	14077	9833	375	NA	-
Railway - Rail Loop	12911	8415	390	NA	-
Railway - Rail Line	12911	8415	390	NA	-



Mid-Western Regional Council
Regional Local Environmental Plan 2012

Land Zoning Map - Sheet LZN_008A

Zone

- E1** Neighbourhood Centre
- E2** Local Centre
- E3** Commercial Core
- E4** Mixed Use
- E5** Business Development
- E6** National Parks and Nature Reserves
- E7** Environmental Management
- I1** General Industrial
- I2** Light Industrial
- I3** Heavy Industrial
- R1** General Residential
- R2** Low Density Residential
- R3** Medium Density Residential
- R4** Large Lot Residential
- RE1** Public Recreation
- RE2** Private Recreation
- PU1** Primary Production
- PU2** Forestry
- PU3** Primary Production Small Lots
- PU4** Village
- IP1** Infrastructure
- TP1** Tourist

Cadastral

-  Cadastral (15/12/2010 Land and Property Information (LPI))



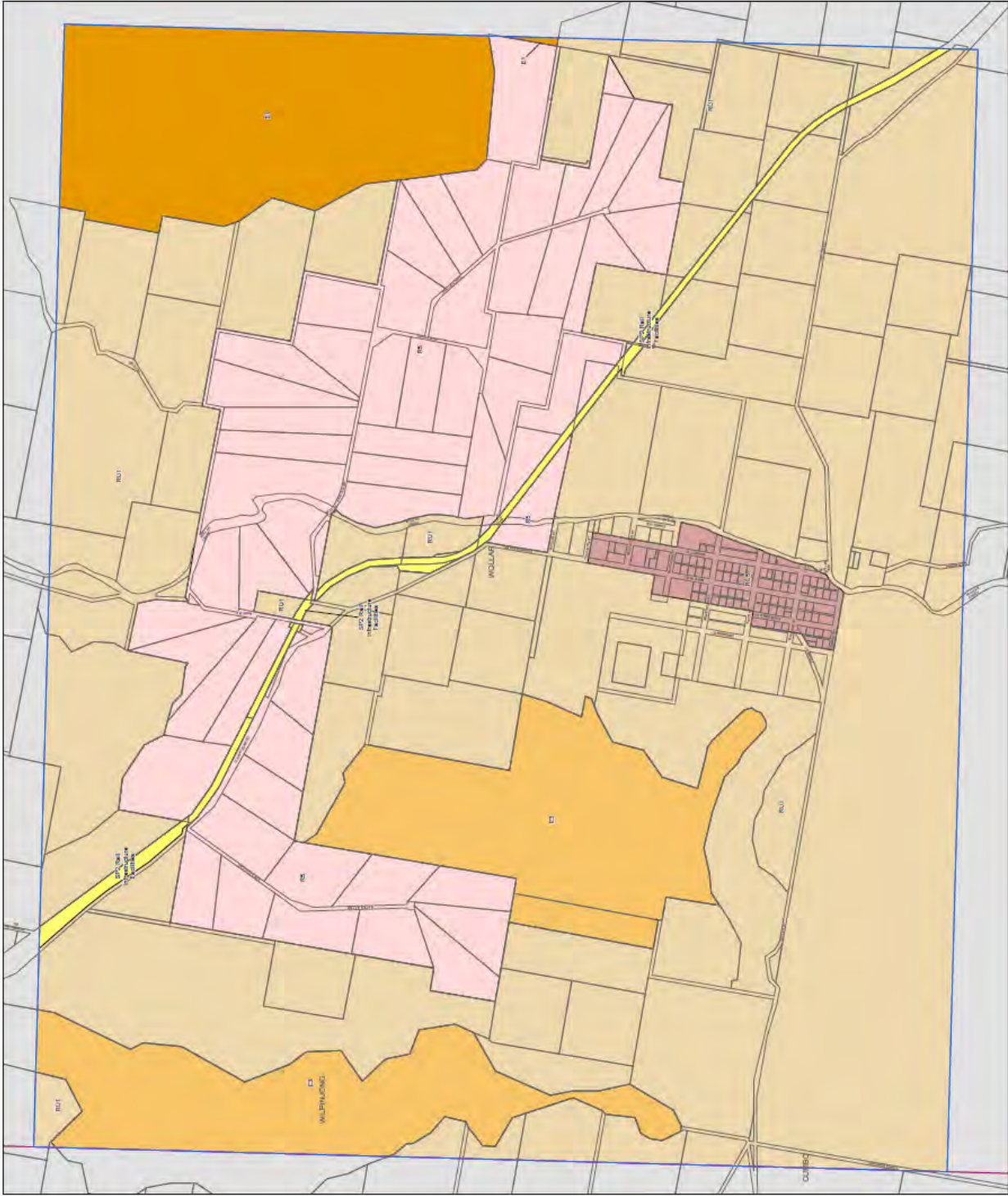
Scale

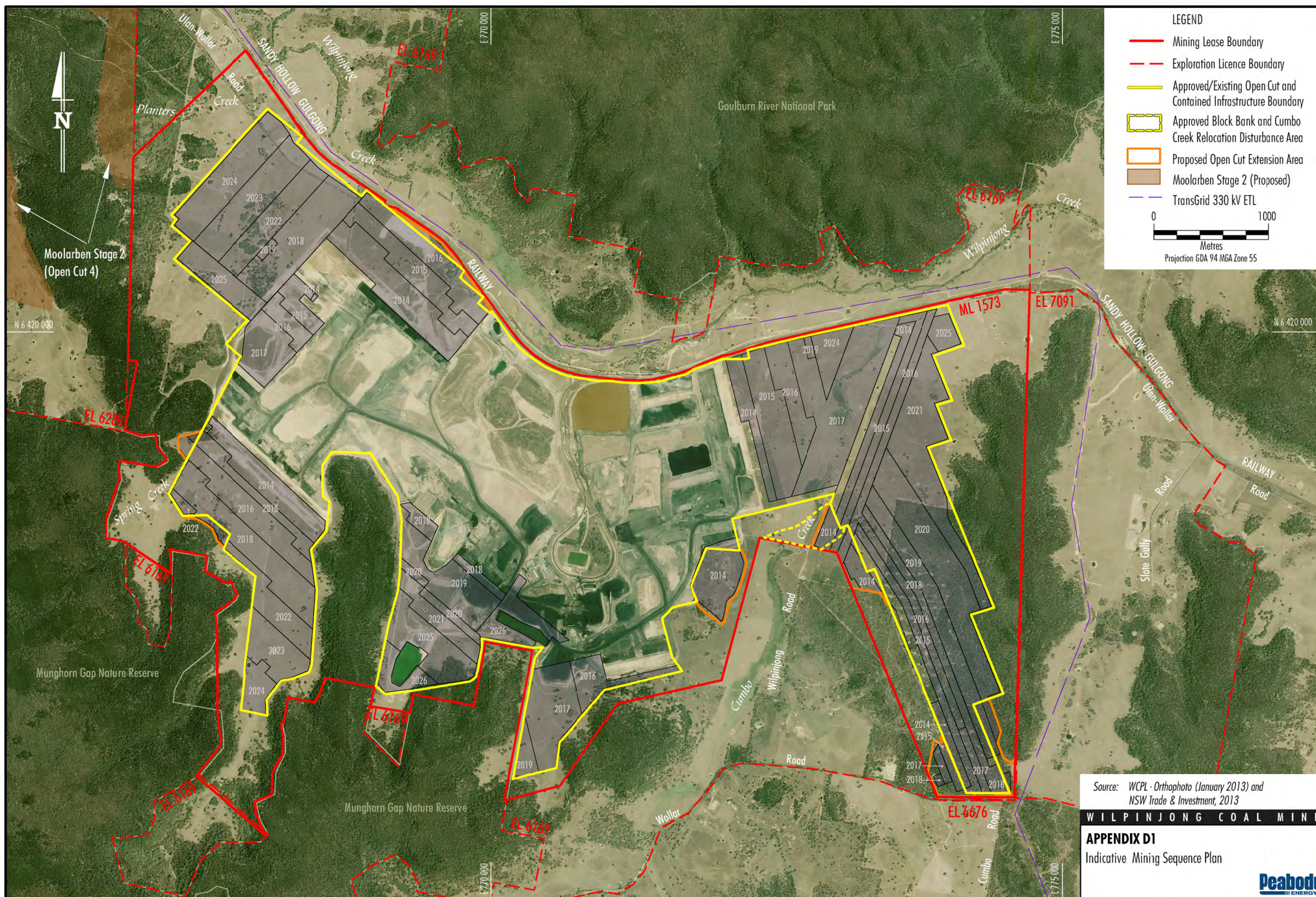
0 200 400 600 800 Metres

Scale: 1:20,000 @ A3

Projection: GDA 94
Map Zone: 48

Map Identification Number: 6270_CON_LZN_008A_020_20120619







0 50 100 150 200
Metres
Projection GDA 94 MGA Zone 55
Source: WCPL - Orthophoto (January 2013)

WILPINJONG COAL MINE

APPENDIX D2
CHPP and Materials Handling Area



SITE METEOROLOGICAL MEASUREMENT METHODOLOGY

1 Prevailing Winds

Section 5.3 of the INP, Wind Effects, states:

“Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season.”

An assessment of prevailing wind conditions was derived from the (new) on-site Automatic Weather Station (AWS) located in the mine facilities area. The dominant seasonal wind speeds and directions for the period August 2011 to September 2012 are presented in **Attachment A** for daytime (0700 hours to 1800 hours), evening (1800 hours to 2200 hours) and night-time (2200 hours to 0700 hours) in accordance with a methodology consistent with the requirements of the INP.

Based on this analysis, the prevailing winds less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30% are presented in **Table E1** and considered to be relevant to the WCM site in accordance with the INP.

Table E1 Prevailing Seasonal 10 m Wind Velocities In Accordance with the INP

Season	Winds ± 45 degrees	3 m/s with Frequency of Occurrence 30%	
	Daytime	Evening	Night-Time
Annual	Nil	Nil	Nil
Summer	Nil	ESE (30%)	ESE (44%), SE (39%), E (38%)
Autumn	Nil	Nil	Nil
Winter	Nil	Nil	Nil
Spring	Nil	Nil	Nil

2 Temperature Inversions

Section 5.2 of the INP, Temperature Inversions, states:

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

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

An assessment of winter temperature gradients and atmospheric stability was derived from the (new) on-site Temperature Tower (TT) located in the mine facilities area. Presented in **Attachment B** is the winter Temperature Gradient Exceedance Levels summary and **Attachment C** winter Temperature Gradient Exceedance Levels 24 hour profile and winter Temperature Gradient Cumulative Frequency Distribution for the 13 month period (August 2011 to September 2012) in accordance with a methodology consistent with the requirements of the INP.

Based on this analysis, the seasonal combine evening/night-time temperature gradients and atmospheric stability are presented in **Table E2** and considered to be relevant to the WCM site in accordance with the INP. Similarly, the winter daytime, evening, night-time and combine evening/night-time temperature gradients and atmospheric stability are presented in **Table E3**.

SITE METEOROLOGICAL MEASUREMENT METHODOLOGY

Table E2 Prevailing Seasonal Temperature Gradients in Accordance with the INP

Stability Class	Frequency of Occurrence – Evening/Night-time					Temperature Gradient °C/100 m ¹	Qualitative Description
	Annual	Summer	Autumn	Winter	Spring		
A	0.3%	0.7%	0.1%	0.0%	0.5%	<-1.9	Lapse
A	0.3%	0.7%	0.1%	0.0%	0.5%	-1.9 to -1.7	Lapse
B	0.6%	1.2%	0.4%	0.0%	0.7%	-1.7 to -1.5	Lapse
C	0.8%	1.8%	0.5%	0.0%	1.3%	-1.5 to -0.5	Neutral
D	33.7%	58.3%	26.7%	18.7%	34.6%	-0.5 to 1.5	Weak inversion
F	23.8%	5.5%	29.9%	35.6%	21.3%	1.5 to 4	Moderate inversion
G	13.5%	0.5%	14.3%	24.4%	12.4%	>4.0	Strong inversion
F+G	37.3%	6.0%	44.2%	60.0%	33.7%	>1.5	Moderate to Strong

Note 1: °C/100 m = Degrees Celsius per 100 metres.

Table E3 Prevailing Winter Temperature Gradients in Accordance with the INP

Stability Class	Frequency of Occurrence - Winter Season				Temperature Gradient °C/100 m ¹	Qualitative Description
	Daytime	Evening	Night	Evening/Night		
A	17.6%	0.0%	0.0%	0.0%	<-1.9	Lapse
B	10.7%	0.0%	0.0%	0.0%	-1.9 to-1.7	Lapse
C	11.9%	0.0%	0.0%	0.0%	-1.7 to-1.5	Lapse
D	38.9%	25.3%	15.8%	18.7%	-1.5 to-0.5	Neutral
E	11.8%	25.4%	19.5%	21.3%	-0.5 to 1.5	Weak Inversion
F	6.9%	26.1%	39.8%	35.6%	1.5 to 4.0	Moderate Inversion
G	2.1%	23.2%	24.9%	24.4%	>4.0	Strong Inversion
F+G	9.0%	49.3%	64.7%	60.0%	>1.5	Moderate to Strong

Note 1: °C/100 m = Degrees Celsius per 100 metres.

In accordance with Table E2 of the INP, the combined frequency of occurrence of moderate to strong (ie >1.5 °C/100 m) winter temperature inversions is greater than 30% (actually 60%) during the combined evening/night-time period and therefore requires assessment (EPA, 2000).

In addition, the INP Section 5.2 *Temperature Inversions* also states:

“The drainage-flow wind default value should generally be applied where a development is at a higher altitude than a residential receiver, with no intervening higher ground (for example, hills). In these cases, both the specified wind and temperature inversion default values should be used in the noise assessment for receivers at the lower altitude.”

All receivers [with the exception of receiver 1_45 (WCPL)] are positioned at higher elevation relative to the WCM site and/or there is intervening topography between the site and the receiver. As receiver 1_45 is mine owned and located to the immediate north-east of the WCM site, a specific drainage flow wind has not been further considered in this assessment.

Noise Model Meteorological Parameters

Further analysis of the winter Temperature Gradient Exceedance Levels 24 hour profile (**Attachment C**) has been carried-out and summarised in **Table E4**.

SITE METEOROLOGICAL MEASUREMENT METHODOLOGY

Table E4 Winter Gradient Exceedance Levels 24 hour Profile

Morning Shoulder 0700 to 0900 hours	Daytime 0900 to 1700 hours	Afternoon Shoulder 1700 to 1800 hours	Evening Period 1800 to 2200 hours	Night-time Period 2200 to 0700 hours
Moderate inversion 10% exceedance 3.9°C/100 m	Temperature Lapse 10% exceedance -1.0°C/100 m	Weak inversion 10% exceedance 1.4°C/100 m	Strong inversion 10% exceedance 5.5°C/100 m	Strong inversion 10% exceedance 5.5°C/100 m

Note 1: °C/100 m = Degrees Celsius per 100 metres

Based on the foregoing analysis of the wind velocity and temperature gradients derived from the (new) on-site automatic weather station (AWS) and temperature Tower (TT), the INP meteorological parameters presented in **Table E5**.

Table E5 INP Assessable Meteorological Noise Modelling Parameters

Period	Meteorological Parameter	Air Temperature	Relative Humidity	Wind Velocity	Temperature Gradient
Daytime INP	Calm	17°C	56%	0 m/s	0°C/100 m
Evening INP	Calm	16°C	62%	0 m/s	0°C/100 m
	Summer Wind 30% (occurrence)	22°C	53%	ESE 3 m/s	0°C/100 m
Night-time INP	Calm	11°C	80%	0 m/s	0°C/100 m
	Summer Wind > 30 % (occurrence)	18°C	69%	ESE, SE, E 3 m/s	0°C/100 m
	Strong Inversion (10% exceedance) ¹	5°C	87%	0 m/s	5.5°C/100 m

Note 1: Winter evening/night-time 10% exceedance temperature gradient in accordance with INP Appendix E Table E2

SITE METEOROLOGICAL MEASUREMENT METHODOLOGY

ATTACHMENT A

New on-site Automatic Weather Station (AWS) - August 2011 to September 2012

Seasonal Frequency of occurrence 10 m Wind Velocity - Daytime

Period	Calm (<0.5 m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	13%	E	14%	10%	24%
Summer	6%	E	13%	15%	28%
Autumn	18%	E	18%	9%	27%
Winter	17%	E	11%	6%	17%
Spring	9%	E	14%	10%	24%

Seasonal Frequency of occurrence 10 m Wind Velocity - Evening

Period	Calm (<0.5 m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	24%	ESE	14%	8%	22%
Summer	8%	ESE	16%	14%	<u>30%</u>
Autumn	32%	ESE	15%	10%	25%
Winter	37%	WNW	11%	9%	20%
Spring	16%	E, ESE	14%, 15%	8%, 8%	22%, 22%

Seasonal Frequency of occurrence 10 m Wind Velocity - Night-Time

Period	Calm (<0.5 m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	45%	ESE	15%	8%	23%
Summer	24%	ESE, SE, E	25%, 22%, 21%	19%, 17%, 17%	<u>44%, 39%, 38%</u>
Autumn	52%	ESE	12%	7%	19%
Winter	59%	NW	10%	7%	17%
Spring	45%	ESE	17%	7%	24%

ATTACHMENT B

New on-site Temperature Tower - August 2011 to September 2012

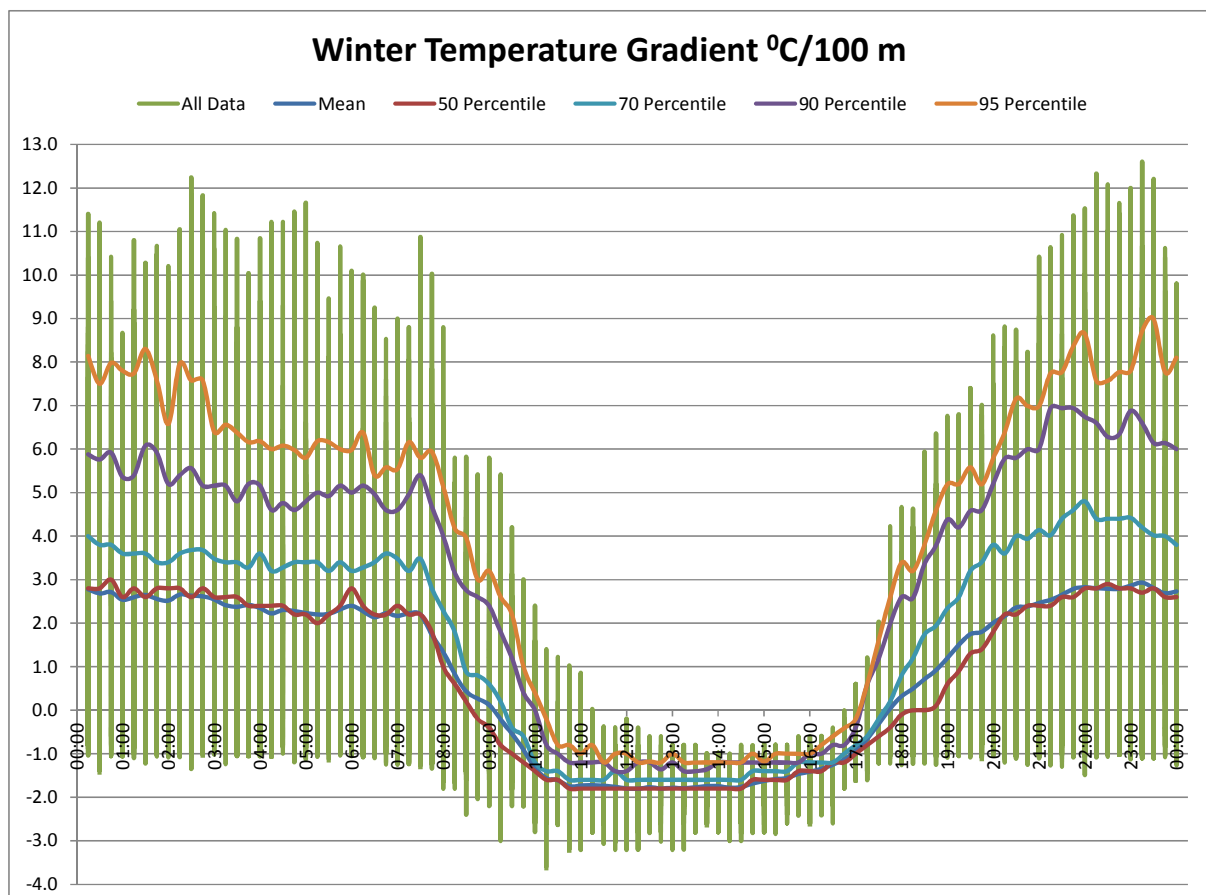
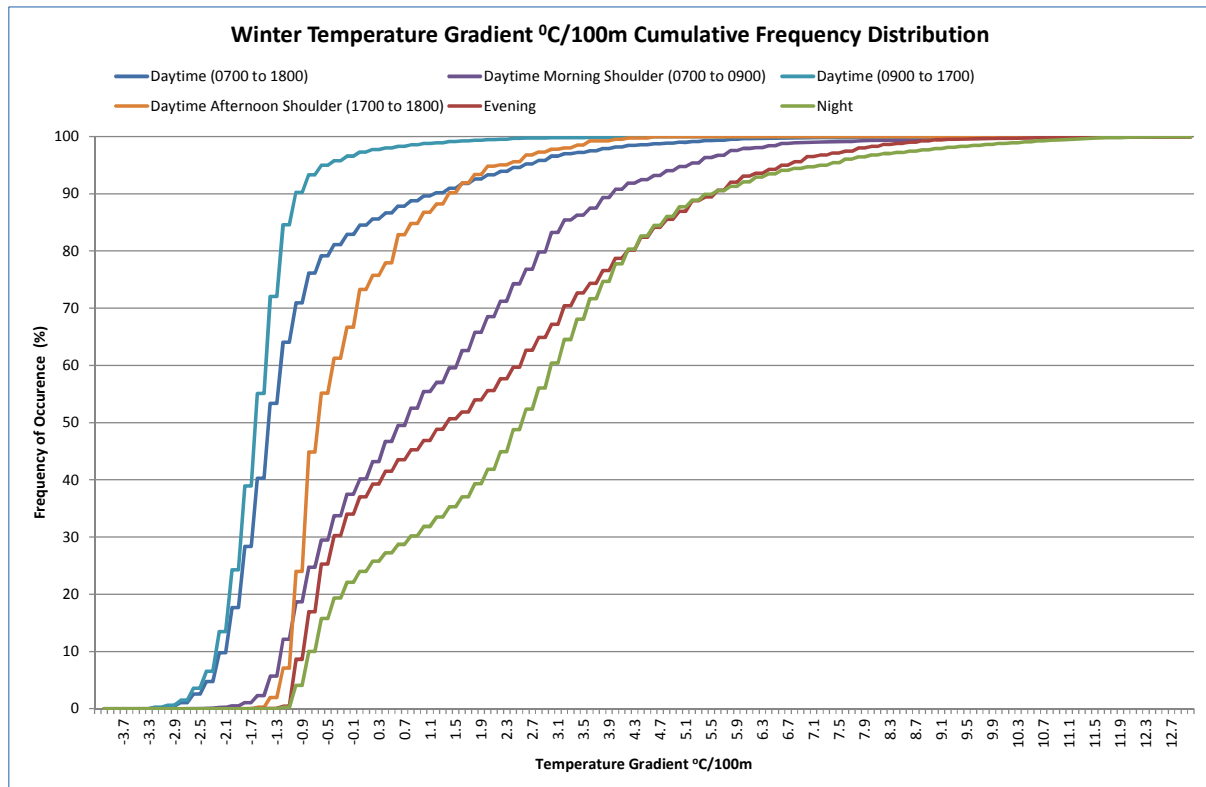
Winter Temperature Gradient Exceedance Level (Degrees C per 100 m) Summary

Daytime Exceedance				Evening Exceedance					Night-time Exceedance				
0700 to 1800 hours				1800 to 2200 hours					2200 to 0700 hours				
50%	30%	10%	5%	50%	30%	21%	10%	2%	50%	30%	22%	10%	3%
-1.4	-1.0	1.1	2.5	1.3	3.2	4.0	5.5	8.0	2.6	3.6	4.0	5.5	8.0

Morning Shoulder, Daytime and Afternoon Shoulder Exceedance											
0700 to 0900 hours				0900 to 1700 hours				1700 to 1800 hours			
50%	30%	10%	5%	50%	30%	10%	5%	50%	30%	10%	5%
0.6	2.2	3.9	5.1	-1.6	-1.4	-1.0	-0.6	-0.6	0.0	1.4	2.0

SITE METEOROLOGICAL MEASUREMENT METHODOLOGY

ATTACHMENT C



SITE NOISE MEASUREMENT METHODOLOGY

Overview of Methodology

A noise monitoring programme was conducted in December 2012 to quantify ambient noise levels (ie all noise sources) and to estimate industrial noise only (ie in the absence of transport, natural and domestic noise) at four representative residential receiver areas in the vicinity of the Wilpingjong Coal Mine in relation to the proposed Project.

In order to supplement the unattended logger measurements and to assist in identifying the character and duration of the noise sources, operator-attended night-time surveys were also conducted at all the vicinity of the logging locations. The ambient noise monitoring programme was implemented in accordance with AS 1055-1997 *Acoustics-Description and Measurement of Environmental Noise* and the *NSW Industrial Noise Policy* (INP) (New South Wales Environment Protection Authority, 2000).

Instrumentation and Measurement Parameters

All acoustic instrumentation employed throughout the noise monitoring programme has been designed to comply with the requirements of Australian Standard (AS) 1259.2-1990 *Sound Level Meters* and carries current National Association of Testing Authorities (NATA) or manufacturer calibration certificates.

A description of instrumentation, designated type and serial numbers is shown in **Table F1**.

Table F1 Acoustic Instrumentation Schedule

ID/Landowner	Location	Survey	Instrumentation
160 Private	Wollar	Ambient noise	SVAN 20665
102 Private	Mogo		SVAN 23815
1_155 Peabody	Tochilar		SVAN 27578
32 Cascade	Coggan		SVAN 23247
Corner of Ulan and Lagoons Roads	Ulan	Road Traffic	SVAN 20675

All instrumentation was programmed to record continuously the noise exceedance levels in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and the L_{Aeq}. Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ± 0.5 dBA.

Weather Monitoring Station

Meteorological data were obtained from the new on-site Automatic Weather Station (AWS) and a 60 m high Permanent Temperature Tower (PTT) as shown on the Environmental Monitoring Site Plan **Appendix B1**.

Unattended Ambient Noise Monitoring Results

The unattended ambient noise logger data from each monitoring location, together with the on-site weather conditions were analysed on a daily basis.

The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the interval period. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or ambient noise level. The L_{A10} is the level exceeded for 10% of the time and is usually referred to as the average maximum noise level. The L_{Aeq} is the equivalent continuous sound pressure level and represents the steady sound level which is equal in energy to the fluctuating level over the interval period.

Prior to further analysis, the ambient noise data from each location which correlated with periods of unstable weather (e.g. rainfall greater than 0.5 millimetres [mm] or wind speed greater than 5 metres per second [m/s]) were discarded. The acceptable ambient noise data were then processed in accordance with the INP "Appendix B - Applying the Background Noise Policy" to derive the Monday to Sunday ambient noise levels presented in **Table F2**.

SITE NOISE MEASUREMENT METHODOLOGY

Table F2 Unattended Ambient Noise Logger Results 2012 (dBA re 20 µPa)

Ref/Landholder	Measured RBL ^{1,2} All Noise Sources			Measured LAeq(period) ² All Noise Sources			Estimated LAeq(period) ² Industrial Noise Only		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
160 Private	13	23	12	57	56	46	<44	<39	<34
102 Private	22	30	12	41	51	45	<44	<39	<34
1_155 Peabody	23	22	18	44	43	45	<44	<39	<34
32 Cascade	19	24	13	54	53	52	<44	<39	<34
Ulan Road	29	38	27	52	52	50	<44	<39	<34

Note 1: In accordance with the NSW INP (2000), if the RBL is below 30 dBA, then 30 dBA shall be the assumed RBL.

Note 2: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

µPa = micro Pascal.

Operator-Attended Ambient Noise Survey Results

Operator-attended noise surveys of 15 minutes duration were conducted with a precision integrating sound level meter in order to qualify the results obtained with the unattended noise loggers. During the attended noise surveys, the operator identified the character and duration of acoustically significant ambient noise sources. Wherever applicable the operator quantified local traffic flow and made a qualitative assessment of the prevailing weather conditions.

The night-time operator-attended noise surveys for the four ambient noise monitoring locations are presented below:

161 - Private

Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels L _{Amax} - dBA
		Leq	L1	L10	L50	L90	
Night 04/12/12 0021 hrs 2 Okta, calm	Ambient	54	30	26	23	21	Insects 26-27 Mine 15-18
	Industrial	Estimated from Wilpinjong Mine L _{Aeq} ≈18 dBA					

102 - Private

Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels L _{Amax} - dBA
		Leq	L1	L10	L50	L90	
Night 04/12/12 0056 hrs 2 Okta, calm	Ambient	48	39	38	35	34	Insects 36-39 Mine (barely discernable) 12-16
	Industrial	Estimated LAeq ≈16 dBA					

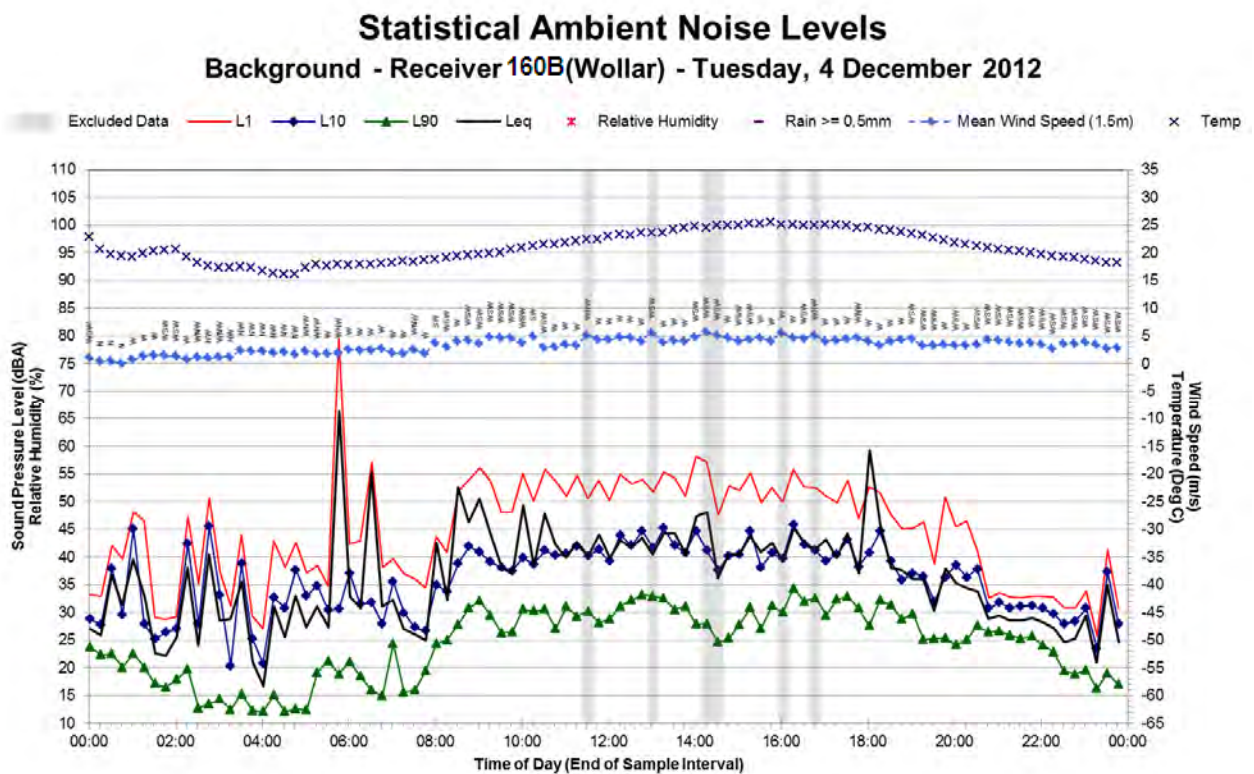
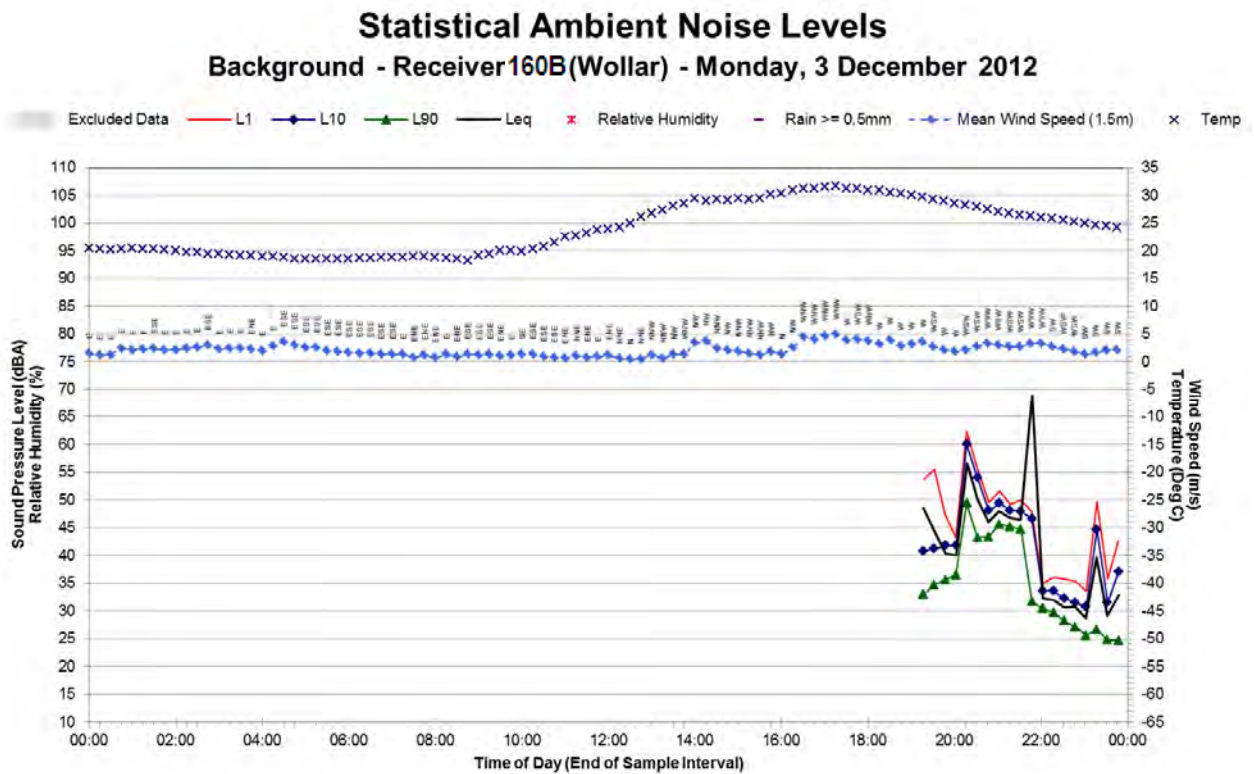
1_155 - Peabody

Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels LAmax - dBA
		Leq	L1	L10	L50	L90	
Night 04/12/12 0159 hrs 1 Okta, calm	Ambient	58	32	24	22	21	Insects 21-41 Cows 24-38
	Industrial	Not discernable					

32 Cascade

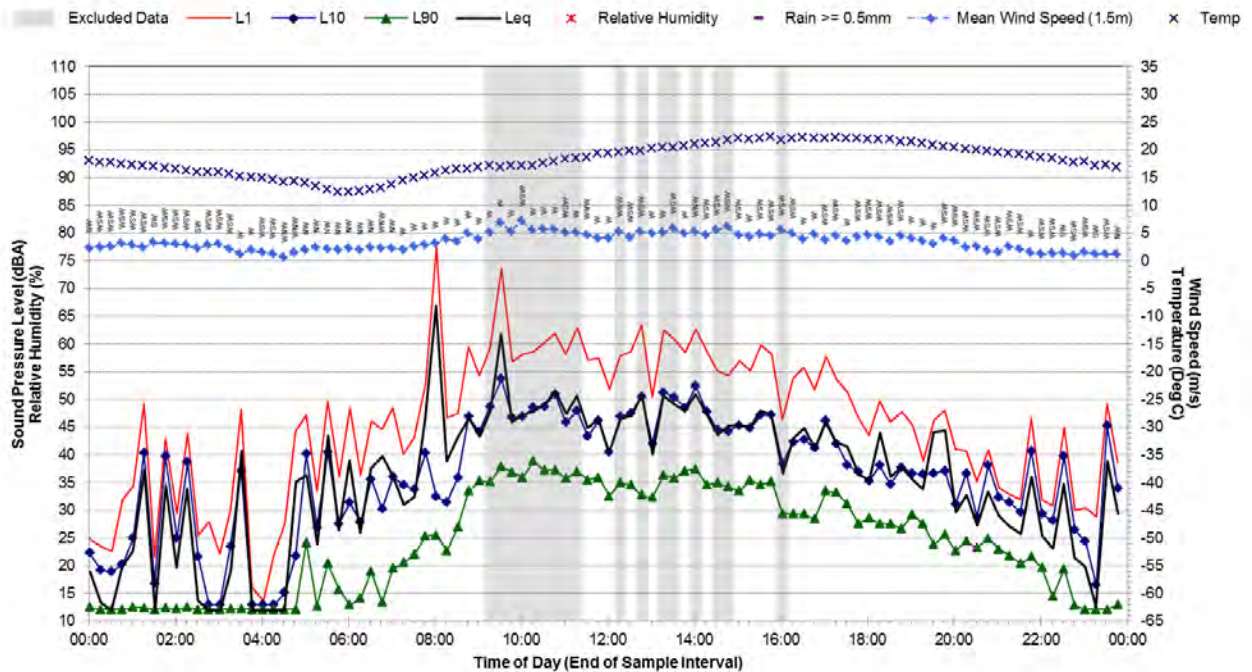
Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels L _{Amax} - dBA
		Leq	L1	L10	L50	L90	
Night 04/12/12 0119 hrs 2 Okta, calm	Ambient	47	34	31	28	26	Insects 28-32 Cows 29-33
	Industrial	Not discernable					Bird 33-34 Traffic 33-39

AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

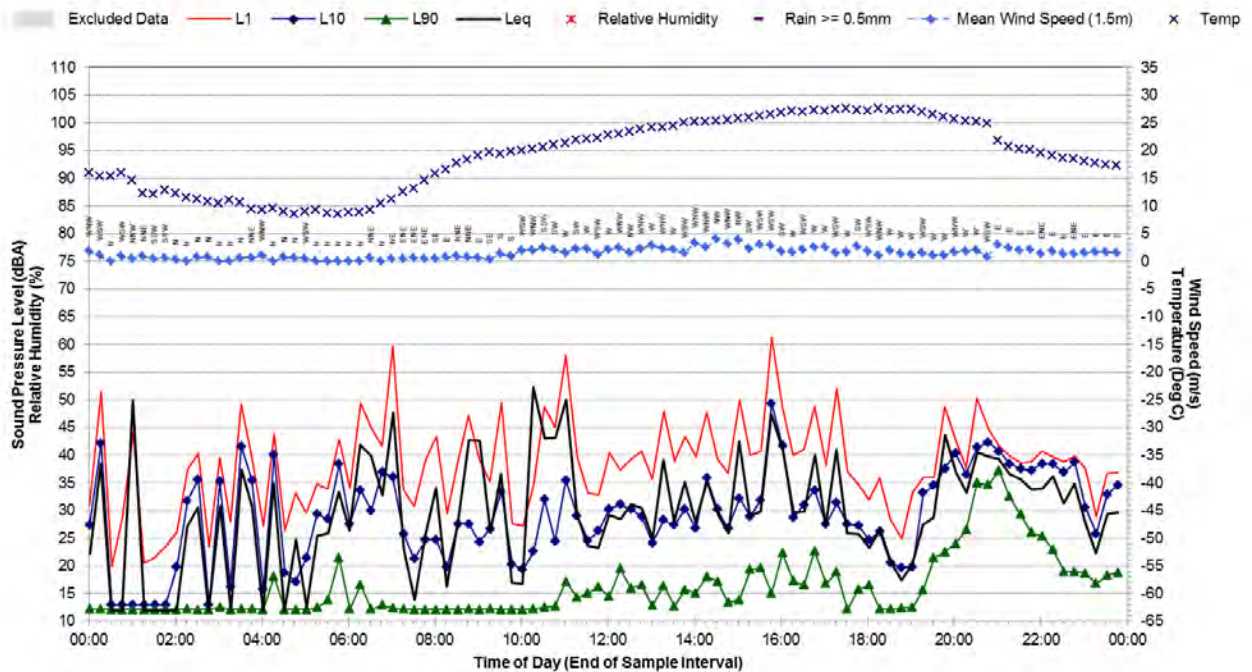


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Wednesday, 5 December 2012

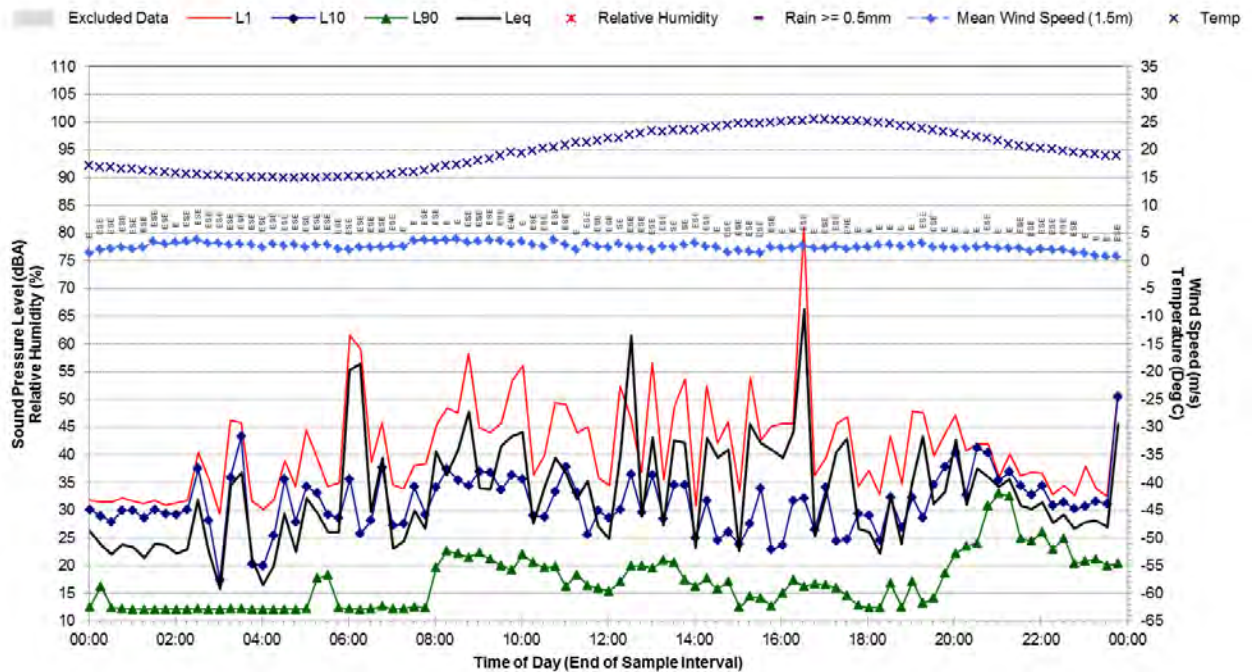


Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Thursday, 6 December 2012

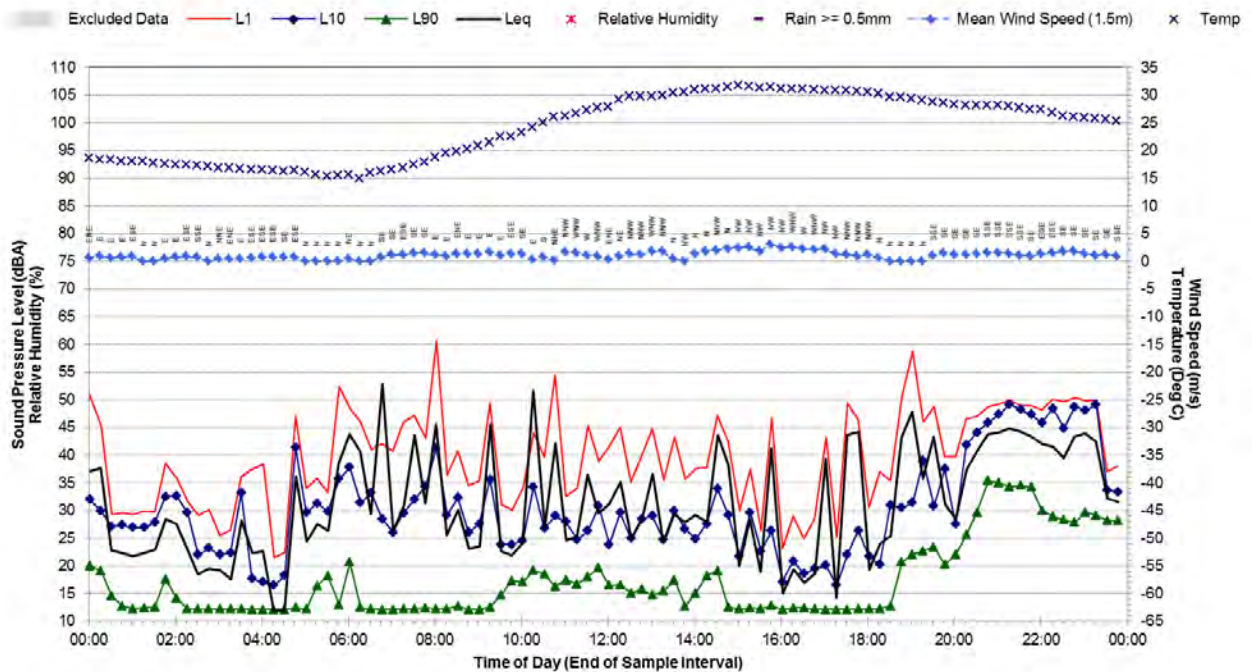


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Friday, 7 December 2012



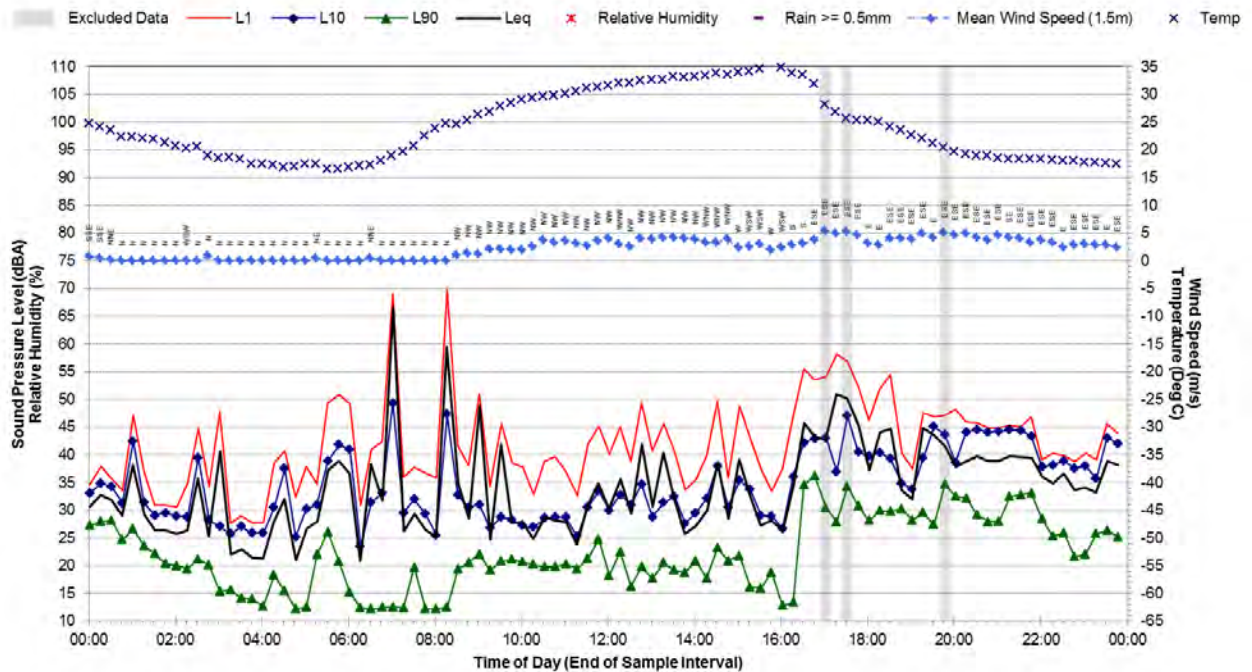
Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Saturday, 8 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

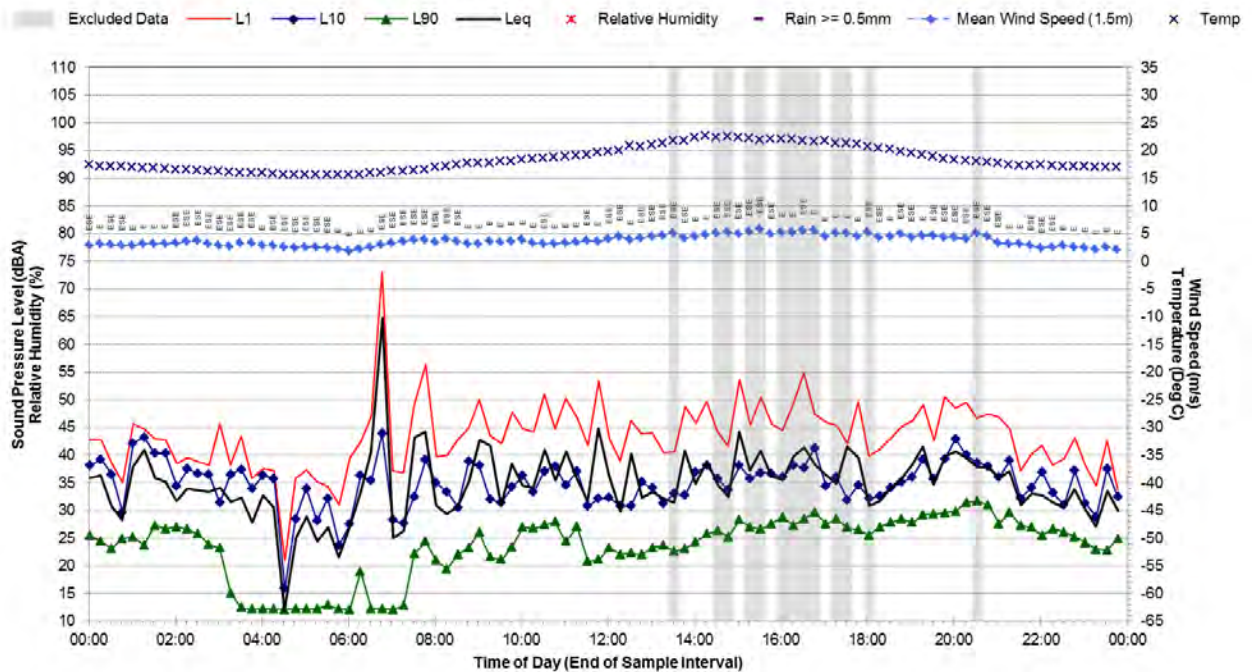
Statistical Ambient Noise Levels

Background - Receiver 160B(Wollar) - Sunday, 9 December 2012



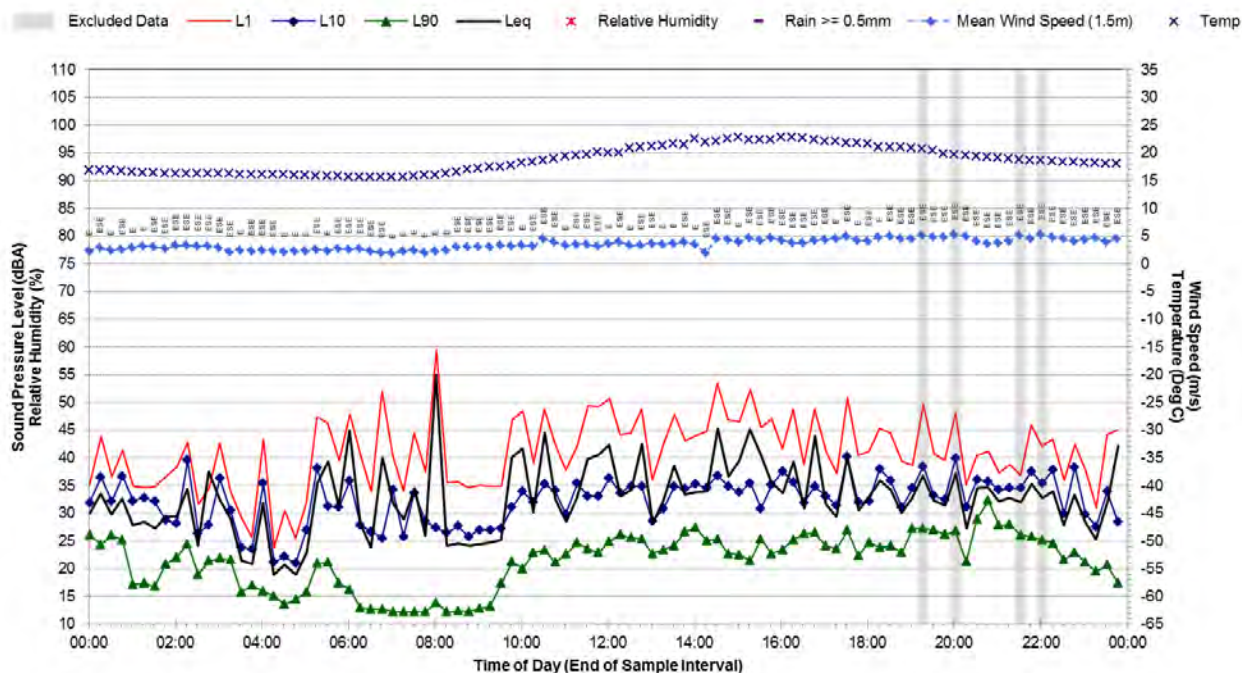
Statistical Ambient Noise Levels

Background - Receiver 160B(Wollar) - Monday, 10 December 2012

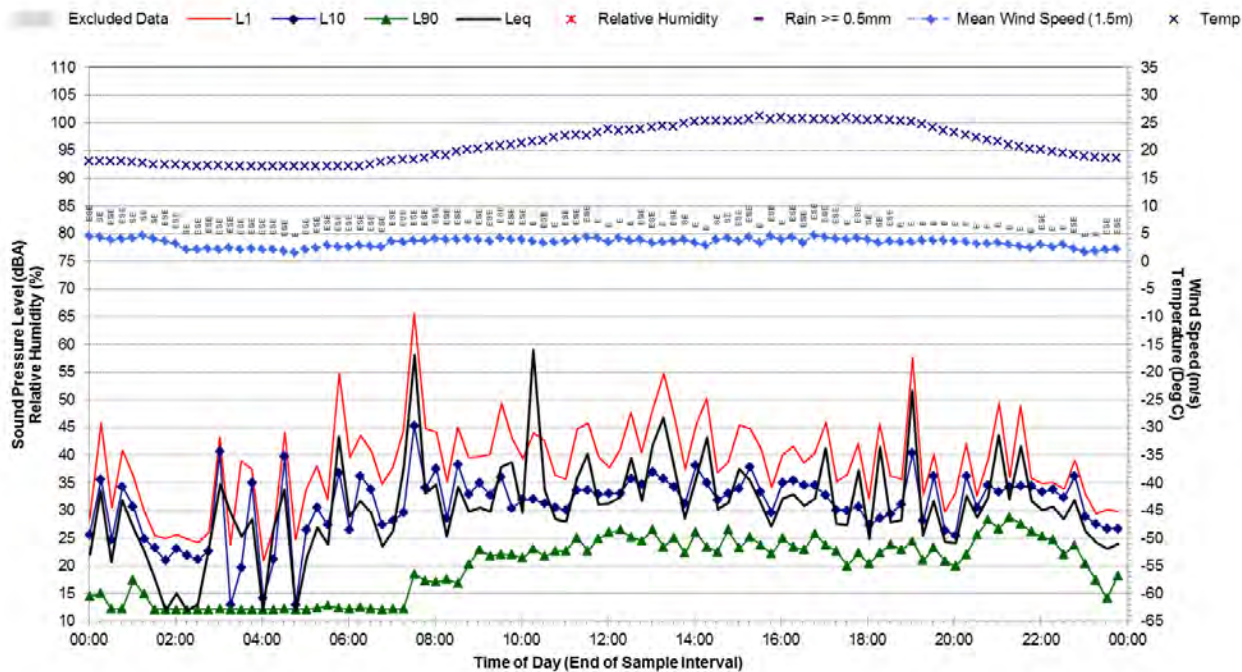


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Tuesday, 11 December 2012

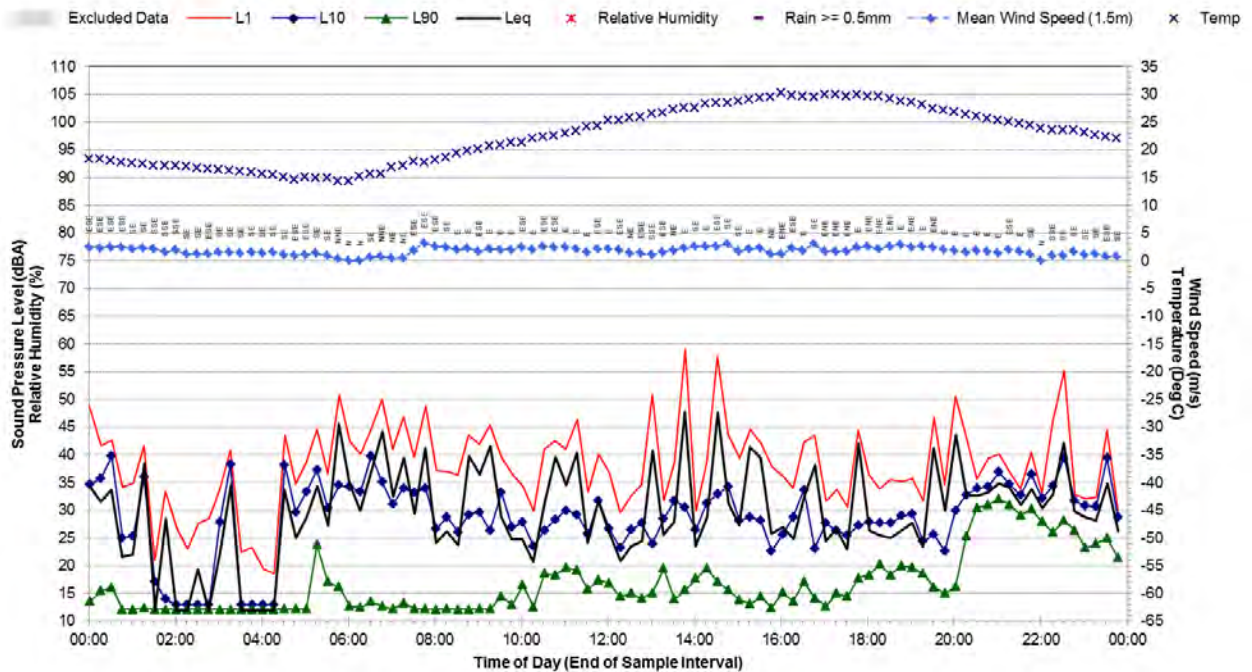


Statistical Ambient Noise Levels
Background - Receiver 160B(Wollar) - Wednesday, 12 December 2012

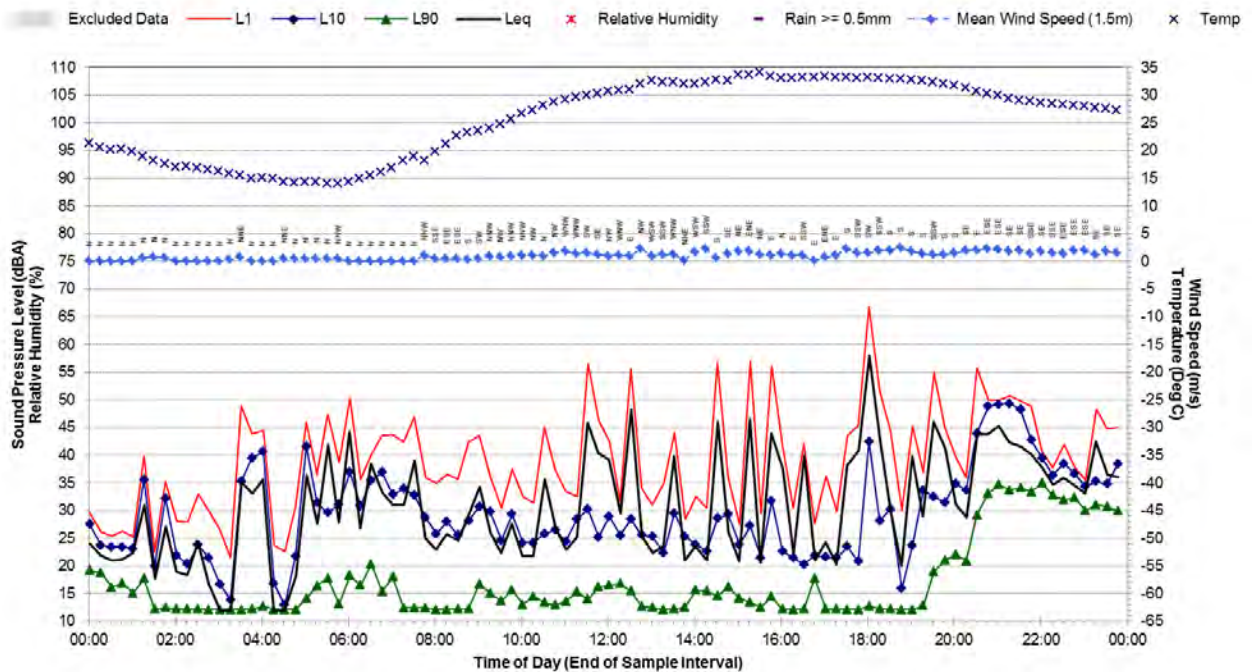


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)

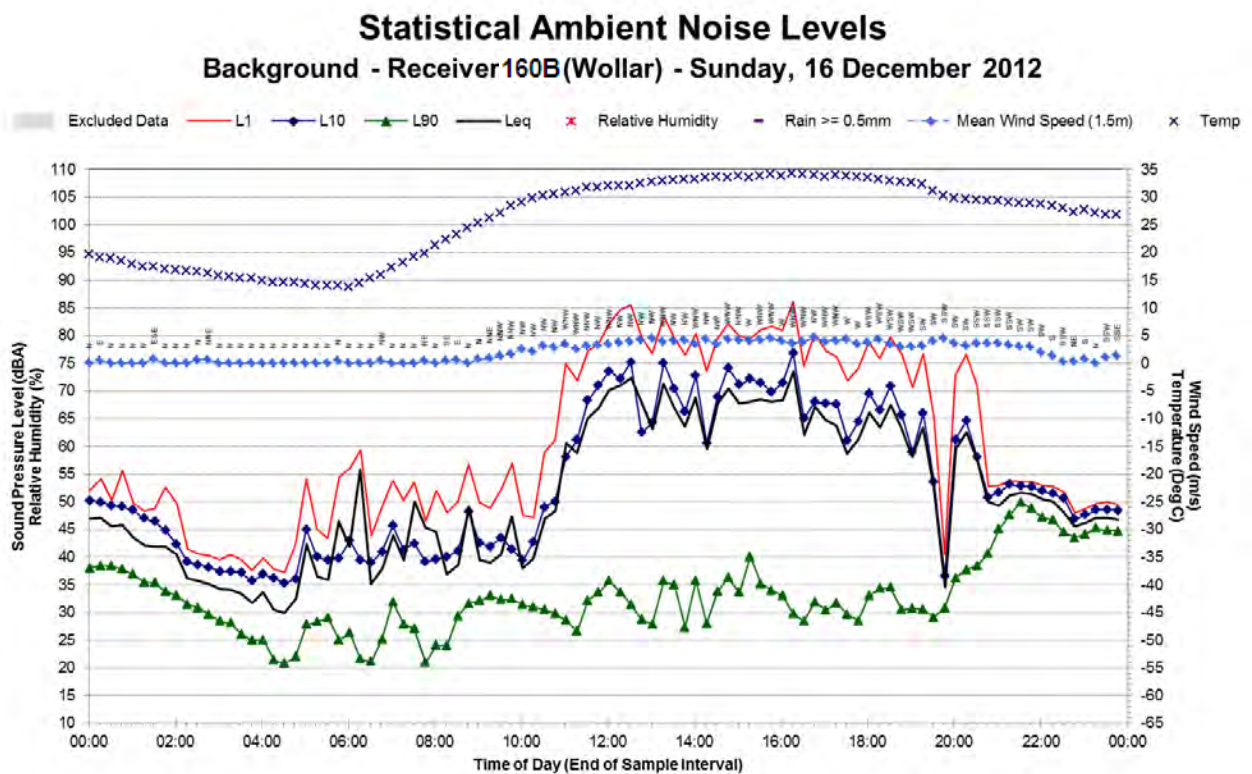
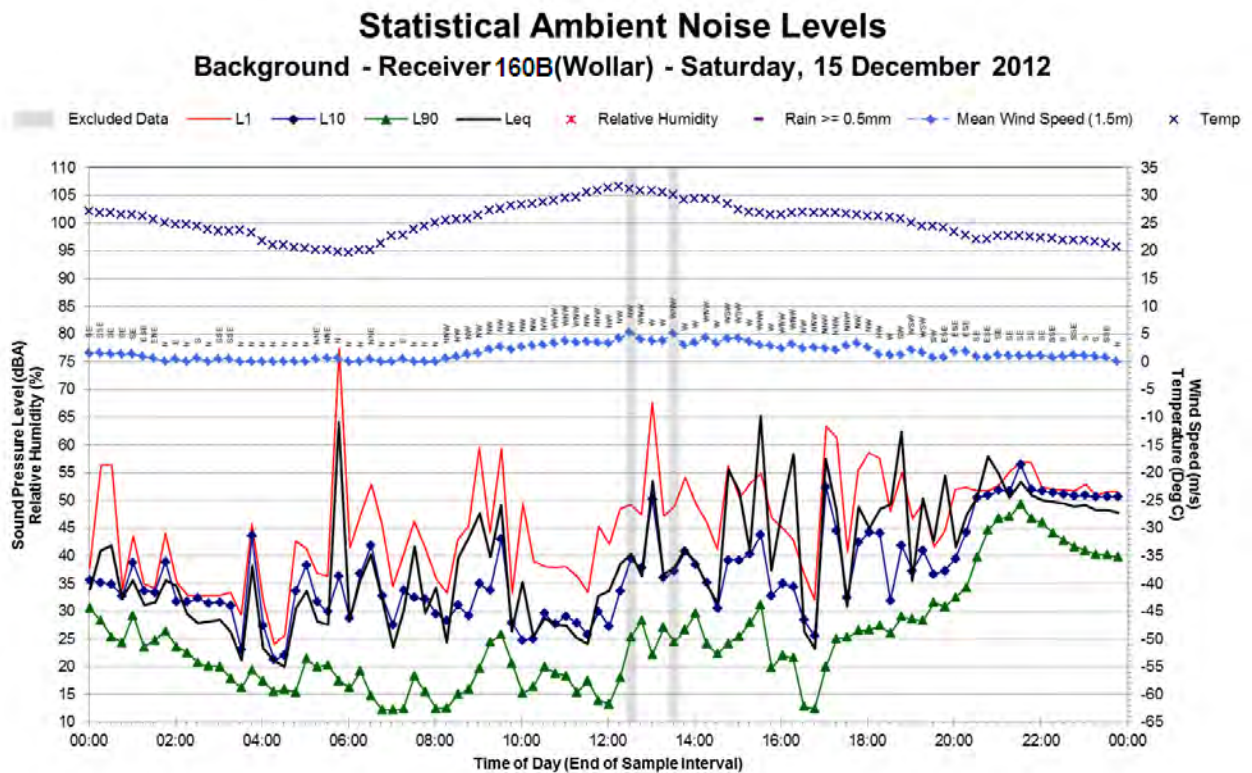
Statistical Ambient Noise Levels
Background - Receiver 160B (Wollar) - Thursday, 13 December 2012



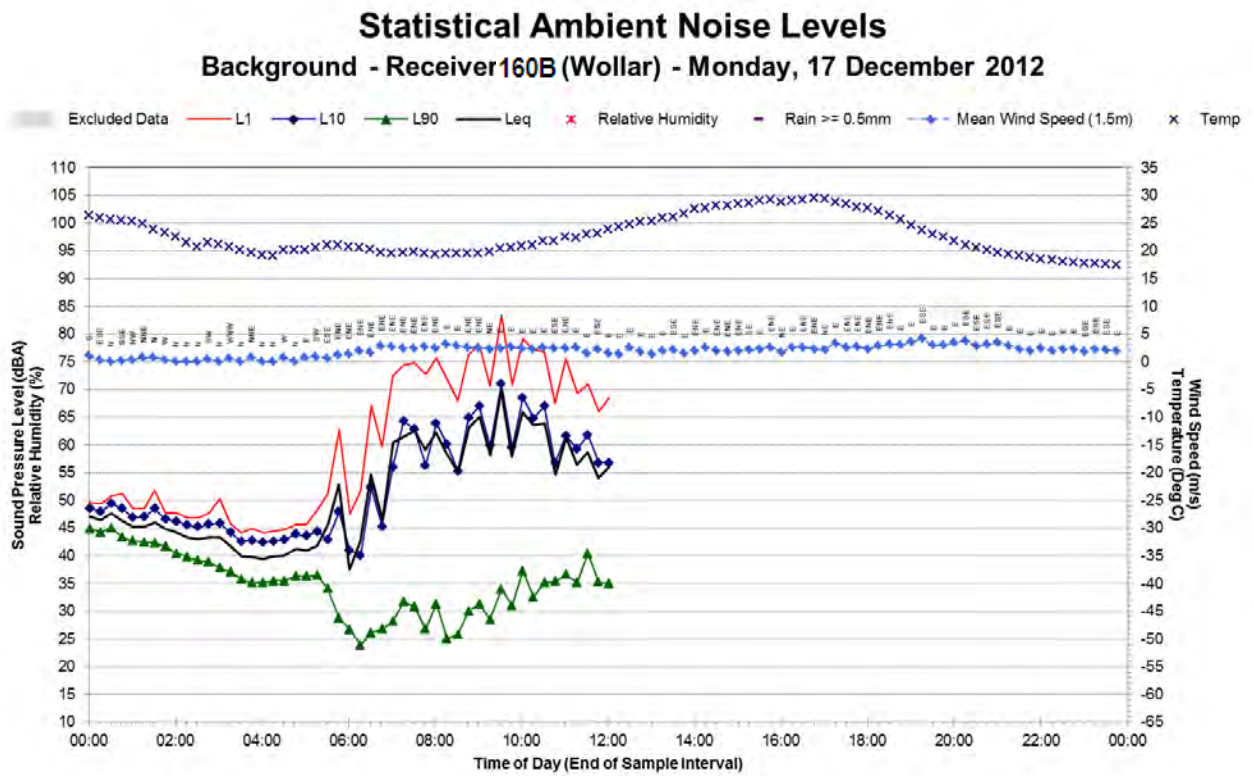
Statistical Ambient Noise Levels
Background - Receiver 160B (Wollar) - Friday, 14 December 2012



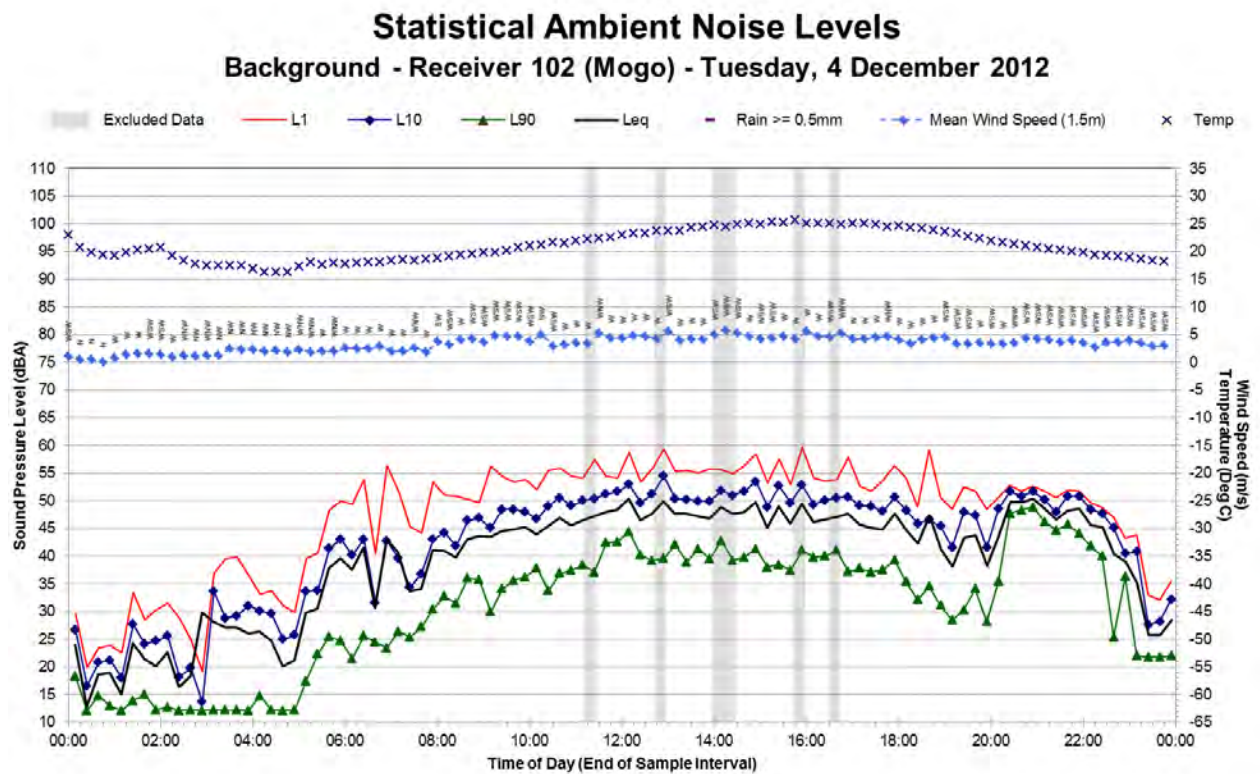
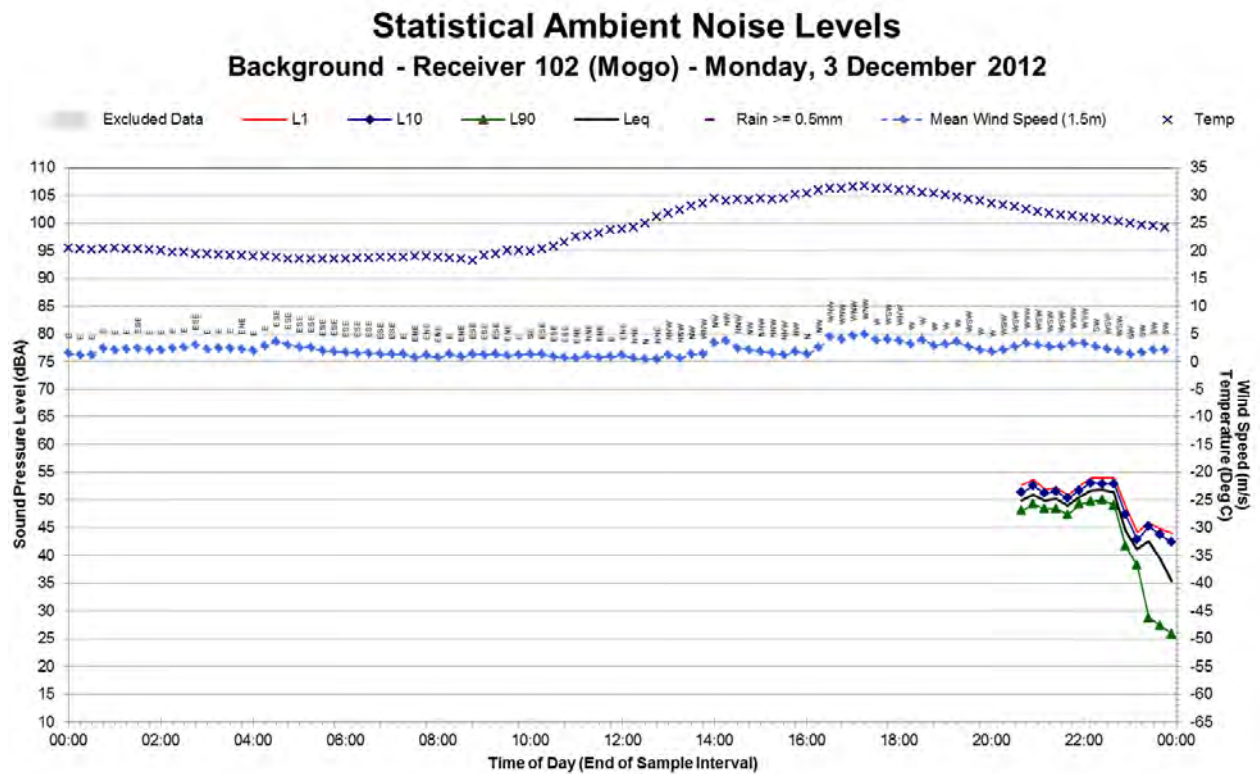
AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 160B (WOLLAR)



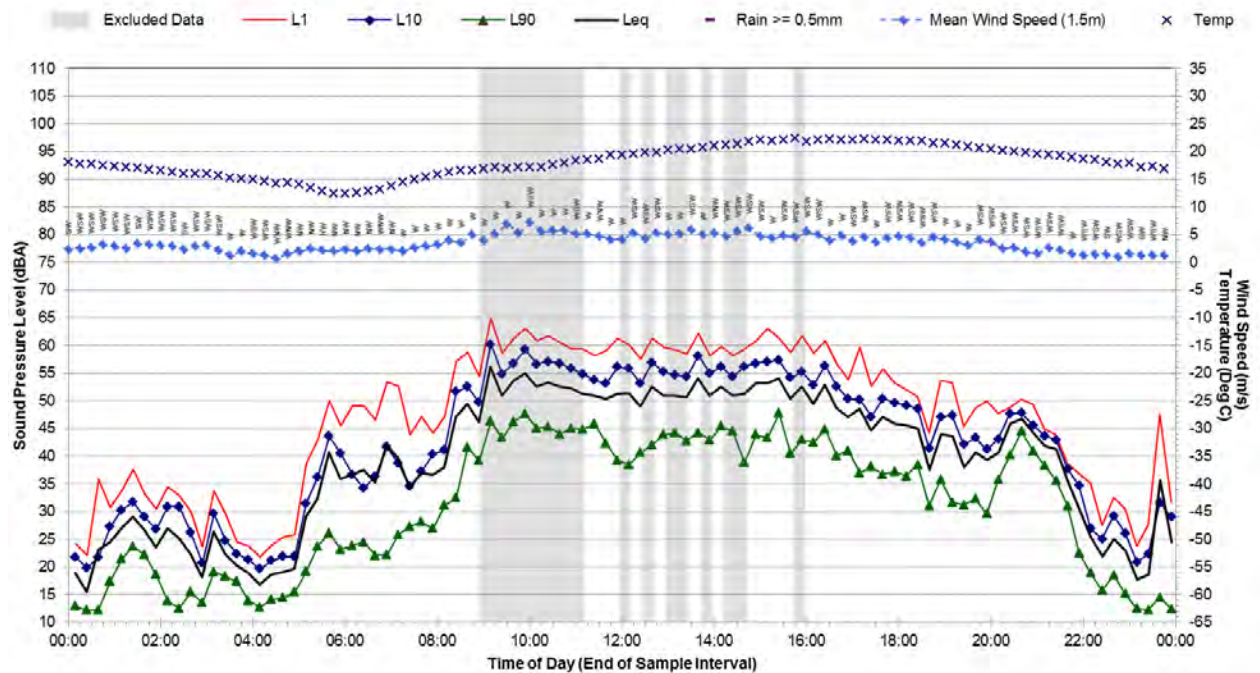
AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

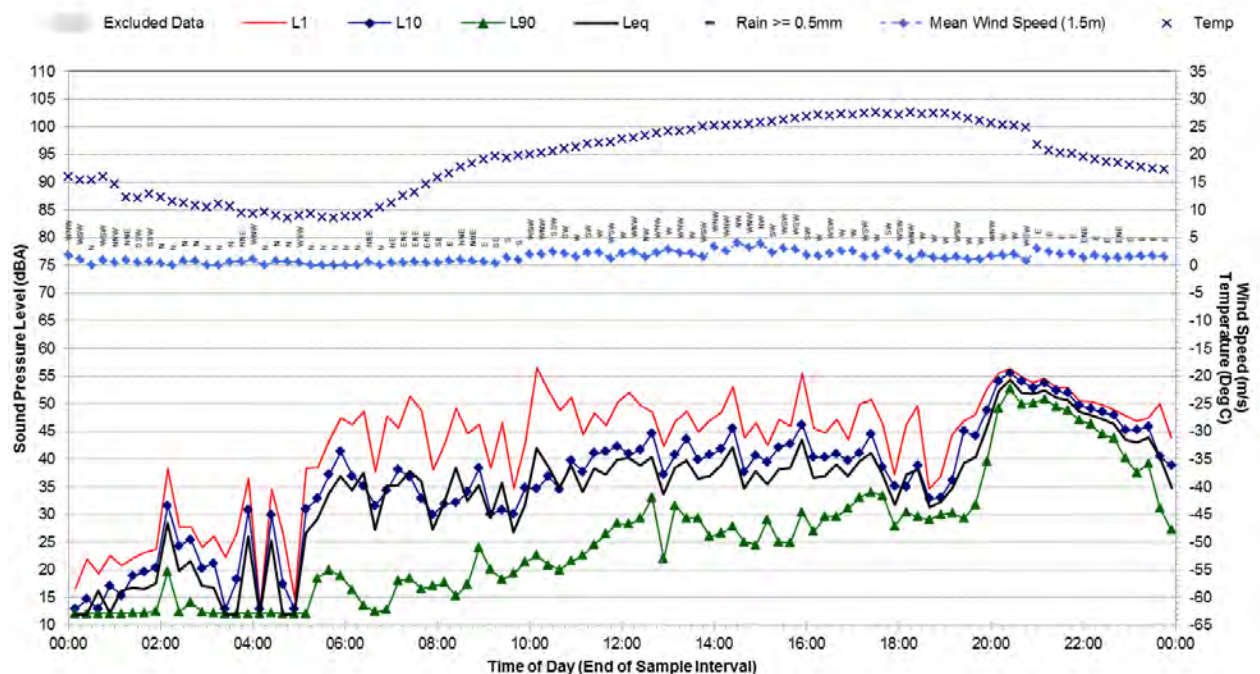
Statistical Ambient Noise Levels

Background - Receiver 102 (Mogo) - Wednesday, 5 December 2012



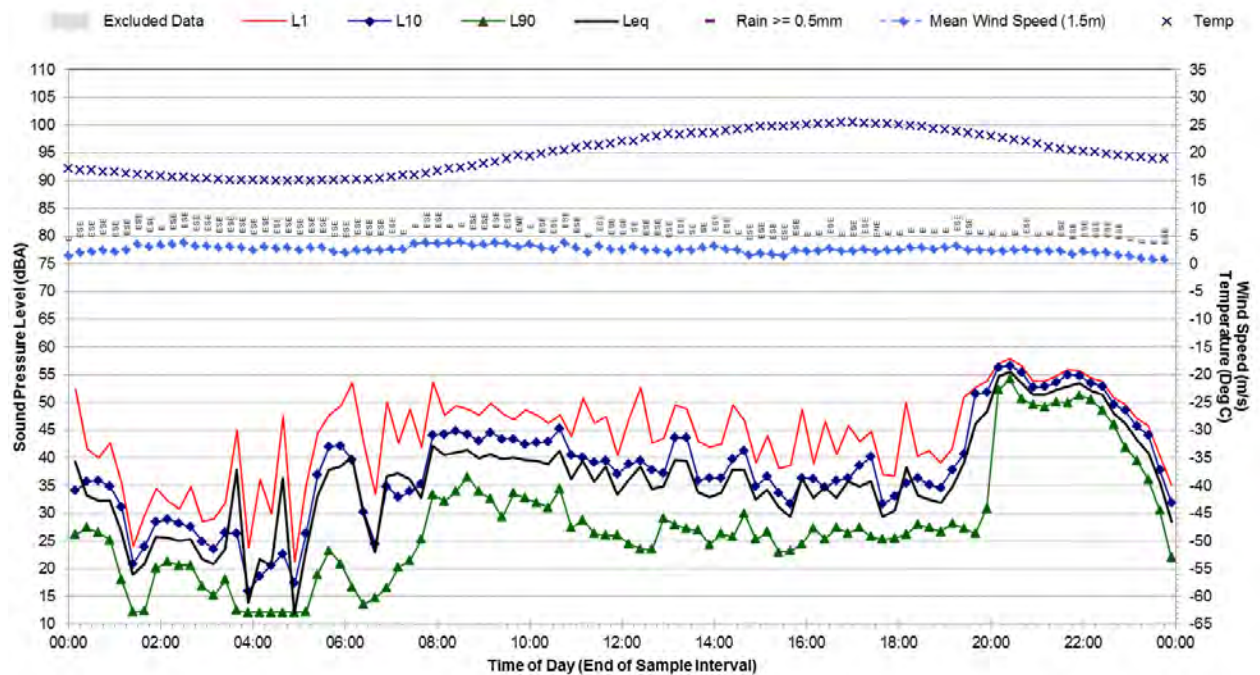
Statistical Ambient Noise Levels

Background - Receiver 102 (Mogo) - Thursday, 6 December 2012

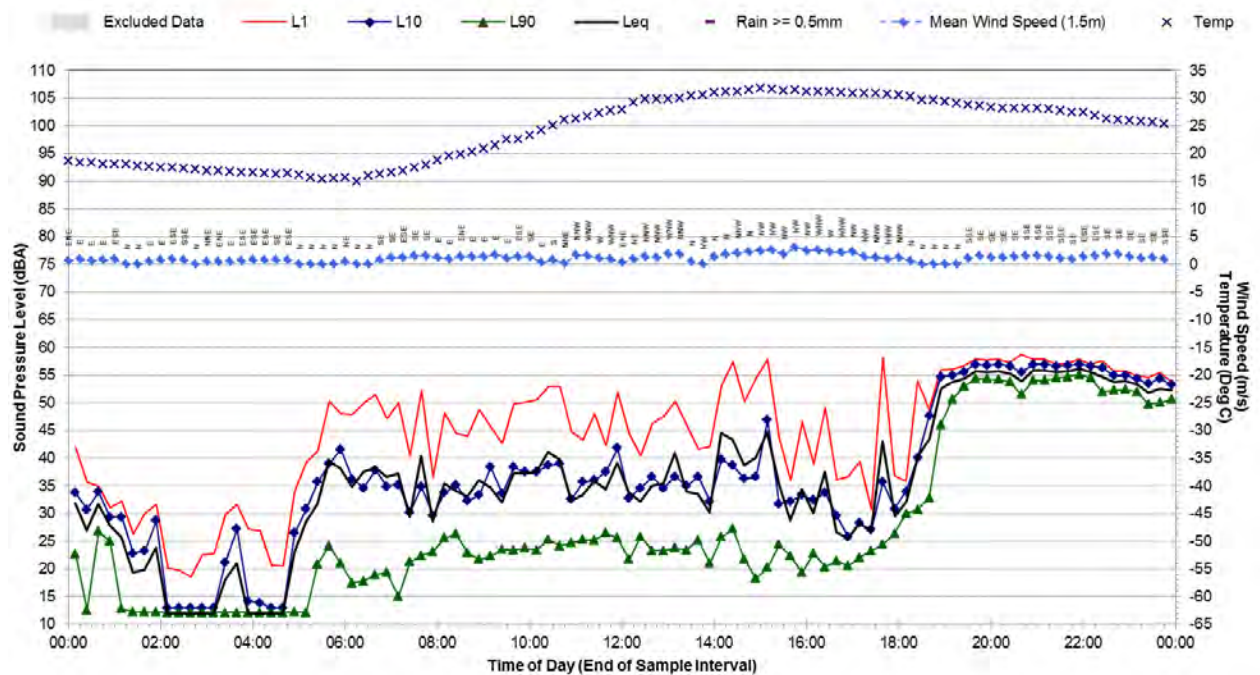


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Friday, 7 December 2012

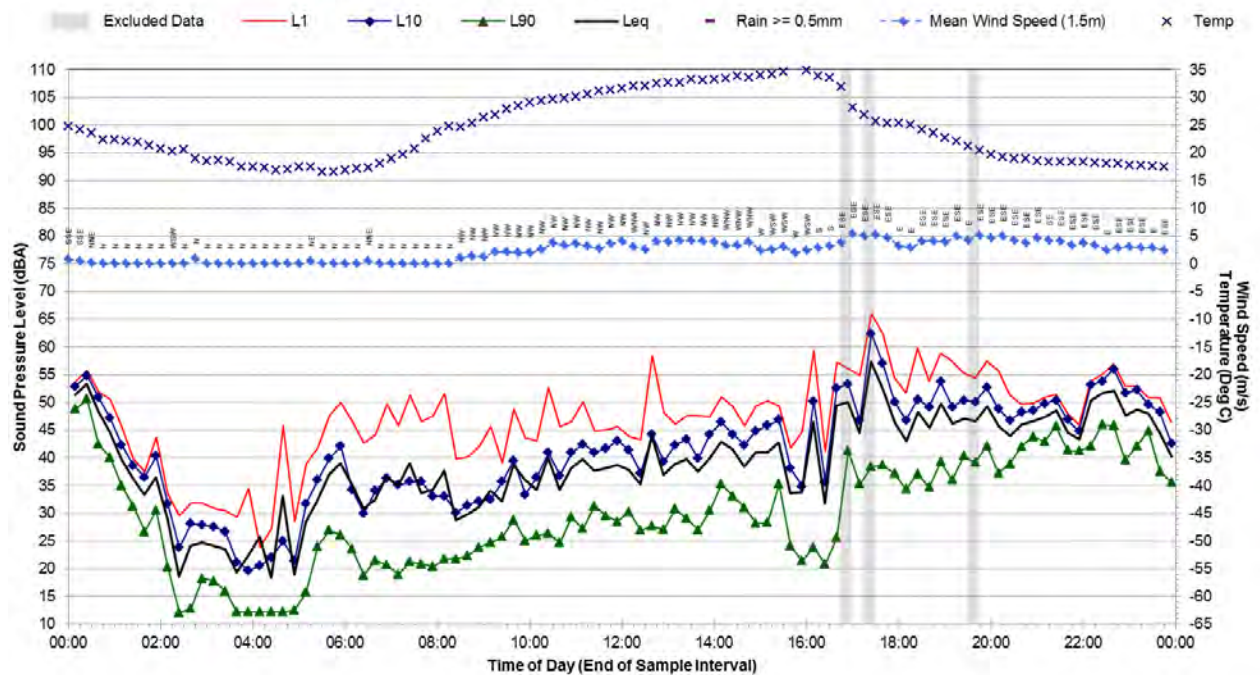


Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Saturday, 8 December 2012

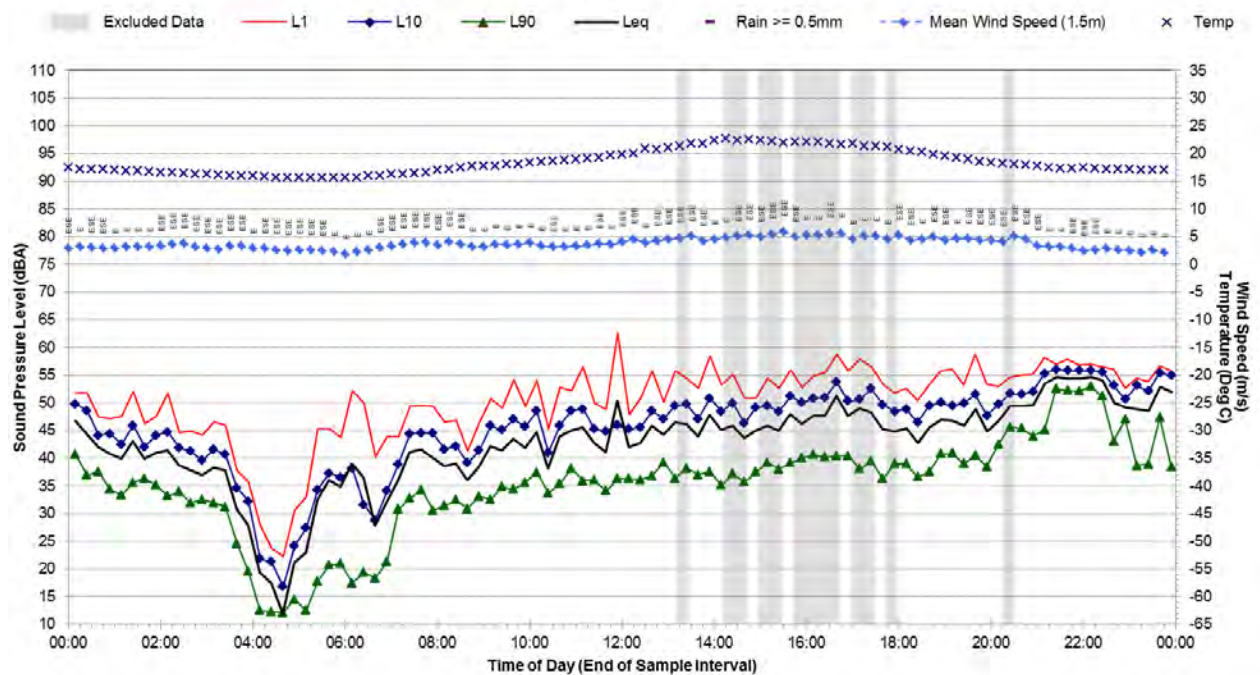


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Sunday, 9 December 2012

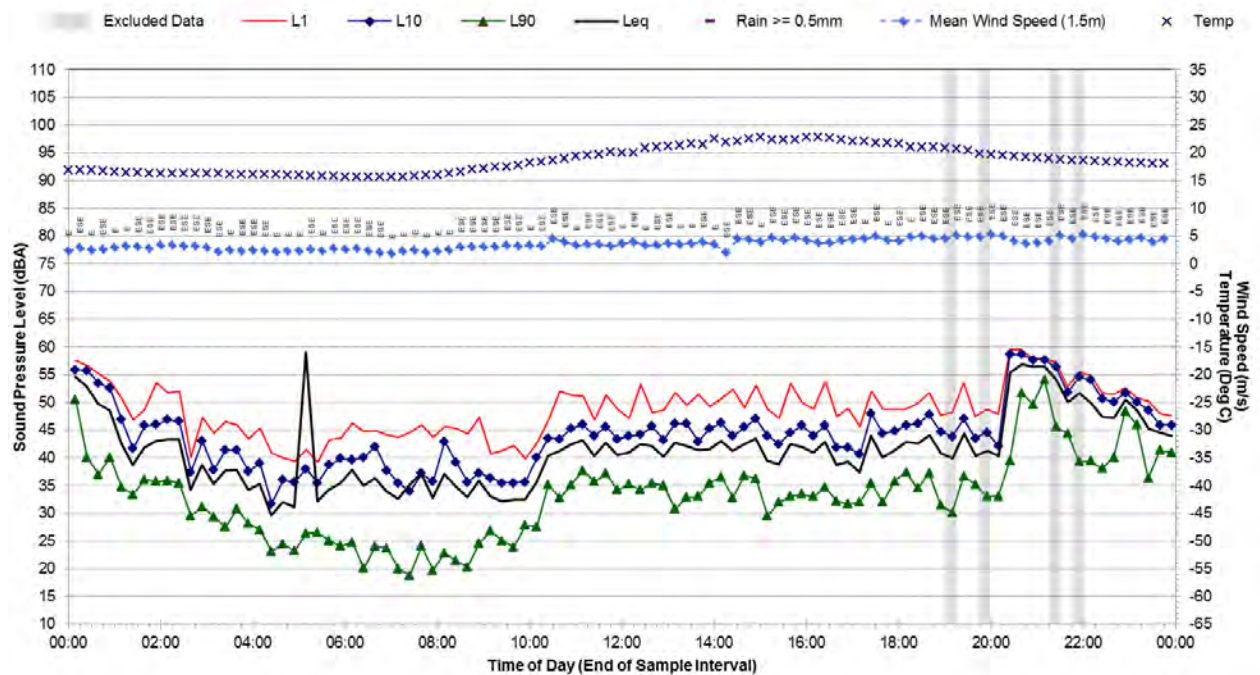


Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Monday, 10 December 2012

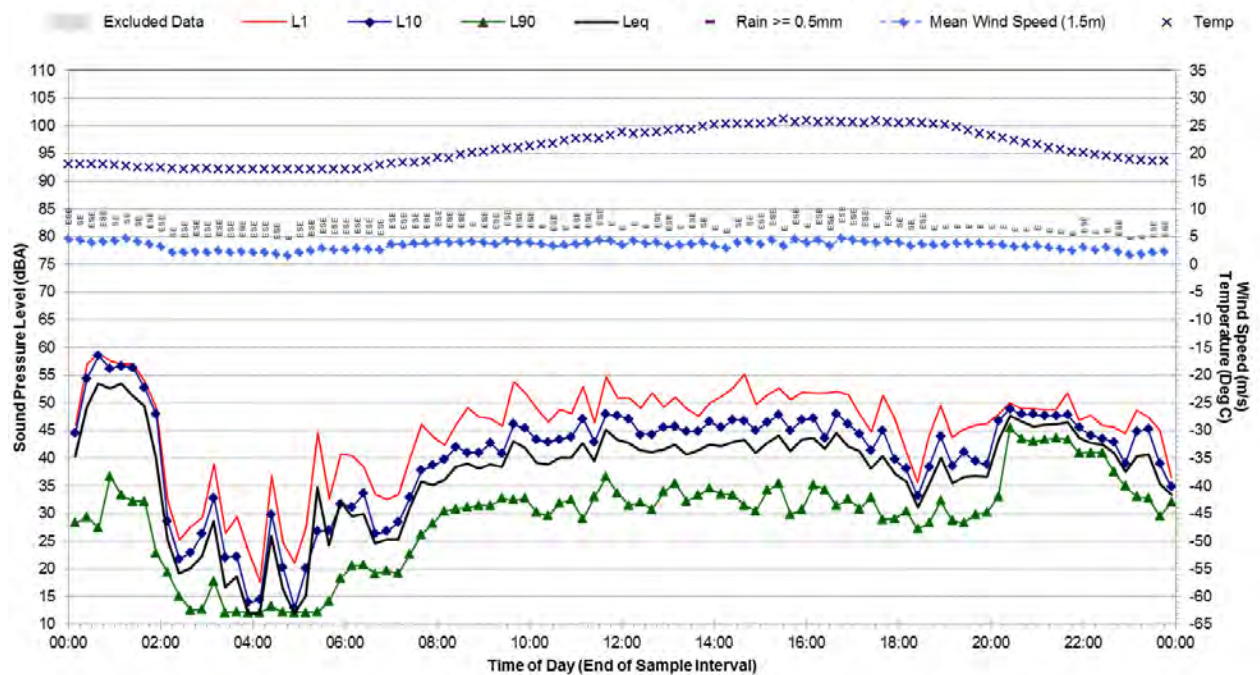


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Tuesday, 11 December 2012

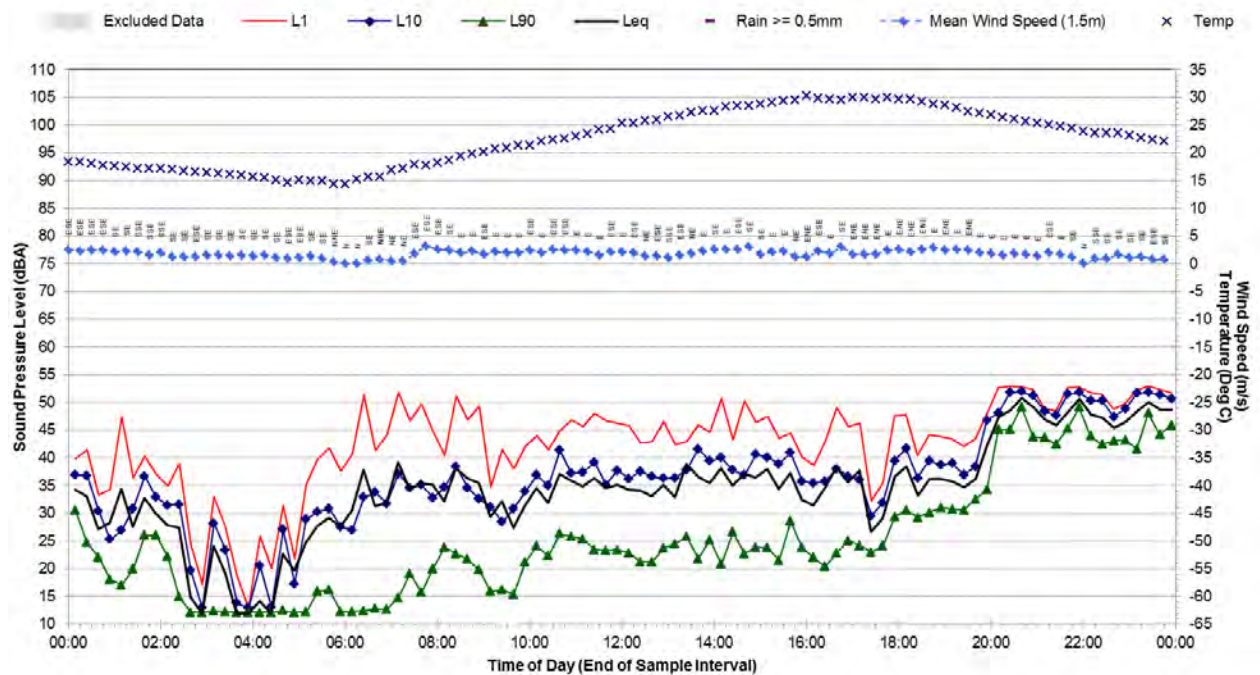


Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Wednesday, 12 December 2012

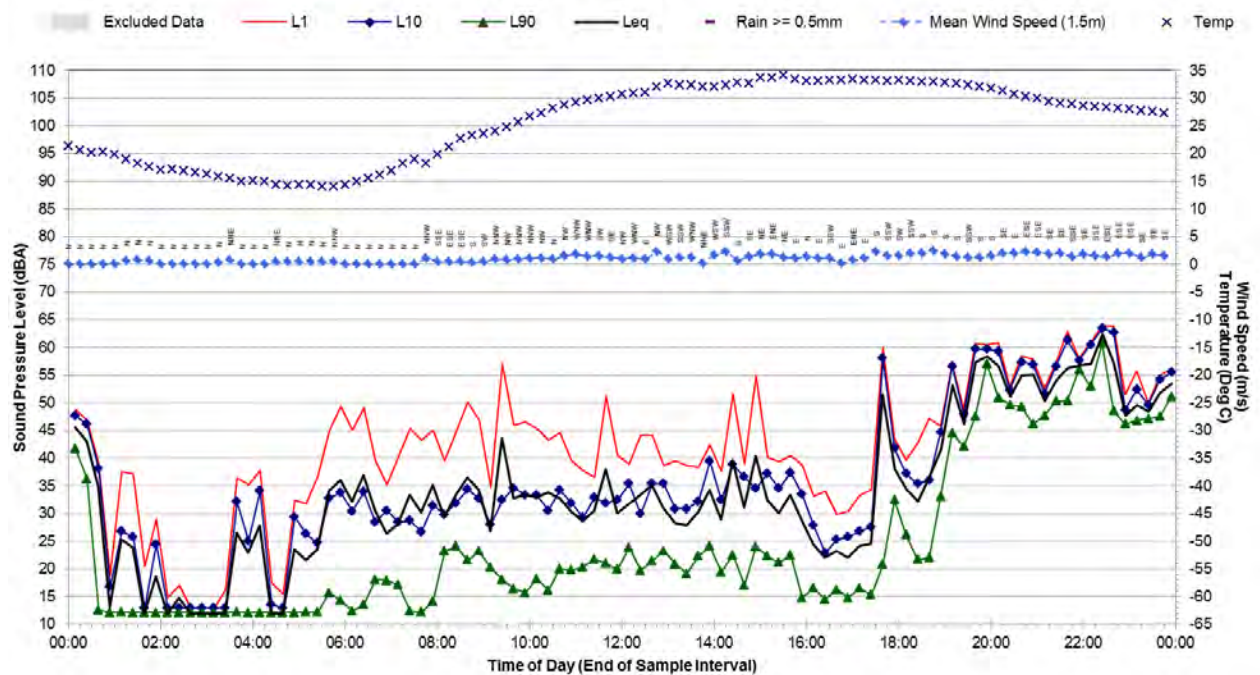


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Thursday, 13 December 2012

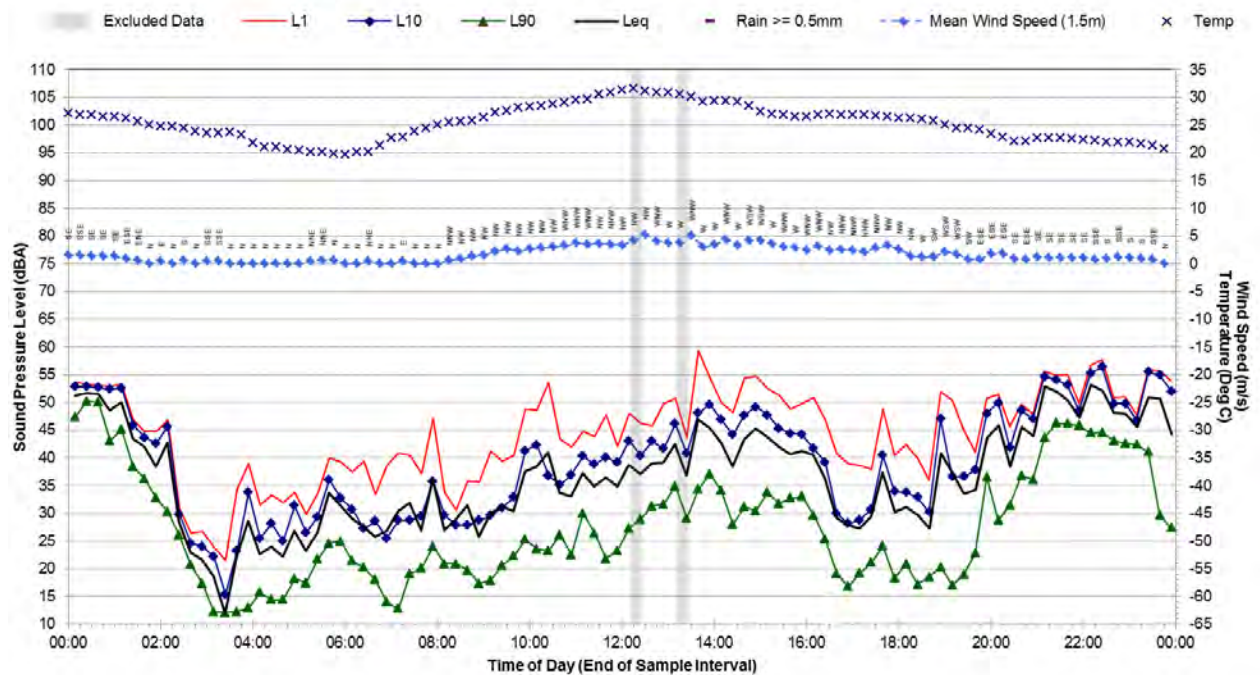


Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Friday, 14 December 2012

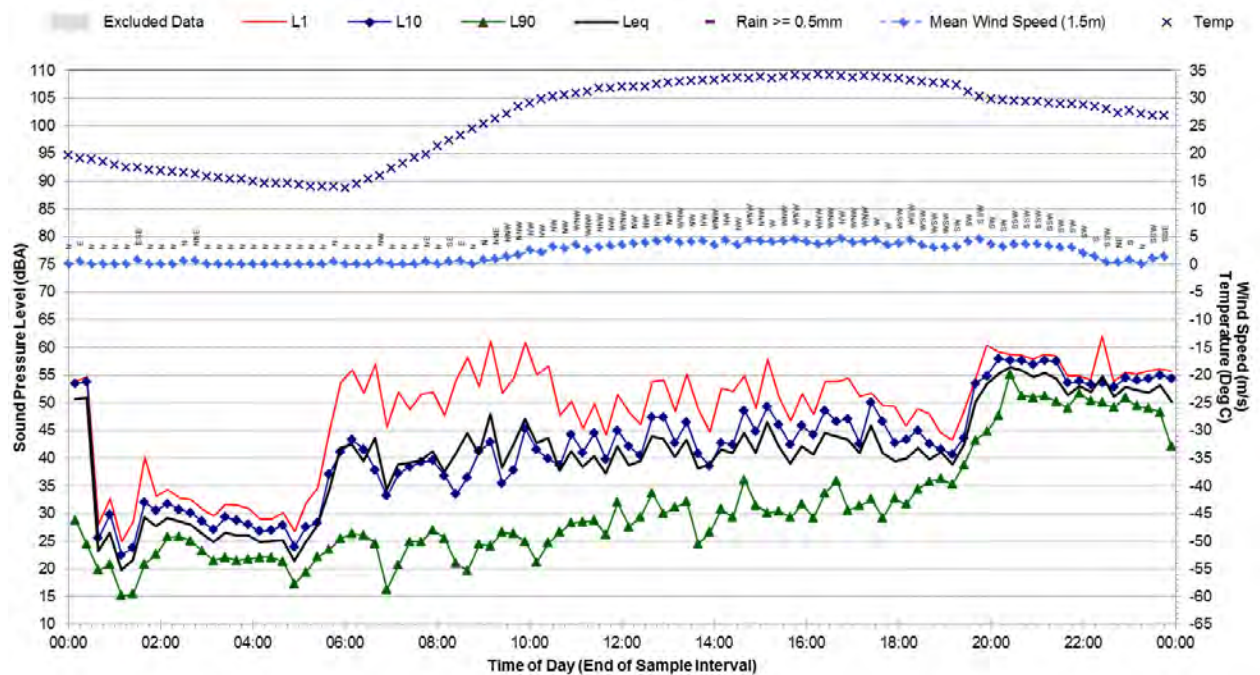


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Saturday, 15 December 2012



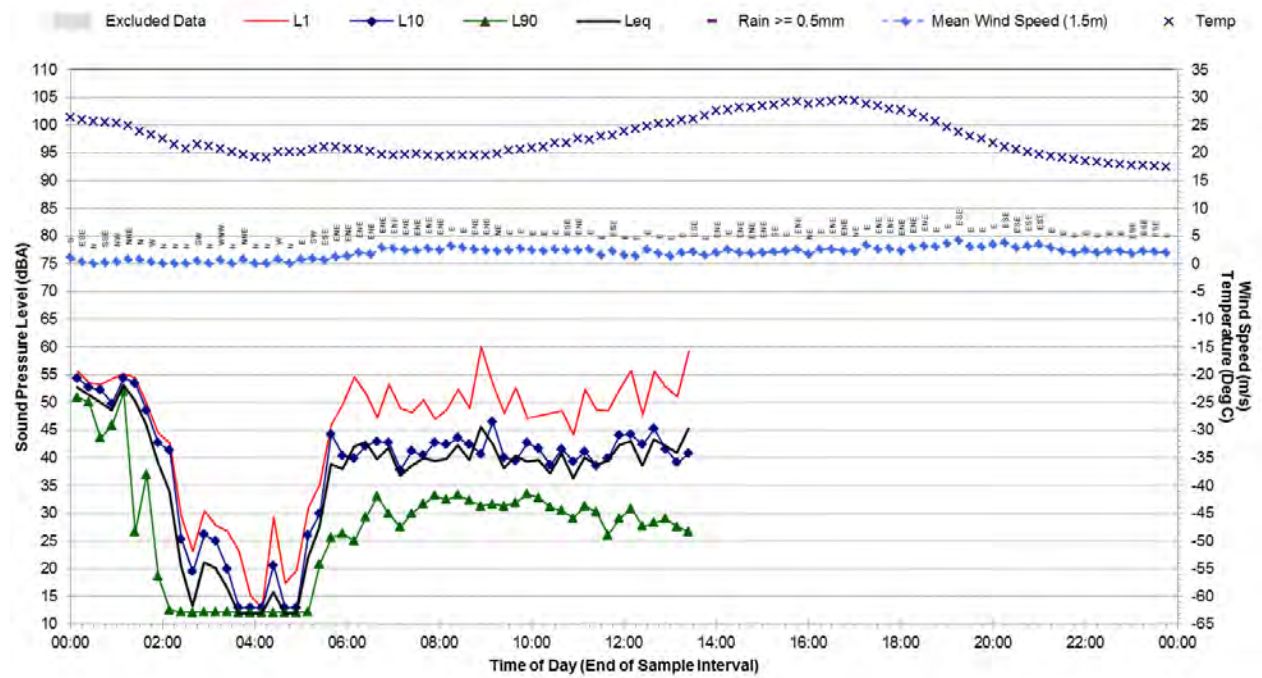
Statistical Ambient Noise Levels
Background - Receiver 102 (Mogo) - Sunday, 16 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 102 (MOGO)

Statistical Ambient Noise Levels

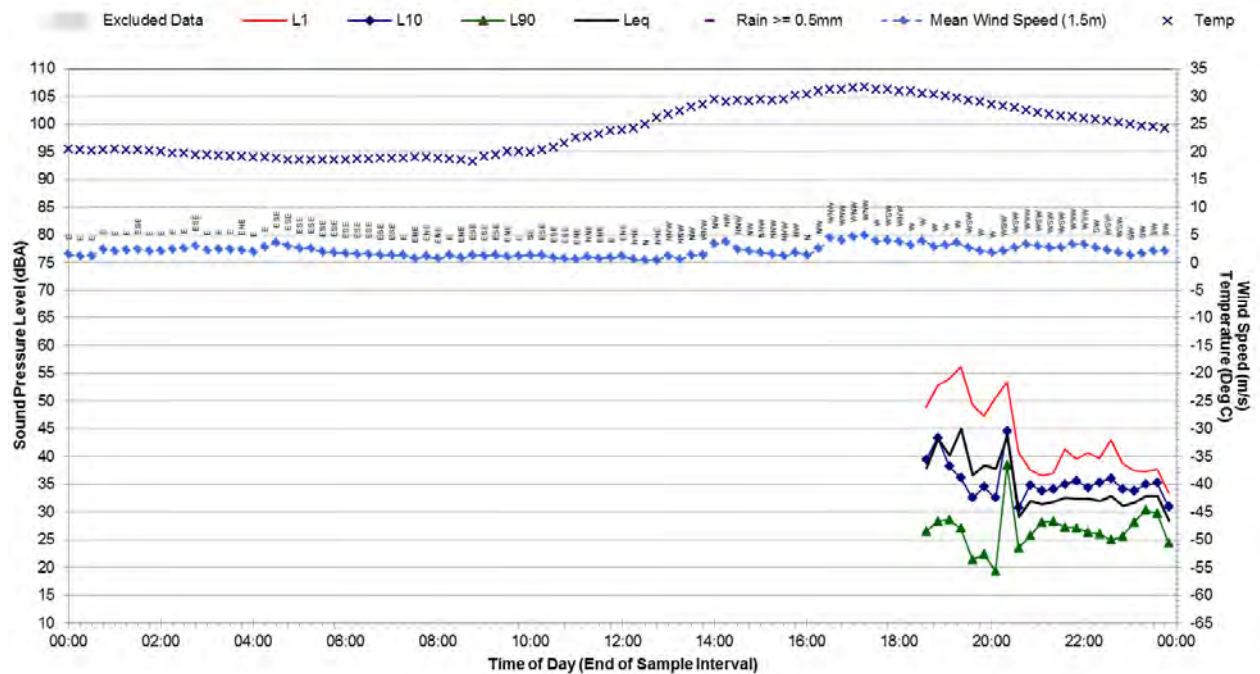
Background - Receiver 102 (Mogo) - Monday, 17 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

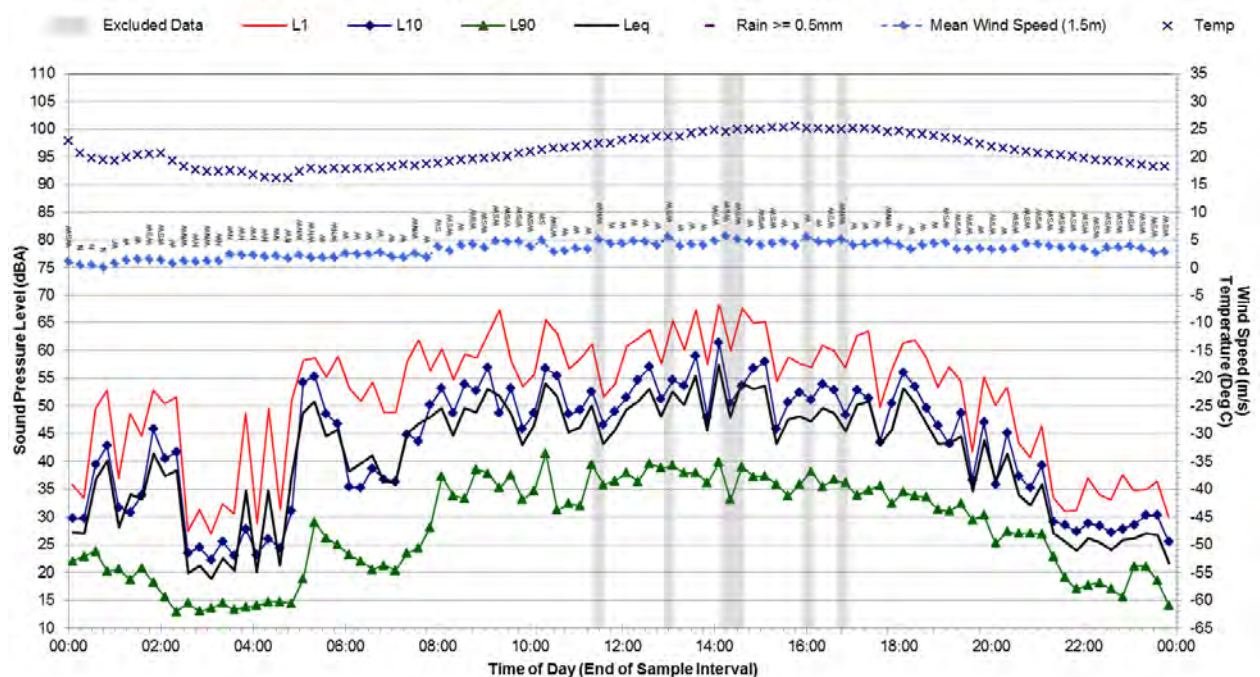
Statistical Ambient Noise Levels

Background - Receiver 1_155 (Tochilar) - Monday, 3 December 2012

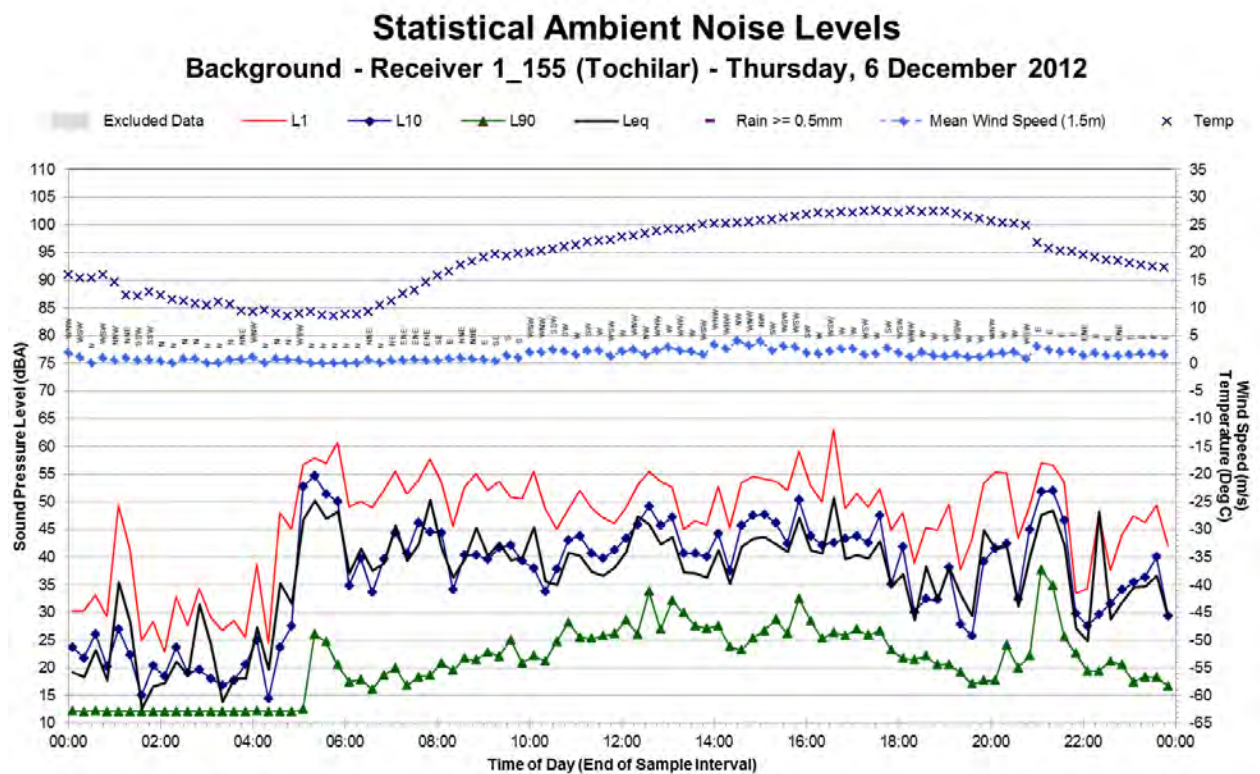
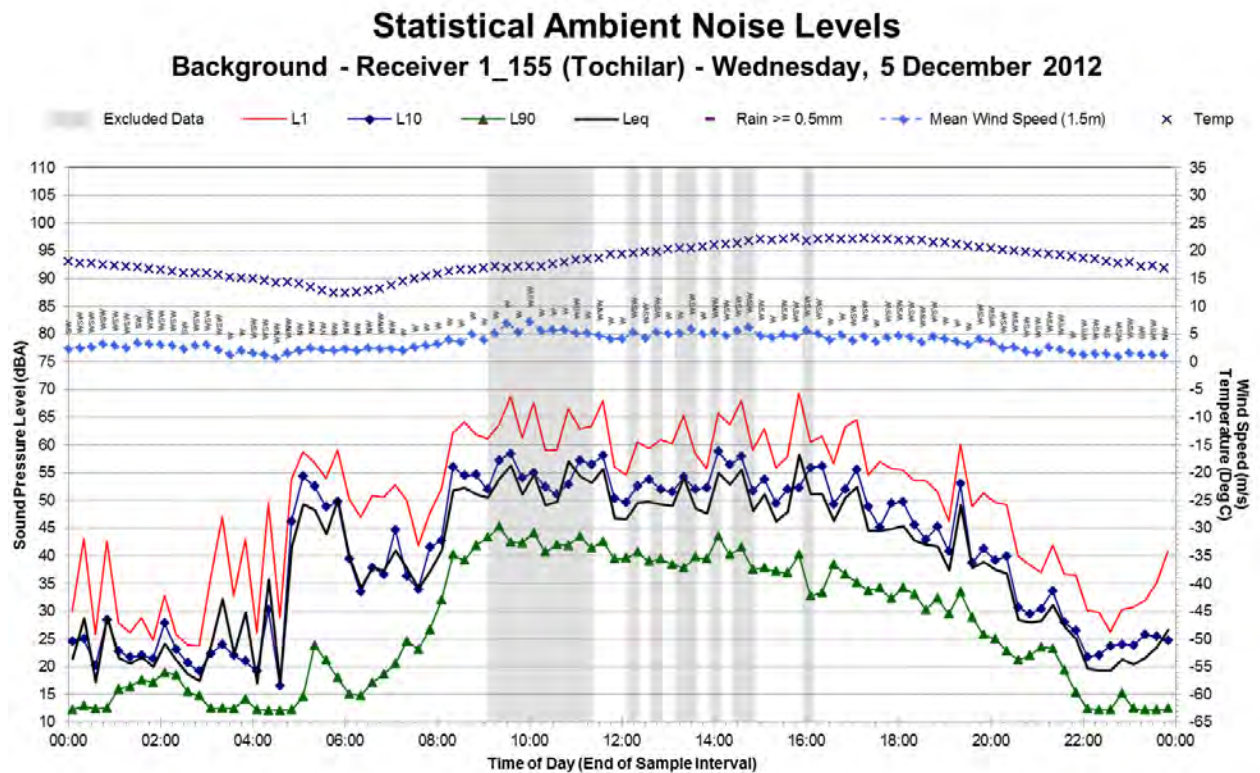


Statistical Ambient Noise Levels

Background - Receiver 1_155 (Tochilar) - Tuesday, 4 December 2012

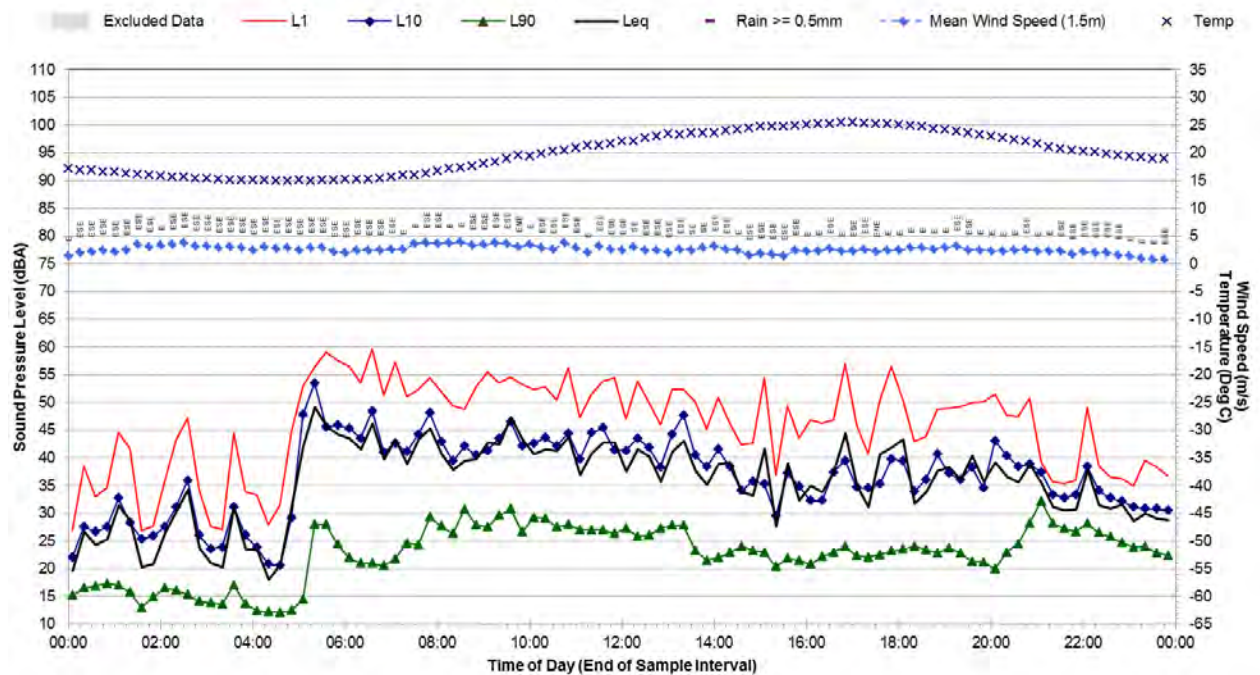


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

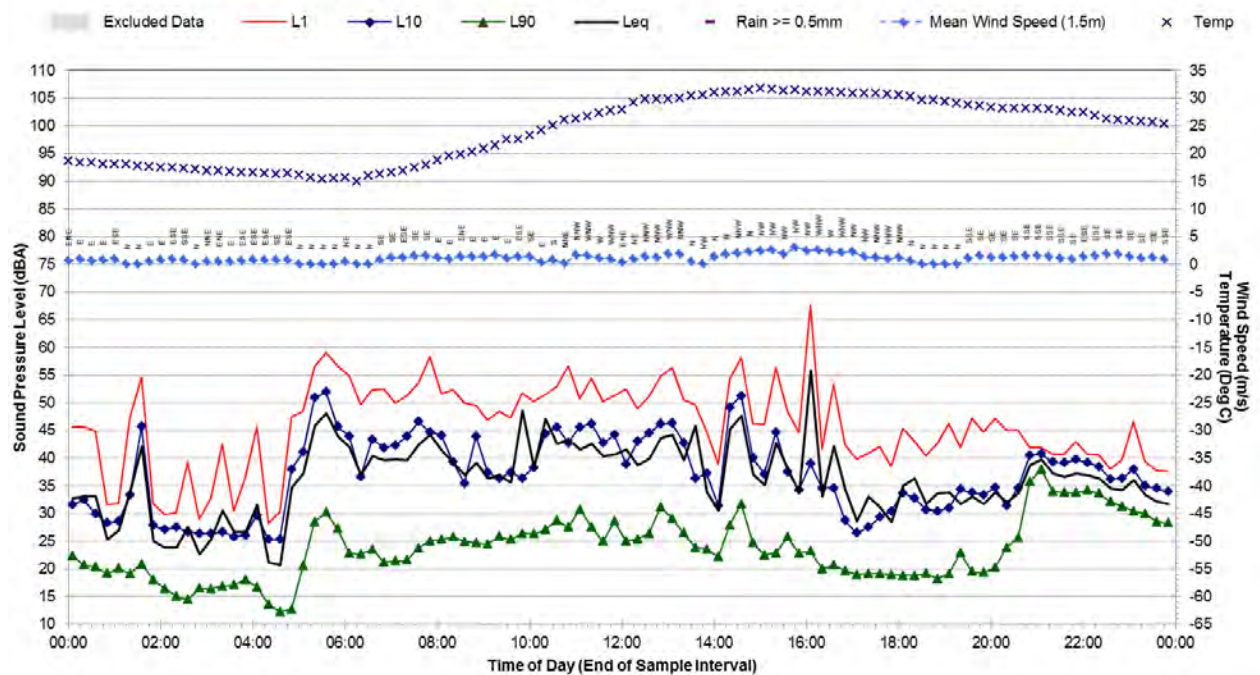


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

Statistical Ambient Noise Levels
Background - Receiver 1_155 (Tochilar) - Friday, 7 December 2012



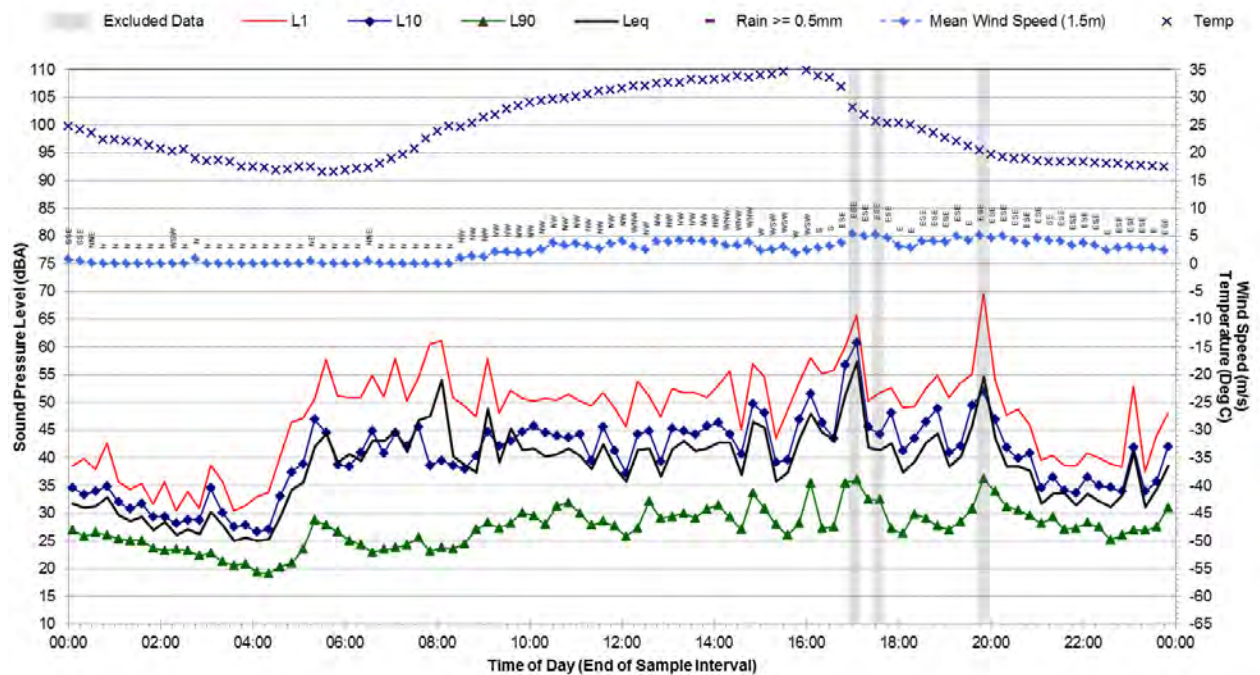
Statistical Ambient Noise Levels
Background - Receiver 1_155 (Tochilar) - Saturday, 8 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

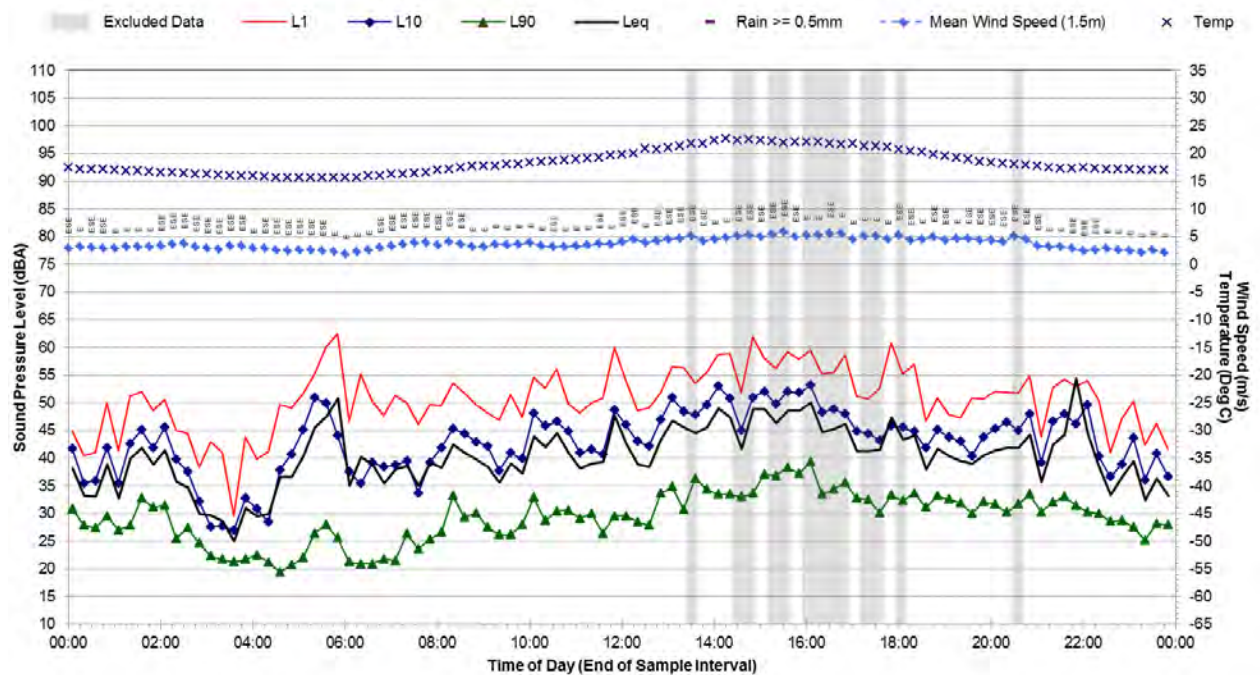
Statistical Ambient Noise Levels

Background - Receiver 1_155 (Tochilar) - Sunday, 9 December 2012

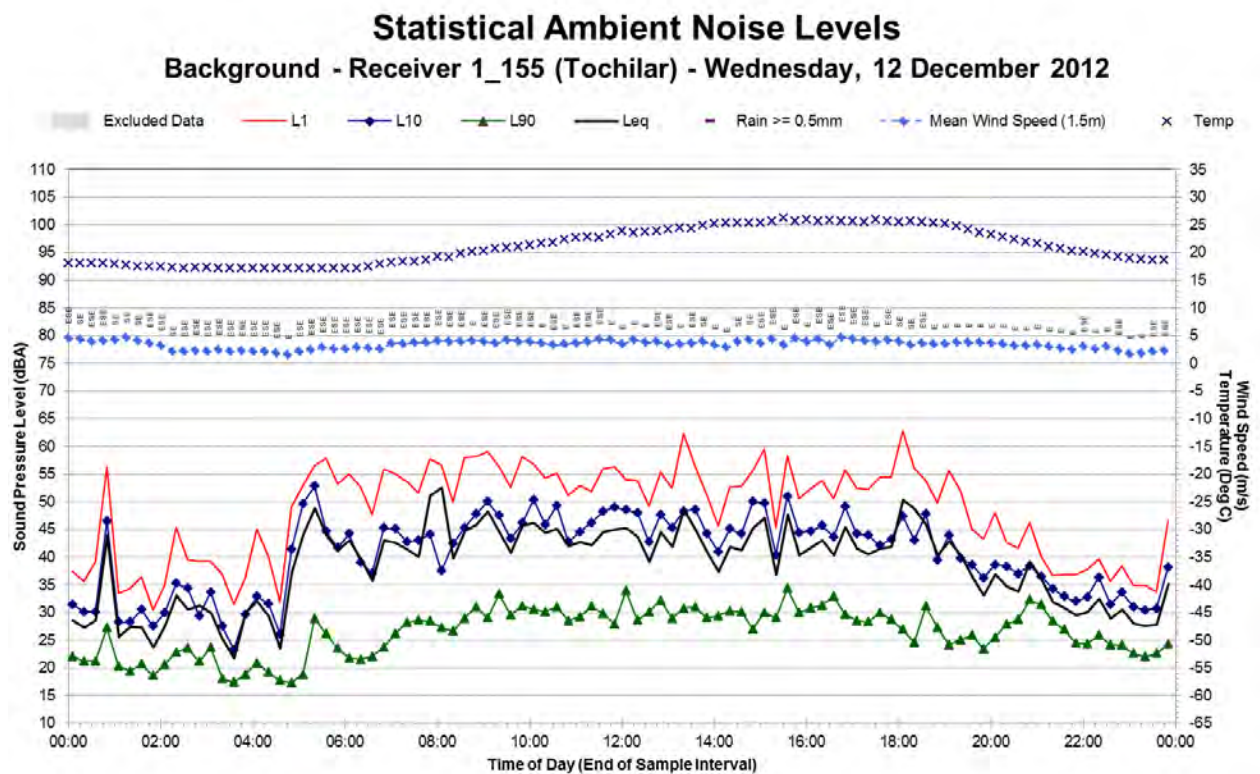
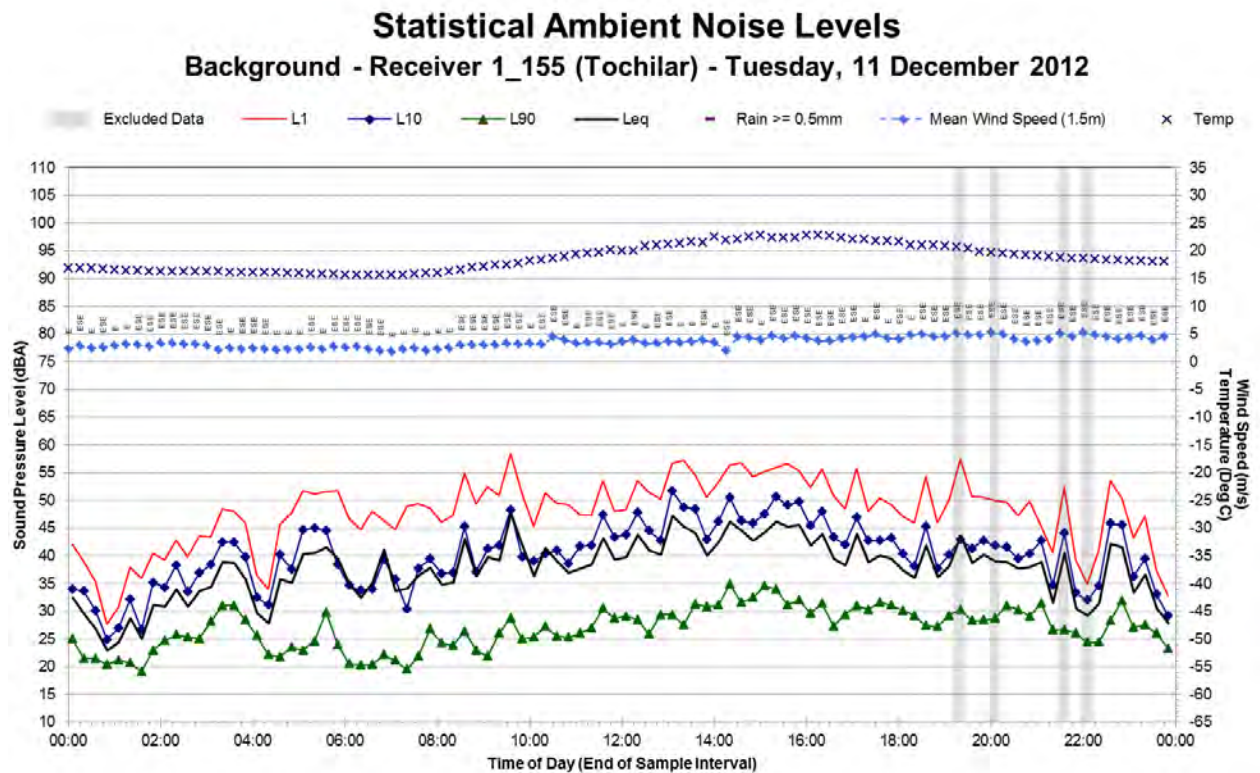


Statistical Ambient Noise Levels

Background - Receiver 1_155 (Tochilar) - Monday, 10 December 2012



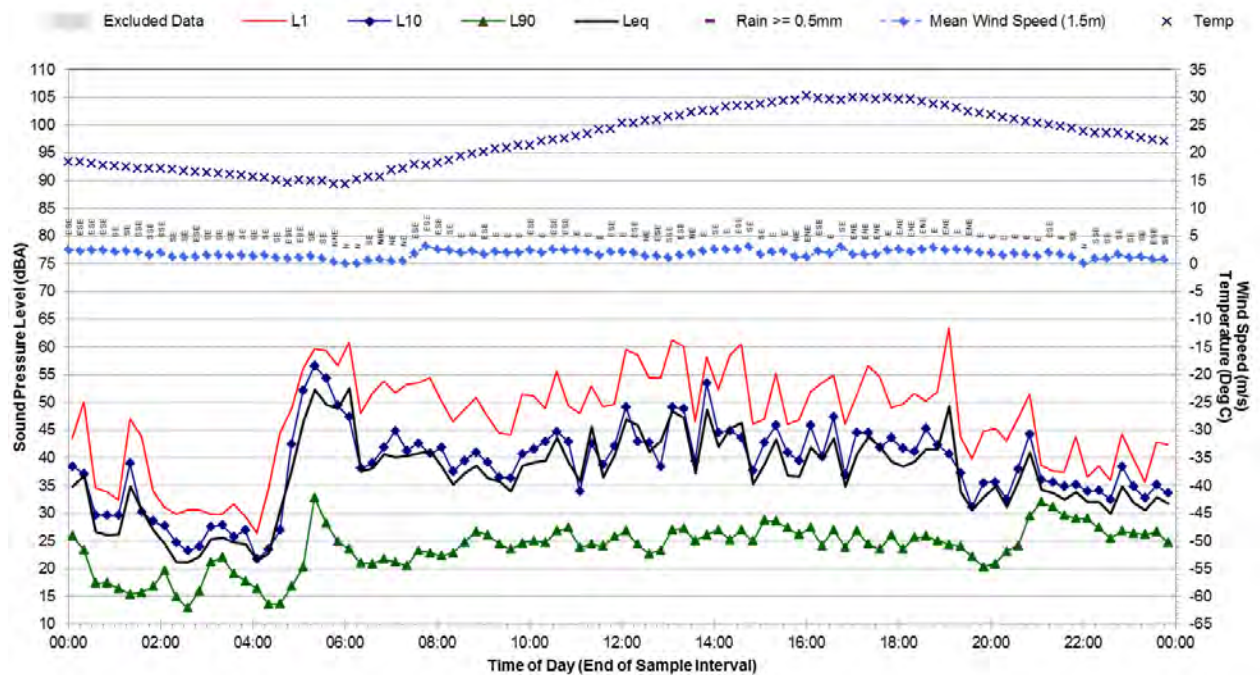
AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

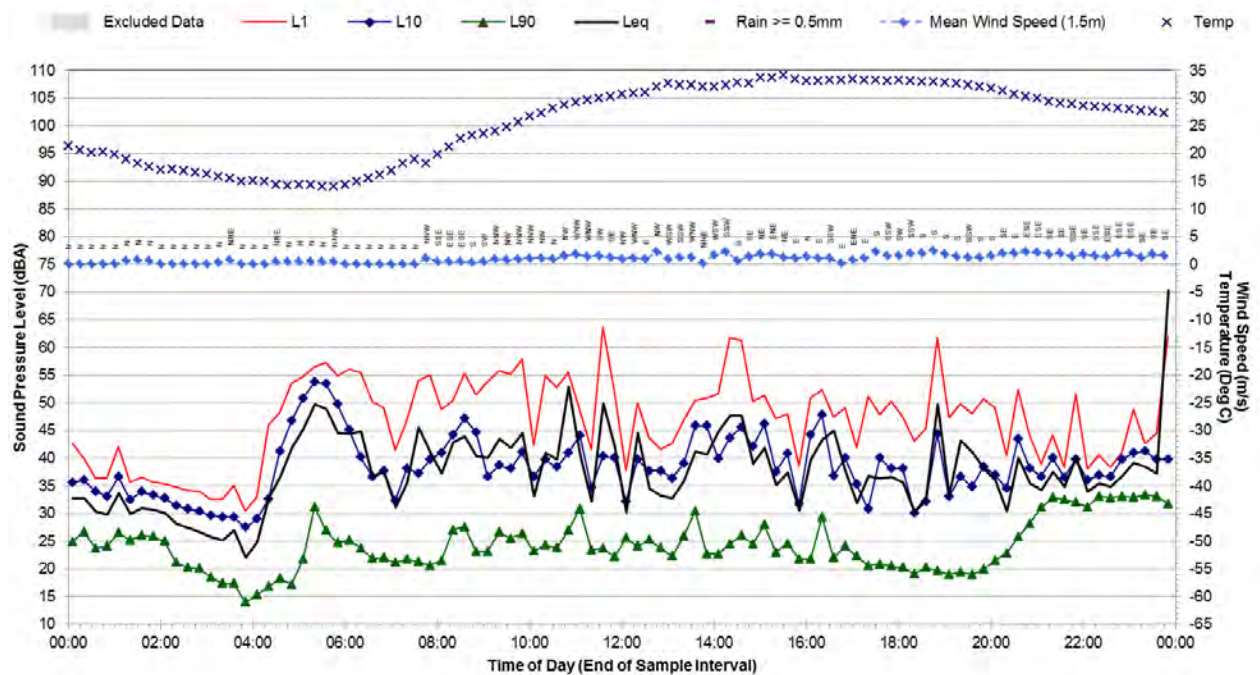
Statistical Ambient Noise Levels

Background - Receiver 1_155 (Tochilar) - Thursday, 13 December 2012

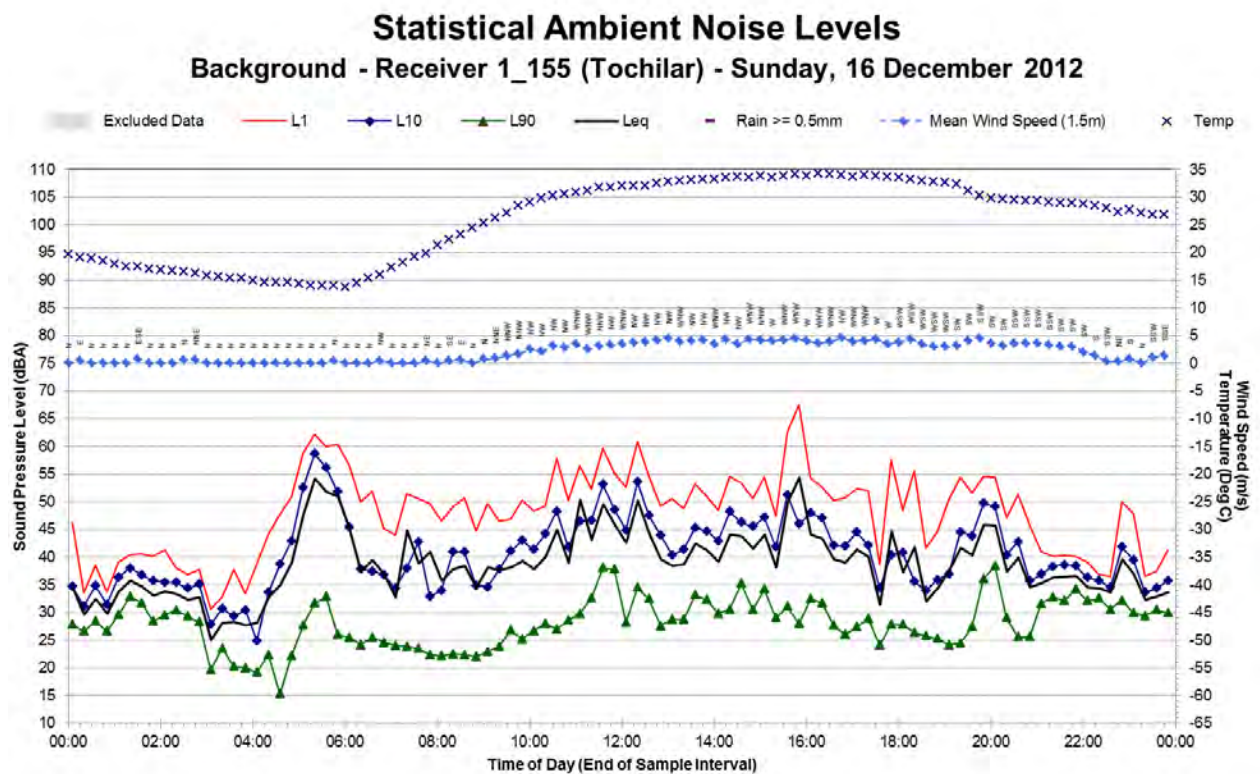
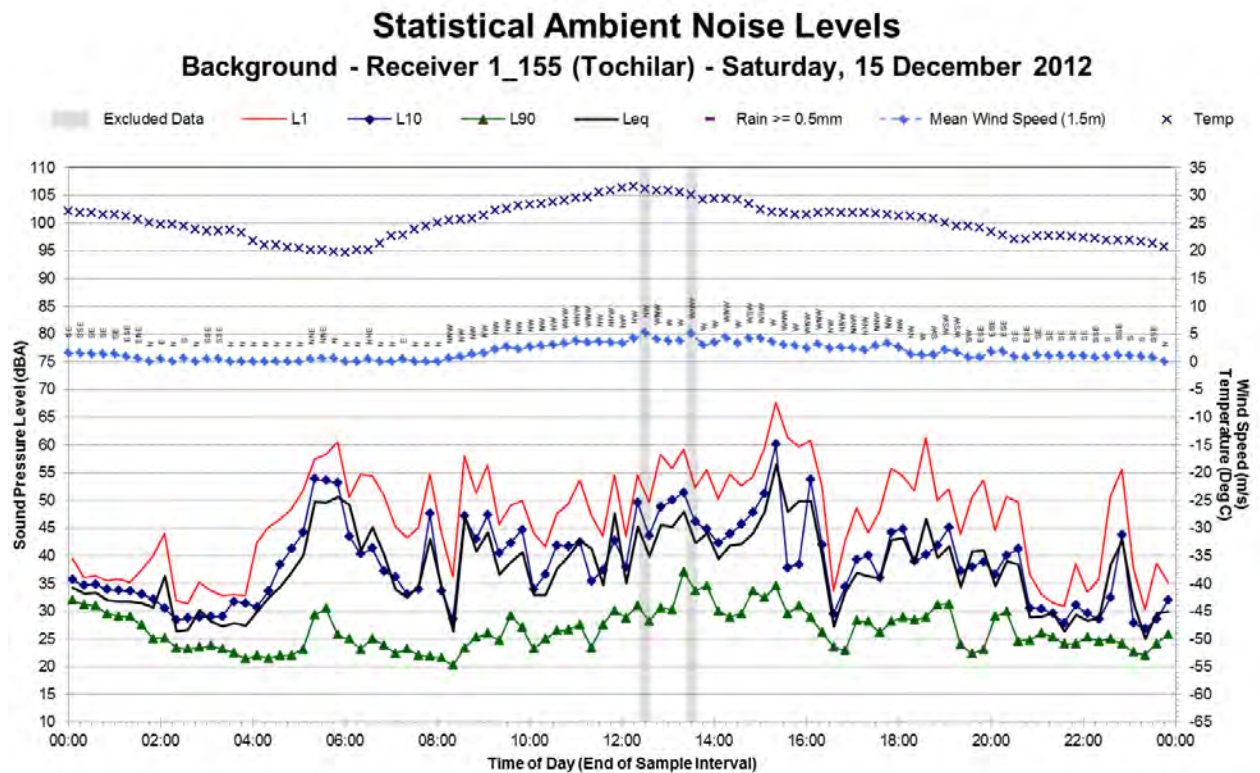


Statistical Ambient Noise Levels

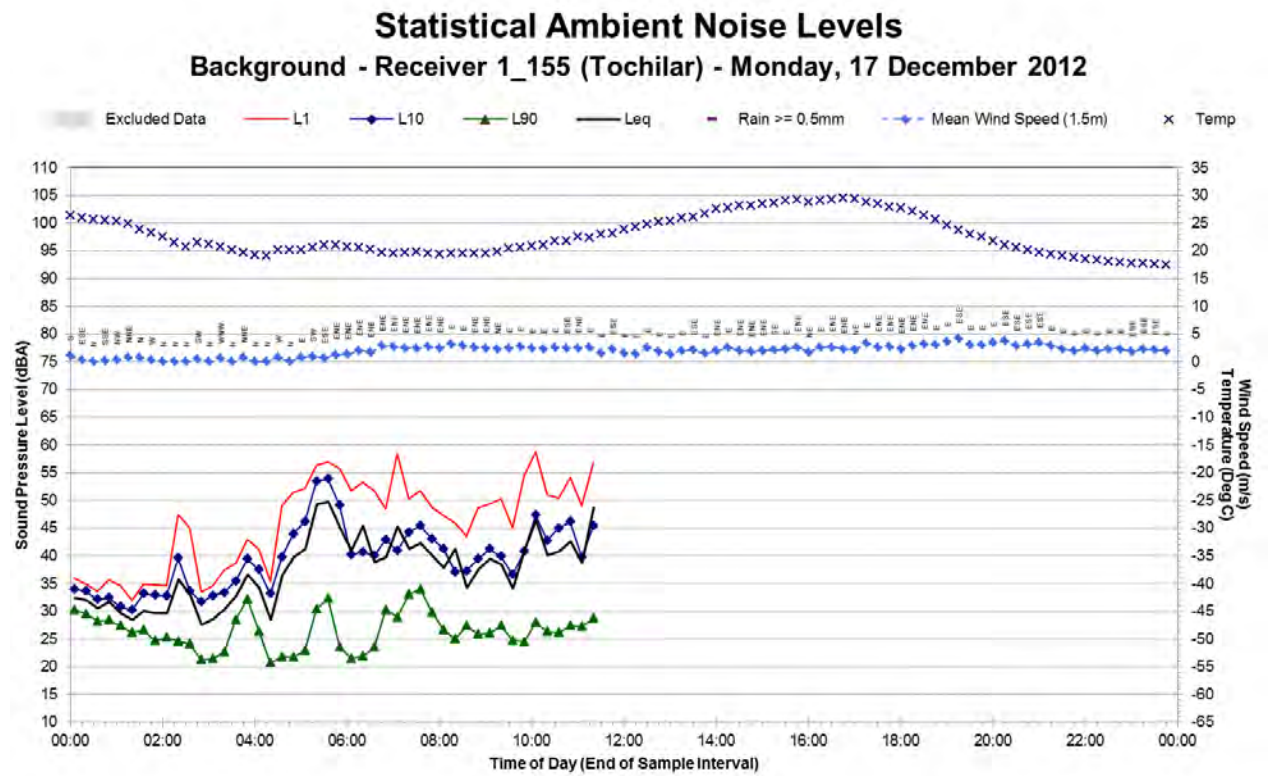
Background - Receiver 1_155 (Tochilar) - Friday, 14 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

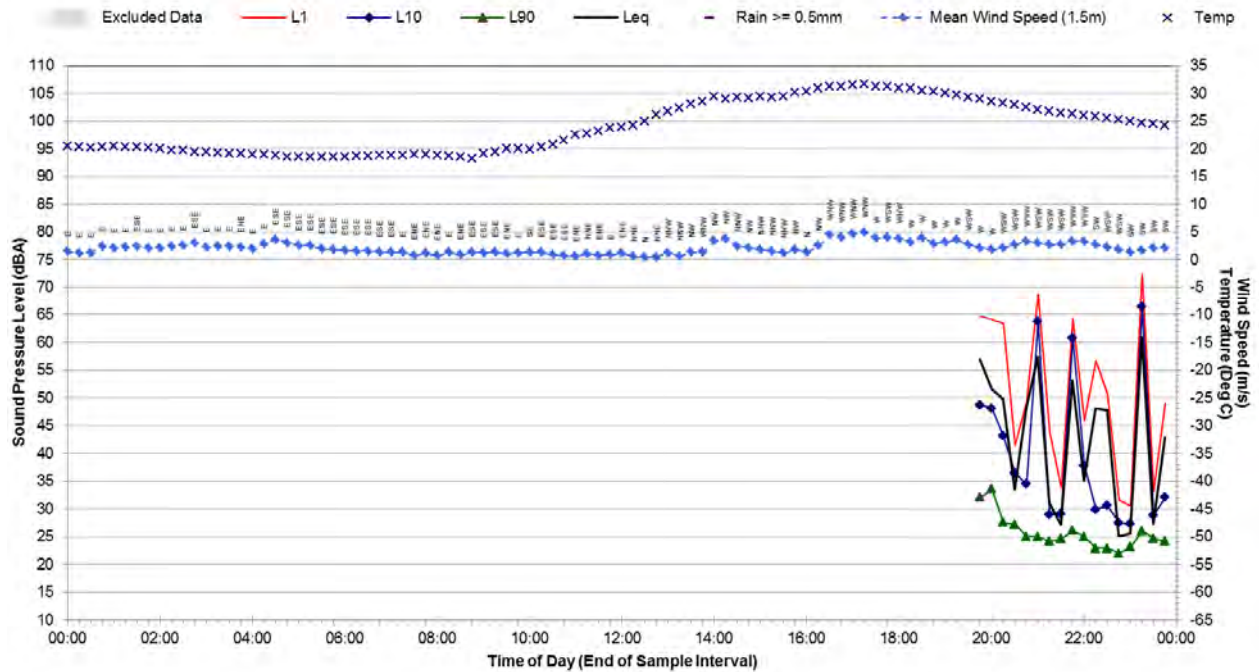


AMBIENT NOISE RESULTS DECEMBER 2012 - RECEIVER 1_155 (TOCHILAR)

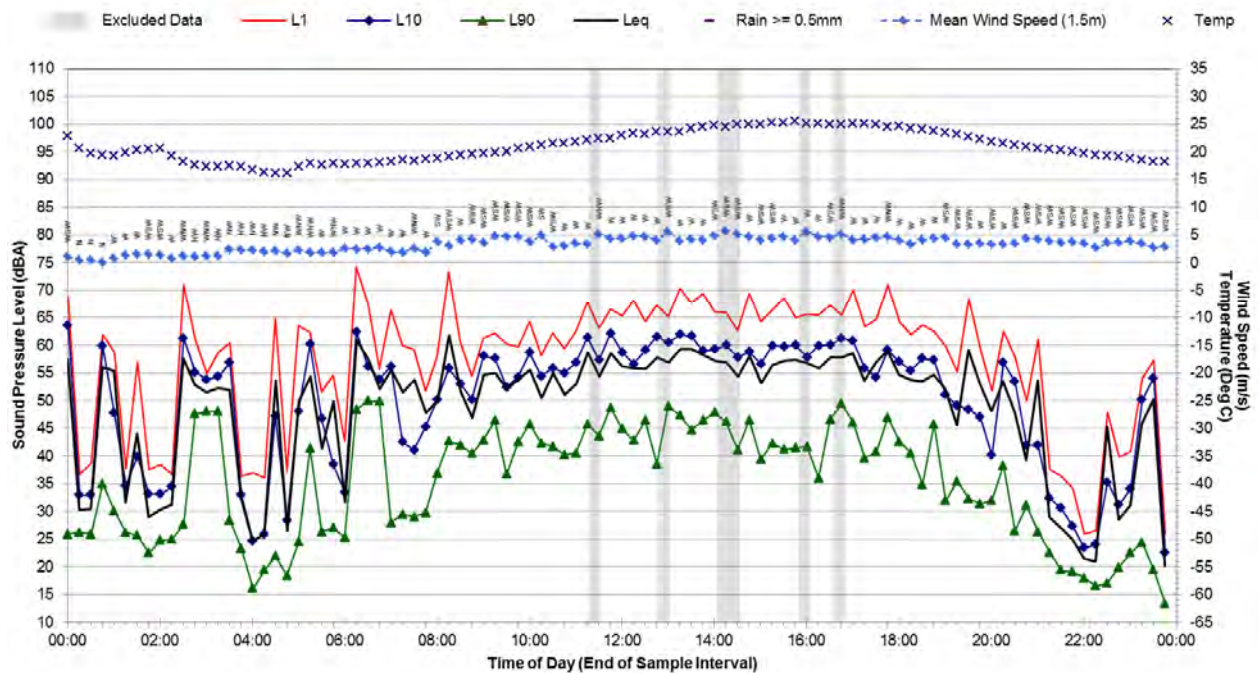


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels Background - Coggan - Monday, 3 December 2012

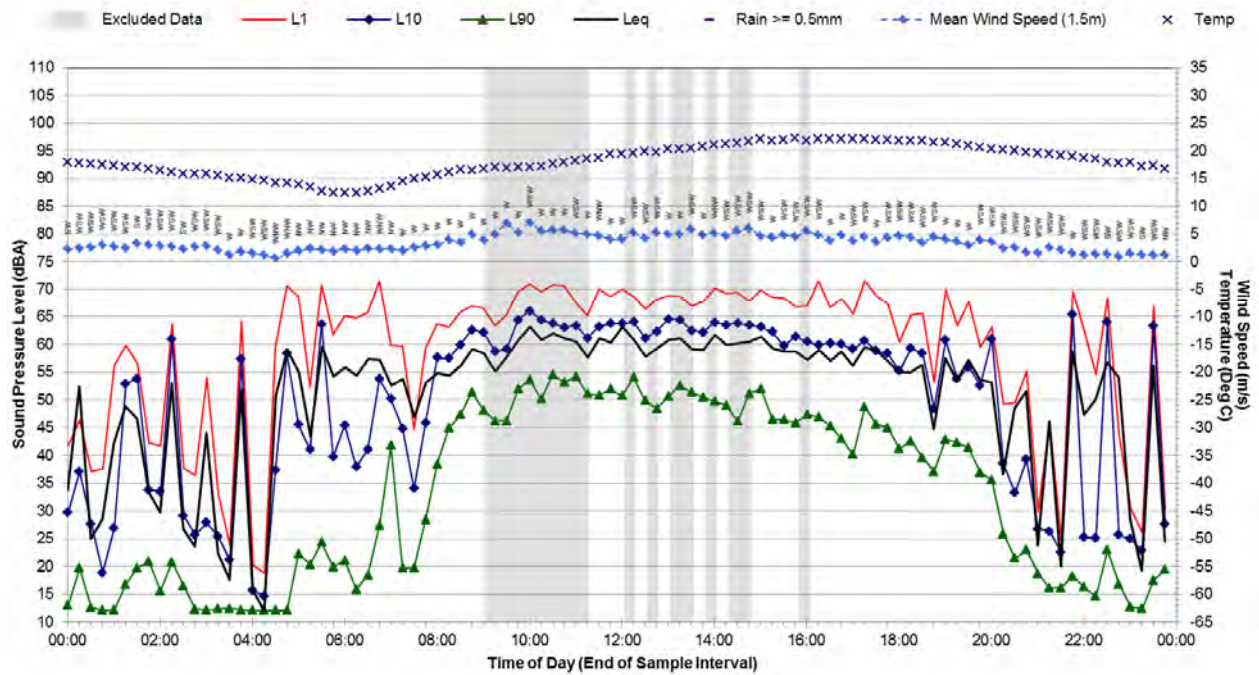


Statistical Ambient Noise Levels Background - Coggan - Tuesday, 4 December 2012

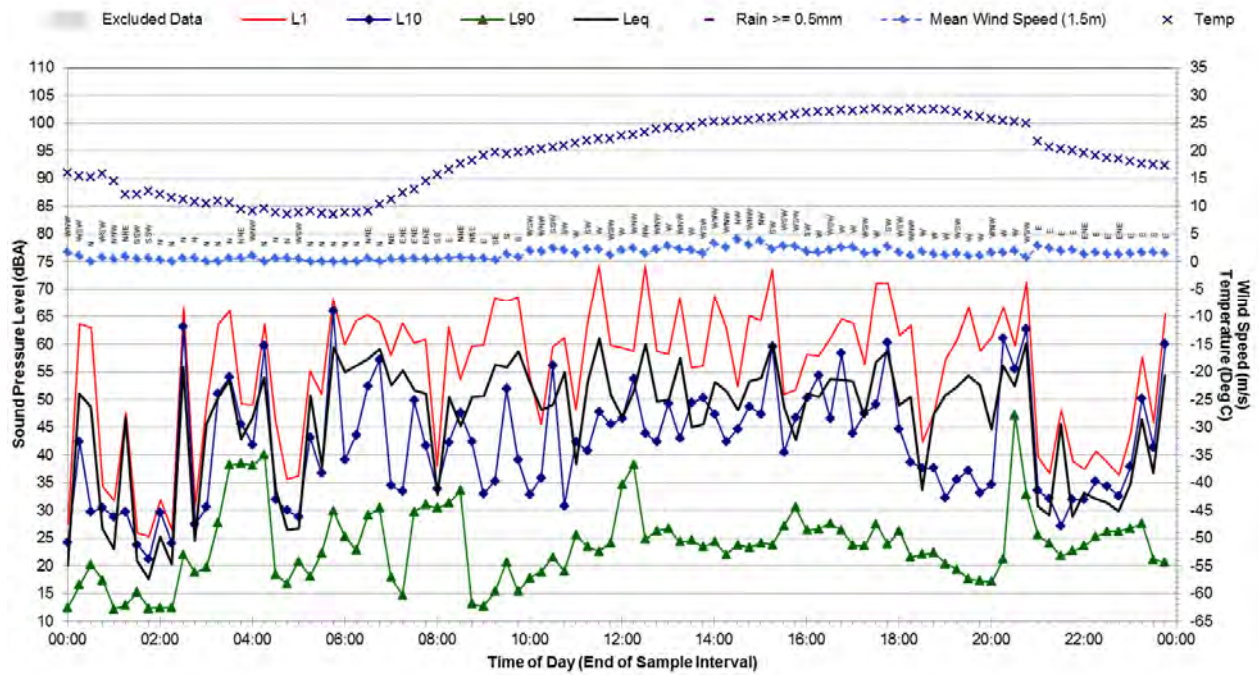


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels
Background - Coggan - Wednesday, 5 December 2012

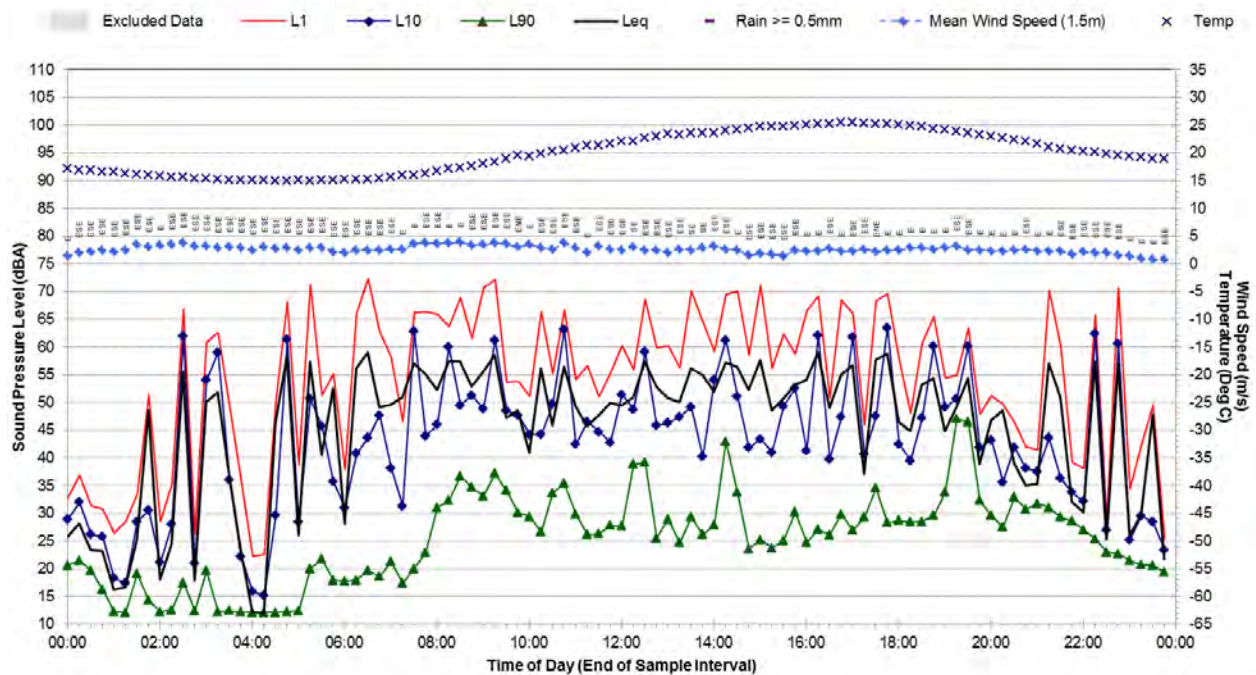


Statistical Ambient Noise Levels
Background - Coggan - Thursday, 6 December 2012

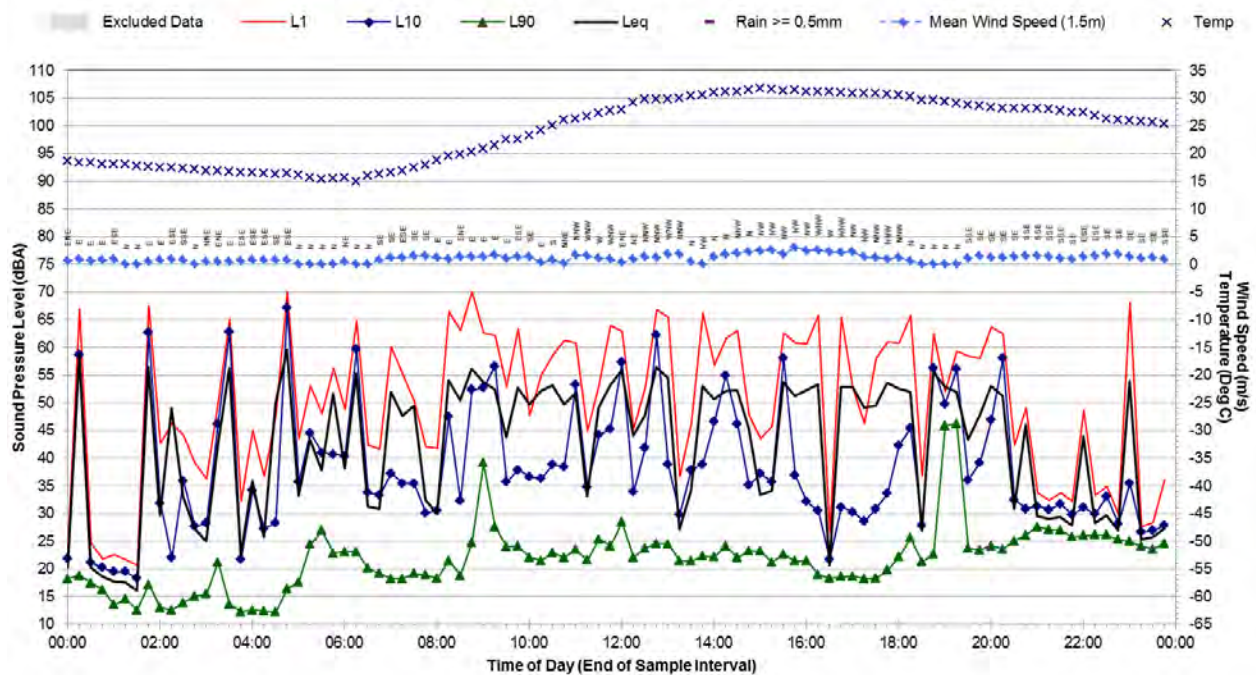


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels
Background - Coggan - Friday, 7 December 2012

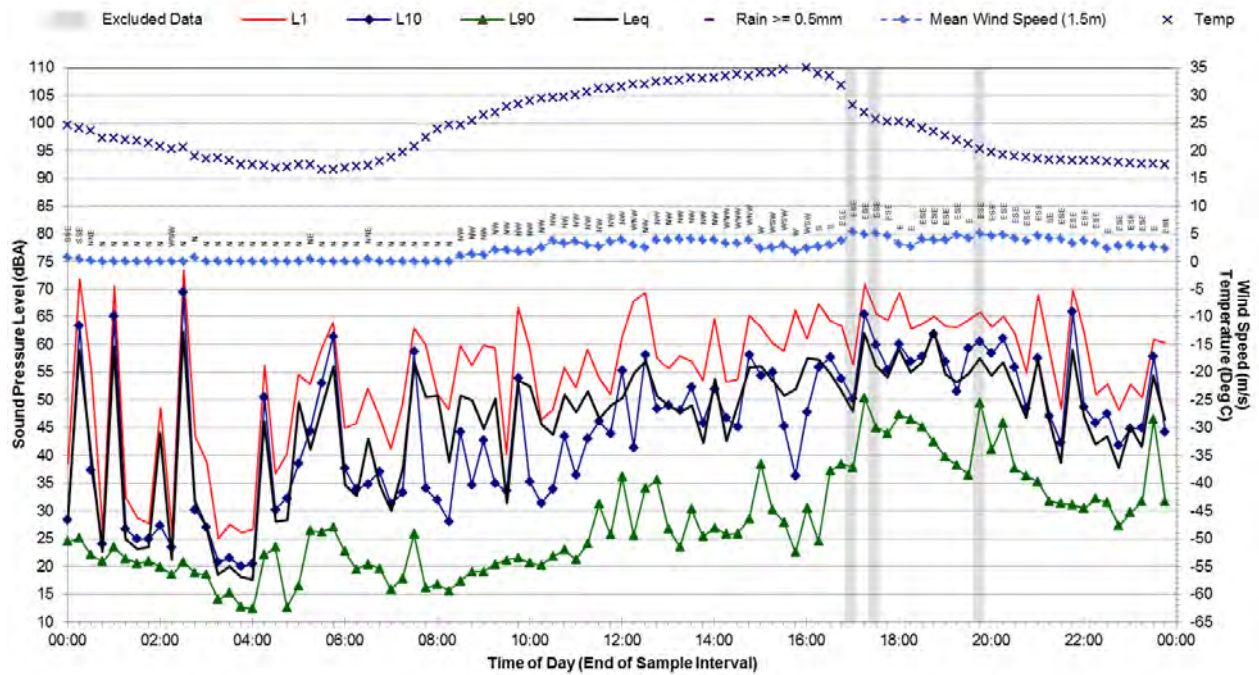


Statistical Ambient Noise Levels
Background - Coggan - Saturday, 8 December 2012

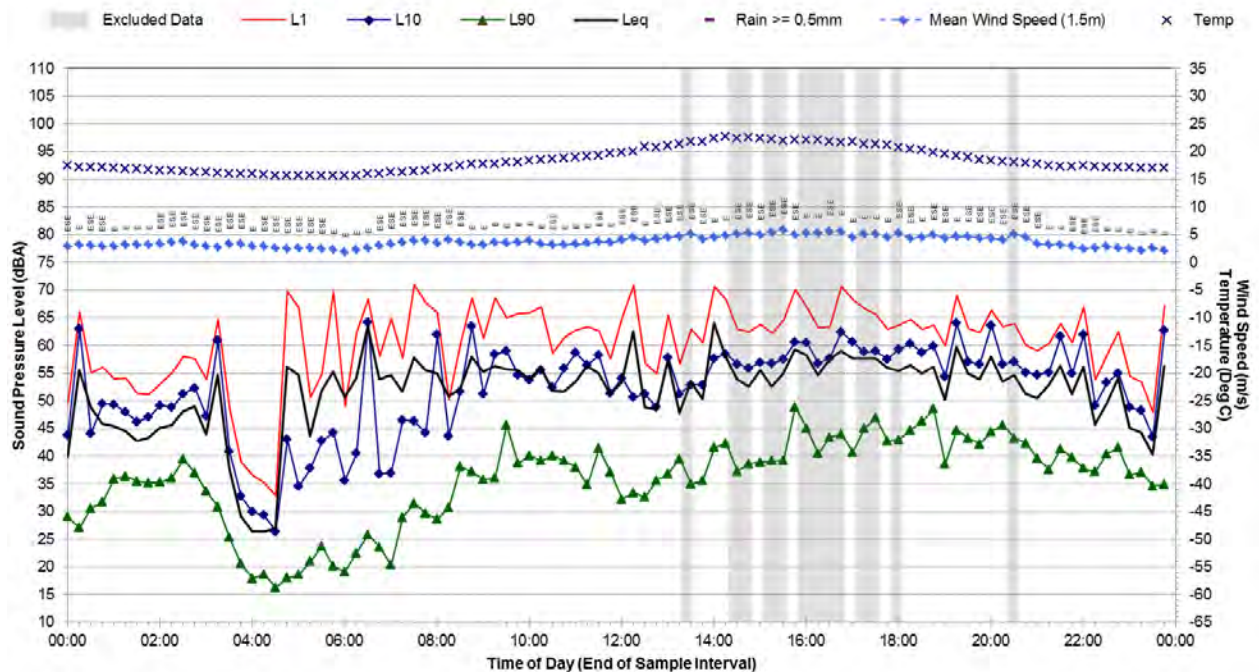


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels
Background - Coggan - Sunday, 9 December 2012

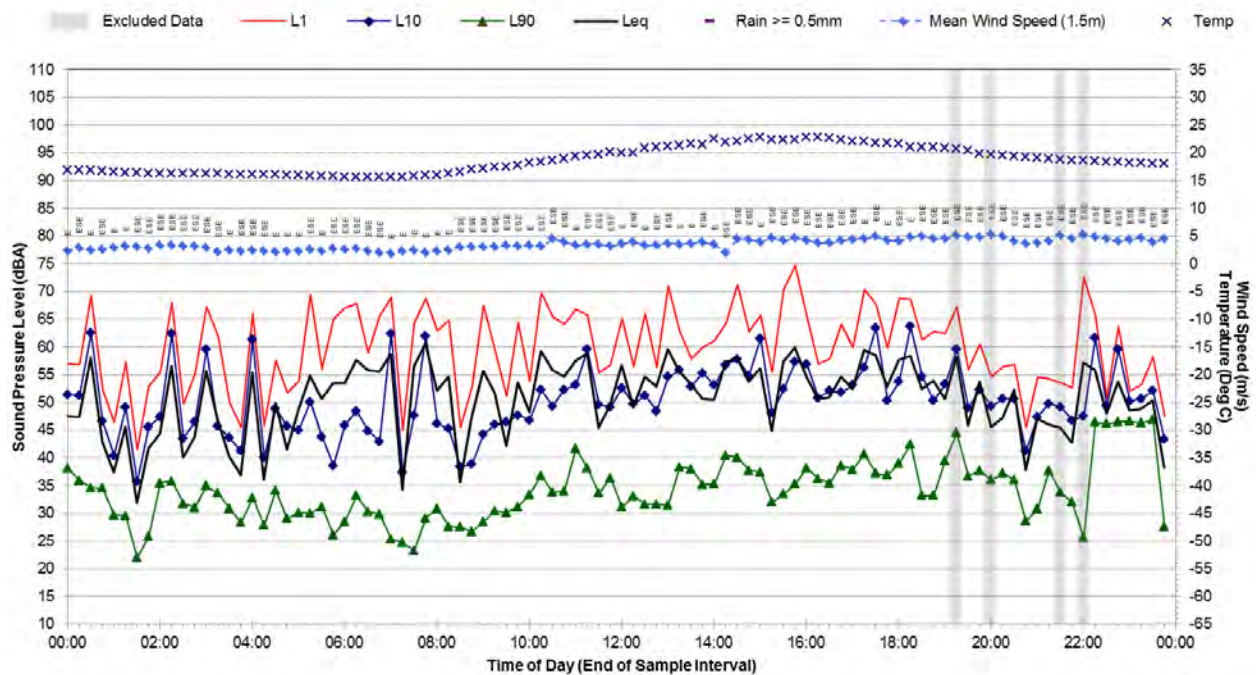


Statistical Ambient Noise Levels
Background - Coggan - Monday, 10 December 2012

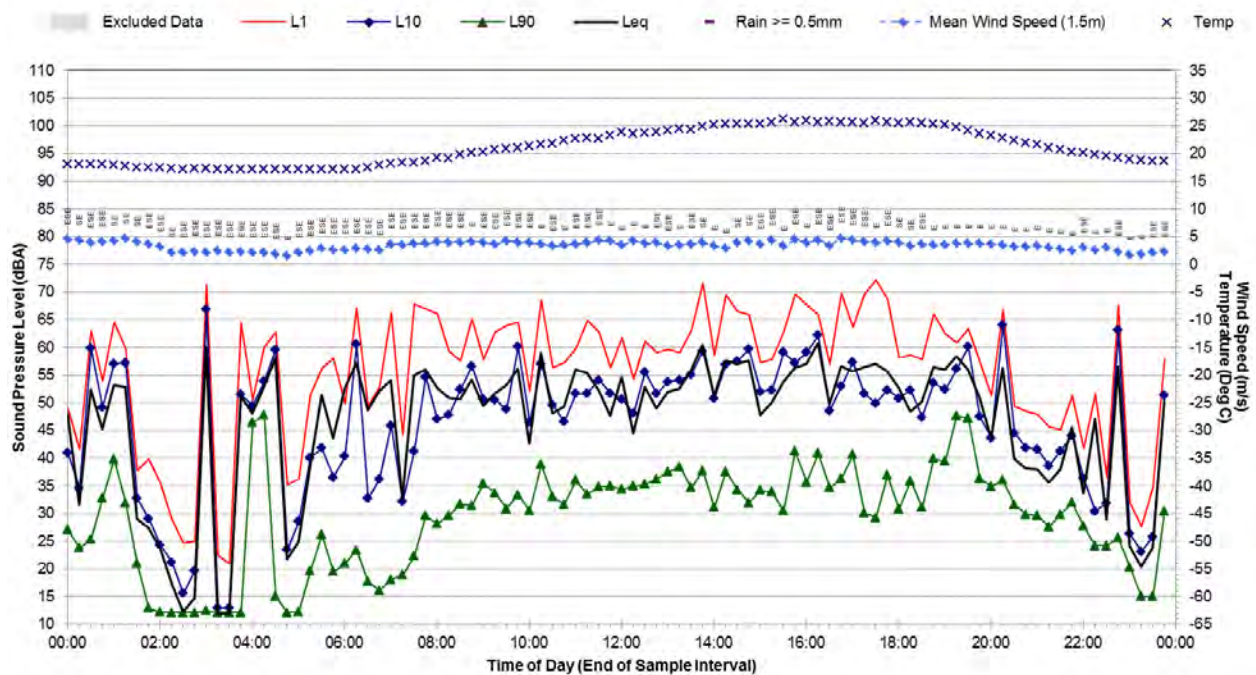


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels
Background - Coggan - Tuesday, 11 December 2012

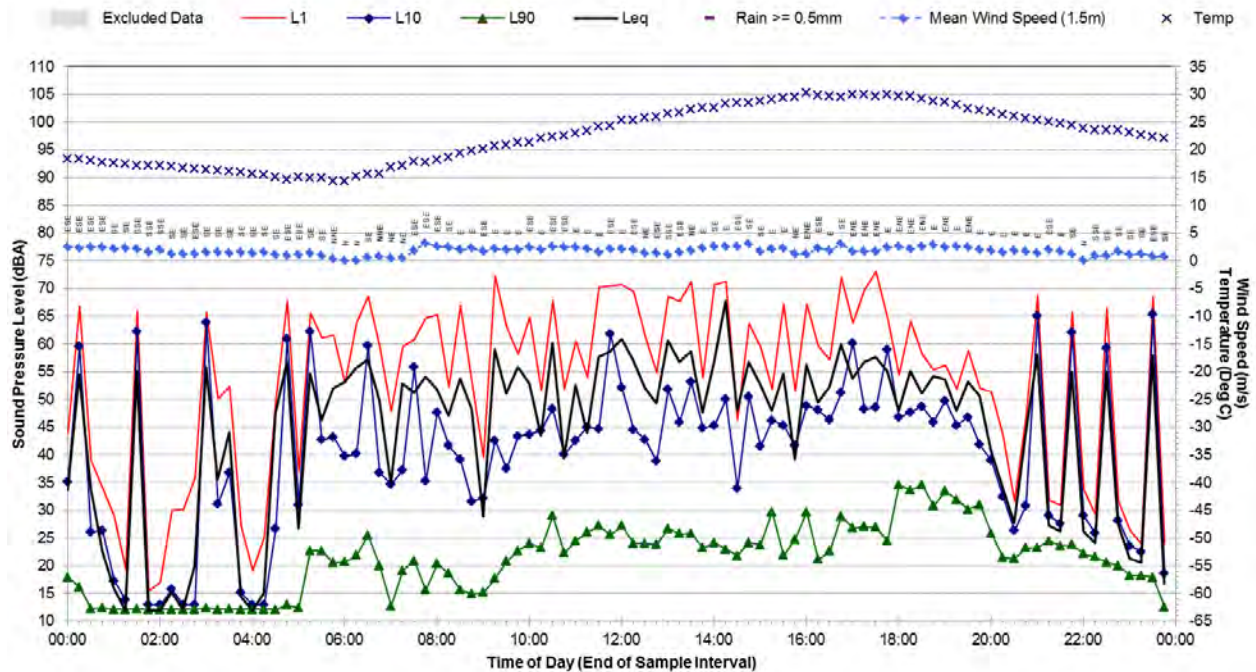


Statistical Ambient Noise Levels
Background - Coggan - Wednesday, 12 December 2012

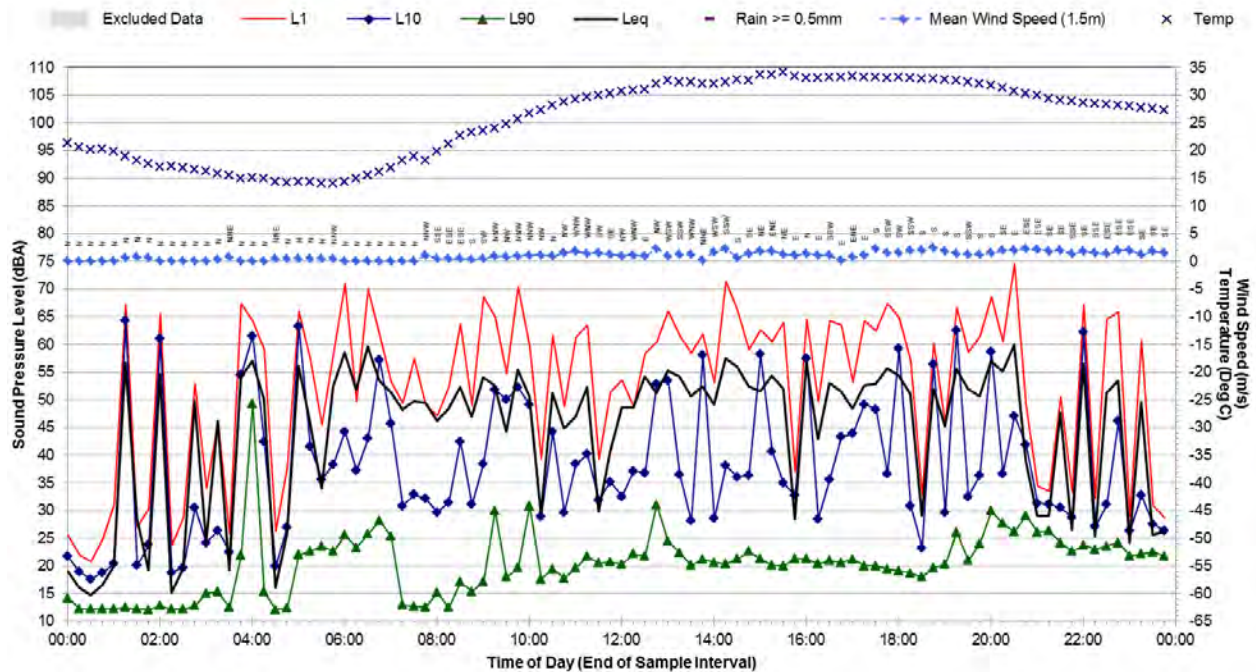


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

Statistical Ambient Noise Levels Background - Coggan - Thursday, 13 December 2012

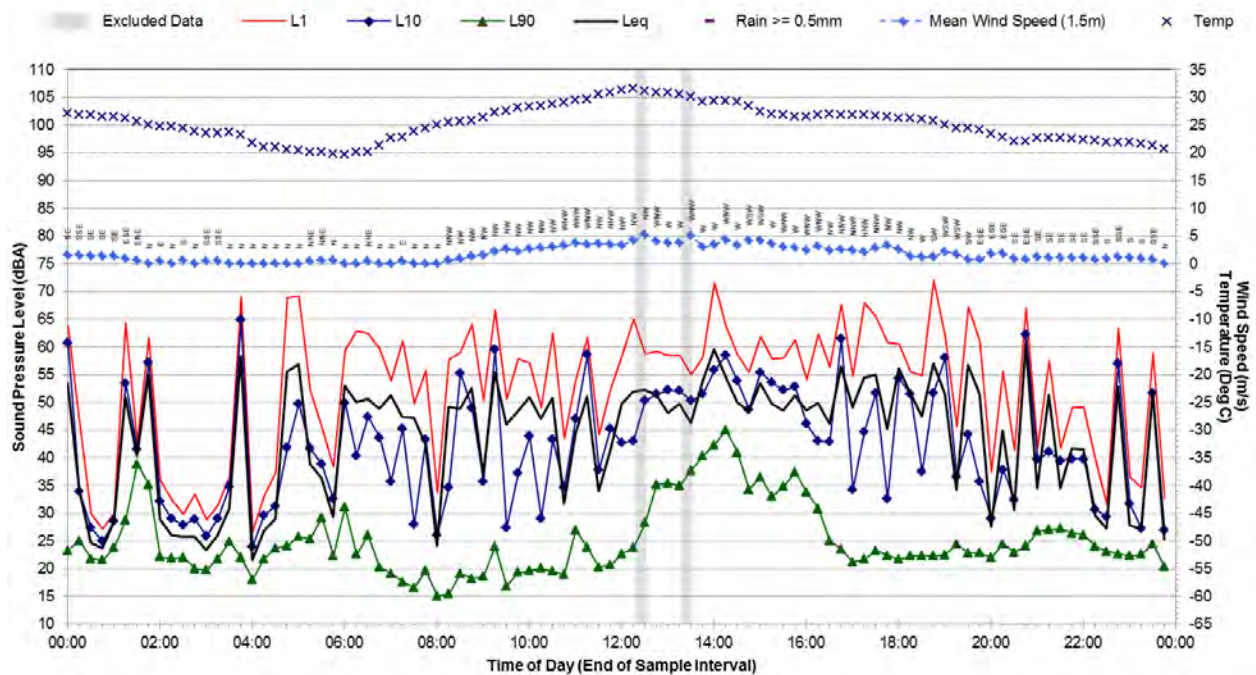


Statistical Ambient Noise Levels Background - Coggan - Friday, 14 December 2012

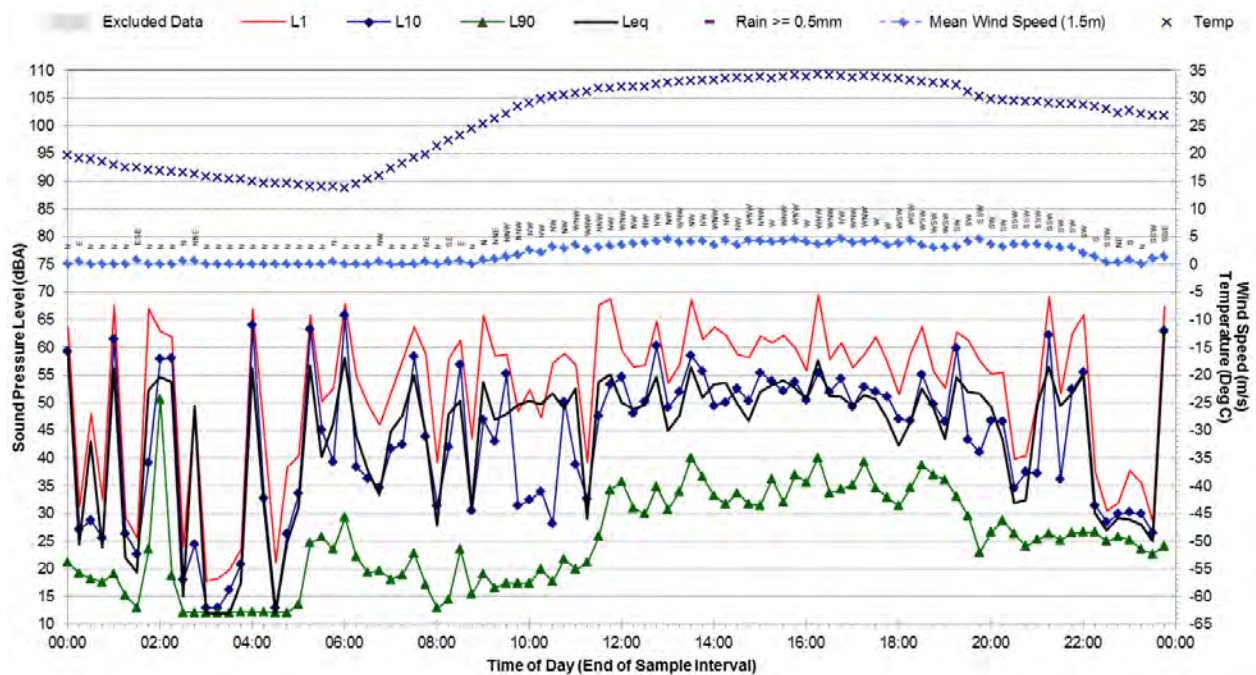


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

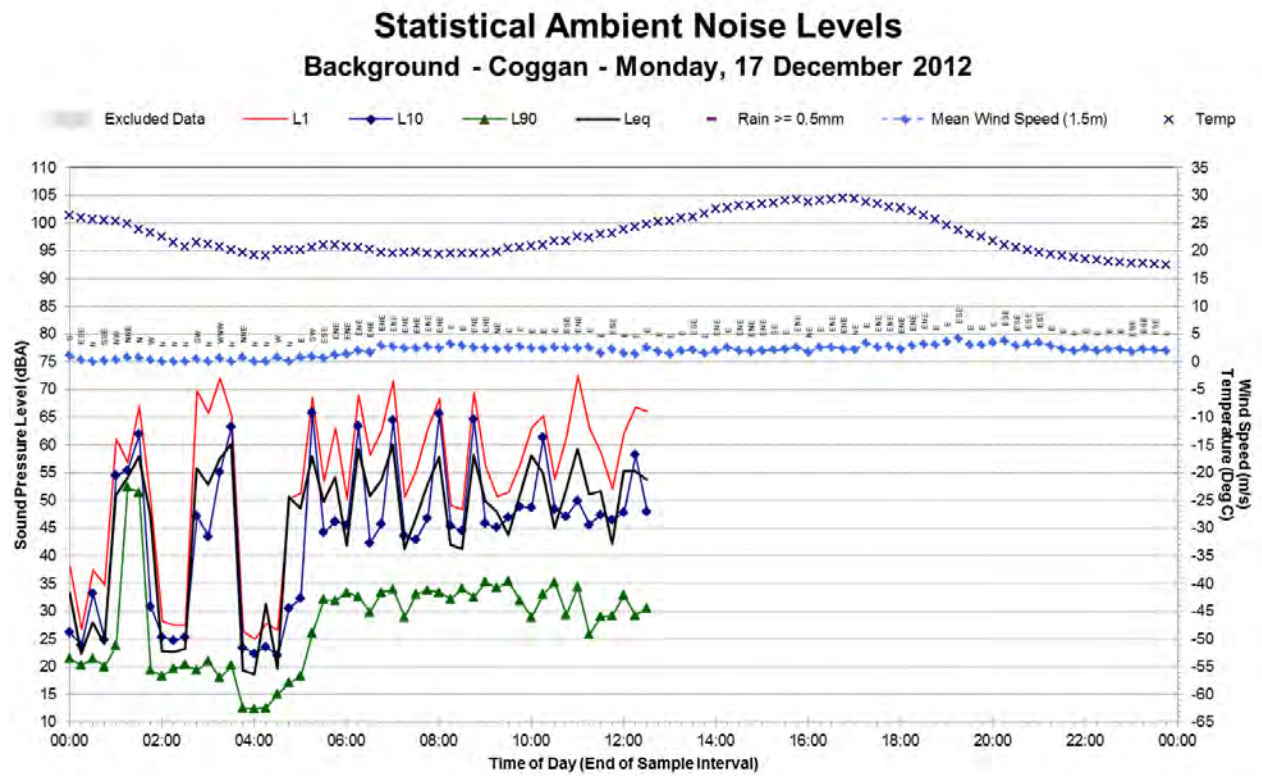
Statistical Ambient Noise Levels
Background - Coggan - Saturday, 15 December 2012



Statistical Ambient Noise Levels
Background - Coggan - Sunday, 16 December 2012

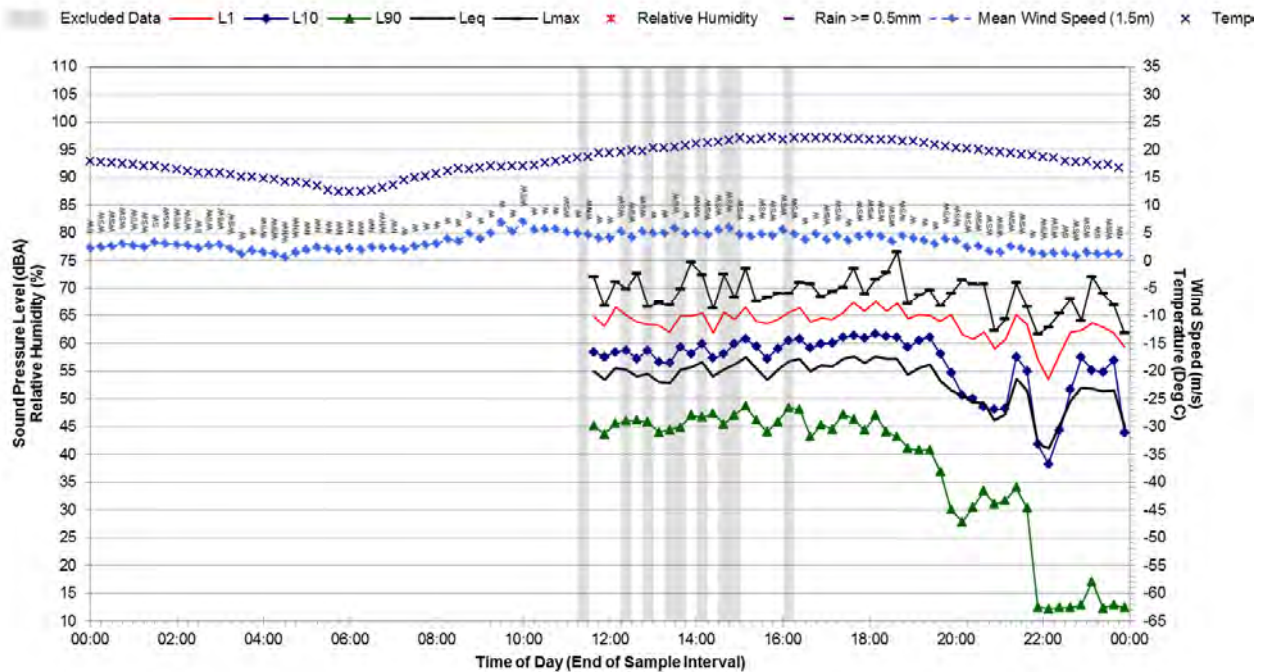


AMBIENT NOISE RESULTS DECEMBER 2012 - COGGAN

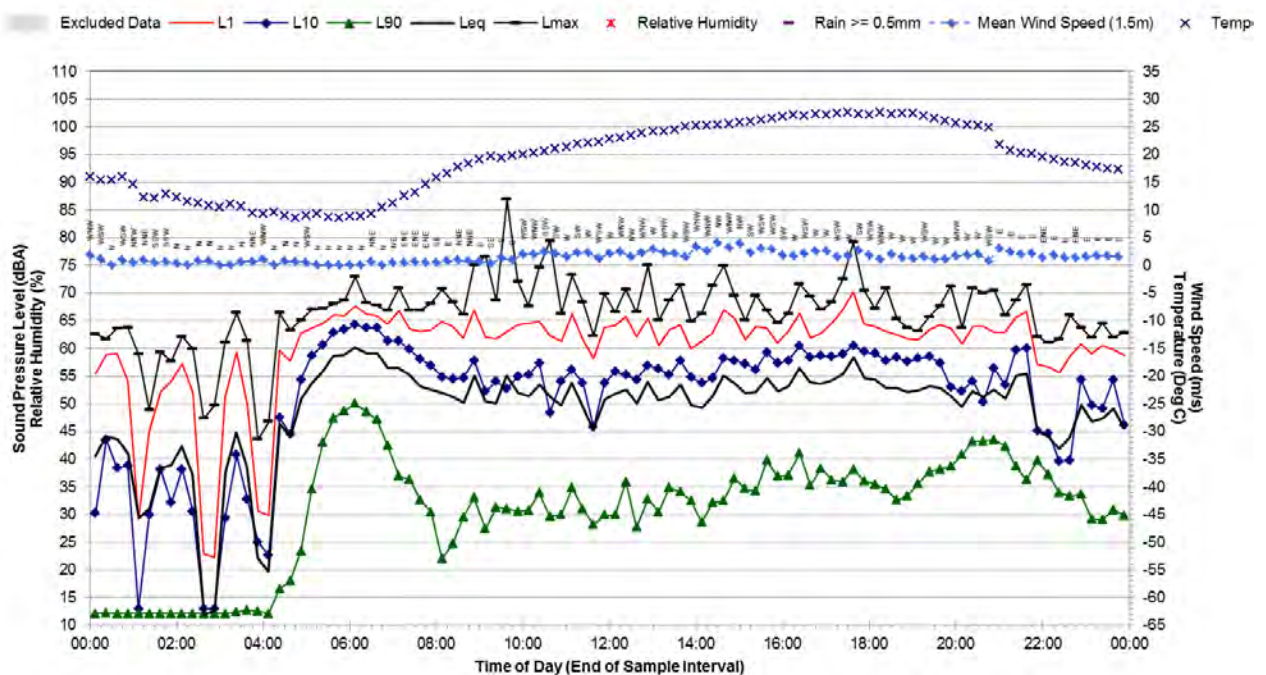


AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

Statistical Ambient Noise Levels
Ulan Road - Wednesday, 5 December 2012



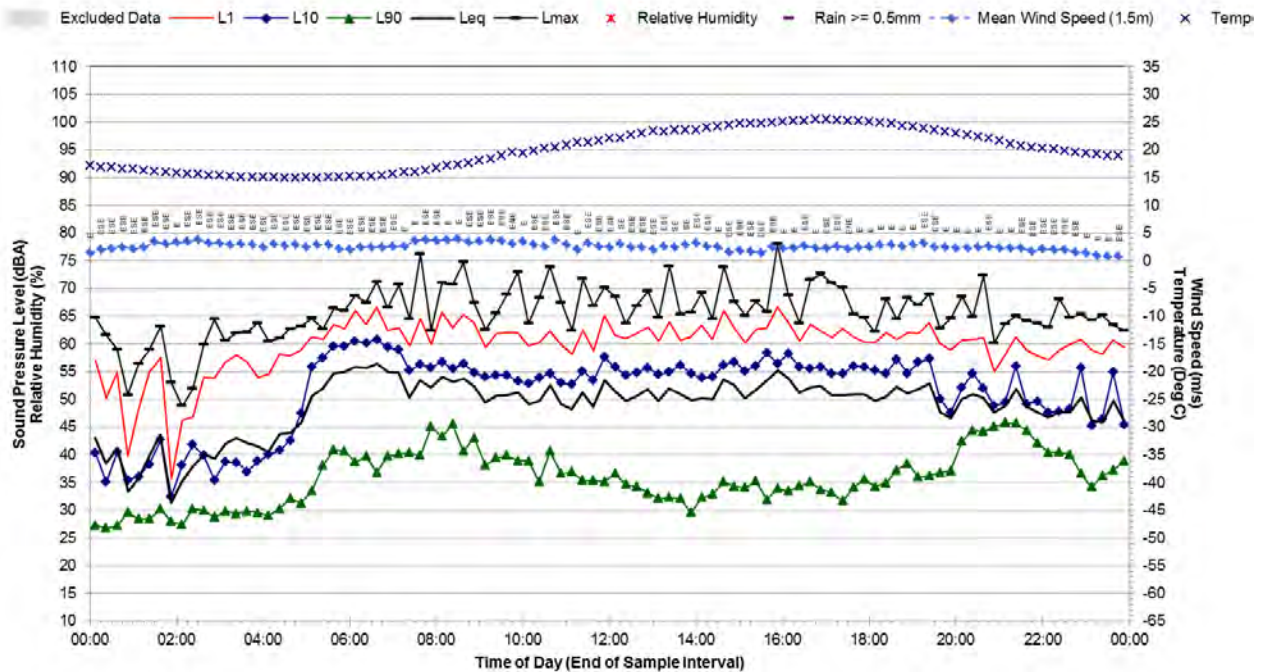
Statistical Ambient Noise Levels
Ulan Road - Thursday, 6 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

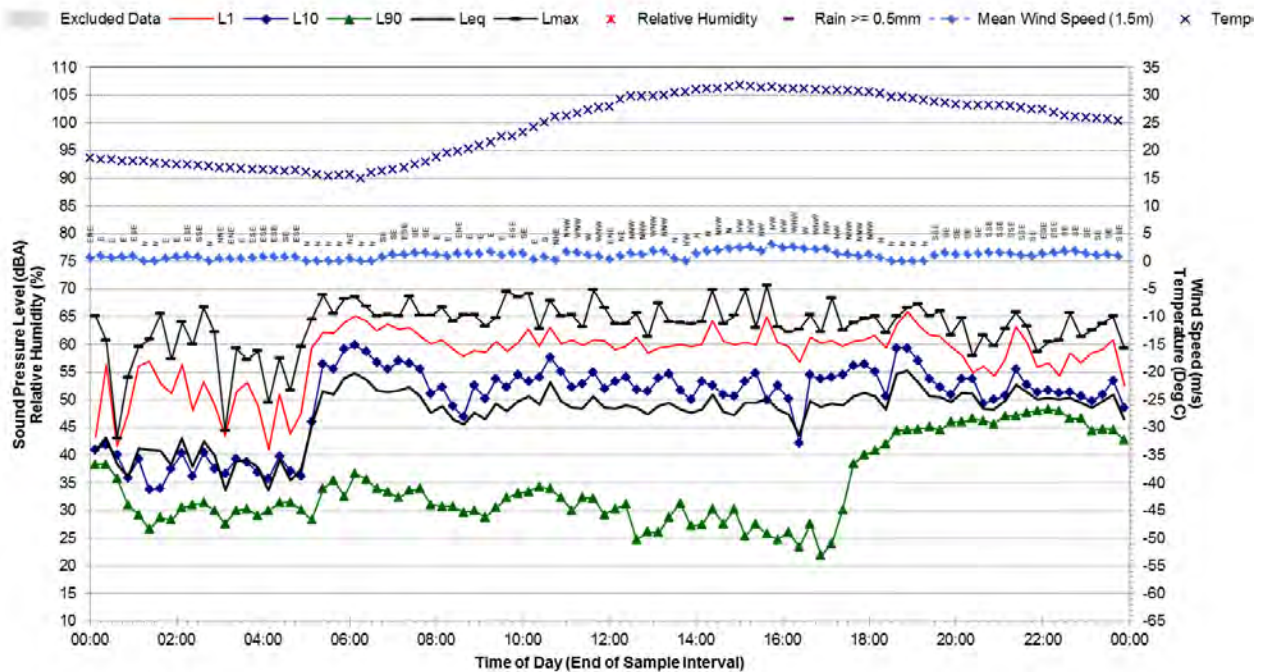
Statistical Ambient Noise Levels

Ulan Road - Friday, 7 December 2012



Statistical Ambient Noise Levels

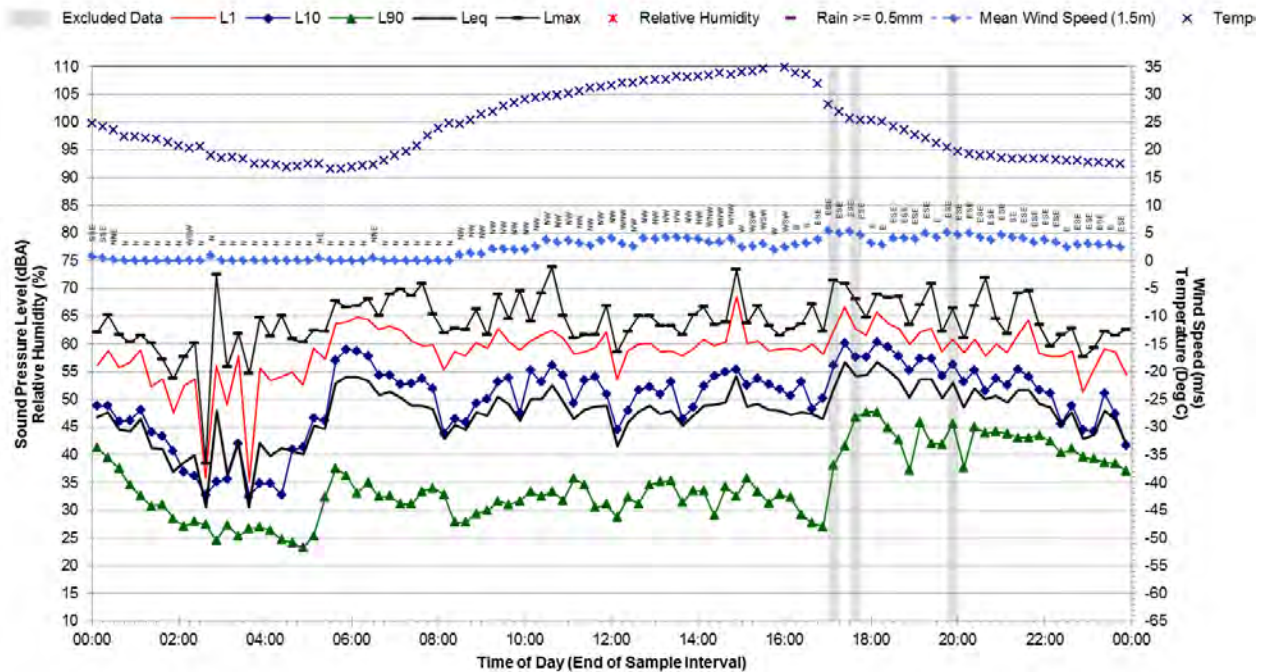
Ulan Road - Saturday, 8 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

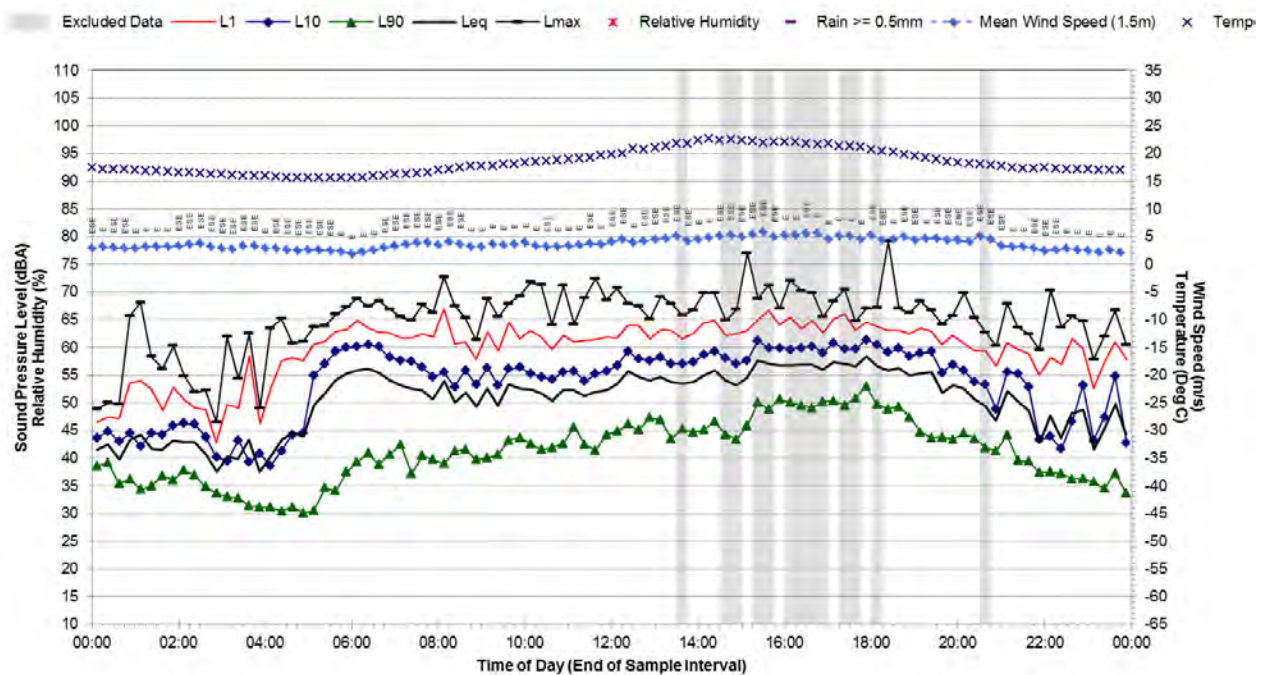
Statistical Ambient Noise Levels

Ulan Road - Sunday, 9 December 2012



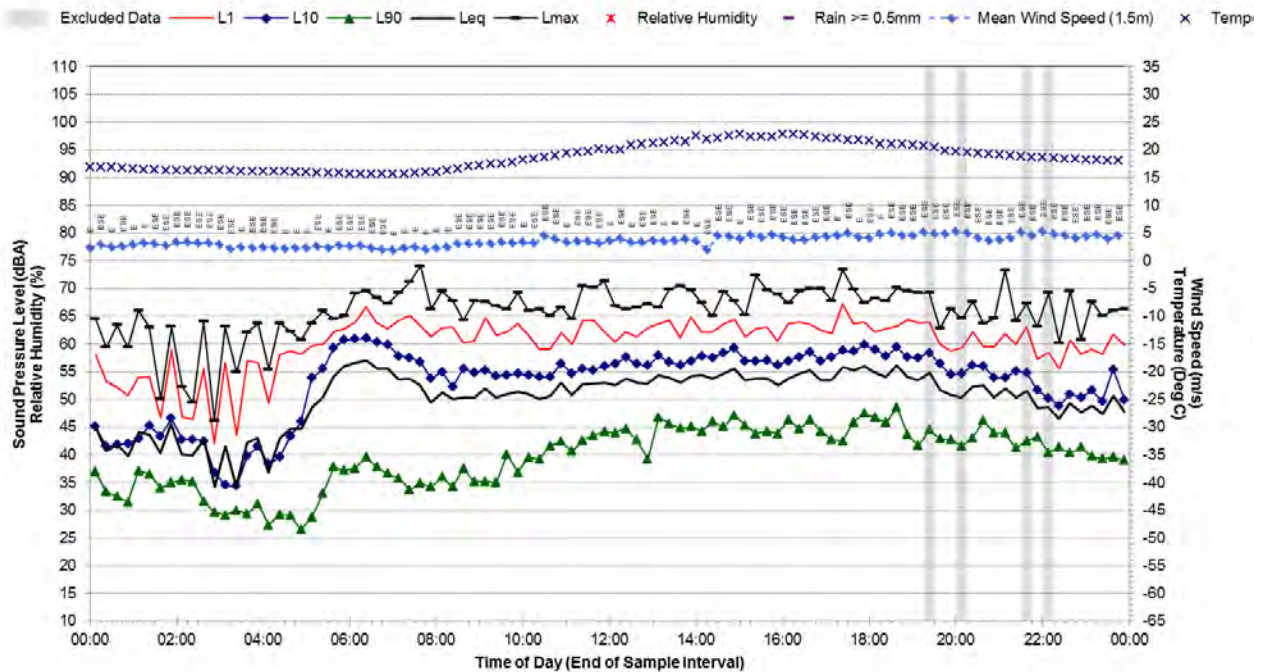
Statistical Ambient Noise Levels

Ulan Road - Monday, 10 December 2012

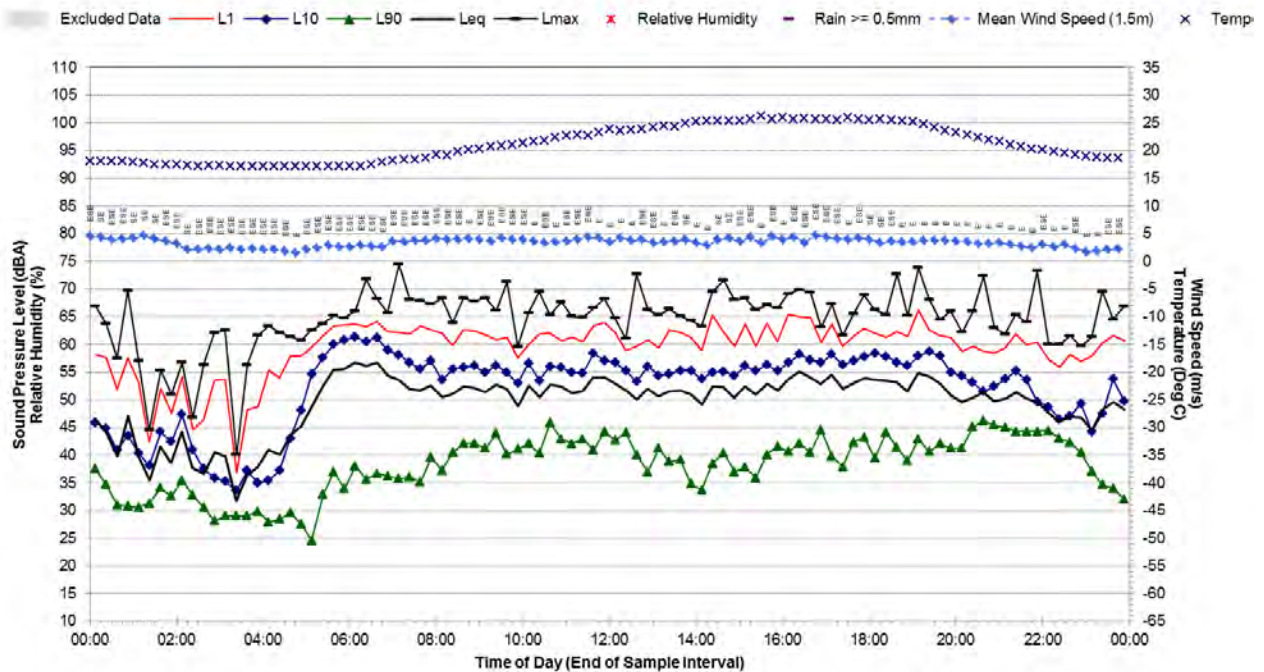


AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

Statistical Ambient Noise Levels
Ulan Road - Tuesday, 11 December 2012

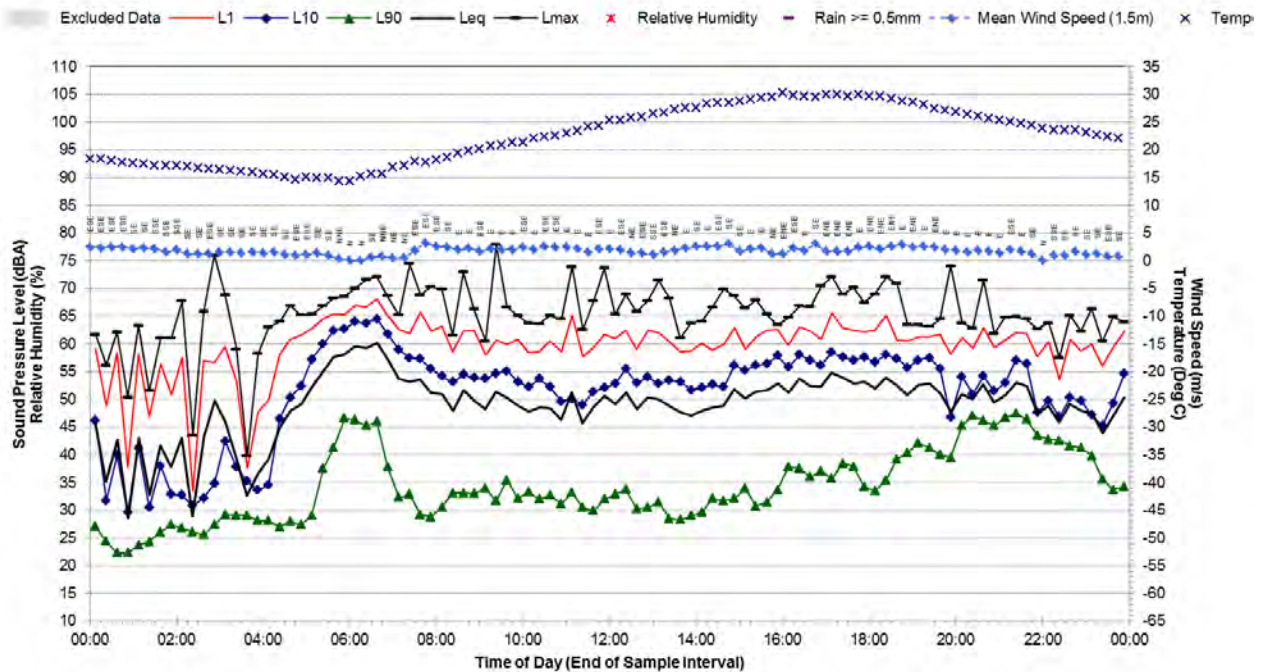


Statistical Ambient Noise Levels
Ulan Road - Wednesday, 12 December 2012

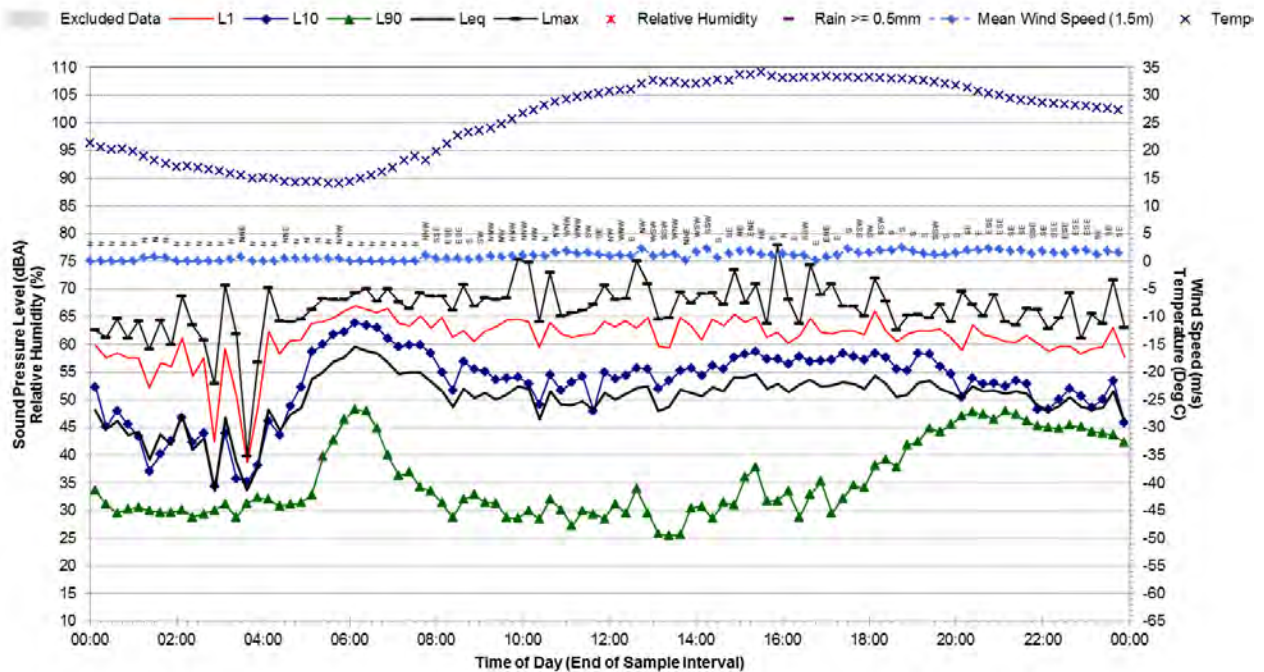


AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

Statistical Ambient Noise Levels
Ulan Road - Thursday, 13 December 2012

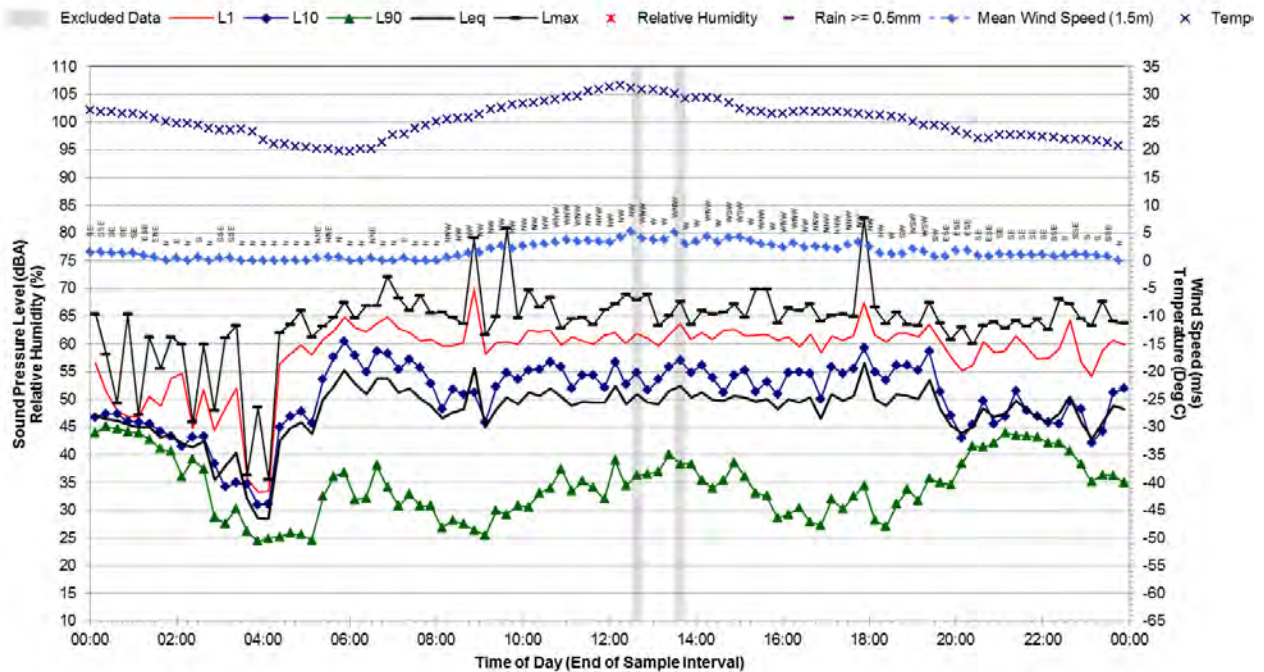


Statistical Ambient Noise Levels
Ulan Road - Friday, 14 December 2012

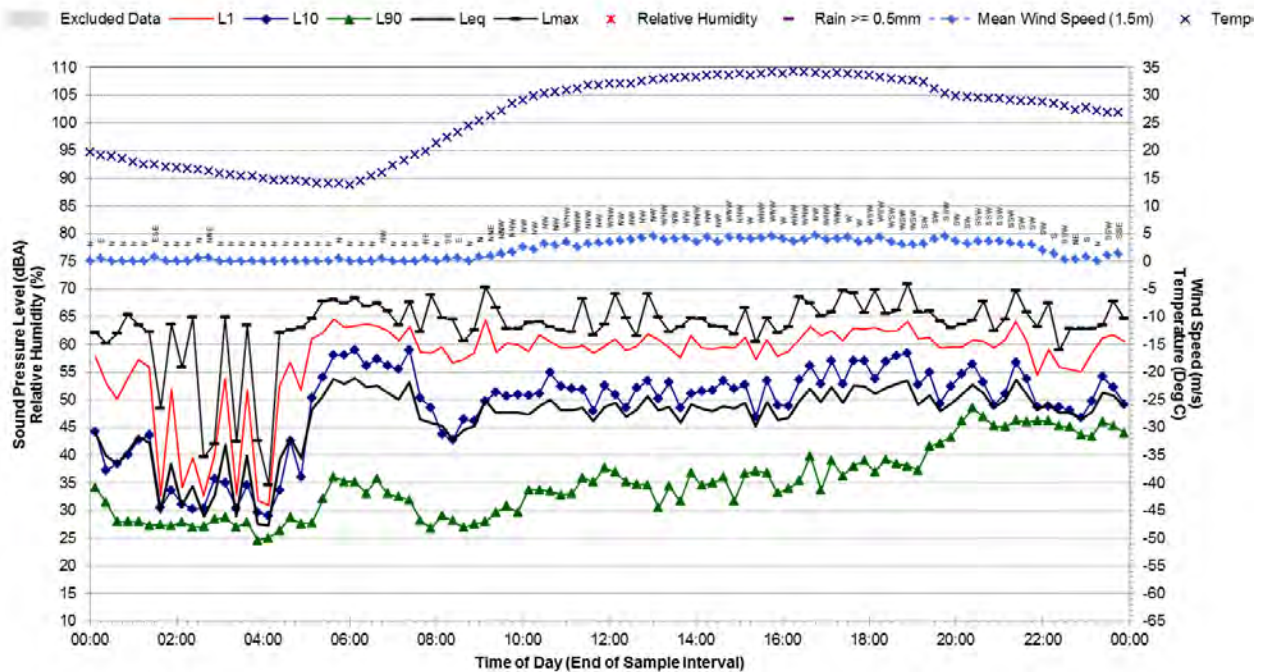


AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

Statistical Ambient Noise Levels
Ulan Road - Saturday, 15 December 2012

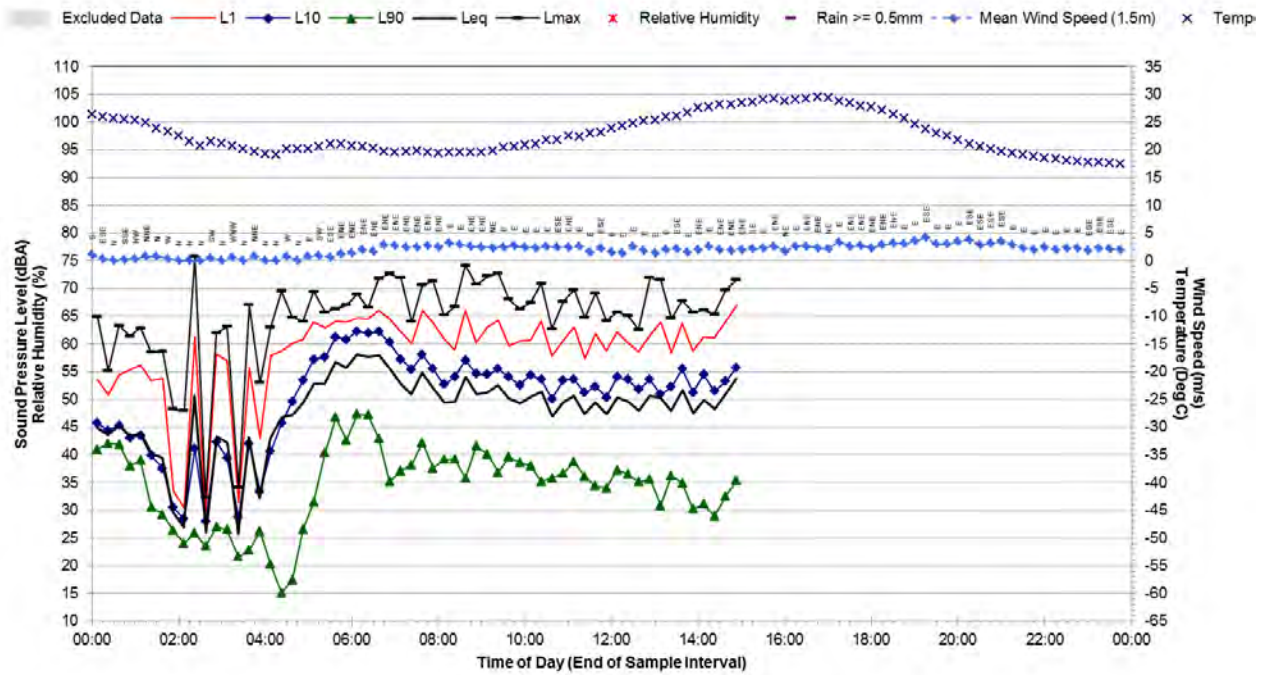


Statistical Ambient Noise Levels
Ulan Road - Sunday, 16 December 2012



AMBIENT NOISE RESULTS DECEMBER 2012 - ULAN ROAD

Statistical Ambient Noise Levels
Ulan Road - Monday, 17 December 2012



NSW EPA INP APPLICATION NOTES - SLEEP DISTURBANCE

Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The NSW Industrial Noise Policy (INP) (New South Wales [NSW] Environmental Protection Agency [EPA], 2000) does not specifically address sleep disturbance from high noise level events.

The NSW Department of Environment, Climate Change and Water (DECCW) reviewed research on sleep disturbance in the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN) (EPA, 1999). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, the DECCW recognised that current sleep disturbance criterion of an LA1(1minute) not exceeding the LA90(15minute) by more than 15 A-weighted decibels (dBA) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, the DECCW will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

The detailed analysis should cover the maximum noise level or LA1(1minute), that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. Other factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur.
- Time of day (normally between 2200 hrs and 0700 hrs).
- Whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

The LA1(1minute) descriptor is meant to represent a maximum noise level measured under “fast” time response. DECC will accept analysis based on either LA1(1minute) or LAmax.

NSW Road Noise Policy - application notes

Relative increase criteria (see Section 2.4 of RNP)

The last paragraph in Section 2.4 (page 15) states: 'The relative increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project'.

'Quiet area' is intended to mean areas 'that are 12 dB or more below the relevant noise assessment criterion that applies day or night'. The relative increase criteria are intended to apply to 'noise from a road project' or 'noise from a land use development with the potential to generate additional traffic'.

The first sentence in the last paragraph should therefore be read to mean: 'The relative increase criteria are primarily intended to protect existing quiet areas, being areas that are 12 dB or more below the relevant noise assessment criterion that applies day or night, from excessive changes in amenity due to noise from additional traffic.'

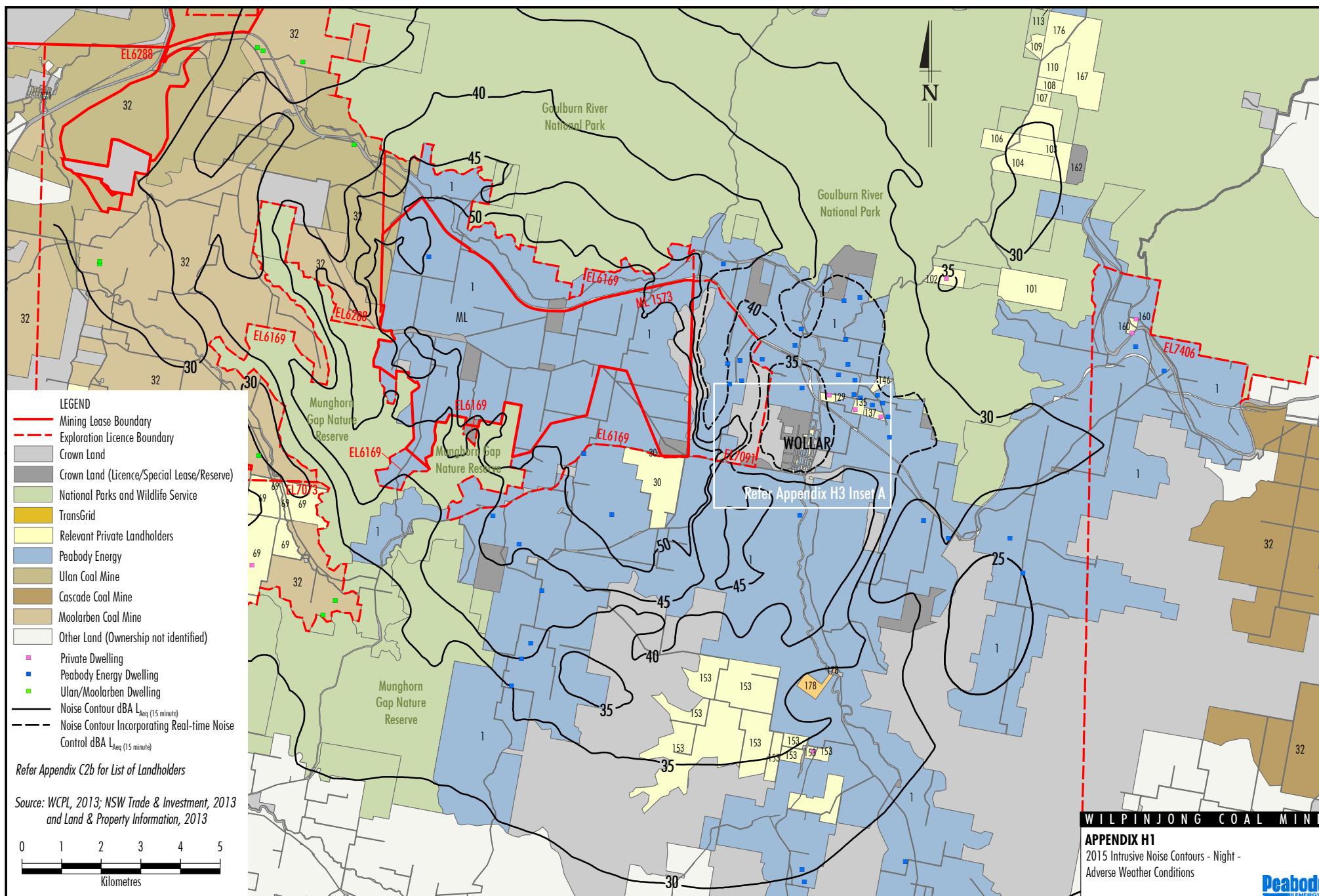
Applying the assessment criteria to additional traffic on existing roads generated by land use developments (see Section 3.4.1 of RNP)

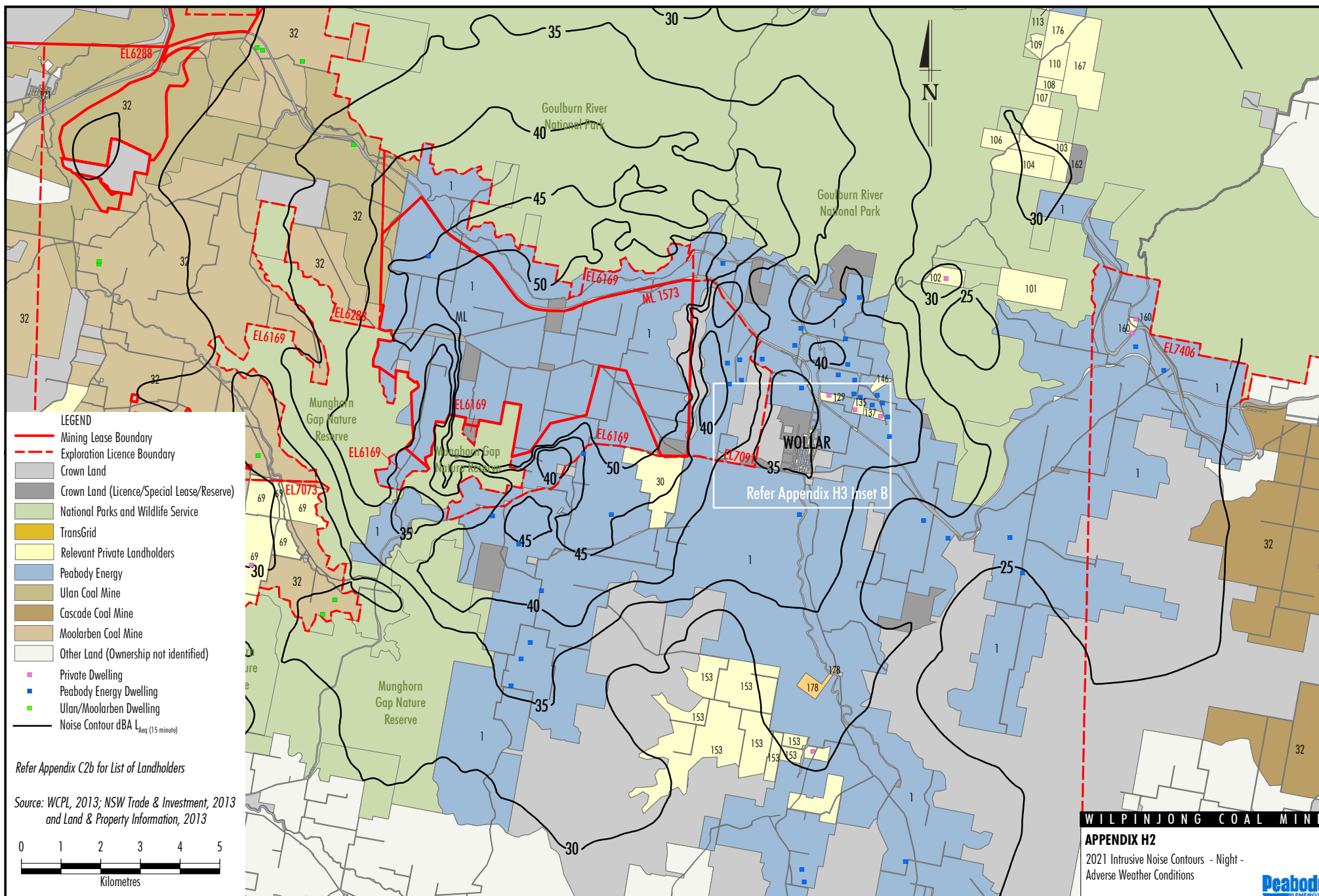
The second paragraph in Step 4 states: 'For existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding "no build option".'

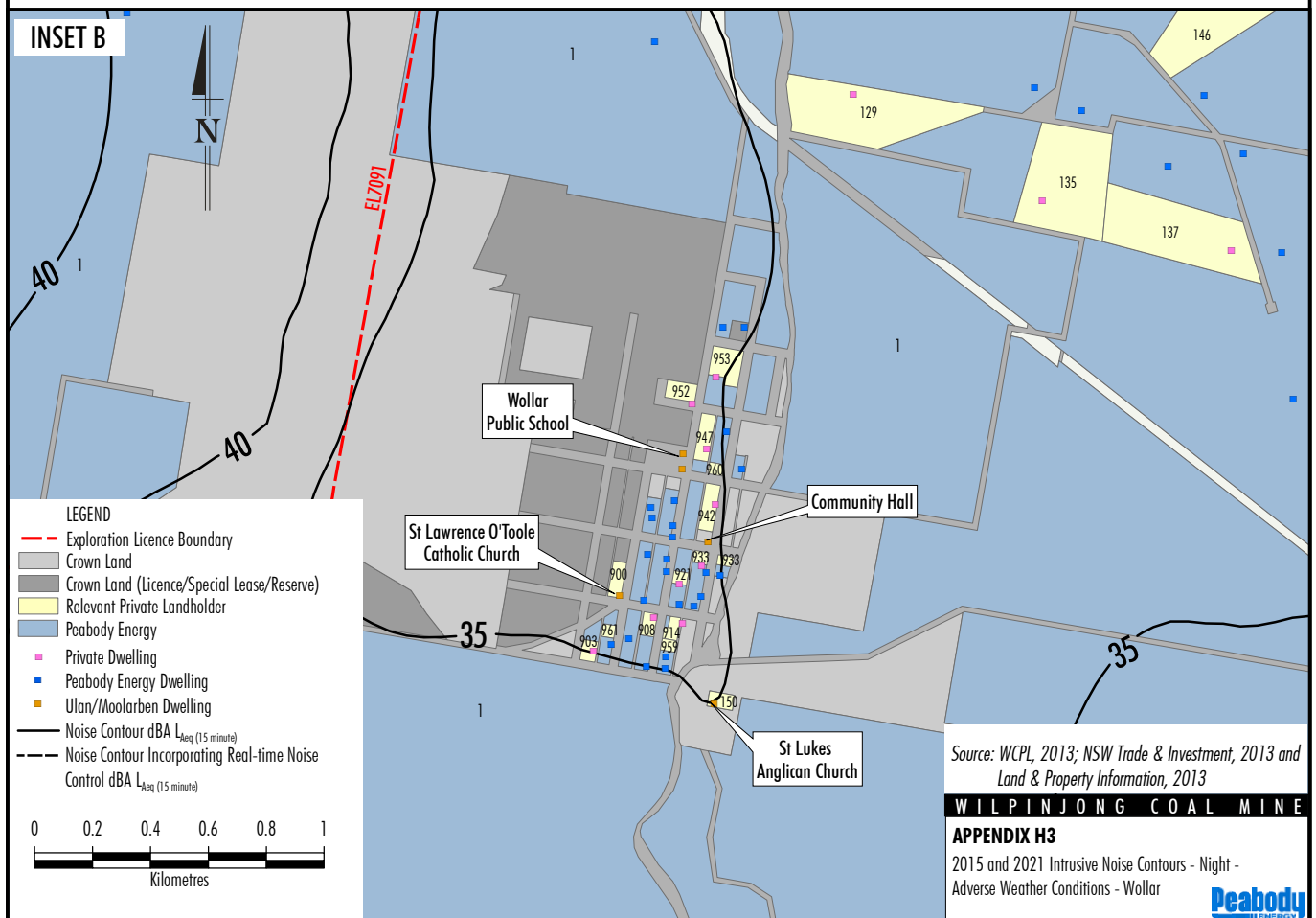
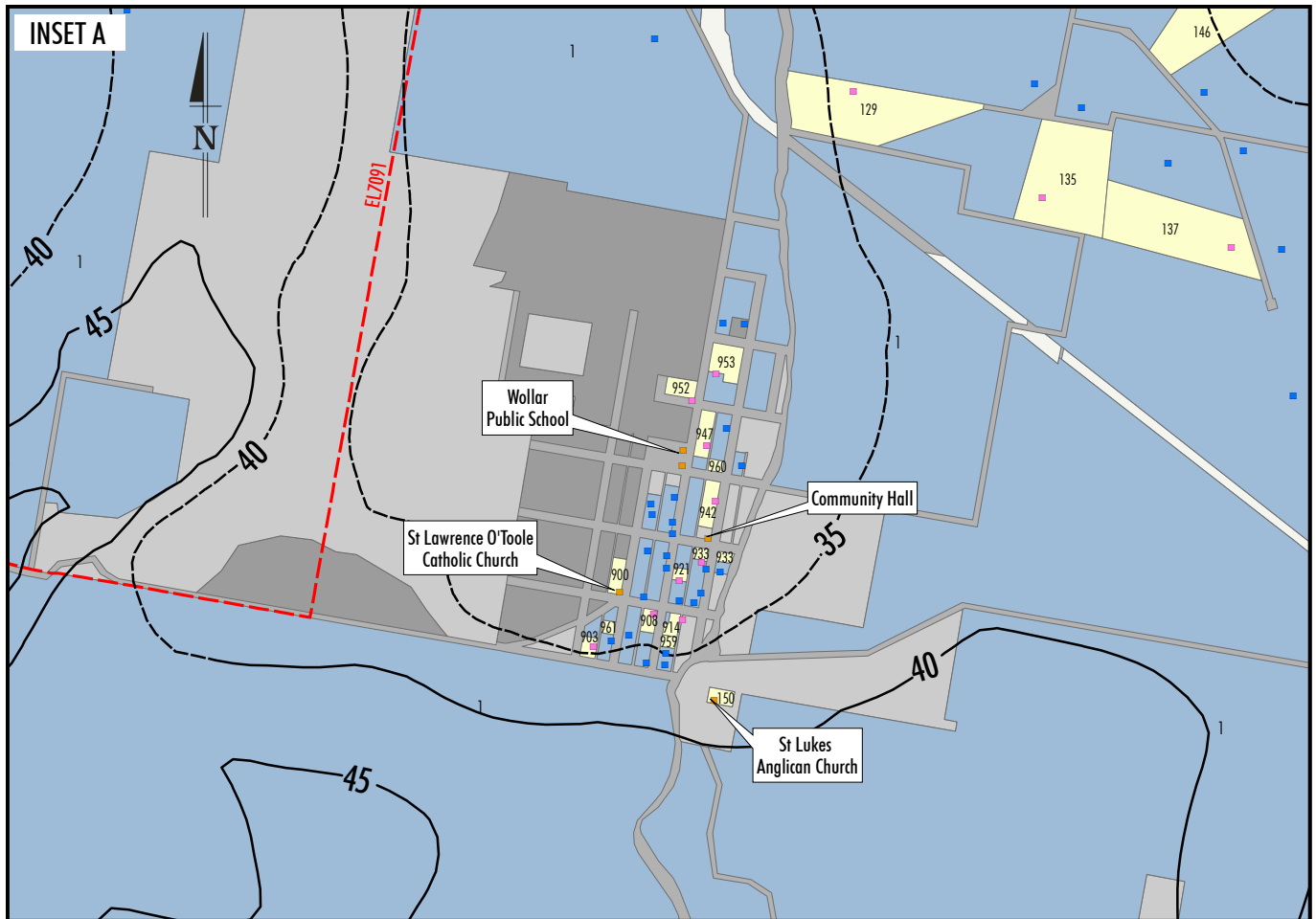
The policy provides for this 2 dB increase if the relevant assessment criteria identified in Step 2 is not achievable after the feasible and reasonable mitigation measures noted in Step 3 have been considered. The 2 dB increase applies to both the relevant day and night assessment criteria.

The second paragraph in Step 4 should therefore be read to mean: 'After taking Steps 1 to 3, for existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.'

Where cumulative impacts from road traffic-generating developments are likely, Section 3.5 notes that planning authorities should use strategic planning policies to minimise exposure to unacceptable noise levels.







RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 AND 2021 DAYTIME INTRUSIVE NOISE

ID No and Landholder	Modification 5 Year 2015 Calm	Modification 5 Year 2018 Calm	Modification 5 Year 2021 Calm
Resource-company - Moolarben			
32_12 Moolarben	22	22	18
32_13 Moolarben	22	22	18
32_14 Moolarben	18	19	15
32_29A Moolarben	15	16	13
32_29B Moolarben	16	17	14
32_48A Moolarben	16	16	15
32_48B Moolarben	16	15	14
32_32C Moolarben	27	28	23
32_33A Moolarben	11	11	8
32_33B_5 Moolarben	11	11	8
Resource-company - Peabody			
1_100B Peabody	13	12	11
1_127 Peabody	20	18	18
1_131 Peabody	19	17	17
1_133 Peabody	19	17	17
1_136 Peabody	18	16	16
1_140 Peabody	17	15	15
1_142 Peabody	18	16	15
1_143 Peabody	19	17	17
1_145 Peabody	19	16	17
1_151 Peabody	19	16	16
1_152 Peabody	18	16	16
1_154 Peabody	10	8	8
1_155 Peabody	10	8	8
1_156 Peabody	12	9	8
1_158 Peabody	13	11	10
1_159 Peabody	8	6	6
1_162 Peabody	7	6	5
1_163 Peabody	7	5	4
1_164 Peabody	39	32	32
1_18 Peabody	22	22	20
1_19 Peabody	22	21	20
1_25 Peabody	22	19	21
1_26 Peabody	18	14	17
1_26 Peabody	19	17	17
1_28C Peabody	20	16	17
1_30 Peabody	19	17	17
1_31 Peabody	22	19	21
1_45 Peabody	30	26	34
1_49 Peabody	42	37	31
1_52A Peabody	27	23	24
1_53 Peabody	26	21	24
1_55 Peabody	25	21	25
1_58 Peabody	27	22	23
1_83 Peabody	19	17	17
1_905 Peabody	22	19	16
1_907 Peabody	21	18	15

RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 AND 2021 DAYTIME INTRUSIVE NOISE

ID No and Landholder	Modification 5 Year 2015 Calm	Modification 5 Year 2018 Calm	Modification 5 Year 2021 Calm
1_910 Peabody	21	19	16
1_912 Peabody	22	19	16
1_913 Peabody	21	19	16
1_915 Peabody	19	15	14
1_916 Peabody	18	15	14
1_917 Peabody	18	15	14
1_920 Peabody	18	15	14
1_923 Peabody	18	15	14
1_926 Peabody	18	15	14
1_927 Peabody	18	15	14
1_929 Peabody	18	15	14
1_931 Peabody	18	15	14
1_934 Peabody	18	15	14
1_937 Peabody	18	15	14
1_938 Peabody	18	15	14
1_939 Peabody	19	15	15
1_941 Peabody	19	15	14
1_946 Peabody	18	15	14
1_950 Peabody	18	15	15
1_956 Peabody	18	15	15
1_957 Peabody	18	15	15
1_W88A Peabody	21	19	18
1_W88B Peabody	22	21	19
1_WA Peabody	48	51	35
1_WF Peabody	30	26	22
1_WJ Peabody	32	28	28
1_WK Peabody	24	22	21
1_WR Peabody	22	19	17
1_WT Peabody	12	9	9

Note 1: Highest predicted noise levels from the INP meteorological conditions in Table 11 for each receiver.

Note 2: Predicted LAeq(15minute) noise level complies with the intrusive PSNL.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.

Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.

Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 AND 2021 EVENING INTRUSIVE NOISE

ID No and Landowner	Modification 5 Yr 2015		Modification 5 Yr 2018		Modification 5 Yr 2021	
	Calm	Wind	Calm	Wind	Calm	Wind
Resource-company - Moolarben						
32_12 Moolarben	22	31	22	32	18	28
32_13 Moolarben	22	31	22	32	19	29
32_14 Moolarben	19	30	19	30	15	29
32_29A Moolarben	15	27	16	24	13	27
32_29B Moolarben	16	34	17	33	13	31
32_48A Moolarben	16	29	16	25	15	27
32_48B Moolarben	16	29	15	25	14	27
32_32C Moolarben	27	35	28	38	23	33
32_33A Moolarben	11	30	11	31	8	28
32_33B_5 Moolarben	11	30	11	31	8	28
Resource-company - Peabody						
1_100B Peabody	14	9	12	7	11	6
1_127 Peabody	20	16	18	14	18	14
1_131 Peabody	19	15	17	13	17	12
1_133 Peabody	20	15	17	13	17	12
1_136 Peabody	18	14	16	13	16	12
1_140 Peabody	17	13	16	11	15	10
1_142 Peabody	18	13	16	11	15	11
1_143 Peabody	19	15	17	13	17	12
1_145 Peabody	19	15	17	13	17	13
1_151 Peabody	19	26	17	19	17	15
1_152 Peabody	18	14	16	12	16	11
1_154 Peabody	10	7	8	5	8	4
1_155 Peabody	10	7	8	5	8	4
1_156 Peabody	12	8	9	5	8	4
1_158 Peabody	13	9	11	7	10	6
1_159 Peabody	8	3	6	1	6	1
1_162 Peabody	7	3	6	2	5	1
1_163 Peabody	7	2	5	1	4	0
1_164 Peabody	39	46	32	43	32	31
1_18 Peabody	22	18	22	18	20	16
1_19 Peabody	22	19	21	17	20	17
1_25 Peabody	22	18	19	15	21	16
1_26 Peabody	18	15	15	11	17	12
1_26 Peabody	19	15	17	13	17	13
1_28C Peabody	20	16	16	12	17	12
1_30 Peabody	19	15	17	13	17	13
1_31 Peabody	22	19	19	15	21	17
1_45 Peabody	30	27	26	22	34	31
1_49 Peabody	42	47	37	43	31	29
1_52A Peabody	27	23	23	19	24	19
1_53 Peabody	26	23	21	18	24	20
1_55 Peabody	25	23	21	18	25	20
1_58 Peabody	27	24	22	19	23	19
1_83 Peabody	19	15	17	13	17	13
1_905 Peabody	22	18	19	15	16	11
1_907 Peabody	22	17	19	14	15	11

RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 AND 2021 EVENING INTRUSIVE NOISE

ID No and Landowner	Modification 5 Yr 2015		Modification 5 Yr 2018		Modification 5 Yr 2021	
	Calm	Wind	Calm	Wind	Calm	Wind
1_910 Peabody	21	17	19	14	16	11
1_912 Peabody	22	17	19	14	16	11
1_913 Peabody	21	17	19	14	16	12
1_915 Peabody	19	14	15	10	14	10
1_916 Peabody	19	14	15	10	14	9
1_917 Peabody	18	14	15	10	14	9
1_920 Peabody	18	14	15	10	14	9
1_923 Peabody	18	14	15	10	14	10
1_926 Peabody	18	14	15	10	14	9
1_927 Peabody	18	14	15	10	14	9
1_929 Peabody	18	14	15	10	14	10
1_931 Peabody	19	14	15	11	14	10
1_934 Peabody	19	14	15	10	14	10
1_937 Peabody	18	14	15	10	14	10
1_938 Peabody	19	14	15	10	15	10
1_939 Peabody	19	14	15	11	15	10
1_941 Peabody	19	14	15	11	15	10
1_946 Peabody	18	14	15	10	14	10
1_950 Peabody	18	14	15	10	15	10
1_956 Peabody	18	14	15	10	15	11
1_957 Peabody	18	14	15	10	15	11
1_W88A Peabody	22	28	20	26	18	16
1_W88B Peabody	23	29	21	27	19	17
1_WA Peabody	48	56	51	55	35	42
1_WF Peabody	30	39	26	33	21	32
1_WJ Peabody	32	38	28	33	28	31
1_WK Peabody	25	29	22	28	21	19
1_WR Peabody	22	17	19	14	17	11
1_WT Peabody	12	7	10	5	9	4

Note 1: Highest predicted noise levels from the INP meteorological conditions in Table 11 for each receiver.

Note 2: Predicted LAeq(15minute) noise level complies with the intrusive PSNL.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.

Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.

Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 & 2021 NIGHT-TIME INTRUSIVE NOISE

ID No and Landowner	Modification 5 Year 2015			Modification 5 Year 2018			Modification 5 Year 2021		
	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)
Resource-company - Moolarben									
32_12 Moolarben	22	34	41	23	35	42	19	31	38
32_13 Moolarben	22	34	42	23	35	42	19	31	38
32_14 Moolarben	19	32	39	20	33	40	16	31	38
32_29A Moolarben	15	30	38	17	27	34	13	29	36
32_29B Moolarben	16	36	43	17	37	44	14	33	40
32_48A Moolarben	16	34	42	16	34	41	15	33	40
32_48B Moolarben	16	34	41	16	33	41	15	32	39
32_32C Moolarben	28	39	46	29	42	49	24	37	45
32_33A Moolarben	11	31	38	12	31	39	9	29	36
32_33B_5 Moolarben	11	31	38	12	31	39	9	29	36
Resource-company - Peabody									
1_100B Peabody	14	30	38	12	29	36	11	28	36
1_127 Peabody	20	38	45	18	35	42	19	39	47
1_131 Peabody	20	37	44	18	34	42	17	39	46
1_133 Peabody	20	37	44	18	34	42	17	38	45
1_136 Peabody	19	37	44	17	34	42	16	33	40
1_140 Peabody	18	38	45	16	35	42	15	37	44
1_142 Peabody	18	37	45	16	34	41	16	37	45
1_143 Peabody	20	37	45	17	34	42	17	38	45
1_145 Peabody	19	36	43	17	34	41	17	38	45
1_151 Peabody	20	37	44	17	37	44	17	36	44
1_152 Peabody	19	37	45	16	34	41	16	34	41
1_154 Peabody	10	30	38	9	28	36	8	27	35
1_155 Peabody	10	30	37	9	28	35	8	27	34
1_156 Peabody	12	29	36	10	27	35	8	26	34
1_158 Peabody	14	27	35	11	27	35	11	26	33
1_159 Peabody	8	25	32	6	25	32	6	24	32
1_162 Peabody	7	27	34	6	26	33	6	25	32
1_163 Peabody	7	27	34	5	25	33	4	25	33
1_164 Peabody	39	51	58	32	45	53	33	45	52
1_18 Peabody	23	39	47	22	36	43	21	40	48
1_19 Peabody	23	38	45	21	36	43	21	39	46
1_25 Peabody	22	41	48	20	37	44	21	41	48
1_26 Peabody	19	24	31	15	20	27	18	23	30
1_26 Peabody	20	37	44	17	35	42	18	40	47
1_28C Peabody	20	36	43	17	36	43	18	35	42
1_30 Peabody	20	37	44	17	35	42	18	37	45
1_31 Peabody	23	34	41	19	33	41	22	33	41
1_45 Peabody	30	43	50	27	40	47	35	47	54
1_49 Peabody	43	53	61	38	50	57	33	45	53
1_52A Peabody	27	43	51	23	40	48	24	41	49
1_53 Peabody	26	43	51	22	40	47	25	41	48
1_55 Peabody	26	42	50	21	40	47	25	41	48
1_58 Peabody	27	43	50	23	41	48	24	42	49
1_83 Peabody	20	37	45	17	35	42	17	39	47
1_905 Peabody	23	35	42	20	35	42	16	34	42
1_907 Peabody	22	35	42	19	35	43	16	35	42
1_910 Peabody	22	39	47	19	38	45	16	35	43
1_912 Peabody	23	35	43	19	35	42	16	35	42

RESOURCE-COMPANY OWNED RECIEVERS - YEARS 2015, 2018 & 2021 NIGHT-TIME INTRUSIVE NOISE

ID No and Landowner	Modification 5 Year 2015			Modification 5 Year 2018			Modification 5 Year 2021		
	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)	Calm	Wind or Inversion	LA1 (1min)
1_913 Peabody	22	39	46	19	38	45	16	35	42
1_915 Peabody	19	33	40	16	31	39	15	31	38
1_916 Peabody	19	33	41	16	31	38	14	30	38
1_917 Peabody	19	34	41	16	31	39	14	31	38
1_920 Peabody	19	35	42	16	33	41	14	33	40
1_923 Peabody	19	35	43	15	34	41	15	34	41
1_926 Peabody	19	36	43	15	35	42	15	35	42
1_927 Peabody	19	36	44	15	35	42	15	35	42
1_929 Peabody	19	36	43	15	34	42	15	34	42
1_931 Peabody	19	35	43	15	34	42	15	34	41
1_934 Peabody	19	36	43	15	35	42	15	35	42
1_937 Peabody	19	37	44	15	35	42	15	35	43
1_938 Peabody	19	37	44	15	36	43	15	36	43
1_939 Peabody	19	37	44	16	36	43	15	36	43
1_941 Peabody	19	37	44	15	35	43	15	35	43
1_946 Peabody	19	37	44	15	35	42	15	36	43
1_950 Peabody	19	36	43	15	35	42	15	35	43
1_956 Peabody	19	35	43	15	35	42	16	35	42
1_957 Peabody	19	35	43	15	35	42	16	35	42
1_W88A Peabody	22	40	47	20	38	45	18	37	45
1_W88B Peabody	23	41	48	21	39	47	20	38	46
1_WA Peabody	49	57	65	51	57	64	36	45	52
1_WF Peabody	32	46	53	27	41	49	22	41	48
1_WJ Peabody	33	47	54	29	45	52	29	45	52
1_WK Peabody	25	43	50	23	42	49	22	41	48
1_WR Peabody	23	45	52	20	40	47	17	36	43
1_WT Peabody	12	27	34	10	27	34	9	26	33

Note 1: Highest predicted noise levels from the INP meteorological conditions in Table 11 for each receiver.

Note 2: Predicted LAeq(15minute) noise level complies with the intrusive PSNL.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.

Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.

Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

RESOURCE-COMPANY OWNED RECEIVERS - YEARS 2015, 2018 AND 2021 INTRUSIVE NOISE IMPACT

The current WCPL property acquisition strategy has resulted in a 'buffer' mine owned lands surrounding the majority of the WCM. Consequently, predicted noise levels are elevated at some resource-company owned properties. In addition, a number of properties in the vicinity of the WCM are owned by MCMPL.

In summary, the predicted operating intrusive LAeq(15minute) noise levels at resource-company owned receivers show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions (refer **Table 11**) that occur at night.
- A total of 52 resource-company owned receivers exceed the PSNLs, including 34 receivers within the Noise Management Zone and 18 receivers in the Noise Affection Zone.
- During the daytime, up to 1 resource-company owned receiver is within the Noise Management Zone and 2 receivers are in the Noise Affection Zone.
- During the evening, up to 4 resource-company owned receivers are within the Noise Management Zone and 3 receivers are in the Noise Affection Zone.
- During the night-time, up to 34 resource company-owned receivers are within the Noise Management Zone and 18 receivers are in the Noise Affection Zone.

Table I1 and **Table I2** present the resource company-owned receivers with predicted intrusive LAeq(15minute) noise level exceedances of the PSNLs and predicted LA1(1minute) exceedances of the SDNLs respectively.

Table I1 Resource Company-owned Receivers¹ with Intrusive PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	3 dBA to 5 dBA above PSNL	> 5 dBA above PSNL
Daytime	-	1_164	1_49, 1_WA
Evening	-	32C, 1_WF, 1_WJ	1_164, 1_49, 1_WA
Night-time	32_29B, 1_136, 1_142, 1_151, 1_152, 1_28C, 1_30, 1_926, 1_927, 1_929, 1_934, 1_937, 1_938, 1_939, 1_941, 1_946, 1_950	1_127, 1_131, 1_133, 1_140, 1_143, 1_145, 1_18, 1_19, 1_26, 1_83, 1_910, 1_913, 1_W88A	32C, 1_164, 1_25, 1_45, 1_49, 1_52A, 1_53, 1_55, 1_58, 1_W88B, 1_WA, 1_WF, 1_WJ, 1_WK, 1_WR

Note 1: Refer to **Appendix D2** for land ownership details.

Table I2 Resource Company-owned Receivers¹ Night-time LA1(1minute) SDNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above SDNL	3 dBA to 5 dBA above SDNL	> 5 dBA above SDNL
Night-time	1_127, 1_131, 1_19, 1_26, 1_83, 1_910, 1_913, 1_W88A	32C, 1_18, 1_25, 1_55, 1_58, 1_W88B, 1_WK	1_164, 1_45, 1_49, 1_52A, 1_53, 1_WA, 1_WF, 1_WG, 1_WJ, 1_WR

Note 1: Refer to **Appendix D2** for land ownership details.

RESOURCE-COMPANY OWNED RECEIVERS - YEARS 2015, 2018 AND 2021 NOISE AMENITY LEVELS

ID No and Landowner	Modification 5 Year 2015			Modification 5 Year 2018			Modification 5 Year 2021		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Resource-company - Moolarben									
32_12 Moolarben	22	31	34	22	32	35	18	28	31
32_13 Moolarben	22	31	34	22	32	35	18	29	31
32_14 Moolarben	18	30	32	19	30	33	15	29	31
32_29A Moolarben	15	27	30	16	24	27	13	27	29
32_29B Moolarben	16	34	36	17	33	37	14	31	33
32_48A Moolarben	16	29	34	16	25	34	15	27	33
32_48B Moolarben	16	29	34	15	25	33	14	27	32
32_32C Moolarben	27	35	39	28	38	42	23	33	37
32_33A Moolarben	11	30	31	11	31	31	8	28	29
32_33B_5 Moolarben	11	30	31	11	31	31	8	28	29
Resource-company - Peabody									
1_100B Peabody	13	14	30	12	12	29	11	11	28
1_127 Peabody	20	20	38	18	18	35	18	18	39
1_131 Peabody	19	19	37	17	17	34	17	17	39
1_133 Peabody	19	20	37	17	17	34	17	17	38
1_136 Peabody	18	18	37	16	16	34	16	16	33
1_140 Peabody	17	17	38	15	16	35	15	15	37
1_142 Peabody	18	18	37	16	16	34	15	15	37
1_143 Peabody	19	19	37	17	17	34	17	17	38
1_145 Peabody	19	19	36	16	17	34	17	17	38
1_151 Peabody	19	26	37	16	19	37	16	17	36
1_152 Peabody	18	18	37	16	16	34	16	16	34
1_154 Peabody	10	10	30	8	8	28	8	8	27
1_155 Peabody	10	10	30	8	8	28	8	8	27
1_156 Peabody	12	12	29	9	9	27	8	8	26
1_158 Peabody	13	13	27	11	11	27	10	10	26
1_159 Peabody	8	8	25	6	6	25	6	6	24
1_162 Peabody	7	7	27	6	6	26	5	5	25
1_163 Peabody	7	7	27	5	5	25	4	4	25
1_164 Peabody	39	46	51	32	43	45	32	32	45
1_18 Peabody	22	22	39	22	22	36	20	20	40
1_19 Peabody	22	22	38	21	21	36	20	20	39
1_25 Peabody	22	22	41	19	19	37	21	21	41
1_26 Peabody	18	18	24	14	15	20	17	17	23
1_26 Peabody	19	19	37	17	17	35	17	17	40
1_28C Peabody	20	20	36	16	16	36	17	17	35
1_30 Peabody	19	19	37	17	17	35	17	17	37
1_31 Peabody	22	22	34	19	19	33	21	21	33
1_45 Peabody	30	30	43	26	26	40	34	34	47
1_49 Peabody	42	47	53	37	43	50	31	31	45
1_52A Peabody	27	27	43	23	23	40	24	24	41
1_53 Peabody	26	26	43	21	21	40	24	24	41
1_55 Peabody	25	25	42	21	21	40	25	25	41
1_58 Peabody	27	27	43	22	22	41	23	23	42
1_83 Peabody	19	19	37	17	17	35	17	17	39

RESOURCE-COMPANY OWNED RECEIVERS - YEARS 2015, 2018 AND 2021 NOISE AMENITY LEVELS

ID No and Landowner	Modification 5 Year 2015			Modification 5 Year 2018			Modification 5 Year 2021		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1_905 Peabody	22	22	35	19	19	35	16	16	34
1_907 Peabody	21	22	35	18	19	35	15	15	35
1_910 Peabody	21	21	39	19	19	38	16	16	35
1_912 Peabody	22	22	35	19	19	35	16	16	35
1_913 Peabody	21	21	39	19	19	38	16	16	35
1_915 Peabody	19	19	33	15	15	31	14	14	31
1_916 Peabody	18	19	33	15	15	31	14	14	30
1_917 Peabody	18	18	34	15	15	31	14	14	31
1_920 Peabody	18	18	35	15	15	33	14	14	33
1_923 Peabody	18	18	35	15	15	34	14	14	34
1_926 Peabody	18	18	36	15	15	35	14	14	35
1_927 Peabody	18	18	36	15	15	35	14	14	35
1_929 Peabody	18	18	36	15	15	34	14	14	34
1_931 Peabody	18	19	35	15	15	34	14	14	34
1_934 Peabody	18	19	36	15	15	35	14	14	35
1_937 Peabody	18	18	37	15	15	35	14	14	35
1_938 Peabody	18	19	37	15	15	36	14	15	36
1_939 Peabody	19	19	37	15	15	36	15	15	36
1_941 Peabody	19	19	37	15	15	35	14	15	35
1_946 Peabody	18	18	37	15	15	35	14	14	36
1_950 Peabody	18	18	36	15	15	35	15	15	35
1_956 Peabody	18	18	35	15	15	35	15	15	35
1_957 Peabody	18	18	35	15	15	35	15	15	35
1_W88A Peabody	21	28	40	19	26	38	18	18	37
1_W88B Peabody	22	29	41	21	27	39	19	19	38
1_WA Peabody	48	56	57	51	55	57	35	42	45
1_WF Peabody	30	39	46	26	33	41	22	32	41
1_WJ Peabody	32	38	47	28	33	45	28	31	45
1_WK Peabody	24	29	43	22	28	42	21	21	41
1_WR Peabody	22	22	45	19	19	40	17	17	36
1_WT Peabody	12	12	27	9	10	27	9	9	26

Note 1: Highest predicted noise levels from the INP meteorological conditions in Table 11 for each receiver.

Note 2: Predicted LAeq(period) noise level complies with the amenity (INP acceptable) PSNL.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above amenity (INP acceptable) PSNL.

Note 4: Predicted moderate noise exceedance 3 to 5 dBA above amenity (INP acceptable) PSNL.

Note 5: Predicted appreciable noise exceedance > 5 dBA above amenity (INP acceptable) PSNL.

RESOURCE-COMPANY OWNED RECEIVERS - YEARS 2015, 2018 AND 2021 NOISE AMENITY IMPACT

In summary, the predicted LAeq(period) amenity noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions (refer **Table 11**) that occur at night.
- A total of 18 resource-company owned receivers exceed the PSNLs, including 12 receivers within the Noise Management Zone and 6 receiver in the Noise Affection Zone.
- During the daytime, up to 1 resource-company owned receiver is within the Noise Management Zone and no receivers are in the Noise Affection Zone.
- During the evening, up to 2 resource-company owned receivers are within the Noise Management Zone and no receivers are in the Noise Affection Zone.
- During the night-time, up to 12 resource-company owned receivers are within the Noise Management Zone and 6 receivers are in the Noise Affection Zone.

Table J1 presents the resource-company owned receivers with predicted LAeq(period) amenity noise level exceedance of the PSNLs.

Table J1 Resource-company Owned receivers¹ with LAeq(period) PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	3 dBA to 5 dBA above PSNL	> 5 dBA above PSNL
Daytime	1_WA	-	-
Evening	1_164, 1_49	-	1_WA
Night-time	32C, 1_25, 1_55, 1_W88B	1_52A, 1_53, 1_58, 1_WG, 1_WK, 1_WR	1_164, 1_45, 1_49, 1_WA, 1_WF, 1_WJ

Note 1: Refer to **Appendix D2** for land ownership details.

RESOURCE-COMPANY OWNED RECEIVERS - EVENING CUMULATIVE NOISE AMENITY LEVELS

ID No and Landowner	Wilpinjong Modification 5	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
Resource-company - Moolarben				
32_12 Moolarben	29	43	21	43
32_13 Moolarben	29	43	20	43
32_14 Moolarben	28	43	17	44
32_29A Moolarben	24	25	9	28
32_29B Moolarben	31	23	9	31
32_48A Moolarben	26	17	5	27
32_48B Moolarben	26	17	6	27
32_32C Moolarben	36	45	13	46
32_33A Moolarben	28	25	22	30
32_33B_5 Moolarben	28	24	22	30
Resource-company - Peabody				
1_100B Peabody	12	8	0	14
1_127 Peabody	19	10	2	19
1_131 Peabody	18	10	2	19
1_133 Peabody	18	10	2	19
1_136 Peabody	17	10	1	18
1_140 Peabody	16	9	1	17
1_142 Peabody	16	9	1	17
1_143 Peabody	18	10	1	18
1_145 Peabody	17	10	1	18
1_151 Peabody	24	13	3	24
1_152 Peabody	17	10	1	18
1_154 Peabody	9	7	0	11
1_155 Peabody	9	7	0	11
1_156 Peabody	10	6	0	12
1_158 Peabody	12	7	0	13
1_159 Peabody	6	7	0	10
1_162 Peabody	5	6	0	9
1_163 Peabody	5	6	0	9
1_164 Peabody	44	16	4	44
1_18 Peabody	21	10	2	21
1_19 Peabody	21	11	2	21
1_25 Peabody	20	11	2	21
1_26 Peabody	17	11	2	18
1_26 Peabody	18	11	2	19
1_28C Peabody	18	11	2	19
1_30 Peabody	18	10	2	18
1_31 Peabody	21	12	3	21
1_45 Peabody	33	13	4	33
1_49 Peabody	45	14	3	45
1_52A Peabody	25	12	3	26
1_53 Peabody	25	13	3	25
1_55 Peabody	24	13	3	25
1_58 Peabody	26	13	3	26
1_83 Peabody	18	10	2	18
1_905 Peabody	21	11	2	21
1_907 Peabody	20	11	2	20
1_910 Peabody	19	11	2	20

RESOURCE-COMPANY OWNED RECEIVERS - EVENING CUMULATIVE NOISE AMENITY LEVELS

ID No and Landowner	Wilpinjong Modification 5	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
1_912 Peabody	20	11	2	21
1_913 Peabody	20	11	2	20
1_915 Peabody	17	11	2	18
1_916 Peabody	17	11	2	18
1_917 Peabody	17	11	2	18
1_920 Peabody	16	11	2	18
1_923 Peabody	17	11	2	18
1_926 Peabody	16	11	2	18
1_927 Peabody	16	11	2	18
1_929 Peabody	17	11	2	18
1_931 Peabody	17	11	2	18
1_934 Peabody	17	11	2	18
1_937 Peabody	17	11	2	18
1_938 Peabody	17	11	2	18
1_939 Peabody	17	11	2	18
1_941 Peabody	17	11	2	18
1_946 Peabody	16	11	2	18
1_950 Peabody	17	11	2	18
1_956 Peabody	17	11	2	18
1_957 Peabody	16	11	2	18
1_W88A Peabody	26	13	3	26
1_W88B Peabody	27	13	3	27
1_WA Peabody	54	31	9	54
1_WF Peabody	36	17	5	36
1_WJ Peabody	36	16	4	36
1_WK Peabody	27	14	3	27
1_WR Peabody	21	11	1	21
1_WT Peabody	10	9	0	13

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 11** for each receiver.

Note 2: Predicted cumulative LAeq(period) amenity noise level complies with 45 dBA (Evening) amenity noise level.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above 45 dBA (Evening) amenity noise level.

Note 4: Predicted moderate noise exceedance 3 dBA above 45 dBA (Evening) amenity noise level.

Note 5: Predicted appreciable noise exceedance > 3 dBA above 45 dBA (Evening) amenity noise level.

RESOURCE-COMPANY OWNED RECEIVERS - CUMULATIVE NIGHT-TIME NOISE AMENITY LEVELS

ID No and Landowner	Wilpinjong Modification 5	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
Resource-company - Moolarben				
32_12 Moolarben	32	39	18	40
32_13 Moolarben	33	40	17	40
32_14 Moolarben	31	40	14	41
32_29A Moolarben	27	22	6	28
32_29B Moolarben	33	20	6	34
32_48A Moolarben	31	13	2	31
32_48B Moolarben	31	14	2	31
32_32C Moolarben	39	42	10	44
32_33A Moolarben	29	21	19	30
32_33B_5 Moolarben	30	21	19	31
Resource-company - Peabody				
1_100B Peabody	25	5	0	25
1_127 Peabody	34	7	0	34
1_131 Peabody	33	7	0	33
1_133 Peabody	33	7	0	33
1_136 Peabody	31	7	0	31
1_140 Peabody	32	6	0	32
1_142 Peabody	32	6	0	32
1_143 Peabody	32	7	0	32
1_145 Peabody	32	7	0	32
1_151 Peabody	32	10	0	32
1_152 Peabody	32	6	0	32
1_154 Peabody	25	4	0	25
1_155 Peabody	25	4	0	25
1_156 Peabody	24	3	0	24
1_158 Peabody	22	4	0	22
1_159 Peabody	20	4	0	20
1_162 Peabody	22	3	0	22
1_163 Peabody	22	3	0	22
1_164 Peabody	47	13	1	47
1_18 Peabody	35	7	0	35
1_19 Peabody	33	7	0	33
1_25 Peabody	35	8	0	35
1_26 Peabody	20	8	0	20
1_26 Peabody	34	8	0	34
1_28C Peabody	30	8	0	30
1_30 Peabody	32	7	0	32
1_31 Peabody	29	9	0	29
1_45 Peabody	42	10	1	42
1_49 Peabody	50	11	0	50
1_52A Peabody	38	9	0	38
1_53 Peabody	38	9	0	38
1_55 Peabody	37	10	0	37
1_58 Peabody	37	10	0	37
1_83 Peabody	34	7	0	34
1_905 Peabody	30	8	0	30

RESOURCE-COMPANY OWNED RECEIVERS - CUMULATIVE NIGHT-TIME NOISE AMENITY LEVELS

ID No and Landowner	Wilpinjong Modification 5	Moolarben Stage 2	Ulan Coal Continued Operations	Cumulative Sum
1_907 Peabody	30	8	0	30
1_910 Peabody	33	8	0	33
1_912 Peabody	30	8	0	30
1_913 Peabody	33	8	0	33
1_915 Peabody	27	8	0	27
1_916 Peabody	28	8	0	28
1_917 Peabody	29	8	0	29
1_920 Peabody	29	8	0	29
1_923 Peabody	30	8	0	30
1_926 Peabody	30	8	0	30
1_927 Peabody	30	7	0	31
1_929 Peabody	30	8	0	30
1_931 Peabody	30	8	0	30
1_934 Peabody	31	8	0	31
1_937 Peabody	31	8	0	31
1_938 Peabody	32	8	0	32
1_939 Peabody	32	8	0	32
1_941 Peabody	31	8	0	31
1_946 Peabody	31	8	0	31
1_950 Peabody	31	8	0	31
1_956 Peabody	30	8	0	30
1_957 Peabody	30	8	0	30
1_W88A Peabody	35	10	0	35
1_W88B Peabody	36	10	0	36
1_WA Peabody	55	27	6	55
1_WF Peabody	42	14	2	42
1_WJ Peabody	43	13	1	43
1_WK Peabody	38	11	0	38
1_WR Peabody	39	7	0	39
1_WT Peabody	22	5	0	22

Note 1: Highest predicted noise levels from the INP meteorological conditions in **Table 11** for each receiver.

Note 2: Predicted cumulative LAeq(period) amenity noise level complies with 40 dBA (Night-time) amenity noise level.

Note 3: Predicted marginal noise exceedance 1 to 2 dBA above 40 dBA (Night-time) amenity noise level.

Note 4: Predicted moderate noise exceedance 3 dBA above 40 dBA (Night-time) amenity noise level.

Note 5: Predicted appreciable noise exceedance > 3 dBA above 40 dBA (Night-time) amenity noise level.

RESOURCE-COMPANY OWNED RECEIVERS - CUMULATIVE NIGHT-TIME NOISE AMENITY IMPACT

In summary, the predicted cumulative LAeq(period) noise amenity levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions (refer **Table 11**) at night.
- All but 1 receiver comply with the INP recommended maximum amenity noise levels.
- A total of 8 resource-company owned receivers exceed the INP's acceptable amenity levels, including 4 receiver within the Noise Management Zone and 4 receivers in the Noise Affection Zone.
- During the evening, up to 1 resource-company owned receiver is within the Noise Management Zone and 1 receiver is in the Noise Affection Zone.
- During the night-time, up to 4 resource-company owned receiver is within the Noise Management Zone and 4 receivers are in the Noise Affection Zone.
- Cumulative noise exceedances are largely dominated by the Modification 5 with the exception of 32C and 32_14 Moolarben which are owned by MCMPL.

Table J2 presents the resource-company owned receivers with predicted noise level exceedance of the INP's acceptable amenity levels.

Table J2 Resource-company Owned Receivers¹ with INP Acceptable Amenity Level Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above INP Acceptable	3 dBA above INP Acceptable	> 3 dBA above INP Acceptable
Evening	32C	-	1_WA
Night-time	32_14, 1_45, 1_WF	1_WJ	32C, 1_164, 1_49, 1_WA

Note 1: Refer to **Appendix D2** for land ownership details.

RESOURCE-COMPANY OWNED RECEIVERS – PREDICTED GROUND VIBRATION AND AIRBLAST IMPACT

ID No and Landowner	Ground Vibration (mm/s)		Airblast ¹ (dBLpk re 20 µPa)		Ground Vibration (mm/s)		Airblast ¹ (dBLpk re 20 µPa)	
	MIC 3000 kg		MIC 3000 kg		MIC 70 kg		MIC 70 kg	
	50%	5%	50%	5%	50%	5%	50%	5%
Mine Owned - Moolarben								
32_12 Moolarben	0.4	1.1	101	107	0.0	0.1	94	100
32_13 Moolarben	0.4	1.1	101	107	0.0	0.1	94	100
32_14 Moolarben	0.5	1.2	102	108	0.0	0.1	94	100
32_29A Moolarben	1.0	2.4	105	111	0.1	0.2	97	103
32_29B Moolarben	0.8	1.9	104	110	0.1	0.1	96	102
32_48A Moolarben	0.6	1.4	102	108	0.0	0.1	95	101
32_48B Moolarben	0.6	1.5	103	109	0.0	0.1	95	101
32_32C Moolarben	0.9	2.2	104	110	0.1	0.1	97	103
32_33A Moolarben	0.5	1.1	101	107	0.0	0.1	94	100
32_33B_5 Moolarben	0.5	1.1	101	107	0.0	0.1	94	100
Mine Owned - Peabody								
1_100B Peabody	0.5	1.3	102	108	0.0	0.1	94	100
1_127 Peabody	0.9	2.2	104	110	0.1	0.2	97	103
1_131 Peabody	1.0	2.4	105	111	0.1	0.2	97	103
1_133 Peabody	1.0	2.4	105	111	0.1	0.2	97	103
1_136 Peabody	0.9	2.2	104	110	0.1	0.1	97	103
1_140 Peabody	0.8	2.0	104	110	0.1	0.1	96	102
1_142 Peabody	0.8	2.0	104	110	0.1	0.1	96	102
1_143 Peabody	1.0	2.3	105	111	0.1	0.2	97	103
1_145 Peabody	0.8	2.1	104	110	0.1	0.1	96	102
1_151 Peabody	0.5	1.3	102	108	0.0	0.1	94	100
1_152 Peabody	0.8	2.0	104	110	0.1	0.1	96	102
1_154 Peabody	0.3	0.7	99	105	0.0	0.0	92	98
1_155 Peabody	0.3	0.6	99	105	0.0	0.0	91	97
1_156 Peabody	0.2	0.6	99	105	0.0	0.0	91	97
1_158 Peabody	0.4	1.0	101	107	0.0	0.1	93	99
1_159 Peabody	0.4	0.9	100	106	0.0	0.1	93	99
1_162 Peabody	0.3	0.6	99	105	0.0	0.0	91	97
1_163 Peabody	0.2	0.6	99	105	0.0	0.0	91	97
1_164 Peabody	4.2	10.3	111	117	0.3	0.7	103	109
1_18 Peabody	0.7	1.7	103	109	0.0	0.1	96	102
1_19 Peabody	0.8	1.9	104	110	0.1	0.1	96	102
1_25 Peabody	1.3	3.2	106	112	0.1	0.2	98	104
1_26 Peabody	1.1	2.8	105	111	0.1	0.2	98	104
1_26 Peabody	1.1	2.8	105	111	0.1	0.2	98	104
1_28C Peabody	1.6	3.8	107	113	0.1	0.3	99	105
1_30 Peabody	1.1	2.6	105	111	0.1	0.2	97	103
1_31 Peabody	1.9	4.6	107	113	0.1	0.3	100	106
1_45 Peabody	1.4	3.4	106	112	0.1	0.2	98	105
1_49 Peabody	2.9	7.1	109	115	0.2	0.5	102	108
1_52A Peabody	2.9	7.1	109	115	0.2	0.5	102	108
1_53 Peabody	2.3	5.7	108	114	0.2	0.4	101	107
1_55 Peabody	2.7	6.6	109	115	0.2	0.5	101	107
1_58 Peabody	3.5	8.7	110	116	0.2	0.6	103	109
1_83 Peabody	1.0	2.4	105	111	0.1	0.2	97	103
1_905 Peabody	1.8	4.4	107	113	0.1	0.3	100	106
1_907 Peabody	1.7	4.3	107	113	0.1	0.3	99	105
1_910 Peabody	1.7	4.1	107	113	0.1	0.3	99	105

RESOURCE-COMPANY OWNED RECEIVERS – PREDICTED GROUND VIBRATION AND AIRBLAST IMPACT

ID No and Landowner	Ground Vibration (mm/s)		Airblast ¹ (dBLpk re 20 µPa)		Ground Vibration (mm/s)		Airblast ¹ (dBLpk re 20 µPa)	
	MIC 3000 kg		MIC 3000 kg		MIC 70 kg		MIC 70 kg	
	50%	5%	50%	5%	50%	5%	50%	5%
1_912 Peabody	1.6	4.0	107	113	0.1	0.3	99	105
1_913 Peabody	1.6	4.0	107	113	0.1	0.3	99	105
1_915 Peabody	1.7	4.2	107	113	0.1	0.3	99	105
1_916 Peabody	1.6	4.0	107	113	0.1	0.3	99	105
1_917 Peabody	1.6	3.9	107	113	0.1	0.3	99	105
1_920 Peabody	1.6	3.9	107	113	0.1	0.3	99	105
1_923 Peabody	1.7	4.1	107	113	0.1	0.3	99	105
1_926 Peabody	1.6	3.9	107	113	0.1	0.3	99	105
1_927 Peabody	1.5	3.8	107	113	0.1	0.3	99	105
1_929 Peabody	1.7	4.1	107	113	0.1	0.3	99	105
1_931 Peabody	1.7	4.3	107	113	0.1	0.3	99	105
1_934 Peabody	1.7	4.1	107	113	0.1	0.3	99	105
1_937 Peabody	1.7	4.1	107	113	0.1	0.3	99	105
1_938 Peabody	1.7	4.3	107	113	0.1	0.3	99	105
1_939 Peabody	1.7	4.3	107	113	0.1	0.3	99	106
1_941 Peabody	1.7	4.1	107	113	0.1	0.3	99	105
1_946 Peabody	1.5	3.7	107	113	0.1	0.3	99	105
1_950 Peabody	1.6	3.8	107	113	0.1	0.3	99	105
1_956 Peabody	1.6	3.8	107	113	0.1	0.3	99	105
1_957 Peabody	1.5	3.7	106	112	0.1	0.3	99	105
1_W88A Peabody	0.6	1.5	103	109	0.0	0.1	95	101
1_W88B Peabody	0.7	1.6	103	109	0.0	0.1	95	101
1_WA Peabody	4.7	11.6	111	117	0.3	0.8	104	110
1_WF Peabody	1.2	2.9	105	111	0.1	0.2	98	104
1_WJ Peabody	1.1	2.6	105	111	0.1	0.2	97	103
1_WK Peabody	0.9	2.3	104	110	0.1	0.2	97	103
1_WR Peabody	1.4	3.4	106	112	0.1	0.2	99	105
1_WT Peabody	0.6	1.5	103	109	0.0	0.1	95	101

Note 1: dBLpk = decibels linear peak.

Note 2: Predicted blast emission level complies with the human comfort criteria of 5 mm/s and 115 dBLpk.

Note 3: Predicted blast emission level exceedance of 1 to 2 mm/s or 1 to 2 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.

Note 4: Predicted blast emission level exceedance of 3 to 5 mm/s or 3 to 5 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.

Note 5: Predicted blast emission level exceedance of > 5 mm/s or > 5 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.

A total of eight resource-company receivers are predicted to exceed the relevant vibration and/or air blast criteria with an MIC of 3,000 kg as presented in **Table K1**.

Table K1 Resource Company-owned Receivers¹ with Criteria 5% Exceedances

Open Cut	> 5 to 7 mm/s or 116 to 117 dBLpk	8 to 10 mm/s or 118 to 120 dBLpk	11 to 12.5 mm/s or 120 to 133 dBLpk	> 12.5 mm/s or > 133 dBLpk
MIC 3,000 kg	1_149, 1_52A, 1_53, 1_55	1_164, 1_58	1_WA	-
MIC 70 kg	-	-	-	-

Note 1: Refer to **Appendix D2** for land ownership details.