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## **Vipac Engineers & Scientists**

**Duralie Coal**

### **Duralie Operations - Environmental Quarterly Survey 2015**

### **July Noise Compliance Survey**





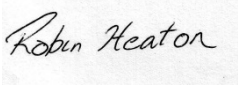
# **DURALIECOAL**

Part of the Yancoal Australia Group

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30 Oct 2015



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## EXECUTIVE SUMMARY

### ENVIRONMENTAL NOISE SURVEY

An Environmental Compliance Noise Monitoring Survey has been carried out in the rural environment surrounding the Duralie Coal Mine (DCM) Site, Stroud Road, NSW. The survey was requested by Duralie Coal Pty Ltd to ascertain the degree of compliance of noise emissions generated from the operation of Duralie Coal Mine with licence and project approval conditions.

Direct temperature inversion measurements were conducted during the entire survey utilising the Duralie Coal Inversion Tower Infrastructure. These measurements were used to ascertain temperature lapse rates and atmospheric stability classes during the survey period, the results of which are presented in **Appendix A** of this report.

The following table provide a summary of the noise impacts associated with Duralie Coal Mine operations on all landowners that currently surround the coal-mining lease, monitored during the July 2015 Environmental Compliance Assessment.

Owner/ Tenant	Monitored - Predicted DCPL Noise Levels <sup>1</sup>								Noise Criteria		
	dB(A) <sub>L<sub>Aeq</sub>(15 minute)</sub>								dB(A) <sub>L<sub>Aeq</sub>(15 Minute)</sub>		
	Day	Evening	Night 1	Night 2	Day	Evening	Night		Day	Evening	Night
Bailey <sup>2</sup>	36	37	32	25	35	35	35		35	35	35
Bragg	8	17	13	13	35	35	35		35	35	35
Fisher-Webster	34 30	34 31	22 25	21 22	35	35	37		35	35	37
Gillard	0	5	4	0	35	35	35		35	35	35
Hamann-Pixelu PL	29	30	26	19	35	35	39		35	35	39
Hare-Scott <sup>2</sup>	35	36	26	24	35	35	35		35	35	35
Hattam <sup>2</sup>	43	43	30	27	35	35	35		35	35	35
Holloway	24	25	18	14	35	35	35		35	35	35
Holmes <sup>2</sup>	36	37	32	25	35	35	35		35	35	35
James	26	27	23	16	35	35	35		35	35	35
Lyll	19	29	30	28	35	39	40		35	39	40
Mahony <sup>2</sup>	Nil 22	24 27	21 26	20 20	35	35	35		35	35	35
Morgan	15	16	12	11	35	35	35		35	35	35
Oleksiuk & Carmody	29	30	27	19	35	35	35		35	35	35
Relton <sup>2</sup>	27	28	24	17	35	35	35		35	35	35
Richards	25	27	21	16	35	35	35		35	35	35
Schultz	5	13	17	9	35	35	35		35	35	35
Wards River Village	Nil 21	26 20	19 15	17 5	35	35	35		35	35	35
Weismantel	28	29	25	17	35	35	35		35	35	35
Wielgosinski	18	28	14	14	35	35	35		35	35	35
Woodley	Nil 14	17 20	Nil 20	25 26	35	35	35		35	35	35
Zulumovski(North) <sup>2</sup>	35 37	37 38	33 33	23 26	35	35	35		35	35	35

Note <sup>1</sup> Nil Denotes an unmeasurable noise contribution from the mine

<sup>2</sup> Owned by Duralie Coal Pty Ltd(DCPL) or private agreement in place between DCPL and the residence

The mine operating noise emissions were within the noise criteria of 35dB<sub>L<sub>Aeq</sub></sub> at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods during the July 2015 compliance survey with the exception of the Zulumovski monitoring location during the evening survey.



During the evening measurement at the Zulumovski monitoring location, a moderate temperature inversion with a lapse rate of 3.7degrees/100m was prevailing. Thus as outlined in section L4.8 of EPL 11701, (presented on page 9 of this report), the noise limits would not be applicable to this noise measurement and the mine is deemed compliant for this measurement. Additionally the Zulumovski is a mine owned property with monitoring conducted there to represent privately owned properties to the North of the Mine.

It is Vipac's professional opinion that the noise emissions produced by Duralie Coal Mine during the July 2015 DCM Environmental Quarterly Survey complied with the noise criteria set out in **Section 4** of this report based on the results and outcomes presented above.

#### **RAIL NOISE SURVEY**

As outlined in **Section 4** of this report, all of the train-monitoring results presented in this assessment are to be used for general information purposes only and are not DCM compliance requirements.

Vipac conducted Duralie shuttle rail pass-by monitoring at TN1 (Craven) and has augmented the monitoring program conducted at TN2 (Wards River) by splitting the monitoring location into two separate locations TN2-South (southern end of wards River village) and TN2-North (northern end of Wards River village) to better assess the rail noise from the Duralie shuttle within Wards River.

Attended measurements and unattended noise logger surveys were conducted at all three locations, TN2-North, TN2-South and TN1 for this the July 2015 noise survey.

The noise emanating from the Duralie shuttle complied with the  $L_{Amax}$  and  $L_{Aeq}$  pass-by noise goals at all the TN2- North (Wards River North), TN2-South (Wards River North) and TN1 (Craven) with the rail horn excluded from the measurement for this quarter monitoring period.

The noise emissions associated with the Duralie shuttle pass-by were therefore deemed to meet with the noise goals set out in the DCM Noise Management Plan, at the TN1-Craven, TN2-South and TN2-North (Wards River) monitoring locations for this the July 2015 monitoring period.



## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>6</b>
<b>2</b>	<b>DURALIE COAL MINE .....</b>	<b>7</b>
<b>3</b>	<b>METHODOLOGY .....</b>	<b>7</b>
<b>4</b>	<b>NOISE CRITERIA .....</b>	<b>10</b>
4.1	EPL Noise Limits .....	10
4.2	Project Approval Limits .....	10
4.3	Rail Noise .....	11
<b>5</b>	<b>TEMPERATURE INVERSION CONDITIONS .....</b>	<b>12</b>
<b>6</b>	<b>NOISE SURVEY RESULTS .....</b>	<b>13</b>
6.1	Noise Survey Weather Conditions .....	13
6.2	Noise Survey Mine Operations .....	13
6.3	Day Survey .....	14
6.3.1	Attended Measurement Results – Day Survey .....	14
6.3.2	Analysis of Day Attended Survey .....	17
6.4	Evening Survey .....	18
6.4.1	Attended Measurement Results - Evening Survey .....	18
6.4.2	Analysis of Evening Attended Survey .....	21
6.5	Night Survey 1 .....	22
6.5.1	Attended Measurement Results - Night Survey 1 .....	22
6.5.2	Analysis of Night Attended Survey 1 .....	25
6.6	Night Survey 2 .....	26
6.6.1	Attended Measurement Results - Night Survey 2 .....	26
6.6.2	Analysis of Night Attended Survey 2 .....	29
<b>7</b>	<b>RAIL NOISE RESULTS .....</b>	<b>30</b>
<b>8</b>	<b>COMPLIANCE ASSESSMENT .....</b>	<b>32</b>
8.1.1	Compliance Assessment Summary – Day Survey Period .....	32
8.1.2	Compliance Assessment Summary – Evening Survey Period .....	32
8.1.3	Compliance Assessment Summary – Night Survey Period .....	32
8.2	Rail Noise Monitoring Assessment Summary .....	33
<b>9</b>	<b>NOISE MODEL PREDICTION .....</b>	<b>34</b>
<b>10</b>	<b>DISCUSSION AND CONCLUSION .....</b>	<b>36</b>
10.1	ENVIRONMENTAL NOISE SURVEY .....	36
10.2	RAIL NOISE SURVEY .....	36
<b>APPENDIX A:</b>	<b>WEATHER DATA .....</b>	<b>37</b>
<b>APPENDIX B:</b>	<b>LOCALITY MAP AND SURVEY LOCATIONS .....</b>	<b>44</b>

## 1 INTRODUCTION

Vipac Engineers & Scientists Ltd. (Vipac) was commissioned to conduct an Environmental Noise Compliance Assessment in the rural environment surrounding the Duralie Coal Mine (DCM) site, located off Bucketts Way, NSW.

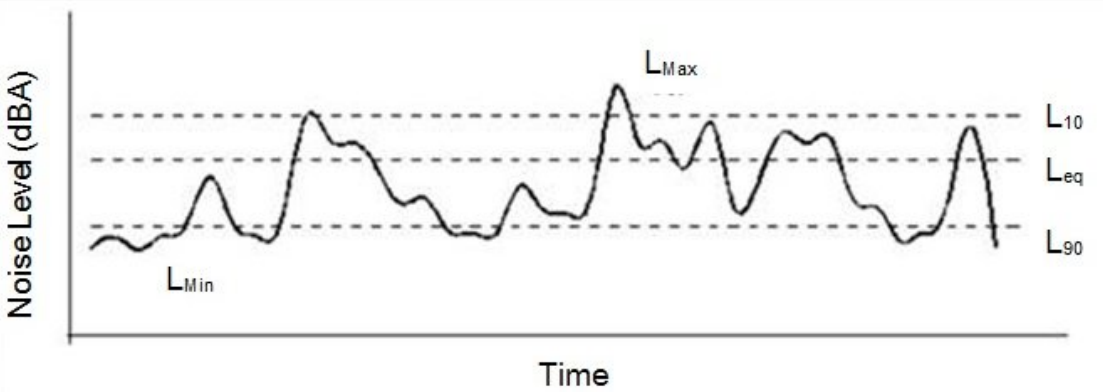
The purpose of the assessment was to conduct an ambient noise survey in accordance with the NSW Project Approval (08\_0203) Condition 2 - Schedule 3, as amended by order of the Land and Environment Court on 10<sup>th</sup> November 2011, first modified on the 1<sup>st</sup> November 2012 and further modified on the 5<sup>th</sup> December 2014, the Environmental Protection Authority (EPA) Environment Protection License (EPL 11701) Section L4 "Noise Limits" and the Duralie Coal Mine Noise Management Plan.

Noise monitoring surveys were conducted at five locations and a reference site surrounding the DCM, which commenced at 11.30 hrs, 07/7/2015 and concluded at 12.30 hrs, on 10/7/2015.

### 1.1 DEFINITIONS OF ACOUSTIC TERMS

**Table 1** provides the definitions of common acoustic terms and is presented as an aid to understanding this report.

**Table 1: Acoustical Terms and Definitions**

	
Term	Definition
dB(A)	A unit of measure in decibels (A) of sound pressure level which has its frequency characteristics modified by a filter ("A weighted") so as to more closely approximate the frequency response of the human ear.
Leq	Equivalent continuous Noise Level – which, lasting for as long as a given noise event has the amount of acoustic energy as the given event.
L <sub>Aeq</sub>	Equivalent continuous Noise Level in the A weighting and is the descriptor used for the assessment of noise compliance.
L <sub>90</sub>	The noise levels that is equalled or exceeded for 90% for the measurement period. An indicator of the mean minimum noise levels as is used in Australia as the descriptor for the background or ambient noise (usually in dBA)
L <sub>10</sub>	The noise levels that is equalled or exceeded for 10% of the measurement period. L <sub>10</sub> is an indicator of the mean maximum noise level and is generally used in Australia as the descriptor for intrusive noise (usually in dBA)
L <sub>1</sub>	The noise levels that is equalled or exceeded for 1% of the measurement period.
Sound Pressure Level (SPL)	Sound pressure is the pressure deviation from the ambient (average, or equilibrium) atmospheric pressure, caused by a sound wave.
1.25kHz Filter	A 1.25kHz filter is applied to the measurements taken to screen out high frequency noises not associated with the operation of the mine. E.g. birds calls and insect noise



## **2 DURALIE COAL MINE**

### **2.1 SITE DESCRIPTION**

Duralie Coal Mine (DCM) is located east of Bucketts Way between the villages of Stroud Road and Wards River, NSW.

### **2.2 DESCRIPTION OF OPERATION**

The following activities have the potential to generate noise during DCM operations:

- Operation of mobile equipment (e.g. excavators, loaders, haul trucks, dozers, graders, water carts and drilling rigs) for:
  - Vegetation removal and stripping/stockpiling of soil resources;
  - Open cut development and production; and
  - Haulage of Run Of Mine (ROM) Coal and mine waste;
- Operation of fixed plant (e.g. ROM bin, ROM coal conveyor, bin loading/unloading, lighting plant and pit pumps); and,
- Rail transportation of coal from the mining lease.

## **3 METHODOLOGY**

Ambient noise level measurements were conducted in accordance with the requirements of the EPA (and the Office of Environment and Heritage (OEH)), and as detailed in the Australian Standard AS1055-1989, "Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures" and the NSW Industrial Noise Policy (INP).

### **3.1 OPERATOR ATTENDED NOISE SURVEYS**

Operator-attended noise surveys were conducted at each monitoring location to quantify ambient noise levels and the contributed levels of noise emitted from current DCM operations. The compliance noise survey consists of a day, an evening and two night surveys for each monitoring location. The timing of each of the survey periods is presented below: -

- Daytime - conducted between 13.17 to 15.37, 7<sup>th</sup> July and 11.46 to 12.01, 8<sup>th</sup> July 2015,
- Evening - conducted between 19.32 to 21.41, 7<sup>th</sup> July 2015
- Night Survey 1 - conducted between 22.00, 7<sup>th</sup> July 2015 to 00.40 8<sup>th</sup> July 2015,
- Night Survey 2 - conducted between 22.02 8<sup>th</sup> July 2015 to 01.05 9<sup>th</sup> July 2015.

The mine noise contribution can be determined using the following methods:

- When the Mine noise emissions are continuous in nature, the contribution is determined by noting the instantaneous sound level meter reading when the mine operations are clearly audible and dominate the measurement environment.
- When the mine noise emissions are transient or frequency specific the contribution is determined by analysing the time trace and frequency spectra recordings to remove extraneous noise source/s from the measurement environment.
- Alternatively, the contribution from the mine can be determined by noting the relative audibility of the operations/activities, at otherwise quiet times, compared to the current background noise levels.

## 3.2 INSTRUMENTATION

### 3.2.1 ATTENDED MEASUREMENTS

Attended noise measurements were taken with a Brüel & Kjær (B&K) 2250 integrating sound level meter (SLM), fitted with a B&K 4189 ½ inch diameter Electret microphone and a windshield. This instrument has performance characteristics within the requirements of Class 1 accuracy in accordance with AS 1259 and AS IEC 61672 and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period.

During attended surveys, the B&K 2250 SLM was used to record a 1/3-octave time trace of each 15-minute measurement enabling detailed analysis of the acoustic environment.

Noise levels over the 15-minute measurement periods were calculated and stored in the B&K 2250 at the monitoring location during the surveys. The identifiable noise sources and their contributions were ranked in order of prominence.

A Rion Sound Level Calibrator was used to calibrate the SLM prior to measurement and checked at the conclusion of the surveys. The calibration check results are summarised in **Table 2**.

### 3.2.2 UNATTENDED NOISE LOGGING

Continuous noise level measurements were conducted using three Larson Davis 870 environmental noise loggers at three monitoring locations along the rail line between the Duralie and Stratford Coal Mines. These locations are TN1-South (South Wards River), TN1-North (North Wards River) and TN2 Craven. Two monitoring locations are utilised in Wards River, 1 toward the south of the village, away from the level crossing and one at the north end of the village near the level crossing.

Loggers were programmed to accumulate environmental noise data continuously over sampling periods of fifteen minutes duration for the entire survey period. The internal software of each logger is capable of calculating and storing the  $L_{An}$  percentile noise levels for the chosen sampling period, which can subsequently be retrieved for detailed analysis.

A Rion Sound Level Calibrator was used to calibrate the SLM and loggers prior to commencement of measurement and checked at the conclusion of the surveys. These calibration check results are also summarised in **Table 2**.

**Table 2: Instrumentation Parameters**

Equipment Calibration Parameters			
Equipment	Serial No.	Last NATA Lab Cal	Next Lab Cal Due
Attended Measurements			
Bruel & Kjaer 2250 Class 1 Integrating Sound Level Meter	21273	16/07/2013	16/07/2015
Hand Held Calibration Check Results	Check		Acceptable?
Tuesday 07/07/2015	94.0, Δ = 0.0		Yes
Wednesday 08/07/2015	94.0, Δ = 0.0		Yes
Thursday 09/07/2015	94.0, Δ = 0.0		Yes
Friday 10/07/2015	94.1, Δ = 0.1		Yes
Unattended Measurements			
Larson Davis 870 ENM 6	1459	26/2/2015	26/02/2015
Larson Davis 870 Set 2	1466	13/04/2015	13/04/2017
Larson Davis 870 Set 9	1465	10/04/2015	10/04/2017



### 3.3 MONITORING LOCATIONS

Monitoring locations for the attended noise survey are summarised in **Table 3** and illustrated in **Appendix B**.

**Table 3: Monitoring Locations**

Location ID	Resident/ Owner	Address
NM1	Woodley <sup>1</sup>	See map of noise monitoring locations in <b>Appendix B</b>
NM2	Zulumovski North	
NM3	Mahony	
NM4	Fisher-Webster	
REF	Duralie Road	
Additional Monitoring Location 1	Wards River Village	

Note: Duralie Road is Yancoal owned land used as a Reference noise monitoring location. An additional monitoring survey is carried out within Wards River Village due to complaints that have been received on occasion from receptors in the village and also due to variations noted under adverse weather conditions during previous surveys.

In addition, one train pass-by measurement was conducted at each of the monitoring locations listed in **Table 4**.

**Table 4: Rail Monitoring Locations**

Location ID	Monitoring Site	Address
TN2- South End of Village	Wards River Village	See map of noise monitoring locations in <b>Appendix B</b>
TN2 – North of End of Village		
TN1	Craven	

Weather Data was sourced from the Duralie Weather station for this compliance survey. The Duralie Mine weather station compound is located on the mining lease. Meteorological data from this location is collected by the mine management and provided to Vipac for analysis. Additionally temperature data is sourced from Duralie Coal's Inversion tower infrastructure in order to calculate the localised temperature inversion for each 15-minute period.

Data is presented in 15-minute intervals in **Appendix A** including meteorological parameters such as wind direction, average wind speed, temperature, sigma-theta, rainfall and calculated inversion strength.

<sup>1</sup>Woodley property has recently been purchased by the Thompson Family but will retain the title of the Woodley until a License revision.  
18 Sep 2015

## 4 NOISE CRITERIA

### 4.1 EPL NOISE LIMITS

The EPA's Environmental Protection Licence (EPL 11701 dated 20<sup>th</sup> Aug 2014) Section *L4 Noise Limits* part *L4.1* specifies the following noise limits and locations as presented in **Table 5**.

**Table 5: EPL Noise Limits and Locations**

Location	Noise Limits (Day, Evening, Night)	Noise Limits (Night)
	Intrusive Criteria dB LAeq 15-minute	Noise Criteria dB LA1 (1-minute)
NM1 Woodley	35	45
NM2 Zulumovski North	35	45
NM3 Mahony	35	45
NM4 Fisher-Webster	35 (day/evening), 37 (night)	45
REF Duralie Road	N/A	N/A
Additional Monitoring Location: Wards River	35	45

Parts *L4.2 (a)* and *L4.8* specify additional conditions regarding noise:

*L4.2 (a) with the  $L_{eq}$  (15-minute) noise limits in condition 4.1, the noise measurement equipment must be located:*

*Approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or*

*Within 30 metres of a dwelling façade, but not closer than 3 m, where any dwelling on the property is situated more than 30 metres from the boundary closest to the premises.*

*Noise from the premises is to be measured at a distance within 30 metres of the locations identified in *L4.1* to determine compliance with this condition.*

*L4.8 The noise limits set out in condition in *L4.1* 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 degrees Celsius/100m and wind speeds greater than 2 metres/second at 10 metres above the ground level; or*
- c) Temperature inversion conditions greater than 3 degrees Celsius/100m.*

### 4.2 PROJECT APPROVAL LIMITS

Duralie Coal Pty Ltd (DCPL) obtained approval from the Department of Planning for the Duralie Coal Mine extension Section 96(2) Modification – Notice of Modification dated 30<sup>th</sup> July 2006 (DA No. 169/99). Additionally DCPL was granted approval for the Duralie Extension Project under Section 75J of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 26<sup>th</sup> November 2010 (NSW Project Approval [08\_0203]). On 10<sup>th</sup> November 2011, the NSW Project Approval (08\_0203) was amended by Order of The Land and Environment Court of NSW and additional approval for extension to the operation hours of the Duralie Coal shuttle was granted to DCPL. NSW Project Approval (08\_0203) was first modified on the 1<sup>st</sup> November 2012 and further modified on the 5<sup>th</sup> December 2014, the Environmental Protection Authority (EPA) Environment Protection License (EPL 11701) Section L4 “Noise Limits” and the Duralie Coal Mine Noise Management Plan.

The relevant noise criteria are described in Schedule 3, Condition No. 2 of the NSW Projects Approval (08\_0203) and are reproduced below.

### SCHEDULE 3 ENVIRONMENTAL PERFORMANCE CONDITIONS

#### Noise Criteria

2. Except for the land referred to in Table 1 (of Schedule 3), the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 (of Schedule 3) at any residence on privately owned land or on more than 25 per cent of any privately-owned land.

**Table 2: Noise criteria dB(A) (Table 2 of Schedule 3)**

Location	Day	Evening	Night	
	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>A1</sub> (1 minute)
172 - Lyall	35	39	40	45
126 – Hamamn Pixalu PI	35	35	39	45
123 – Oleksiuk & Carmody				
173 – Trigg & Holland	35	36	37	45
116 - Weismantel				
127 – Fisher-Webster	35	35	37	45
131(1) - Relton				
180(1) - Thompson	35	36	36	45
95 – Smith & Ransley	35	35	36	45
144 - Wielgosinski				
169 - Williams	35	36	35	45
177 - Thompson				
All other privately-owned land	35	35	35	45

**Notes:**

- To identify the locations referred to in Table 2, refer to the figure in Appendix 3; and
- 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.

However these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

#### 4.3 RAIL NOISE

Duralie Coal Mine - Noise Management Plan Section 4.2.2 specifies the following noise limits in clause L2.2:

*“It is the objective of this license to progressively reduce noise levels to the goals of 65dB(A)Leq , (daytime from 7am – 10pm), 60dB(A)Leq (night-time from 10pm –7am) and 85dB(A) (24hr) max pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Programs”.*

In addition Section 7.6 of the Duralie Coal Mine Noise Management Plan stipulates the following with regard to rail noise:

*“Rail Noise monitoring and reporting against the other rail noise performance criteria described in Section 4 will be undertaken for general information purposes only (i.e. they are not DCM compliance requirements).”*

Additionally Schedule 3 Condition 4(e) of the DCPL Extension Project Approval stipulates:

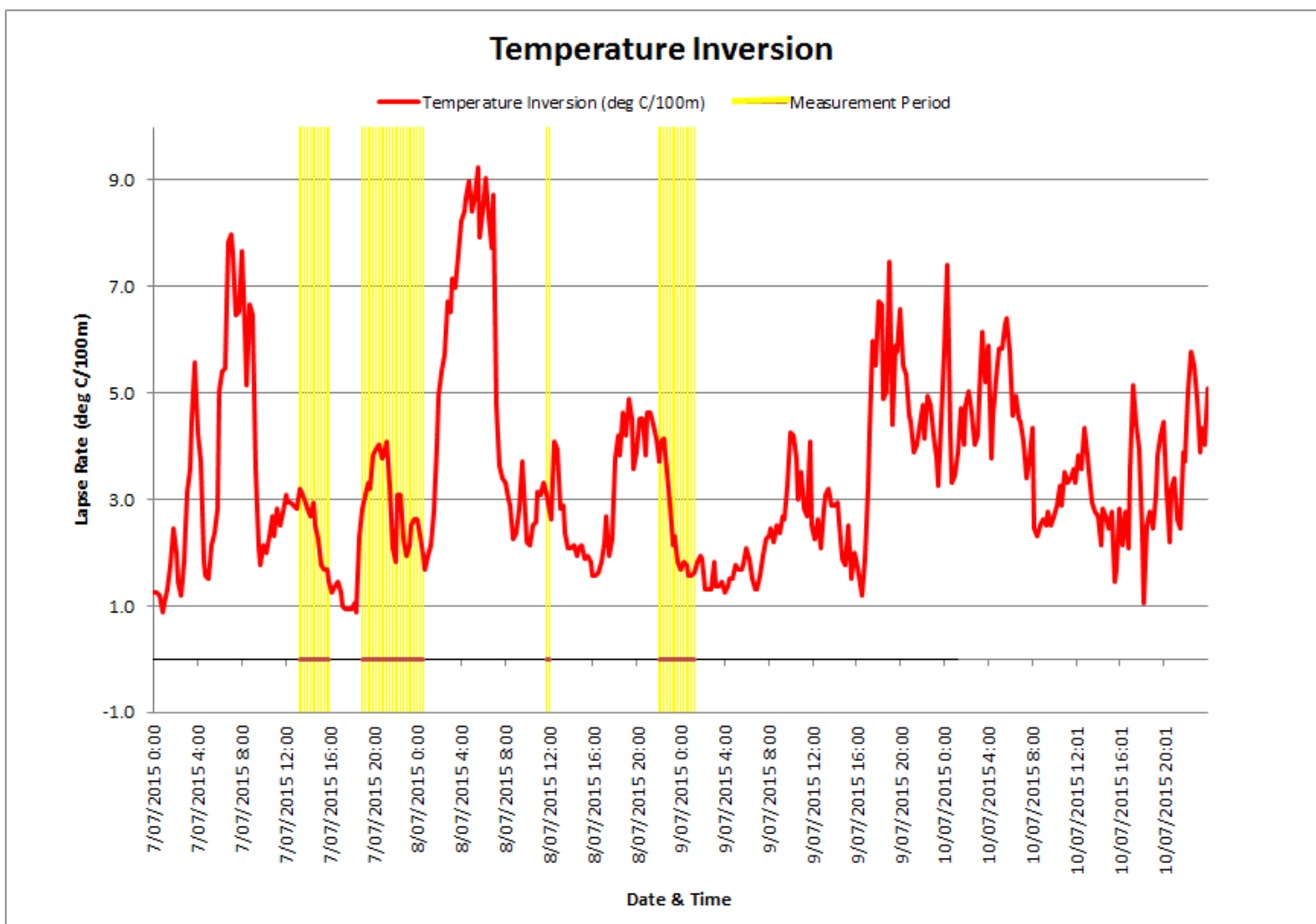
*“On privately owned land between the Stratford and Duralie mines where the maximum pass-by rail traffic noise from the Project exceeds 85dBA, the Proponent shall implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner. These measures must be reasonable and feasible.”*

## 5 TEMPERATURE INVERSION CONDITIONS

Typically at DCM, temperature inversion strength and occurrence is determined by utilizing the inversion tower data provided by the Duralie Coal Mine and calculating the lapse rate and Pasquill Stability Categories.

This section presents graphically the calculated temperature inversion results for the survey period. A comparison against predicted inversion results is presented in **Appendix A** of this report.

**Figure 1** below presents the calculated lapse rate from the measurement data collect by the inversion towers and indicates that there is a high occurrence of moderate to strong temperature inversions. Due to the presence of moderate to strong temperature inversions throughout the evening and night survey periods there is a strong probability of noise enhancements. The times at which each of the compliance surveys were conducted are highlighted in yellow for ease of presentation.



**Figure 1 : DCM Temperature Inversion Tower Measured (Lapse rate) Results 07/07/2015 – 10/07/2015**

## 6 NOISE SURVEY RESULTS

The results of the day, evening, and night-time operator attended surveys under prevailing weather conditions are presented in the following sections, together with a description of audible sounds and their contribution. Noise events such as passing road, rail and air traffic, wildlife noise and other extraneous noise sources have been excluded from the measurement data, with the excluded periods being highlighted in yellow in the survey graphs (*Figures 2-25*).

### 6.1 NOISE SURVEY WEATHER CONDITIONS

The weather conditions at the time of each attended noise measurement as obtained from direct measurement at each monitoring location are presented in **Table 6**.

**Table 6: Attended Noise Measurements & Prevailing Weather Conditions**

Weather Parameters						
Location	Measurement Start Time (hrs.)	Temp. °C	Cloud Cover (Okta)	Wind Speed <sup>1</sup> (ms <sup>-1</sup> )	Wind Direction	Rainfall (mm)
<b>Day Survey 07/07/2015 – 08/07/2015</b>						
Woodley	07/07/15 13:17	17.4	3/8	2.4	South	0
Zulumovski	07/07/15 15:22	16.2	8/8	2.0	South West	0
Mahony	07/07/15 13:57	16.4	6/8	1.2	West	0
Fisher- Webster	07/07/15 14:41	17.2	8/8	1.0	South West	0
Duralie Road	07/07/15 14:20	16.4	7/8	1.4	South West	0
Wards River Village	08/07/15 11:47	16.7	4/8	1.3	South West	0
<b>Evening Survey 07/07/2015</b>						
Woodley	07/07/15 21:16	11.4	8/8	0	Still Conditions	0
Zulumovski	07/07/15 19:52	11.8	8/8	0	Still Conditions	0
Mahony	07/07/15 20:40	11.6	7/8	0	Still Conditions	0
Fisher- Webster	07/07/15 19:32	11.0	6/8	0.1	South	0
Duralie Road	07/07/15 20:15	12.2	6/8	0	Still Conditions	0
Wards River Village	07/07/15 19:05	11.6	5/8	0.1	South	0
<b>Night Survey 1, 07/07/2015 – 08/07/2015</b>						
Woodley	07/07/15 22:00	10.7	6/8	0.2	South	0
Zulumovski	08/07/15 00:04	9.5	8/8	0.3	South	0
Mahony	07/07/15 23:23	10.7	8/8	0	Still Conditions	0
Fisher- Webster	07/07/15 23:45	11.6	8/8	0	Still Conditions	0
Duralie Road	07/07/15 23:02	11.7	0/8	0.1	South	0
Wards River Village	08/07/15 00:25	11.0	6/8	0	Still Conditions	0
<b>Night Survey 2, 08/07/2015 – 09/07/2015</b>						
Woodley	08/07/15 22:01	11.6	0/8	0.2	South	0
Zulumovski	08/07/15 00:09	13.6	0/8	0.1	South west	0
Mahony	09/07/15 00:50	10.2	1/8	0	Still Conditions	0
Fisher- Webster	08/07/15 23:34	11.5	0/8	0.1	West	0
Duralie Road	09/07/15 00:30	10.4	1/8	0	Still Conditions	0
Wards River Village	08/07/15 23:09	12.0	0/8	0	Still Conditions	0

Note 1 Wind speed was checked at each location during attended noise monitoring. Noise measurements were only conducted where weather conditions were within acceptable levels at the microphone position.

### 6.2 NOISE SURVEY MINE OPERATIONS

DCM provided Vipac with information for reporting on mining plant, equipment and operations with correlating times and location. A full description of the Mine Operations and Activities are provided in **Appendix C** of this report.

### 6.3.1 ATTENDED MEASUREMENT RESULTS – DAY SURVEY





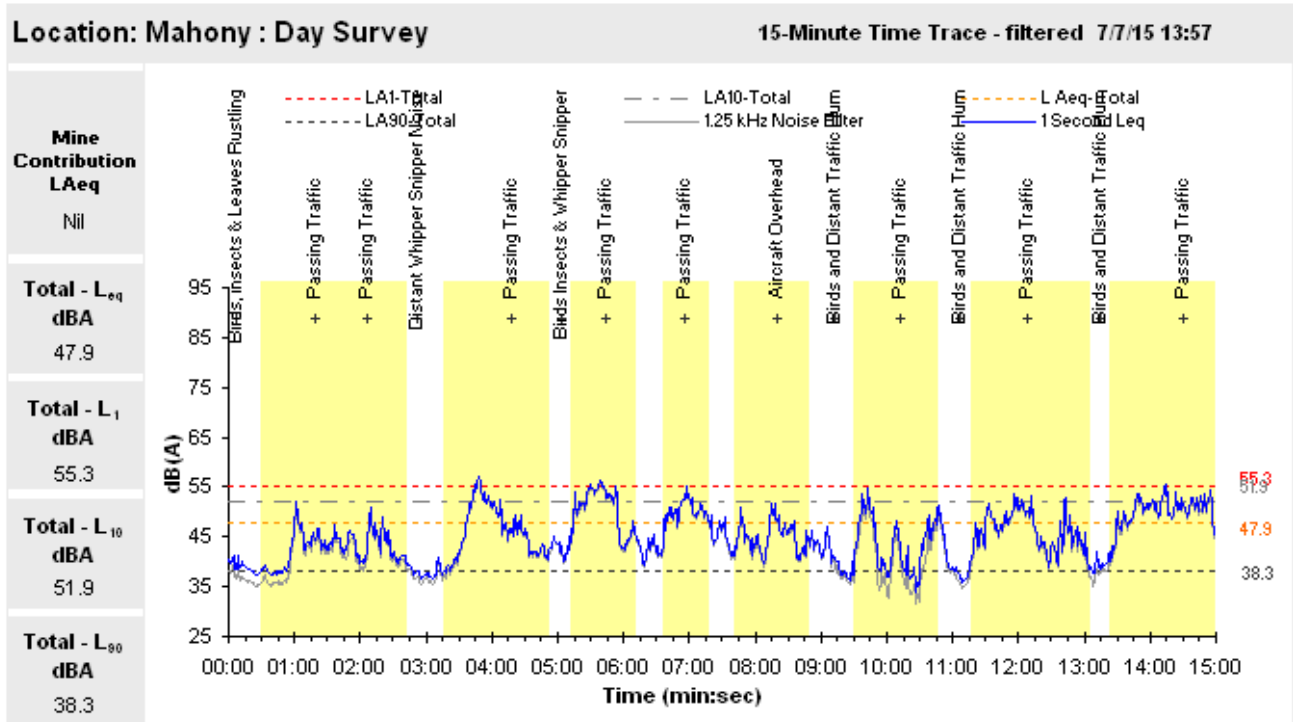


Figure 4: Day Survey, Mahony

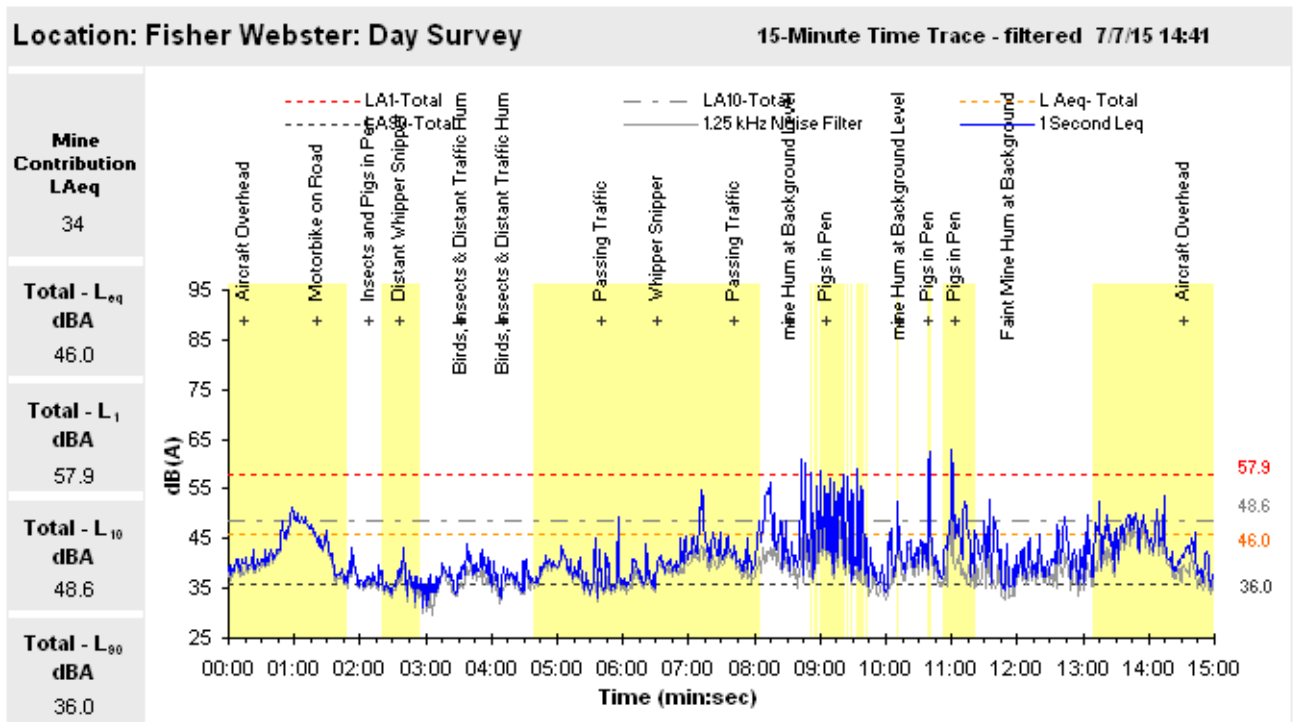


Figure 5: Day Survey, Fisher-Webster

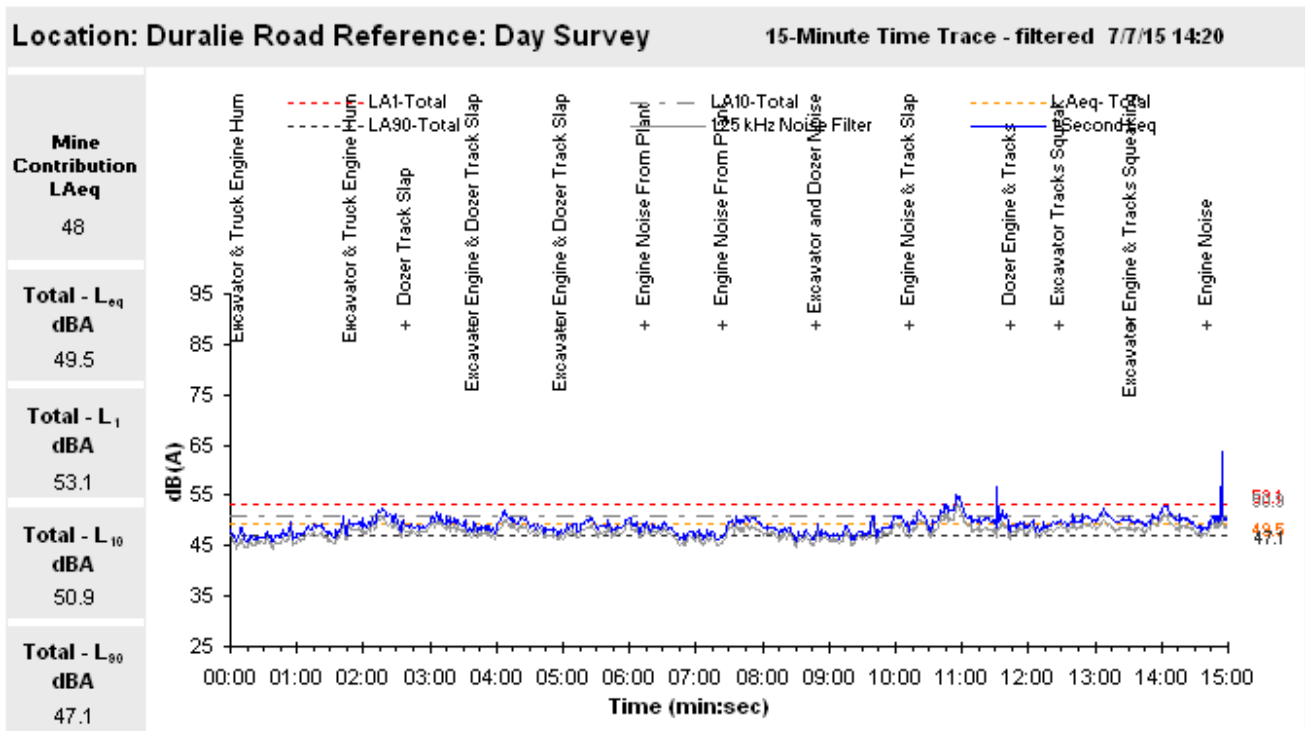


Figure 6: Day Survey, Duralie Road

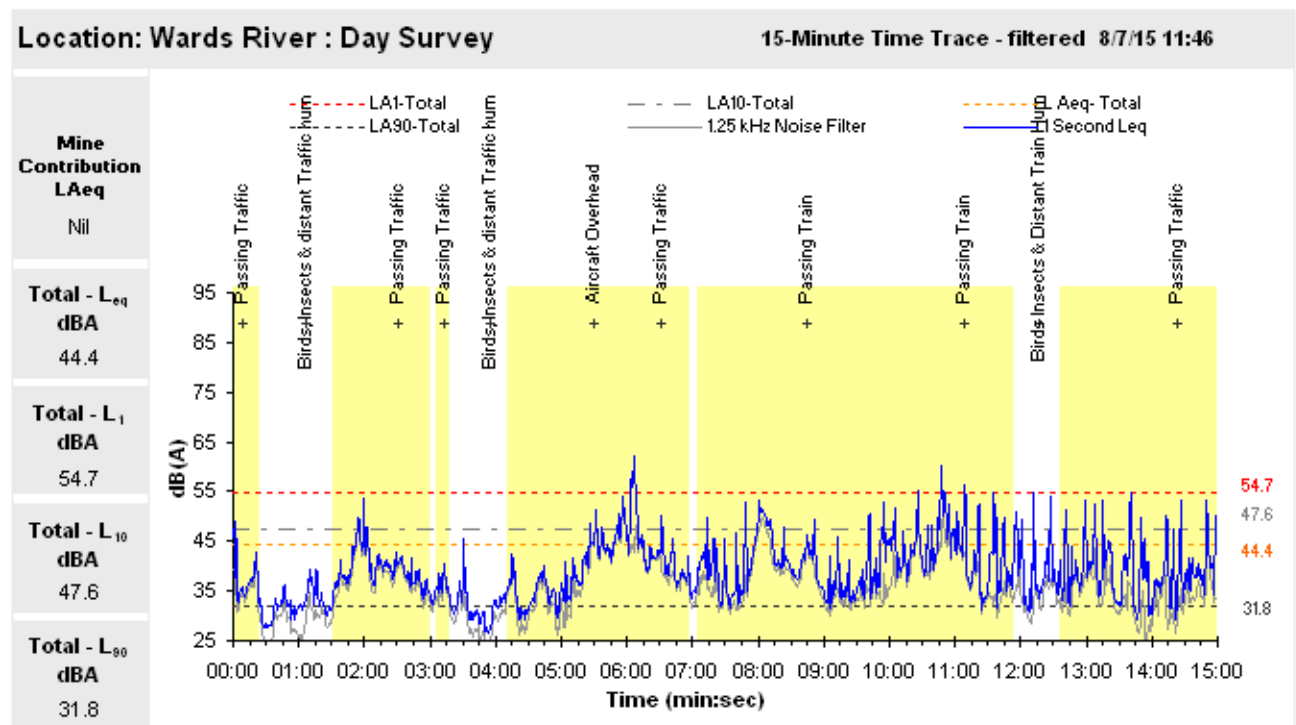


Figure 7: Day Survey, Wards River

### 6.3.2 ANALYSIS OF DAY ATTENDED SURVEY

#### Summary of Audible Noises during the Day Survey Period

The mine noise emissions at the reference site (REF Duralie Road) measured 48dB  $L_{Aeq}$  during typical operations on the mine lease. Audible noise sources that contributed to this result consisted of excavation activities such as excavator operations, haul truck movements and track dozers operating on excavation strips. Noise emissions measured at Duralie Road were representative of mine operations for this survey period.

Noise from DCM operations was audible at the Zulumovski and Fisher Webster monitoring locations during the day survey period survey. The Woodley, Mahony and Wards River monitoring locations had a nil mine contribution, for the day survey periods conducted on the 07<sup>th</sup> and 08<sup>th</sup> July 2015.

Excluding extraneous noise sources (i.e. frequent road traffic movements, continuous sounds from birds, insects, dogs and occasional passing air and rail traffic) from the overall noise measurement resulted in the mine noise contribution determined at each monitoring location, which are summarised below. The audible noise sources at the monitoring locations consisted of passing road, rail and air traffic, insect and wildlife noise and general farm noise.

Prevailing weather conditions were characterised by cloudy skies with medium strength winds blowing from a south-westerly direction on the 07<sup>th</sup> and 8<sup>th</sup> of July 2015 during the daytime survey period based on the observations of onsite engineer.

#### Summary of Measured Mine Noise

The DCM  $L_{Aeq}$  noise contributions for the day survey are as follows:

- Nil at NM1 Woodley.
- 35dB  $L_{Aeq}$  15-minute at NM2 Zulumovski.
- Nil at NM3 Mahony.
- 34dB  $L_{Aeq}$  15-minute at NM4 Fisher Webster.
- 48dB  $L_{Aeq}$  15-minute at Ref. Duralie Road.
- Nil at Wards River.



## 6.4 EVENING SURVEY

### 6.4.1 ATTENDED MEASUREMENT RESULTS - EVENING SURVEY

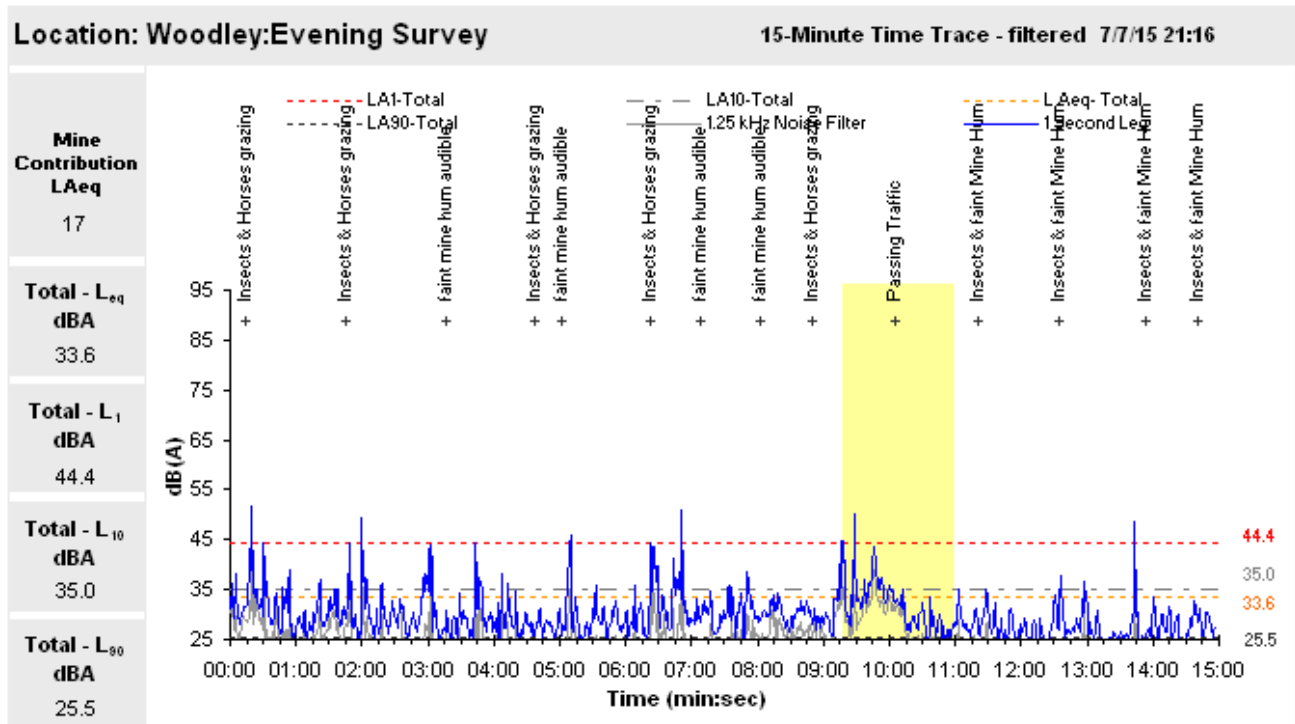


Figure 8: Evening Survey, Woodley

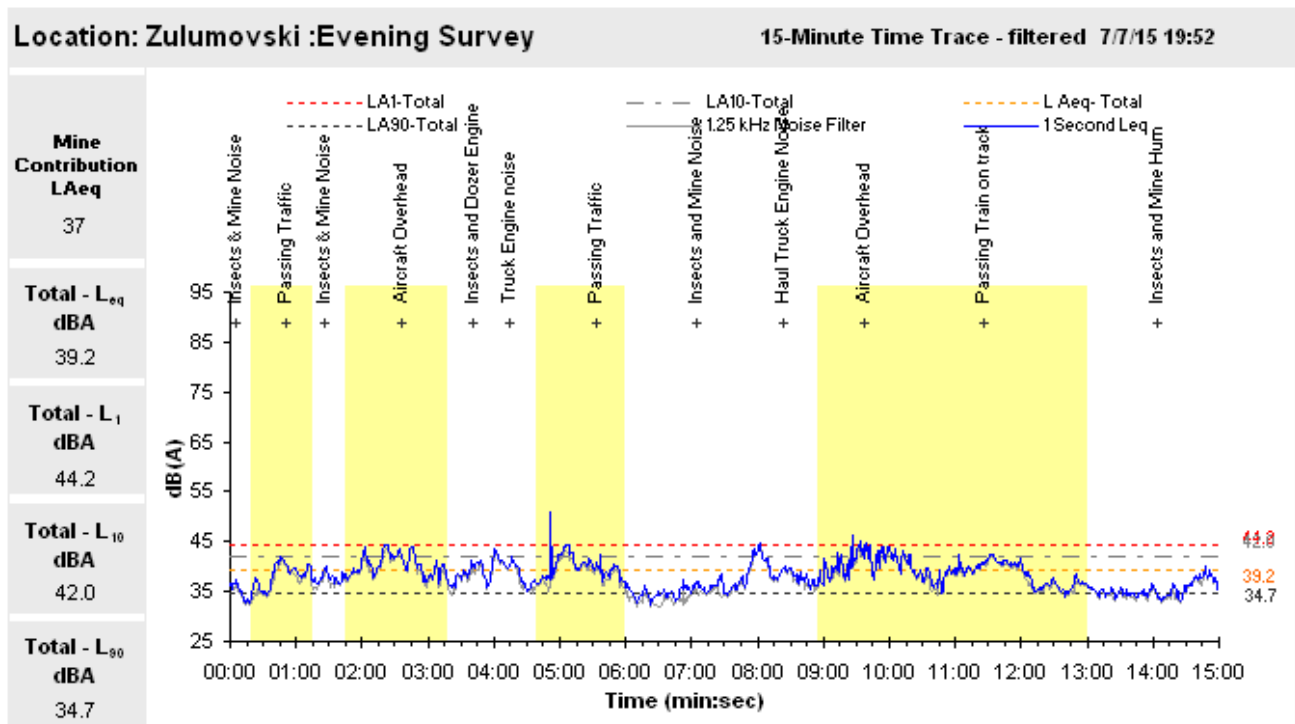


Figure 9: Evening Survey, Zulumovski

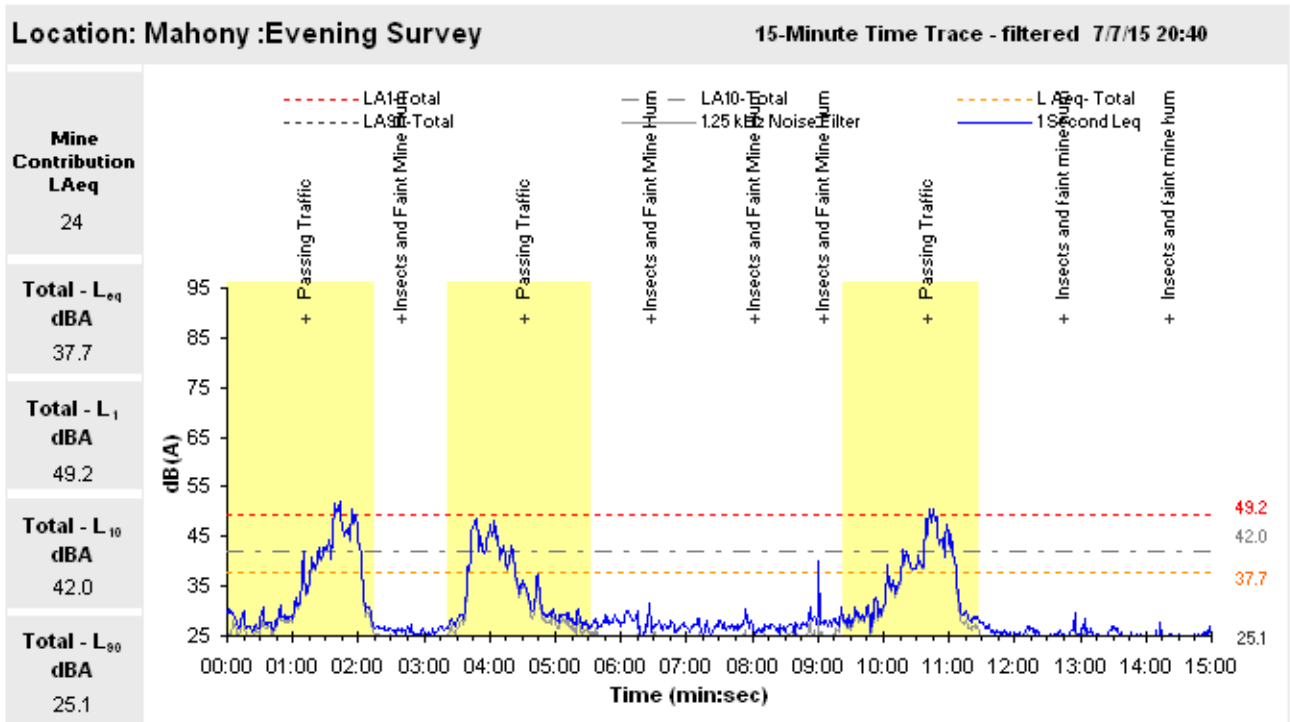


Figure 10: Evening Survey, Mahony

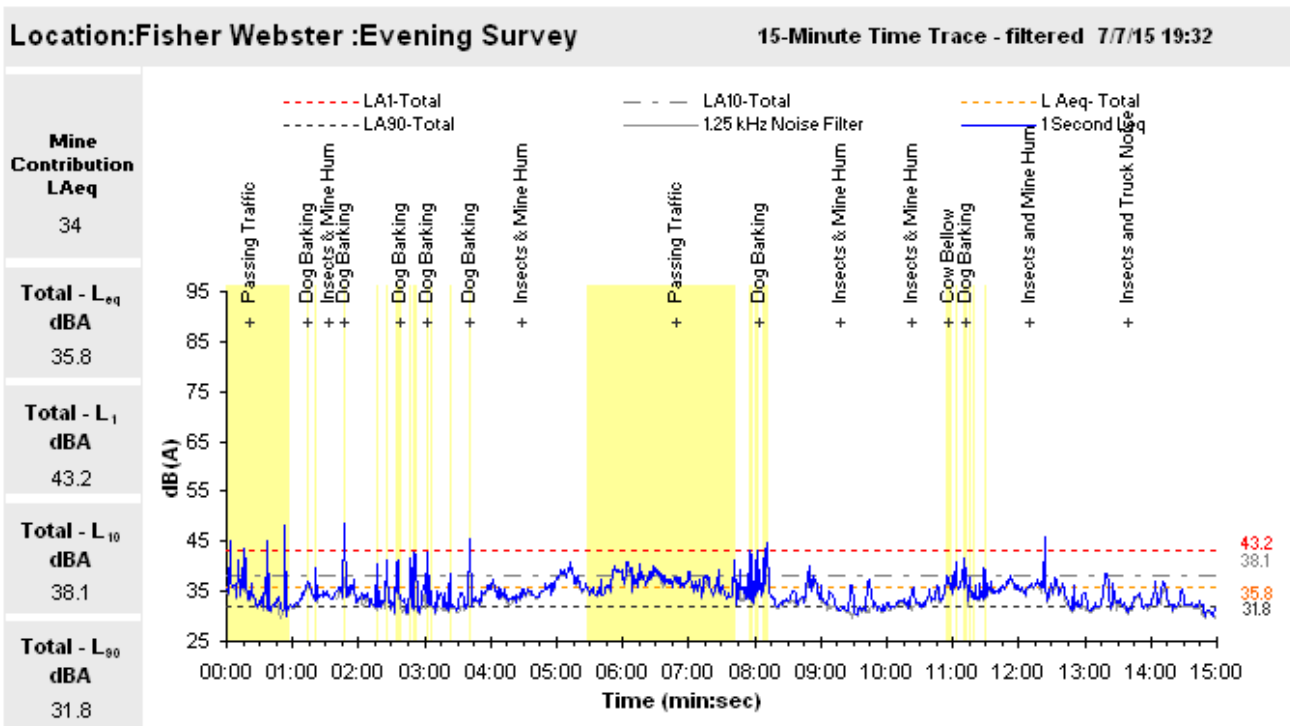


Figure 11: Evening Survey, Fisher-Webster

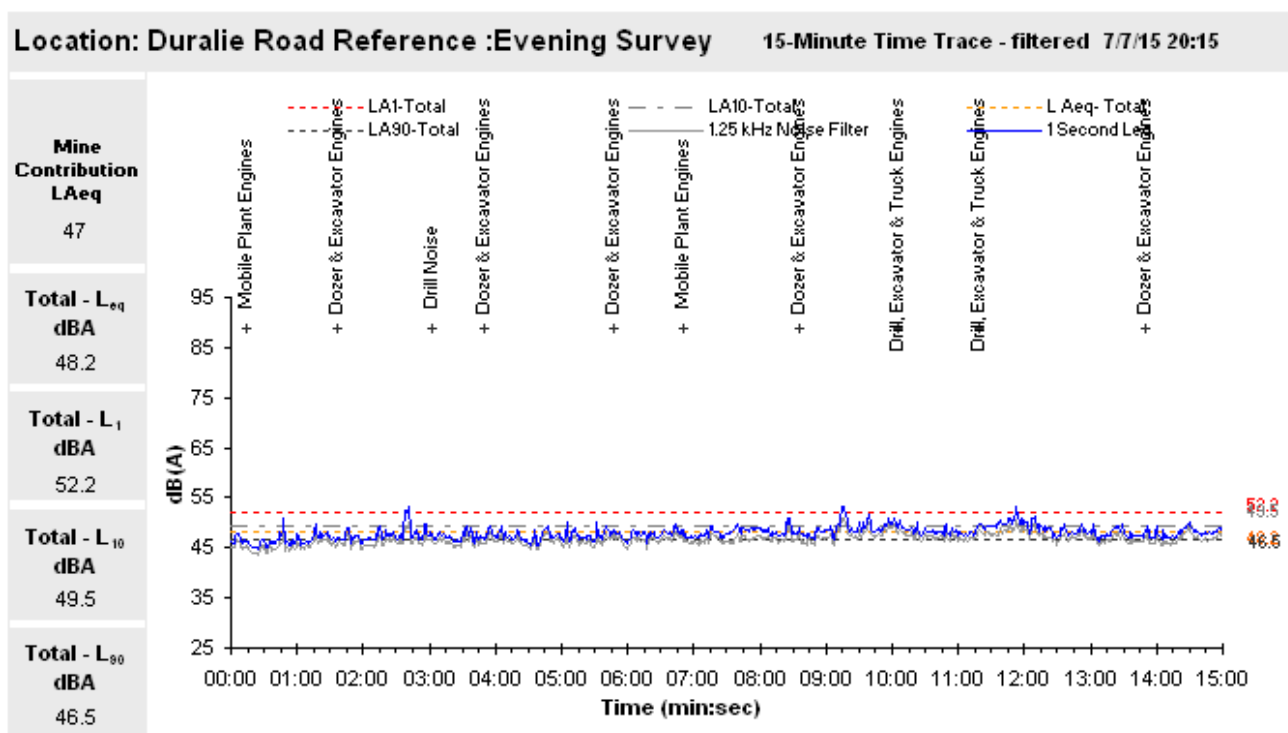


Figure 12: Evening Survey, Duralie Road

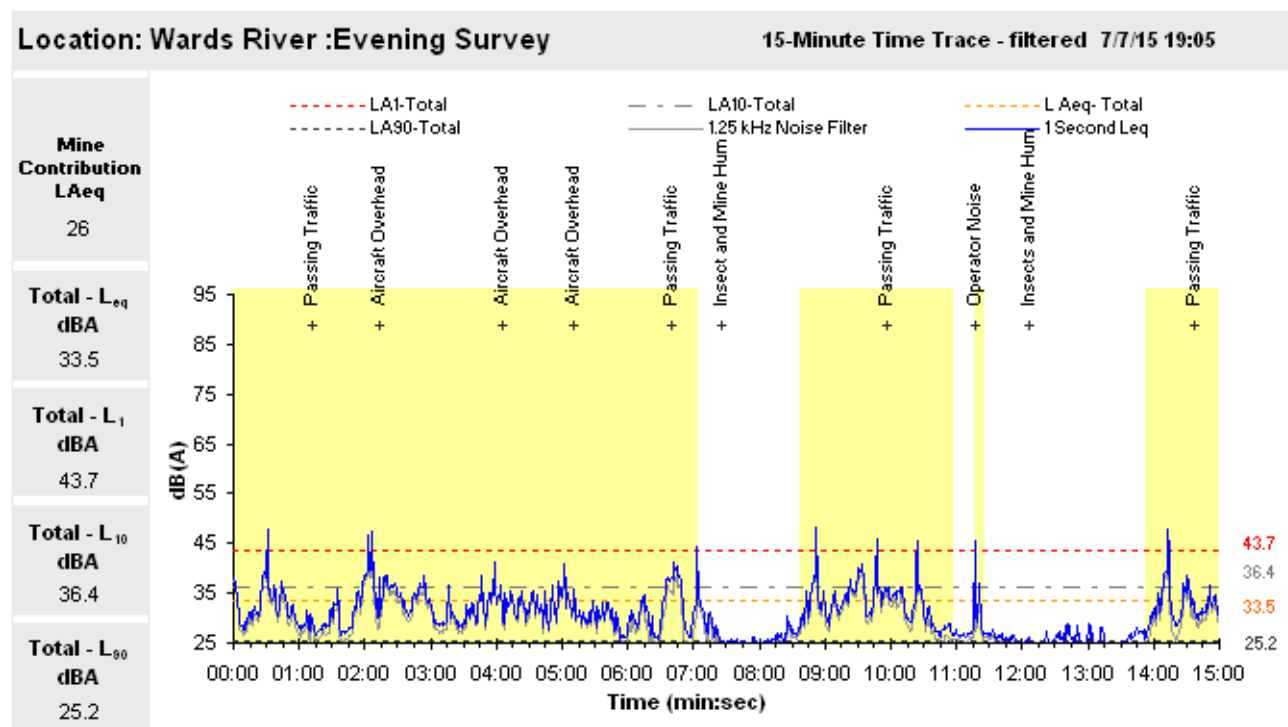


Figure 13: Evening Survey, Wards River



## 6.4.2 ANALYSIS OF EVENING ATTENDED SURVEY

### Summary of Audible Noises during the Evening Survey Period

The mine noise emissions at the reference site (REF Duralie Road) measured 47dB  $L_{Aeq}$  during typical operations on the Mine lease. Noise emissions measured at Duralie Road were representative of mine operations for this survey period.

Noise emissions from DCM operations were audible at all monitoring locations during the evening survey period conducted on 7<sup>th</sup> July 2015. The audible mining operations at the noise sensitive receivers consisted of excavator, dozer and haul truck engine operations.

Excluding extraneous noise sources (i.e. frequent road traffic movements, continuous sounds from birds, insects, dogs and occasional passing rail traffic) from the overall noise measurement resulted in the mine noise contribution being determined at each monitoring location, which are summarised below.

Prevailing weather conditions at the time were characterised by cloudy skies with still and southerly wind conditions, combined with moderate temperature inversion conditions as calculated from the Duralie Inversion Tower Infrastructure throughout the evening survey period.

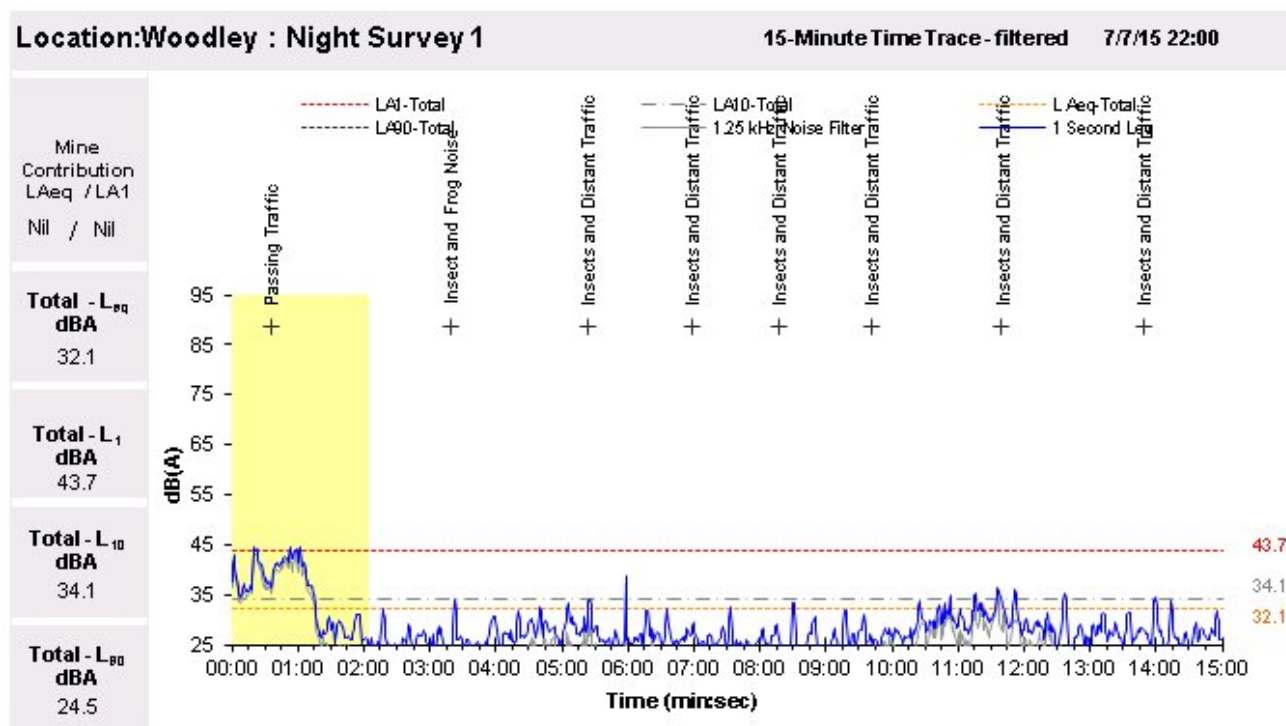
### Summary of Measured Mine Noise

The DCM  $L_{Aeq}$  noise contributions for the evening survey period are as follows:

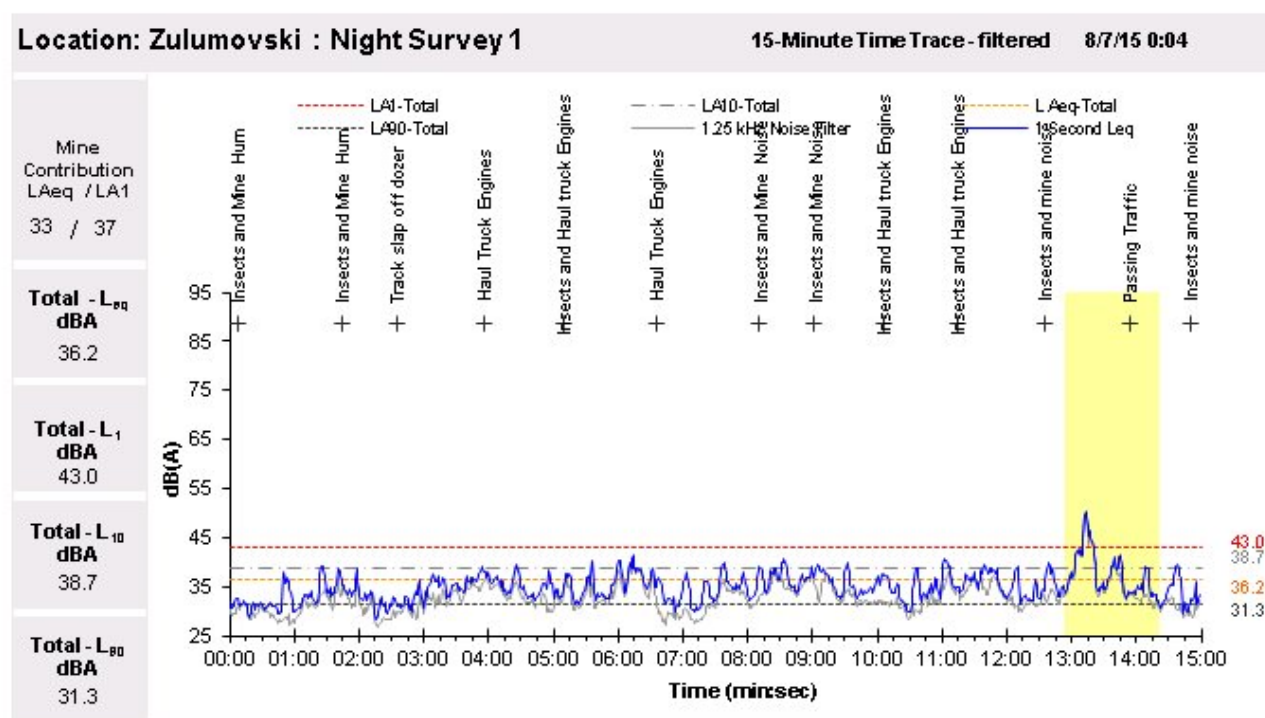
- 17dB  $L_{Aeq}$  15-minute at NM1 Woodley.
- 37dB  $L_{Aeq}$  15-minute at NM2 Zulumovski.
- 24dB  $L_{Aeq}$  15-minute at NM3 Mahony.
- 34dB  $L_{Aeq}$  15-minute at NM4 Fisher Webster.
- 47dB  $L_{Aeq}$  15-minute at Ref Duralie Road.
- 26dB  $L_{Aeq}$  15-minute at Wards River.

## 6.5 NIGHT SURVEY 1

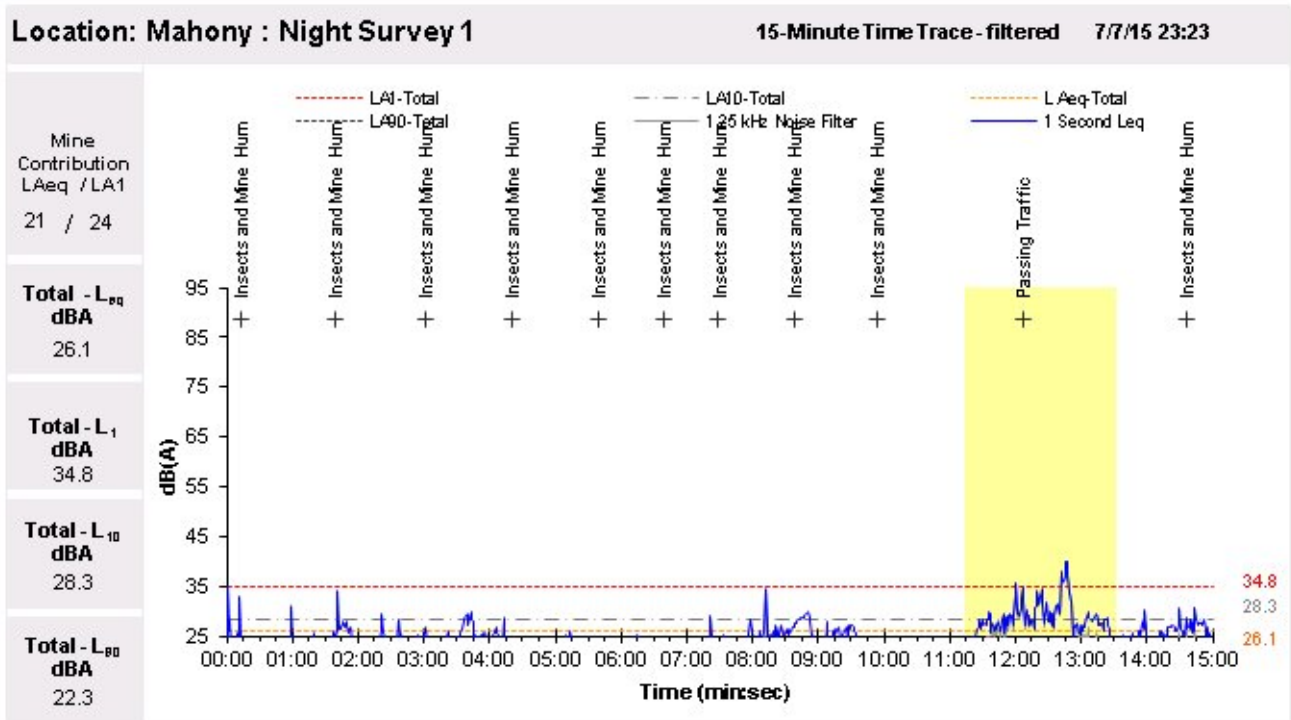
#### 6.5.1 ATTENDED MEASUREMENT RESULTS - NIGHT SURVEY 1



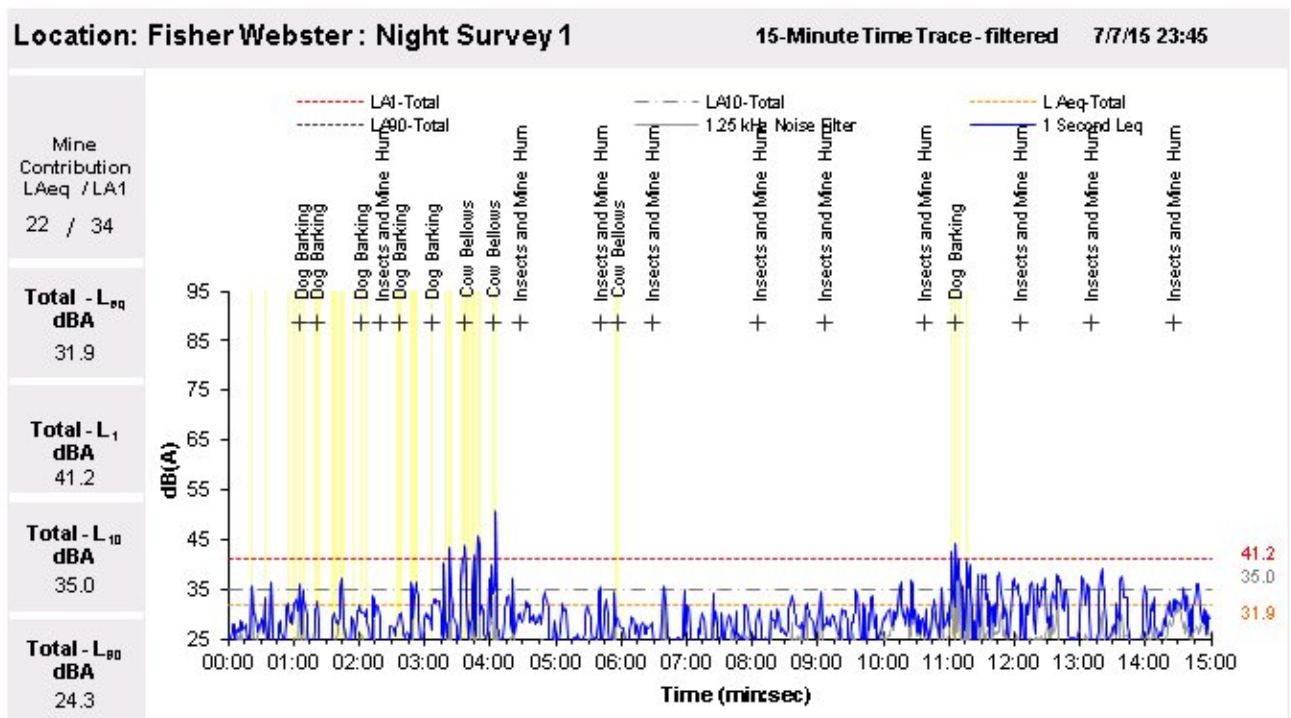
**Figure 14: Night Survey 1, Woodley**



**Figure 15: Night Survey 1, Zulumovski**



**Figure 16: Night Survey 1, Mahony**



**Figure 17: Night Survey 1, Fisher-Webster**

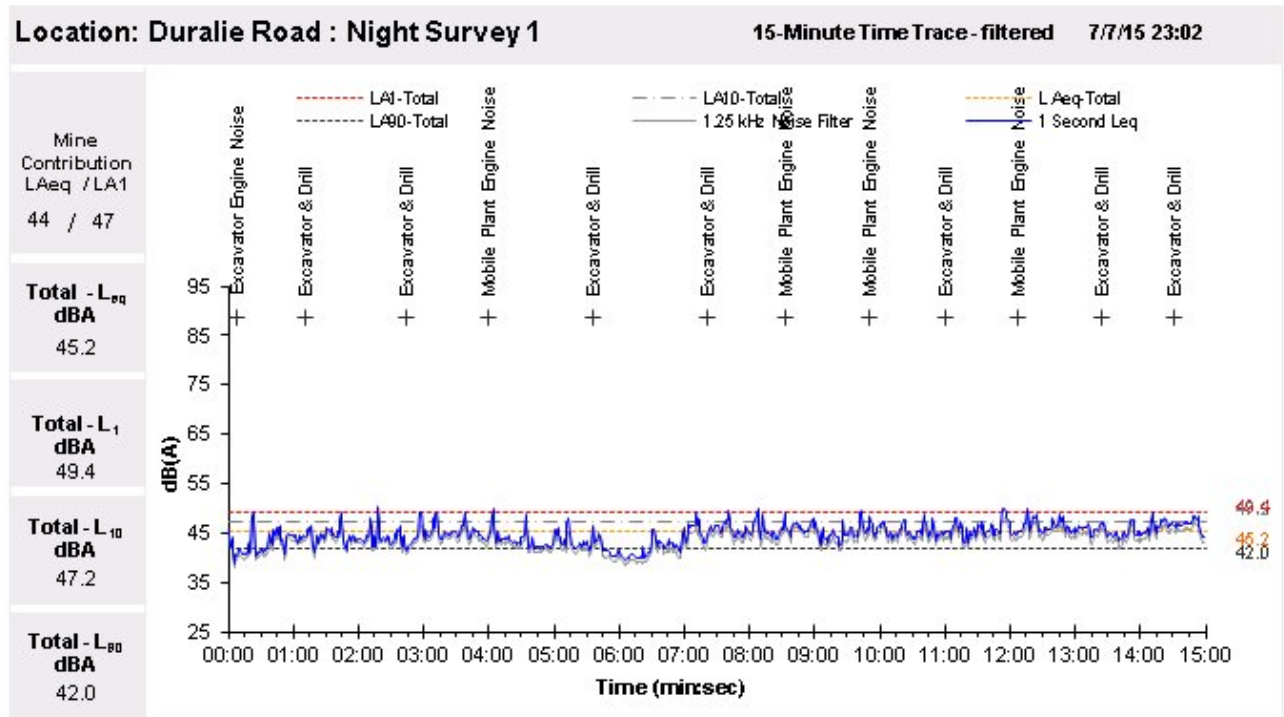


Figure 18: Night Survey 1, Duralie Road

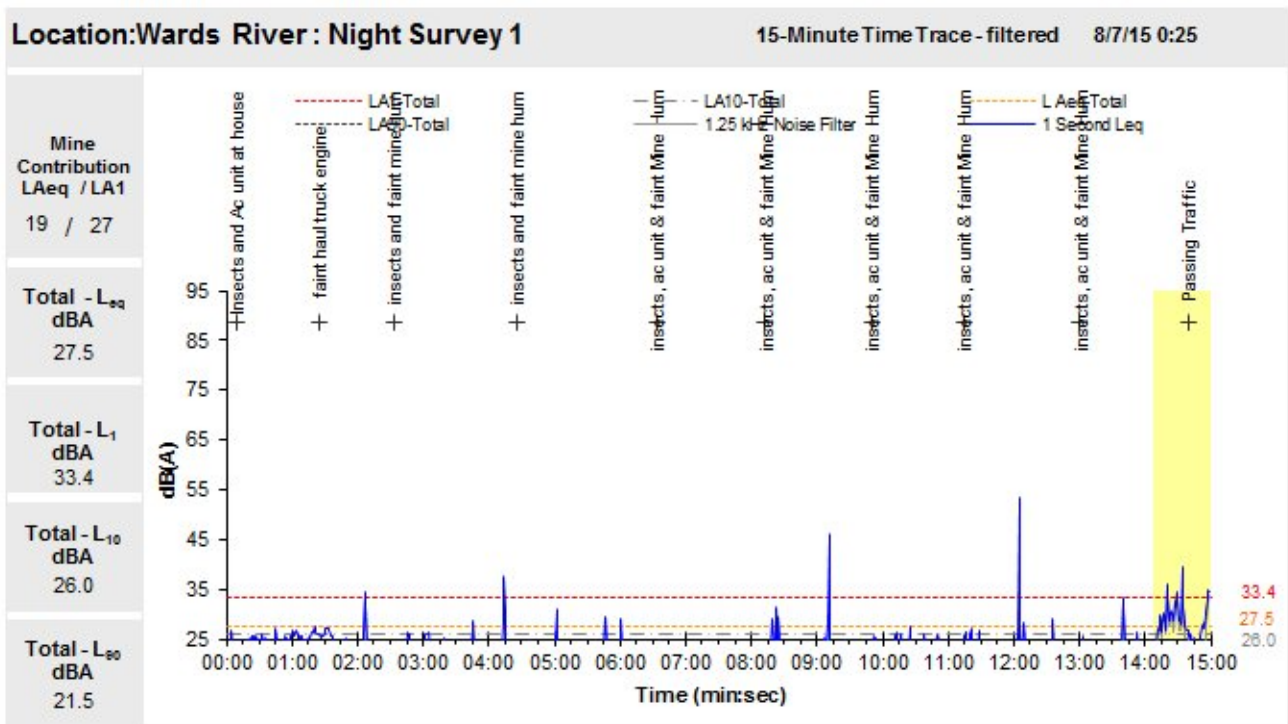


Figure 19: Night Survey 1, Wards River

## 6.5.2 ANALYSIS OF NIGHT ATTENDED SURVEY 1

### Summary of Audible Noises during the Night Survey Period 1

The mine noise emissions at the reference site (REF Duralie Road) measured 44dB  $L_{Aeq}$  during typical operations on the Mine lease on the 07<sup>th</sup> - 08<sup>th</sup> July 2015. Audible noise sources that contributed to this result consisted of excavation activities such as excavator operations and haul truck movements operating on excavation strips. Noise emissions measured at Duralie Road were representative of mine operations for this survey period.

Noise from DCM operations was audible at all monitoring locations with the exception of the Woodley monitoring location during the first night survey conducted on 7<sup>th</sup> - 08<sup>th</sup> of July 2015. The audible mining operations at the noise sensitive receivers consisted of excavator operations, dozer operations including track slap and haul truck.

Excluding extraneous noise sources (i.e. road traffic movements, sounds from birds, insects, dogs and occasional passing rail traffic) from the overall noise measurement resulted in the mine noise contribution being determined at each monitoring location, which are summarised below.

Prevailing weather conditions were characterised by clear skies with still to light wind conditions blowing from a predominately southerly direction, combined with moderate temperature inversion conditions throughout the survey periods on the Night Survey 1.

The DCM  $L_{Aeq}$  noise contributions for the first night survey period are as follows:

- Nil at NM1 Woodley.
- 33dB  $L_{Aeq}$  15-minute at NM2 Zulumovski.
- 21dB  $L_{Aeq}$  15-minute at NM3 Mahony.
- 22dB  $L_{Aeq}$  15-minute at NM4 Fisher Webster.
- 44dB  $L_{Aeq}$  15-minute at Ref Duralie Road.
- 19dB  $L_{Aeq}$  15-minute at Wards River.

The DCM  $L_{A1}$  (1 minute) contributions for the first night survey period are as follows

- Nil at NM1 Woodley.
- 37dB  $L_{A1}$  (1-minute) at NM2 Zulumovski.
- 24dB  $L_{A1}$  (1-minute) at NM3 Mahony.
- 34dB  $L_{A1}$  (1-minute) at NM4 Fisher Webster.
- 47dB  $L_{A1}$  (1-minute) at Ref Duralie Road.
- 27dB  $L_{A1}$  (1-minute) at Wards River.





## 6.6 NIGHT SURVEY 2

### 6.6.1 ATTENDED MEASUREMENT RESULTS - NIGHT SURVEY 2

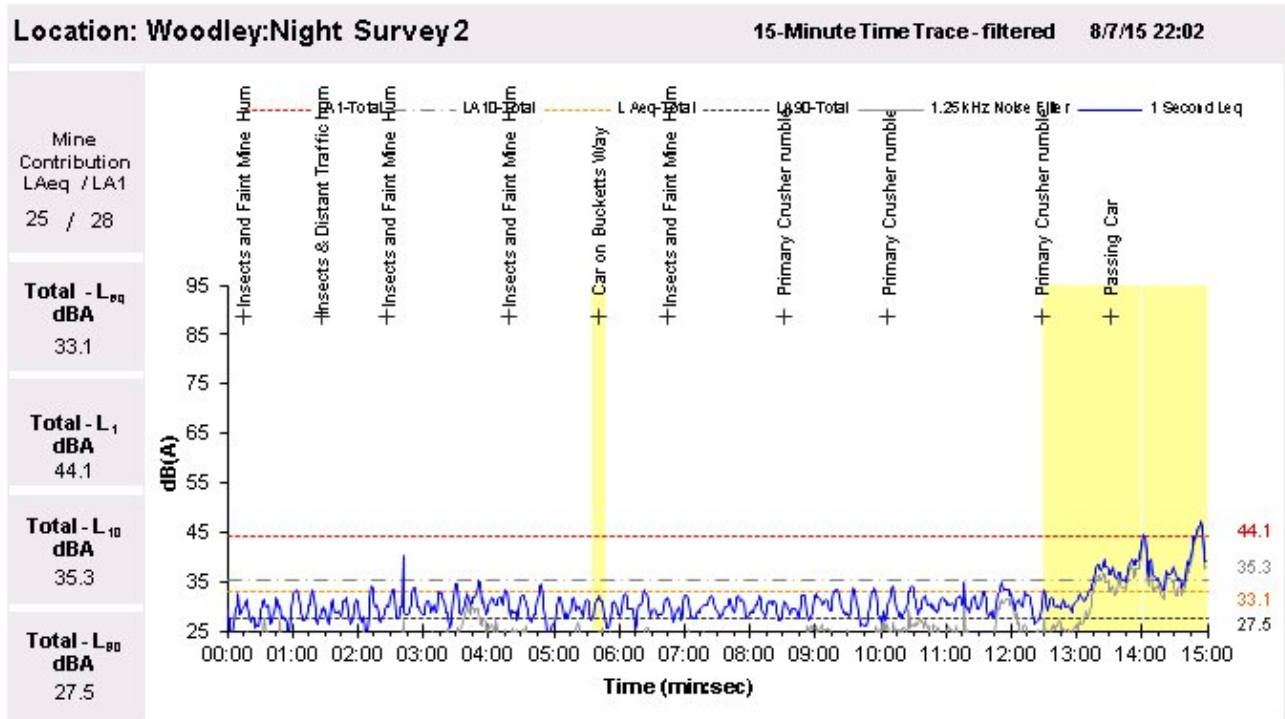


Figure 20: Night Survey 2, Woodley

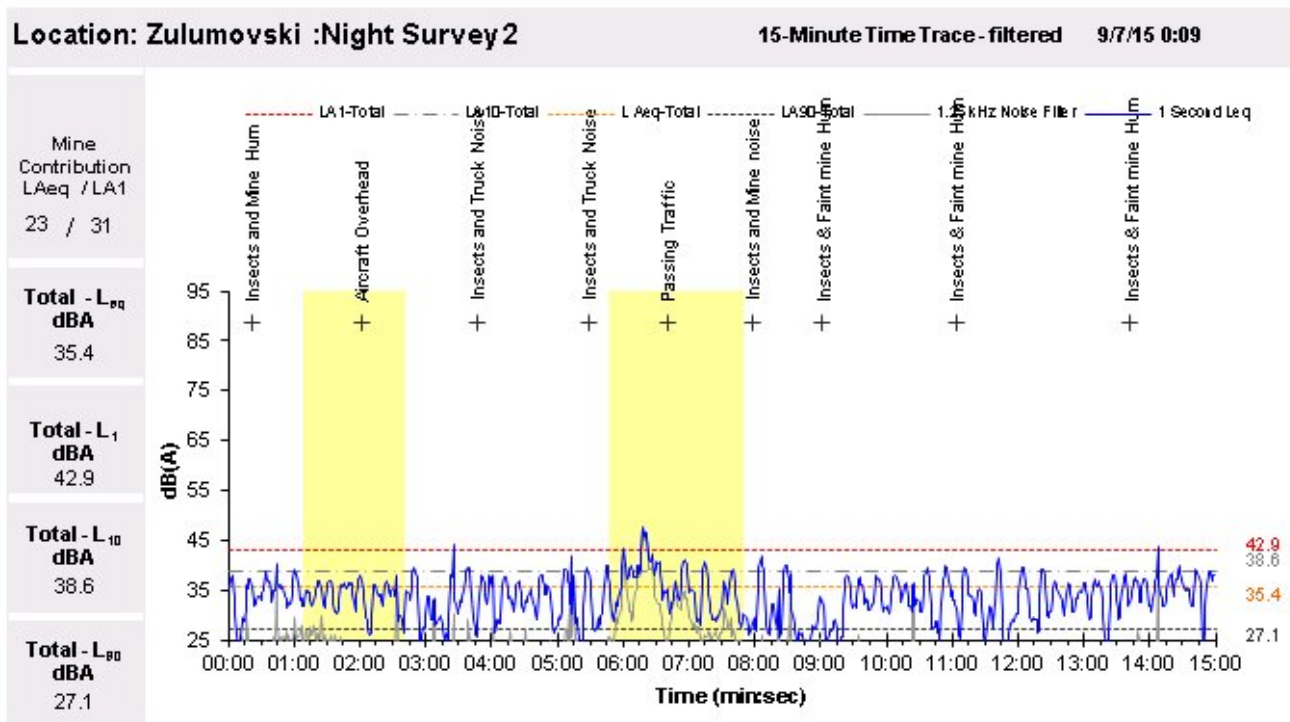


Figure 21: Night Survey 2, Zulumovski



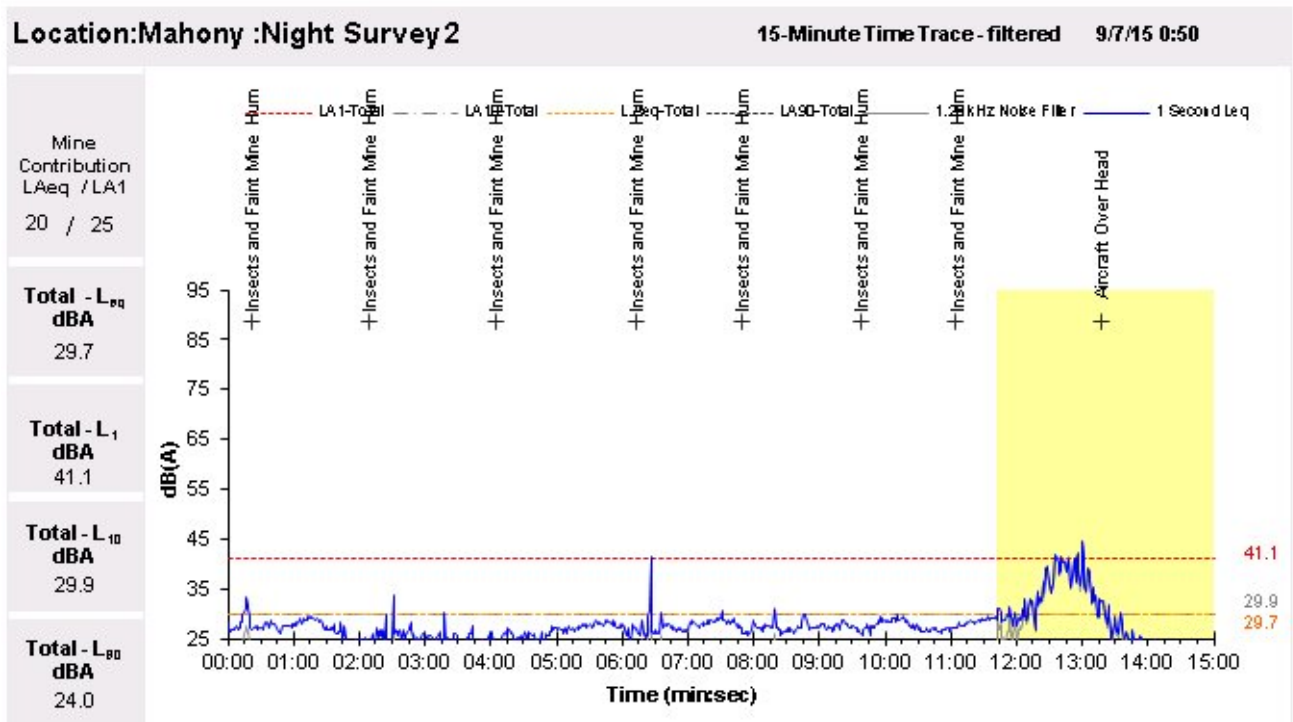


Figure 22: Night Survey 2, Mahony

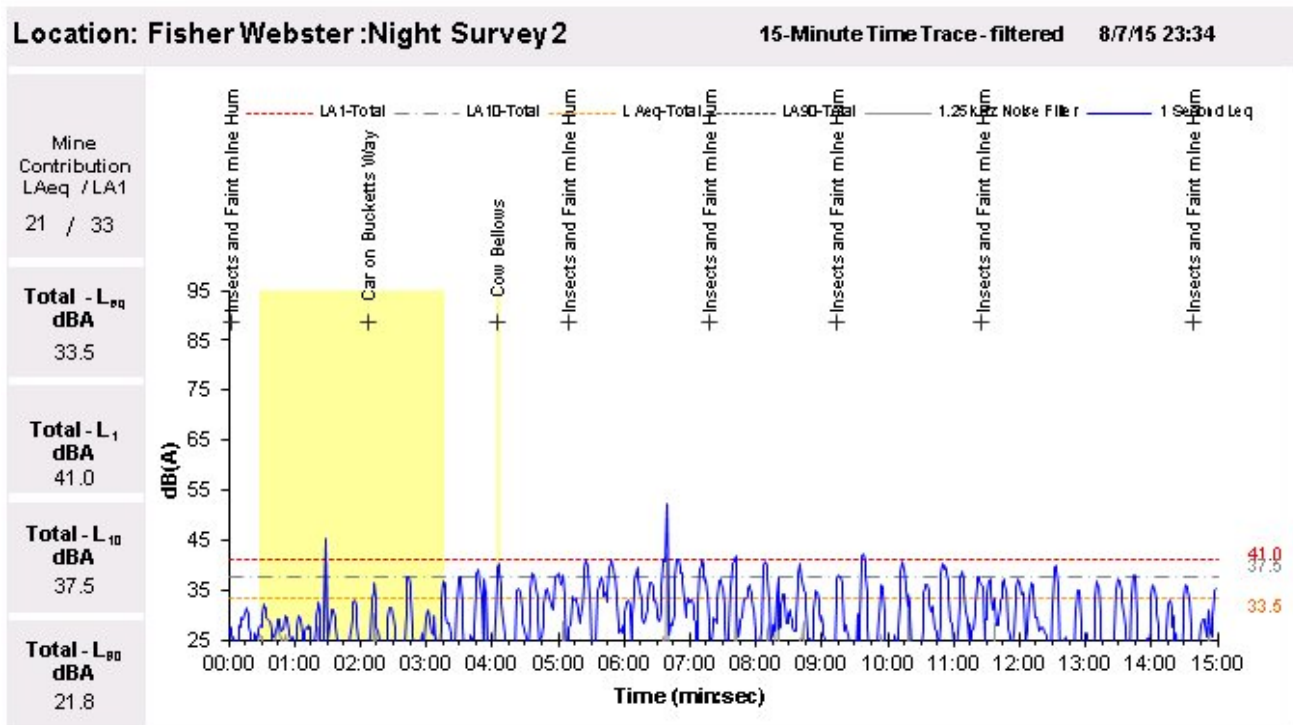


Figure 23: Night Survey 2, Fisher Webster

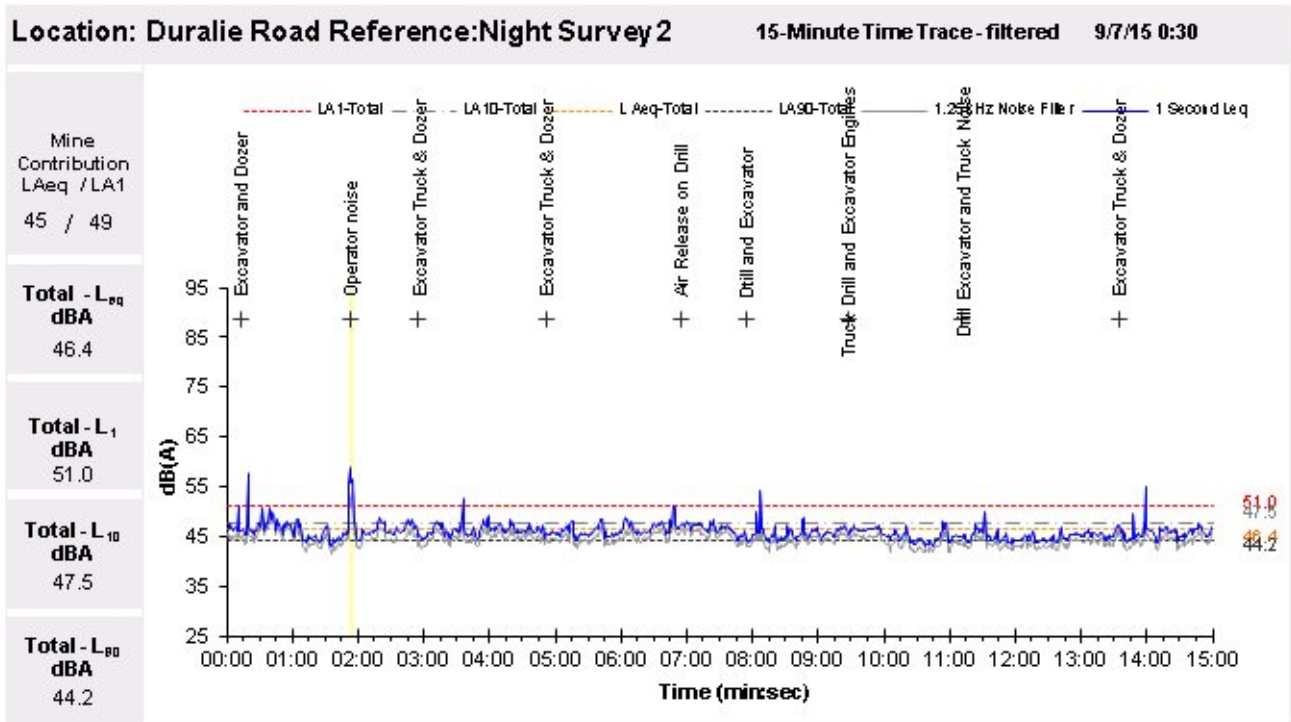


Figure 24: Night Survey 2, Duralie Road

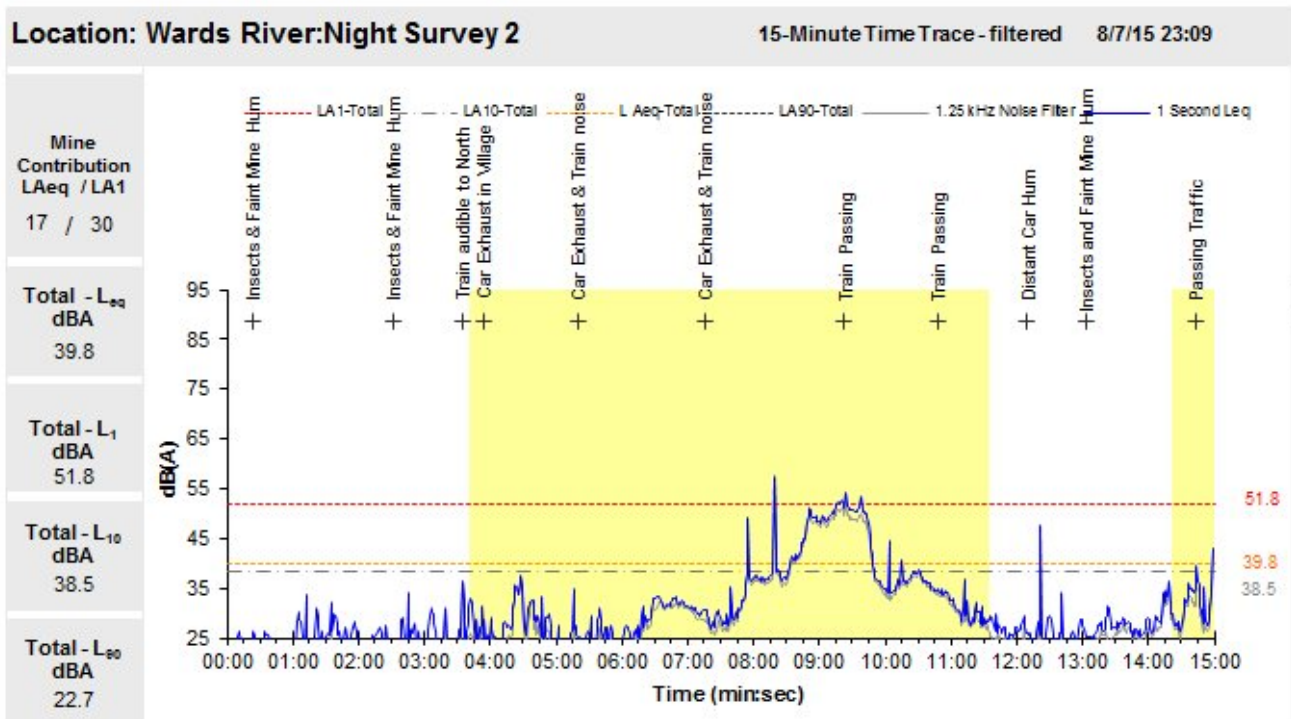


Figure 25: Night Survey 2, Wards River

## 6.6.2 ANALYSIS OF NIGHT ATTENDED SURVEY 2

### Summary of Audible Noises during the Night Survey Period 2

The Mine noise emissions at the reference site (REF Duralie Road) measured 45dB  $L_{Aeq}$  during typical operations on the Mine lease. Audible noise sources that contributed to this result consisted of excavation activities such as excavator operations; haul truck movements and track dozers operating on excavation strips. Noise emissions measured at Duralie Road were representative of mine operations for this survey period.

The mine operations were audible at all monitoring locations during the night survey 2, conducted on 8<sup>th</sup> July 2015. The audible mining operations at the noise sensitive receivers consisted of haul truck movements and excavator operations and hum from the DCM fixed plant operation.

Excluding extraneous noise sources (i.e. road traffic movements, sounds from birds, insects, dogs and occasional passing rail traffic) from the overall noise measurement resulted in the mine noise contribution determined at each monitoring location, which are summarised below.

Prevailing weather conditions were characterised by clear conditions during the night with still and southerly wind conditions combined with weak to moderate temperature inversion conditions throughout the second night survey period.

### Summary of Measured Mine Noise

The DCM  $L_{Aeq}$  noise contributions for the second night survey period are as follows:

- 25dB  $L_{Aeq}$  15-minute at NM1 Woodley.
- 23dB  $L_{Aeq}$  15-minute at NM2 Zulumovski.
- 20dB  $L_{Aeq}$  15-minute at NM3 Mahony.
- 21dB  $L_{Aeq}$  15-minute at NM4 Fisher Webster.
- 45dB  $L_{Aeq}$  15-minute at Ref Duralie Road.
- 17dB  $L_{Aeq}$  15-minute at Wards River.

The DCM  $L_{A1}$  (1 minute) contributions for the second night survey period are as follows:

- 28dB  $L_{A1}$  (1-minute) at NM1 Woodley.
- 31dB  $L_{A1}$  (1-minute) at NM2 Zulumovski.
- 25dB  $L_{A1}$  (1-minute) at NM3 Mahony.
- 33dB  $L_{A1}$  (1-minute) at NM4 Fisher Webster.
- 49dB  $L_{A1}$  (1-minute) at Ref Duralie Road.
- 30dB  $L_{A1}$  (1-minute) at Wards River.

## 7 RAIL NOISE RESULTS

**Table 7** presents the results of the attended Duralie shuttle pass-by assessment. These measurements were conducted at locations TN1 (Craven), TN2-South and TN2-North (both in Wards River) as shown in **Appendix B** and are assessed against the criteria set out in **Section 4.3** of this report. Measurements were conducted in accordance with AS 2377: 2002 *Acoustics – Methods for the measurement of rail bound vehicle noise*.

**Table 7: Attended Rail Monitoring Results**

Monitoring Site	Time, Date	Distance to track	L <sub>Amax</sub> dB Train	L <sub>Amax</sub> dB Train (Horn Excluded)	L <sub>Aeq</sub> Train Pass-by dB (Horn included)	L <sub>Aeq</sub> Train Pass-by dB Train (Horn Excluded)
TN2 South–Wards River	11:48 10/07/2015	65m	74dB(A)	74dB(A)	64dB(A)	63dB(A)
TN2 North – Wards River	12:00 07/07/2015	65m	96dB(A)	76dB(A)	75dB(A)	62dB(A)
TN1 - Craven	11:02 08/07/2015	34m	87dB(A)	81dB(A)	62dB(A)	61dB(A)

**Table 8** presents the results of the unattended measurements at the Wards River Monitoring location TN2 (south and north), at the estimated time of the Duralie shuttle pass-by. These measurements were conducted approximately 65m from the centre of the rail track and may be influenced by extraneous noise sources such as vehicles on the Bucketts Way and/or wildlife in the vicinity of the microphone etc.

**Table 8: Unattended Rail Monitoring Results at TN2 (Wards River)**

Date & Time	TN2 – South of Village		TN2 – North of Village		Departed From
	L <sub>Aeq</sub> (15-minute) dB(A)	L <sub>Amax</sub> dB(A)	L <sub>Aeq</sub> (15-minute) dB(A)	L <sub>Amax</sub> dB(A)	
7/07/2015 12:00	60	78	68	97	Duralie
7/07/2015 14:30	67	92	61	81	Stratford
7/07/2015 16:45	62	82	65	94	Duralie
7/07/2015 18:30	58	81	61	83	Stratford
7/07/2015 20:00	60	90	59	83	Duralie
7/07/2015 21:30	45	72	55	73	Stratford
8/07/2015 6:45	50	73	69	97	Duralie
8/07/2015 9:30	49	68	61	83	Stratford
8/07/2015 11:00	53	74	64	92	Duralie
8/07/2015 13:15	57	80	60	81	Stratford
8/07/2015 16:45	54	73	64	89	Duralie
8/07/2015 19:30	48	71	60	77	Stratford
8/07/2015 21:15	45	66	59	79	Duralie
8/07/2015 23:30	44	67	57	77	Stratford
9/07/2015 7:15	48	69	71	99	Duralie
9/07/2015 10:30	56	78	62	81	Stratford
9/07/2015 12:30	63	83	63	85	Duralie
9/07/2015 14:45	62	81	61	78	Stratford
9/07/2015 17:15	63	87	65	87	Duralie
9/07/2015 19:30	51	77	62	90	Stratford
9/07/2015 21:15	51	74	62	90	Duralie
9/07/2015 23:15	46	72	58	75	Stratford
10/07/2015 8:15	50	69	62	83	Duralie
10/07/2015 10:00	58	79	61	80	Stratford
10/07/2015 11:45	58	75	60	84	Duralie

**Table 9** presents the results of the unattended measurements at the Craven Monitoring location TN1, at the estimated time of the Duralie train pass-by. These measurements were conducted approximately 34m from the centre of the rail track and may be influenced by rail horn utilised for the crossing and other extraneous noise sources such as the level-crossing bells and wildlife.

**Table 9: Unattended Rail Monitoring Results at TN1 (Craven)**

Date & Time	L <sub>Aeq</sub> (15-minute) dB(A)	L <sub>Amax</sub> dB(A)	Departed from
7/07/2015 14:00	62	84	Stratford
7/07/2015 16:45	67	97	Duralie
7/07/2015 18:15	62	84	Stratford
7/07/2015 20:00	58	92	Duralie
7/07/2015 21:45	63	86	Stratford
8/07/2015 6:45	64	81	Duralie
8/07/2015 9:30	64	81	Stratford
8/07/2015 11:00	76	89	Duralie
8/07/2015 17:00	61	89	Duralie
8/07/2015 19:15	54	75	Stratford
8/07/2015 21:15	56	78	Duralie
8/07/2015 23:15	67	83	Stratford
9/07/2015 7:30	63	87	Duralie
9/07/2015 10:30	65	80	Stratford
9/07/2015 12:45	64	94	Duralie
9/07/2015 14:30	60	83	Stratford
9/07/2015 17:15	60	90	Duralie
9/07/2015 19:00	62	91	Stratford
9/07/2015 21:15	55	79	Duralie
9/07/2015 23:00	60	83	Stratford
10/07/2015 8:15	63	87	Duralie
10/07/2015 10:15	61	81	Stratford
10/07/2015 11:45	61	89	Duralie

**Table 10** presents the L<sub>Aeq</sub>-daytime and the L<sub>Amax</sub>-daytime noise levels for the four days the three loggers (TN2-South, TN2-North and TN1) were located onsite.

The L<sub>Aeq</sub> results presented in **Table 10** for the 07/07/2015 and 10/07/2015 are not for a full 15-hour period, rather the daytime period the loggers were deployed (i.e. 8.5 hours on 07/07/2015 and 5 hours on 10/07/2015). The L<sub>Aeq</sub> results presented in **Table 10** for the 08/07/2015 and 09/07/2015 however are for the full 15-hour period.

It should be noted that the results presented in **Table 10** are for data from unattended noise loggers. Based on Vipac's experience in undertaking noise surveys in the area it should also be noted that noise levels recorded during the logging surveys may also be influenced by additional noise sources such as birds and other wildlife in the vicinity of the noise logging equipment, in addition to passing traffic on the Buckets Way. In Vipac's experience the noise levels at the monitoring locations would not just be influenced by noise emissions associated with the Duralie shuttle train alone. Therefore, the results presented in **Table 10** should not be taken as the basis for the assessment of noise emissions from the shuttle train as such.

**Table 10: Unattended Rail Monitoring Results at TN1 and TN2 (North and South)**

Date	Wards River – TN2South		Wards River – TN2North		Craven – TN1	
	L <sub>Aeq</sub> – daytime period dB	L <sub>Amax</sub> - daytime period dB	L <sub>Aeq</sub> – daytime period dB	L <sub>Amax</sub> - day time period dB	L <sub>Aeq</sub> – daytime period dB	L <sub>Amax</sub> - day time period dB
07/07/2015	61	92	62	97	60	101
08/07/2015	55	90	62	104	62	117
09/07/2015	62	103	63	101	61	97
10/07/2015	58	85	61	85	58	89

\* Measurement conducted for an 8.5 hour period.

\*\* Measurement conducted for a 4.5 hour period.



## 8 COMPLIANCE ASSESSMENT

This section presents the compliance assessment for the measured DCM noise emissions for each of the survey periods as well as an assessment of the rail noise monitoring with NMP noise target goals.

### 8.1.1 COMPLIANCE ASSESSMENT SUMMARY – DAY SURVEY PERIOD

DCM operational  $L_{Aeq15-minute}$  noise emissions during the day attended monitoring period under the prevailing weather conditions are summarised in **Table 11**. The results indicate noise levels at all monitoring locations were within criterion limits during the daytime survey.

**Table 11: Received Noise Level ( $L_{Aeq (15-minute)}$ ) at Monitoring Locations under prevailing weather conditions – Daytime**

Monitoring Locations	Sound Pressure Level dB $L_{Aeq (15-minute)}$	Noise Criteria dB $L_{Aeq (15-minute)}$	Excursion dB(A)
NM1 Woodley	Nil	35	0
NM2 Zulumovski North	35	35	0
NM3 Mahony	Nil	N/A	0
NM4 Fisher-Webster	34	35	0
REF1 Duralie Road	48	N/A	0
Additional Monitoring Location Wards River	Nil	35	0

### 8.1.2 COMPLIANCE ASSESSMENT SUMMARY – EVENING SURVEY PERIOD

DCM operational  $L_{Aeq15-minute}$  noise emissions during the evening attended monitoring period under the prevailing weather conditions are summarised in **Table 12**. The results indicate noise levels at all monitoring locations complied with the criterion during the evening survey period with the exception of the Zulumovski monitoring location which exceeded the criteria by 2dB.

**Table 12: Received Noise Level ( $L_{Aeq (15-minute)}$ ) at Monitoring Locations under prevailing weather conditions – Evening**

Monitoring Locations	Sound Pressure Level dB $L_{Aeq (15-minute)}$	Noise Criteria dB $L_{Aeq (15-minute)}$	Excursion dB(A)
NM1 Woodley	17	35	0
NM2 Zulumovski North	37	35	2
NM3 Mahony	24	N/A	0
NM4 Fisher-Webster	34	35	0
REF1 Duralie Road	47	N/A	0
Additional Monitoring Location Wards River	26	35	0

### 8.1.3 COMPLIANCE ASSESSMENT SUMMARY – NIGHT SURVEY PERIOD

DCM operational  $L_{Aeq15-minute}$  and  $L_{A1 (1-minute)}$  noise emissions during the first and second night attended monitoring survey periods under the prevailing weather conditions are summarised respectively in **Table 13** and **Table 14**. The results indicate noise levels at all monitoring locations were within criterion limits during the night-time surveys. The results presented in **Table 13** indicate that the  $L_{Aeq (15-minute)}$  noise levels at all monitoring locations were within criterion limits during the night-time survey periods. The results presented in **Table 14** indicate that the  $L_{A1 (1-minute)}$  noise levels at all monitoring locations were within criterion limits during the night-time survey periods.

**Table 13: Received Noise Level ( $L_{Aeq (15-minute)}$ ) at Monitoring Locations under prevailing weather conditions – Night-time**

Monitoring Locations	Sound Pressure Level dB $L_{Aeq (15-minute)}$		Noise Criteria dB $L_{Aeq (15-minute)}$	Excursion dB(A)	
	Night 1	Night 2		Night 1	Night 2
NM1 Woodley	Nil	25	35	0	0
NM2 Zulumovski North	33	23	35	0	0
NM3 Mahony	21	20	N/A	0	0
NM4 Fisher-Webster	22	21	37	0	0
REF1 Duralie Road	44	45	N/A	0	0
Additional Monitoring Location Wards River	19	17	35	0	0



**Table 14: Received Noise Levels ( $L_{A1}$  (1-minute)) at Monitoring Locations under prevailing weather conditions – Night-time**

Monitoring Locations	Sound Pressure Level dB $L_{A1}$ (1-minute)		Noise Criteria dB $L_{A1}$ (1-minute)	Excursion dB(A)	
	Night 1	Night 2		Night 1	Night 2
NM1 Woodley	Nil	28	45	0	0
NM2 Zulumovski North	37	31	45	0	0
NM3 Mahony	24	25	N/A	0	0
NM4 Fisher-Webster	34	33	45	0	0
REF1 Duralie Road	47	49	N/A	0	0
Additional Monitoring Location Wards River	27	30	45	0	0

## 8.2 RAIL NOISE MONITORING ASSESSMENT SUMMARY

Vipac has conducted rail noise measurements at three attended monitoring locations TN2-North and TN2-South (both in Wards River) and TN1 (Craven) along the rail line between the Duralie and Stratford Coal Mines. **Table 15** below presents the measured sound pressure levels at the property boundary at the three locations without the rail horn being excluded from the measurement.

**Table 15: Sound Pressure Levels at the property boundary with Rail Horn Noise**

Date Time	Sound Pressure Level at Receiver		Noise Goal		Excursion	
	dB $L_{Amax}$ train horn	dB $L_{Aeq}$ Pass-by train horn included	dB $L_{Amax}$	dB $L_{Aeq}$	dB $L_{Amax}$	dB $L_{Aeq}$
<b>TN2 South - Wards River</b>						
11:48, 10/07/2015	74	64	85	65	0	0
<b>TN2 North - Wards River</b>						
12:00, 07/07/2015	96	75	85	65	11	10
<b>TN1 - Craven</b>						
11:02,08/07/2015	87	62	85	65	0	0

**Table 15** shows that the noise emanating from the Duralie shuttle rail horn operation complied with the  $L_{Amax}$  and  $L_{Aeq}$  noise goal at the TN2-South (South Wards River) and TN1 (Craven) monitoring locations for this monitoring period. The noise emanating from the Duralie shuttle failed to comply with the noise goal for both the  $L_{Amax}$  and  $L_{Aeq}$  noise at TN2-North (Wards River) monitoring location. It should be noted that the train pass-by at TN2 North (Wards River North) was conducted at a time when civil workers were congregated near the crossing conducting maintenance works near the bridge and surrounding area. For this reason the shuttle train sounded its country horn twice to notify all personnel in the area of its approach as a safety precaution.

The noise levels for the shuttles operation with the rail horn excluded are presented below in **Table 16**.

**Table 16: Sound Pressure Levels at the property boundary with Rail Horn Noise Excluded**

Date Time	Sound Pressure Level at Receiver		Noise Goal		Excursion	
	dB $L_{Amax}$ (train horn excluded)	dB $L_{Aeq}$ Pass-by train horn excluded	dB $L_{Amax}$	dB $L_{Aeq}$	dB	dB
<b>TN2 South - Wards River</b>						
11:48, 10/07/2015	74	63	85	65	0	0
<b>TN2 North - Wards River</b>						
12:00, 07/07/2015	76	62	85	65	0	0
<b>TN1 - Craven</b>						
11:02,08/07/2015	81	61	85	65	0	0

It is evident from **Table 16** that the noise emanating from the Duralie shuttle complied with the  $L_{Amax}$  noise goals at all monitoring locations for the rail pass-by with the exclusion of the noise from the sounding of the rail horn.

The noise emissions associated with the Duralie shuttle pass-by complied with the noise goal set out in the DCM Noise Management Plan, at TN1 and TN2-South based on the results presented in **Table 16** of this report.

## 9 NOISE MODEL PREDICTION

The mine contributed noise emissions from mining and process operations for each monitoring location were calculated using a noise model with the operational data provided by Duralie Coal Mine. The model inputs incorporated the following:

- Current sound power levels of mobile plant and fixed machinery associated with the mine;
- Prevailing meteorological conditions over the attended noise monitoring period;
- Operator attended noise-monitoring results.

The current mine production, operations and weather data were supplied by Duralie Coal Mine, as detailed in **Appendix A** and **Appendix C**.

Calculated day, evening and night contributed noise emissions from Duralie Coal Mine at each owner/tenant location are presented in **Table 17**.

A comparison of the model predictions and actual operator attended noise level measurements is also presented in **Table 17**. Contributed mine noise emissions at most locations generally agree with the modelled noise level prediction and the operator attended measured  $L_{Aeq}$  noise levels conducted between the 07<sup>th</sup>-10<sup>th</sup> July 2015 at all landowners and tenants that currently surround the coal-mining lease.

Some variances are experienced between the attended measurements and the predicted at the Mahony and Wards River monitoring locations. The variances at the Mahony and Wards River monitoring locations during the daytime period were due to the masking effect of traffic passing along the Bucketts Way.

The variance at the Mahony monitoring location during the Night 1 measurement period may be due to the changes in topography between the current depth of the pit compared to the model pit layout which now differs due to progress in the mine and due to the changing position of mobile plant.

The variance in the measurements at Wards River during the Night 2 measurement period may be attributed to the weather conditions and change in mine topography as outlined above..

Noise criteria for this survey are applicable for all attended noise measurements not withstanding meteorological conditions during the course of the survey.

**Table 17: Environmental Noise Levels – July 2015**

Owner/ Tenant	Monitored - Predicted DCPL Noise Levels <sup>1</sup>								Noise Criteria		
	dB(A) <sub>L<sub>Aeq</sub>(15 minute)</sub>								dB(A) <sub>L<sub>Aeq</sub> (15 Minute)</sub>		
	Day	Evening	Night 1	Night 2	Day	Evening	Night		Day	Evening	Night
Bailey <sup>2</sup>	36	37	32	25	35	35	35		35	35	35
Bragg	8	17	13	13	35	35	35		35	35	35
Fisher-Webster	34 30	34 31	22 25	21 22	35	35	37		35	35	37
Gillard	0	5	4	0	35	35	35		35	35	35
Hamann-Pixalu PL	29	30	26	19	35	35	39		35	35	39
Hare-Scott <sup>2</sup>	35	36	26	24	35	35	35		35	35	35
Hattam <sup>2</sup>	43	43	30	27	35	35	35		35	35	35
Holloway	24	25	18	14	35	35	35		35	35	35
Holmes <sup>2</sup>	36	37	32	25	35	35	35		35	35	35
James	26	27	23	16	35	35	35		35	35	35
Lyll	19	29	30	28	35	39	40		35	39	40
Mahony <sup>2</sup>	Nil 22	24 27	21 26	20 20	35	35	35		35	35	35
Morgan	15	16	12	11	35	35	35		35	35	35
Oleksiuk & Carmody	29	30	27	19	35	35	35		35	35	35
Relton <sup>2</sup>	27	28	24	17	35	35	35		35	35	35
Richards	25	27	21	16	35	35	35		35	35	35
Schultz	5	13	17	9	35	35	35		35	35	35
Wards River Village	Nil 21	26 20	19 15	17 5	35	35	35		35	35	35
Weismantel	28	29	25	17	35	35	35		35	35	35
Wielgosinski	18	28	14	14	35	35	35		35	35	35
Woodley	Nil 14	17 20	Nil 20	25 26	35	35	35		35	35	35
Zulumovski(North) <sup>2</sup>	35 37	37 38	33 33	23 26	35	35	35		35	35	35

Note <sup>1</sup> Nil Denotes an unmeasurable noise contribution from the mine

<sup>2</sup> Owned by Duralie Coal Pty Ltd(DCPL) or private agreement in place between DCPL and the residence

## 10 DISCUSSION AND CONCLUSION

### 10.1 ENVIRONMENTAL NOISE SURVEY

An Environmental Compliance Noise Monitoring Survey has been carried out in the rural environment surrounding the Duralie Coal Mine (DCM) Site, Stroud Road, NSW. The survey was requested by Duralie Coal Pty Ltd to ascertain the degree of compliance of noise emissions generated from the operation of Duralie Coal Mine with licence and project approval conditions.

Direct temperature inversion measurements were conducted during the entire survey utilising the Duralie Coal Inversion Tower Infrastructure. These measurements were used to ascertain temperature lapse rates and atmospheric stability classes during the survey period, the results of which are presented in **Appendix A** of this report.

The mine operating noise emissions were within the noise criteria of 35dBL<sub>Aeq</sub> at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods during the July 2015 compliance survey with the exception of the Zulumovski monitoring location during the evening survey.

During the evening measurement at the Zulumovski monitoring location, a moderate temperature inversion with a lapse rate of 3.7degrees/100m was prevailing. Thus as outlined in section L4.8 of EPL 11701, (presented on page 9 of this report), the noise limits would not be applicable to this noise measurement and the mine is deemed compliant for this measurement. Additionally the Zulumovski is a mine owned property with monitoring conducted there to represent privately owned properties to the North of the Mine.

It is Vipac's professional opinion that the noise emissions produced by Duralie Coal Mine during the July 2015 DCM Environmental Quarterly Survey complied with the noise criteria set out in **Section 4** of this report based on the results and outcomes presented above.

### 10.2 RAIL NOISE SURVEY

As outlined in **Section 4** of this report, all of the train-monitoring results presented in this assessment are to be used for general information purposes only and are not DCM compliance requirements.

Vipac conducted Duralie shuttle rail pass-by monitoring at TN1 (Craven) and has augmented the monitoring program conducted at TN2 (Wards River) by splitting the monitoring location into two separate locations TN2-South (southern end of wards River village) and TN2-North (northern end of Wards River village) to better assess the rail noise from the Duralie shuttle within Wards River.

Attended measurements and unattended noise logger surveys were conducted at all three locations, TN2-North, TN2-South and TN1 for this the July 2015 noise survey.

The noise emanating from the Duralie shuttle complied with the L<sub>Amax</sub> and L<sub>Aeq</sub> pass-by noise goals at all the TN2- North (Wards River North), TN2-South (Wards River North) and TN1 (Craven) with the rail horn excluded from the measurement for this quarter monitoring period.

The noise emissions associated with the Duralie shuttle pass-by were therefore deemed to comply with the noise goals set out in the DCM Noise Management Plan, at the TN1-Craven, TN2-South and TN2-North (Wards River) monitoring locations for this the July 2015 monitoring period.



## Appendix A: WEATHER DATA

Date	Time	Ave Air Temp (deg C)	Ave Wind Dir (deg)	Ave Sigma (deg)	Ave Wind Spd (m/s)	Total Rain (mm)	Inversion Tower Lapse Rate (deg/100m)
7/07/2015	8:00	10.7	243.97	18.6	2.4	0	7.5
7/07/2015	8:15	10.9	252.64	14.4	2.6	0	5.5
7/07/2015	8:30	11.4	249.39	19.8	3.6	0	4.8
7/07/2015	8:45	11.8	232.59	18.9	4.1	0	6.2
7/07/2015	9:00	12.1	234.22	16.8	3.7	0	5.3
7/07/2015	9:15	12.3	239.48	16.0	4.0	0	2.3
7/07/2015	9:30	12.6	241.12	16.7	3.9	0	0.7
7/07/2015	9:45	13.0	230.07	11.8	3.5	0	0.3
7/07/2015	10:00	13.1	229.98	13.1	4.8	0	0.3
7/07/2015	10:15	13.2	230.91	14.8	5.0	0	0.2
7/07/2015	10:30	13.5	225.82	10.9	4.4	0	0.4
7/07/2015	10:45	13.8	222.52	13.6	4.4	0	0.5
7/07/2015	11:00	13.9	224.63	21.7	4.5	0	0.2
7/07/2015	11:15	14.3	222.91	18.3	3.3	0	0.4
7/07/2015	11:30	14.5	224.24	20.0	4.0	0	0.3
7/07/2015	11:45	14.4	231.47	19.1	5.0	0	0.6
7/07/2015	12:00	14.5	233.29	11.9	4.5	0	0.6
7/07/2015	12:15	14.6	231.12	16.8	4.8	0	0.8
7/07/2015	12:30	14.8	227.97	21.8	4.3	0	0.9
7/07/2015	12:45	15.0	226.35	10.5	4.4	0	0.6
7/07/2015	13:00	14.9	225.69	14.5	4.7	0	0.8
7/07/2015	13:15	15.1	212.92	22.8	3.9	0	0.8
7/07/2015	13:30	15.1	225.8	12.4	4.8	0	0.8
7/07/2015	13:45	15.2	214.97	10.4	4.1	0	0.8
7/07/2015	14:00	15.2	209.56	10.9	5.1	0	0.5
7/07/2015	14:15	15.0	212.45	10.1	5.2	0	0.9
7/07/2015	14:30	15.0	210.7	12.7	5.6	0	1.1
7/07/2015	14:45	14.6	210.73	11.4	5.4	0	1.3
7/07/2015	15:00	14.4	201.4	9.7	4.5	0	1.2
7/07/2015	15:15	14.1	196.36	14.9	3.5	0	1.0
7/07/2015	15:30	14.0	181.41	15.3	3.0	0	0.9
7/07/2015	15:45	13.7	169.09	19.1	4.2	0	0.9
7/07/2015	16:00	12.7	172.99	23.7	4.5	0	0.6
7/07/2015	16:15	12.1	155.56	21.2	3.1	0	0.7
7/07/2015	16:30	12.0	155.88	13.9	2.1	0	0.7
7/07/2015	16:45	11.9	176.89	8.2	2.8	0	0.9
7/07/2015	17:00	11.7	186.31	10.8	2.4	0	0.8
7/07/2015	17:15	11.6	176.24	11.6	2.6	0	0.7
7/07/2015	17:30	11.2	172.16	10.7	3.3	0	0.6
7/07/2015	17:45	10.8	188.04	6.0	2.8	0	0.6
7/07/2015	18:00	10.6	200.07	9.3	1.7	0	0.5
7/07/2015	18:15	10.9	211.41	7.4	2.1	0	0.6
7/07/2015	18:30	11.0	220.35	7.6	2.3	0	0.6
7/07/2015	18:45	11.1	215.97	15.7	2.6	0	2.4
7/07/2015	19:00	10.8	193.09	8.9	1.5	0	2.8
7/07/2015	19:15	10.6	193.38	8.2	1.4	0	3.1
7/07/2015	19:30	10.5	188.51	19.0	1.3	0	3.3
7/07/2015	19:45	10.5	186.9	10.5	0.6	0	3.1
7/07/2015	20:00	10.8	204.72	13.1	1.2	0	3.7
7/07/2015	20:15	10.9	222.4	10.4	1.3	0	3.8
7/07/2015	20:30	11.0	214.16	14.0	1.6	0	3.9
7/07/2015	20:45	10.9	211.23	11.0	1.2	0	3.7
7/07/2015	21:00	10.9	211.59	9.1	1.6	0	3.7
7/07/2015	21:15	11.0	215.59	11.6	2.4	0	4.1
7/07/2015	21:30	10.9	198.58	11.2	1.7	0	3.3
7/07/2015	21:45	10.7	192.67	19.9	1.1	0	1.8
7/07/2015	22:00	10.6	221.02	12.7	1.3	0	1.7

18 Sep 2015



Date	Time	Ave Air Temp (deg C)	Ave Wind Dir (deg)	Ave Sigma (deg)	Ave Wind Spd (m/s)	Total Rain (mm)	Inversion Tower Lapse Rate (deg/100m)
7/07/2015	22:15	10.5	239.52	11.7	2.0	0	3.0
7/07/2015	22:30	10.7	214.56	9.8	3.0	0	2.9
7/07/2015	22:45	10.6	200.84	10.9	2.3	0	2.2
7/07/2015	23:00	10.7	210.23	13.2	2.7	0	2.3
7/07/2015	23:15	10.7	217.73	42.6	2.0	0	2.2
7/07/2015	23:30	10.5	152.6	72.0	0.5	0	2.4
7/07/2015	23:45	10.3	181.98	50.9	0.2	0	2.4
8/07/2015	0:00	10.2	106.13	26.2	0.1	0	2.5
8/07/2015	0:15	10.1	177.61	16.2	0.5	0	2.1
8/07/2015	0:30	10.3	205.72	15.0	1.7	0	1.8
8/07/2015	0:45	10.6	210.13	30.2	1.7	0	1.6
8/07/2015	1:00	10.3	163.4	67.7	0.9	0	1.8
8/07/2015	1:15	9.8	212.77	44.1	0.2	0	2.1
8/07/2015	1:30	9.7	256.03	29.4	0.1	0	3.0
8/07/2015	1:45	9.6	211	17.4	0.3	0	4.2
8/07/2015	2:00	9.4	223.57	25.5	0.2	0	5.0
8/07/2015	2:15	9.4	170.43	20.9	0.0	0	5.6
8/07/2015	2:30	9.0	135.39	45.4	0.5	0	6.1
8/07/2015	2:45	8.4	157.92	25.7	0.2	0	7.2
8/07/2015	3:00	8.5	161.3	26.1	0.7	0	7.0
8/07/2015	3:15	8.5	144.75	28.7	1.1	0	7.9
8/07/2015	3:30	8.5	178.41	23.5	0.6	0	7.8
8/07/2015	3:45	8.1	159.44	15.6	0.4	0	8.3
8/07/2015	4:00	8.1	173.42	17.1	0.5	0	8.7
8/07/2015	4:15	8.2	153.99	29.8	0.9	0	9.0
8/07/2015	4:30	8.2	171.12	18.6	0.3	0	9.4
8/07/2015	4:45	8.0	137.19	15.3	0.2	0	9.4
8/07/2015	5:00	7.7	110.58	6.3	0.5	0	9.0
8/07/2015	5:15	7.8	110.16	43.7	0.6	0	9.5
8/07/2015	5:30	8.0	96.64	26.2	0.1	0	9.6
8/07/2015	5:45	8.2	100.35	58.0	0.2	0	9.7
8/07/2015	6:00	7.9	125.01	59.2	0.3	0	9.5
8/07/2015	6:15	7.8	152.42	27.6	0.0	0	9.9
8/07/2015	6:30	7.6	130.99	28.8	0.2	0	9.6
8/07/2015	6:45	7.4	155.01	40.4	0.2	0	9.4
8/07/2015	7:00	7.4	141.12	51.6	0.1	0	9.9
8/07/2015	7:15	7.4	148.75	51.7	0.6	0	6.8
8/07/2015	7:30	7.5	144.2	31.3	0.1	0	3.6
8/07/2015	7:45	7.0	98.25	64.5	0.3	0	2.9
8/07/2015	8:00	7.3	164.06	17.0	0.1	0	3.2
8/07/2015	8:15	7.5	280.3	20.3	0.6	0	2.3
8/07/2015	8:30	7.8	235.62	43.6	0.5	0	1.9
8/07/2015	8:45	8.3	179.78	45.9	0.0	0	1.3
8/07/2015	9:00	8.8	114.79	36.9	0.2	0	1.6
8/07/2015	9:15	8.5	105.17	66.2	0.1	0	1.9
8/07/2015	9:30	9.5	195.97	60.5	0.0	0	2.6
8/07/2015	9:45	10.1	146.4	80.8	0.1	0	2.4
8/07/2015	10:00	11.1	163.85	59.5	0.2	0	0.9
8/07/2015	10:15	12.4	171.74	45.9	0.1	0	0.8
8/07/2015	10:30	13.3	166.27	26.3	0.2	0	0.6
8/07/2015	10:45	12.3	136.64	25.9	1.0	0	0.9
8/07/2015	11:00	12.0	136.14	21.7	1.9	0	1.6
8/07/2015	11:15	11.3	169.82	27.5	2.1	0	1.6
8/07/2015	11:30	11.8	177.89	16.2	0.7	0	1.7
8/07/2015	11:45	11.8	194.27	23.8	1.8	0	1.4
8/07/2015	12:00	12.1	213.12	28.6	0.3	0	1.3
8/07/2015	12:15	12.6	231.02	22.8	0.4	0	0.9
8/07/2015	12:30	13.3	233.85	22.3	0.8	0	2.1





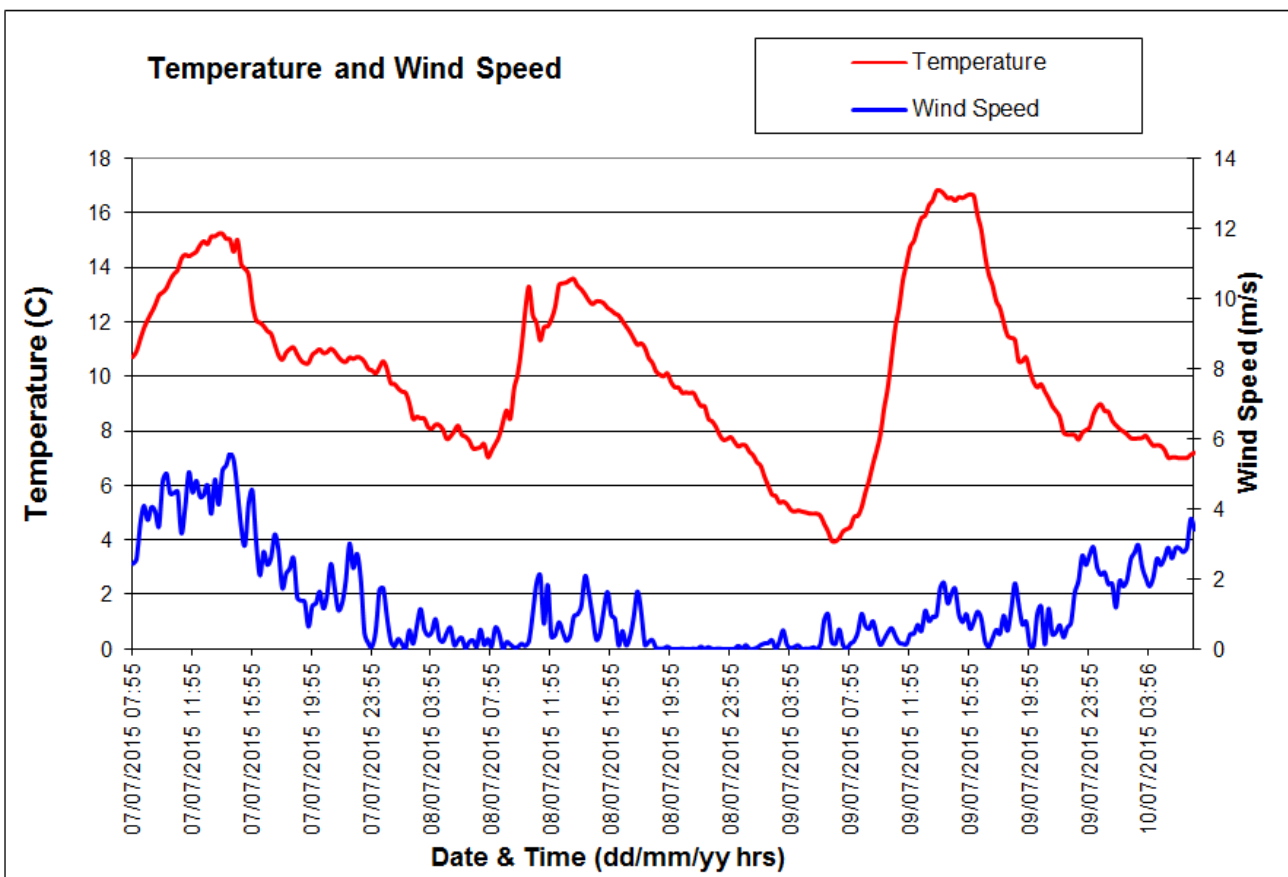
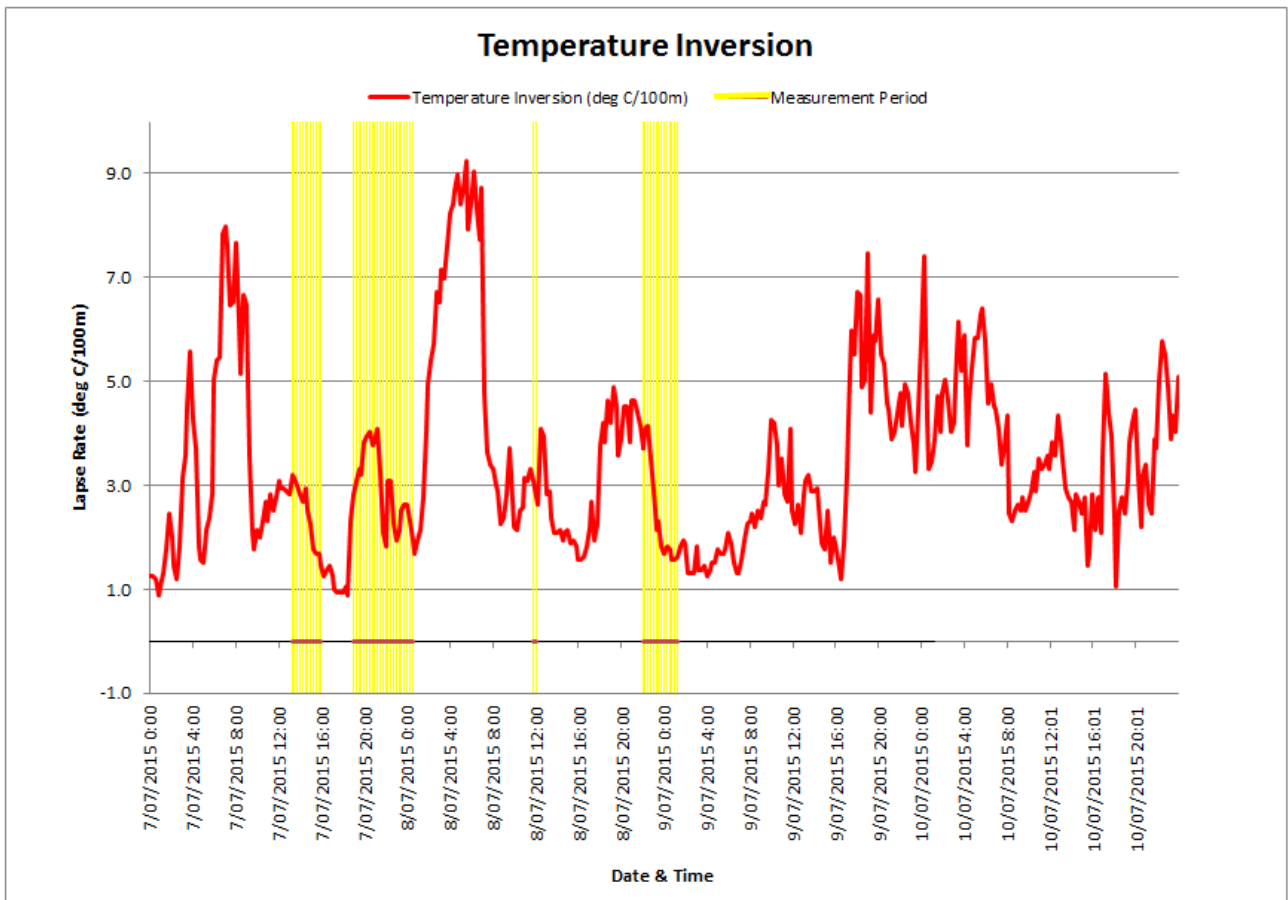
Date	Time	Ave Air Temp (deg C)	Ave Wind Dir (deg)	Ave Sigma (deg)	Ave Wind Spd (m/s)	Total Rain (mm)	Inversion Tower Lapse Rate (deg/100m)
8/07/2015	12:45	13.4	228.38	68.7	0.5	0	1.9
8/07/2015	13:00	13.4	211.82	29.2	0.2	0	1.2
8/07/2015	13:15	13.5	230.02	43.9	0.4	0	1.5
8/07/2015	13:30	13.6	116.14	18.2	0.9	0	0.9
8/07/2015	13:45	13.3	108.56	26.9	1.0	0	0.8
8/07/2015	14:00	13.2	141.63	20.9	1.2	0	1.0
8/07/2015	14:15	13.0	157.29	23.2	2.1	0	0.9
8/07/2015	14:30	12.8	155.94	25.7	1.6	0	0.8
8/07/2015	14:45	12.7	151.77	13.7	0.9	0	1.1
8/07/2015	15:00	12.8	176.61	10.6	0.3	0	1.2
8/07/2015	15:15	12.8	190.43	11.9	0.5	0	0.9
8/07/2015	15:30	12.7	227.89	8.0	1.1	0	0.9
8/07/2015	15:45	12.5	235.05	14.8	1.6	0	0.8
8/07/2015	16:00	12.4	231.96	10.1	1.0	0	0.8
8/07/2015	16:15	12.3	263.43	14.1	0.9	0	0.9
8/07/2015	16:30	12.2	293.4	9.1	0.1	0	0.9
8/07/2015	16:45	12.0	281.79	26.3	0.5	0	1.1
8/07/2015	17:00	11.8	294.45	11.4	0.1	0	1.6
8/07/2015	17:15	11.6	292.76	5.9	0.3	0	2.1
8/07/2015	17:30	11.4	288.59	8.9	0.9	0	1.6
8/07/2015	17:45	11.2	280.54	8.6	1.6	0	2.1
8/07/2015	18:00	11.2	280.33	30.0	1.1	0	3.3
8/07/2015	18:15	11.1	241.46	27.3	0.1	0	4.0
8/07/2015	18:30	10.7	116.5	28.3	0.2	0	3.9
8/07/2015	18:45	10.5	211.47	22.0	0.3	0	4.7
8/07/2015	19:00	10.2	197.69	22.4	0.0	0	4.4
8/07/2015	19:15	10.1	198.33	46.2	0.0	0	5.1
8/07/2015	19:30	10.0	210.58	14.4	0.0	0	5.0
8/07/2015	19:45	10.1	234.07	43.3	0.1	0	3.8
8/07/2015	20:00	9.8	148.85	29.2	0.0	0	3.7
8/07/2015	20:15	9.6	71.76	21.2	0.0	0	4.6
8/07/2015	20:30	9.6	115.59	28.1	0.0	0	4.6
8/07/2015	20:45	9.4	99.97	29.4	0.0	0	3.7
8/07/2015	21:00	9.4	290.33	17.9	0.0	0	4.5
8/07/2015	21:15	9.4	258.16	9.2	0.0	0	4.5
8/07/2015	21:30	9.4	252.08	81.4	0.0	0	4.3
8/07/2015	21:45	9.1	225.53	18.8	0.0	0	3.8
8/07/2015	22:00	8.9	315.69	49.9	0.1	0	3.6
8/07/2015	22:15	8.9	292.5	59.4	0.0	0	3.9
8/07/2015	22:30	8.4	157.49	87.5	0.1	0	3.8
8/07/2015	22:45	8.4	170.4	63.1	0.0	0	3.5
8/07/2015	23:00	8.2	250.54	21.6	0.0	0	2.5
8/07/2015	23:15	7.9	234.88	40.5	0.0	0	1.8
8/07/2015	23:30	7.7	95.78	83.8	0.0	0	2.1
8/07/2015	23:45	7.7	195.43	85.6	0.0	0	1.4
9/07/2015	0:00	7.8	174.51	44.7	0.0	0	1.3
9/07/2015	0:15	7.6	259.84	15.2	0.0	0	1.3
9/07/2015	0:30	7.4	310.65	73.0	0.1	0	1.1
9/07/2015	0:45	7.5	178.97	41.4	0.0	0	0.9
9/07/2015	1:00	7.5	206.17	100.3	0.1	0	0.9
9/07/2015	1:15	7.2	138.01	71.2	0.0	0	1.1
9/07/2015	1:30	7.1	155.61	40.1	0.0	0	1.4
9/07/2015	1:45	6.9	122.63	13.3	0.0	0	1.4
9/07/2015	2:00	6.7	321.97	26.6	0.1	0	1.3
9/07/2015	2:15	6.3	308.08	20.9	0.2	0	0.8
9/07/2015	2:30	6.0	316.44	46.4	0.2	0	0.8
9/07/2015	2:45	5.7	140.22	54.5	0.3	0	0.7
9/07/2015	3:00	5.6	196.33	15.6	0.0	0	1.4



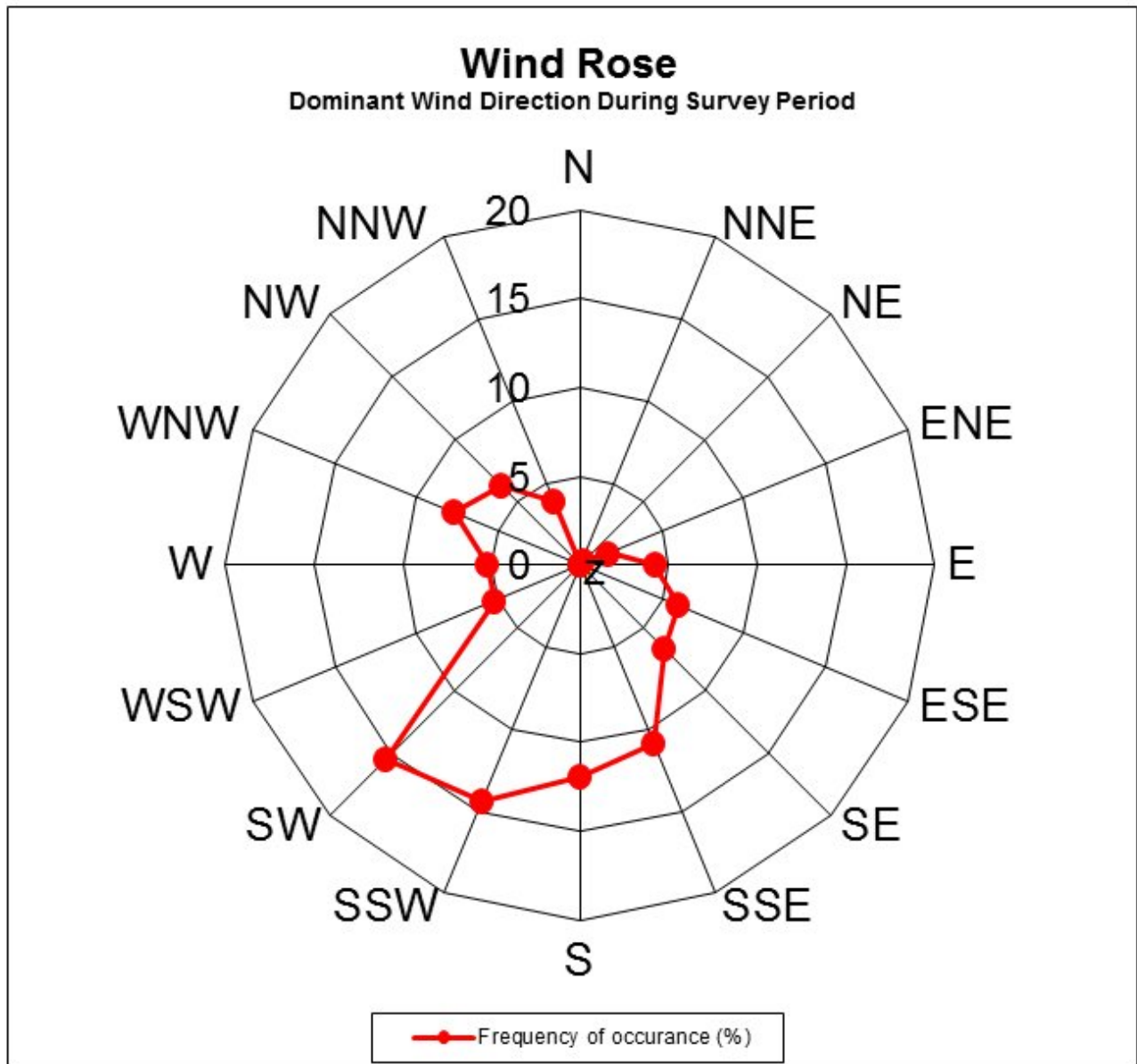
Date	Time	Ave Air Temp (deg C)	Ave Wind Dir (deg)	Ave Sigma (deg)	Ave Wind Spd (m/s)	Total Rain (mm)	Inversion Tower Lapse Rate (deg/100m)
9/07/2015	3:15	5.4	186.71	20.0	0.2	0	0.8
9/07/2015	3:30	5.4	214.21	20.1	0.5	0	0.8
9/07/2015	3:45	5.3	319.46	26.6	0.1	0	0.8
9/07/2015	4:00	5.1	307.01	15.0	0.0	0	0.6
9/07/2015	4:15	5.0	317.99	48.2	0.1	0	0.8
9/07/2015	4:30	5.1	188.79	85.5	0.1	0	0.9
9/07/2015	4:45	5.0	167.8	53.6	0.0	0	0.9
9/07/2015	5:00	5.0	118.17	44.9	0.0	0	1.2
9/07/2015	5:15	5.0	156.01	48.4	0.0	0	1.1
9/07/2015	5:30	5.0	155.59	59.3	0.1	0	1.0
9/07/2015	5:45	5.0	147.06	47.8	0.0	0	1.1
9/07/2015	6:00	4.9	185.2	15.0	0.1	0	1.3
9/07/2015	6:15	4.6	281.67	13.4	0.8	0	1.2
9/07/2015	6:30	4.3	241.22	28.0	1.0	0	0.7
9/07/2015	6:45	4.0	123.97	11.7	0.2	0	0.7
9/07/2015	7:00	4.0	328.93	9.6	0.2	0.2	0.7
9/07/2015	7:15	4.1	322.62	42.8	0.6	0	0.8
9/07/2015	7:30	4.3	165.79	23.4	0.1	0	1.2
9/07/2015	7:45	4.4	122.96	46.5	0.0	0	1.4
9/07/2015	8:00	4.5	200.81	40.5	0.2	0	1.5
9/07/2015	8:15	4.9	236.34	27.5	0.2	0	1.6
9/07/2015	8:30	4.9	118.47	14.2	0.5	0	1.2
9/07/2015	8:45	5.2	191.53	27.8	1.0	0	1.3
9/07/2015	9:00	5.8	120.04	24.8	0.7	0	1.3
9/07/2015	9:15	6.2	193.02	15.6	0.6	0	1.8
9/07/2015	9:30	6.8	221.71	35.9	0.8	0	1.7
9/07/2015	9:45	7.3	175.2	51.7	0.4	0	2.0
9/07/2015	10:00	7.9	120.6	81.3	0.1	0	3.3
9/07/2015	10:15	8.8	163.42	25.5	0.3	0	3.4
9/07/2015	10:30	9.6	223.58	26.4	0.5	0	2.3
9/07/2015	10:45	10.7	138.04	33.8	0.6	0	1.5
9/07/2015	11:00	11.8	266.7	38.9	0.4	0	1.5
9/07/2015	11:15	12.5	283.02	57.7	0.2	0	0.4
9/07/2015	11:30	13.5	139.9	96.6	0.2	0	0.7
9/07/2015	11:45	14.1	202.43	44.6	0.1	0	1.6
9/07/2015	12:00	14.8	257.44	65.1	0.4	0	0.2
9/07/2015	12:15	15.0	202.34	64.6	0.4	0	0.1
9/07/2015	12:30	15.4	160.39	50.4	0.7	0	0.4
9/07/2015	12:45	15.8	182.2	55.8	0.5	0	-0.4
9/07/2015	13:00	15.9	201.71	36.0	1.1	0	0.9
9/07/2015	13:15	16.3	128.33	48.8	0.8	0	0.9
9/07/2015	13:30	16.5	94.27	62.3	0.9	0	1.3
9/07/2015	13:45	16.8	176.24	21.3	0.9	0	0.7
9/07/2015	14:00	16.8	251.01	18.0	1.7	0	0.7
9/07/2015	14:15	16.7	124.17	32.2	1.9	0	0.9
9/07/2015	14:30	16.5	81.58	17.2	1.3	0	0.6
9/07/2015	14:45	16.6	80.82	11.8	1.6	0	0.3
9/07/2015	15:00	16.4	81.67	37.2	1.7	0	0.1
9/07/2015	15:15	16.6	74.36	32.4	1.0	0	0.6
9/07/2015	15:30	16.5	71.03	33.1	0.8	0	-0.1
9/07/2015	15:45	16.6	151.01	31.8	1.0	0	0.6
9/07/2015	16:00	16.7	84.54	19.3	0.6	0	0.8
9/07/2015	16:15	16.6	65.39	18.9	0.8	0	0.7
9/07/2015	16:30	15.9	47.94	14.5	1.1	0	1.2
9/07/2015	16:45	15.4	63.23	71.4	0.9	0	2.3
9/07/2015	17:00	14.4	148.59	27.8	0.2	0	4.0
9/07/2015	17:15	13.7	178.16	10.6	0.1	0	5.8
9/07/2015	17:30	13.3	225.98	9.9	0.3	0	7.0



Date	Time	Ave Air Temp (deg C)	Ave Wind Dir (deg)	Ave Sigma (deg)	Ave Wind Spd (m/s)	Total Rain (mm)	Inversion Tower Lapse Rate (deg/100m)
9/07/2015	17:45	12.8	216.84	25.8	0.5	0	5.9
9/07/2015	18:00	12.5	204	18.4	0.4	0	7.1
9/07/2015	18:15	12.0	292.3	79.7	1.0	0	7.5
9/07/2015	18:30	11.5	210.99	14.6	0.5	0	6.0
9/07/2015	18:45	11.4	292.19	10.4	1.1	0	6.2
9/07/2015	19:00	11.3	298.58	37.7	1.9	0	8.2
9/07/2015	19:15	10.6	282.69	24.3	1.3	0	5.4
9/07/2015	19:30	10.6	292.12	22.5	0.7	0	6.7
9/07/2015	19:45	10.7	287.47	69.2	0.8	0	7.2
9/07/2015	20:00	10.2	116.88	34.5	0.1	0	7.5
9/07/2015	20:15	9.8	100	7.9	0.1	0	5.8
9/07/2015	20:30	9.6	335.62	3.8	1.0	0	5.6
9/07/2015	20:45	9.7	346.11	35.3	1.2	0	5.0
9/07/2015	21:00	9.4	273.87	13.2	0.1	0	5.2
9/07/2015	21:15	9.2	312.32	21.9	1.1	0	4.3
9/07/2015	21:30	8.9	163.39	7.8	0.4	0	4.7
9/07/2015	21:45	8.7	338.96	7.6	0.5	0	5.4
9/07/2015	22:00	8.5	265.7	27.3	0.7	0	5.3
9/07/2015	22:15	8.0	100.85	23.5	0.3	0	4.1
9/07/2015	22:30	7.9	309.44	22.7	0.6	0	5.0
9/07/2015	22:45	7.9	172.99	9.5	0.7	0	5.5
9/07/2015	23:00	7.9	133.53	9.1	1.6	0	4.6
9/07/2015	23:15	7.7	174.36	6.4	1.9	0	3.6
9/07/2015	23:30	7.9	296.49	7.8	2.7	0	3.8
9/07/2015	23:45	8.0	103.17	5.7	2.4	0	4.8
10/07/2015	0:00	8.1	346.92	5.5	2.7	0	5.8
10/07/2015	0:15	8.6	342.01	7.3	2.9	0	7.7
10/07/2015	0:30	8.9	334.25	12.7	2.3	0	4.8
10/07/2015	0:45	9.0	260.41	11.7	2.1	0	3.5
10/07/2015	1:00	8.7	144.18	21.0	2.2	0	3.6
10/07/2015	1:15	8.7	279.91	8.8	1.8	0	4.1
10/07/2015	1:30	8.4	330.97	7.8	1.9	0	5.3
10/07/2015	1:45	8.2	329.94	8.5	1.2	0	4.3
10/07/2015	2:00	8.1	320.32	9.3	1.9	0	4.8
10/07/2015	2:15	8.0	266.1	6.2	1.8	0	5.0
10/07/2015	2:30	7.9	300.17	6.0	2.0	0	4.5
10/07/2015	2:45	7.7	312.77	6.5	2.6	0	4.1
10/07/2015	3:00	7.7	263.11	5.7	2.8	0	4.1
10/07/2015	3:15	7.7	285.39	7.1	3.0	0	5.0
10/07/2015	3:30	7.7	323.8	9.2	2.4	0	6.2
10/07/2015	3:45	7.8	267.62	12.2	2.0	0	5.2
10/07/2015	4:00	7.6	288.08	8.3	1.8	0	5.7
10/07/2015	4:15	7.5	310.62	9.3	2.0	0	3.7
10/07/2015	4:30	7.5	309.18	10.9	2.6	0	4.5
10/07/2015	4:45	7.5	286.87	9.2	2.4	0	5.2
10/07/2015	5:00	7.3	270.88	7.6	2.6	0	5.8
10/07/2015	5:15	7.0	287.41	8.3	2.9	0	5.8
10/07/2015	5:30	7.0	226.08	8.8	2.6	0	6.1
10/07/2015	5:45	7.0	279.92	7.7	2.9	0	6.2
10/07/2015	6:00	7.0	320.7	6.9	2.9	0	5.7
10/07/2015	6:15	7.0	335.66	6.0	2.8	0	4.4
10/07/2015	6:30	7.0	339.66	8.7	2.9	0	4.8
10/07/2015	6:45	7.1	301.39	7.8	3.7	0	4.5
10/07/2015	7:00	7.2	322.13	7.6	3.4	0	4.3



18 Sep 2015



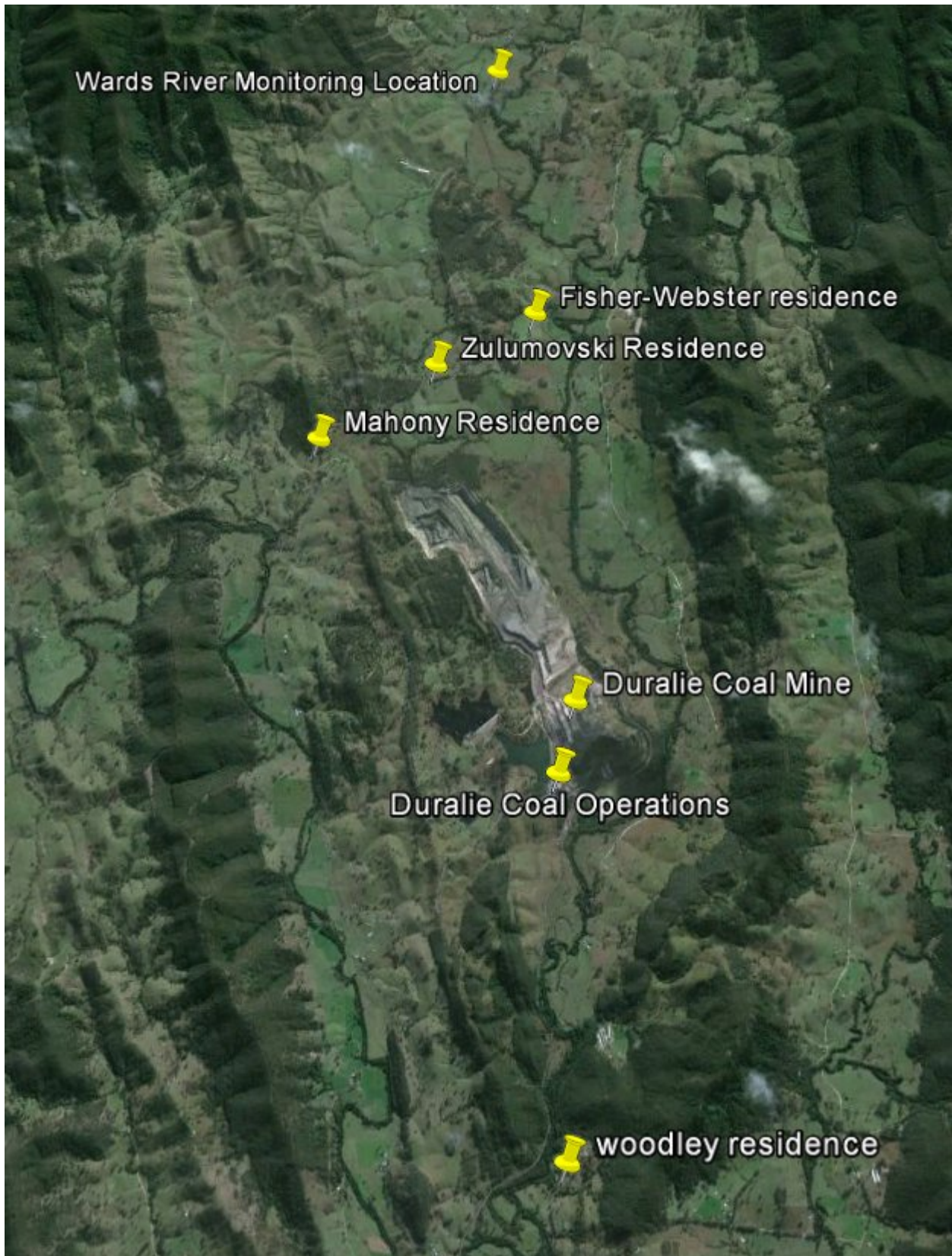


## Appendix B: LOCALITY MAP AND SURVEY LOCATIONS



The monitoring locations at the Woodley and Wards River properties are located further from the Mine Site. An additional Locality Map illustrating those monitoring locations is provided below.











## Operations

**Tuesday**

7/07/2015

	Arrive time	Start load/unload	Finish load/unload	Depart
Duralie				6:35
Stratford	7:05		7:18	8:38
Duralie	10:15		10:31	11:12
Stratford	12:25		12:30	13:52
Duralie	14:25		14:38	15:44
Stratford	16:55		17:00	18:10
Duralie	18:45		18:55	19:45
Stratford	20:25		20:30	21:35
Duralie	22:10		22:20	0:05

**Wednesday**

8/07/2015

Duralie				6:35
Stratford	7:08		7:15	8:25
Duralie	9:49		10:00	10:42
Stratford	11:18		11:25	12:58
Duralie	13:26		13:40	14:40
Stratford	17:15		17:20	18:30
Duralie	19:50		20:15	21:00
Stratford	21:40		21:45	23:00

**Thursday**

9/07/2015

Duralie				7:20
Stratford	7:54		8:55	10:10
Duralie	11:05		11:15	12:15
Stratford	13:00		13:05	14:20
Duralie	15:00		15:15	17:03
Stratford	17:40		17:45	18:55
Duralie	19:40		20:10	20:50
Stratford	21:40		21:45	22:50
Duralie	23:25		23:35	0:50

**Friday**

10/07/2015

Duralie				8:00
Stratford	8:30		8:35	9:45
Duralie	10:25		10:35	11:15
Stratford	12:10		12:15	13:30
Duralie	14:05		14:10	14:50
Stratford	15:35		15:40	16:45
Duralie	17:15		17:25	18:45
Stratford	19:30		19:35	20:45
Duralie	21:15		21:25	22:10



## Tuesday Day Shift (6.30 am to 5.00 pm)

7/07/2015

Crib break 12:30 - 13:15

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		6 2 trucks
	EX 5029 -		0
	EX 6105 B6 waste		9.1 3-5 trucks
	EX 6119 B7 waste		8.7 3-5 trucks
D10 dozer	DZ 45 Topsoil	27.7 Total	
	DZ 21 -		
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
	DZ52 B6 & B7		
16M graders	MG6049 Roads, Dumps, Pit Floor	8 total	
	MG6052		
Loader	LWX4076 Topsoil RL120	8	
Water Cart	WC3011 Haul Roads, dig face	8 total	
	WTX2192 Haul Roads, dig face		
Drill	DR14 B6	8.7	
	DR216	0	
	DR215 B6	8.8	

## Tuesday Night Shift (5.00pm to 3.30am)

7/07/2015

Crib break 22:00 - 22:45

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		8 2 trucks
	EX 5029 -		0
	EX 6105 B6 waste		9.2 3-5 trucks
	EX 6119 B7 waste		9 3-5 trucks
D10 dozer	DZ 45 Topsoil	20 Total	
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
	DZ52 B6 & B7		
16M graders	MG6049 Roads, Dumps, Pit Floor	7.8 total	
	MG6052		
Loader	LWX4076	0	
Water Cart	WC3011 Haul Roads, dig face	2 Total	
	WTX2192 Haul Roads, dig face	0	
Drill	DR14 B6	8.5	
	DR215 B6	7.8	



### Wednesday Day Shift (6.30 am to 5.00 pm)

8/07/2015

Crib break 12:30 - 13:15

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		1 2 trucks
	EX 5029 -		0
	EX 6105 B6 waste		8.8 3-5 trucks
	EX 6119 B7 waste		8.8 3-5 trucks
D10 dozer	DZ 45 Ramps	25.7 Total	
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
	DZ52 B6 & B7		
16M graders	MG6049 Roads, Dumps, Pit Floor	10 total	
	MG6052		
Loader	LWX4076 Topsoil RL120	7.1	
Water Cart	WC3011 Haul Roads, dig face	5.9 total	
	WTX2192 Haul Roads, dig face		
Drill	DR14 B6	8	
	DR216	0	
	DR215 B6	8.4	

### Wednesday Night Shift (5.00pm to 3.30am)

8/07/2015

Crib break 22:00 - 22:45

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		4 2 trucks
	EX 5029 -		0
	EX 6105 B6 waste		8 3-5 trucks
	EX 6119 B7 waste		8.8 3-5 trucks
D10 dozer	DZ 45 Topsoil	20 Total	
	DZ 21 -		
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
16M graders	DZ52 B6 & B7		
	MG6049 Roads, Dumps, Pit Floor	9.1 total	
	MG6052		
Loader	LWX4076	0	
Water Cart	WC3011 Haul Roads, dig face	0 Total	
	WTX2192 Haul Roads, dig face	0	
Drill	DR14 B6	8.9	
	DR215 B6	7.8	

### Thursday Day Shift (6.30 am to 5.00 pm)

9/07/2015

Crib break 12:30 - 13:15

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		7 2 trucks
	EX 6105 B6 waste PAF		8.9 3-5 trucks
	EX 6119 B7 waste PAF and NAF dump		8.6 3-5 trucks
D10 dozer	DZ 45 Ramps	27.5 Total	
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
	DZ52 B6 & B7		
16M graders	MG6049 Roads, Dumps, Pit Floor	20 total	
	MG6052		
Water Cart	WC3011 Haul Roads, dig face	8 total	
	WTX2192 Haul Roads, dig face		
Drill	DR14 B6	10.1	
	DR215 B6	9.6	

### Thursday Night Shift (5.00pm to 3.30am)

9/07/2015

Crib break 22:00 - 22:45

Plant	Activity	Operating Hours	Trucks
Excavator	EX 5028 R69 stockpile		6 2 trucks
	EX 5029 -		0
	EX 6105 B6 waste PAF		8.5 3-5 trucks
	EX 6119 B7 waste PAF and NAF dump		9.7 3-5 trucks
D10 dozer	DZ 45 Ramps	20 Total	
	DZ 37 Drill prep		
	DZ 15 PAF & NAF dump		
	DZ52 B6 & B7		
16M graders	MG6049 Roads, Dumps, Pit Floor	9.6 total	
	MG6052		
Water Cart	WC3011 Haul Roads, dig face	2.7 Total	
	WTX2192 Haul Roads, dig face		
Drill	DR215 B6	8.5	