Appendix 6

Noise Monitoring Reports*

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*Note: A copy of this Appendix is available on the Project CD

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Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending March 2015

Report Number Q57 630.01053-R1

6 May 2015

Donaldson Coal Pty Ltd
PO Box 675
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Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending March 2015

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1 INTRODUCTION

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979.

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct quarterly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Mine Project Noise Monitoring Program, dated 27 May 2008.

The objectives of the noise monitoring survey for this operating quarter were as follows:

- Measure the ambient noise levels at six (6) focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 DEVELOPMENT CONSENT PROJECT APPROVAL

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)"*, and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:

Location	*LA10(15minute) Noise Limits (dBA)*	
	Daytime	*Night-time*
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.

19. The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Colliery Project Approval:

- Extraction of up to 6.1 Mtpa of ROM coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield CHPP by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield CHPP to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The PA was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the PA was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the PA was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the Bloomfield Coal Handling and Preparation Plant (CHPP).

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Location I	*Lord Howe Drive, Ashtronfield*	*36*	*36*	*36*	*45*
Location K	*Catholic Diocese Land*	*37*	*37*	*37*	*45*
Location L	*Killshanny Avenue, Ashtonfield*	*40*	*40*	*40*	*47*
All other Locations	*All other privately-owned Residences*	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3 (Appendix A).*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		LAeq(15minute)
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	**Day**	**Evening**	**Night**
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;*
    c. *Describe the proposed noise management system in detail; and*
    d. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*
        - *Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.*

Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*

4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*
    i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*
    ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*

b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*
    i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. Implement all reasonable and feasible best practice noise mitigation measures on the site; and

d. Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.

3 NOISE MONITORING METHODOLOGY

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), and in accordance with Heggies Report 30-1409-R2 dated 27 May 2008 (*Abel Mine Project Noise Monitoring Program)* and AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of IEC 61672.1-2004 *Electroacoustics – Sound Level Meters – Specifications* and carries current NATA or manufacturer calibration certificates.

3.2 Monitoring Locations

Baseline and preceding operational quarterly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six (6) focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Lord Howe Drive, Ashtonfield
J	Parish Drive, Thornton
L	17 Kilshanny Ave, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix B**.

3.3 Unattended Continuous Noise Monitoring

Environmental noise loggers were deployed for a minimum of seven (7) days between 17 March 2015 and 1 April 2015 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background 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. The L_{Amax} is the maximum noise level recorded over the interval. Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six (6) monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 OPERATOR ATTENDED NOISE MONITORING

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were conducted during the daytime on Tuesday 17 March 2015 and Tuesday 24 March 2015, evening on Monday 23 March 2015 and during the night-time on Monday 23 March 2015, Tuesday 24 March 2015 and Wednesday 1 April 2015. All operator attended noise surveys were conducted using a Brüel & Kjær 2270 Type 1, integrating sound level meter (s/n: 2679354).

Results of the operator attended noise measurements are given in **Table 2** to **Table 7**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date & start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from Donaldson Mine and Abel Coal Mine and are stated only when a contribution could be quantified.

Mine noise at all monitoring locations during various periods was inaudible over the existing ambient noise levels. Where this is the case, noise levels from the source are typically 10 dB (or more) below the measured L_{A90} noise level. Therefore, subtracting 10 dB from the measured L_{A90} noise level gives an indication of the maximum contribution of Abel operations at these locations.

Table 2 Location D, Black Hill School, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/3/2015 11:33am W = 5 m/s SSW Temp = 24.1°C Cloud cover = 7/8	Daytime Ambient	72	66	51	38	52	M1 Traffic ~ 34-35 dBA Local Traffic ~ 46 to 72 dBA Birds ~ 44 to 48 dBA Trees in wind 39 -40 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1].					
23/3/2015 6:03pm W = 4.3 m/s ENE Temp = 27.4°C Cloud cover = 3/8	Evening Ambient	73	66	54	39	53	Local Traffic ~ 55 to 73 dBA Distant Traffic ~ 33 -38 dBA Aircraft 48 to 49 dBA Birds 40 to 54 dBA Tress in wind 40 to 42 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1].					
23/3/2015 22:00pm W = 3.7 m/s ENE Temp = 20.4°C Cloud cover = 0/8	Night-time Ambient	50	47	45	41	43	Insects ~ 35 to 38 dBA Distant Traffic ~ 45 to 50 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <31 dBA[1]. LA1(1min) contribution <31 dBA[1].					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dBA below the overall LA90 noise level.

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/3/2015 12:03pm W = 5 m/s S Temp = 23.7°C Cloud cover = 7/8	Daytime Ambient	85	74	61	46	62	Local Traffic ~ 74 to 85 dBA Birds ~ 54 to 55 dBA JRD Traffic ~ 56 to 67 dBA Birds 54 to 55 dBA Trees in wind 45 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <36 dBA[1].					
23/3/2015 6:23pm W = 4.87 m/s ESE Temp = 26°C Cloud cover = 3/8	Evening Ambient	79	67	58	40	57	JRD Traffic ~ 52 to 68 dBA Insects/frogs ~ 40 dBA Birds 50 to 61 dBA Local road traffic 56 to 79 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1].					
23/3/2015 10:20pm W = 4.9 m/s ENE Temp = 21.9°C Cloud cover = 0/8	Night-time Ambient	73	64	53	38	52	JRD Traffic ~ 52 to 73 dBA Insects/frogs ~ 33-35 dBA Abel mine not audible Bloomfield mine haul tru movements 32 dBA
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]. LA1(1min) contribution <30 dBA[1]					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 4 Location G, 156 Buchannan Road, Buchannan

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/03/2015 1:31pm W = 4.97 m/s SE Temp = 26.4°C Cloud cover = 7/8	Daytime Ambient	66	59	44	32	45	Trees in wind 33 to 34 Birds 35 to 66 Distant road traffic 33- 34 dBA Aircraft 35 – 62 dBA Insects 38 – 39 dBA Abel mine not audible Bloomfield mine haul trucks 31 33 dBA
		Estimated Abel mine LAeq(15min) contribution <32[1] dBA					
23/03/2015 7:26pm W = 2.7 m/s ESE Temp = 23°C Cloud cover = 1/8	Evening Ambient	58	57	57	49	54	Insects ~ 56 to 58 dBA Distant Traffic ~ 49 dBA Birds 56 dBA Abel mine not audible Bloomfield mine haul trucks 40 t 50 dBA
		Estimated Abel mine LAeq(15min) contribution <39[1] dBA					
23/03/2015 11:26pm W = 2.2 m/s ESE Temp = 19.3°C Cloud cover = 0/8	Night-time Ambient	49	45	43	38	40	Distant Traffic ~ 44 to 49 dBA Insects 38 to 44 dBA Birds 44 dBA Abel mine not audible Bloomfield mine haul tracks dBA
		Estimated Abel mine LAeq(15min) contribution <30[1] dBA LA1(1min) contribution <30[1] dBA					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 5 Location I, Lord Howe Drive, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
24/03/2015 2:12pm W = 5 m/s WNW Temp = 34.2°C Cloud cover = 5/8	Daytime Ambient	74	67	60	47	57	Distant Traffic ~ 33 to 34 dBA Birds ~ 58 to 74 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <37 dBA[1].					
23/03/2015 8:19pm W = 4.9 m/s ENE Temp = 21.2°C Cloud cover = 0/8	Evening Ambient	60	56	55	46	52	Distant Traffic ~ 40 to 43 dBA Insect/frogs 54 to 55 dBA Local Road traffic 50 to 60 dBA Rail passby 49 – 51 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <36 dBA[1].					
1/4/2015 10:00pm W = 1.85 m/s ESE Temp = 20.9°C Cloud cover = 0/8	Night-time Ambient	53	50	48	42	45	Distant Traffic ~ 41 to 52 dBA Locomotive passby 40 – 51 dBA Birds 50-53 Insect/frogs 49-50 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1] LA1(1min) contribution <32 dBA[1]					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 6 Location J, Parish Drive, Thornton

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
24/03/2015 2:36pm W = 4.5 m/s WNW Temp = 33°C Cloud cover = 7/8	Daytime Ambient	57	51	46	38	43	Distant road traffic 41-42 dBA Birds 46 to 57 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1].					
23/03/2015 8:43pm W = 3.56 m/s ENE Temp = 21.9°C Cloud cover = 0/8	Evening Ambient	52	49	47	41	44	Distant road traffic 40-52 dBA Insects 40 to 41 dBA Local Road traffic 43 dBA Locomotive passby 46 – 50 dBA Abel mine not audible
		Estimated Abel mine LAeq(15min) contribution <31 dBA[1].					
1/4/2015 10:23pm W = 2.53 m/s E Temp = 20.5°C Cloud cover = 2/8	Night-time Ambient	50	47	45	40	43	Distant Traffic ~ 40 to 41 dBA insects ~ 42 to 50 dBA Abel mine not audible.
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]. LA1(1min) contribution <30 dBA[1]					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 7 Location L, 17 Killshanny Ave, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissi and Typical Maximum Leve LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/03/2015 2:07pm W = 3.9 m/s ESE Temp = 27.1°C Cloud cover = 7/8	Daytime Ambient	66	59	41	32	45	Birds ~ 36 - 51 dBA Trees in wind 32 to 34 dBA Local Traffic ~ 44 to 66 dBA Insects 30 -31 dBA Abel not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
23/03/2015 7:58pm W = 2.8 m/s ESE Temp = 22.5°C Cloud cover = 0/8	Evening Ambient	72	61	53	45	50	Dog Barking ~ 65 dBA Local traffic ~ 548 to 72 dBA Insects ~ 44 to 45 dBA Distant road traffic 38 – 52 Tress in wind 46-48 dBA Abel mine audible 34 dE Constant rumble (CHP)
		Estimated Abel mine LAeq(15min) contribution 34 dBA					
23/03/2015 11:55pm W = 2.3 m/s E Temp = 19.1°C Cloud cover = 0/8	Night-time Ambient	64	54	52	47	50	Distant road traffic 33 -35 dbA Local traffic ~ 57 to 64 dBA Insects ~ 50 to 52 dBA Dogs 52-53 dBA Train horn 53 dBA Residential aircon unit 33 dBA Abel not audible
		Estimated Abel mine LAeq(15min) contribution <37 dBA[1] LA1(1min) contribution <37 dBA[1]					

Note: 1. Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as "natural" noises such as birds, insects and leaf rustle.

Abel operations were observed to be audible at times at Location L.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8**.

Table 8 Compliance Noise Assessment – Operations

Location	Estimated Abel LAeq(15minute) Contribution			Consent Conditions LAeq(15minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	<30	<30	<31	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
F – Black Hill Road, Black Hill	<36	<30	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
G – Buchanan Road, Buchanan	<32	<39	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<37	<36	<32	36	36	36	Yes[1,2]	Yes[1,2]	Yes[1,2]
J – Parish Drive, Thornton	<30	<31	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	30	34	<30	40	40	40	Yes[1,2]	Yes	Yes[1,2]

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**.

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Abel LA1(1minute) Contribution	Consent Conditions LA1(1minute)	Compliance
D – Black Hill School, Black Hill	<31	45	Yes[1,2]
F – Black Hill Road, Black Hill	<30	45	Yes[1,2]
G – Buchanan Road, Buchanan	<30	45	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<32	45	Yes[1,2]
J – Parish Drive, Thornton	<30	45	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<37	47	Yes[1,2]

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 UNATTENDED CONTINUOUS NOISE MONITORING

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between 17 March 2015 and 1 April 2015 at each of the six (6) monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	ARL EL- 316 16-004-033	17/03/2015-24/03/2015
F – Black Hill Road, Black Hill	ARL EL- 316 16-301-472	17/03/2015-24/03/2015
G – Buchanan Road, Buchanan	ARL EL- 316 16-203-508	17/03/2015-24/03/2015
I – Lord Howe Drive, Ashtonfield	ARL EL- 316 16-301-472	24/03/2015-01/04/2015
L – Kilshanny Ave, Kilshanny	ARL EL- 316 16-207-043	17/03/2015-24/03/2015
J – Parish Drive, Thornton	Brüel & Kjær 2250-L	24/03/2015-01/04/2015

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendices C1 to C6**. A summary of the results of the unattended continuous noise monitoring is given in **Table 11**.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Industrial Noise Policy (INP). The day, evening and night periods replace the day and night periods defined under the Environmental Noise Control Manual (ENCM). However, as the Donaldson conditions of consent are under the ENCM, these periods have also been reported.

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA Re 20 µPa)

Location	Period	Primary Noise Descriptor (dBA re 20 µPa)			
		L_{A1}	L_{A10}	L_{A90}	L_{Aeq}
D Black Hill School, Black Hill	Daytime	64	53	36	56
	Evening	60	51	39	53
	ENCM Daytime	63	52	38	55
	Night	49	43	39	48
F Lot 684 Black Hill Road, Black Hill	Daytime	73	59	42	59
	Evening	63	54	40	53
	ENCM Daytime	70	57	41	57
	Night	59	51	35	51
G 156 Buchanan Road, Buchanan	Daytime	52	45	33	46
	Evening	57	55	38	55
	ENCM Daytime	55	52	37	52
	Night	56	54	42	54
I 49 Magnetic Drive, Ashtonfield	Daytime	69	61	45	59
	Evening	57	48	41	57
	ENCM Daytime	66	58	43	58
	Night	48	45	35	49
L 17 Kilshanny Ave, Ashtonfield	Daytime	61	46	31	54
	Evening	57	46	36	50
	ENCM Daytime	59	46	34	52
	Night	48	46	40	46
J 220 Parish Drive, Thornton	Daytime	51	47	41	50
	Evening	48	45	38	44
	ENCM Daytime	50	46	40	48
	Night	45	42	34	43

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.
Environmental Noise Control Manual (ENCM) Daytime 7.00 am to 10.00 pm, Night 10.00 pm to 7.00 am.

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient L_{A90} Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1**, **Figure 2** and **Figure 3** for the daytime, evening and night-time periods respectively.

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Figure 1 Long term Daytime L_{A90} Noise Levels

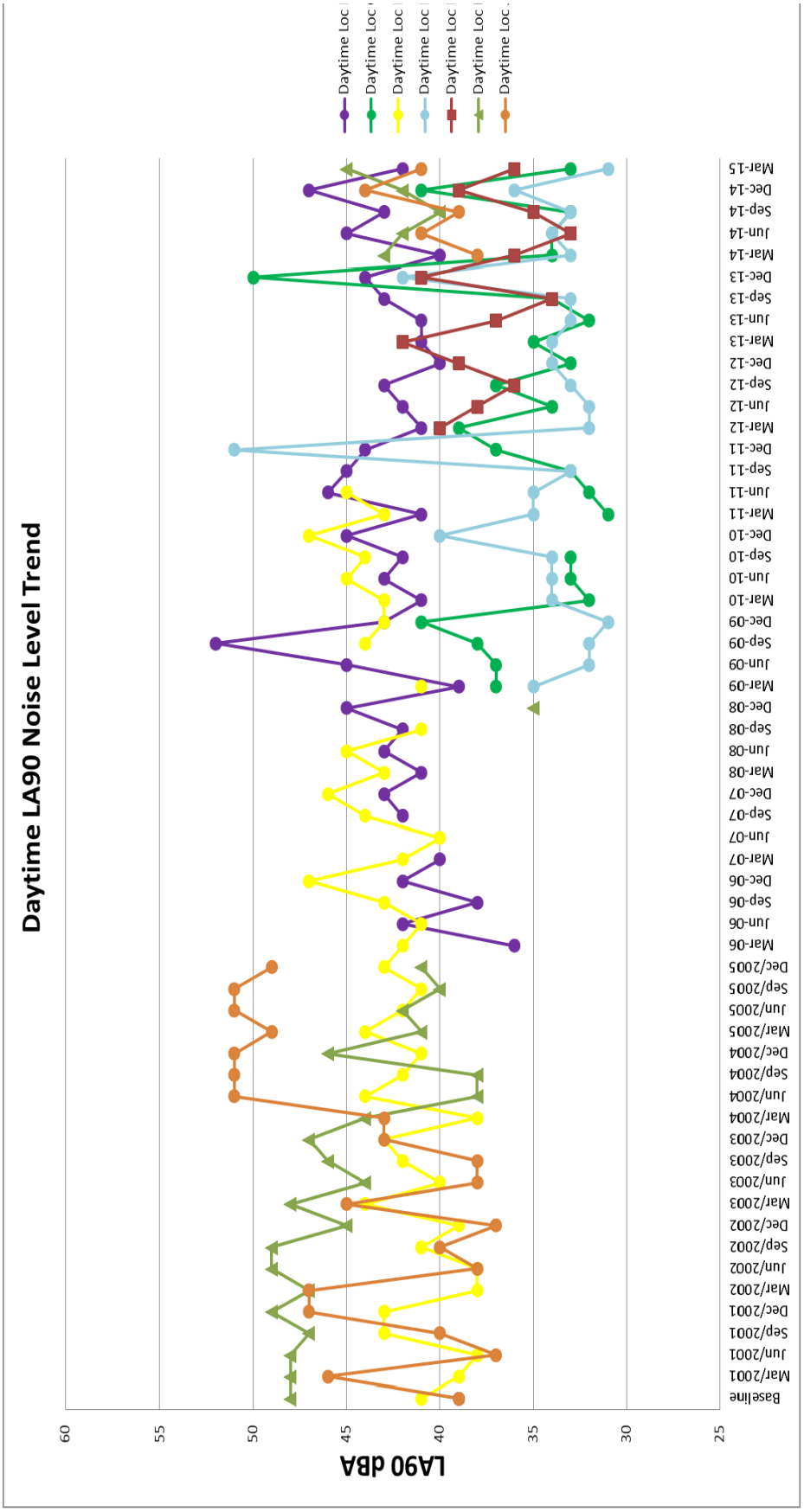

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Figure 2 Long term Evening L_{A90} Noise Levels

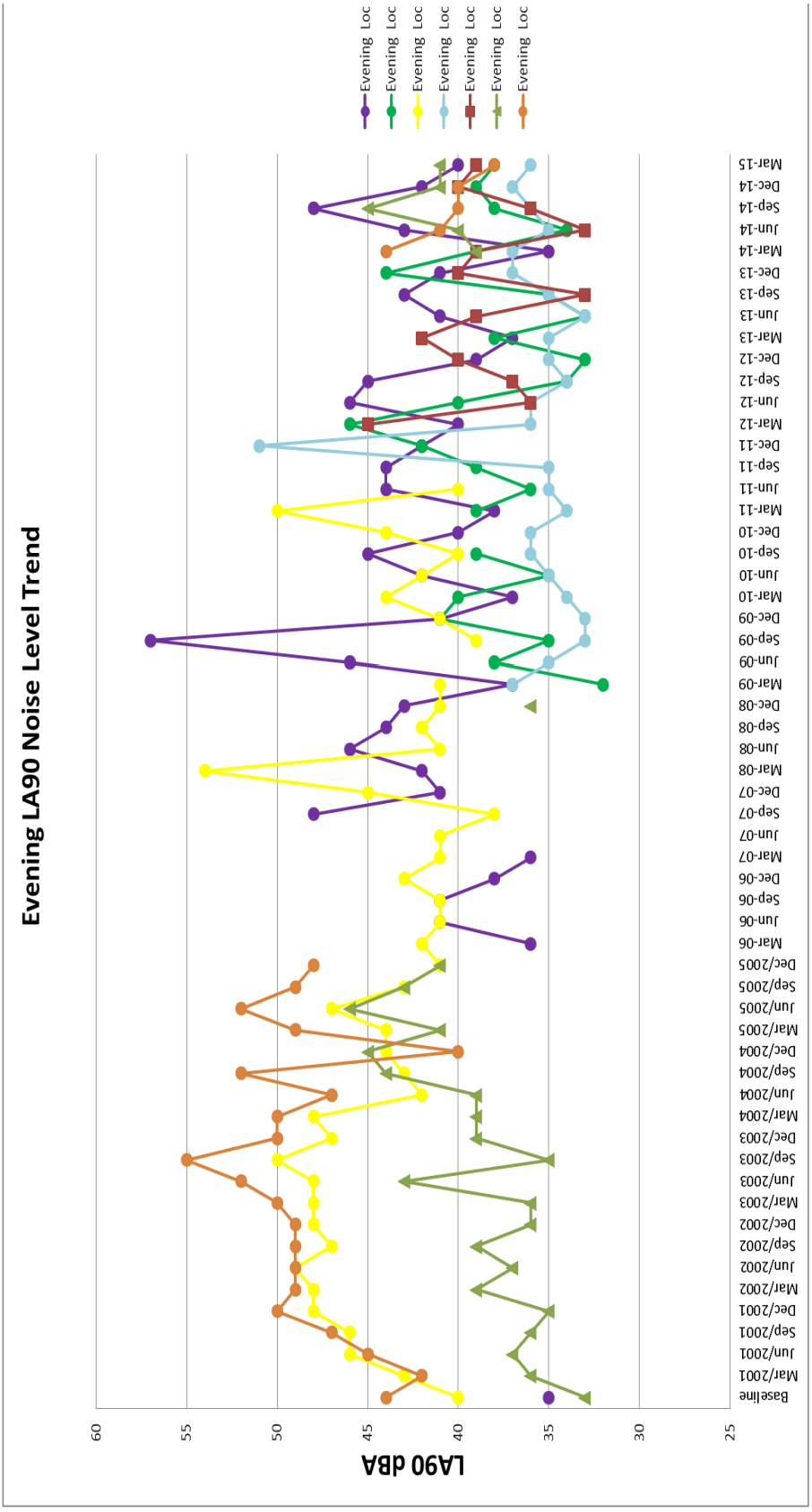

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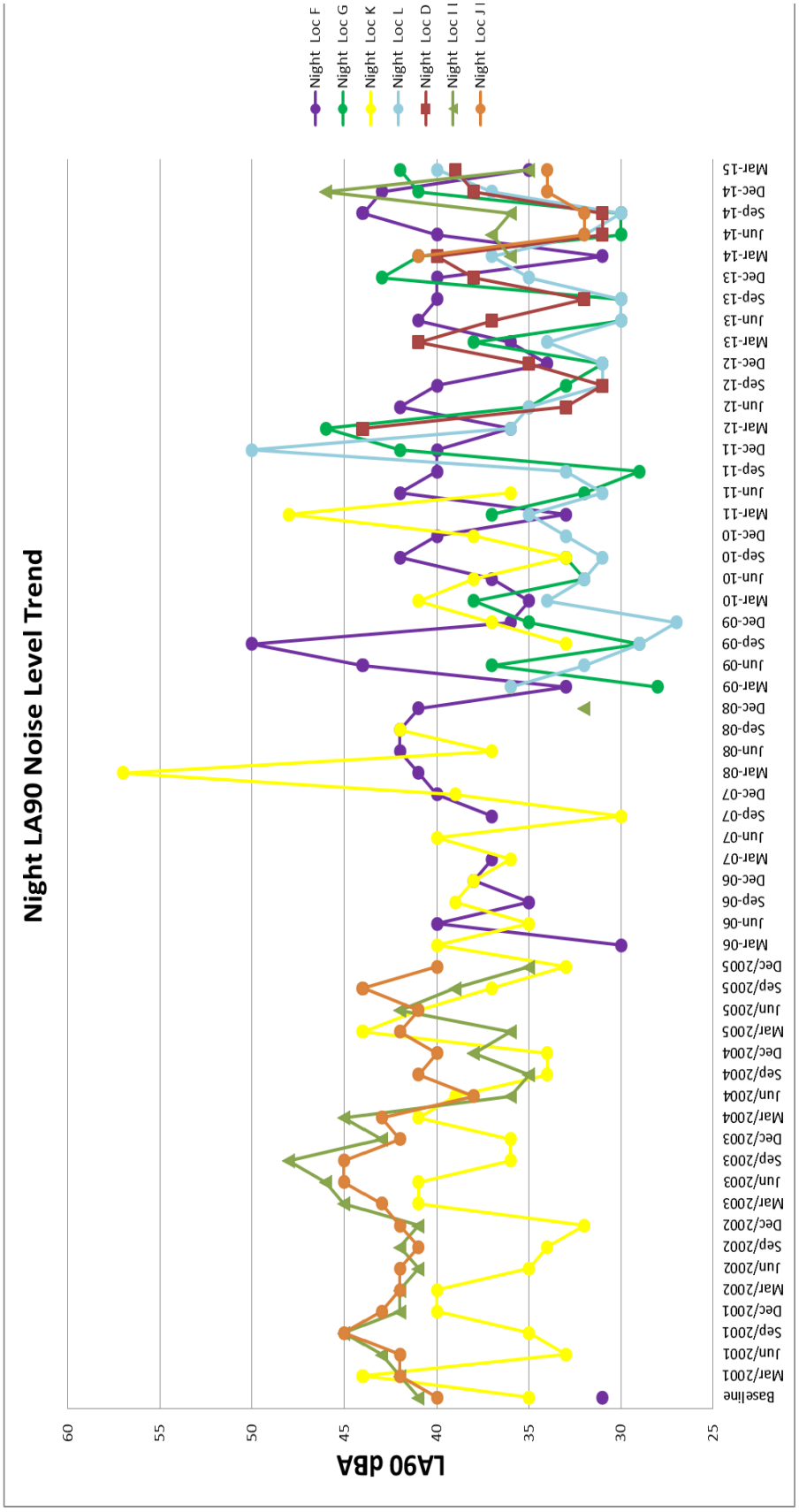
Figure 3 Long term Night-time L_{A90} Noise Levels



Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the quarter ending March 2015 compared to the levels recorded during the baseline monitoring process (ie. Prior to commencement of mining operation at Donaldson).

Table 12 LA90 Results Comparison – Baseline

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		Baseline	March 2015	
D Black Hill School, Black Hill	Day	N/A[1]	36	N/A[1]
	Evening	N/A[1]	39	N/A[1]
	Night	N/A[1]	39	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	39	42	3
	Evening	35	40	5
	Night	31	35	4
G 156 Buchanan Road, Buchanan	Day	N/A[1]	33	N/A[1]
	Evening	N/A[1]	38	N/A[1]
	Night	N/A[1]	42	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	48	45	-3
	Evening	33	41	8
	Night	41	35	-6
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	31	N/A[1]
	Evening	N/A[1]	36	N/A[1]
	Night	N/A[1]	40	N/A[1]
J 220 Parish Drive, Thornton	Day	39	41	2
	Evening	44	38	-6
	Night	40	34	-6

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday..

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (December 2014)

Table 13 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured in the previous monitoring period.

Table 13 LA90 Results Comparison – Previous Quarter (December 2014)

Monitoring Location	Period	Long term Night-time L_{A90} Noise Levels		Difference dB
		December 2014	March 2015	
D Black Hill School, Black Hill	Day	39	36	-3
	Evening	40	39	-1
	Night	38	39	1
F Lot 684 Black Hill Road, Black Hill	Day	47	42	-5
	Evening	42	40	-2
	Night	43	35	-8
G 156 Buchanan Road, Buchanan	Day	41	33	-8
	Evening	39	38	-1
	Night	41	42	1
I 49 Magnetic Drive, Ashtonfield	Day	42	45	3
	Evening	41	41	0
	Night	46	35	-11
L 17 Kilshanny Ave, Ashtonfield	Day	36	31	-5
	Evening	37	36	-1
	Night	37	40	3
J 220 Parish Drive, Thornton	Day	44	41	-3
	Evening	40	38	-2
	Night	34	34	0

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (March 2014)

Table 14 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 LA90 Results Comparison – Coinciding Period Last Year (March 2014)

Monitoring Location	Period	Long term Night-time L_{A90} Noise Levels		Difference dB
		March 2014	March 2015	
D Black Hill School, Black Hill	Day	36	36	0
	Evening	39	39	0
	Night	40	39	-1
F Lot 684 Black Hill Road, Black Hill	Day	40	42	2
	Evening	35	40	5
	Night	31	35	4
G 156 Buchanan Road, Buchanan	Day	34	33	-1
	Evening	39	38	-1
	Night	41	42	1
I 49 Magnetic Drive, Ashtonfield	Day	43	45	2
	Evening	39	41	2
	Night	36	35	-1
L 17 Kilshanny Ave, Ashtonfield	Day	33	31	-2
	Evening	37	36	-1
	Night	37	40	3
J 220 Parish Drive, Thornton	Day	38	41	3
	Evening	44	38	-6
	Night	41	34	-7

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time periods respectively.

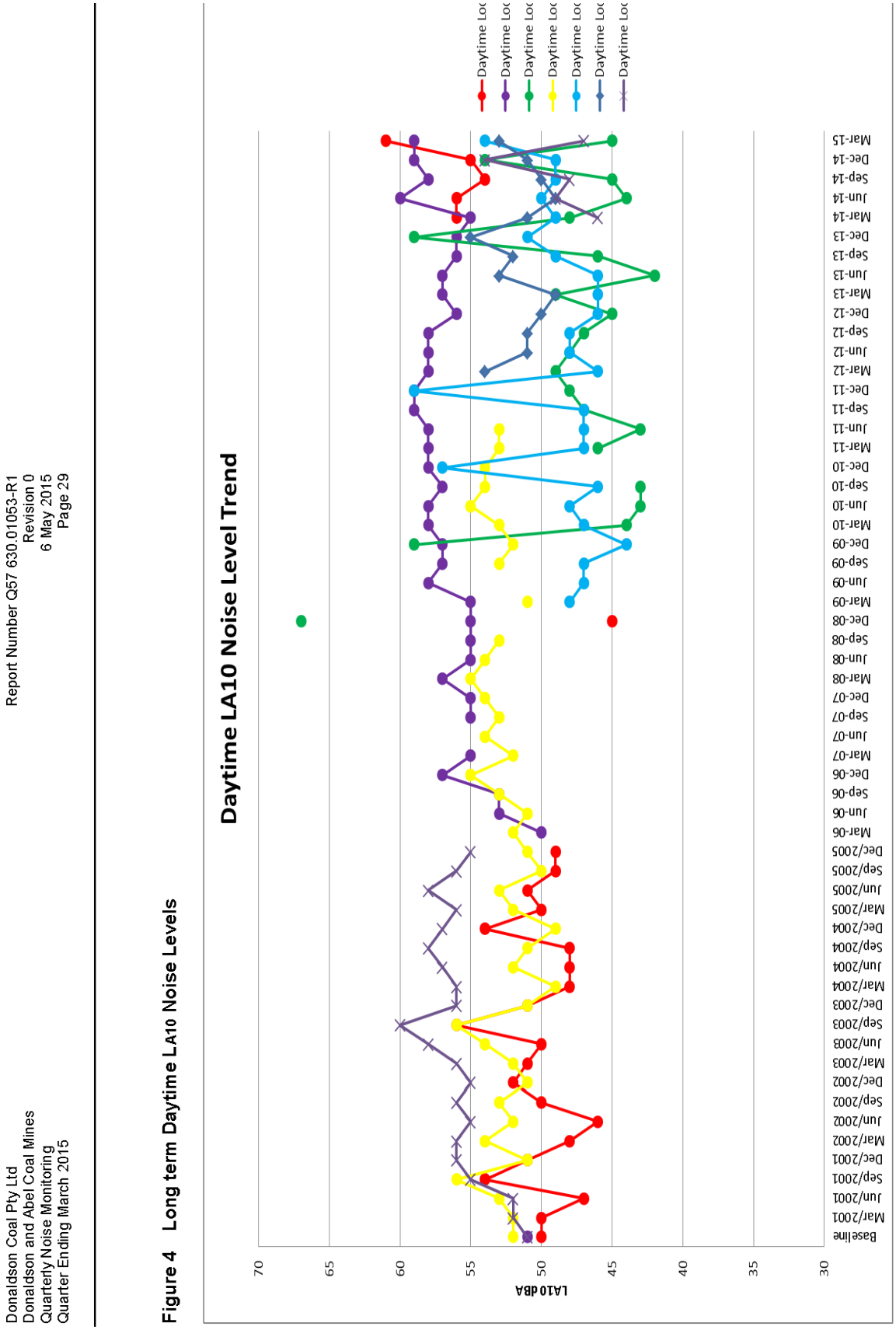


Figure 4 Long term Daytime L_{A10} Noise Levels

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Figure 5 Long term Evening L_{A10} Noise Levels

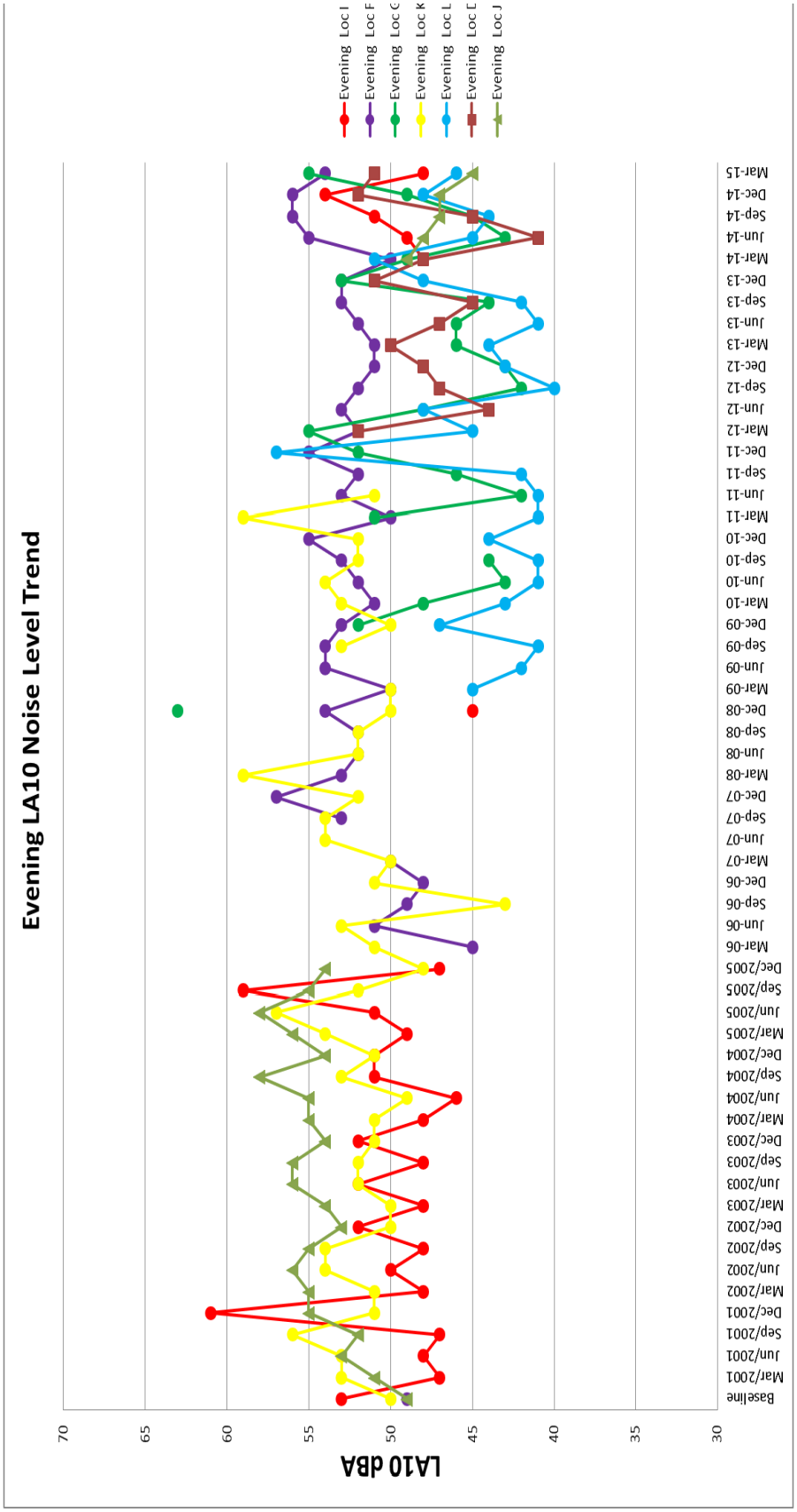

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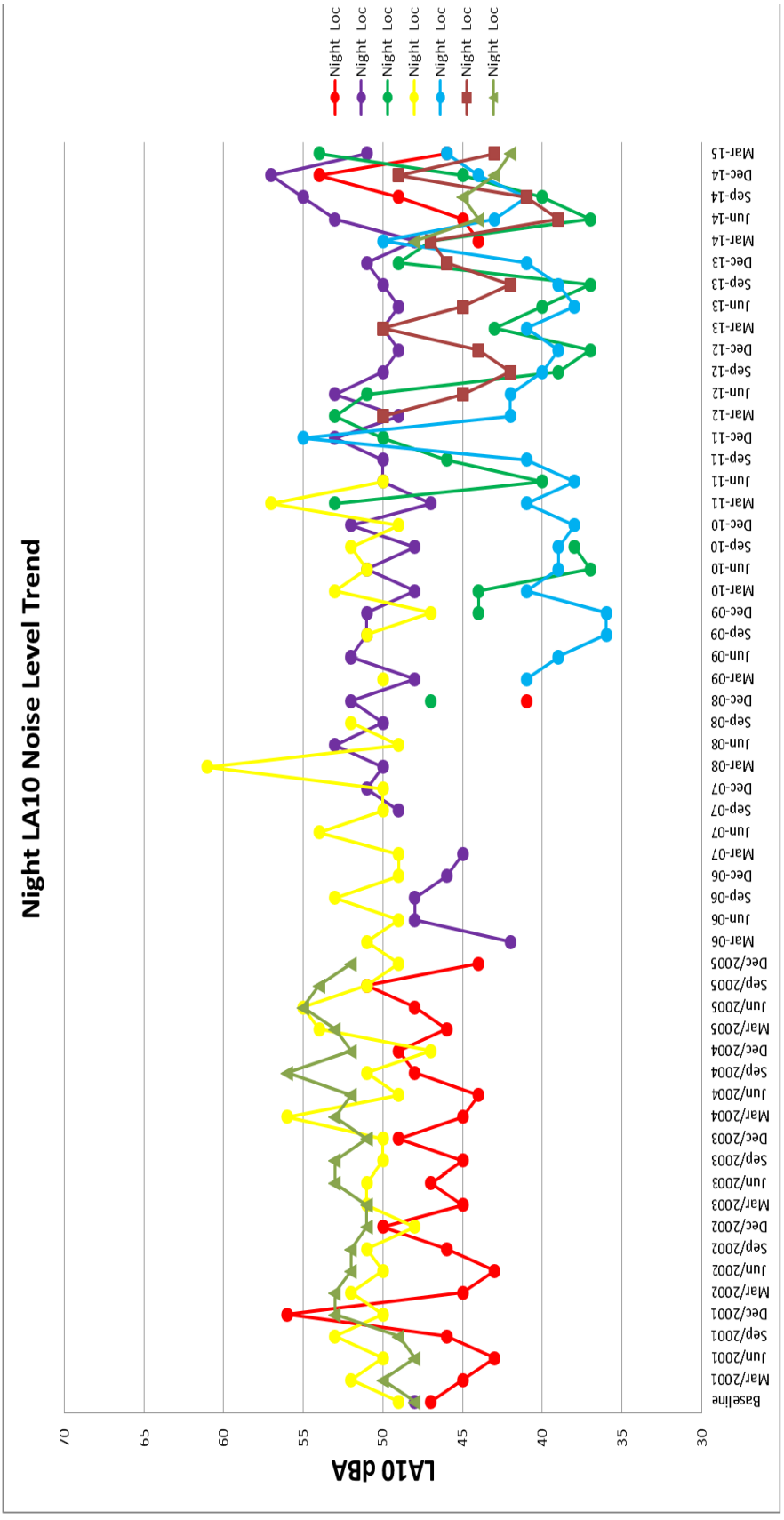
Figure 6 Long term Night-time L_{A10} Noise Levels



Baseline

Table 15 presents the ambient L_{A10} noise levels recorded for the quarter ending March 2015 compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		Baseline	March 2015	
D Black Hill School, Black Hill	Day	N/A[1]	53	N/A[1]
	Evening	N/A[1]	51	N/A[1]
	Night	N/A[1]	43	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	51	59	8
	Evening	49	54	5
	Night	48	51	3
G 156 Buchanan Road, Buchanan	Day	N/A[1]	45	N/A[1]
	Evening	N/A[1]	55	N/A[1]
	Night	N/A[1]	54	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	50	61	11
	Evening	53	48	-5
	Night	47	46	-1
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	54	N/A[1]
	Evening	N/A[1]	46	N/A[1]
	Night	N/A[1]	46	N/A[1]
J 220 Parish Drive, Thornton	Day	51	47	-4
	Evening	49	45	-4
	Night	48	42	-6

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (December 2014)

Table 16 presents the ambient LA10 noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 LA10 Results Comparison – Previous Quarter (December 2014)

Monitoring Location	Period	Long term Night-time LA10 Noise Levels		Difference dB
		December 2014	March 2015	
D Black Hill School, Black Hill	Day	51	53	2
	Evening	52	51	-1
	Night	49	43	-6
F Lot 684 Black Hill Road, Black Hill	Day	59	59	0
	Evening	56	54	-2
	Night	57	51	-6
G 156 Buchanan Road, Buchanan	Day	54	45	-9
	Evening	49	55	6
	Night	45	54	9
I 49 Magnetic Drive, Ashtonfield	Day	55	61	6
	Evening	54	48	-6
	Night	54	46	-8
L 17 Kilshanny Ave, Ashtonfield	Day	49	54	5
	Evening	48	46	-2
	Night	44	46	2
J 220 Parish Drive, Thornton	Day	54	47	-7
	Evening	47	45	-2
	Night	43	42	-1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (March 2014)

Table 17 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 LA10 Results Comparison – Coinciding Period Last Year (March 2014)

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		March 2014	March 2015	
D Black Hill School, Black Hill	Day	51	53	2
	Evening	48	51	3
	Night	47	43	-4
F Lot 684 Black Hill Road, Black Hill	Day	55	59	4
	Evening	50	54	4
	Night	48	51	3
G 156 Buchanan Road, Buchanan	Day	48	45	-3
	Evening	49	55	6
	Night	47	54	7
I 49 Magnetic Drive, Ashtonfield	Day	56	61	5
	Evening	48	48	0
	Night	44	46	2
L 17 Kilshanny Ave, Ashtonfield	Day	49	54	5
	Evening	51	46	-5
	Night	50	46	-4
J 220 Parish Drive, Thornton	Day	46	47	1
	Evening	49	45	-4
	Night	48	42	-6

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.3 Rail Noise Impact

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**. Only 3 trains during the day time and night were recorded to have passed the monitoring location J during the monitoring period. No trains were loaded during the evening period during the noise monitoring at Location J.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time
25/04/2015	08:00 am to 15:58 pm
26/04/2015	06:20 am to 09:20 am
26/04/2015	14:09 pm to 17:31 pm

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19**.

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(Period)}$	Criteria $L_{Aeq(Period)}$	Compliance
Location J	25/04/2015	Day	48	55	Yes
	26/04/2015		47		Yes
	N/A	Evening	N/A	45	Yes[1]
	25/04/2015	Night	40	40	Yes

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No trains were loaded during this time period.

The results contained in **Table 19** show that compliance with the rail noise criteria was achieved during the March 2015 Quarter.

6 CONCLUSION

SLR was engaged by Donaldson Coal Pty Ltd to conduct quarterly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Coal Mine Noise Monitoring Program, dated 27 May 2007.

The results of the operator-attended noise measurements conducted at six (6) focus locations surrounding the mine site are included in **Table 2** to **Table 7**.

Abel Mine operations at the CHPP were only faintly audible at Location L during the evening. Abel portal operations were not observed to be audible at any other locations during the monitoring period. Contributed noise levels from Abel Mine did not exceed noise emission goals (including night-time sleep arousal criteria) and were in compliance with the Abel Mine *Project Approval* at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (March 2015), the baseline monitoring period, the last monitoring period (December 2014), and the coinciding monitoring period from last year (March 2014) has been conducted.

An assessment of the rail noise impact was also undertaken, determining compliance with the criteria stated in **Section 2.2**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

Appendix A

Acoustic Terminology
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1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

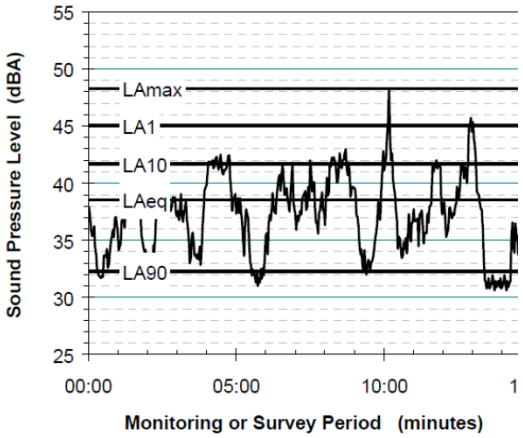
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 1E-12 W.
The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

Appendix A

Acoustic Terminology
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7 Frequency Analysis

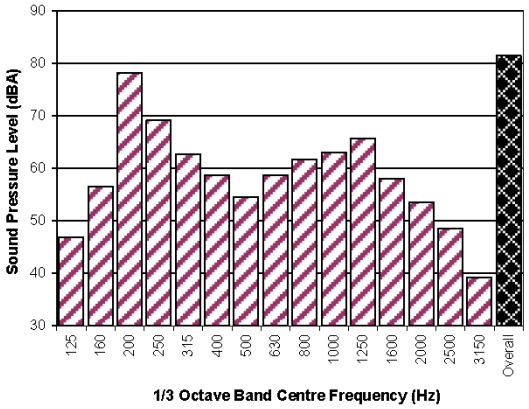
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

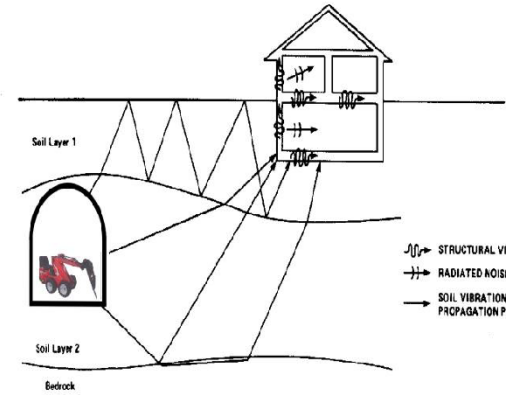
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

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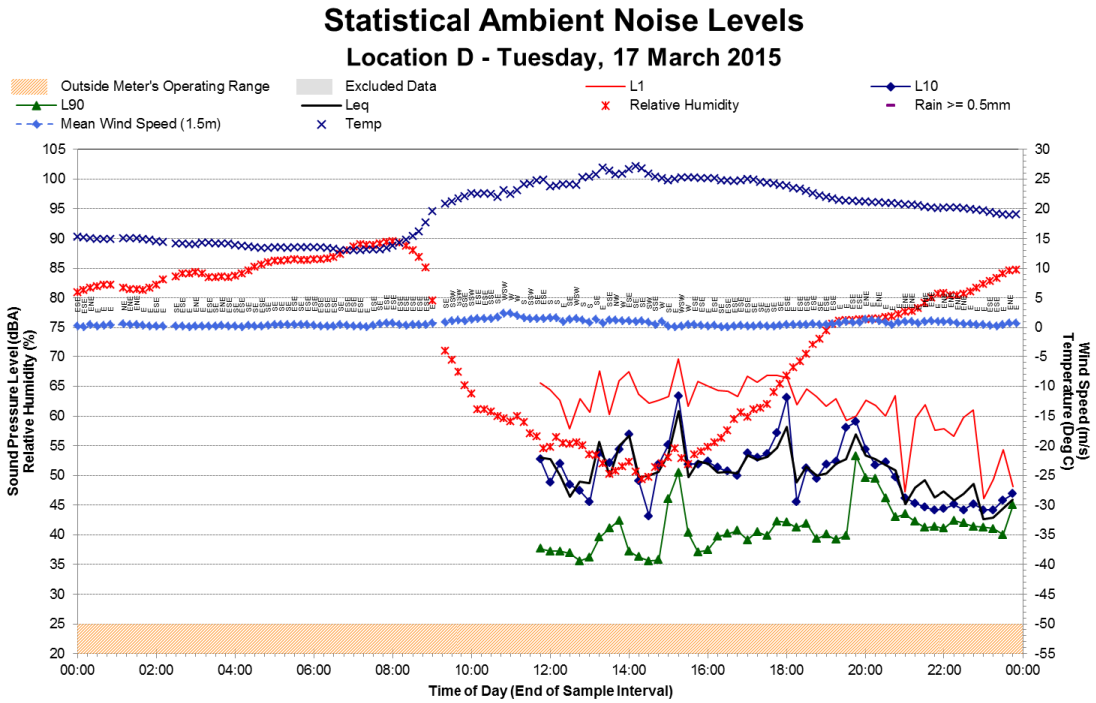
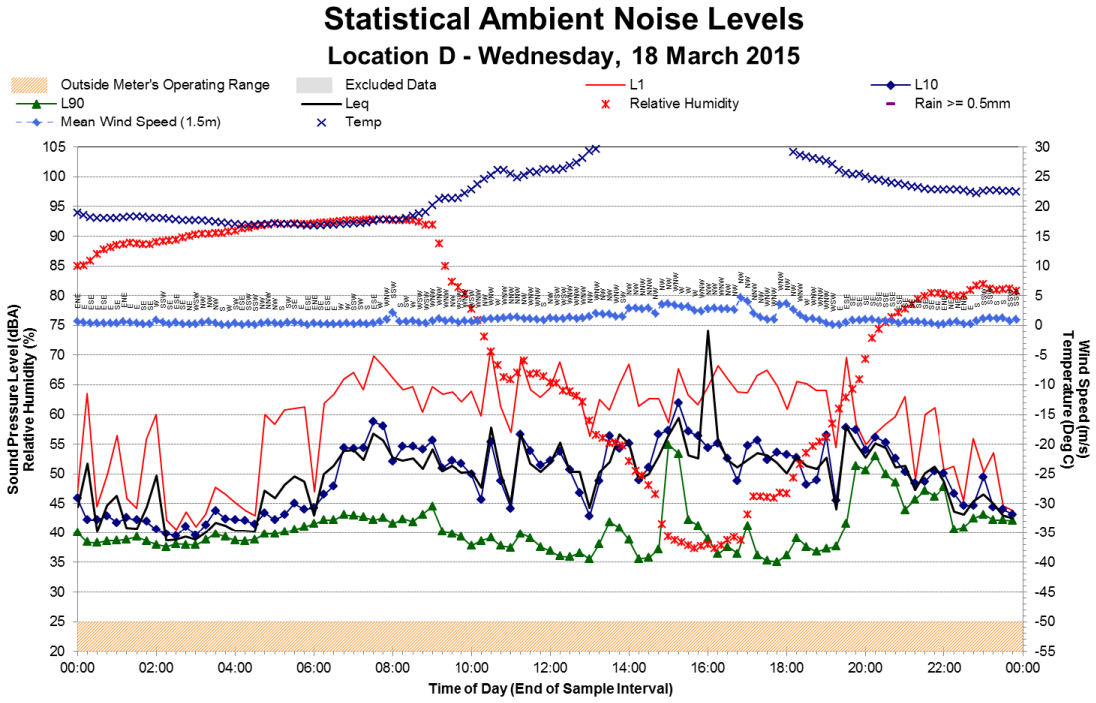
Appendix C1

Statistical Ambient Noise Levels – Location D
Report Q57 630.01053-R1





Appendix C1

Statistical Ambient Noise Levels – Location D
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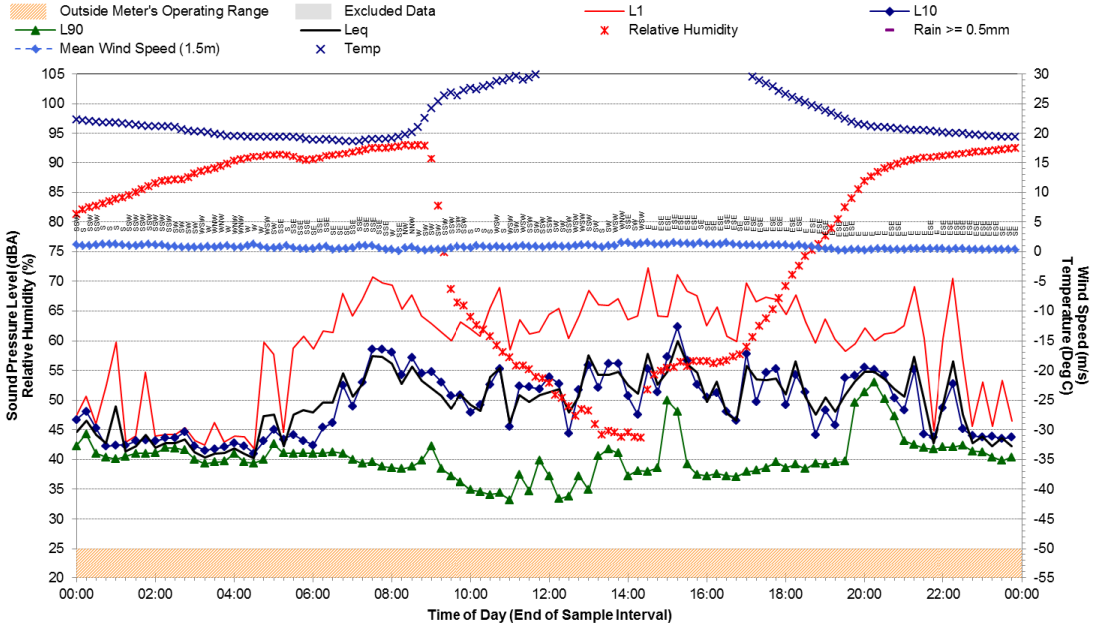
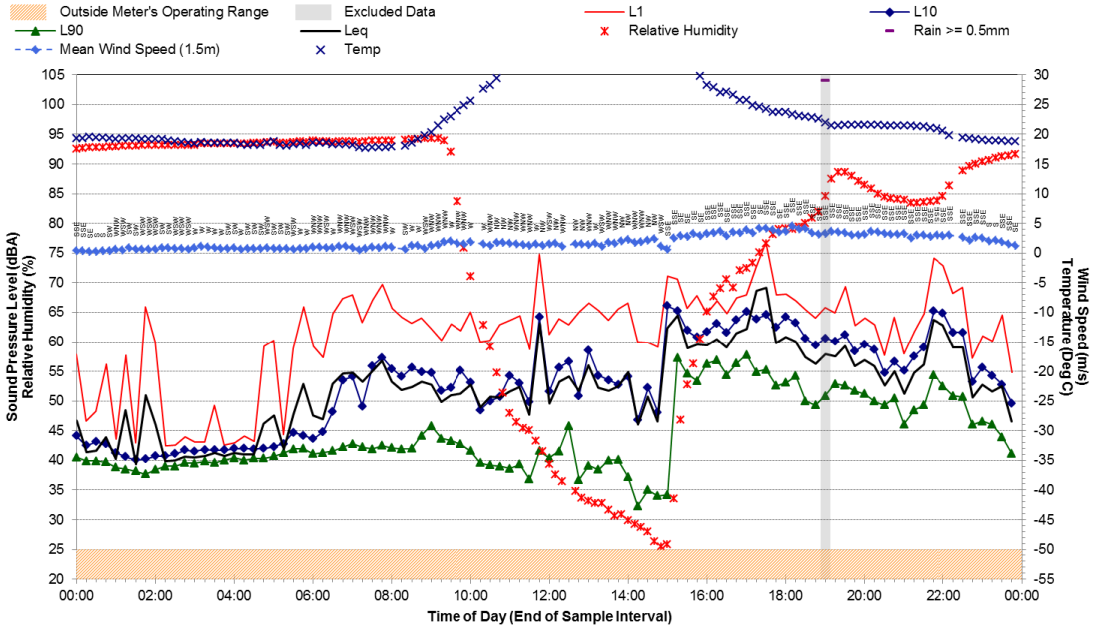
Statistical Ambient Noise Levels

Location D - Thursday, 19 March 2015



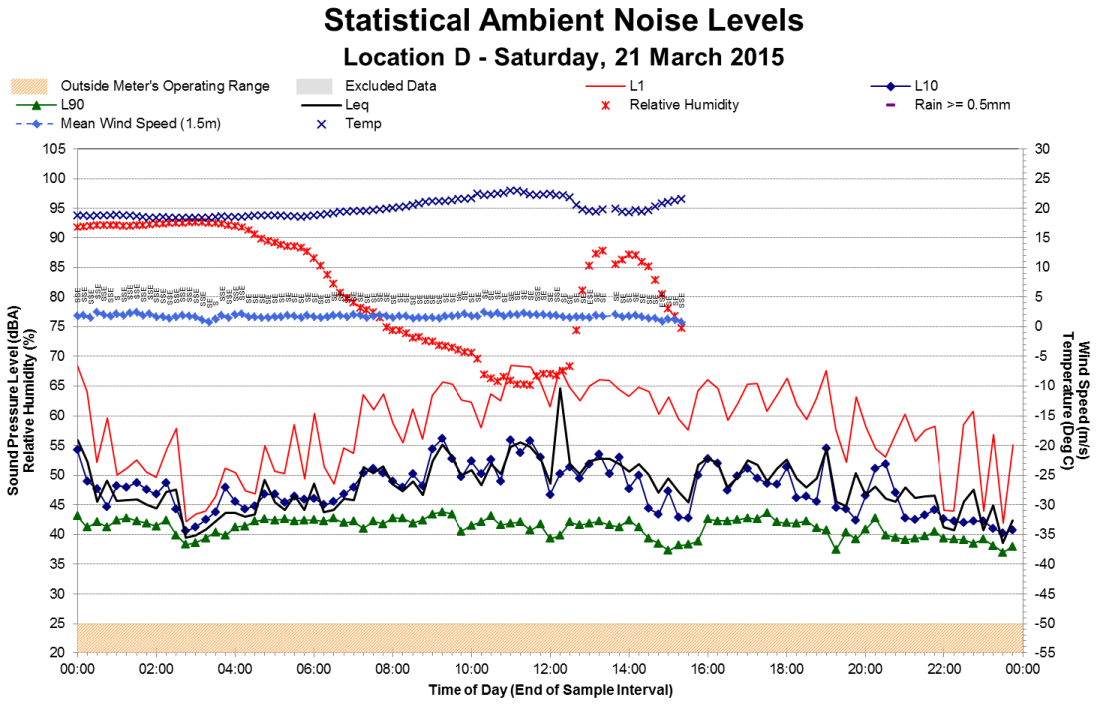
Statistical Ambient Noise Levels

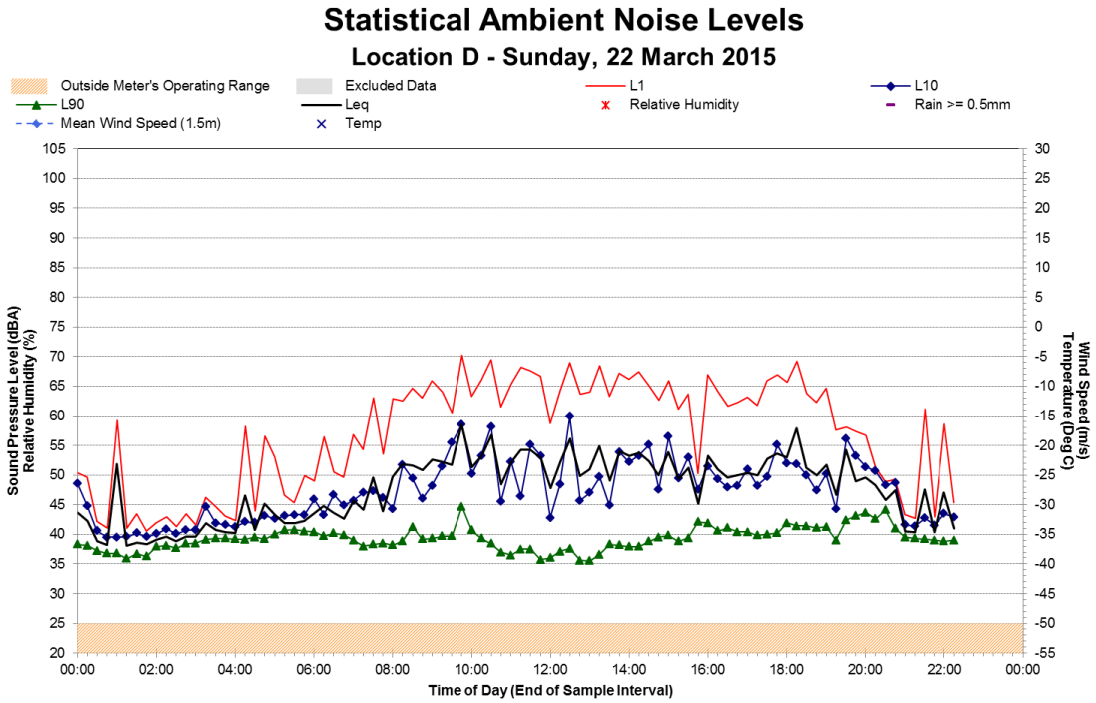
Location D - Friday, 20 March 2015



Appendix C1

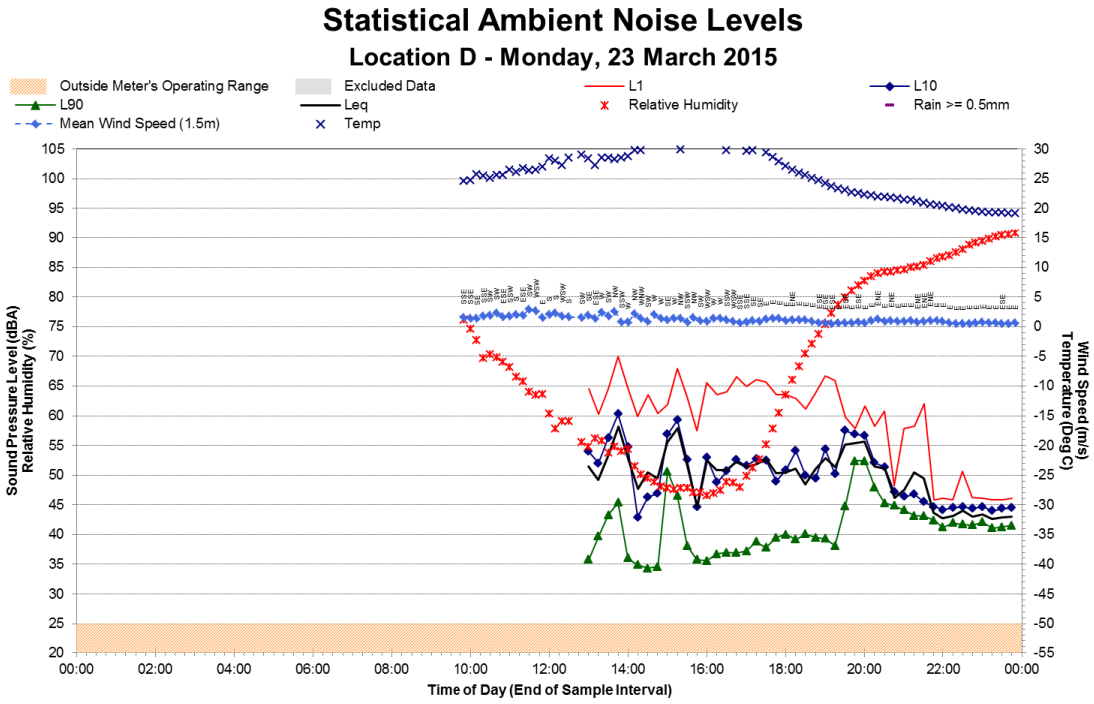
Statistical Ambient Noise Levels – Location D
Report Q57 630.01053-R1

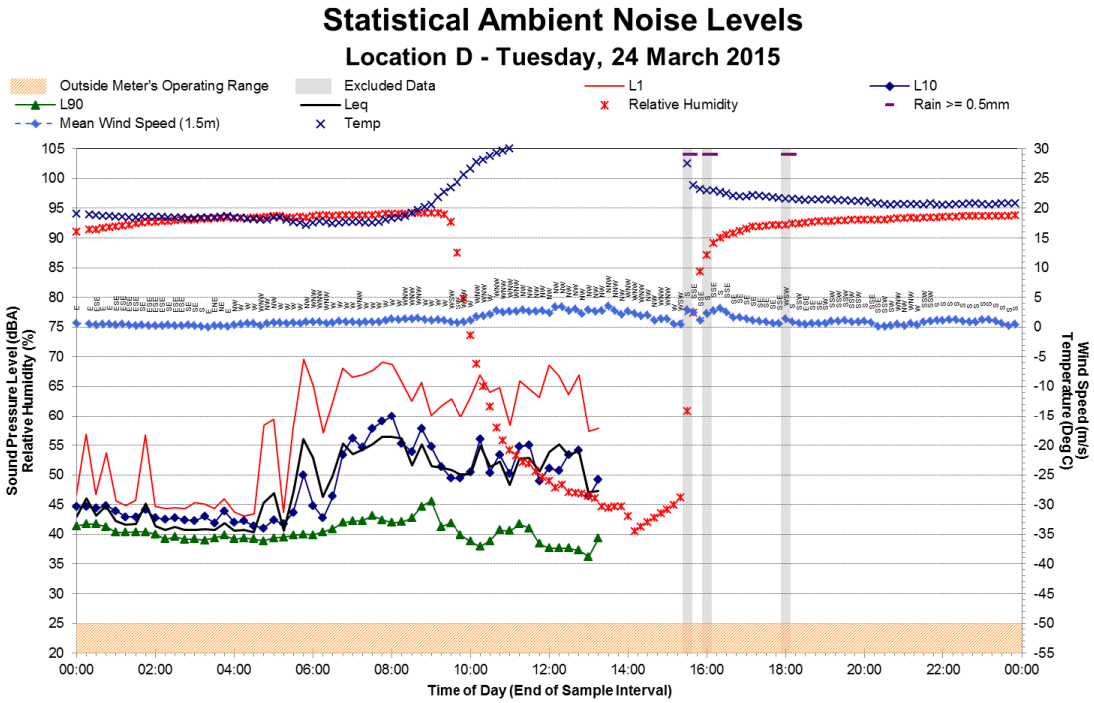




Appendix C1

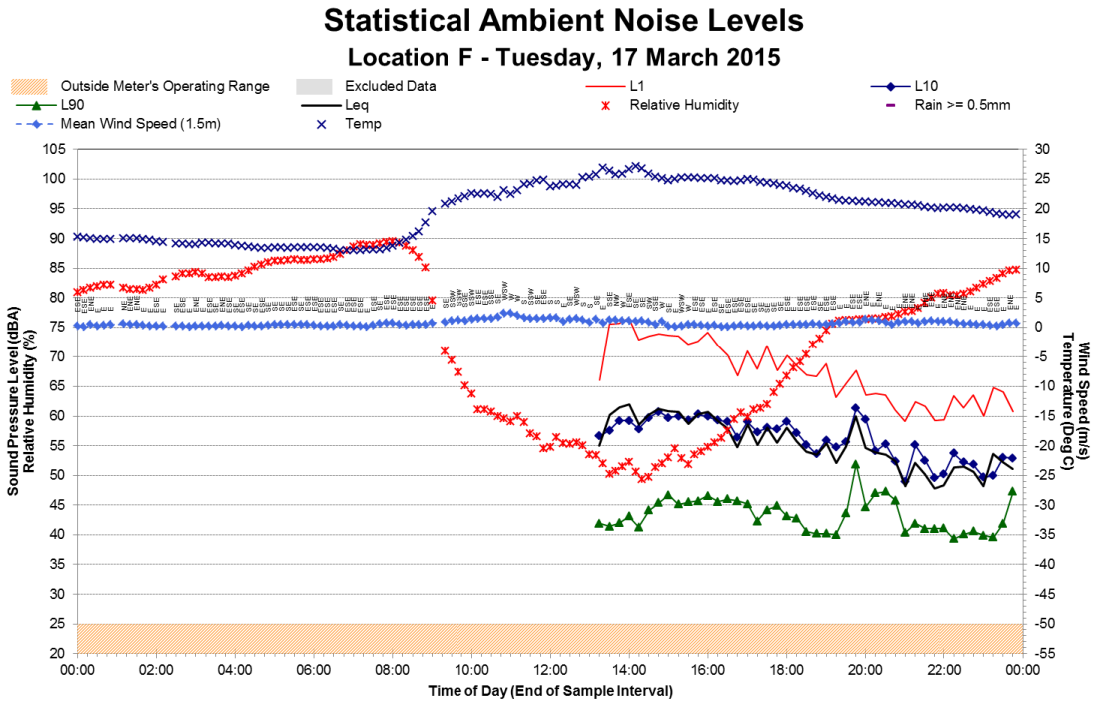
Statistical Ambient Noise Levels – Location D
Report Q57 630.01053-R1

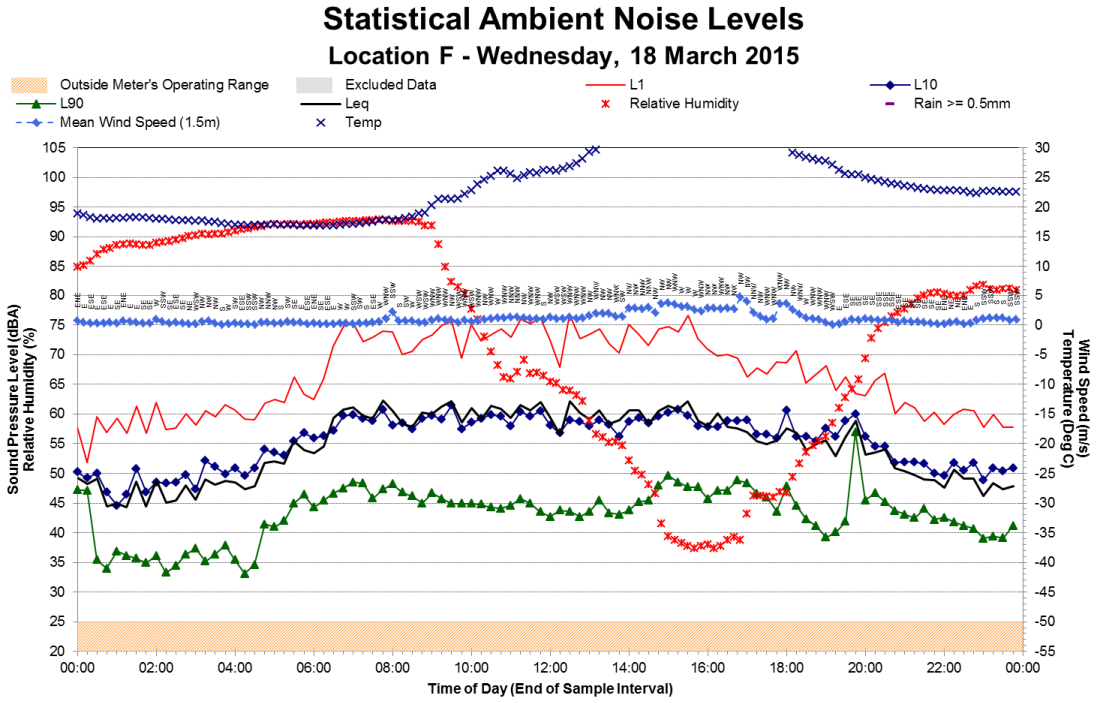




Appendix C2

Statistical Ambient Noise Levels – Location F
Report Q57 630.01053-R1





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Statistical Ambient Noise Levels – Location F
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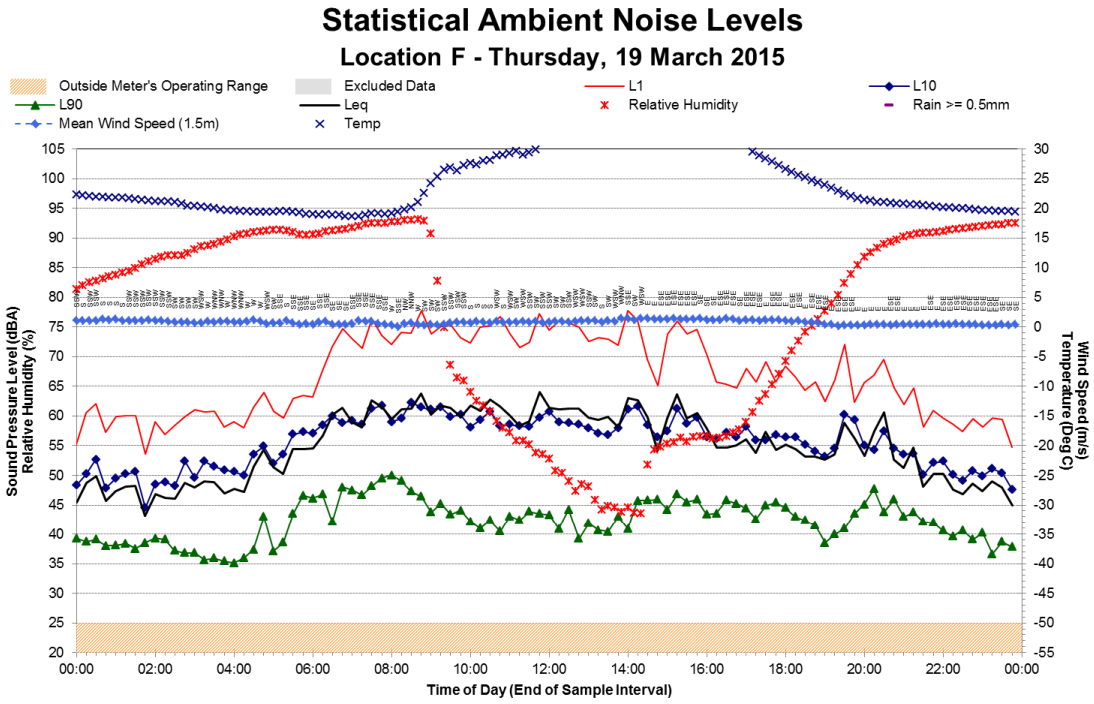

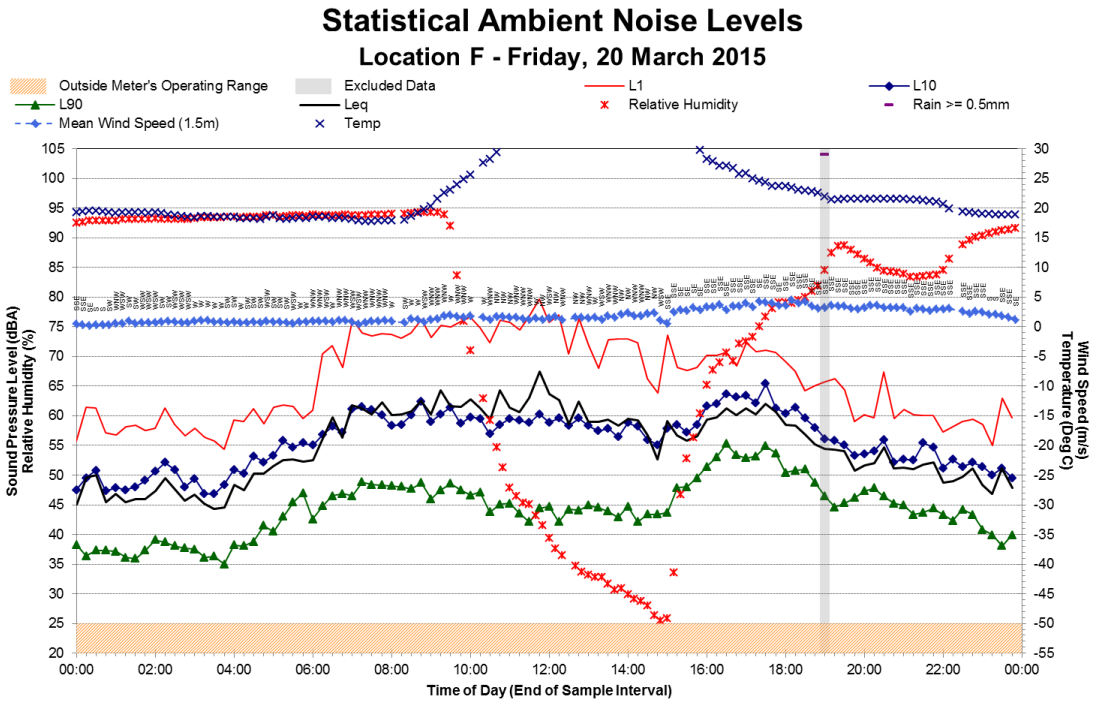

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Statistical Ambient Noise Levels – Location F
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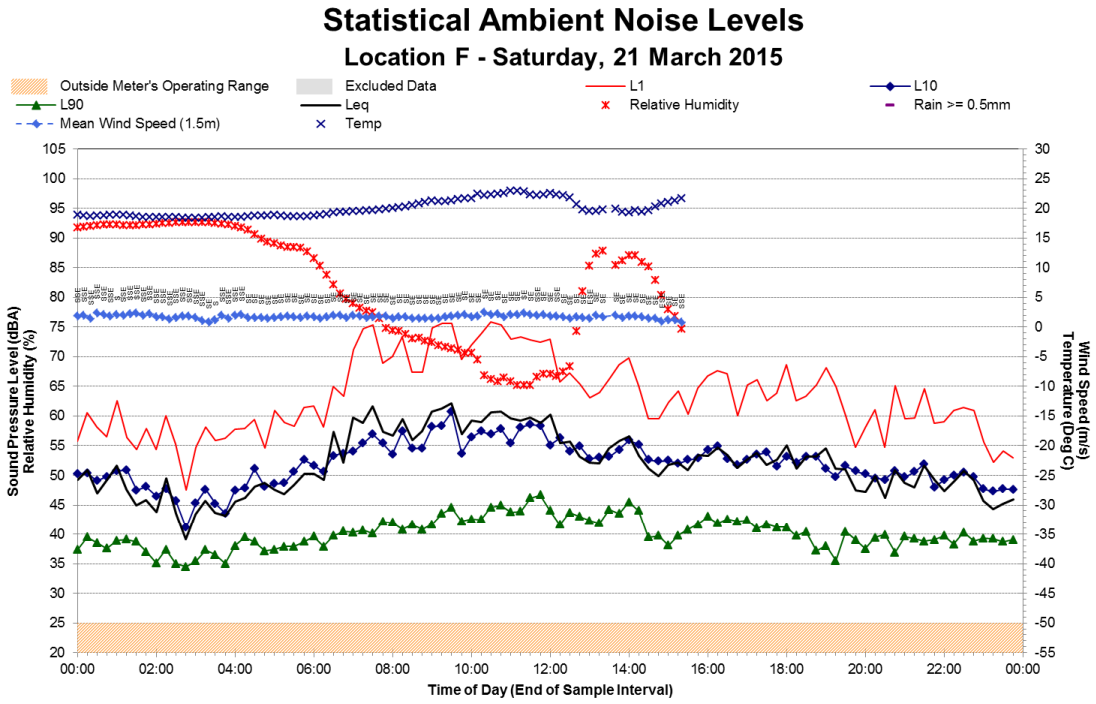

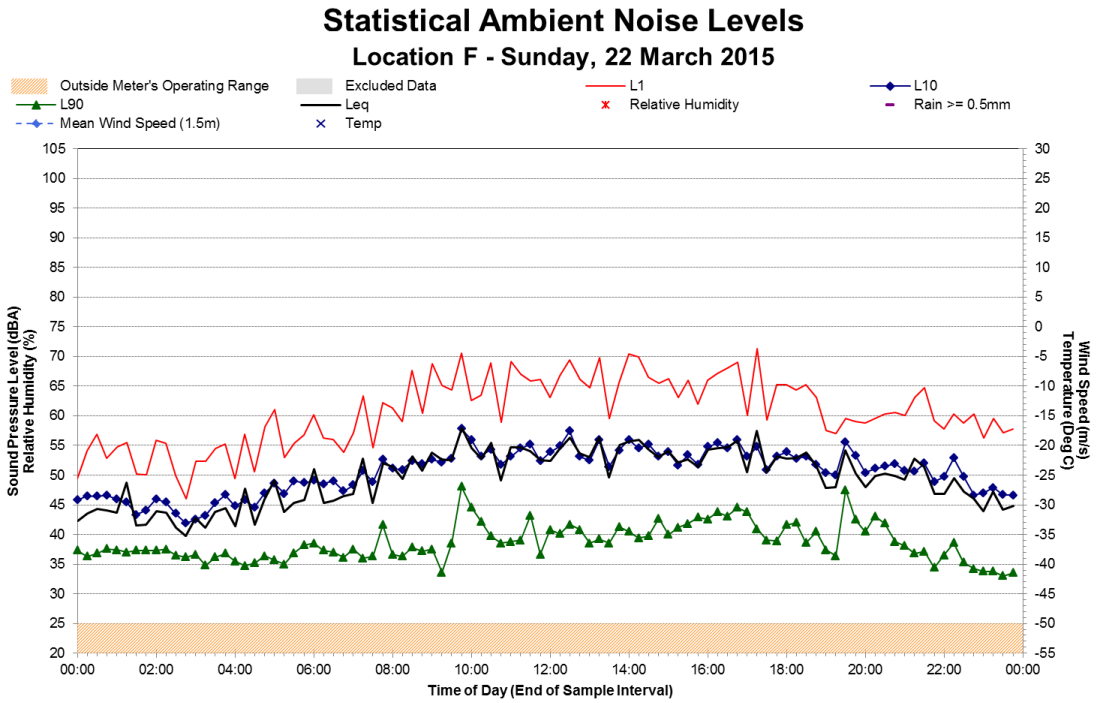

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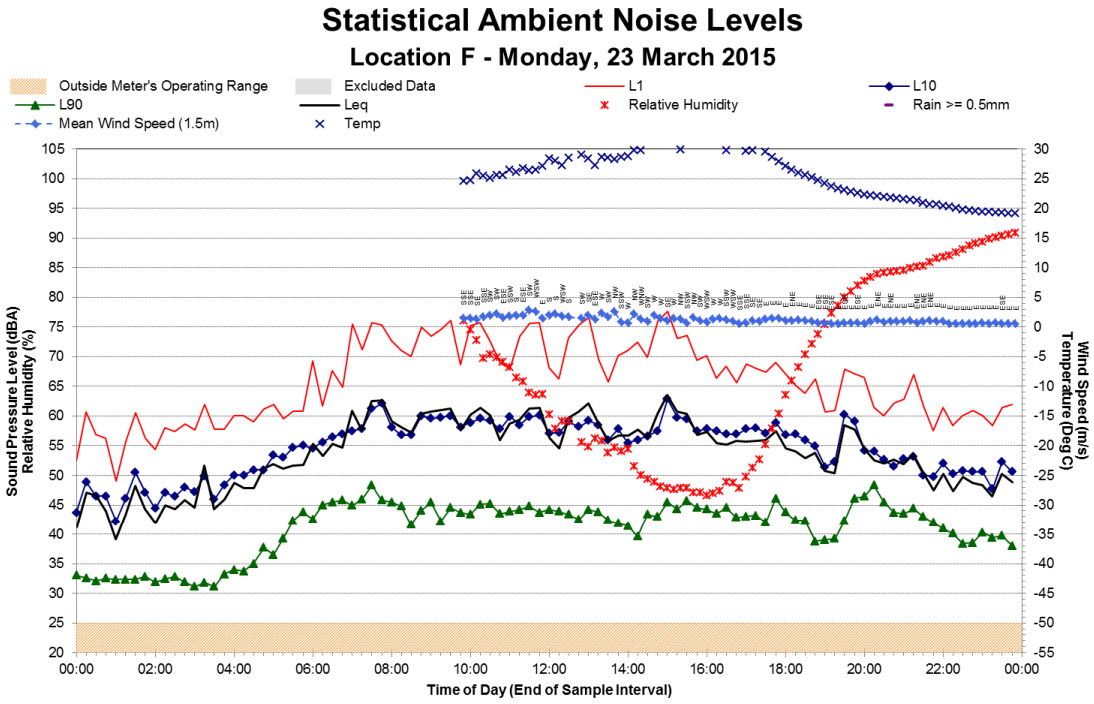

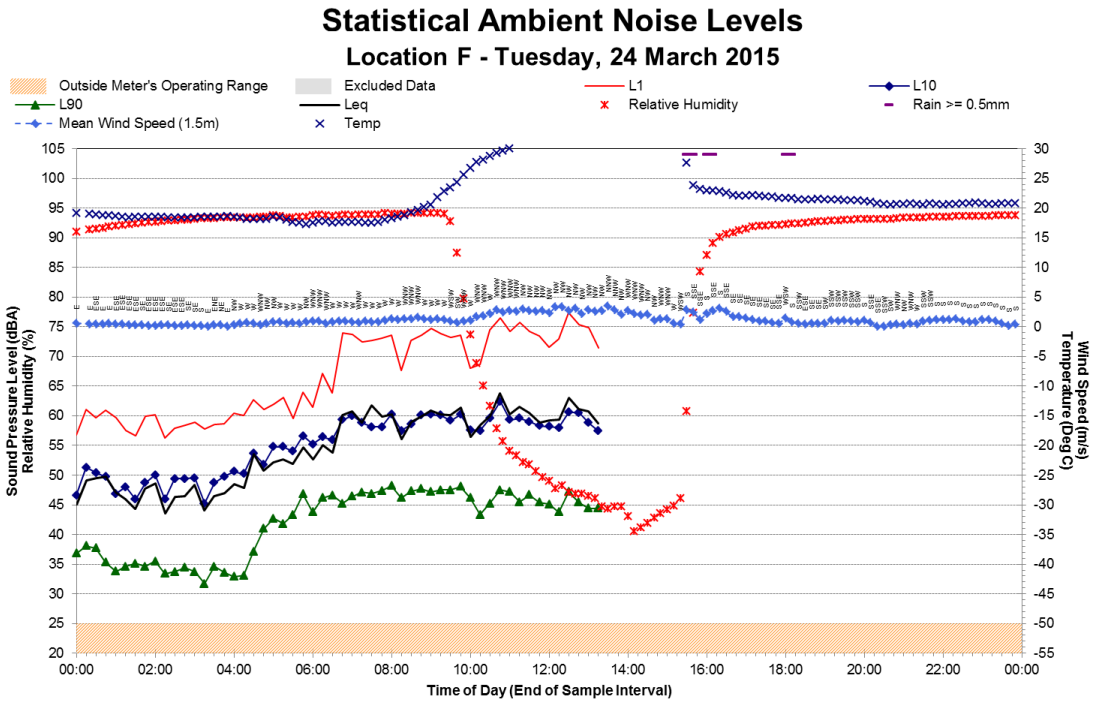

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Statistical Ambient Noise Levels – Location G
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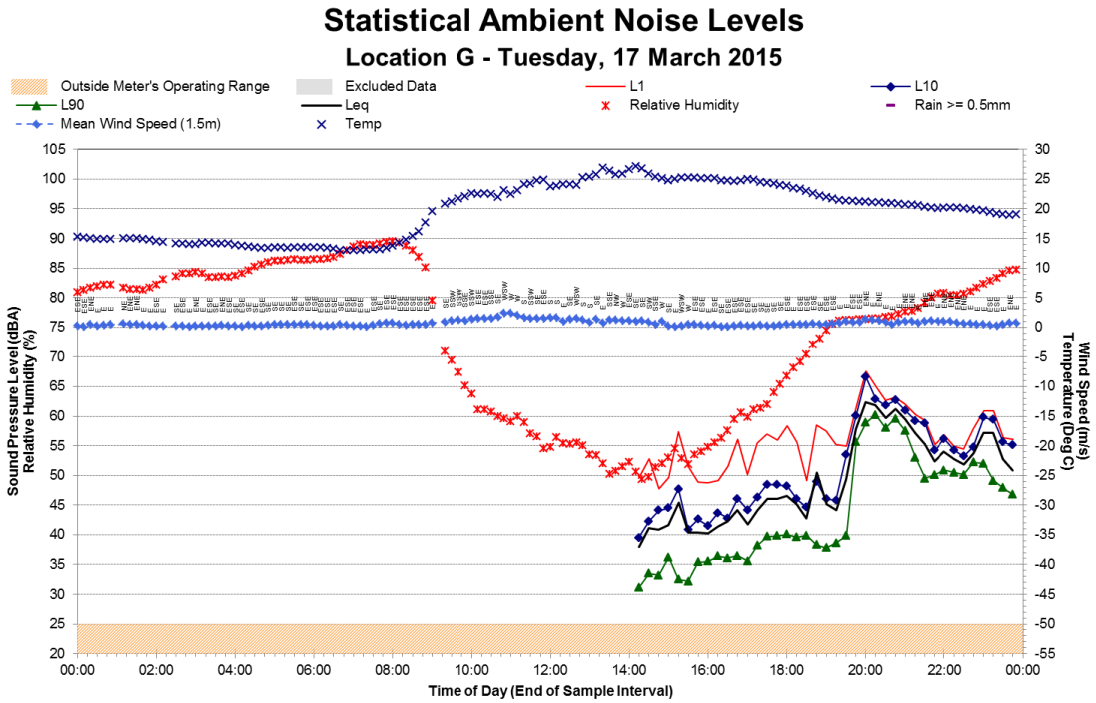

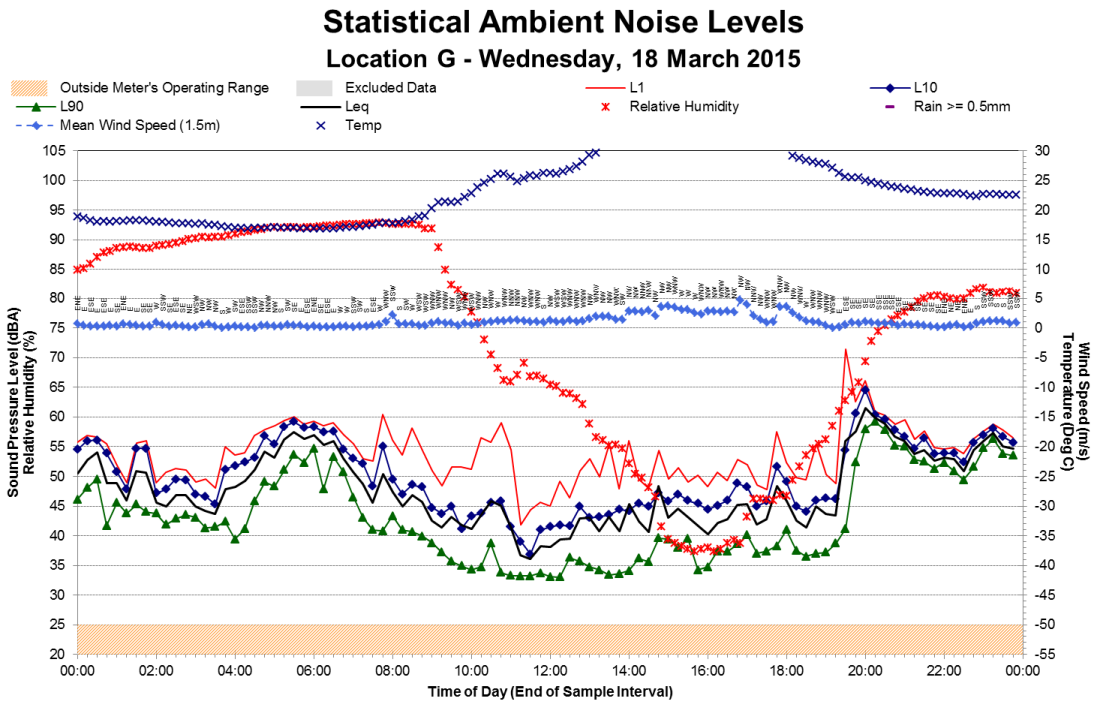

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Statistical Ambient Noise Levels – Location G
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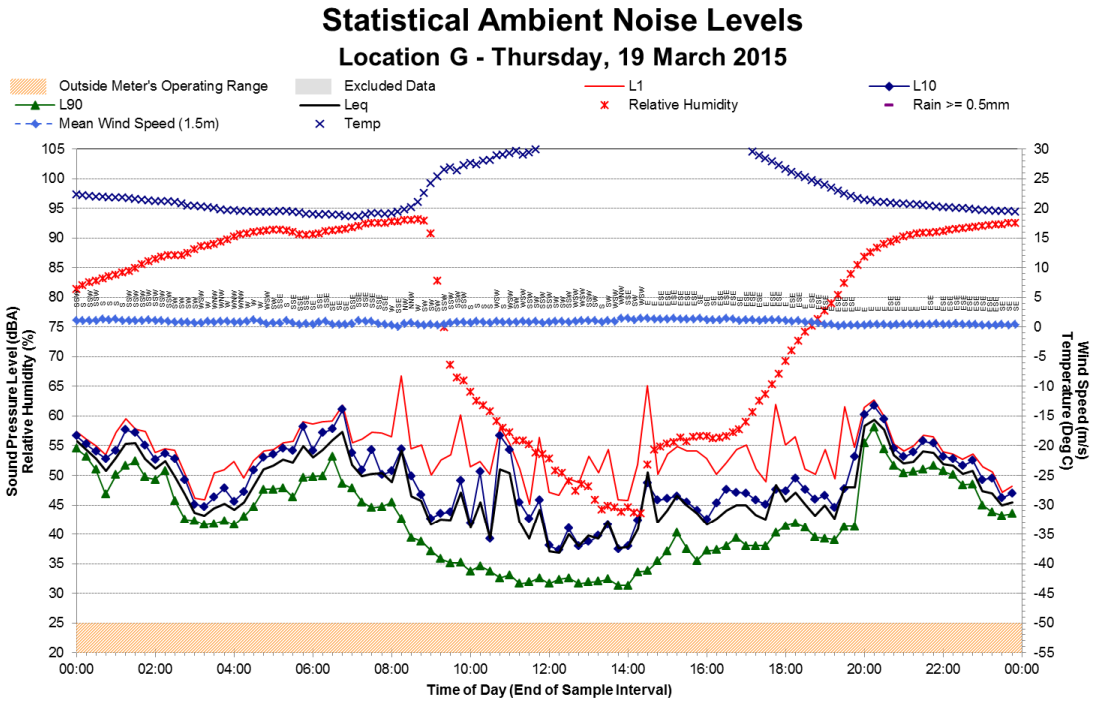

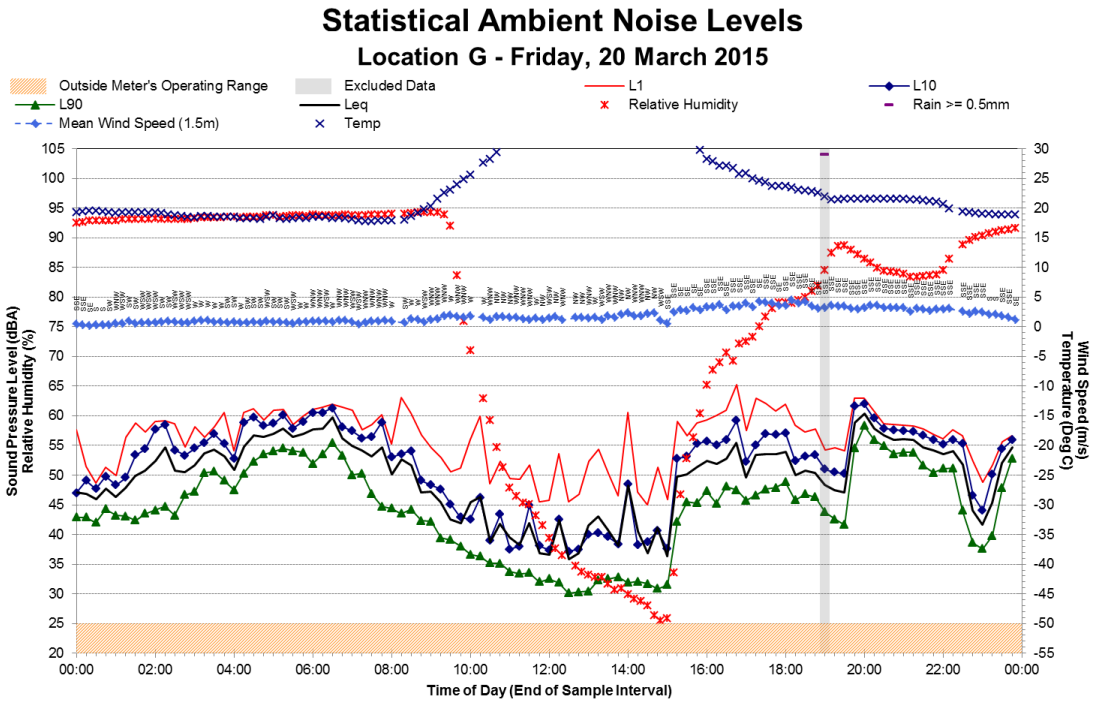

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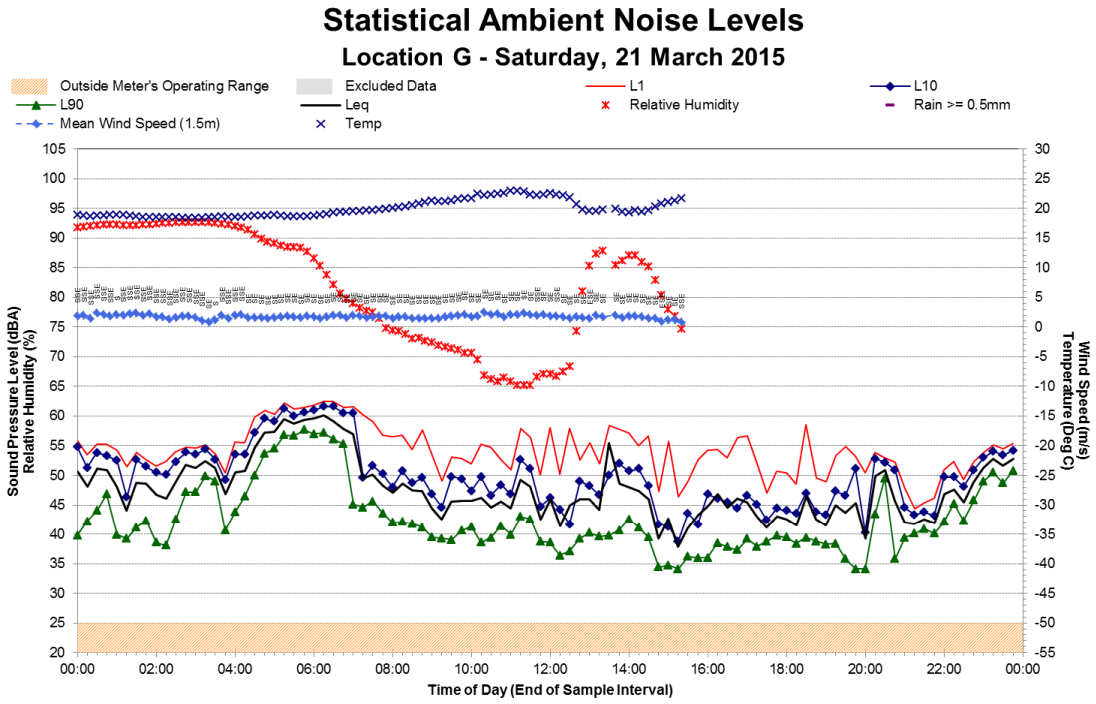

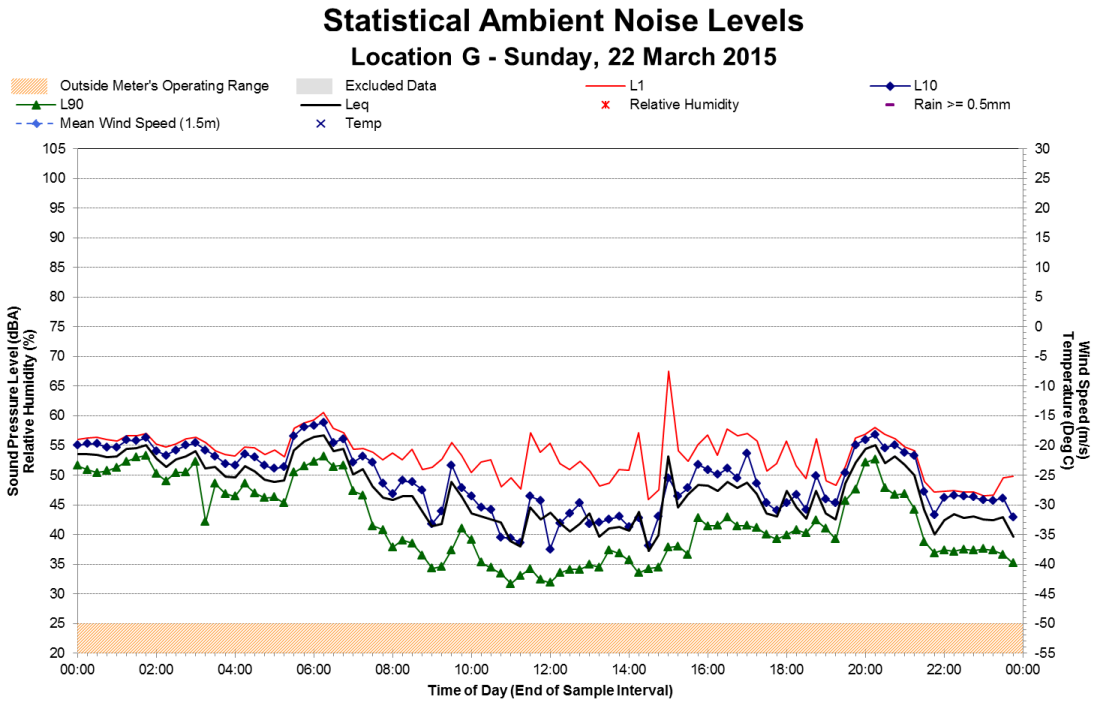

Appendix C3

Statistical Ambient Noise Levels – Location G
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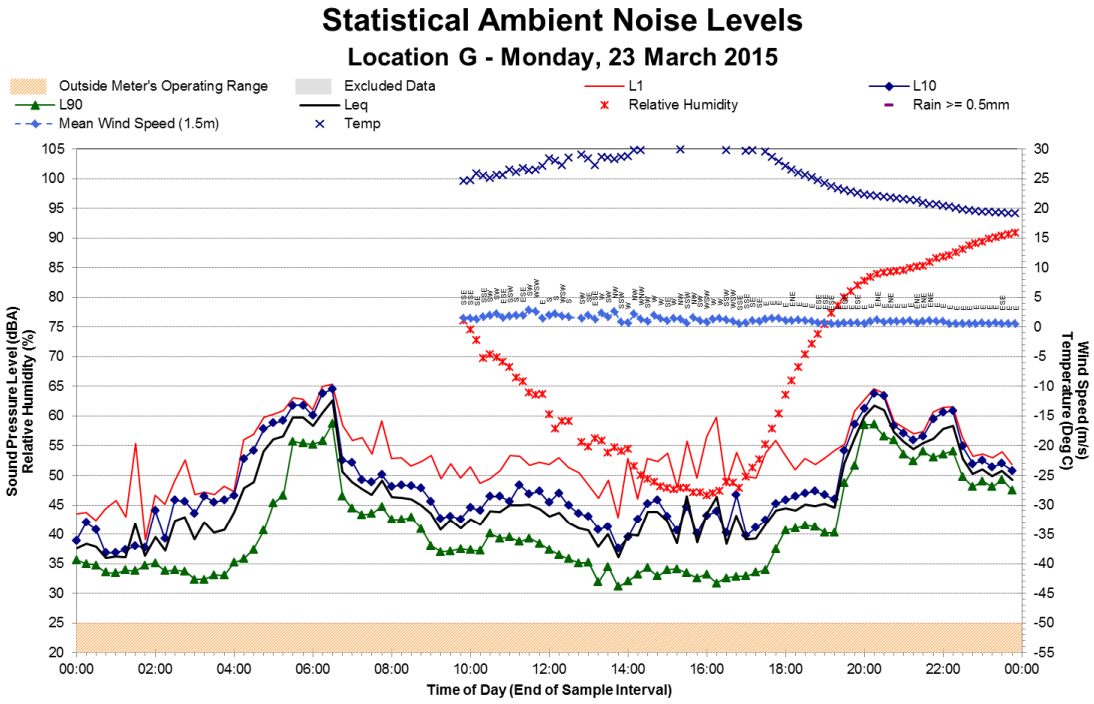

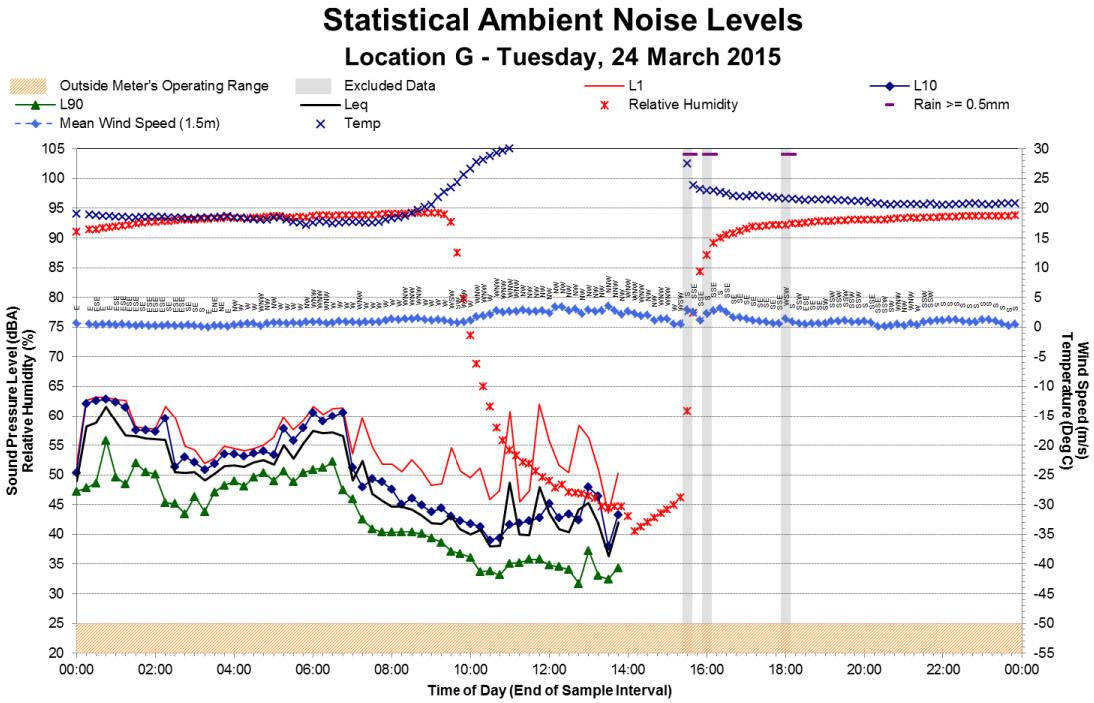

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Statistical Ambient Noise Levels – Location I
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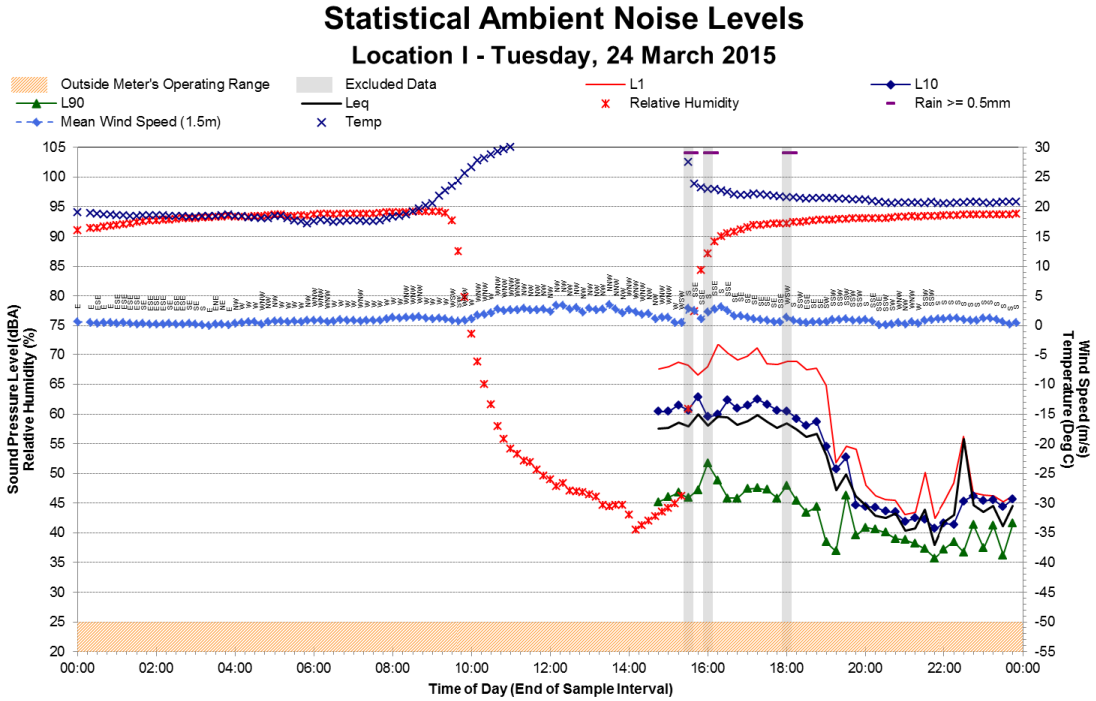

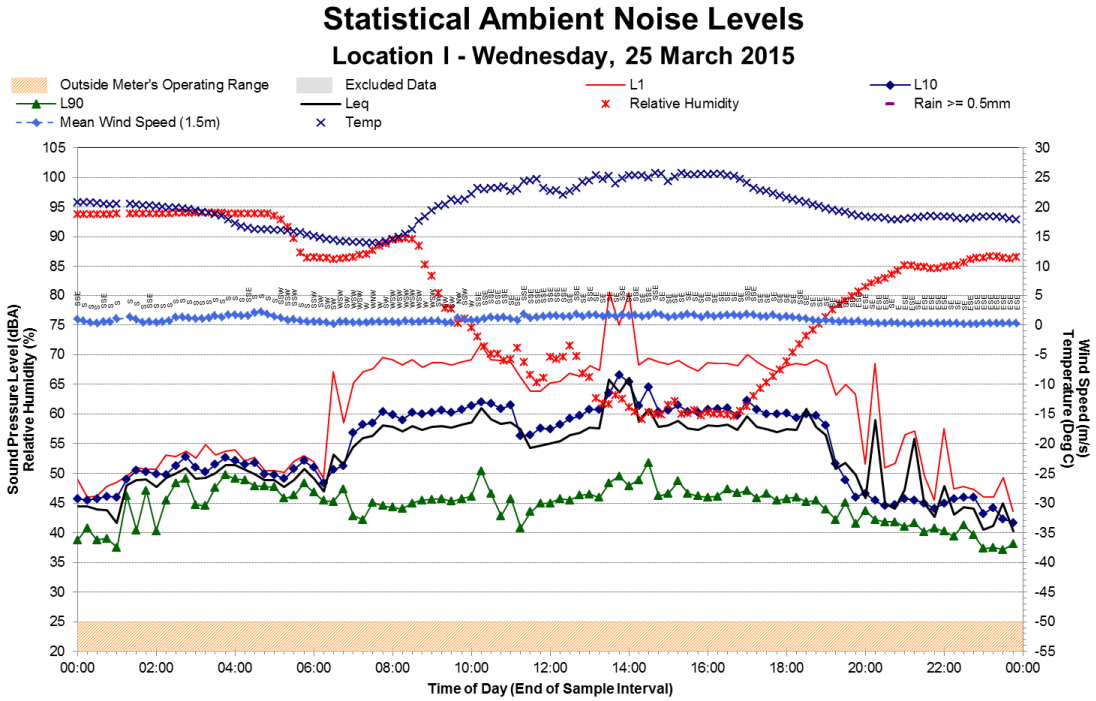

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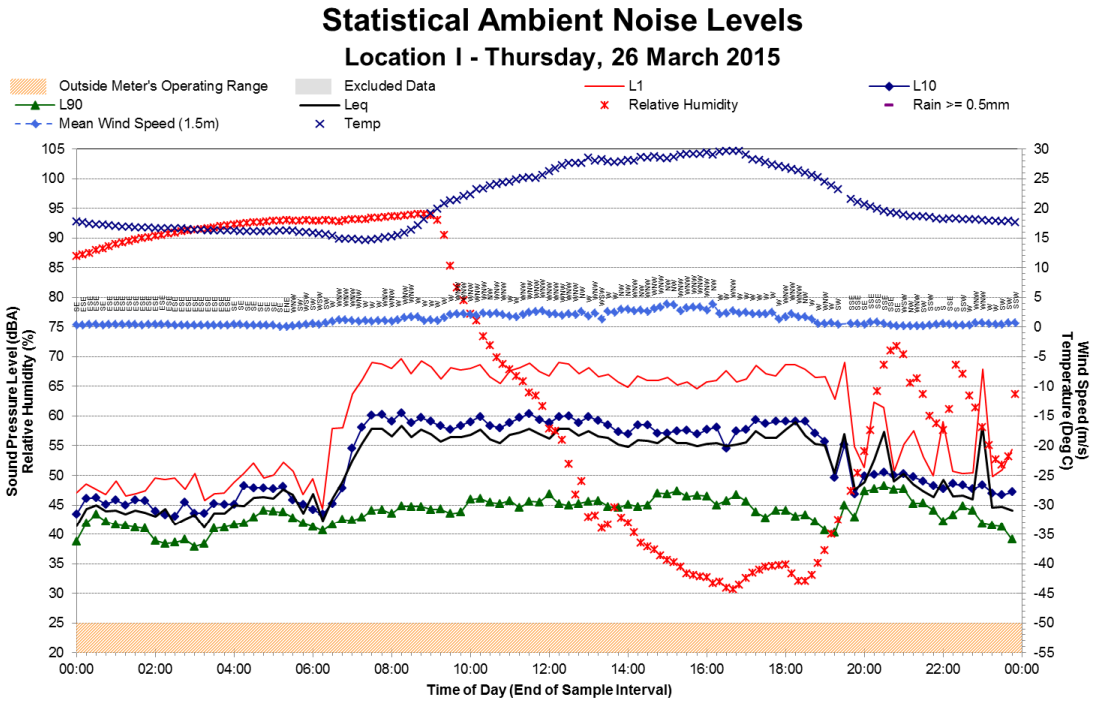

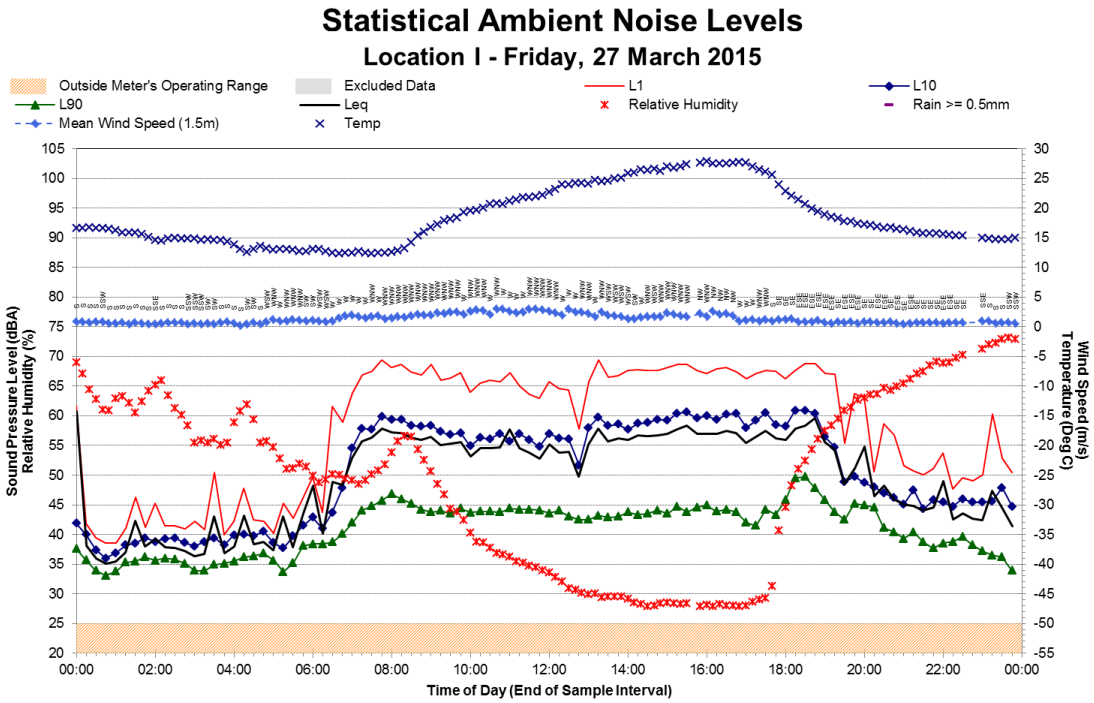

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Statistical Ambient Noise Levels – Location I
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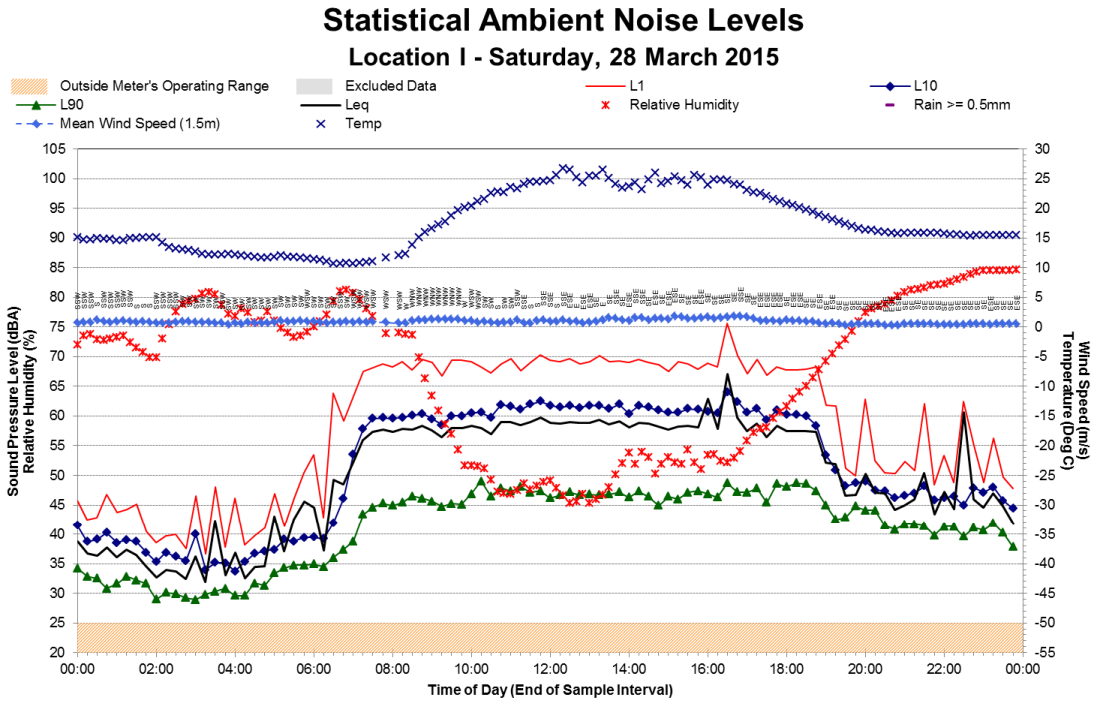

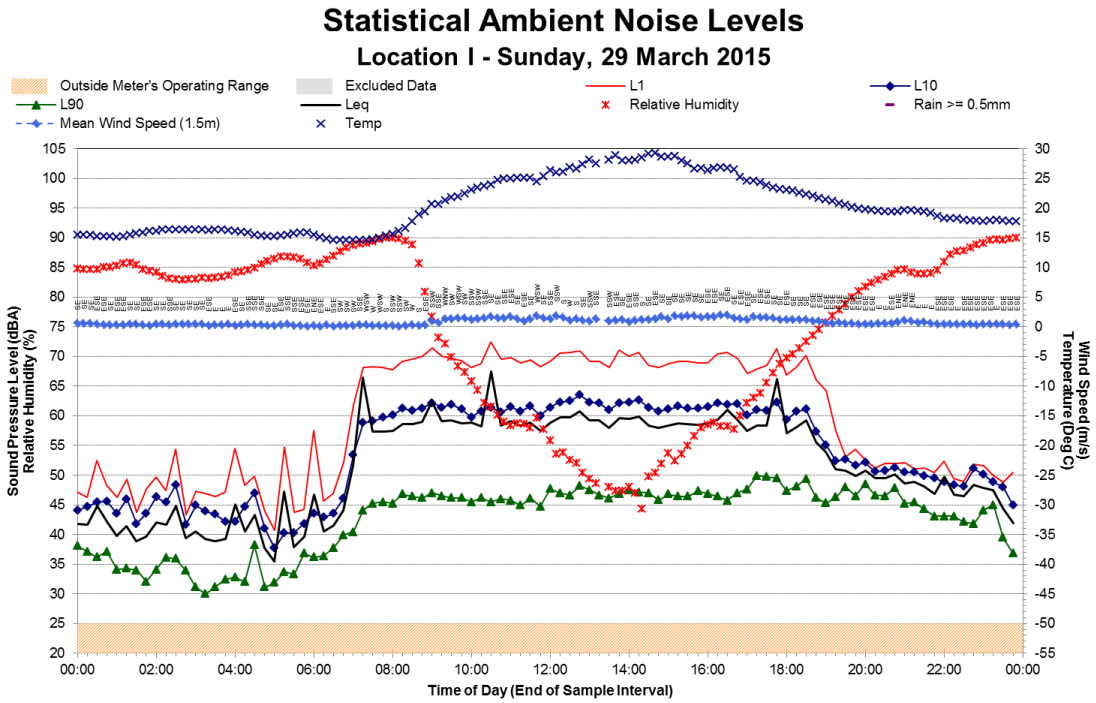

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Statistical Ambient Noise Levels – Location I
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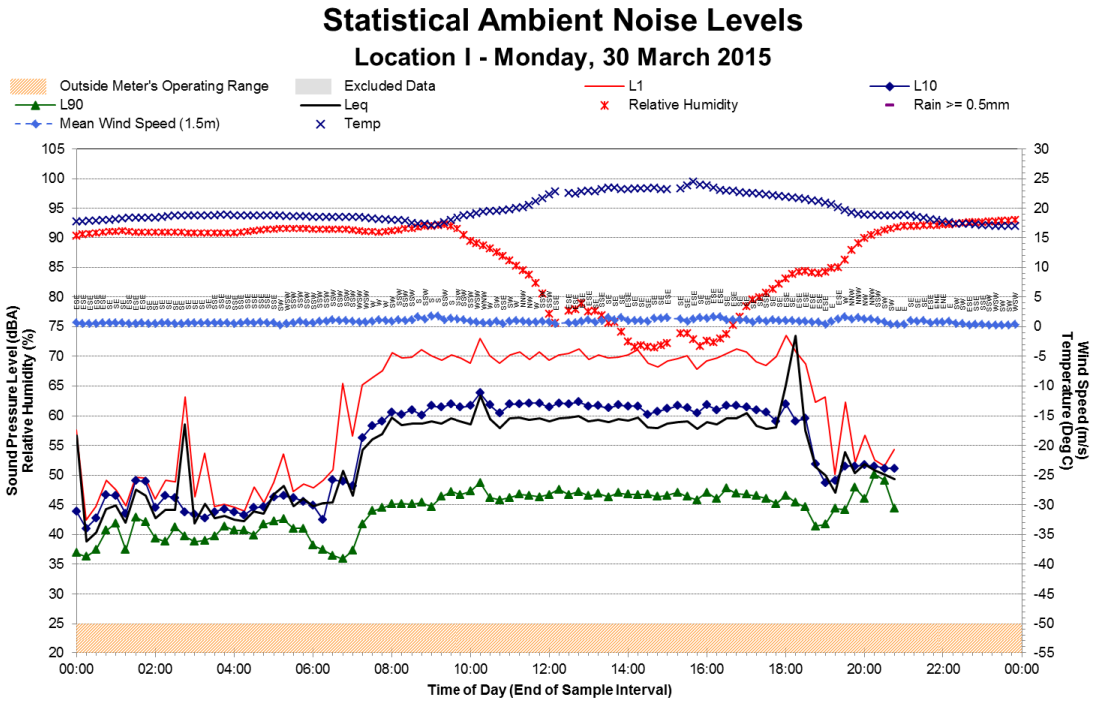

Appendix C5

Statistical Ambient Noise Levels – Location L
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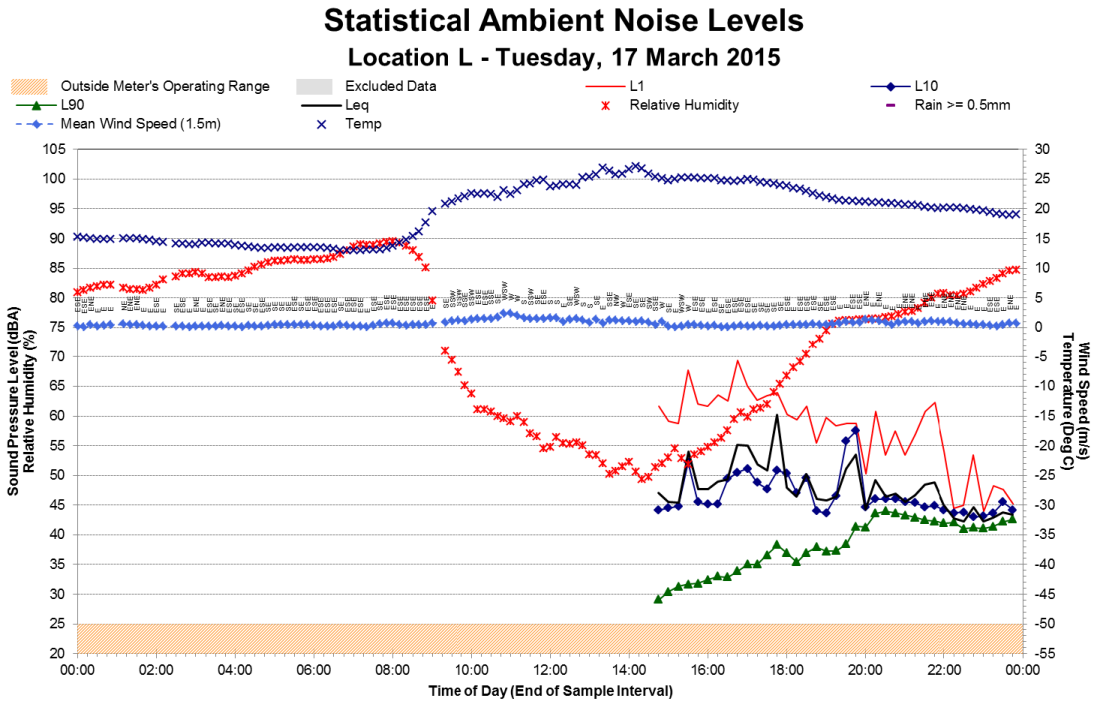
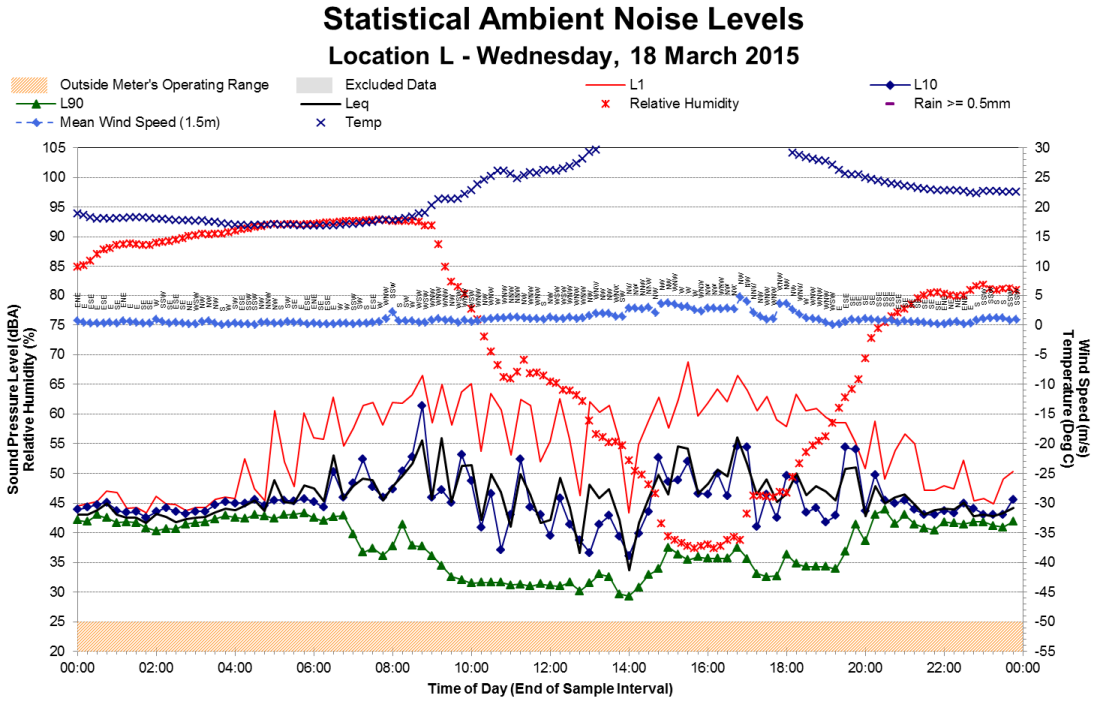
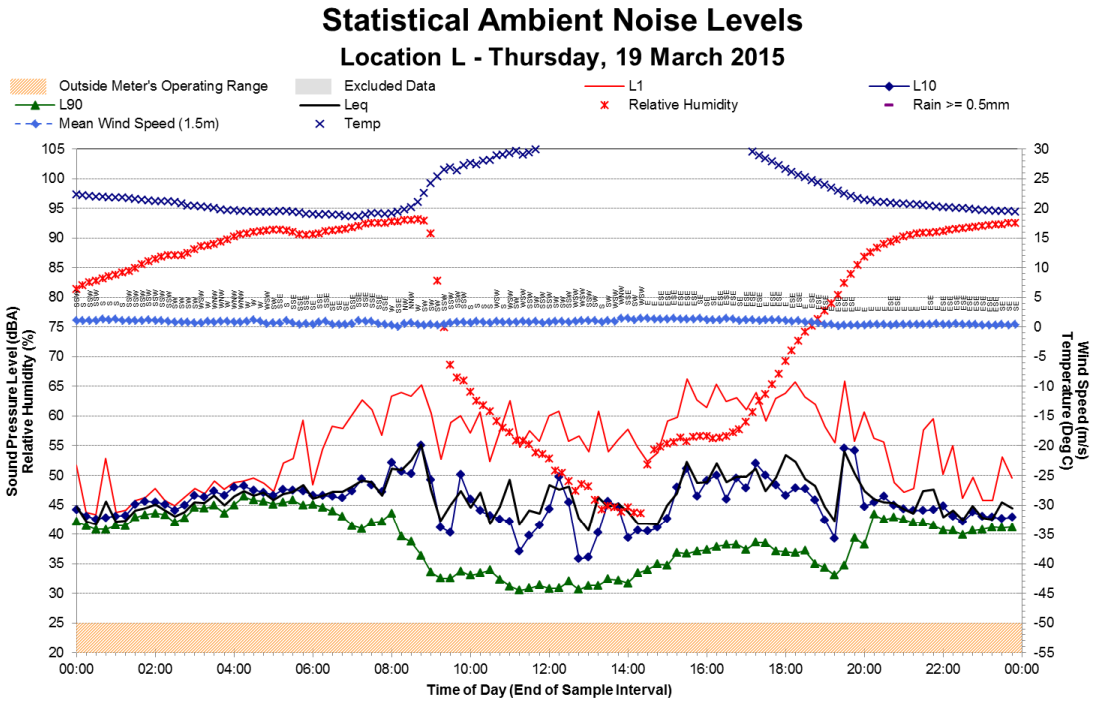
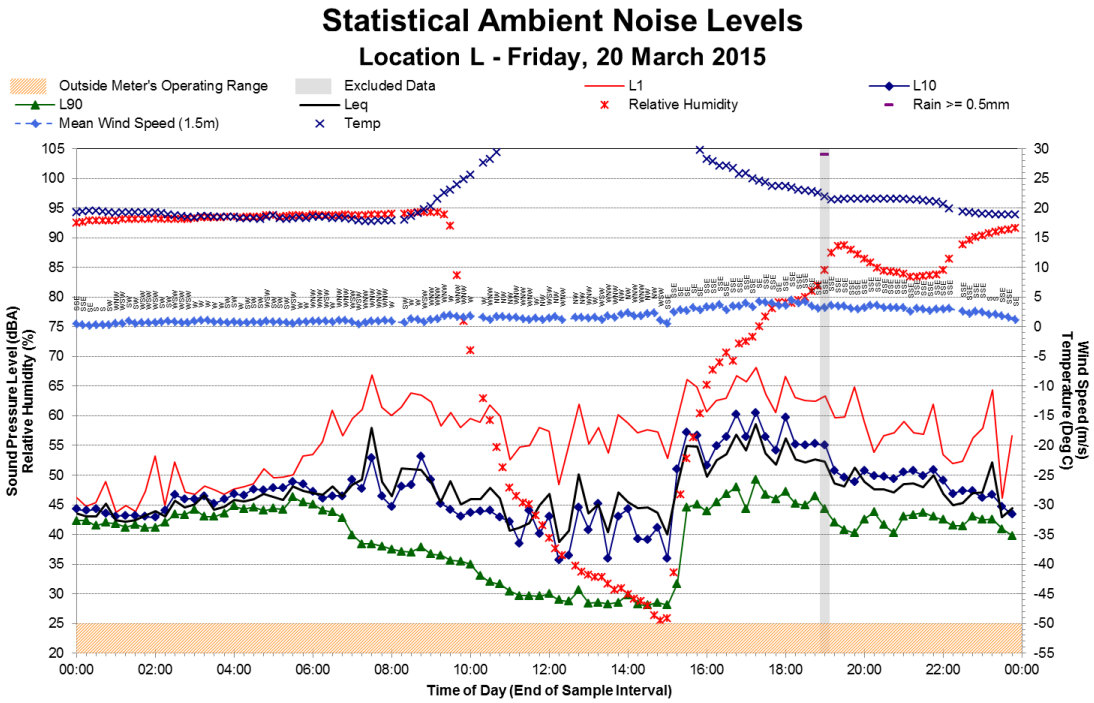





Statistical Ambient Noise Levels
Location L - Thursday, 19 March 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location L - Friday, 20 March 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

Appendix C5

Statistical Ambient Noise Levels – Location L
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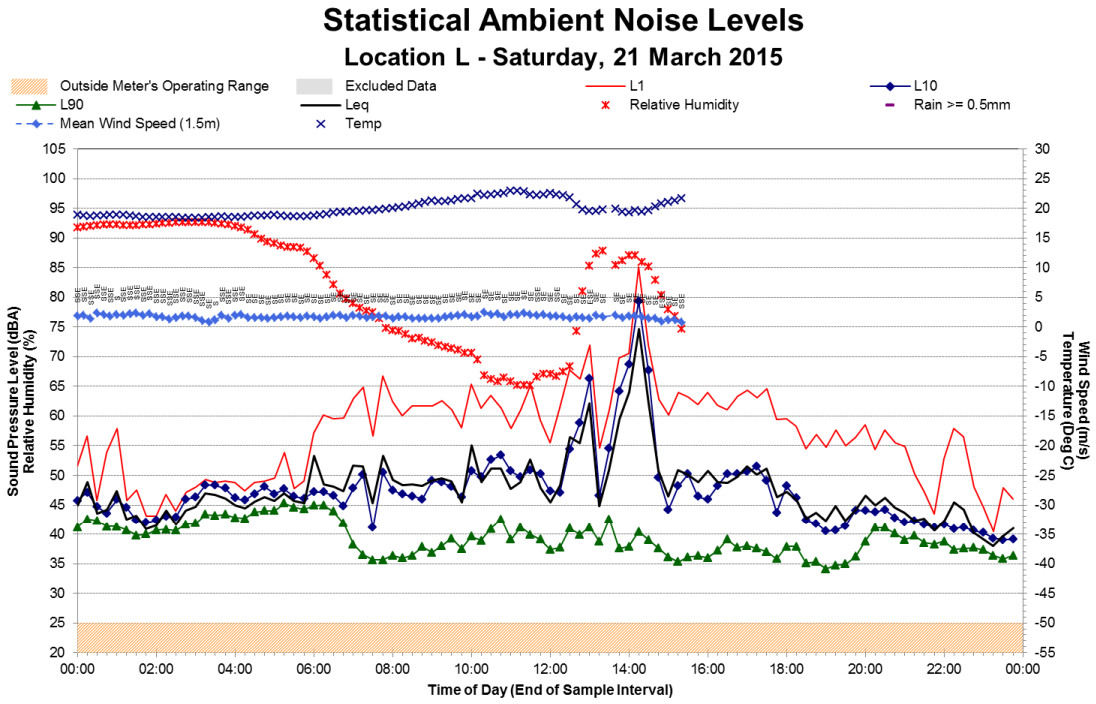

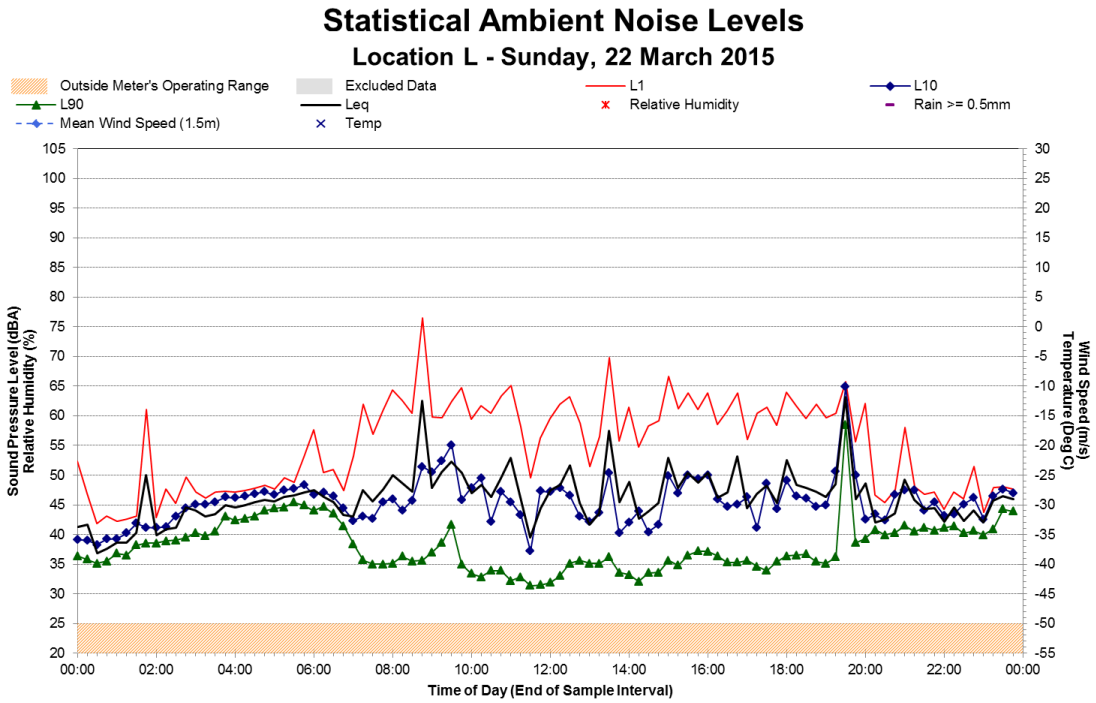

Appendix C5

Statistical Ambient Noise Levels – Location L
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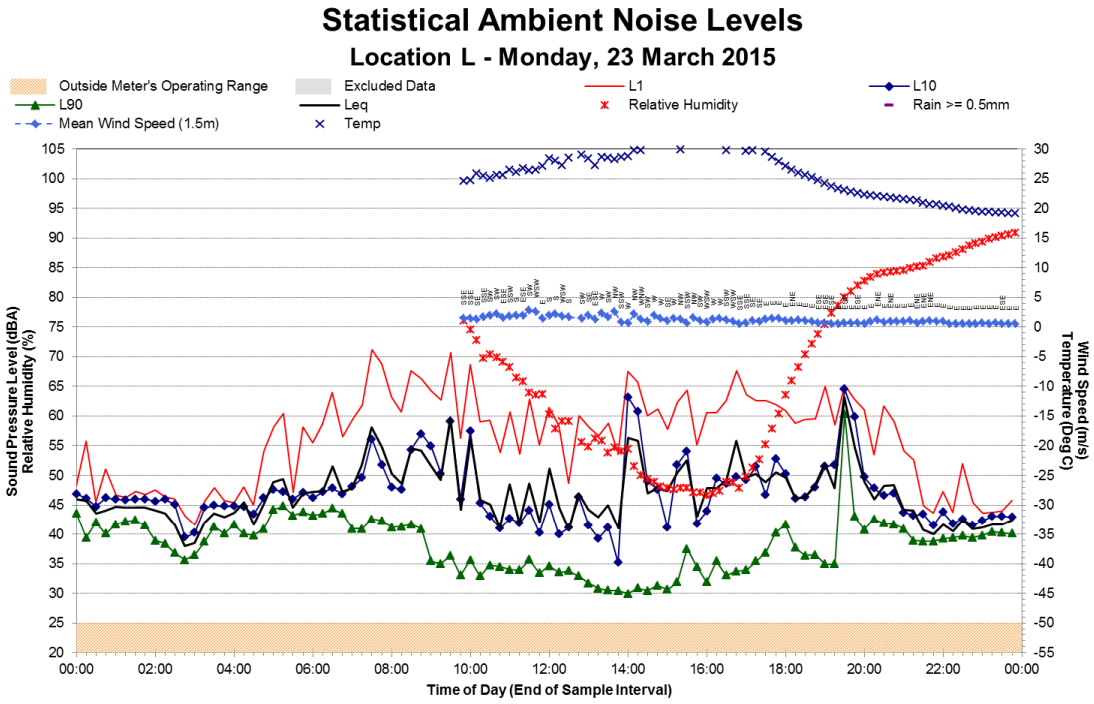

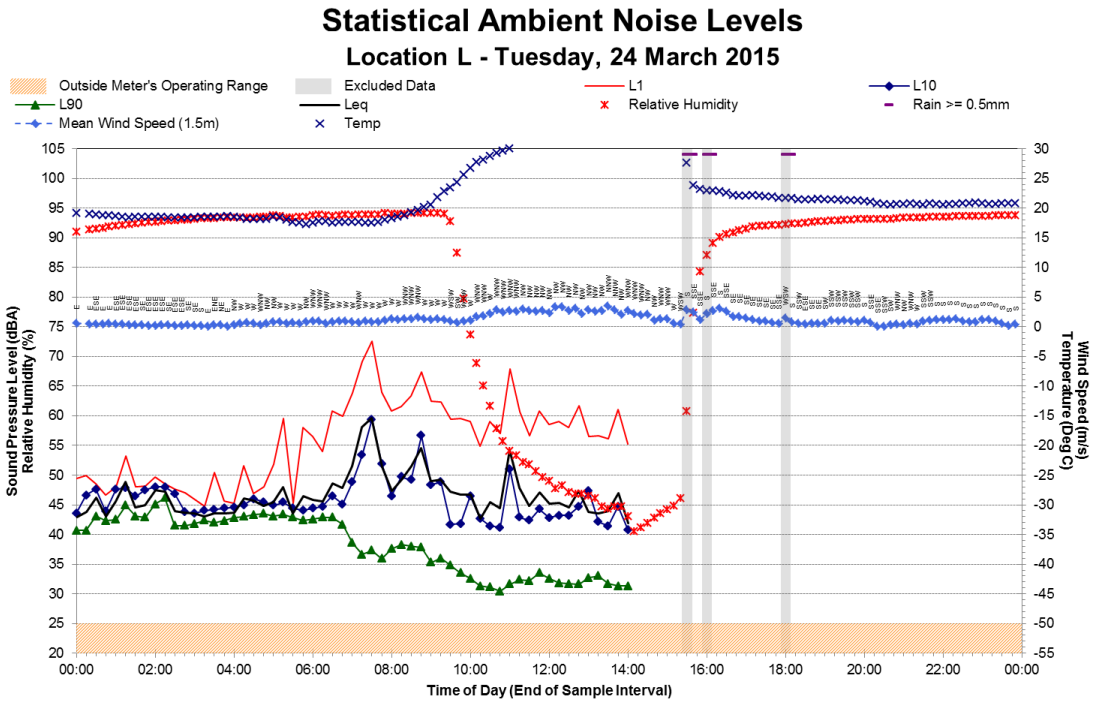

Appendix C6

Statistical Ambient Noise Levels – Location J
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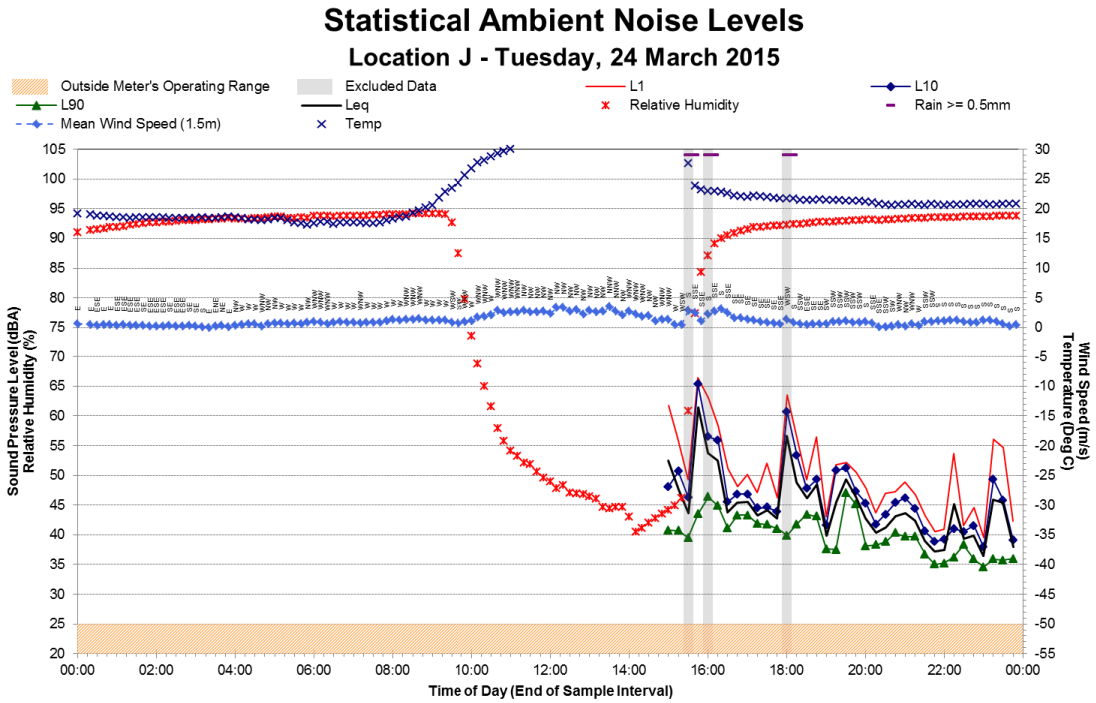

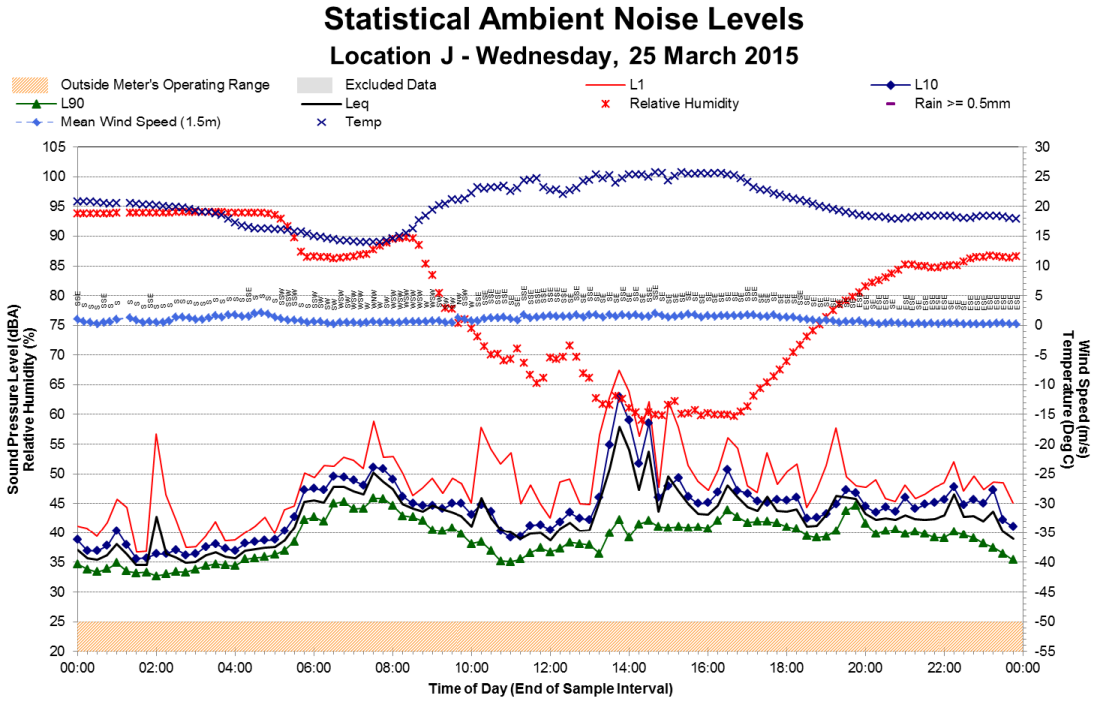

Appendix C6

Statistical Ambient Noise Levels – Location J
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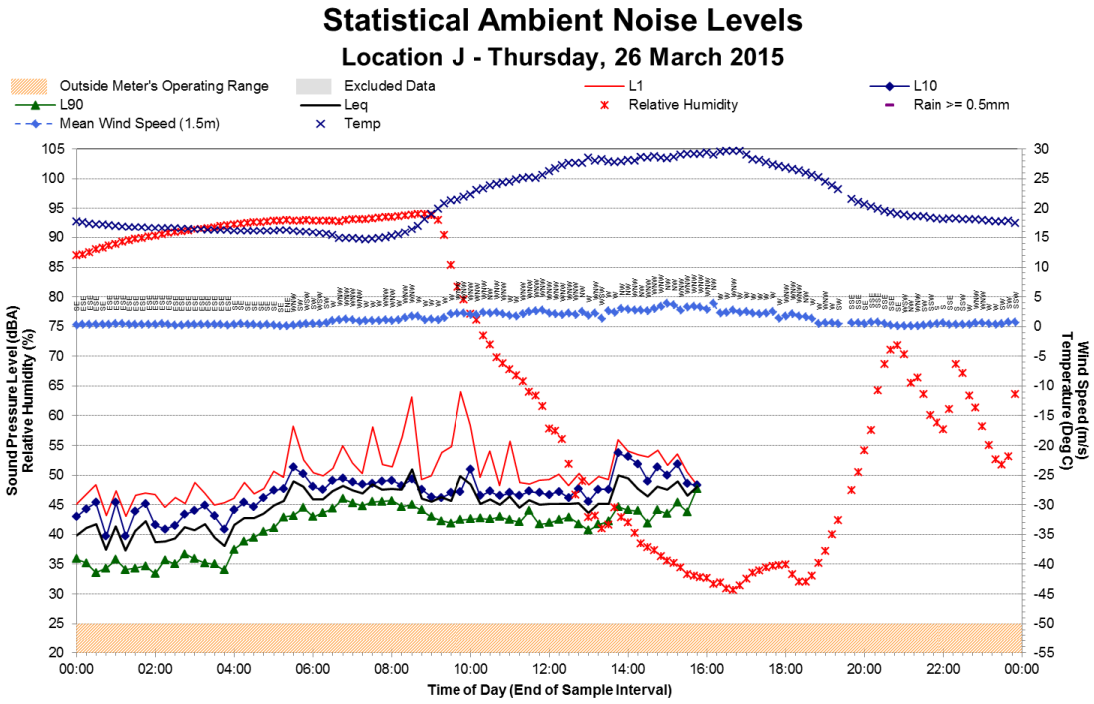

Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending June 2015

Report Number Q58 630.01053-R1

1 July 2015

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

Version: Revision 0

Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending June 2015

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
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Q58 630.01053-R1	Draft 1	19 June 2015	Tristan Robertson	Nathan Archer	Nathan Archer

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FIGURES

APPENDICES

1 INTRODUCTION

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct quarterly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Mine Project Noise Monitoring Program, dated 27 May 2008.

The objectives of the noise monitoring survey for this operating quarter were as follows:

- Measure the ambient noise levels at six (6) focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 DEVELOPMENT CONSENT PROJECT APPROVAL

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)*", and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:

Location	***LA10(15minute) Noise Limits (dBA)***	
	Daytime	***Night-time***
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. *The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.*

19. *The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.*

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Coal Mine Project Approval:

- Extraction of up to 6.1 Mtpa of ROM coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield Coal Handling and Preparation Plant by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield CHPP to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The Project Approval was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the Project Approval was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the Project Approval was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the CHPP.

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Location I	*Lord Howe Drive, Ashtonfield*	*36*	*36*	*36*	*45*
Location K	*Catholic Diocese Land*	*37*	*37*	*37*	*45*
Location L	*Kilshanny Avenue, Ashtonfield*	*40*	*40*	*40*	*47*
All other Locations	*All other privately-owned Residences*	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3 (Appendix A).*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		LAeq(15minute)
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	Day	Evening	Night
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;*
    c. *Describe the proposed noise management system in detail; and*
    d. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*
        - *Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.*

Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*
4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*

   i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*

   ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*

b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*

   i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. *Implement all reasonable and feasible best practice noise mitigation measures on the site; and*

d. *Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.*

3 NOISE MONITORING METHODOLOGY

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), and in accordance with Heggies Report 30-1409-R2 dated 27 May 2008 (*Abel Mine Project Noise Monitoring Program)* and AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of IEC 61672.1-2004 *Electroacoustics – Sound Level Meters – Specifications* and carries current NATA or manufacturer calibration certificates.

3.2 Monitoring Locations

Baseline and preceding operational quarterly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six (6) focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Lord Howe Drive, Ashtonfield
J	Parish Drive, Thornton
L	17 Kilshanny Ave, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix B**.

3.3 Unattended Continuous Noise Monitoring

Environmental noise loggers were deployed for a minimum of seven (7) days between 21 May 2015 and 28 May 2015 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background 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. The L_{Amax} is the maximum noise level recorded over the interval. Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six (6) monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 OPERATOR ATTENDED NOISE MONITORING

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were conducted during the daytime on Thursday 21 May 2015, evening on Monday 25 May 2015 and during the night-time on Monday 25 May 2015 and Wednesday 27 May 2015. All operator attended noise surveys were conducted using a Brüel & Kjær 2270 Type 1, integrating sound level meter (s/n: 2679354).

Results of the operator attended noise measurements are given in **Table 2** to **Table 7**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date & start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from the Abel Coal Mine and are stated only when a contribution could be quantified.

Mine noise at all monitoring locations during various periods was inaudible over the existing ambient noise levels. Where this is the case, noise levels from the source are typically 10 dB (or more) below the measured L_{A90} noise level. Therefore, subtracting 10 dB from the measured L_{A90} noise level gives an indication of the maximum contribution of Abel operations at these locations.

Table 2 Location D, Black Hill School, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 11:49 AM W = 3 m/s SW Temp = 20°C Cloud cover = 7/8	Daytime Ambient	71	58	47	33	48	Local Road Traffic 52 to 71 dBA School Children 42 to 53 dBA Music from School 43 to 53 dBA Birds 37 to 56 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
25/05/2015 6:00 PM W = <1 m/s E Temp = 15 °C Cloud cover = 8/8	Evening Ambient	76	70	58	40	56	Local Road Traffic 49 to 76 dBA Distant road traffic noise 39 to 42 dBA Insects 40 to 41 dBA Birds 42 to 43 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
25/05/2015 10:00 PM W = 4 m/s W Temp = 12 °C Cloud cover = 0/8	Night-time Ambient	52	45	42	34	39	Distant road traffic noise 35 to 52 dBA Insects 28 to 30 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 12:13 PM W = 3 m/s W Temp = 20°C Cloud cover = 7/8	Daytime Ambient	81	72	62	45	60	John Renshaw Drive 56 to 66 dBA Local Road Traffic 71 to 81 dBA Birds 50 to 63 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <35 dBA[1]					
25/05/2015 6:21 PM W = 1 m/s E Temp = 15 °C Cloud cover = 8/8	Evening Ambient	80	69	58	48	58	John Renshaw Drive 62 to 76 dBA Local Road Traffic 78 to 80 dBA Insects 48 to 50 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <38 dBA[1]					
25/05/2015 10:20 PM W = 3 m/s SSW Temp = 12 °C Cloud cover = 3/8	Night-time Ambient	80	68	56	44	57	John Renshaw Drive 46 to 80 dBA Birds 50 to 57 dBA Insects 40 to 43 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <34 dBA[1] LA1(1min) contribution <34 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 4 Location G, 156 Buchannan Road, Buchannan

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 1:46 PM W = 3 m/s SW Temp = 20 °C Cloud cover = 3/8	Daytime Ambient	56	38	34	30	33	Distant road traffic noise 33 to 35 dBA Insect/Frogs 34 to 37 dBA Birds 35 dBA Operator 56 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
25/05/2015 7:29 PM W = <1m/s E Temp = 15 °C Cloud cover = 5/8	Evening Ambient	83	78	69	44	65	Distant road traffic noise 43 to 47 dBA Dog Barking 63 to 83 dBA Insects 30 to 33 dBA Bloomfield Mine audible 44 to 47 dBA Haul Trucks Abel Mine not audible Air-Conditioning Plant 43 dBA
		Estimated Abel mine LAeq(15min) contribution <34 dBA[1]					
25/05/2015 11:26 PM W = 3 m/s SSW Temp = 11.49 °C Cloud cover = 0/8	Night-time Ambient	53	44	39	31	36	Distant road traffic noise 33 to 53 dBA Dog Barking 39 dBA Insects 30 to 43 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 5 Location I, Lord Howe Drive, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 2:47 PM W = 4 m/s NW Temp = 19 °C Cloud cover = 6/8	Daytime Ambient	84	69	61	42	60	Local Road Traffic 55 to 69 dBA Distant road traffic noise 32 to 33 dBA Birds 59 to 73 dBA Nearby Construction 84 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1]					
25/05/2015 8:23 PM W = 1 m/s NW Temp = 13 °C Cloud cover = 4/8	Evening Ambient	55	49	47	42	45	Distant road traffic noise 47 to 49 dBA Insects 30 to 33 dBA Birds 46 dBA Rail traffic noise 47 to 55 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1]					
27/05/2015 10:21 PM W = 2 m/s SW Temp = 13 °C Cloud cover = 6/8	Night-time Ambient	60	44	41	38	40	Distant road traffic noise 35 to 36 dBA Birds 44 to 60 dBA Local Road Traffic 40 dBA Insect/frogs 40 to 41 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 6 Location J, Parish Drive, Thornton

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 3:11 PM W = 3 m/s WNW Temp = 20 °C Cloud cover = 7/8	Daytime Ambient	57	49	47	42	45	Distant road traffic noise 41 to 47 dBA Birds 47 to 57 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1]					
25/05/2015 8:48 PM W = <1 m/s WSW Temp = 13 °C Cloud cover = 4/8	Evening Ambient	72	59	48	41	49	Distant road traffic noise 39 to 51 dBA Dog barking 47 dBA Local Road Traffic 57 to 72 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1]					
27/05/2015 10:43 PM W = 2 m/s SW Temp = 13 °C Cloud cover = 6/8	Night-time Ambient	59	48	45	38	41	Distant road traffic noise 39 to 59 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 7 Location L, 17 Killshanny Ave, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
21/05/2015 2:25 PM W = 7 m/s NW Temp = 20 °C Cloud cover = 4/8	Daytime Ambient	74	67	57	30	55	Local Road Traffic 64 to 74 dBA Dog Barking 71 to 72 dBA Birds 36 to 48 dBA Insects 28 to 30 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
25/05/2015 8:00 PM W = <1 m/s S Temp = 14 °C Cloud cover = 4/8	Evening Ambient	68	60	42	34	46	Distant road traffic noise 36 to 42 dBA Insects 35 to 36 dBA Dog Barking 48 to 68 dBA Aircraft noise 36 dBA Local Road Traffic 57 to 68 dBA Abel Mine audible 32 to 35 dBA CHPP and Alarms
		Estimated Abel mine LAeq(15min) contribution 32 dBA					
27/05/2015 10:00 PM W = 3 m/s SSW Temp = 13 °C Cloud cover = 6/8	Night-time Ambient	73	58	40	36	47	Distant road traffic noise 38 to 39 dBA Insects 30 dBA Air-Conditioning Plant 33 to 35 dBA Local Road Traffic 73 dBA Abel Mine audible 33 to 35 dBA CHPP
		Estimated Abel mine LAeq(15min) contribution 33 dBA LA1(1min) contribution 35 dBA					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as "natural" noises such as birds, insects and leaf rustle.

Abel operations were observed to be audible at times at Location L.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8**.

Table 8 Compliance Noise Assessment – Operations

Location	Estimated Abel LAeq(15minute) Contribution			Consent Conditions LAeq(15minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	<30	<30	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
F – Black Hill Road, Black Hill	<35	<38	<34	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
G – Buchanan Road, Buchanan	<30	<34	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<32	<32	<30	36	36	36	Yes[1,2]	Yes[1,2]	Yes[1,2]
J – Parish Drive, Thornton	<32	<32	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<30	32	33	40	40	40	Yes[1,2]	Yes	Yes

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**.

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Abel LA1(1minute) Contribution	Consent Conditions LA1(1minute)	Compliance
D – Black Hill School, Black Hill	<30	45	Yes[1,2]
F – Black Hill Road, Black Hill	<34	45	Yes[1,2]
G – Buchanan Road, Buchanan	<30	45	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<30	45	Yes[1,2]
J – Parish Drive, Thornton	<30	45	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	35	47	Yes

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 UNATTENDED CONTINUOUS NOISE MONITORING

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between 21 May 2015 and 28 May 2015 at each of the six (6) monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	ARL EL- 316 16-301-472	21/05/2015-28/05/2015
F – Black Hill Road, Black Hill	ARL EL- 316 16-201-043	21/05/2015-28/05/2015
G – Buchanan Road, Buchanan	ARL EL- 316 16-103-494	21/05/2015-28/05/2015
I – Lord Howe Drive, Ashtonfield	ARL EL- 316 16-207-044	21/05/2015-28/05/2015
L – Kilshanny Ave, Kilshanny	ARL EL- 316 16-203-508	21/05/2015-28/05/2015
J – Parish Drive, Thornton	Brüel & Kjær 2250-L 3005908	21/05/2015-28/05/2015

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendices C1 to C6**. A summary of the results of the unattended continuous noise monitoring is given in **Table 11**.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Industrial Noise Policy (INP). The day, evening and night periods replace the day and night periods defined under the Environmental Noise Control Manual (ENCM). However, as the Donaldson conditions of consent are under the ENCM, these periods have also been reported.

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA Re 20 µPa)

Location	Period	Primary Noise Descriptor (dBA re 20 µPa)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	ENCM Daytime	62	51	35	56
	Daytime	64	53	33	56
	Evening	57	49	36	56
	Night	55	47	32	55
F Lot 684 Black Hill Road, Black Hill	ENCM Daytime	67	56	43	56
	Daytime	69	58	44	58
	Evening	62	53	41	53
	Night	60	51	39	51
G 156 Buchanan Road, Buchanan	ENCM Daytime	46	41	33	43
	Daytime	47	41	32	44
	Evening	44	41	34	40
	Night	41	37	29	38
I 49 Magnetic Drive, Ashtonfield	ENCM Daytime	65	54	40	55
	Daytime	67	57	40	57
	Evening	51	45	39	50
	Night	46	42	36	45
L 17 Kilshanny Ave, Ashtonfield	ENCM Daytime	61	47	32	54
	Daytime	62	49	31	57
	Evening	58	43	34	47
	Night	47	38	30	43
J 220 Parish Drive, Thornton	ENCM Daytime	49	46	39	47
	Daytime	51	47	40	48
	Evening	48	44	38	44
	Night	46	43	33	42

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.
Environmental Noise Control Manual (ENCM) Daytime 7.00 am to 10.00 pm, Night 10.00 pm to 7.00 am.

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient L_{A90} Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1**, **Figure 2** and **Figure 3** for the daytime, evening and night-time periods respectively.

Figure 1 Long term Daytime L_{A90} Noise Levels

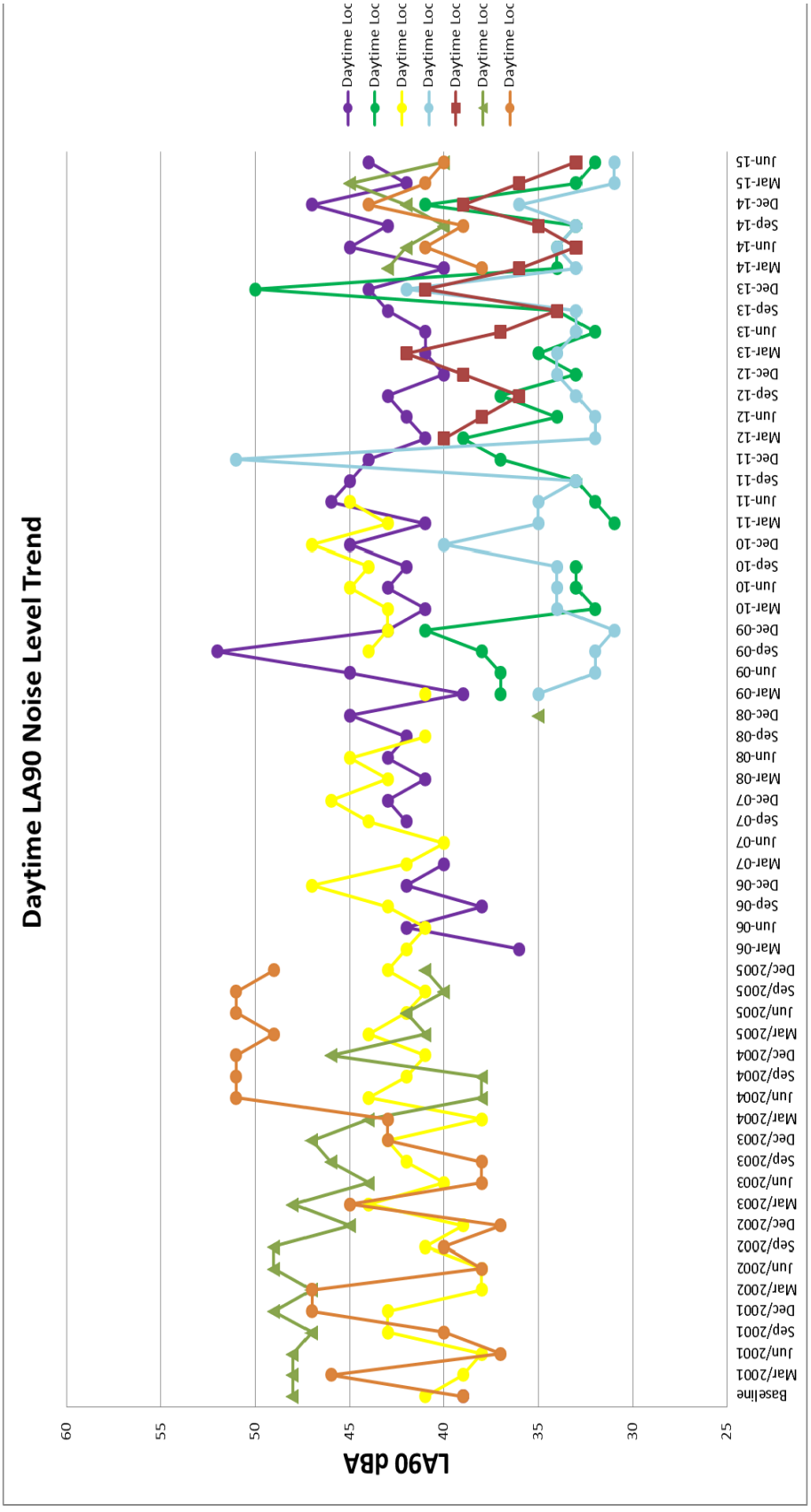

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Figure 2 Long term Evening L_{A90} Noise Levels

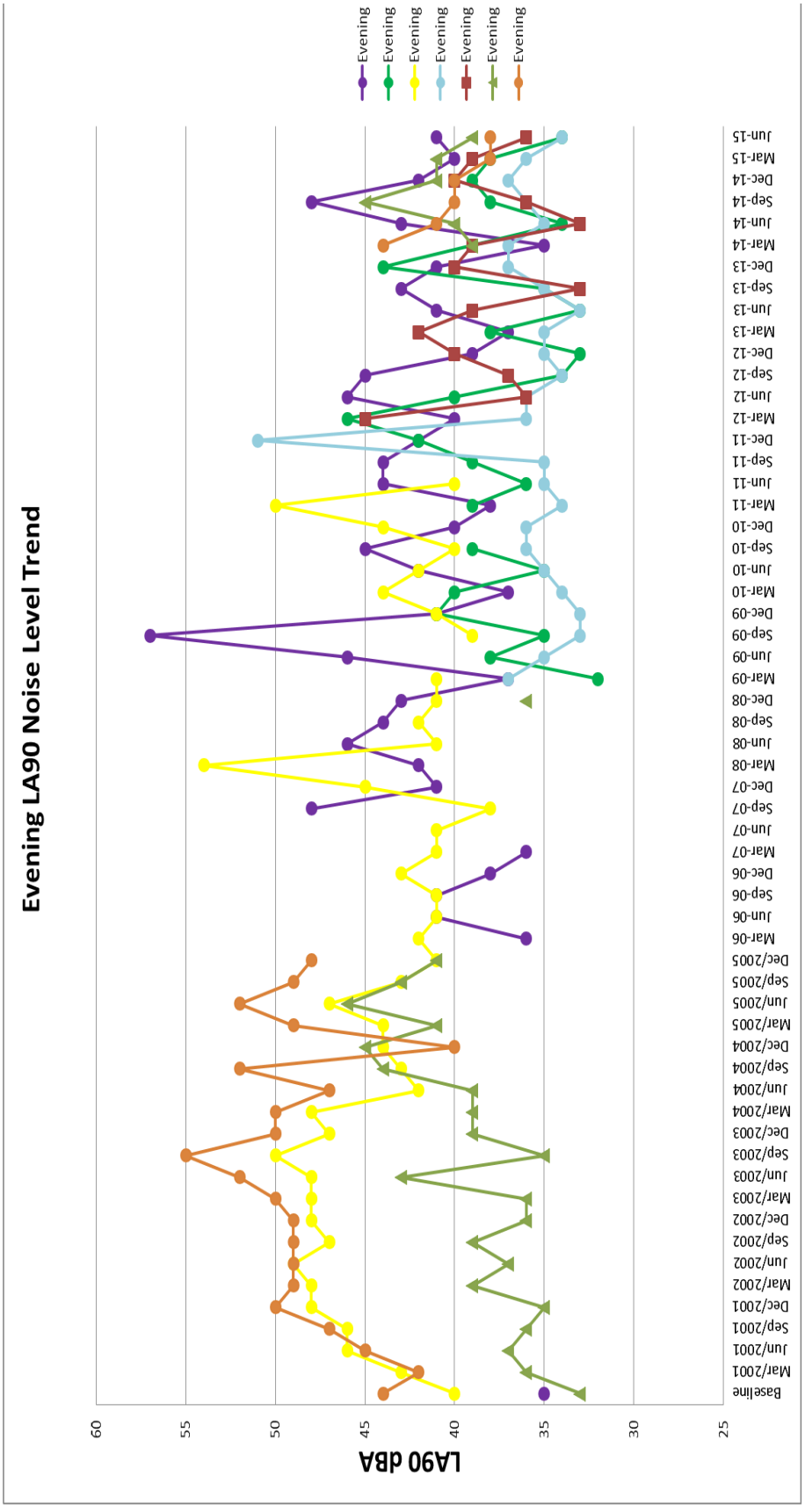
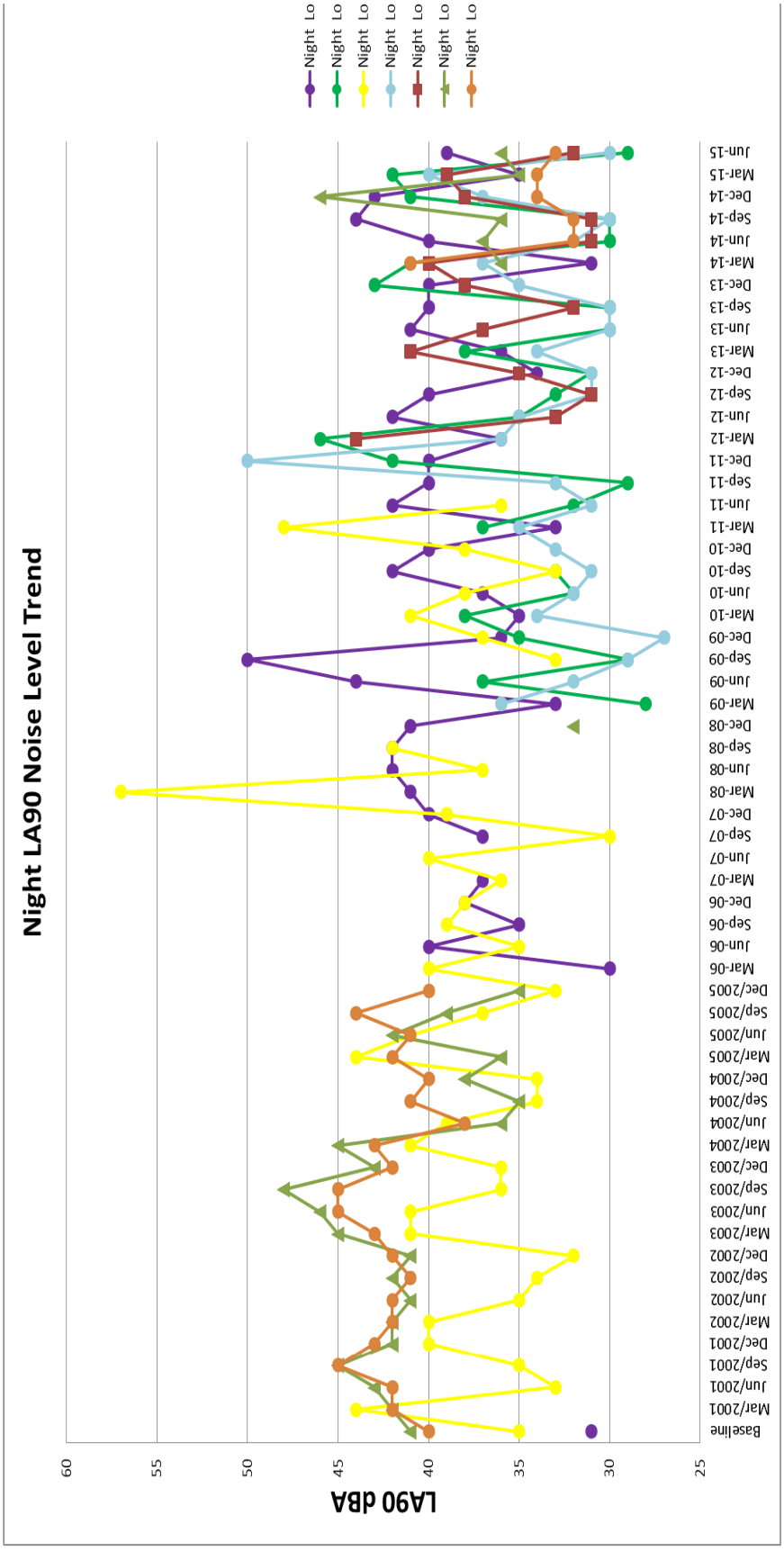


Figure 3 Long term Night-time L_{A90} Noise Levels



Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the quarter ending June 2015 compared to the levels recorded during the baseline monitoring process (ie. Prior to commencement of mining operation at Donaldson).

Table 12 LA90 Results Comparison – Baseline

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		Baseline	June 2015	
D Black Hill School, Black Hill	Day	N/A[1]	33	N/A[1]
	Evening	N/A[1]	36	N/A[1]
	Night	N/A[1]	32	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	39	44	5
	Evening	35	41	6
	Night	31	39	8
G 156 Buchanan Road, Buchanan	Day	N/A[1]	32	N/A[1]
	Evening	N/A[1]	34	N/A[1]
	Night	N/A[1]	29	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	48	40	-8
	Evening	33	39	6
	Night	41	36	-5
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	31	N/A[1]
	Evening	N/A[1]	34	N/A[1]
	Night	N/A[1]	30	N/A[1]
J 220 Parish Drive, Thornton	Day	39	40	1
	Evening	44	38	-6
	Night	40	33	-7

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday..

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (March 2015)

Table 13 presents the ambient LA90 noise levels recorded for the current monitoring period compared to those measured in the previous monitoring period.

Table 13 LA90 Results Comparison – Previous Quarter (March 2015)

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		March 2015	June 2015	
D Black Hill School, Black Hill	Day	36	33	-3
	Evening	39	36	-3
	Night	39	32	-7
F Lot 684 Black Hill Road, Black Hill	Day	42	44	2
	Evening	40	41	1
	Night	35	39	4
G 156 Buchanan Road, Buchanan	Day	33	32	-1
	Evening	38	34	-4
	Night	42	29	-13
I 49 Magnetic Drive, Ashtonfield	Day	45	40	-5
	Evening	41	39	-2
	Night	35	36	1
L 17 Kilshanny Ave, Ashtonfield	Day	31	31	0
	Evening	36	34	-2
	Night	40	30	-10
J 220 Parish Drive, Thornton	Day	41	40	-1
	Evening	38	38	0
	Night	34	33	-1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (June 2014)

Table 14 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 LA90 Results Comparison – Coinciding Period Last Year (June 2014)

Monitoring Location	Period	Long term Night-time L_{A90} Noise Levels		Difference dB
		June 2014	June 2015	
D Black Hill School, Black Hill	Day	33	33	0
	Evening	33	36	3
	Night	31	32	1
F Lot 684 Black Hill Road, Black Hill	Day	45	44	-1
	Evening	43	41	-2
	Night	40	39	-1
G 156 Buchanan Road, Buchanan	Day	34	32	-2
	Evening	34	34	0
	Night	30	29	-1
I 49 Magnetic Drive, Ashtonfield	Day	42	40	-2
	Evening	40	39	-1
	Night	37	36	-1
L 17 Kilshanny Ave, Ashtonfield	Day	34	31	-3
	Evening	35	34	-1
	Night	32	30	-2
J 220 Parish Drive, Thornton	Day	41	40	-1
	Evening	41	38	-3
	Night	32	33	1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time periods respectively.

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Figure 4 Long term Daytime LA10 Noise Levels

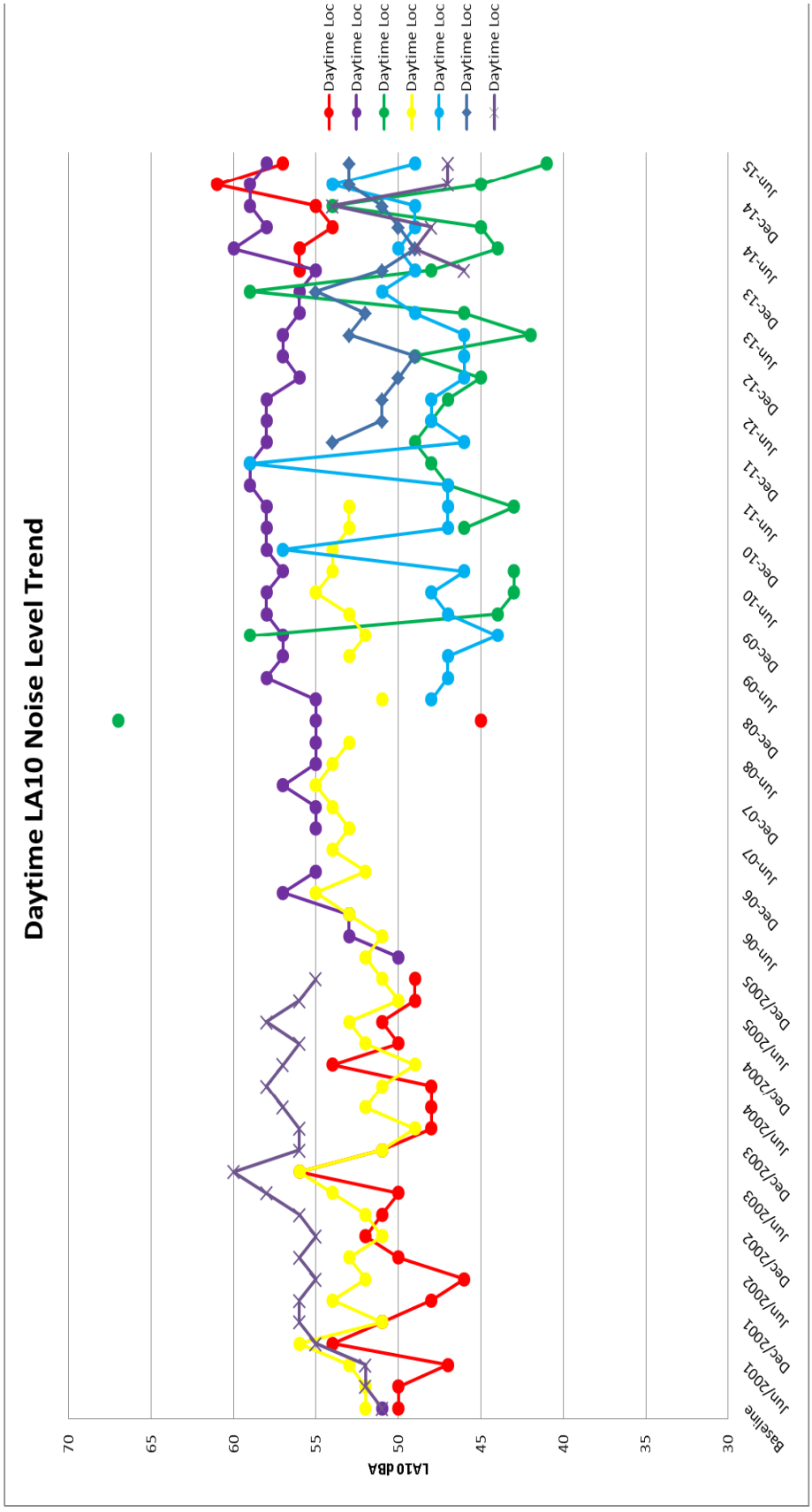

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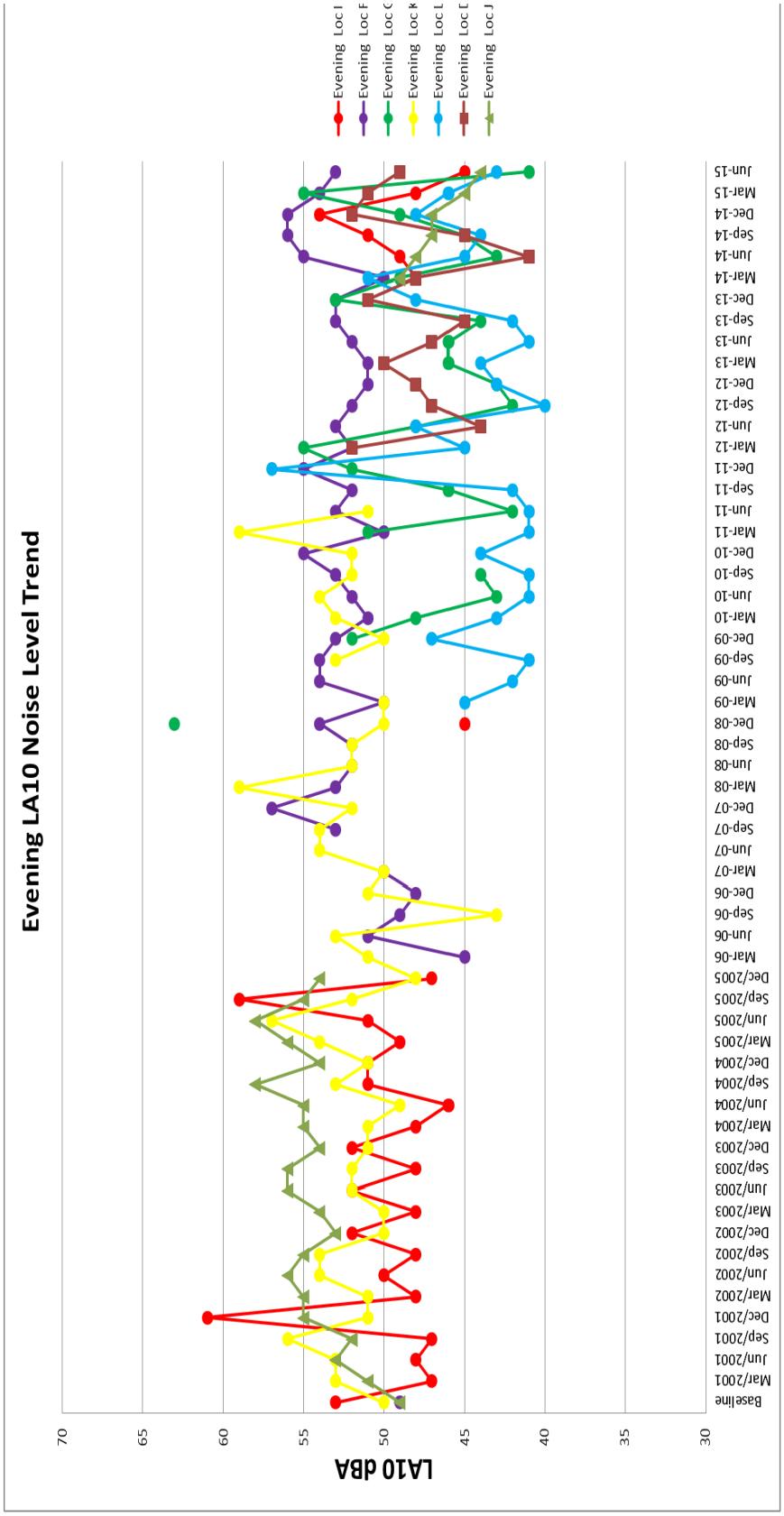
Figure 5 Long term Evening L_{A10} Noise Levels



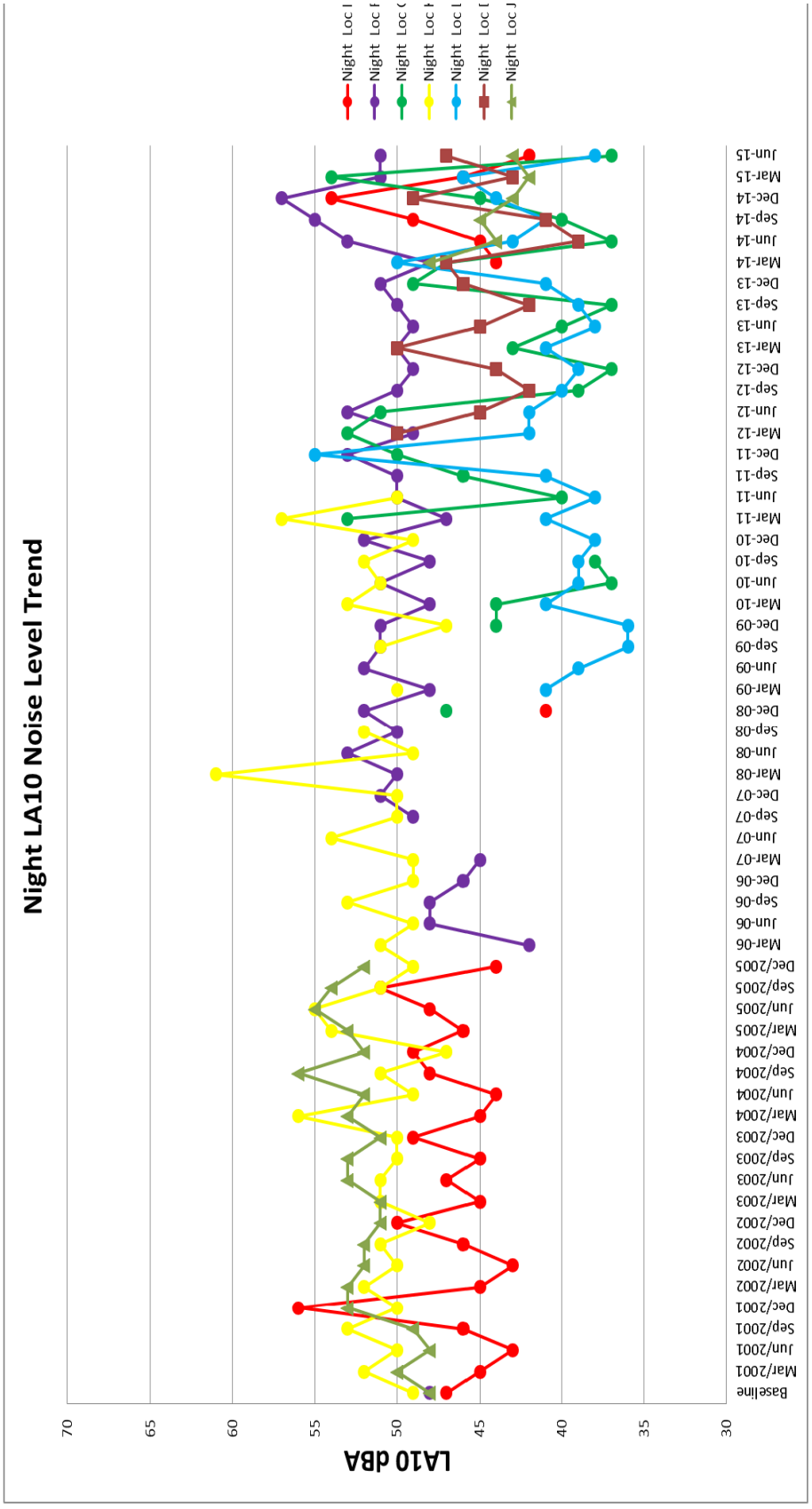


Figure 6 Long term Night-time L_{A10} Noise Levels

Baseline

Table 15 presents the ambient L_{A10} noise levels recorded for the quarter ending June 2015 compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		Baseline	June 2015	
D Black Hill School, Black Hill	Day	N/A[1]	53	N/A[1]
	Evening	N/A[1]	49	N/A[1]
	Night	N/A[1]	47	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	51	58	7
	Evening	49	53	4
	Night	48	51	3
G 156 Buchanan Road, Buchanan	Day	N/A[1]	41	N/A[1]
	Evening	N/A[1]	41	N/A[1]
	Night	N/A[1]	37	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	50	57	7
	Evening	53	45	-8
	Night	47	42	-5
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	49	N/A[1]
	Evening	N/A[1]	43	N/A[1]
	Night	N/A[1]	38	N/A[1]
J 220 Parish Drive, Thornton	Day	51	47	-4
	Evening	49	44	-5
	Night	48	43	-5

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (March 2015)

Table 16 presents the ambient LA10 noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 LA10 Results Comparison – Previous Quarter (March 2015)

Monitoring Location	Period	Long term Night-time LA10 Noise Levels		Difference dB
		March 2015	June 2015	
D Black Hill School, Black Hill	Day	53	53	0
	Evening	51	49	-2
	Night	43	47	4
F Lot 684 Black Hill Road, Black Hill	Day	59	58	-1
	Evening	54	53	-1
	Night	51	51	0
G 156 Buchanan Road, Buchanan	Day	45	41	-4
	Evening	55	41	-14
	Night	54	37	-17
I 49 Magnetic Drive, Ashtonfield	Day	61	57	-4
	Evening	48	45	-3
	Night	46	42	-4
L 17 Kilshanny Ave, Ashtonfield	Day	54	49	-5
	Evening	46	43	-3
	Night	46	38	-8
J 220 Parish Drive, Thornton	Day	47	47	0
	Evening	45	44	-1
	Night	42	43	1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (June 2014)

Table 17 presents the ambient LA10 noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 LA10 Results Comparison – Coinciding Period Last Year (June 2014)

Monitoring Location	Period	Long term Night-time LA10 Noise Levels		Difference dB
		June 2014	June 2015	
D Black Hill School, Black Hill	Day	49	53	4
	Evening	41	49	8
	Night	39	47	8
F Lot 684 Black Hill Road, Black Hill	Day	60	58	-2
	Evening	55	53	-2
	Night	53	51	-2
G 156 Buchanan Road, Buchanan	Day	44	41	-3
	Evening	43	41	-2
	Night	37	37	0
I 49 Magnetic Drive, Ashtonfield	Day	56	57	1
	Evening	49	45	-4
	Night	45	42	-3
L 17 Kilshanny Ave, Ashtonfield	Day	50	49	-1
	Evening	45	43	-2
	Night	43	38	-5
J 220 Parish Drive, Thornton	Day	49	47	-2
	Evening	48	44	-4
	Night	44	43	-1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.3 Rail Noise Impact

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**. Only five (5) trains were recorded to have passed the monitoring location J during the monitoring period. No trains were loaded during the evening period during the noise monitoring at Location J.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
23/05/15	14:15 pm to 17:04 pm	Day
26/05/15	06:05 am to 09:35 am	Night/Day
26/05/15	13:45 pm to16:35 pm	Day
27/05/15	10:30 am to13:40 pm	Day
27/05/15	14:00 am to 17:05 pm	Day

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19**.

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(Period)}$	Criteria $L_{Aeq(Period)}$	Compliance
Location J	23/05/15	Day	51	55	Yes
	26/05/15		46		Yes
	27/05/15		46		Yes
	N/A	Evening	N/A	45	Yes[1]
	26/05/15	Night	40	40	Yes

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No trains were loaded during this time period.

The results contained in **Table 19** show that compliance with the rail noise criteria was achieved during the June 2015 Quarter.

6 CONCLUSION

SLR was engaged by Donaldson Coal Pty Ltd to conduct quarterly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Coal Mine Noise Monitoring Program, dated 27 May 2007.

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

The results of the operator-attended noise measurements conducted at six (6) focus locations surrounding the mine site are included in **Table 2** to **Table 7**.

Abel Mine operations at the CHPP were only faintly audible at Location L during the evening and night-time. Abel portal operations were not observed to be audible at any other locations during the monitoring period. Contributed noise levels from Abel Mine did not exceed noise emission goals (including night-time sleep arousal criteria) and were in compliance with the Abel Mine *Project Approval* at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (June 2015), the baseline monitoring period, the last monitoring period (December 2014), and the coinciding monitoring period from last year (June 2014) has been conducted.

An assessment of the rail noise impact was also undertaken, determining compliance with the criteria stated in **Section 2.2**.

Appendix A

Acoustic Terminology
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1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

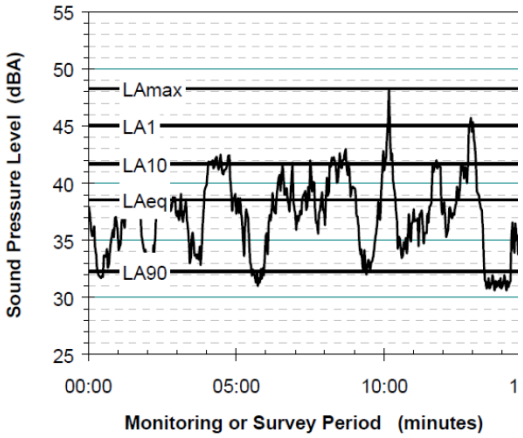
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 1E-12 W.
The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

Appendix A

Acoustic Terminology
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7 Frequency Analysis

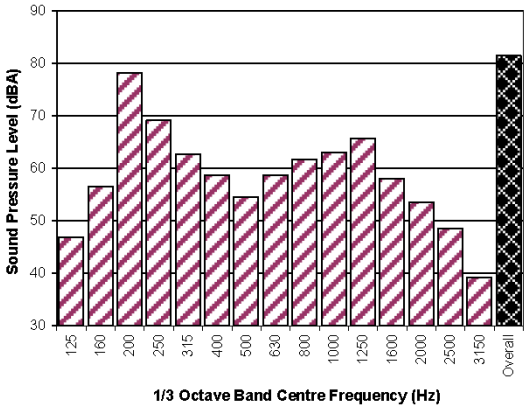
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

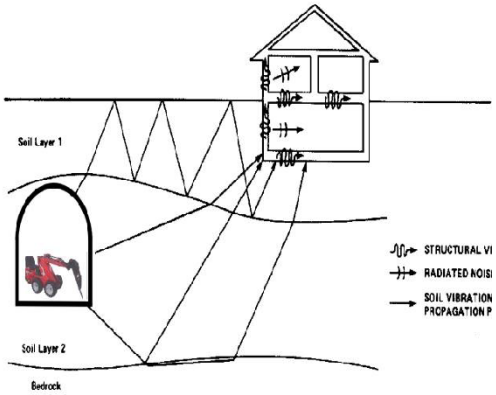
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

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Appendix C1

Statistical Ambient Noise Levels – Location D
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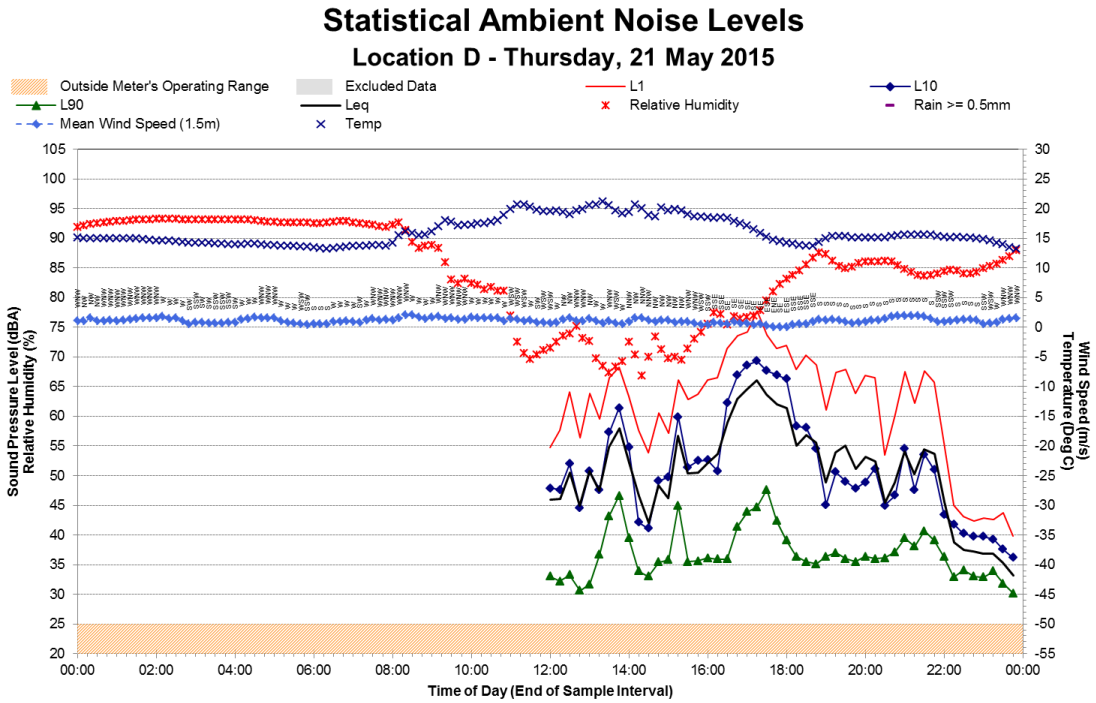
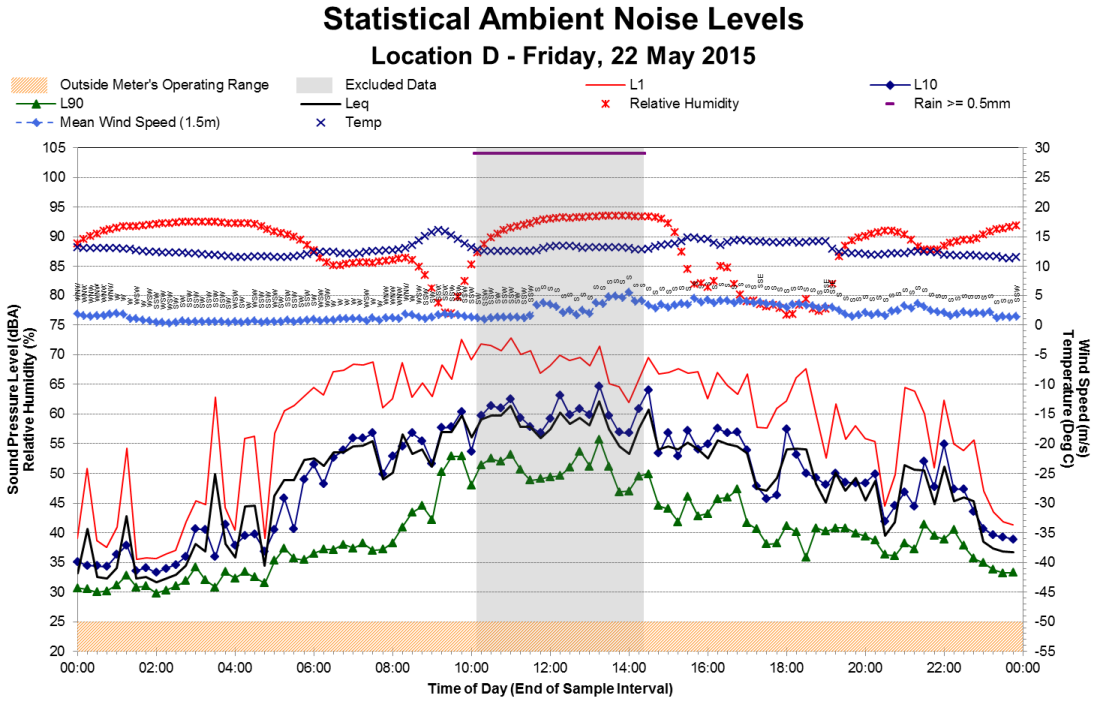
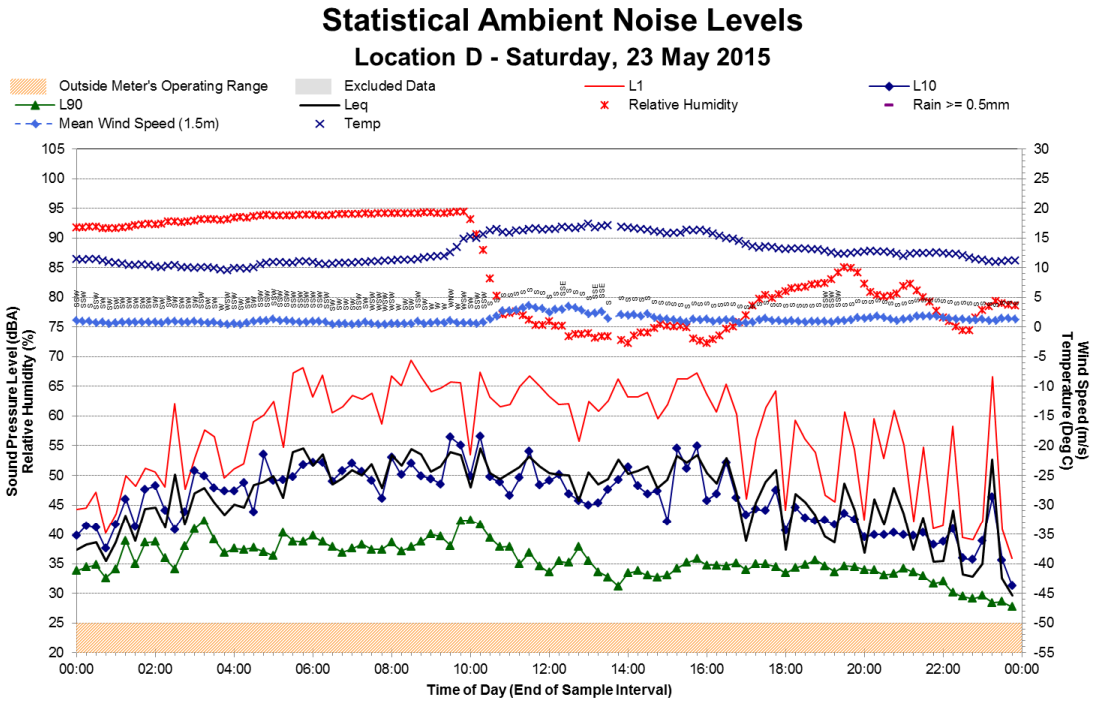
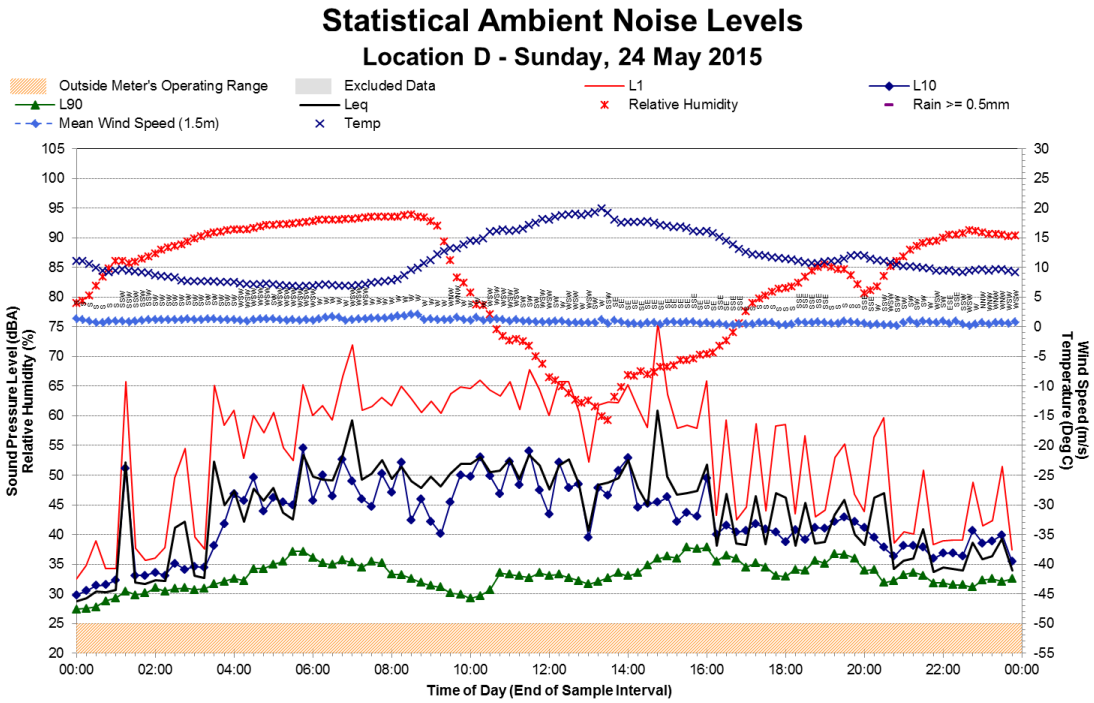


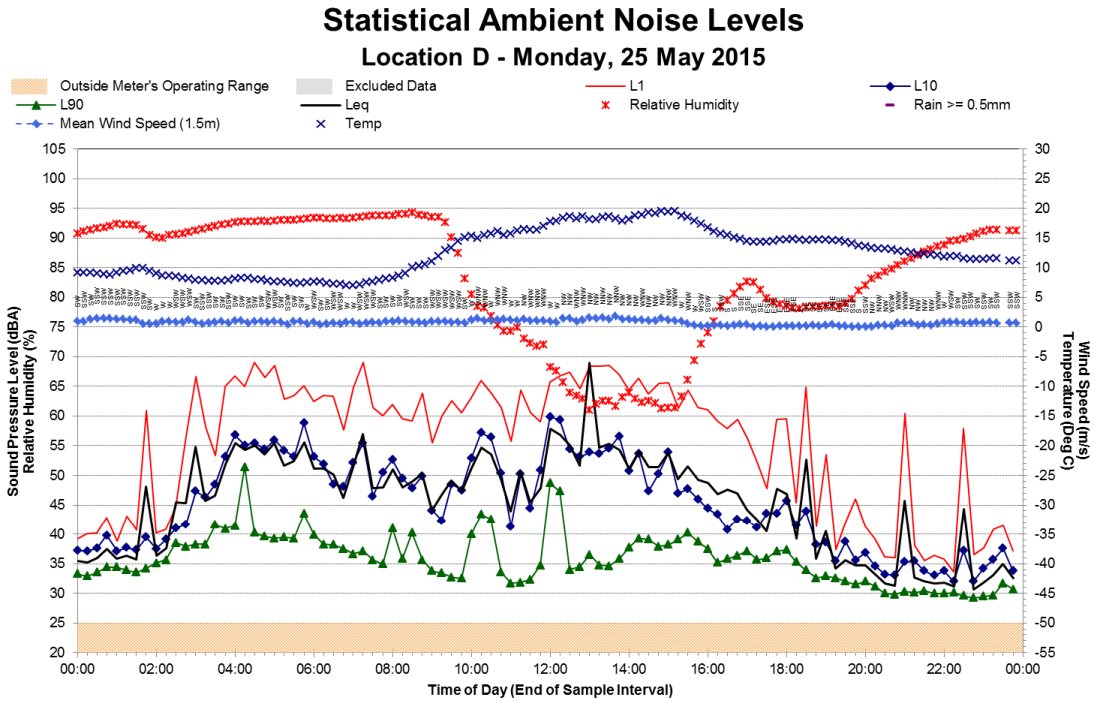


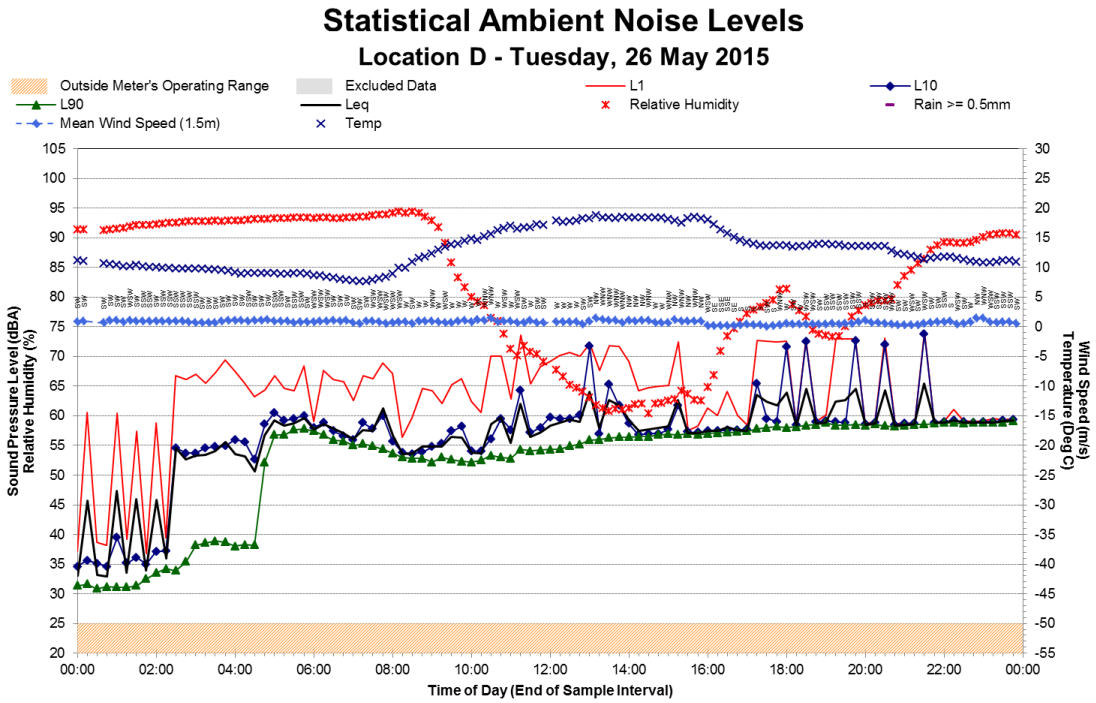

Statistical Ambient Noise Levels
Location D - Saturday, 23 May 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location D - Sunday, 24 May 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

Appendix C1

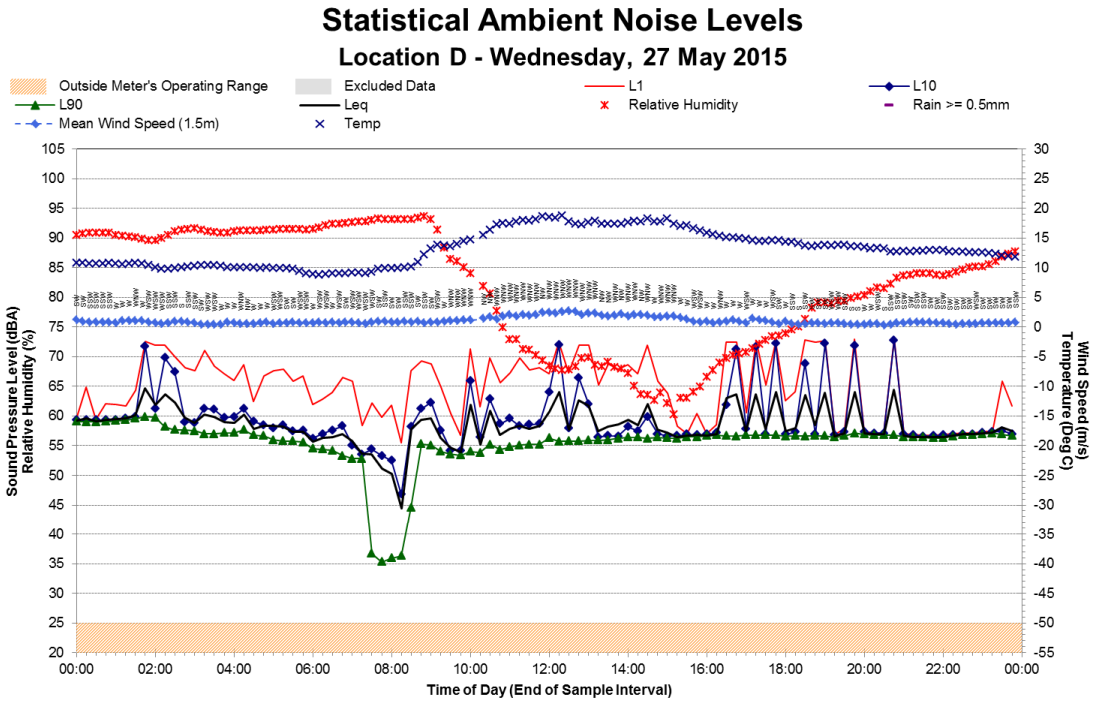
Statistical Ambient Noise Levels – Location D
Report Q58 630.01053-R1

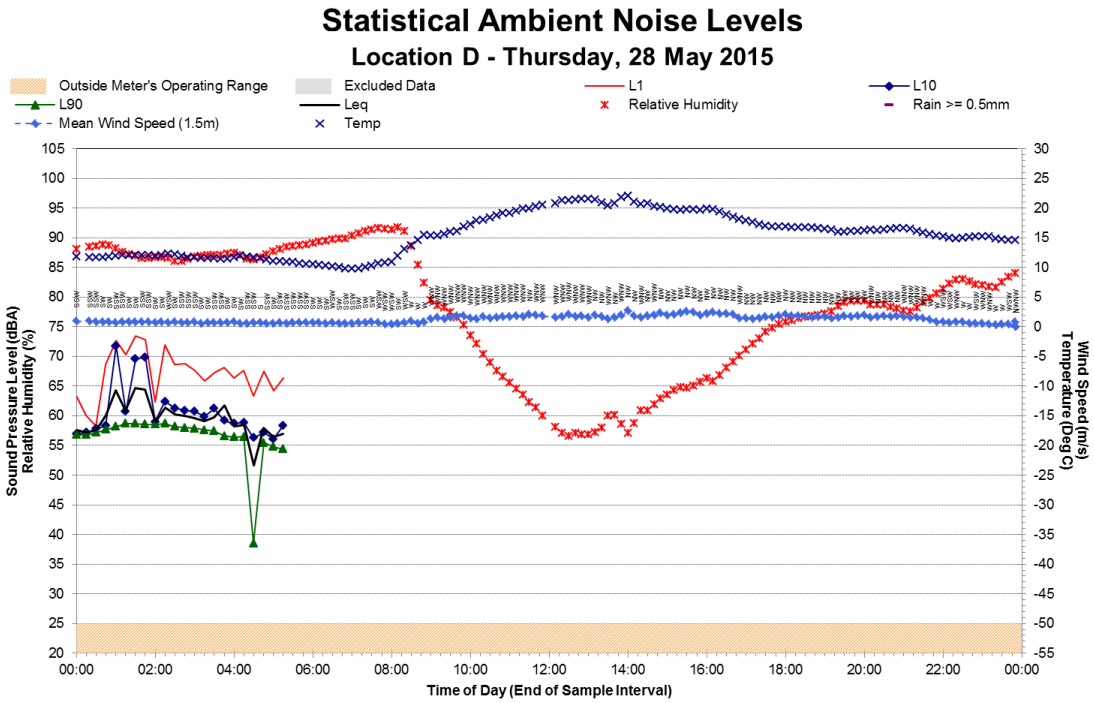




Appendix C1

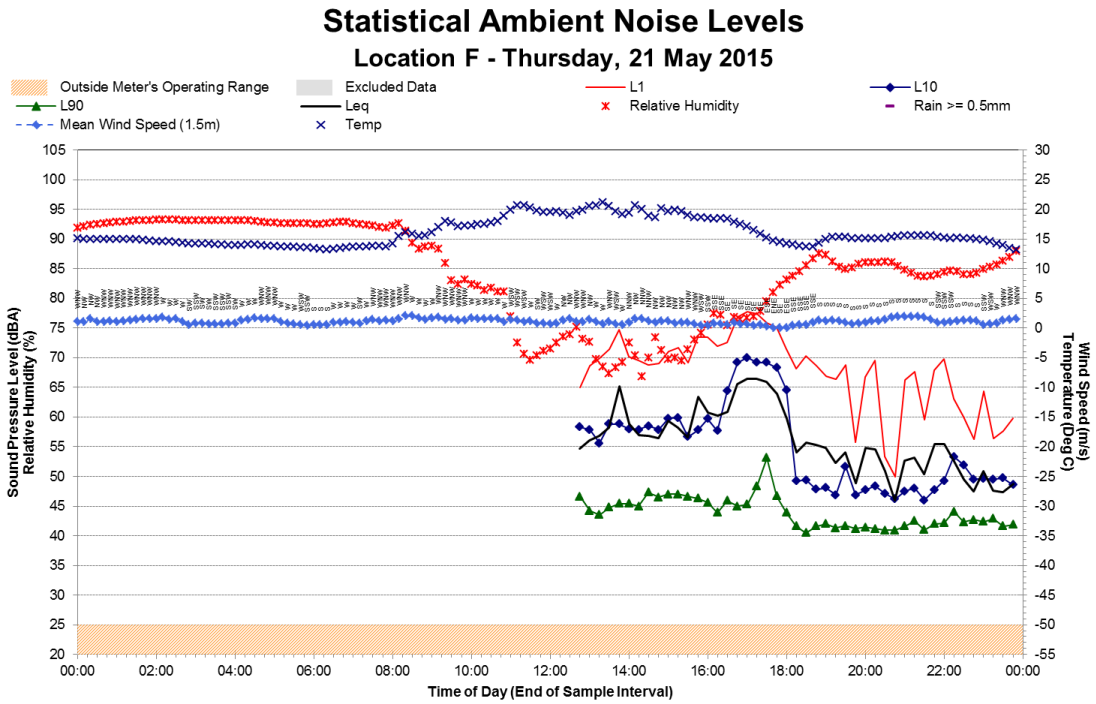
Statistical Ambient Noise Levels – Location D
Report Q58 630.01053-R1

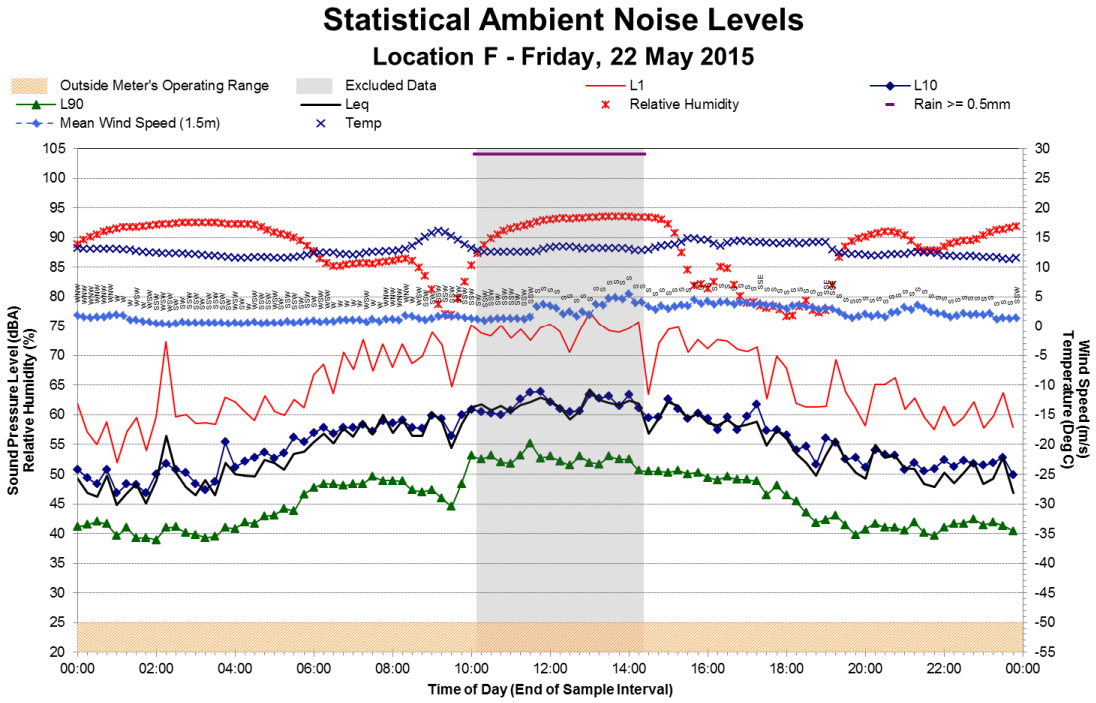




Appendix C2

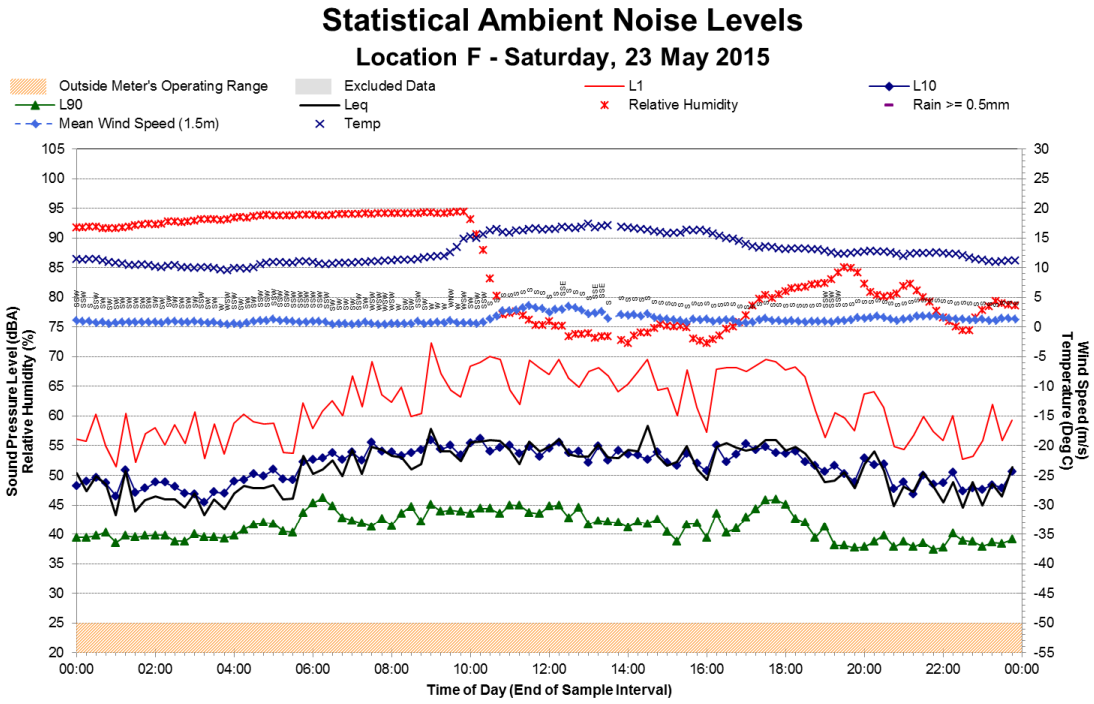
Statistical Ambient Noise Levels – Location F
Report Q58 630.01053-R1

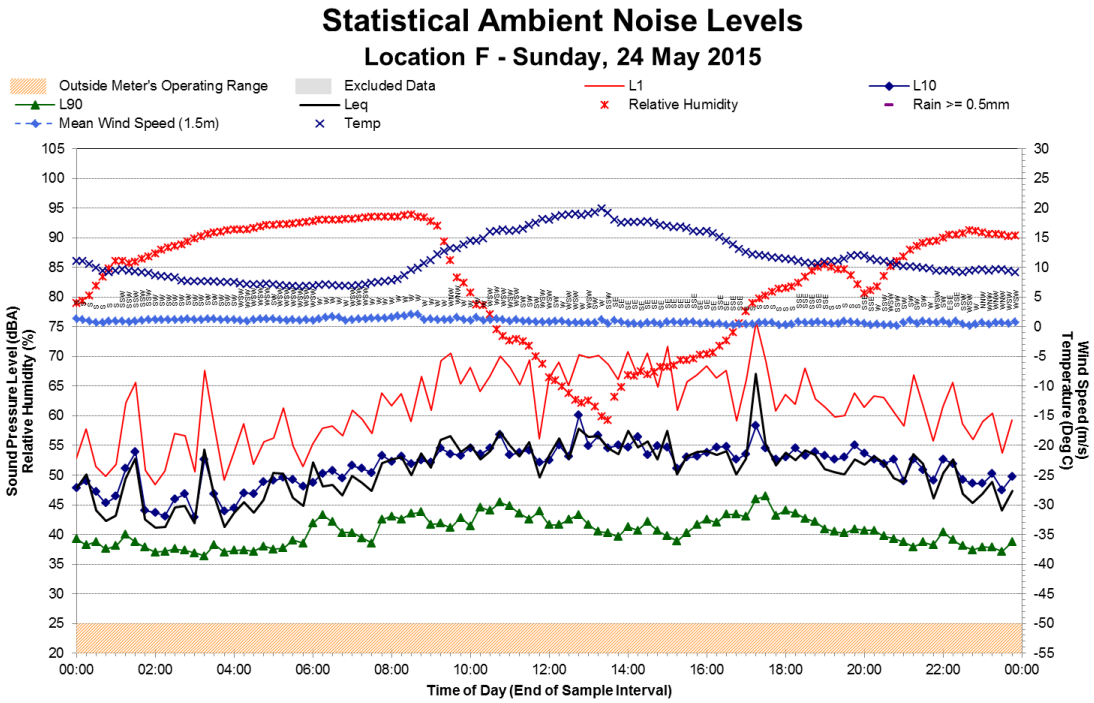




Appendix C2

Statistical Ambient Noise Levels – Location F
Report Q58 630.01053-R1





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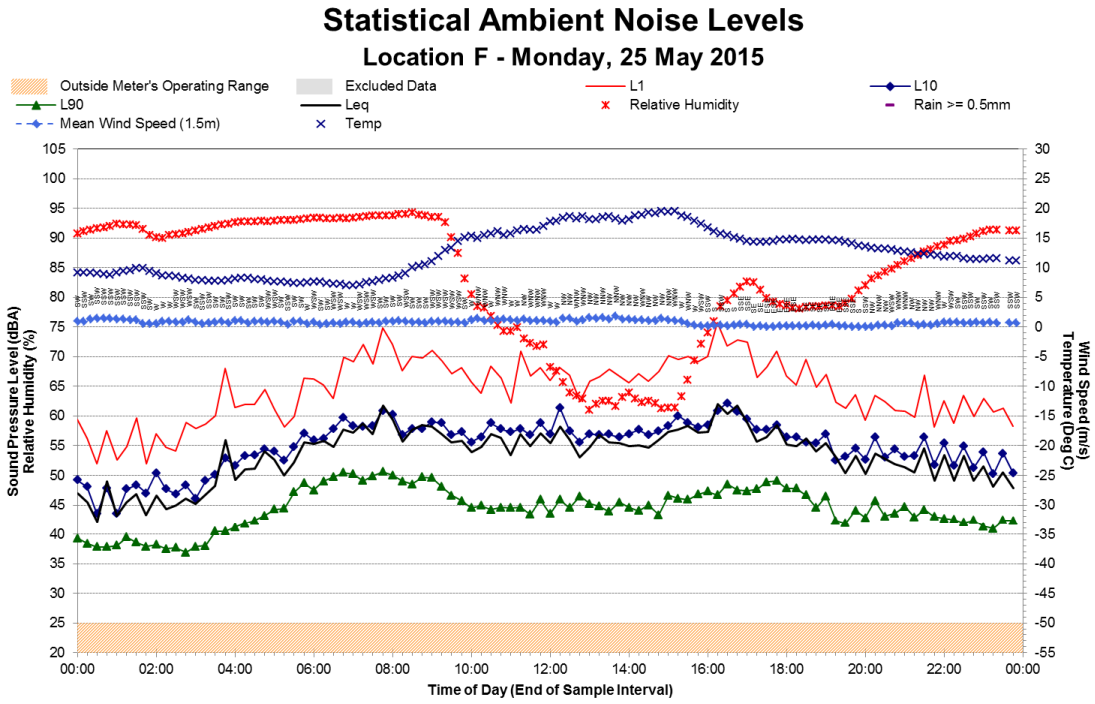
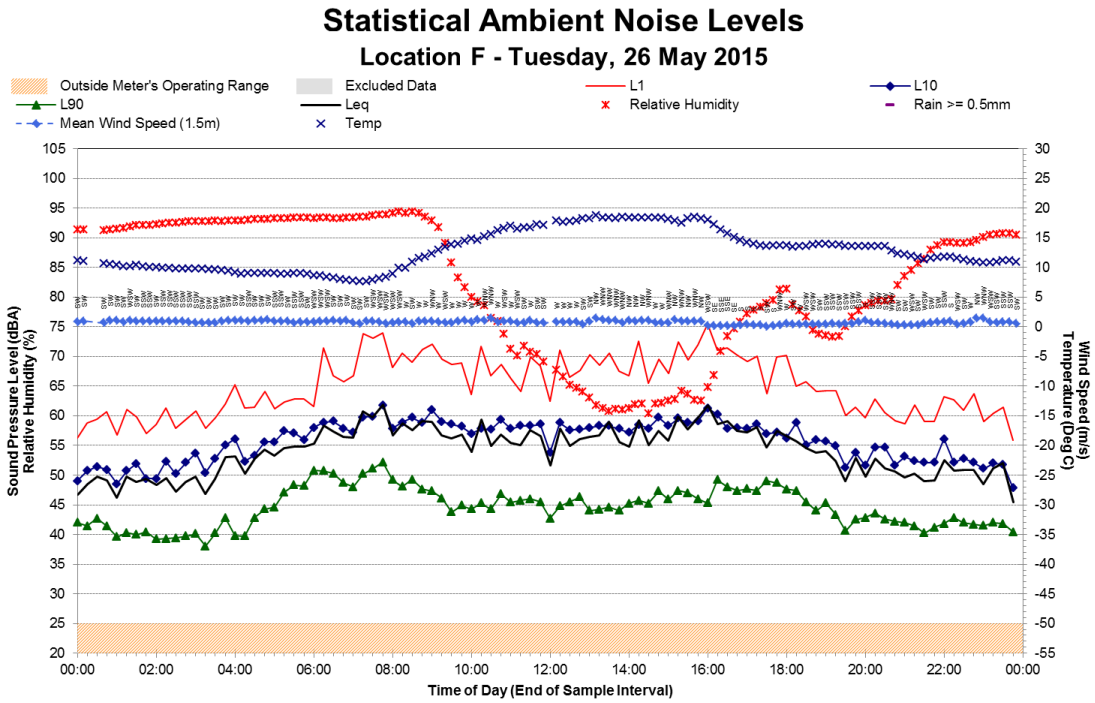
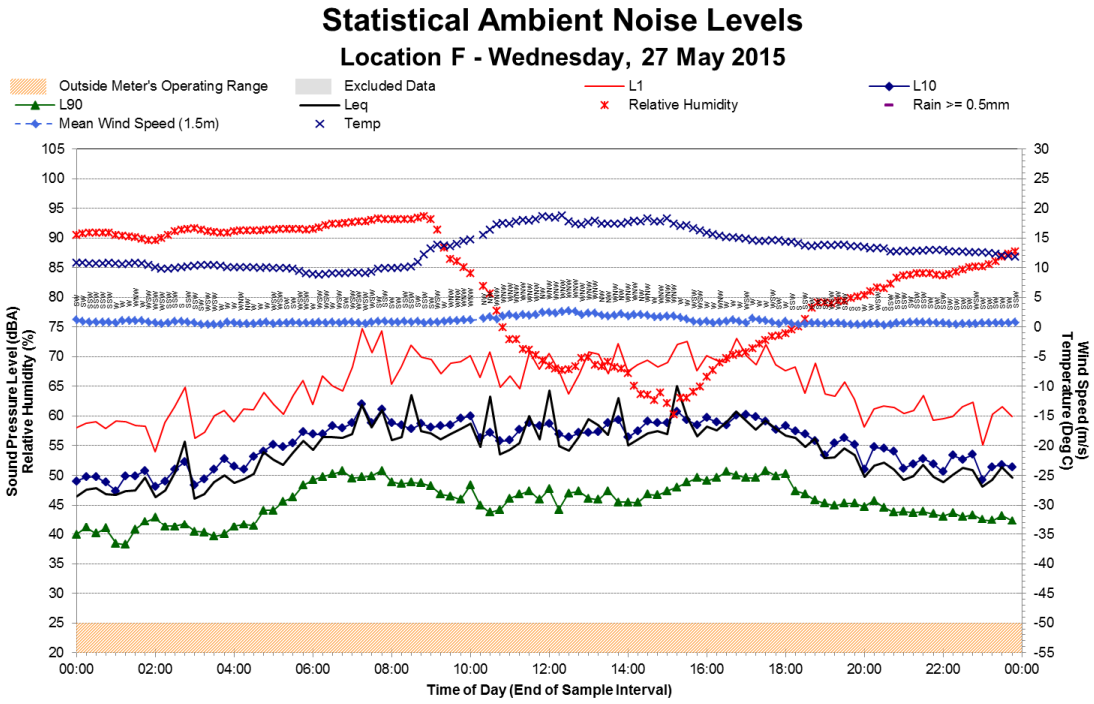
Statistical Ambient Noise Levels – Location F
Report Q58 630.01053-R1

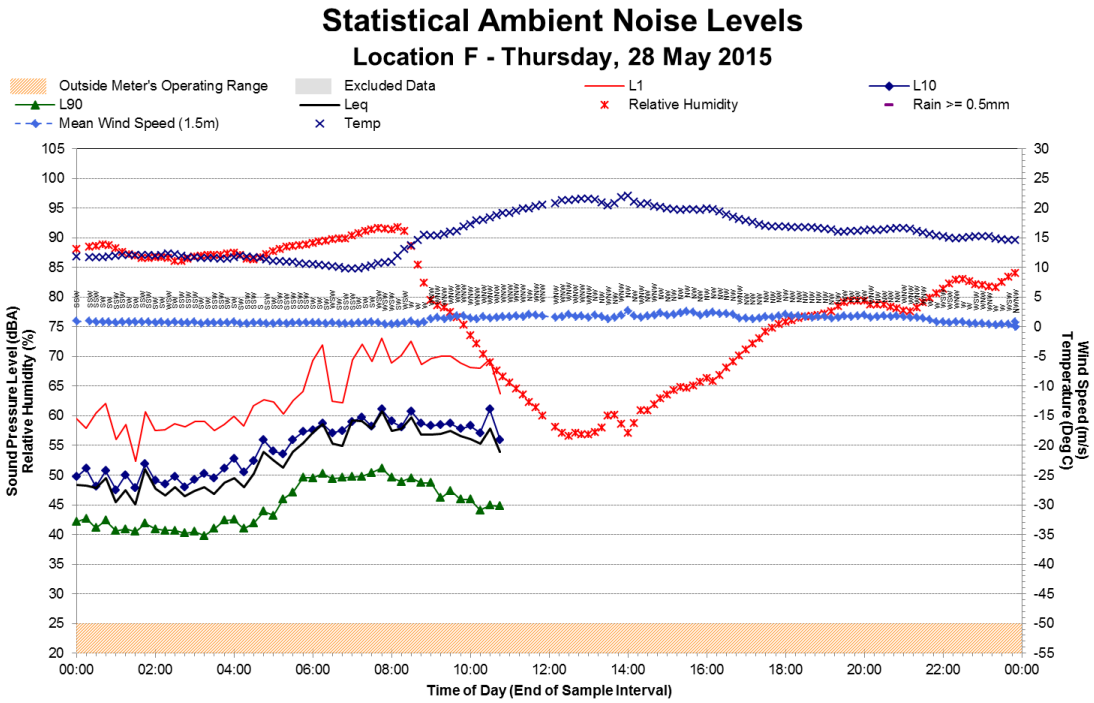




Appendix C2

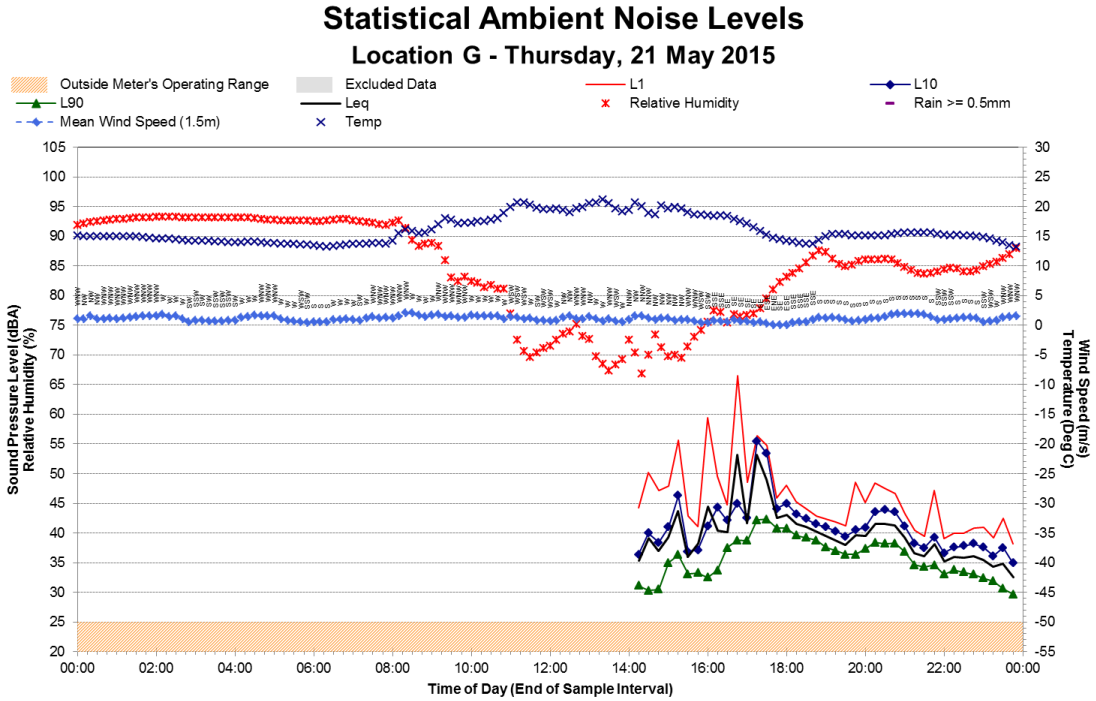
Statistical Ambient Noise Levels – Location F
Report Q58 630.01053-R1

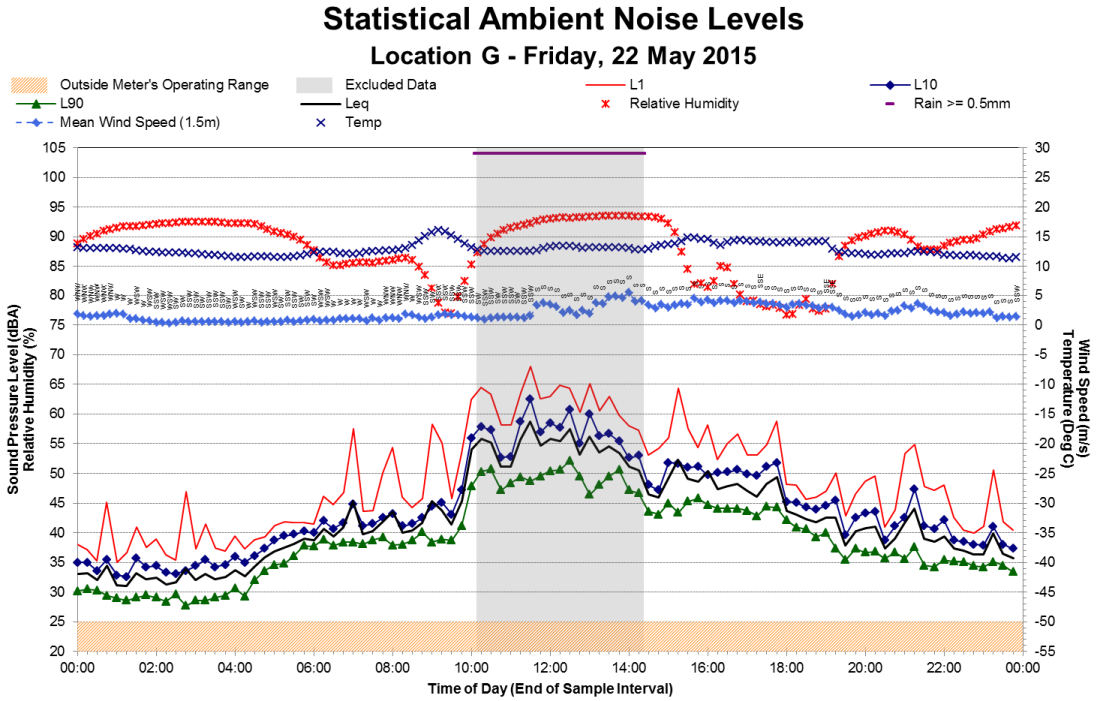




Appendix C3

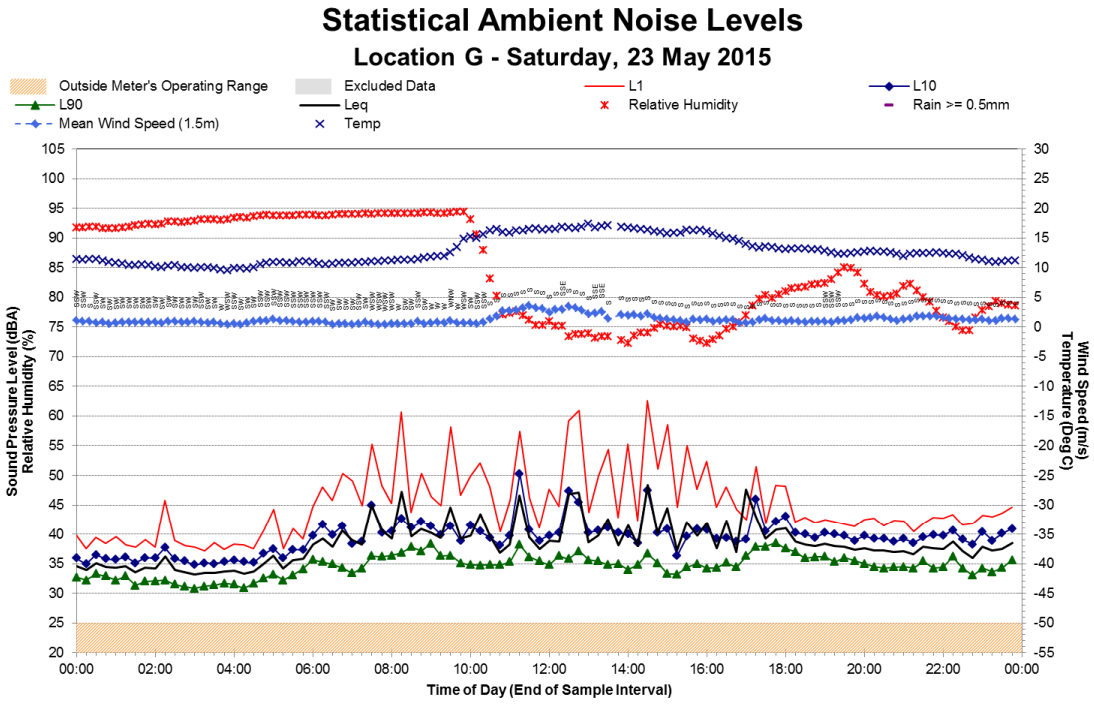
Statistical Ambient Noise Levels – Location G
Report Q58 630.01053-R1

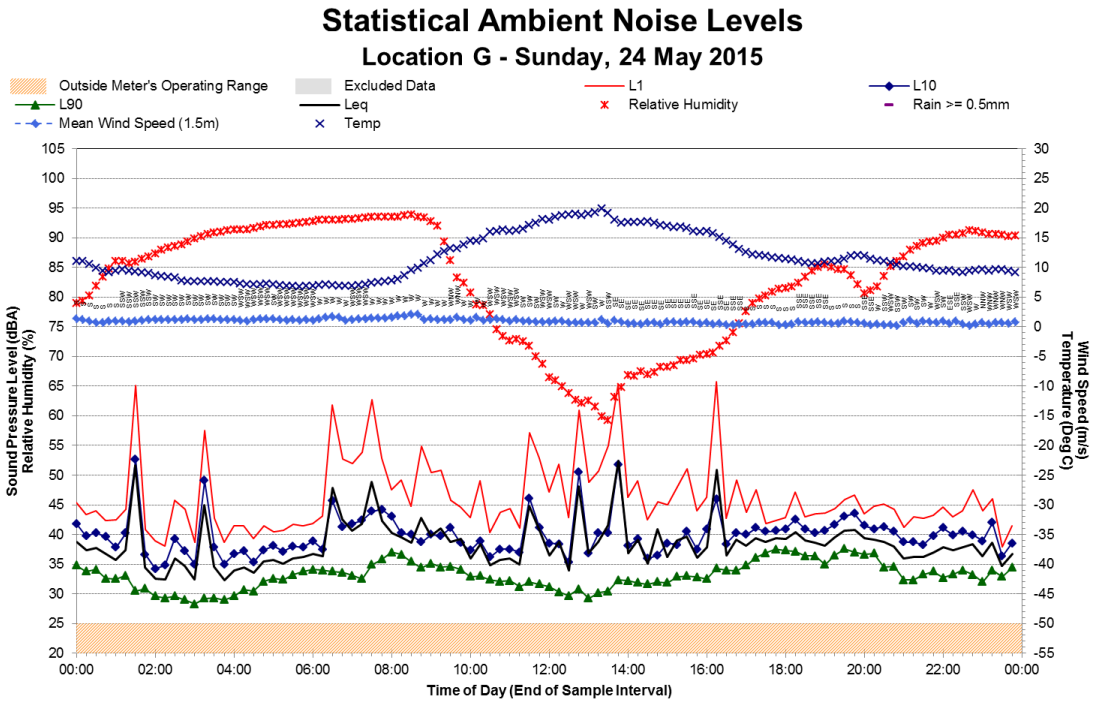




Appendix C3

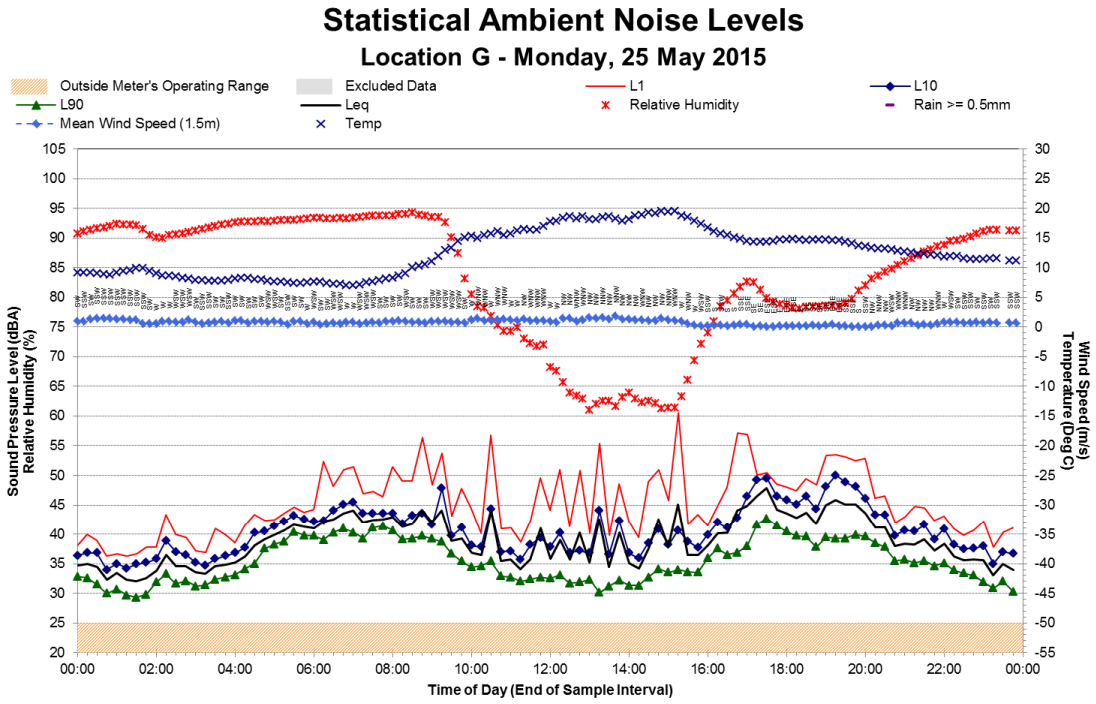
Statistical Ambient Noise Levels – Location G
Report Q58 630.01053-R1

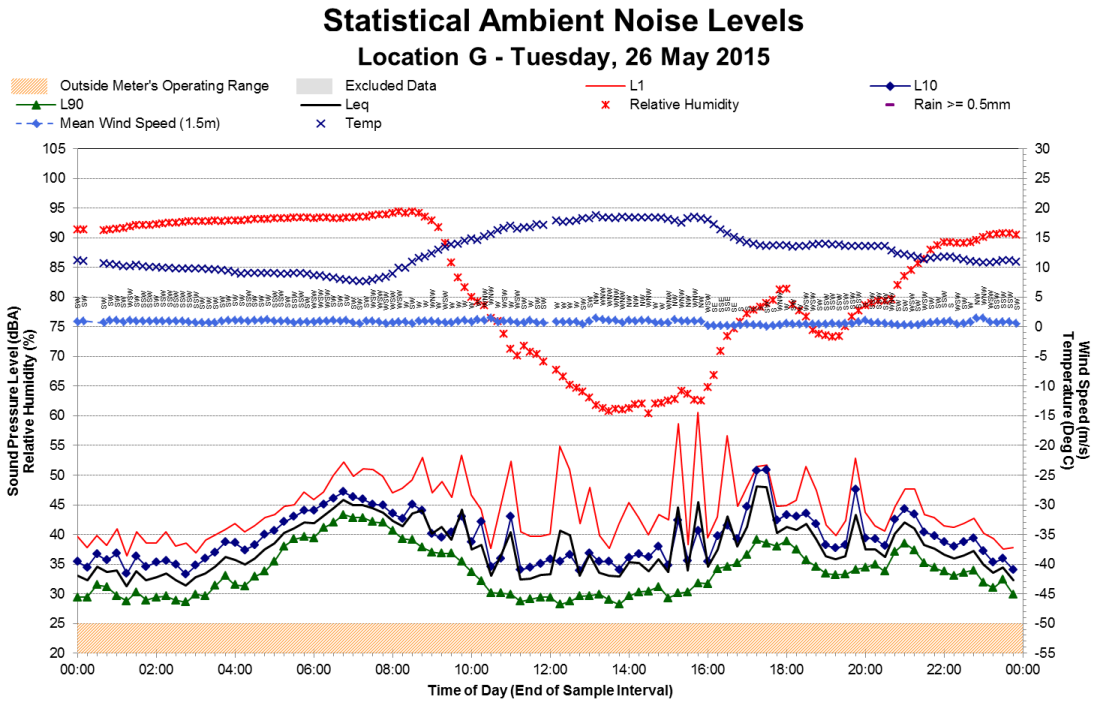




Appendix C3

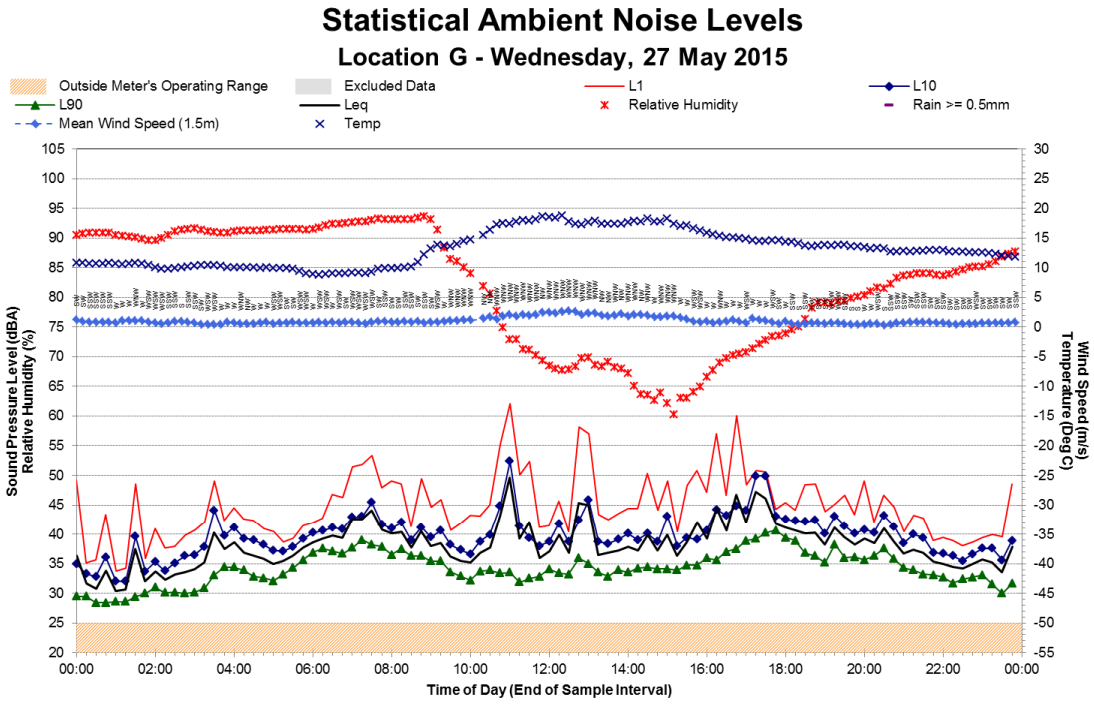
Statistical Ambient Noise Levels – Location G
Report Q58 630.01053-R1

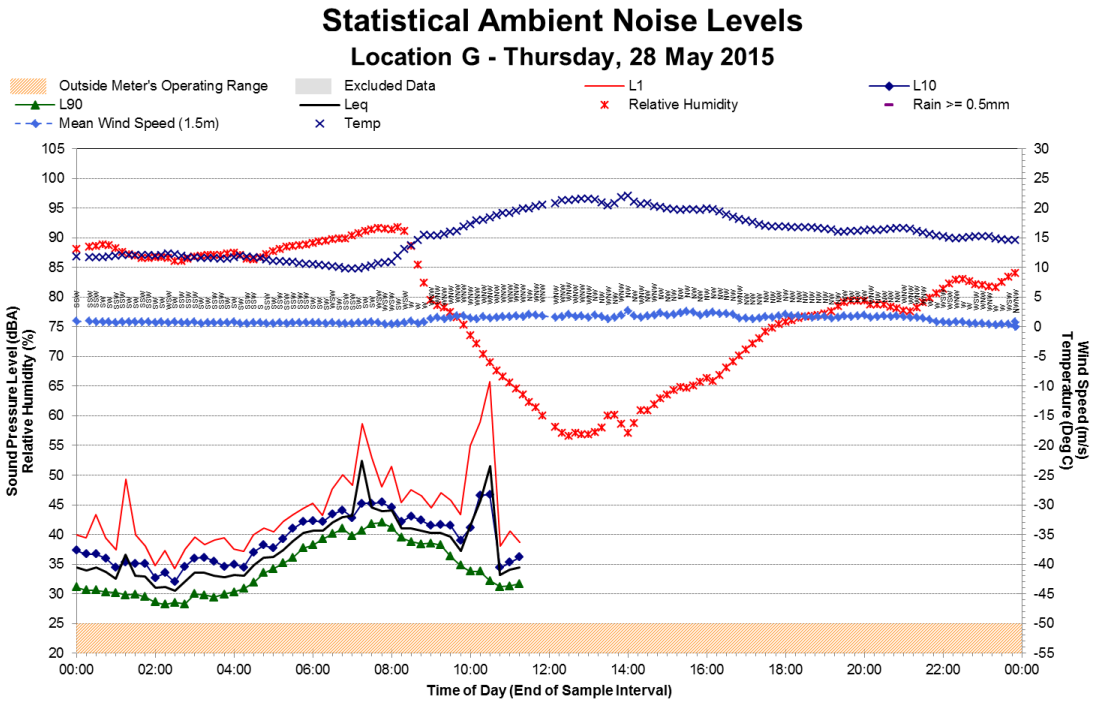




Appendix C3

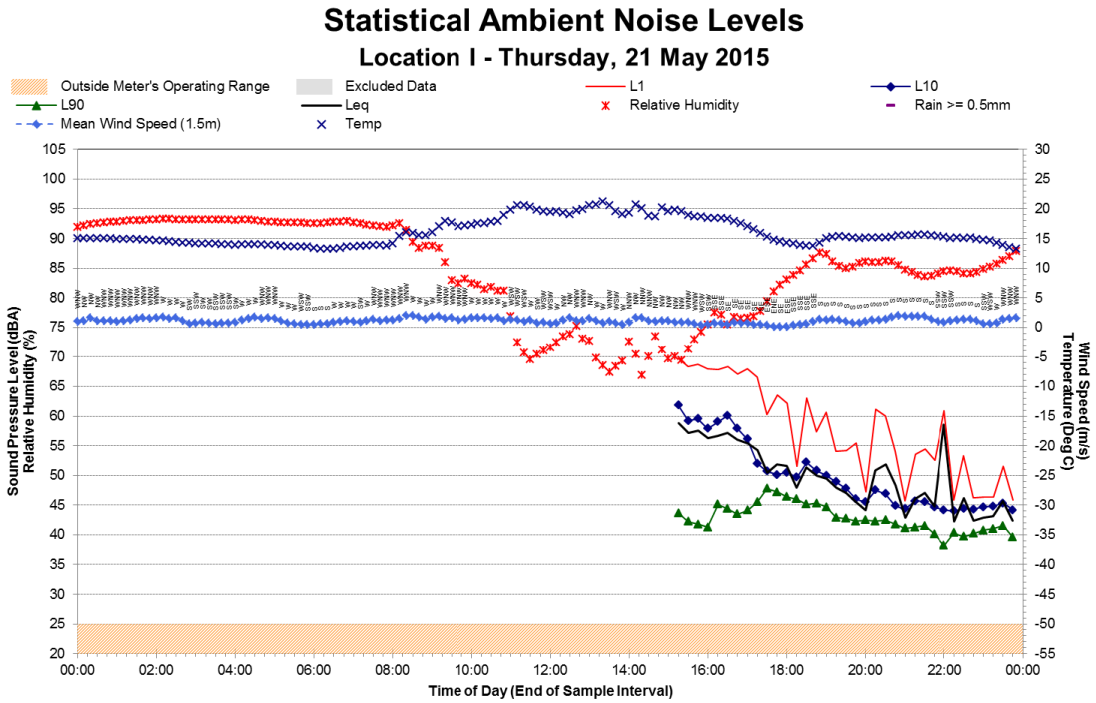
Statistical Ambient Noise Levels – Location G
Report Q58 630.01053-R1

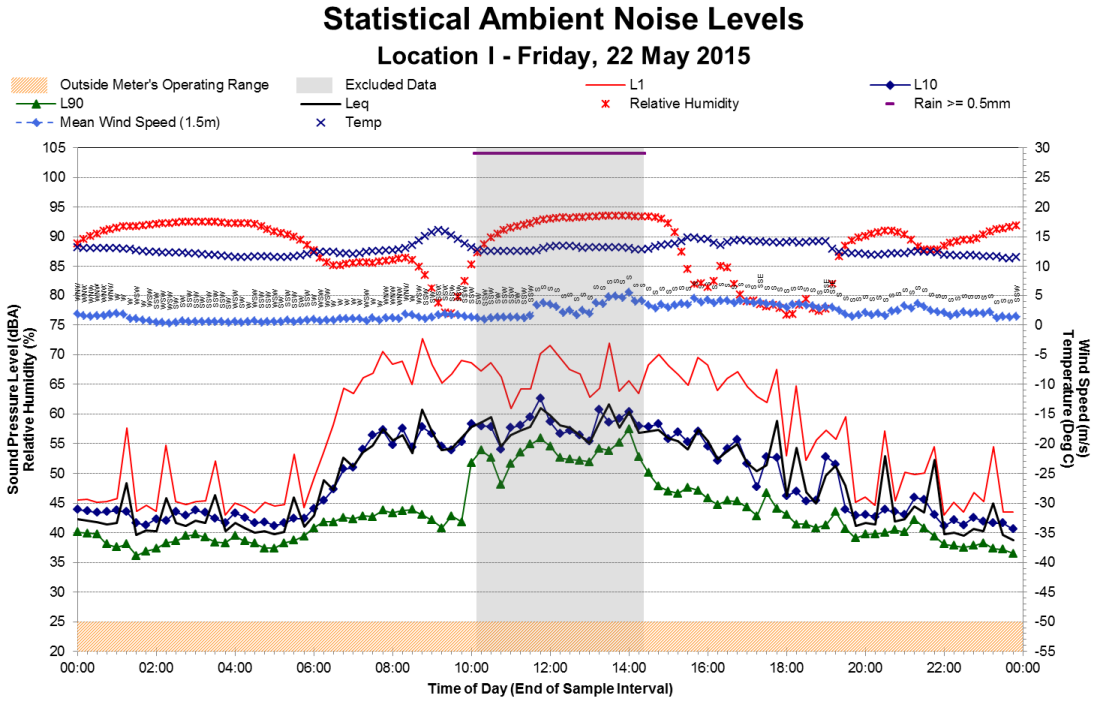




Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q58 630.01053-R1



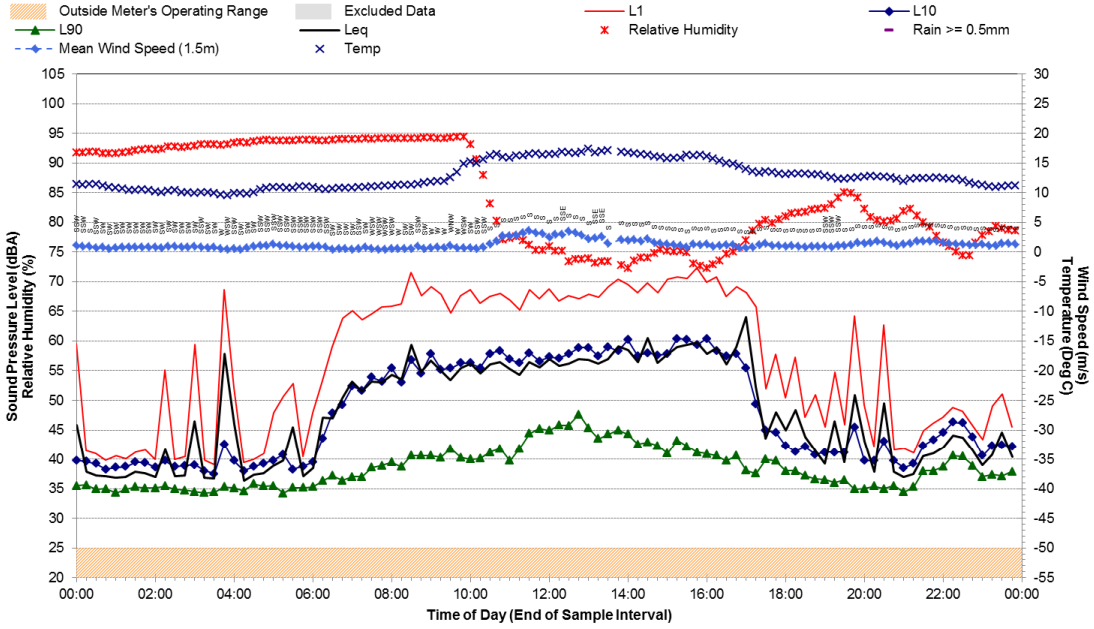


Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q58 630.01053-R1

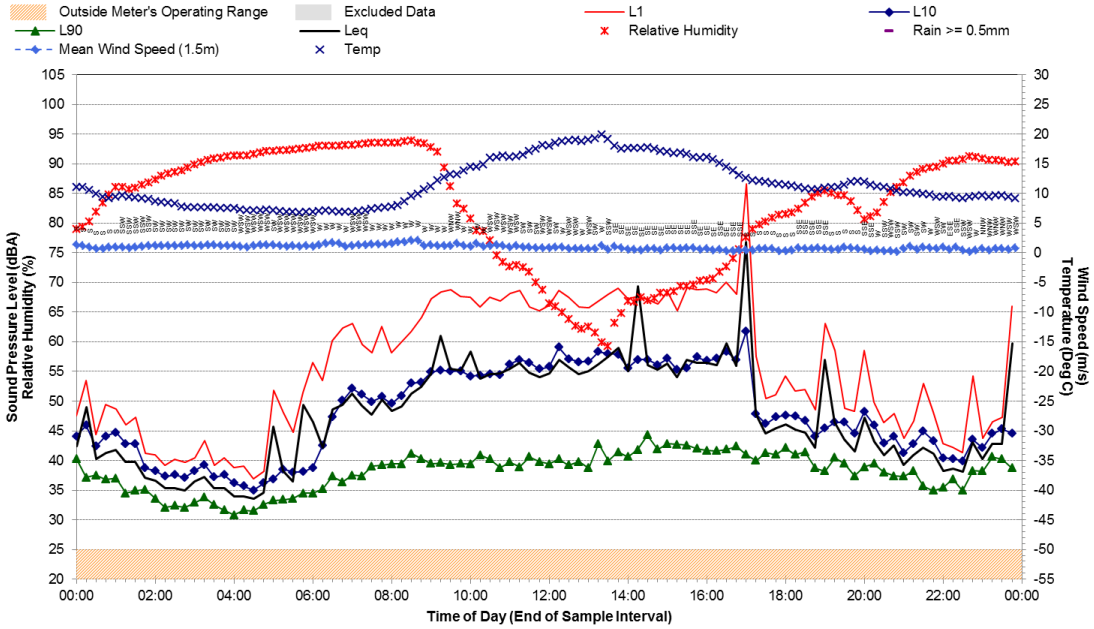
Statistical Ambient Noise Levels

Location I - Saturday, 23 May 2015



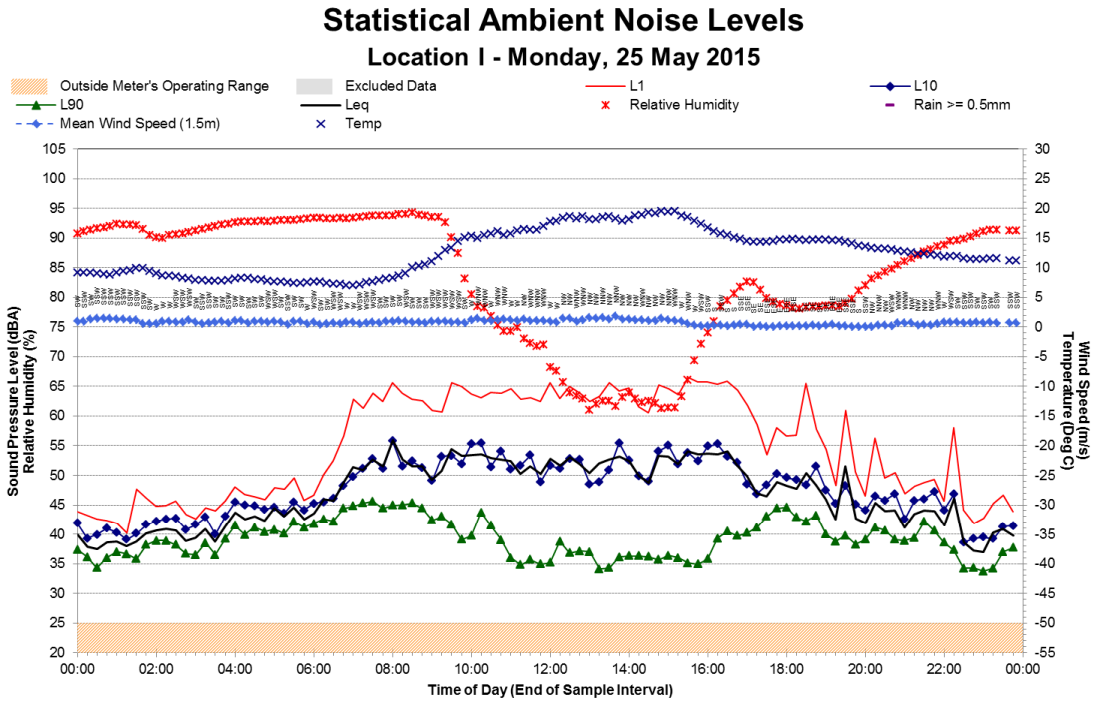
Statistical Ambient Noise Levels

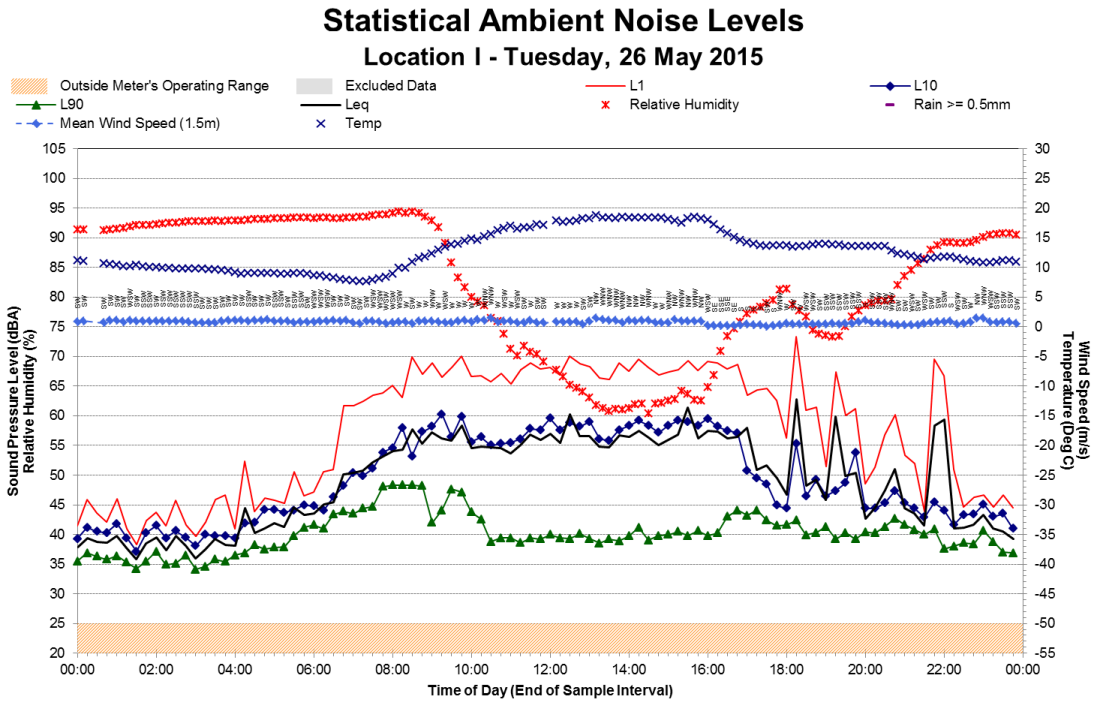
Location I - Sunday, 24 May 2015



Appendix C4

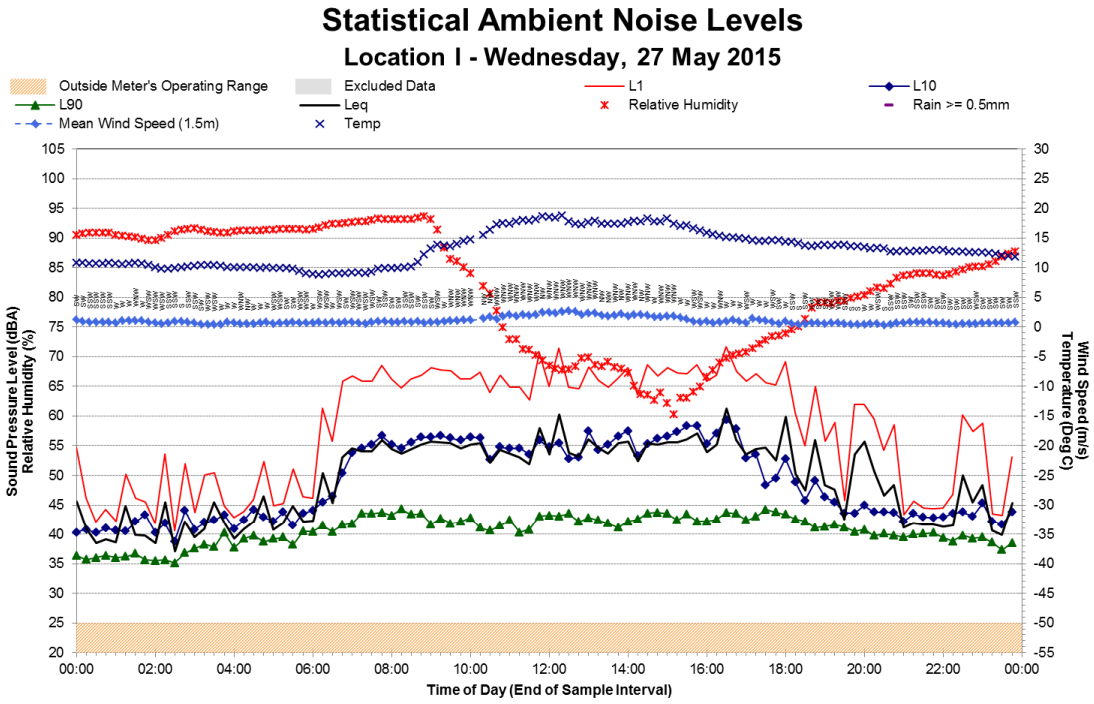
Statistical Ambient Noise Levels – Location I
Report Q58 630.01053-R1

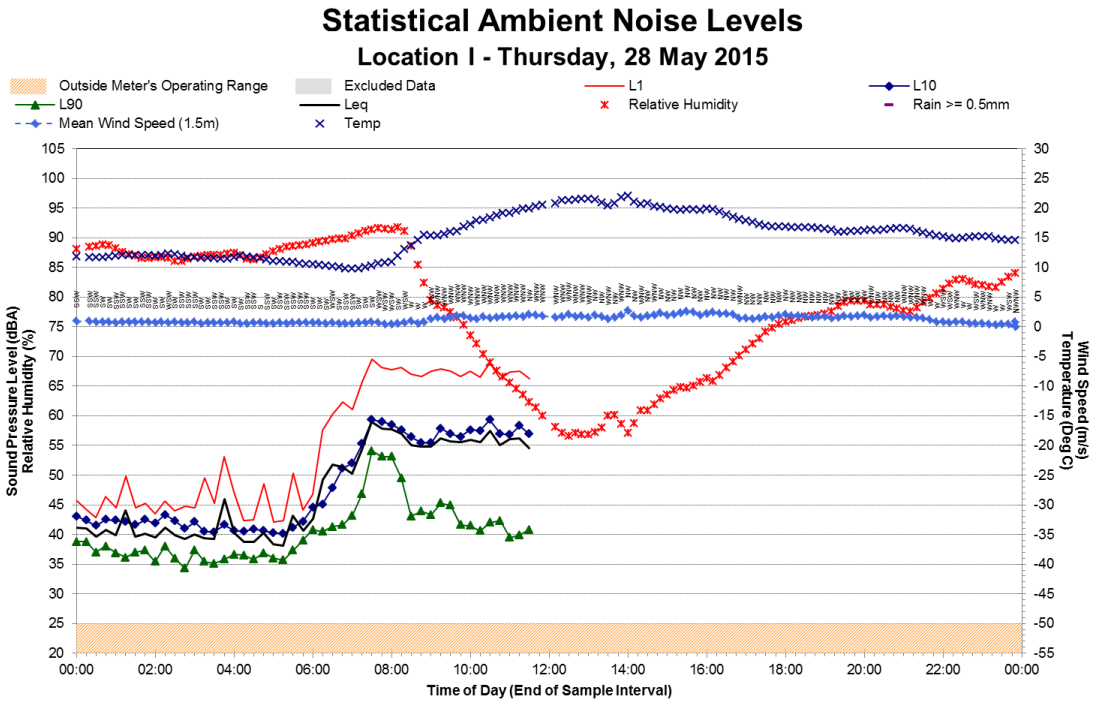




Appendix C4

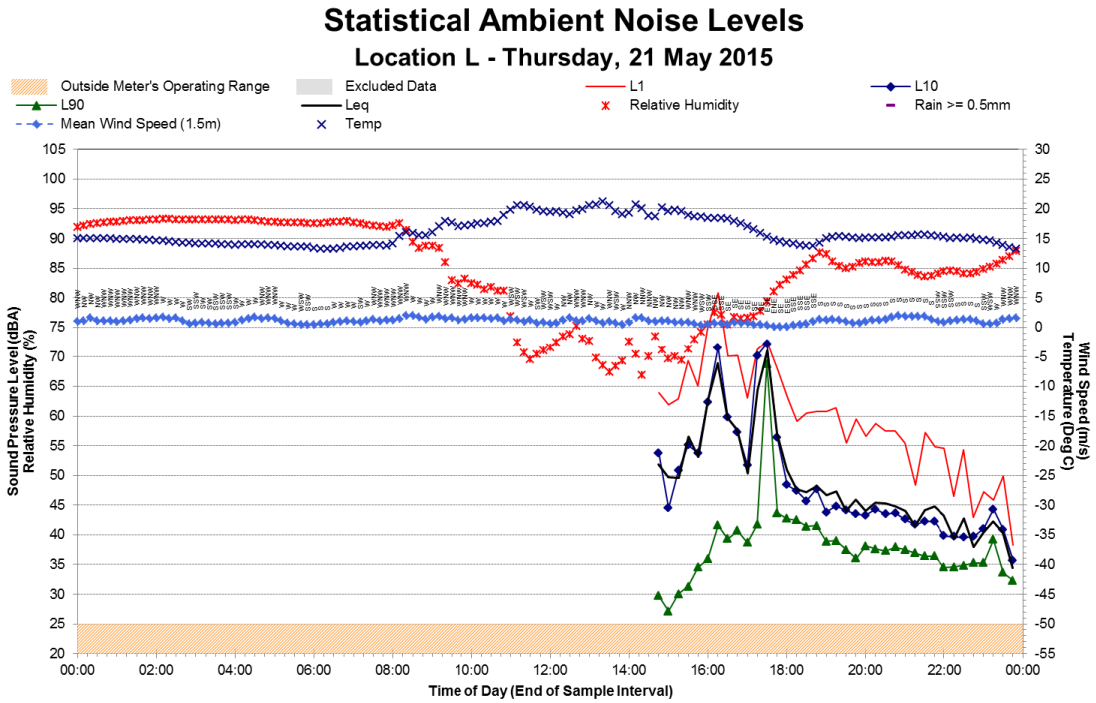
Statistical Ambient Noise Levels – Location I
Report Q58 630.01053-R1

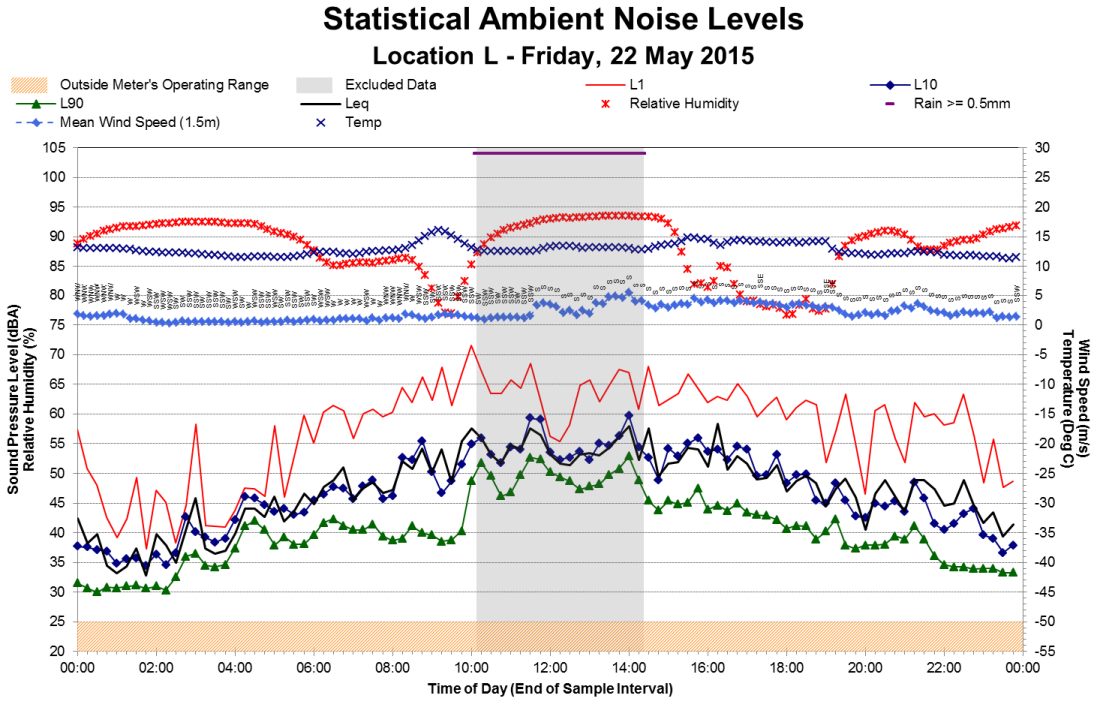




Appendix C5

Statistical Ambient Noise Levels – Location L
Report Q58 630.01053-R1





Statistical Ambient Noise Levels

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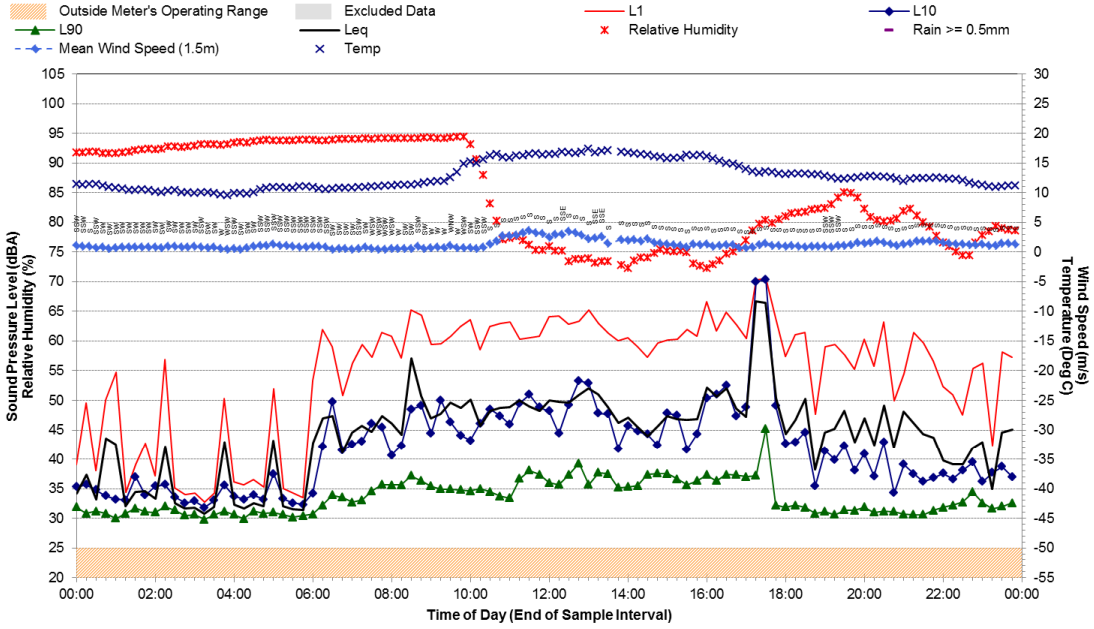

Statistical Ambient Noise Levels

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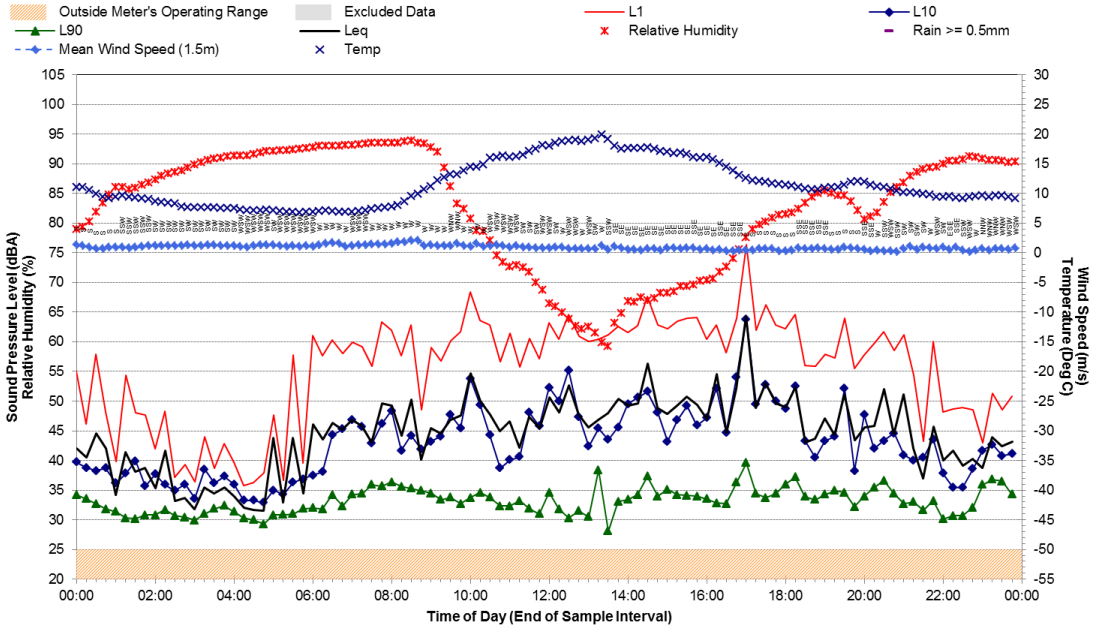

Appendix C5

Statistical Ambient Noise Levels – Location L
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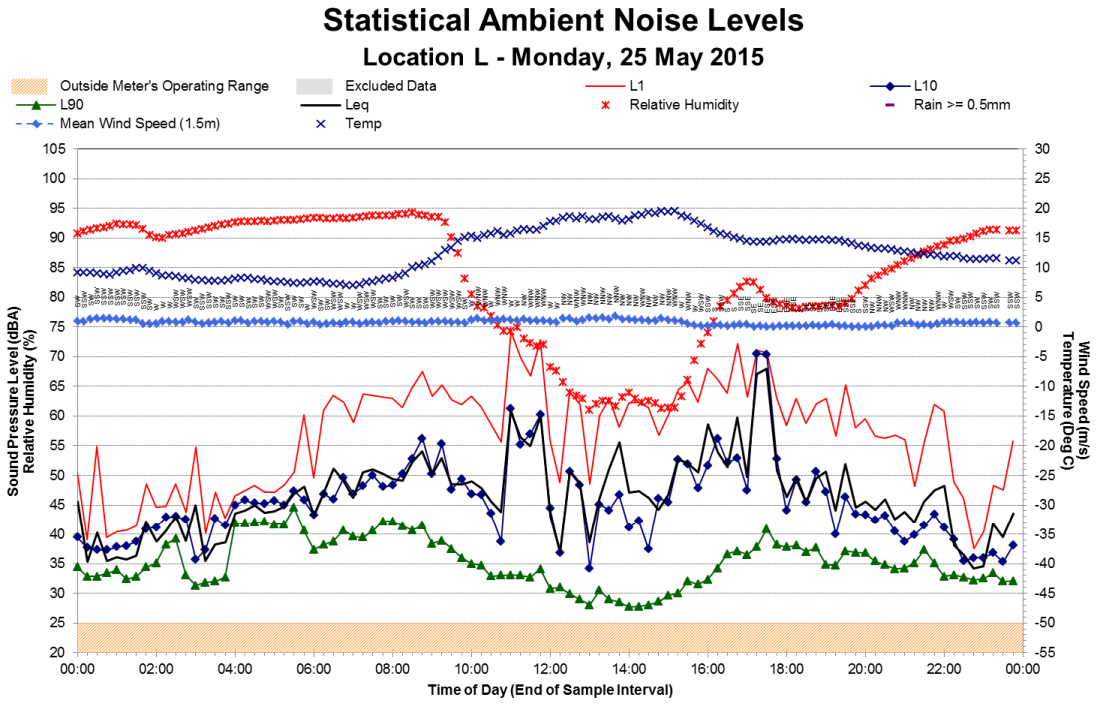

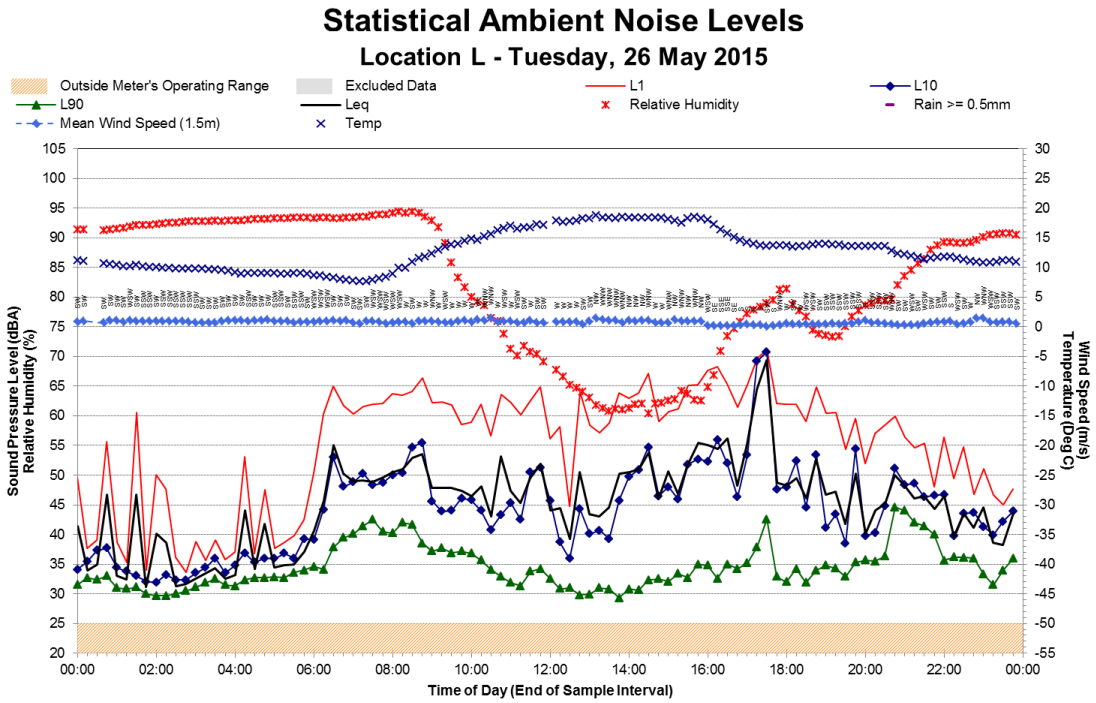

Appendix C5

Statistical Ambient Noise Levels – Location L
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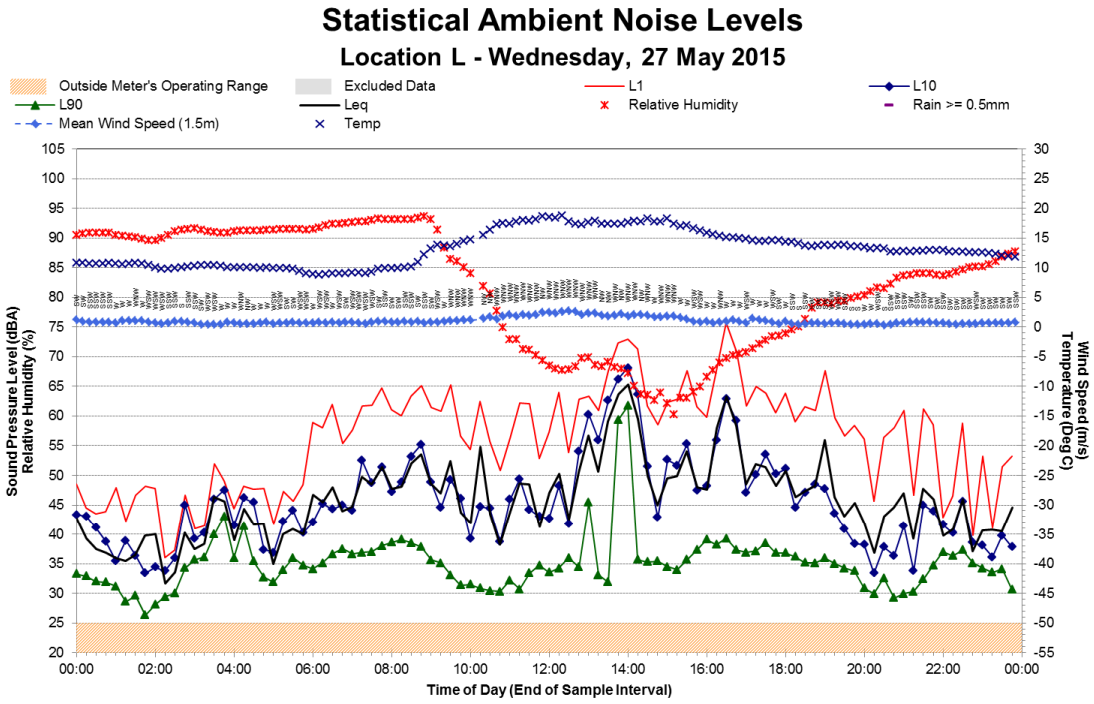

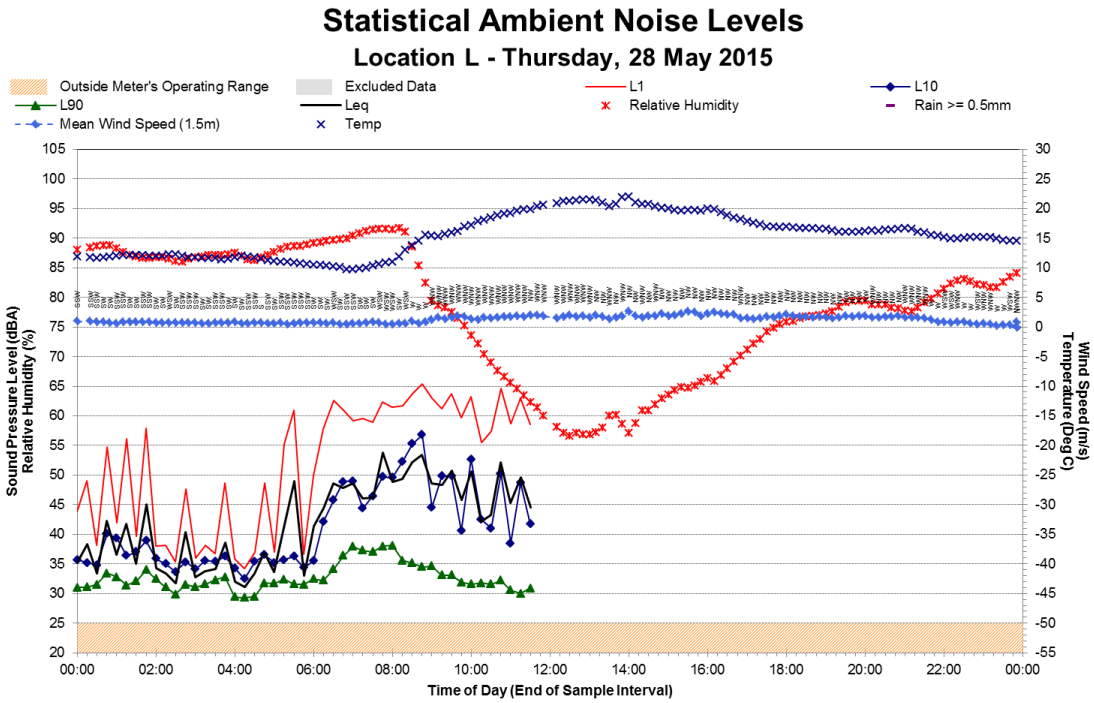

Appendix C6

Statistical Ambient Noise Levels – Location J
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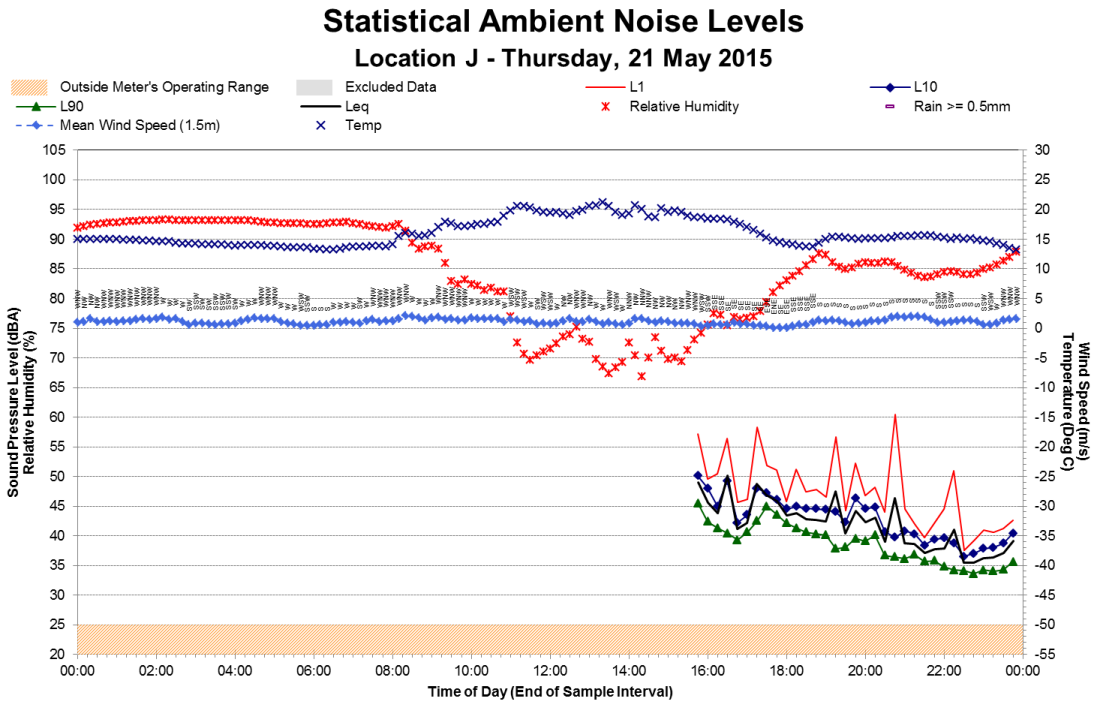
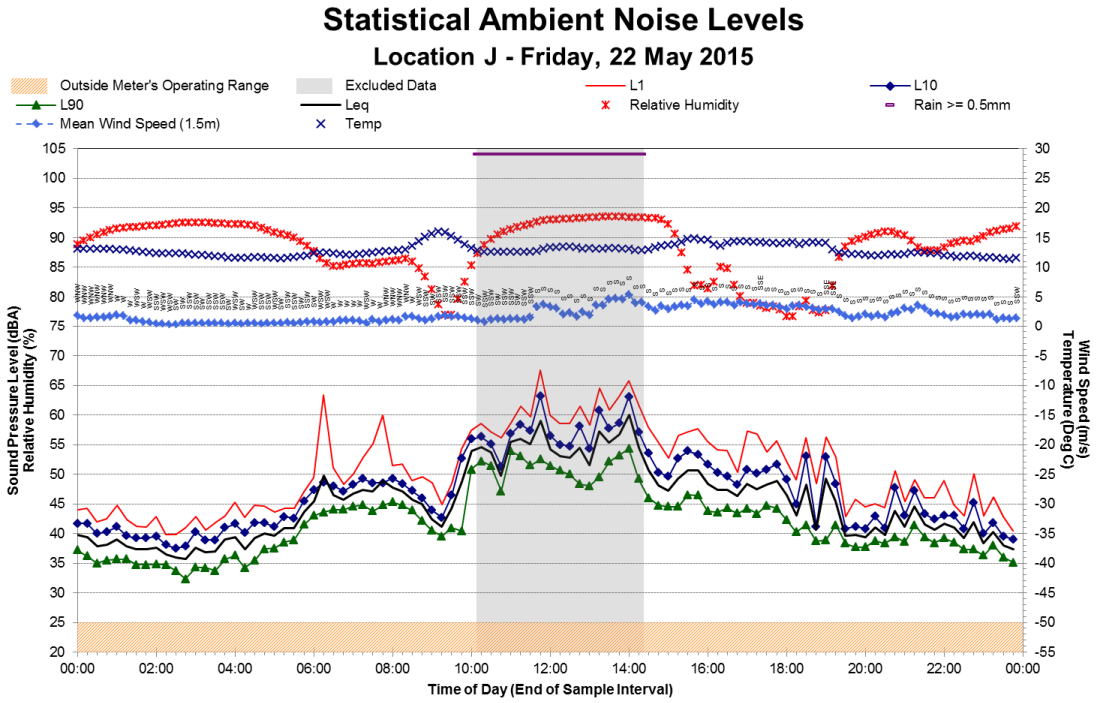
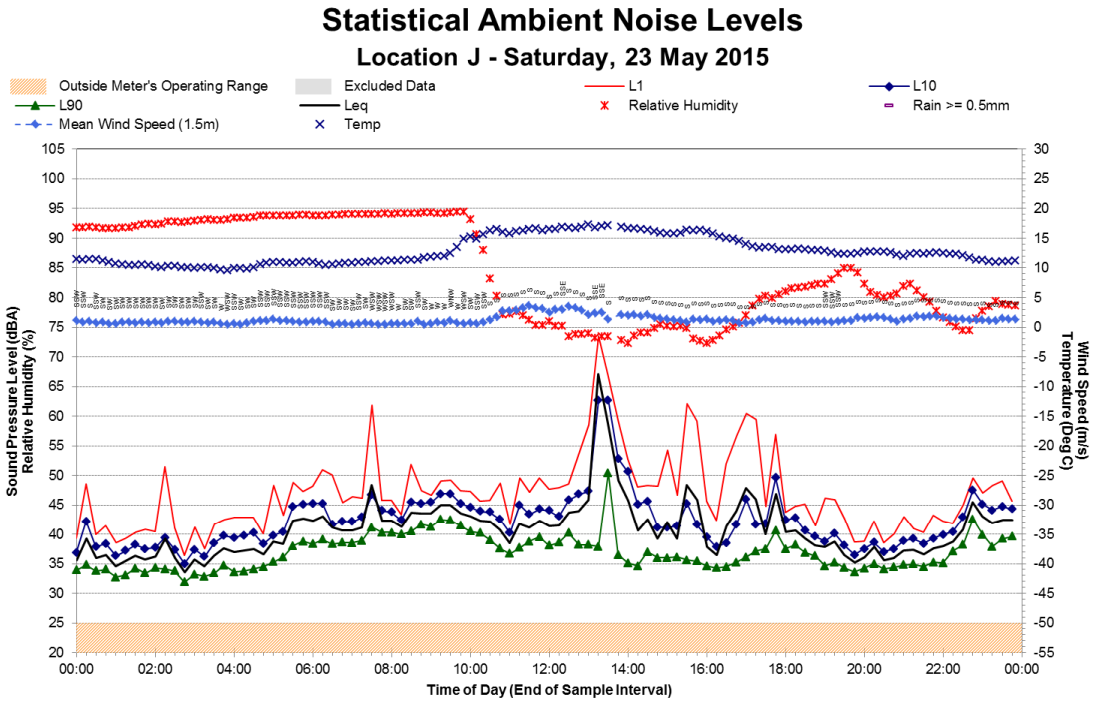
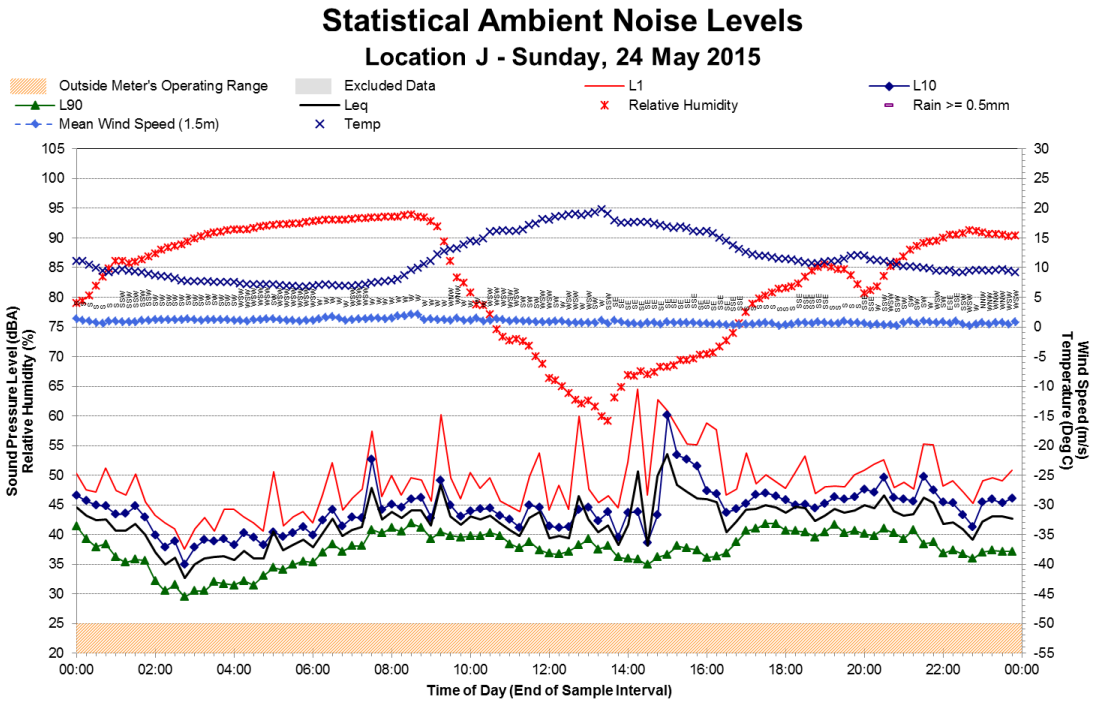




Appendix C6

Statistical Ambient Noise Levels – Location J
Report Q58 630.01053-R1





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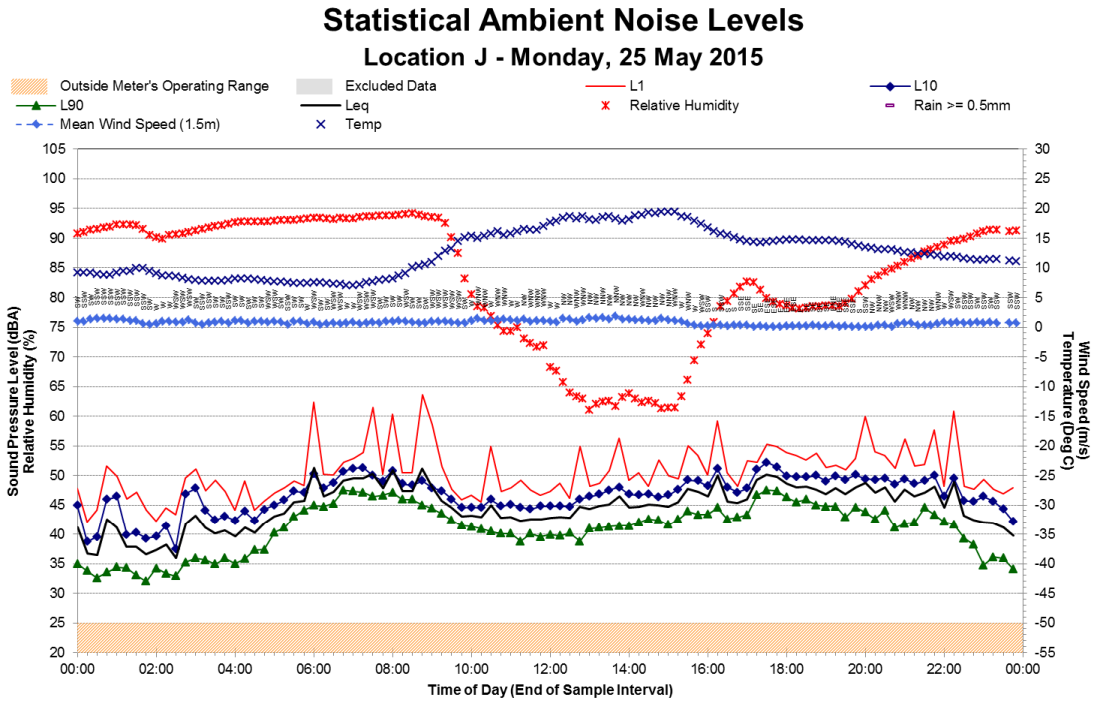
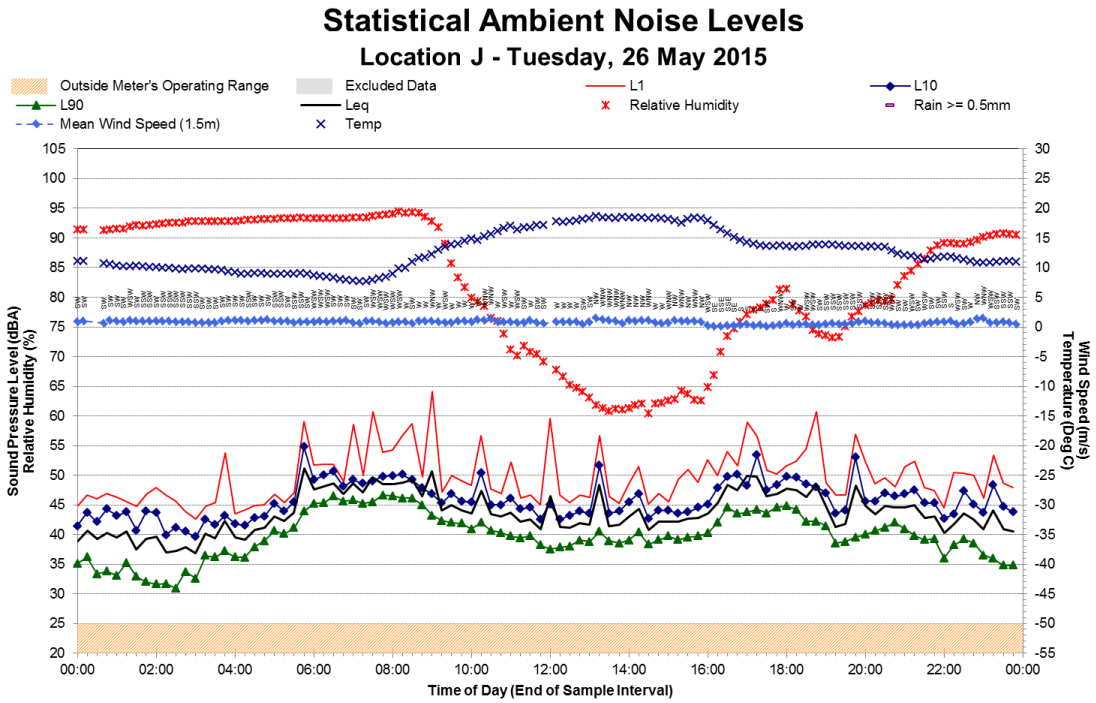
Statistical Ambient Noise Levels – Location J
Report Q58 630.01053-R1



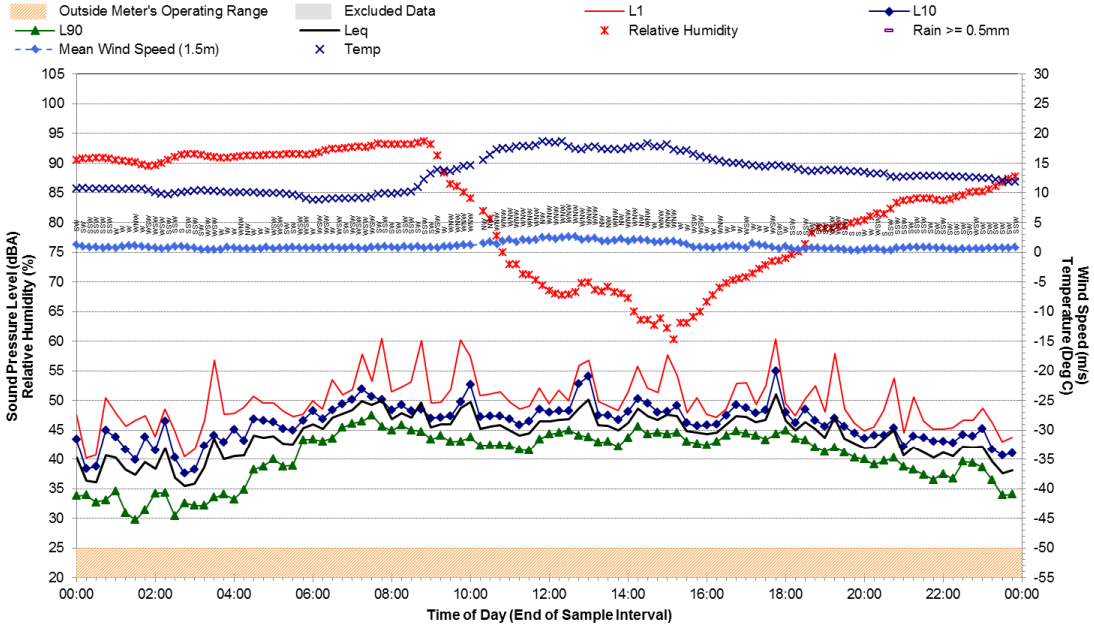


Appendix C6

Statistical Ambient Noise Levels – Location J
Report Q58 630.01053-R1

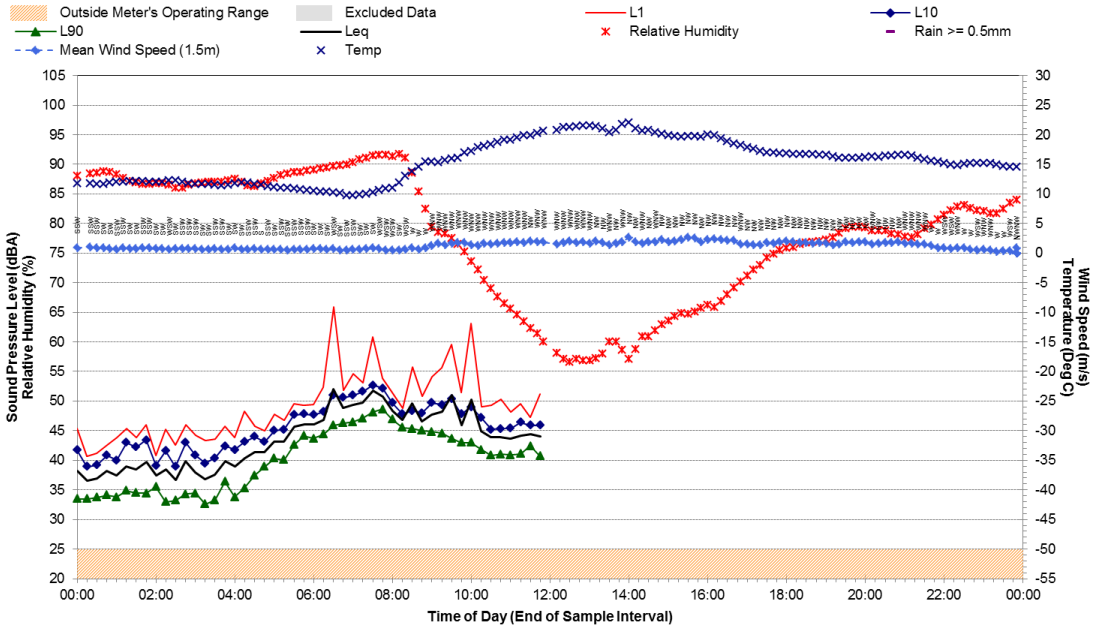
Statistical Ambient Noise Levels

Location J - Wednesday, 27 May 2015



Statistical Ambient Noise Levels

Location J - Thursday, 28 May 2015



Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending September 2015

Report Number Q59 630.01053-R1

13 October 2015

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

Version: Revision 0

Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending September 2015

PREPARED BY:

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DOCUMENT CONTROL

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Q59 630.01053-R1	Revision 0	13 October 2015	Tristan Robertson	Stephen Kozakiewicz	Tristan Robertson
Q59 630.01053-R1	Draft 1	13 October 2015	Tristan Robertson	Stephen Kozakiewicz	Tristan Robertson

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APPENDICES

1 INTRODUCTION

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct quarterly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Mine Project Noise Monitoring Program, dated 27 May 2008.

The objectives of the noise monitoring survey for this operating quarter were as follows:

- Measure the ambient noise levels at six (6) focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 DEVELOPMENT CONSENT PROJECT APPROVAL

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)*", and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:

Location	***LA10(15minute) Noise Limits (dBA)***	
	Daytime	***Night-time***
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. *The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.*

19. *The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.*

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Coal Mine Project Approval:

- Extraction of up to 6.1 Mtpa of Run of Mine (ROM) coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield Coal Handling and Preparation Plant by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield Coal Handling Processing Plant (CHPP) to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The Project Approval was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the Project Approval was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the Project Approval was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the CHPP.

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Location I	*Lord Howe Drive, Ashtonfield*	*36*	*36*	*36*	*45*
Location K	*Catholic Diocese Land*	*37*	*37*	*37*	*45*
Location L	*Kilshanny Avenue, Ashtonfield*	*40*	*40*	*40*	*47*
All other Locations	*All other privately-owned Residences*	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3 (Appendix A).*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		LAeq(15minute)
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	Day	Evening	Night
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;*
    c. *Describe the proposed noise management system in detail; and*
    d. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*
        - *Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.*

Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*
4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*

   i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*

   ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*

b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*

   i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. *Implement all reasonable and feasible best practice noise mitigation measures on the site; and*

d. *Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.*

3 NOISE MONITORING METHODOLOGY

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), and in accordance with Heggies Report 30-1409-R2 dated 27 May 2008 (*Abel Mine Project Noise Monitoring Program)* and AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of IEC 61672.1-2004 *Electroacoustics – Sound Level Meters – Specifications* and carries current NATA or manufacturer calibration certificates.

3.2 Monitoring Locations

Baseline and preceding operational quarterly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six (6) focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Lord Howe Drive, Ashtonfield
J	Parish Drive, Thornton
L	17 Kilshanny Ave, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix B**.

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of seven (7) days between 7 September 2015 and 14 September 2015 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background 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. The L_{Amax} is the maximum noise level recorded over the interval.

Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six (6) monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 OPERATOR ATTENDED NOISE MONITORING

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were conducted during the daytime, evening and night on Monday 7 September 2015. All operator attended noise surveys were conducted using a Brüel & Kjær 2250L Type 1, integrating sound level meter (s/n: 3005908).

Results of the operator attended noise measurements are given in **Table 2** to **Table 7**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date and start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from the Abel Coal Mine and are stated only when a contribution could be quantified.

Mine noise at all monitoring locations, with the exception of Location L, during various periods was inaudible over the existing ambient noise levels. Where this is the case, noise levels from the source are typically 10 dB (or more) below the measured L_{A90} noise level. Therefore, subtracting 10 dB from the measured L_{A90} noise level gives an indication of the maximum contribution of Abel operations at these locations.

Table 2 Location D, Black Hill School, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa) LAmax	LA1	LA10	LA90	LAeq	Description of Noise Emission and Typical Maximum Levels LAmax - dBA
7/08/2015 12:35 AM W = 3.8 m/s NW Temp = 22.2°C Cloud cover = 0/8	Daytime Ambient	73	64	52	44	51	Local Road Traffic 64 to 73 dBA Distant Road traffic 43 to 49 dBA Trees in wind 44 to 45 dBA Birds 47 to 54 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <34 dBA[1]					
7/08/2015 6:00 PM W = <1 m/s N Temp = 21.8 °C Cloud cover = 0/8	Evening Ambient	74	66	56	39	53	Local Road Traffic 51 to 74 dBA Distant road traffic noise 30 to 40 dBA Insects 39 to 42 dBA Birds 42 to 63 dBA Cow moo 51 dBA Air blower school cleaner 44 to 6 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
7/08/2015 10:00 PM W = 1.5 m/s NW Temp = 14.9 °C Cloud cover = 0/8	Night-time Ambient	67	57	46	38	45	Distant road traffic noise 30dBA Insects 40 to 44 dBA Wind in trees 43 to 45 dBA Sheep 46 to 48 dBA Local Road traffic noise 57 to 67 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa) LAmax	LA1	LA10	LA90	LAeq	Description of Noise Emission and Typical Maximum Levels LAmax - dBA
7/08/2015 13:04 PM W = 4.5 m/s WNW Temp = 22.5°C Cloud cover = 0/8	Daytime Ambient	82	73	63	52	62	John Renshaw Drive 56 to 68 dBA Local Road Traffic 63 to 82 dBA Birds 57 to 60 dBA Trees in wind 50 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <42 dBA[1]					
7/08/2015 18:21 PM W = <1 m/s N Temp = 20.6 °C Cloud cover = 1/8	Evening Ambient	85	74	61	54	62	John Renshaw Drive 59 to 61 dBA Local Road Traffic 59 to 85 dBA Insects/frogs 51 to 55 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <44 dBA[1]					
7/08/2015 22:20 PM W = <1.5 m/s NW Temp = 14.9 °C Cloud cover = 0/8	Night-time Ambient	66	57	52	49	51	John Renshaw Drive 50 to 66 dBA Birds 52 to 53 dBA Insects/frogs 50 to 52 dBA Trees in wind 40 to 45 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <39 dBA[1] LA1(1min) contribution <39 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 4 Location G, 156 Buchannan Road, Buchannan

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
7/08/2015 14:43 PM W = <2.7 m/s NW Temp = 24 °C Cloud cover = 3/8	Daytime Ambient	71	47	42	38	42	Distant road traffic noise 38 to 40 dBA Dog barking 51 to 71 dBA Birds 42 to 44 dBA Trees in wind 41 to 46 dBA Aircraft flyover 45 to 50 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
7/08/2015 19:25 PM W = Calm Temp = 18 °C Cloud cover = 0/8	Evening Ambient	52	49	46	41	44	Distant road traffic noise 44 to 49 dBA Aircraft flyover 46 to 52 dBA Insects 40 to 42 dBA Air conditioner compressor 30 to 3 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <31 dBA[1]					
7/08/2015 23:23 PM W = <1 m/s WNW Temp = 14.1 °C Cloud cover = 0/8	Night-time Ambient	52	44	40	32	37	Distant road traffic noise 32 to 52 dBA Tree in wind 35 to 36 dBA Insects 33 to 36 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 5 Location I, Lord Howe Drive, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
7/08/2015 15:43 PM W = <2.6 m/s WNW Temp = 22.7 °C Cloud cover = 4/8	Daytime Ambient	75	63	53	42	53	Local Road Traffic 55 to 75 dBA Distant road traffic noise 31 to 40 dBA Birds 46 to 59 dBA Trees in wind 45 to 47 dBA Insect/frogs 45 to 50 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1]					
7/08/2015 20:15 PM W = calm Temp = 16.9 °C Cloud cover = 0/8	Evening Ambient	59	52	49	45	47	local road traffic noise 49 to 59 dBA Insects 46 to 47 dBA Rail traffic noise 36 to 39 dBA Train horn 52 to 54 dBA Abel Mine audible 30 to 40 CHPP
		Estimated Abel mine LAeq(15min) contribution 31 dBA					
8/08/2015 00:11 AM W = <1-2 m/s W Temp = 13 °C Cloud cover = 0/8	Night-time Ambient	53	49	44	39	42	Distant road traffic noise 30 dBA Insect/frogs 43 to 53 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 6 Location J, Parish Drive, Thornton

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
7/08/2015 16:15 PM W = 2.4 m/s NW Temp = 22.6 °C Cloud cover = 3/8	Daytime Ambient	60	54	49	44	47	Distant road traffic noise 40 to 49 dBA Birds 51 to 60 dBA Trees in wind 45 to 46 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <34 dBA[1]					
7/08/2015 20:41 PM W = Calm Temp = 15 °C Cloud cover = 0/8	Evening Ambient	47	43	41	36	39	Distant road traffic noise 40 to 47 dBA train 38 to 39 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1]					
8/08/2015 00:34 PM W = <1-2 m/s W Temp = 13 °C Cloud cover = 0/8	Night-time Ambient	52	46	36	28	35	Distant road traffic noise 31 to 52 dBA Trees in wind 33 to 34 dBA Dog barking 32 to 43 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 7 Location L, 17 Killshanny Ave, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax - dBA
		LAmax	LA1	LA10	LA90	LAeq	
7/08/2015 15:17 PM W = <2.6 m/s NW Temp = 23.6 °C Cloud cover = 3/8	Daytime Ambient	90	72	56	38	60	Local Road Traffic 56 to 90 dBA Trees in wind 40 to 48 dBA Birds 44 to 67 dBA Distant road traffic 38 to 48 dBA Abel Mine not audible
		Estimated Abel Mine LAeq(15min) contribution <30 dBA[1]					
7/08/2015 19:55 PM W = Calm Temp = 16.9 °C Cloud cover = 0/8	Evening Ambient	81	59	46	34	51	Insects 36 to 38 dBA Aircraft flyover 40 to 42 dBA Local road traffic 45 to 81 dBA Nearby residences talking 50 to 55 dBA Abel Mine audible 30 dBA CHPP
		Estimated Abel Mine LAeq(15min) contribution <30 dBA					
7/08/2015 23:50 PM W = 1 m/s W Temp = 12.9 °C Cloud cover = 0/8	Night-time Ambient	52	40	36	31	34	Distant road traffic noise 28 to 52 dBA Air-Conditioning Plant 30 to 31 dBA Trees in wind 37 to 43 dBA Abel Mine audible 33 to 35 dBA CHPP
		Estimated Abel Mine LAeq(15min) contribution <33 dBA[1] LA1(1min) contribution <35 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as "natural" noises such as birds, insects and leaf rustle.

Abel operations were observed to be audible at times at Location L.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8**.

Table 8 Compliance Noise Assessment – Operations

Location	Estimated Abel LAeq(15minute) Contribution			Consent Conditions LAeq(15minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	<34	<30	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
F – Black Hill Road, Black Hill	<42	<44	<39	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
G – Buchanan Road, Buchanan	<30	<31	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<32	31	<30	36	36	36	Yes[1,2]	Yes	Yes[1,2]
J – Parish Drive, Thornton	<34	<30	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<30	30	33	40	40	40	Yes[1,2]	Yes	Yes

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**.

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Abel LA1(1minute) Contribution	Consent Conditions LA1(1minute)	Compliance
D – Black Hill School, Black Hill	<30	45	Yes[1,2]
F – Black Hill Road, Black Hill	<39	45	Yes[1,2]
G – Buchanan Road, Buchanan	<30	45	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<30	45	Yes[1,2]
J – Parish Drive, Thornton	<30	45	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<35	47	Yes

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 UNATTENDED CONTINUOUS NOISE MONITORING

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between 7 September 2015 and 25 October 2015 at each of the six (6) monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	ARL EL- 316 16-203-508	02/10/2015-9/10/2015
F – Black Hill Road, Black Hill	ARL EL- 316 16-203-508	07/09/2015-14/09/2015
G – Buchanan Road, Buchanan	ARL EL- 316 16-004-033	07/09/2015-14/09/2015
I – Lord Howe Drive, Ashtonfield	ARL EL- 316 16-103-494	15/09/2015-25/09/2015
L – Kilshanny Ave, Kilshanny	ARL EL- 316 16-103-494	07/09/2015-14/09/2015
J – Parish Drive, Thornton	Brüel & Kjær 2250-L 3003389	07/09/2015-14/09/2015

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendices C1** to **C6**. A summary of the results of the unattended continuous noise monitoring is given in

Table 11.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Industrial Noise Policy (INP). The day, evening and night periods replace the day and night periods defined under the Environmental Noise Control Manual (ENCM). However, as the Donaldson conditions of consent are under the ENCM, these periods have also been reported.

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA Re 20 µPa)

Location	Period	Primary Noise Descriptor (dBA re 20 µPa)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	ENCM Daytime	61	51	31	53
	Daytime	66	50	35	54
	Evening	55	52	45	51
	Night	52	47	32	50
F Lot 684 Black Hill Road, Black Hill	ENCM Daytime	66	56	44	58
	Daytime	69	58	42	60
	Evening	62	55	48	54
	Night	60	52	41	52
G 156 Buchanan Road, Buchanan	ENCM Daytime	48	44	36	42
	Daytime	49	44	35	42
	Evening	46	43	38	42
	Night	41	38	30	42
I 49 Magnetic Drive, Ashtonfield	ENCM Daytime	63	53	41	71
	Daytime	64	53	39	73
	Evening	57	51	45	55
	Night	50	44	35	48
L 17 Kilshanny Ave, Ashtonfield	ENCM Daytime	60	46	33	52
	Daytime	63	50	31	54
	Evening	57	42	33	51
	Night	44	36	27	44
J 220 Parish Drive, Thornton	ENCM Daytime	54	46	39	47
	Daytime	55	47	38	48
	Evening	48	46	39	45
	Night	49	45	31	44

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.
Environmental Noise Control Manual (ENCM) Daytime 7.00 am to 10.00 pm, Night 10.00 pm to 7.00 am.

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient L_{A90} Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1**, **Figure 2** and **Figure 3** for the daytime, evening and night-time periods respectively.

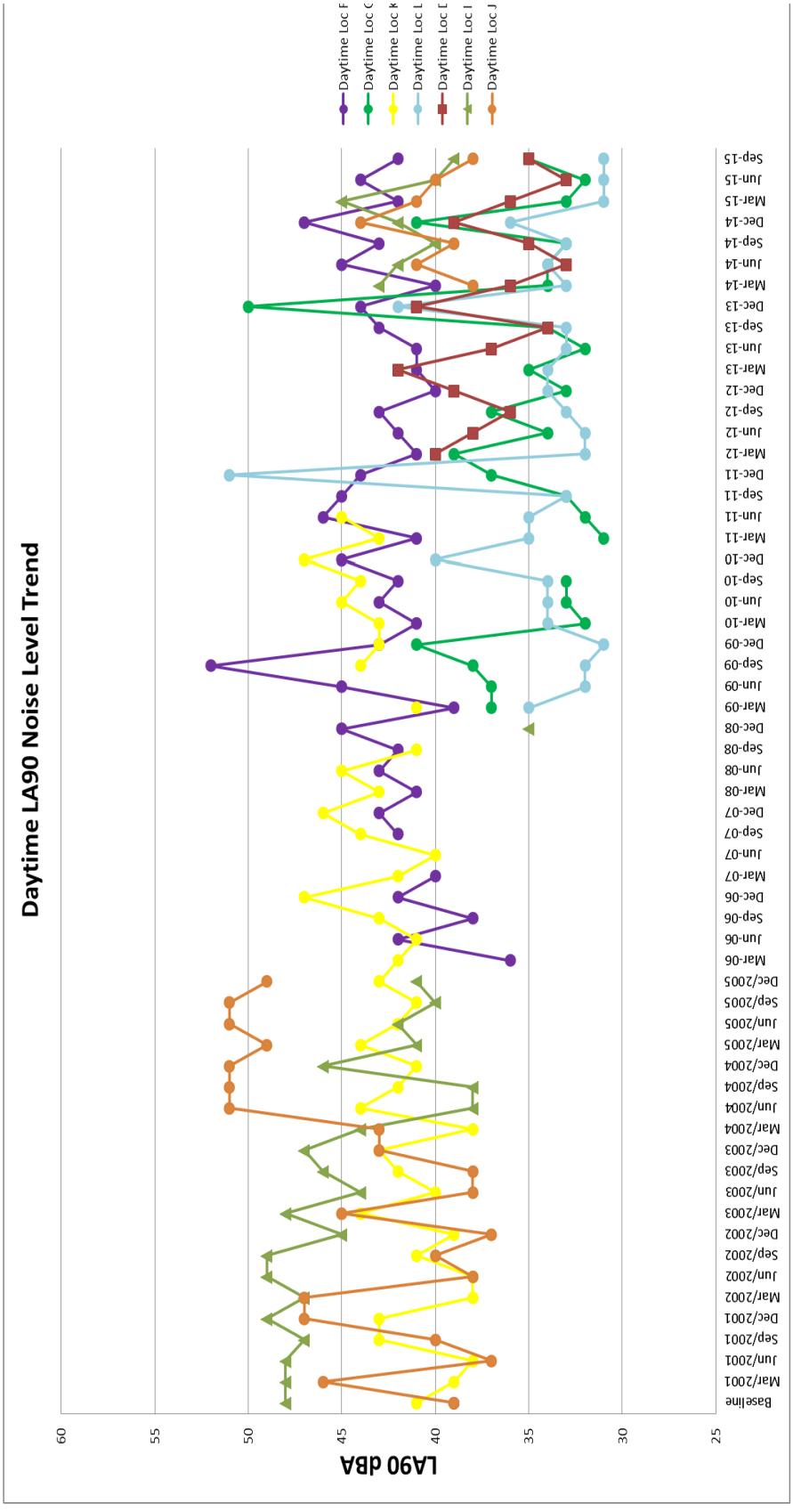

Figure 1 Long term Daytime LA90 Noise Levels

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Donaldson and Abel Coal Mines
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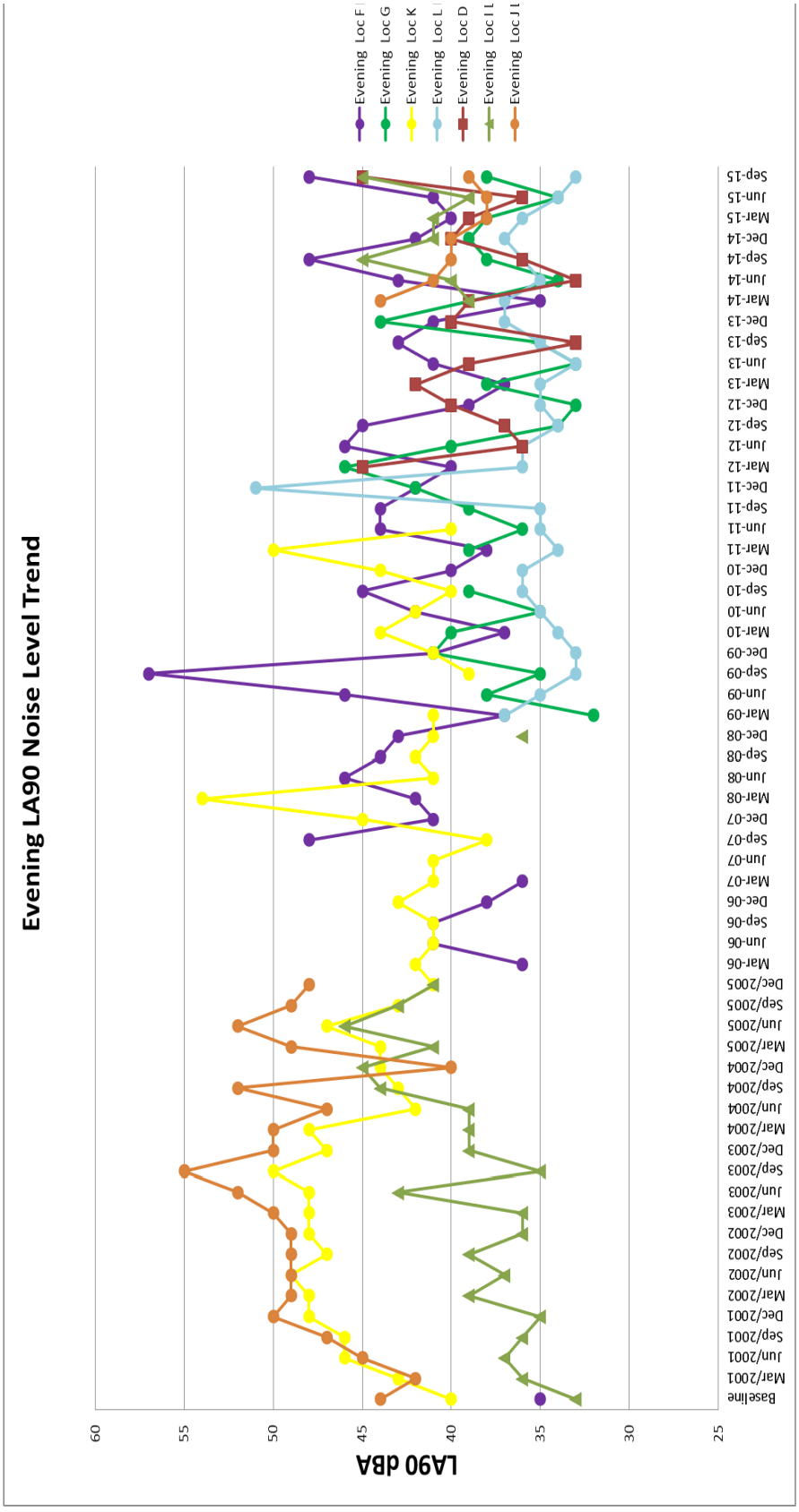
Figure 2 Long term Evening L_{A90} Noise Levels



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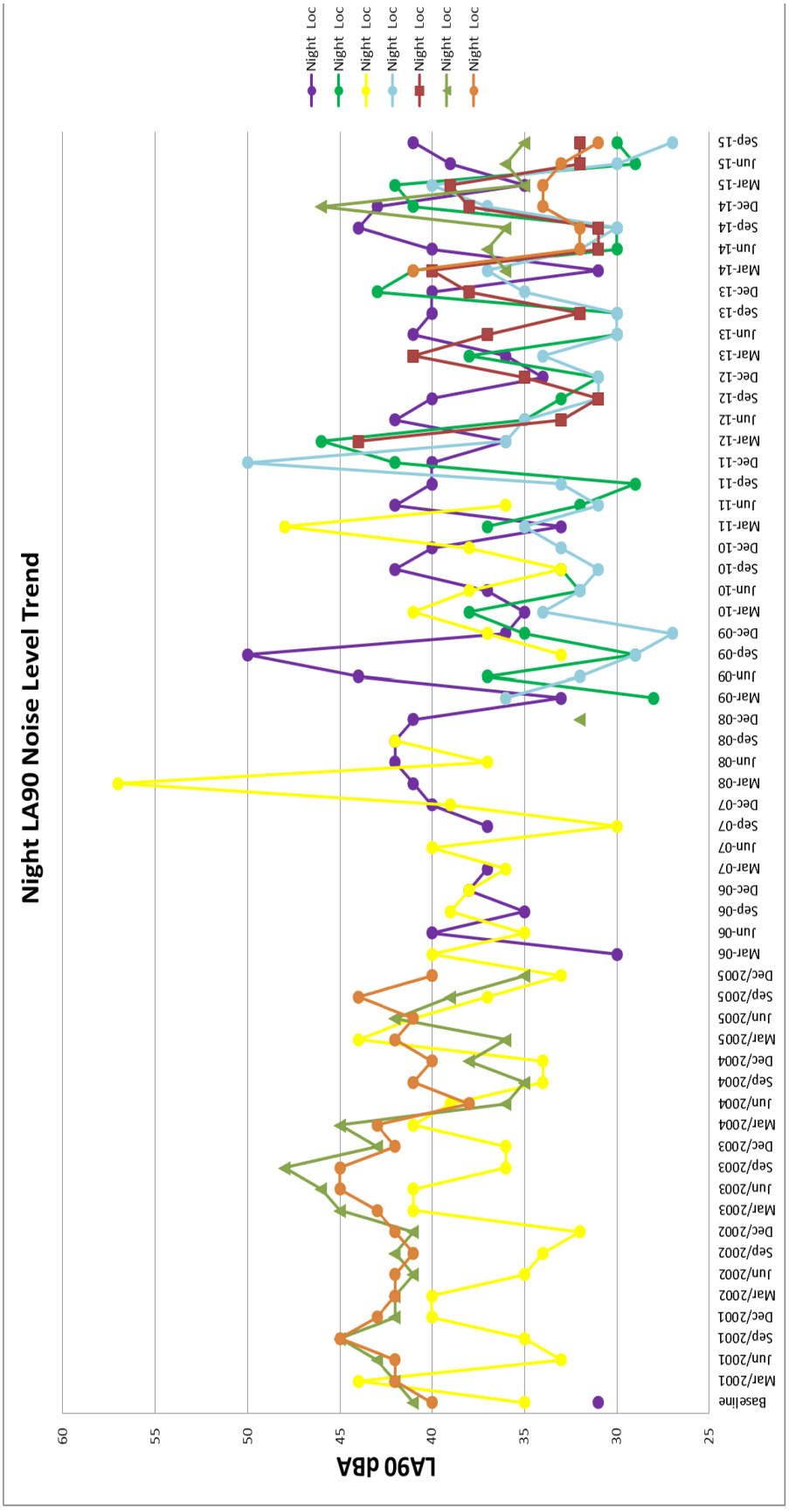

Figure 3 Long term Night-time L_{A90} Noise Levels

Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the quarter ending September 2015 compared to the levels recorded during the baseline monitoring process (ie. Prior to commencement of mining operation at Donaldson).

Table 12 LA90 Results Comparison (quarter ending September 2015) – Baseline

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		Baseline	September 2015	
D Black Hill School, Black Hill	Day	N/A[1]	35	N/A[1]
	Evening	N/A[1]	45	N/A[1]
	Night	N/A[1]	32	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	39	42	3
	Evening	35	48	13
	Night	31	41	10
G 156 Buchanan Road, Buchanan	Day	N/A[1]	35	N/A[1]
	Evening	N/A[1]	38	N/A[1]
	Night	N/A[1]	30	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	48	39	-9
	Evening	33	45	12
	Night	41	35	-6
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	31	N/A[1]
	Evening	N/A[1]	33	N/A[1]
	Night	N/A[1]	27	N/A[1]
J 220 Parish Drive, Thornton	Day	39	38	-1
	Evening	44	39	-5
	Night	40	31	-9

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday..

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (June 2015)

Table 13 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured in the previous monitoring period.

Table 13 LA90 Results Comparison – Previous Quarter (June 2015)

Monitoring Location	Period	Long term Night-time L_{A90} Noise Levels		Difference dB
		June 2015	September 2015	
D Black Hill School, Black Hill	Day	33	35	2
	Evening	36	45	9
	Night	32	32	0
F Lot 684 Black Hill Road, Black Hill	Day	44	42	-2
	Evening	41	48	7
	Night	39	41	2
G 156 Buchanan Road, Buchanan	Day	32	35	3
	Evening	34	38	4
	Night	29	30	1
I 49 Magnetic Drive, Ashtonfield	Day	40	39	-1
	Evening	39	45	6
	Night	36	35	-1
L 17 Kilshanny Ave, Ashtonfield	Day	31	31	0
	Evening	34	33	-1
	Night	30	27	-3
J 220 Parish Drive, Thornton	Day	40	38	-2
	Evening	38	39	1
	Night	33	31	-2

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (September 2014)

Table 14 presents the ambient LA90 noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 LA90 Results Comparison – Coinciding Period Last Year (September 2014)

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		September 2014	September 2015	
D Black Hill School, Black Hill	Day	35	35	0
	Evening	36	45	9
	Night	31	32	1
F Lot 684 Black Hill Road, Black Hill	Day	43	42	-1
	Evening	48	48	0
	Night	44	41	-3
G 156 Buchanan Road, Buchanan	Day	33	35	2
	Evening	38	38	0
	Night	30	30	0
I 49 Magnetic Drive, Ashtonfield	Day	40	39	-1
	Evening	45	45	0
	Night	36	35	-1
L 17 Kilshanny Ave, Ashtonfield	Day	33	31	-2
	Evening	36	33	-3
	Night	30	27	-3
J 220 Parish Drive, Thornton	Day	39	38	-1
	Evening	40	39	-1
	Night	32	31	-1

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time periods respectively.

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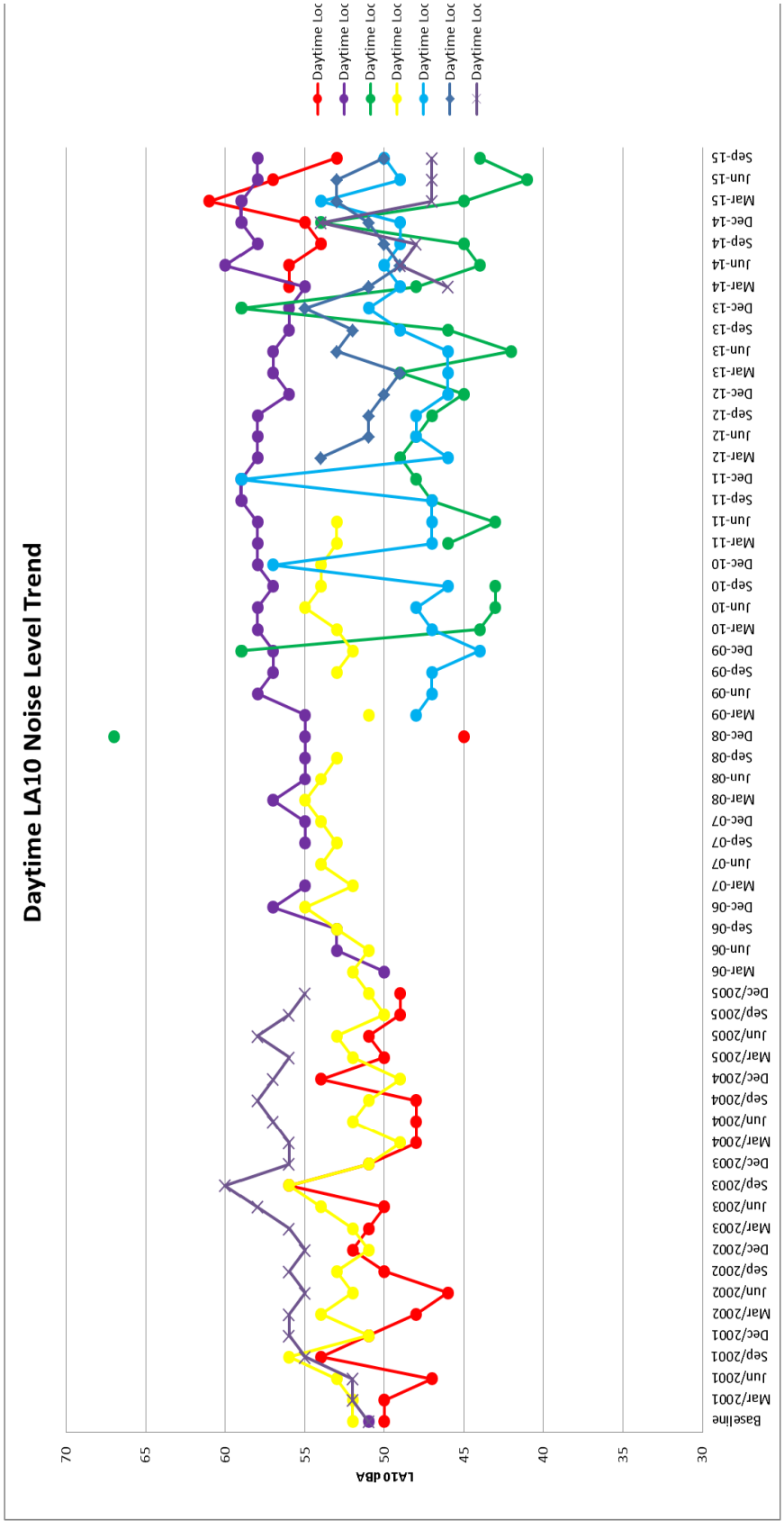

Figure 4 Long term Daytime LA10 Noise Levels

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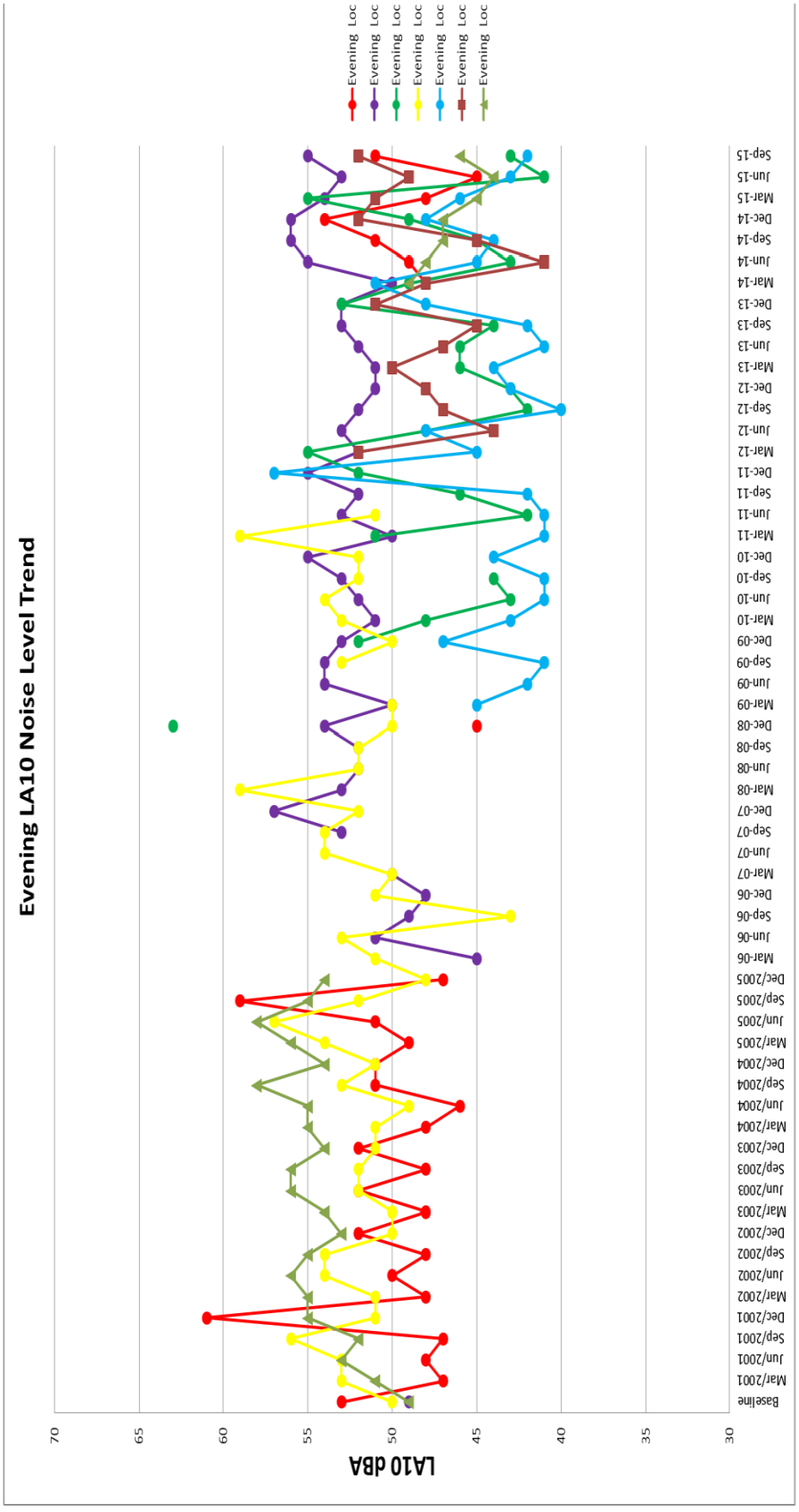

Figure 5 Long term Evening L_{A10} Noise Levels

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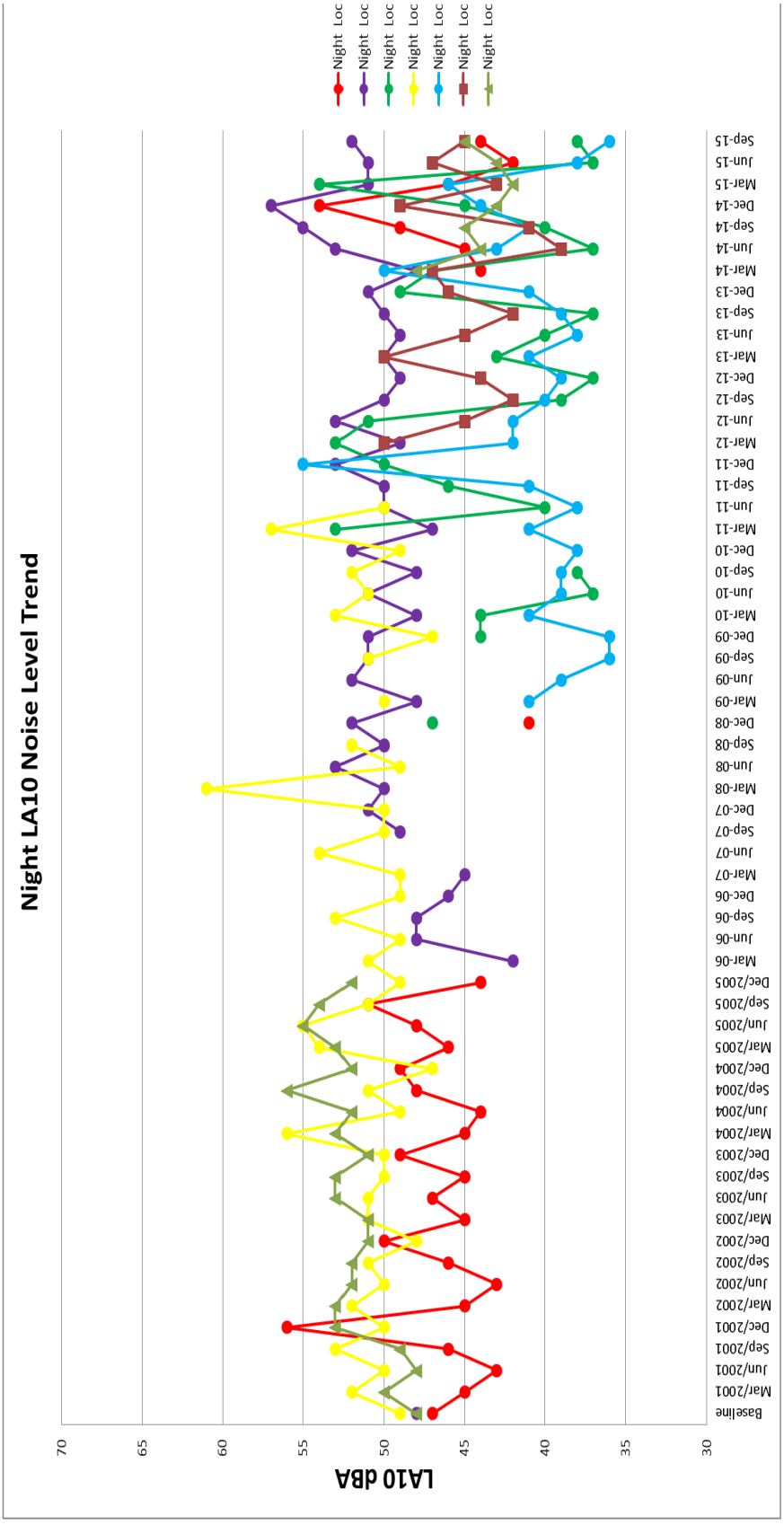
Figure 6 Long term Night-time L_{A10} Noise Levels



Baseline

Table 15 presents the ambient L_{A10} noise levels recorded for the quarter ending September 2015 compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison (quarter ending September 2015) – Baseline

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		Baseline	September 2015	
D Black Hill School, Black Hill	Day	N/A[1]	50	N/A[1]
	Evening	N/A[1]	52	N/A[1]
	Night	N/A[1]	45	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	51	58	7
	Evening	49	55	6
	Night	48	52	4
G 156 Buchanan Road, Buchanan	Day	N/A[1]	44	N/A[1]
	Evening	N/A[1]	43	N/A[1]
	Night	N/A[1]	38	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	50	53	3
	Evening	53	51	-2
	Night	47	44	-3
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	50	N/A[1]
	Evening	N/A[1]	42	N/A[1]
	Night	N/A[1]	36	N/A[1]
J 220 Parish Drive, Thornton	Day	51	47	-4
	Evening	49	46	-3
	Night	48	45	-3

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (June 2015)

Table 16 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 LA10 Results Comparison – Previous Quarter (June 2015)

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		June 2015	September 2015	
D Black Hill School, Black Hill	Day	53	50	-3
	Evening	49	52	3
	Night	47	45	-2
F Lot 684 Black Hill Road, Black Hill	Day	58	58	0
	Evening	53	55	2
	Night	51	52	1
G 156 Buchanan Road, Buchanan	Day	41	44	3
	Evening	41	43	2
	Night	37	38	1
I 49 Magnetic Drive, Ashtonfield	Day	57	53	-4
	Evening	45	51	6
	Night	42	44	2
L 17 Kilshanny Ave, Ashtonfield	Day	49	50	1
	Evening	43	42	-1
	Night	38	36	-2
J 220 Parish Drive, Thornton	Day	47	47	0
	Evening	44	46	2
	Night	43	45	2

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Coinciding Period Last Year (September 2014)

Table 17 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 LA10 Results Comparison – Coinciding Period Last Year (September 2014)

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		September 2014	September 2015	
D Black Hill School, Black Hill	Day	50	50	0
	Evening	45	52	7
	Night	41	45	4
F Lot 684 Black Hill Road, Black Hill	Day	58	58	0
	Evening	56	55	-1
	Night	55	52	-3
G 156 Buchanan Road, Buchanan	Day	45	44	-1
	Evening	45	43	-2
	Night	40	38	-2
I 49 Magnetic Drive, Ashtonfield	Day	54	53	-1
	Evening	51	51	0
	Night	49	44	-5
L 17 Kilshanny Ave, Ashtonfield	Day	49	50	1
	Evening	44	42	-2
	Night	41	36	-5
J 220 Parish Drive, Thornton	Day	48	47	-1
	Evening	47	46	-1
	Night	45	45	0

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.3 Rail Noise Impact

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**. Only five (5) trains were recorded to have passed the monitoring location J during the monitoring period. No trains were loaded during the evening period during the noise monitoring at Location J.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
8/09/15	5:45 am to 9:24 am	Night/Day
10/09/15	8:10 am to 11:00 am	Day
10/09/15	14:30 pm to 17:20 pm	Day
11/09/15	10:10 am to12:47 pm	Day
11/09/15	15:45 pm to 18:45 pm	Day/evening

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19**.

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(Period)}$	Criteria $L_{Aeq(Period)}$	Compliance
Location J	8/09/15	Day	45	55	Yes
	10/09/15		49		Yes
	11/09/15		47		Yes
	11/09/15	Evening	42	45	Yes
	7/09/15	Night	40	40	Yes

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

The results contained in **Table 19** show that compliance with the rail noise criteria was achieved during the September 2015 Quarter.

6 CONCLUSION

SLR was engaged by Donaldson Coal Pty Ltd to conduct quarterly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Coal Mine Noise Monitoring Program, dated 27 May 2007.

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

The results of the operator-attended noise measurements conducted at six (6) focus locations surrounding the mine site are included in **Table 2** to **Table 7**.

Abel Mine operations at the CHPP were only faintly audible at Location L during the evening and night-time. Abel portal operations were not observed to be audible at any other locations during the monitoring period. Contributed noise levels from Abel Mine did not exceed noise emission goals (including night-time sleep arousal criteria) and were in compliance with the Abel Mine *Project Approval* at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (September 2015), the baseline monitoring period, the last monitoring period (June 2015), and the coinciding monitoring period from last year (September 2014) has been conducted.

An assessment of the rail noise impact was also undertaken, determining compliance with the criteria stated in **Section 2.2**.

Appendix A

Acoustic Terminology
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1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

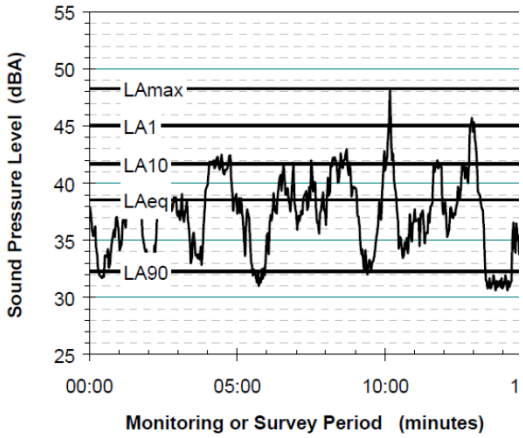
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 1E-12 W.
The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

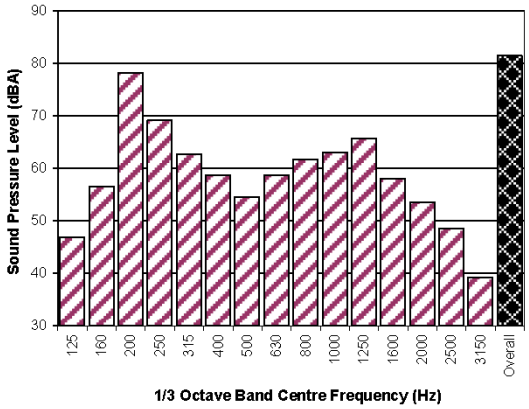
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

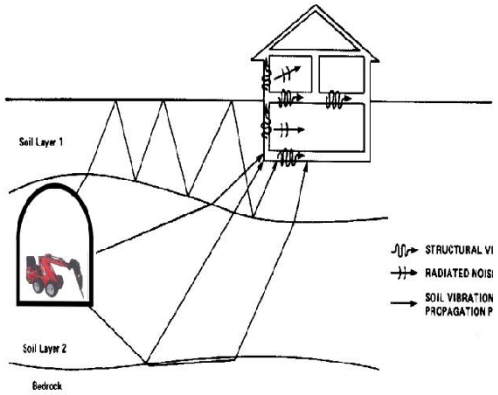
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

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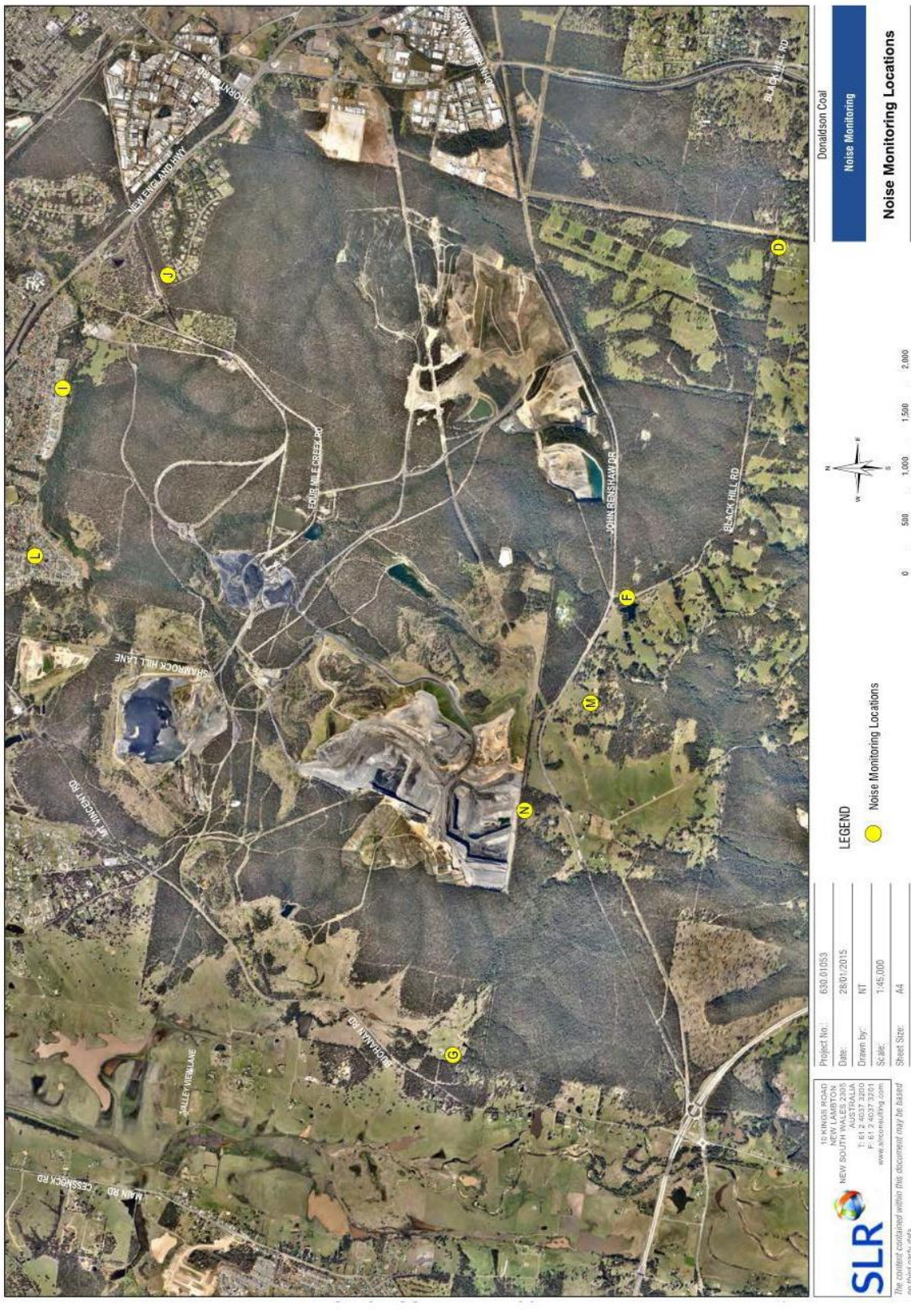
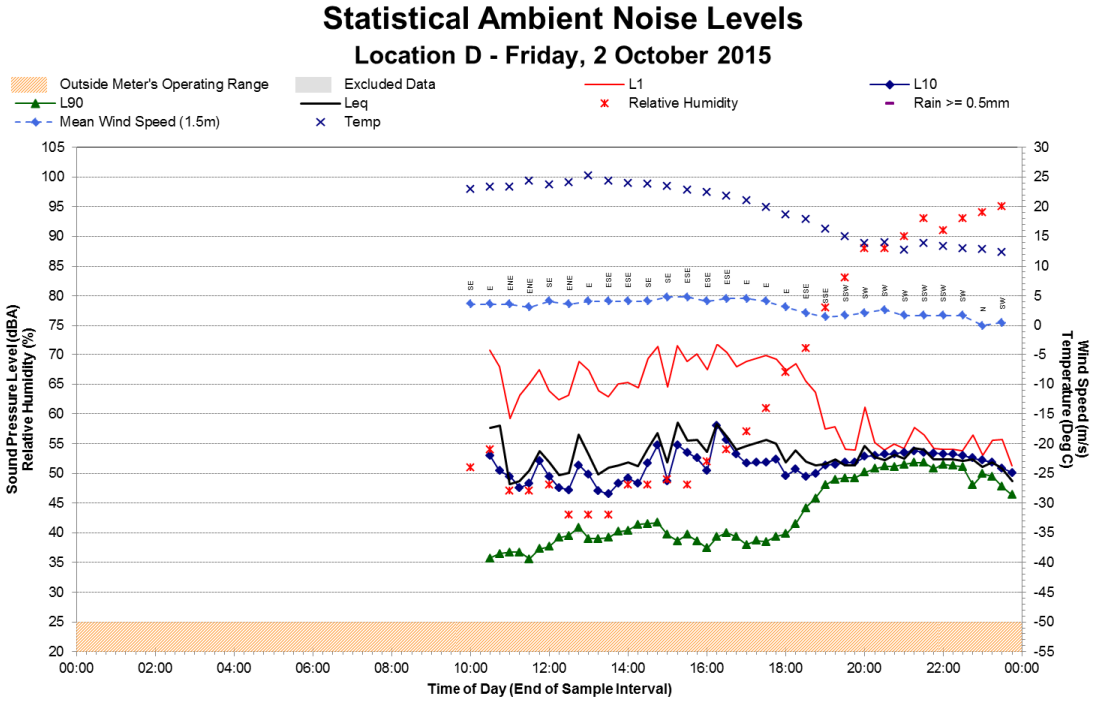
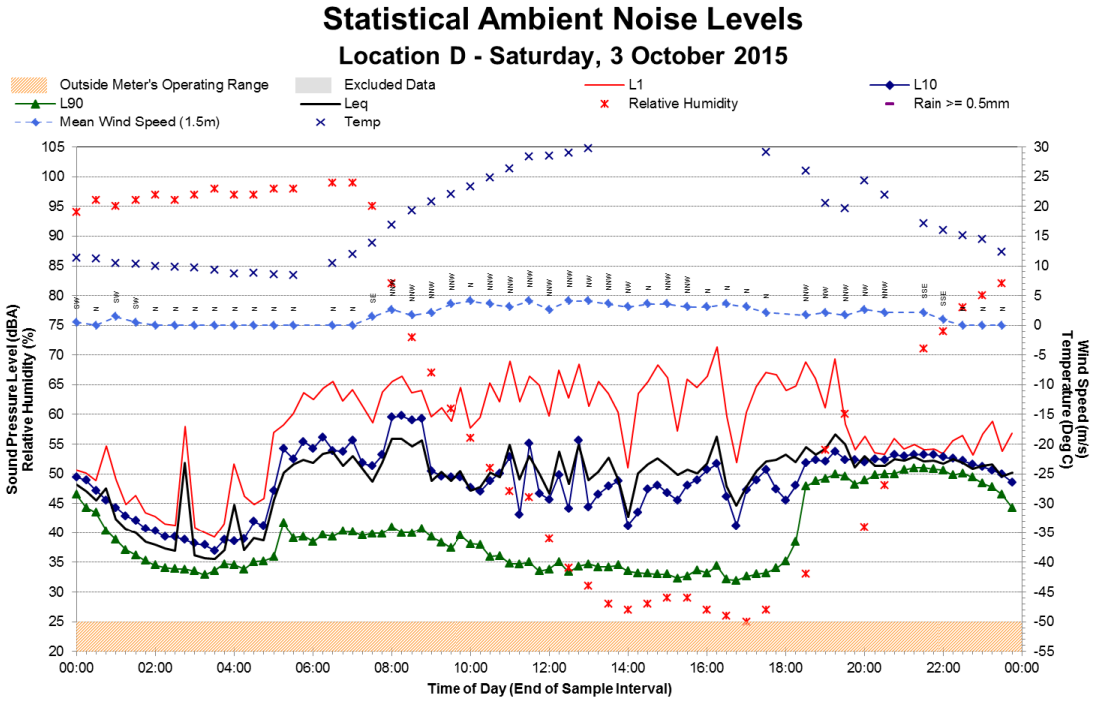


Appendix C1

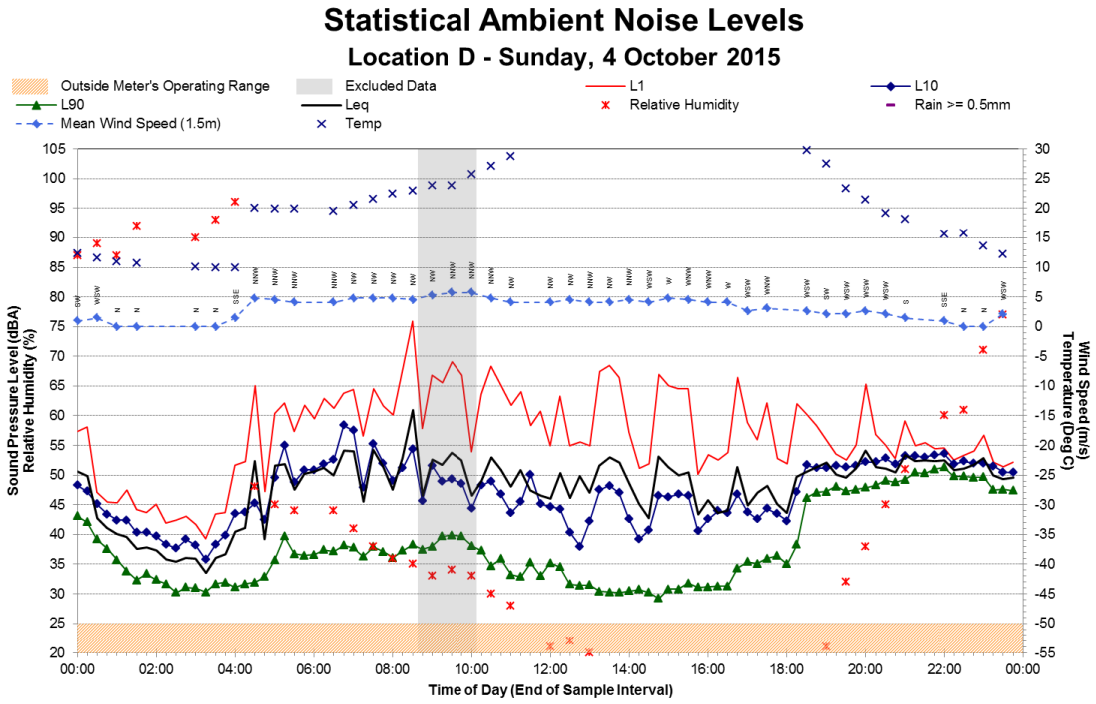
Statistical Ambient Noise Levels – Location D
Report Q59 630.01053-R1

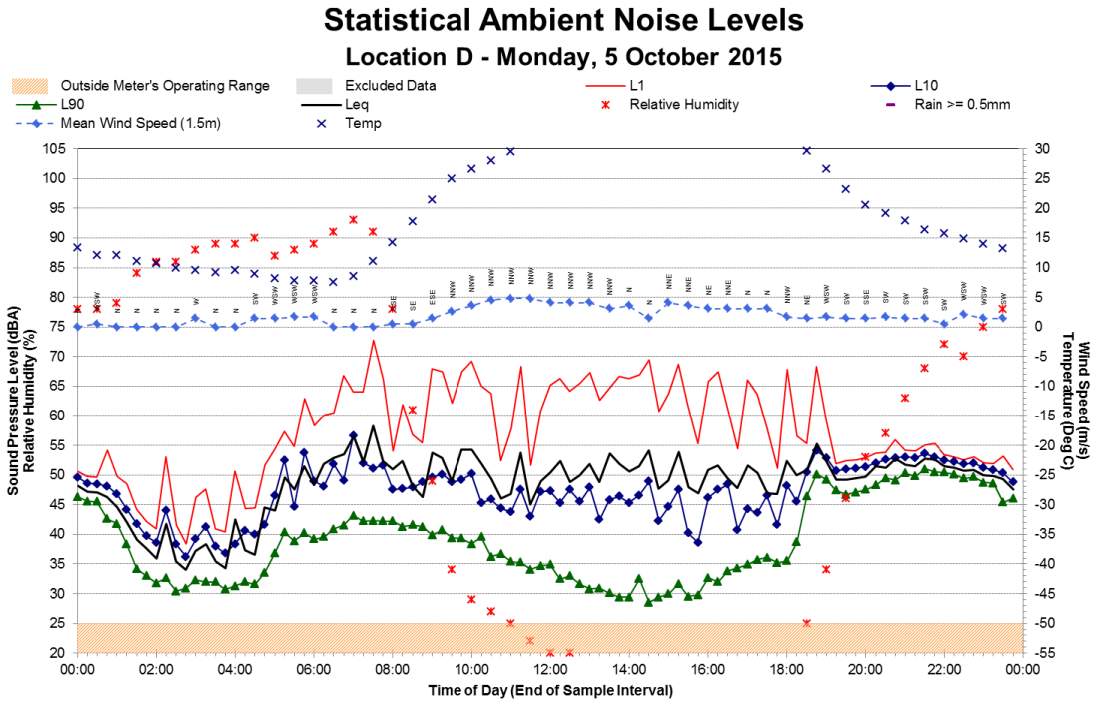




Appendix C1

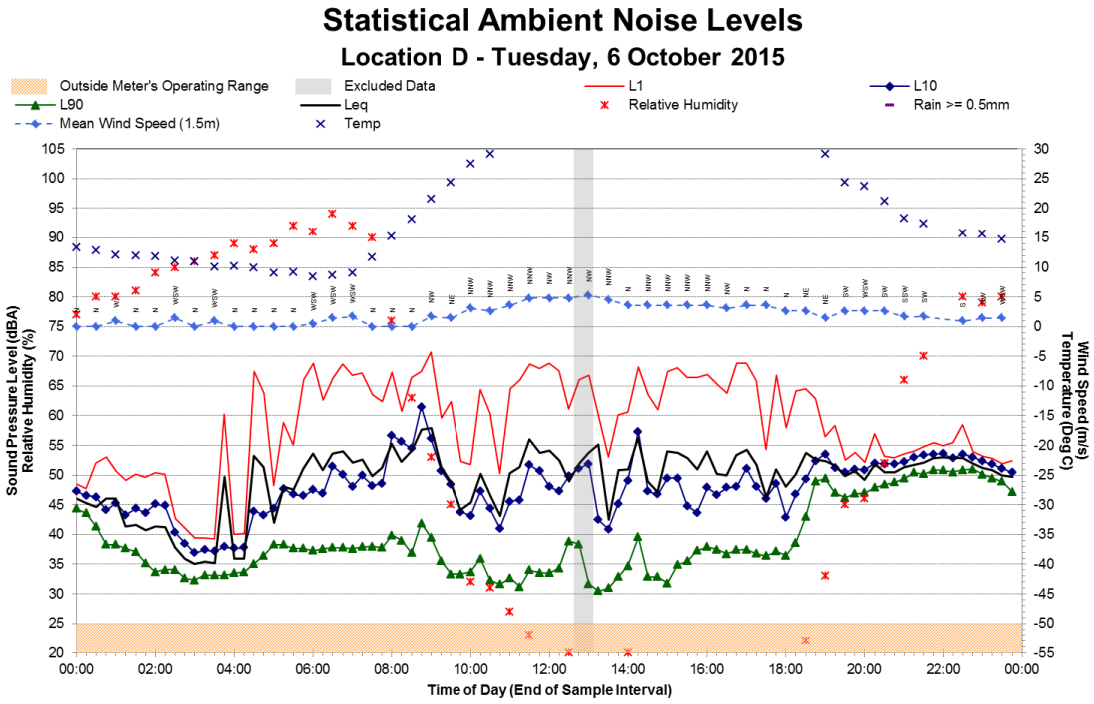
Statistical Ambient Noise Levels – Location D
Report Q59 630.01053-R1

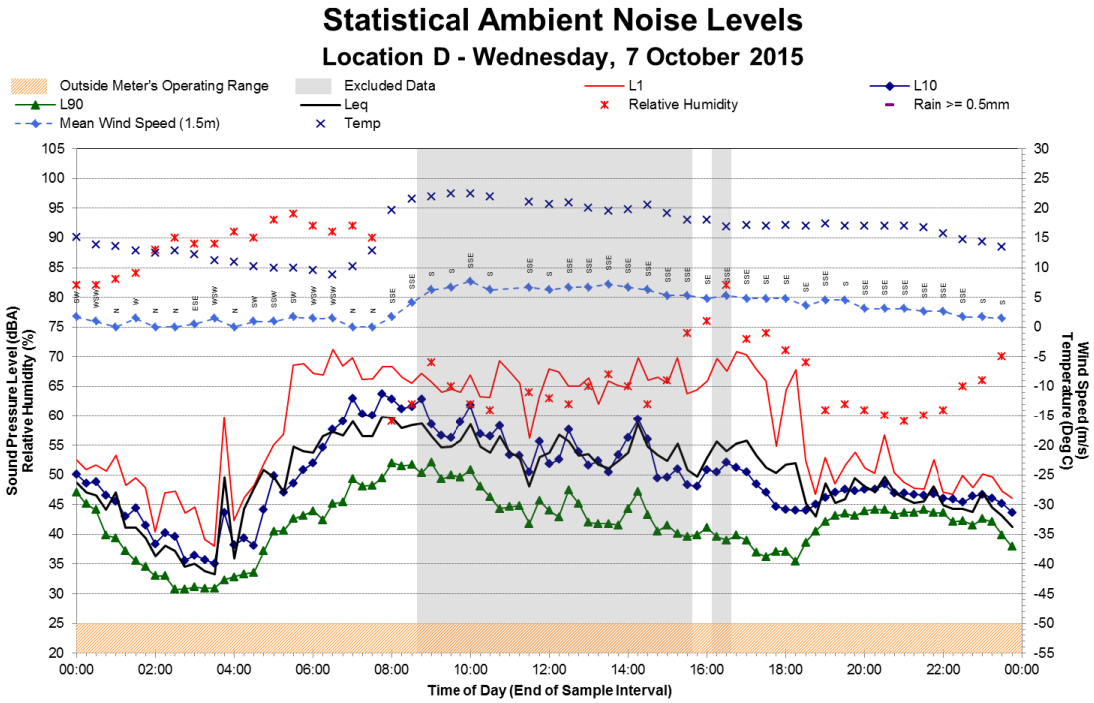




Appendix C1

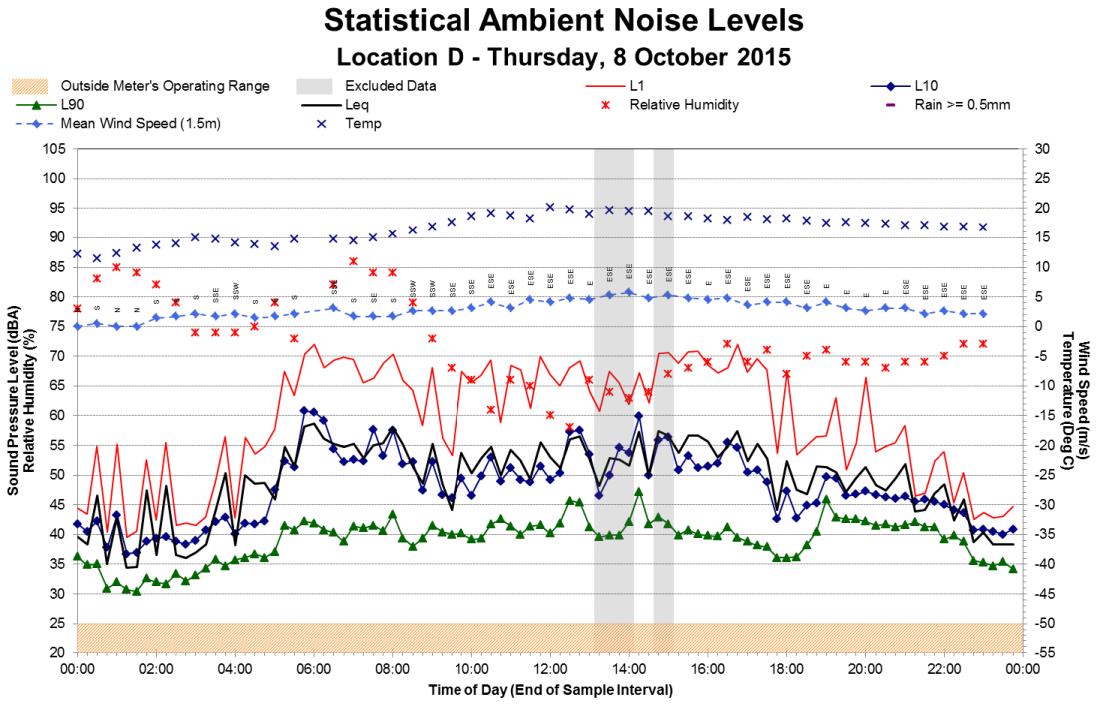
Statistical Ambient Noise Levels – Location D
Report Q59 630.01053-R1

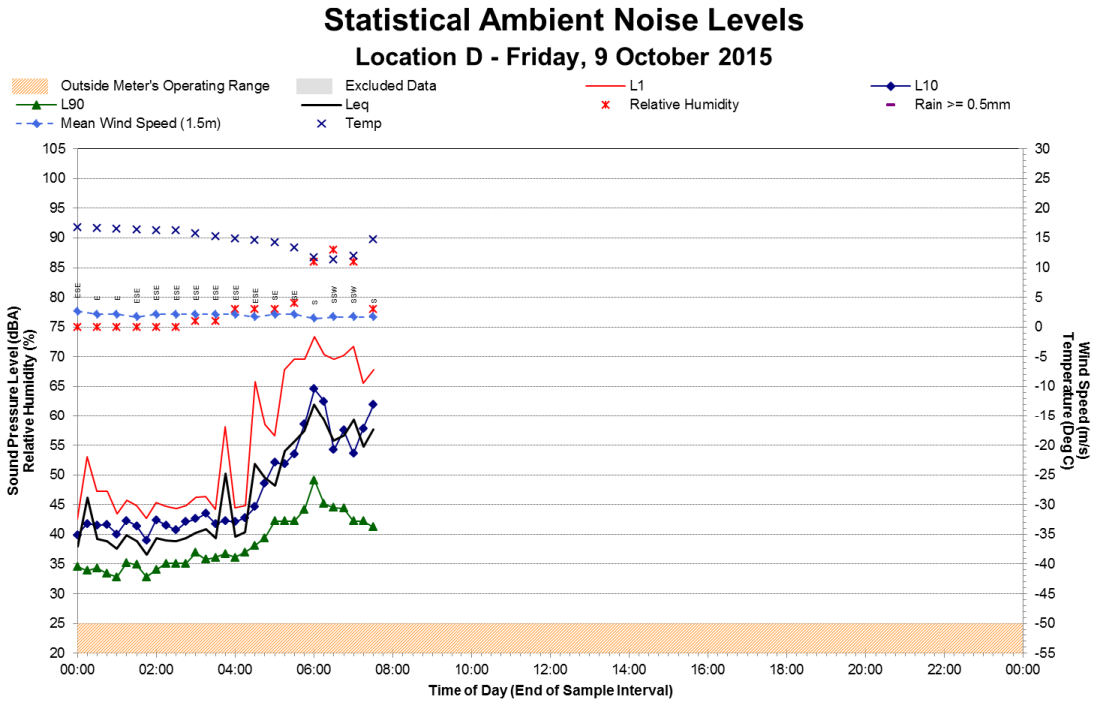




Appendix C1

Statistical Ambient Noise Levels – Location D
Report Q59 630.01053-R1





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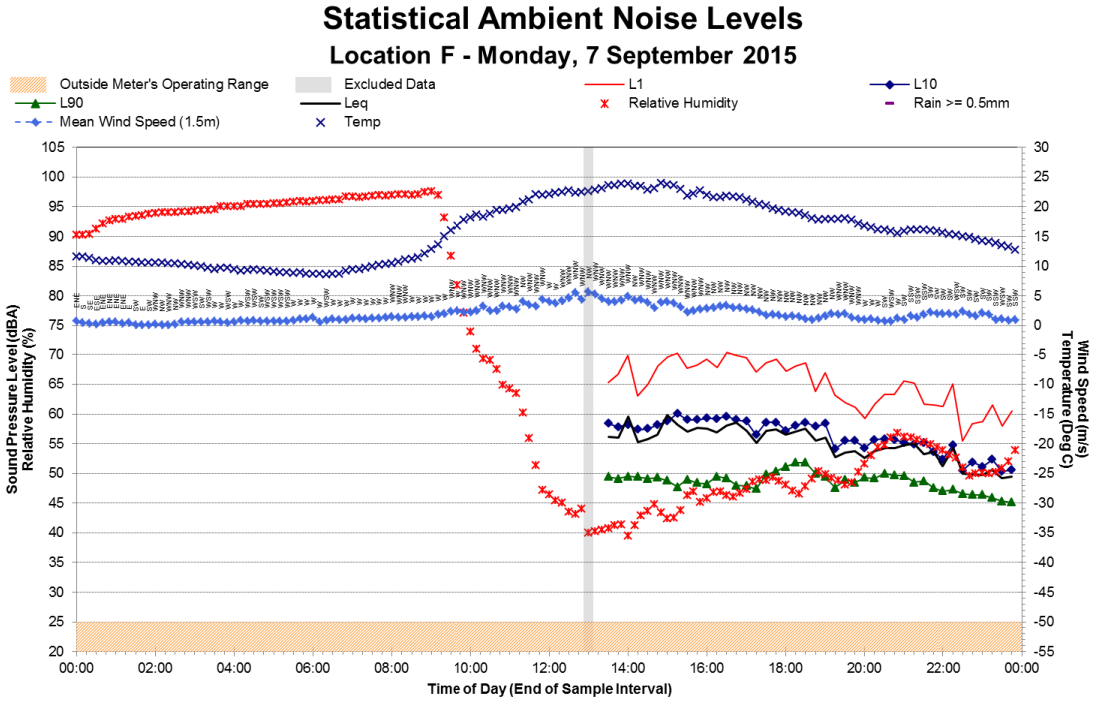
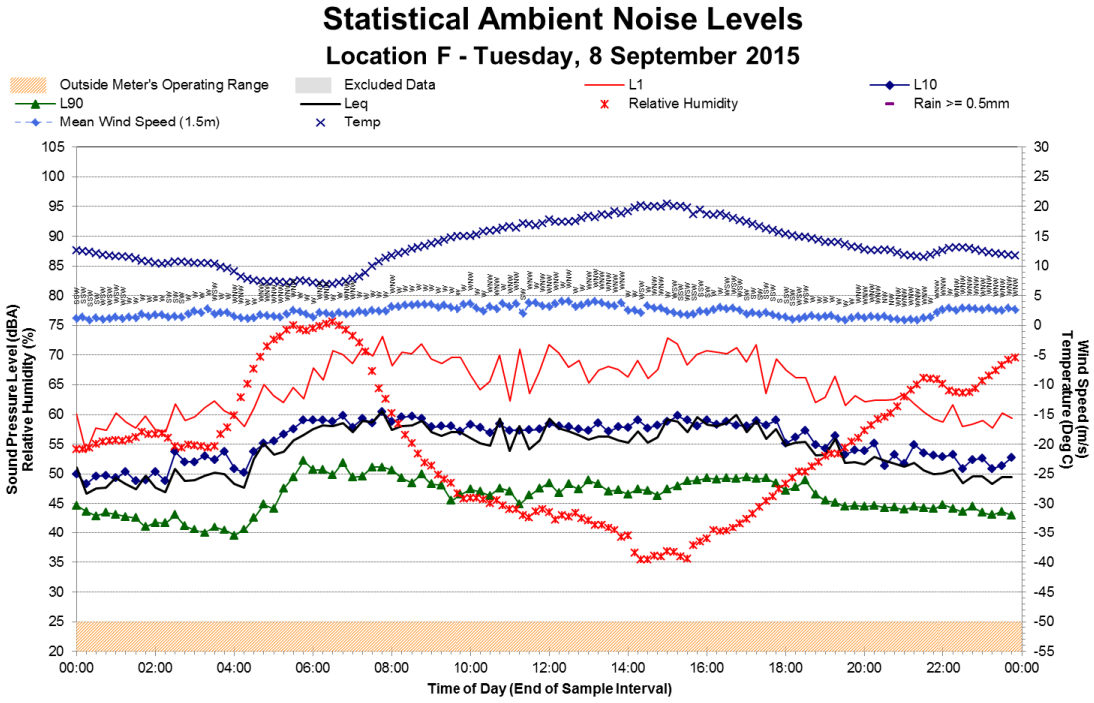
Statistical Ambient Noise Levels – Location F
Report Q59 630.01053-R1





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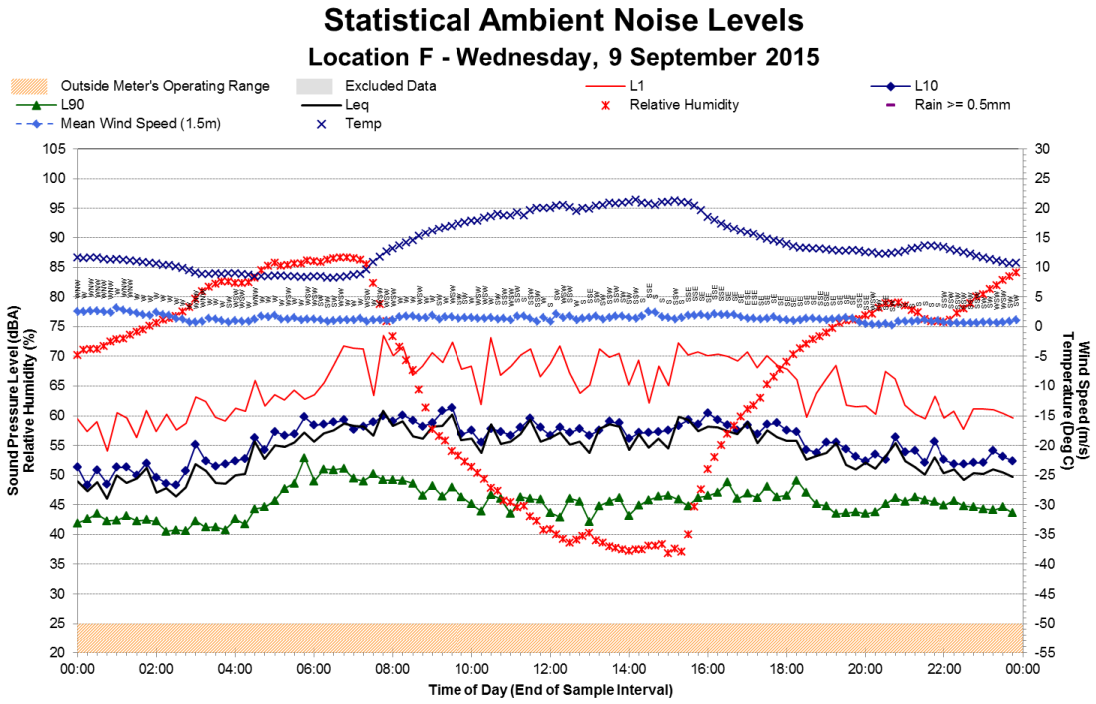
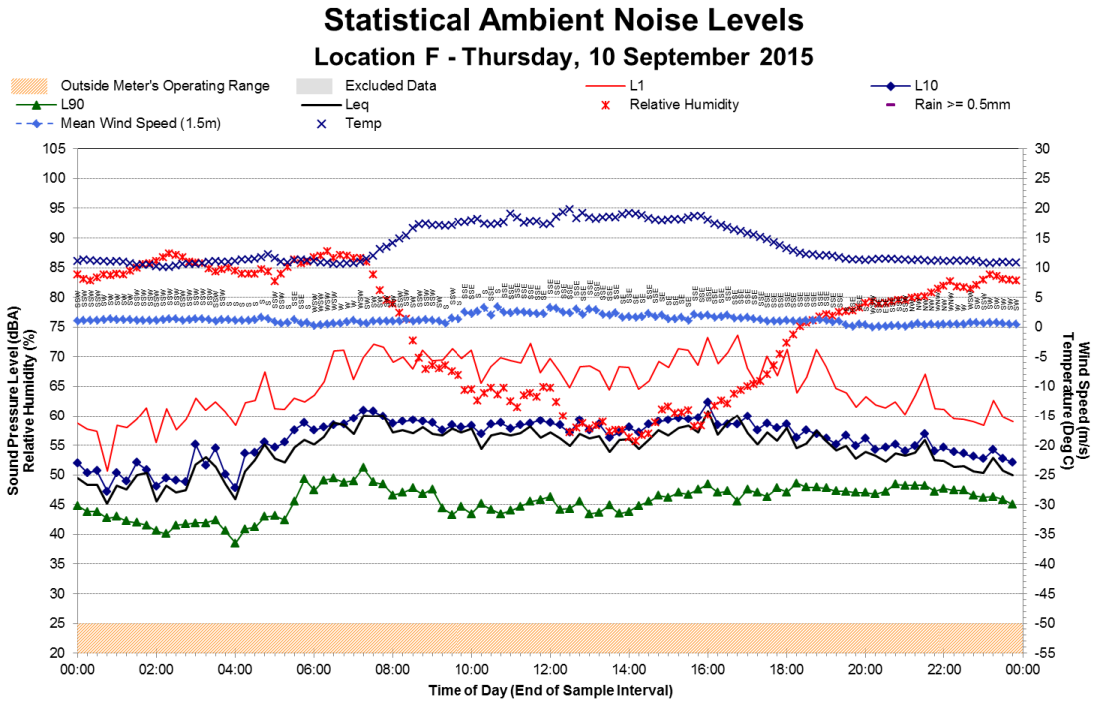
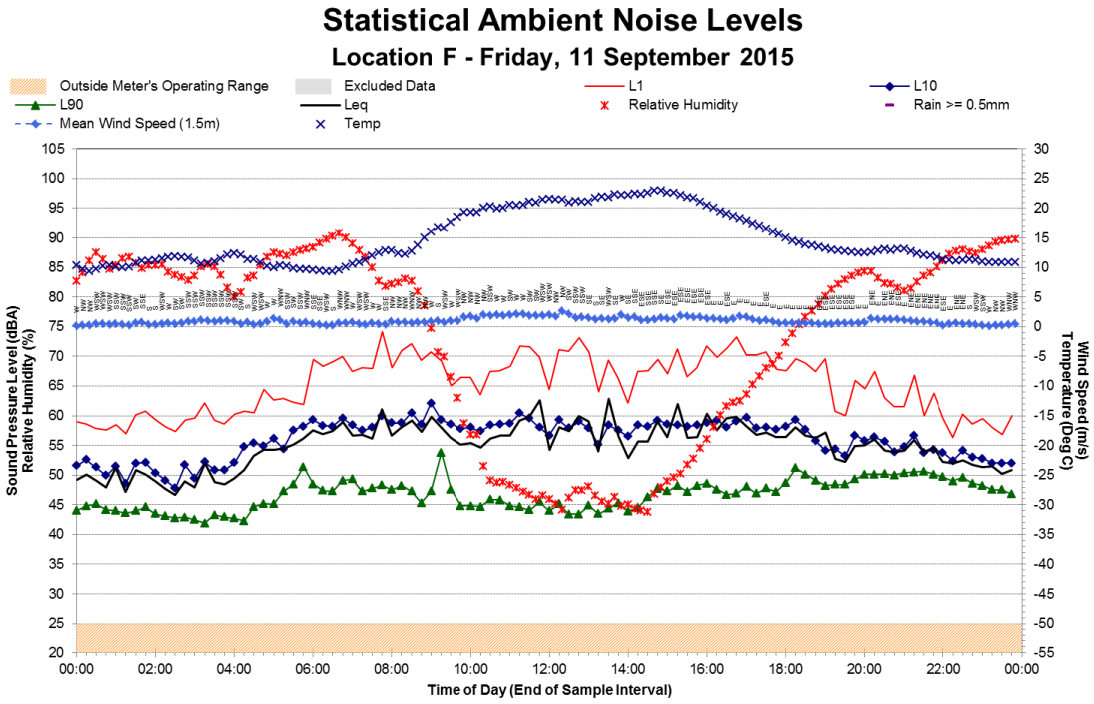
Statistical Ambient Noise Levels – Location F
Report Q59 630.01053-R1

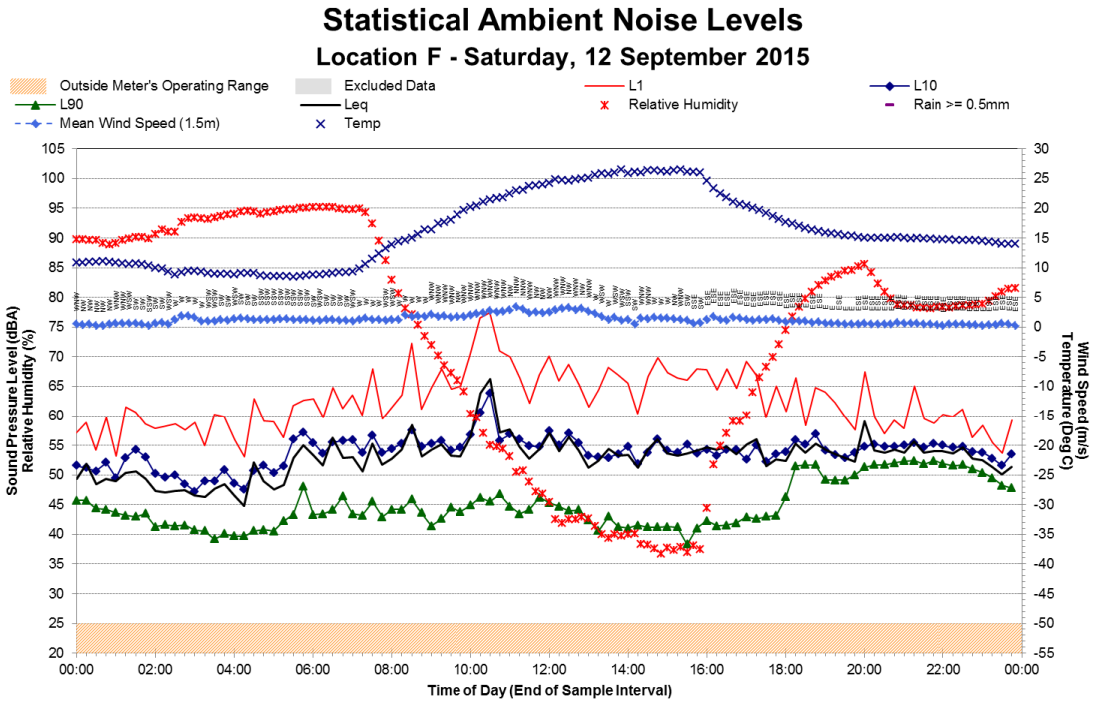




Appendix C2

Statistical Ambient Noise Levels – Location F
Report Q59 630.01053-R1





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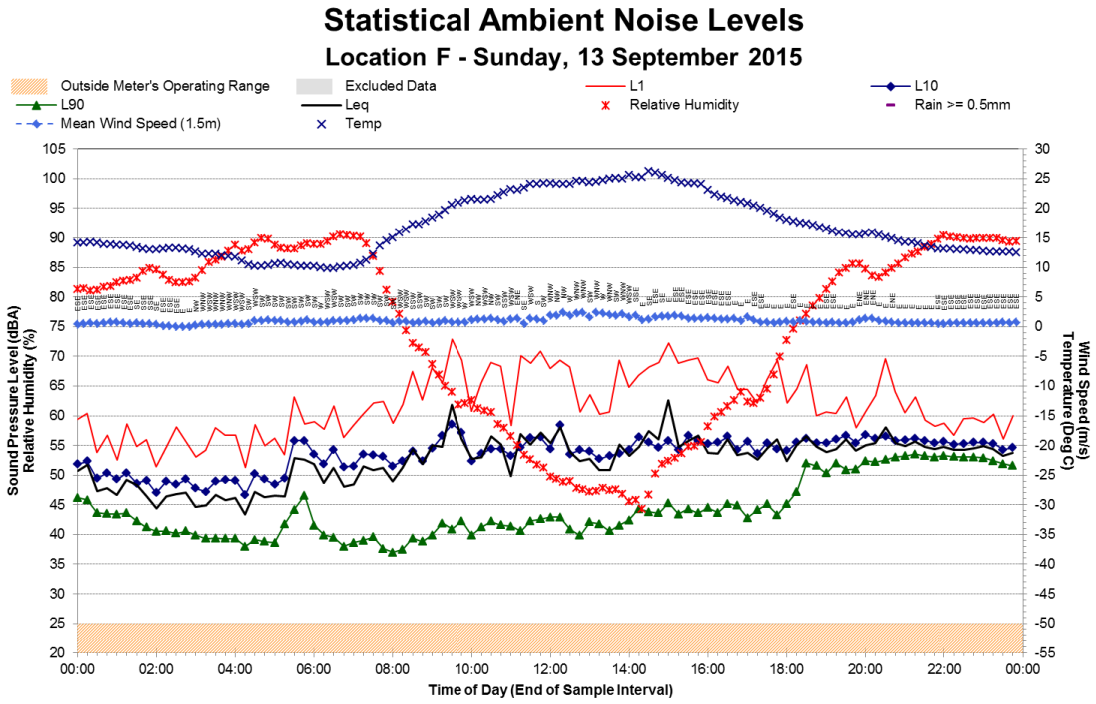
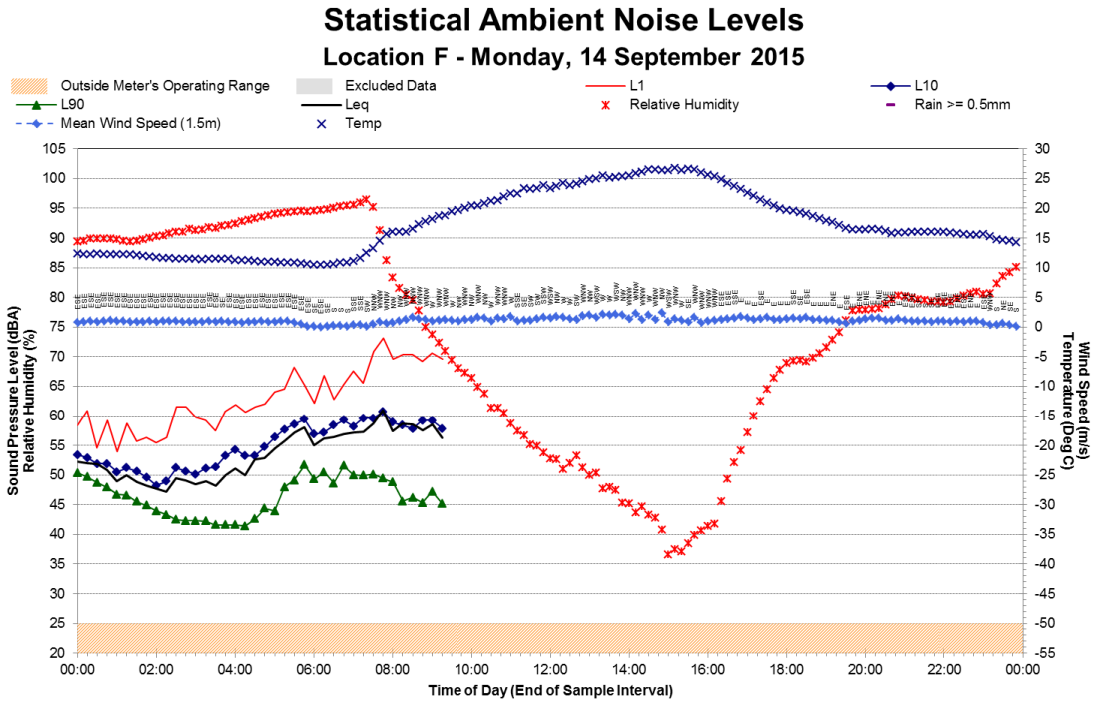
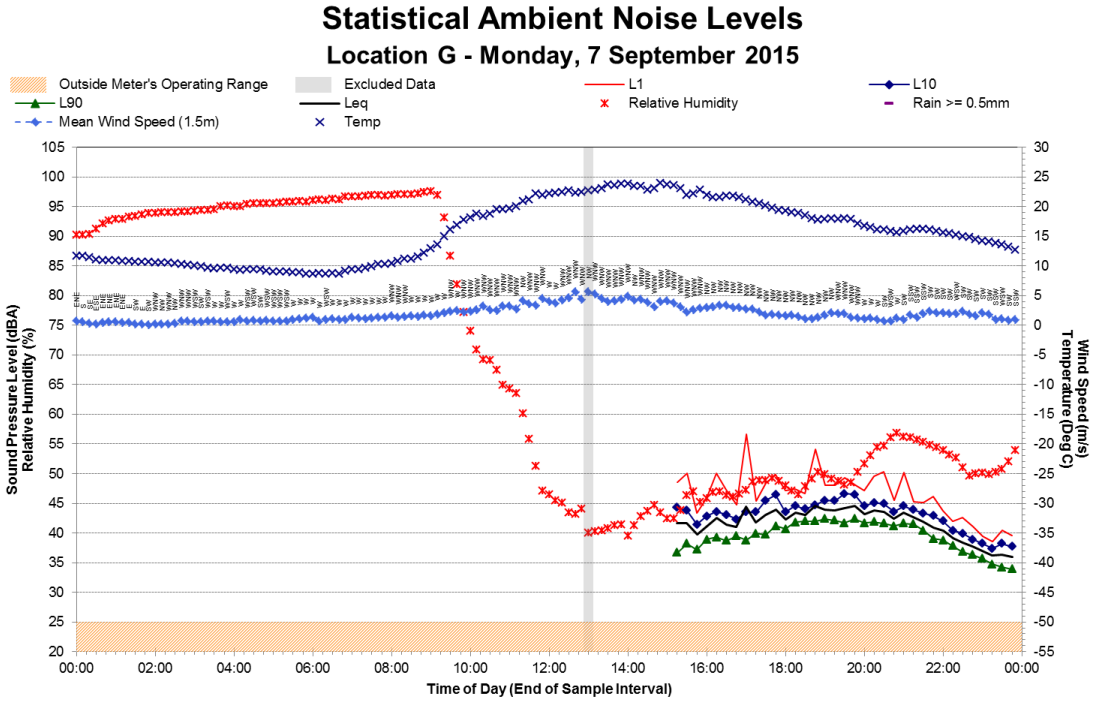
Statistical Ambient Noise Levels – Location F
Report Q59 630.01053-R1

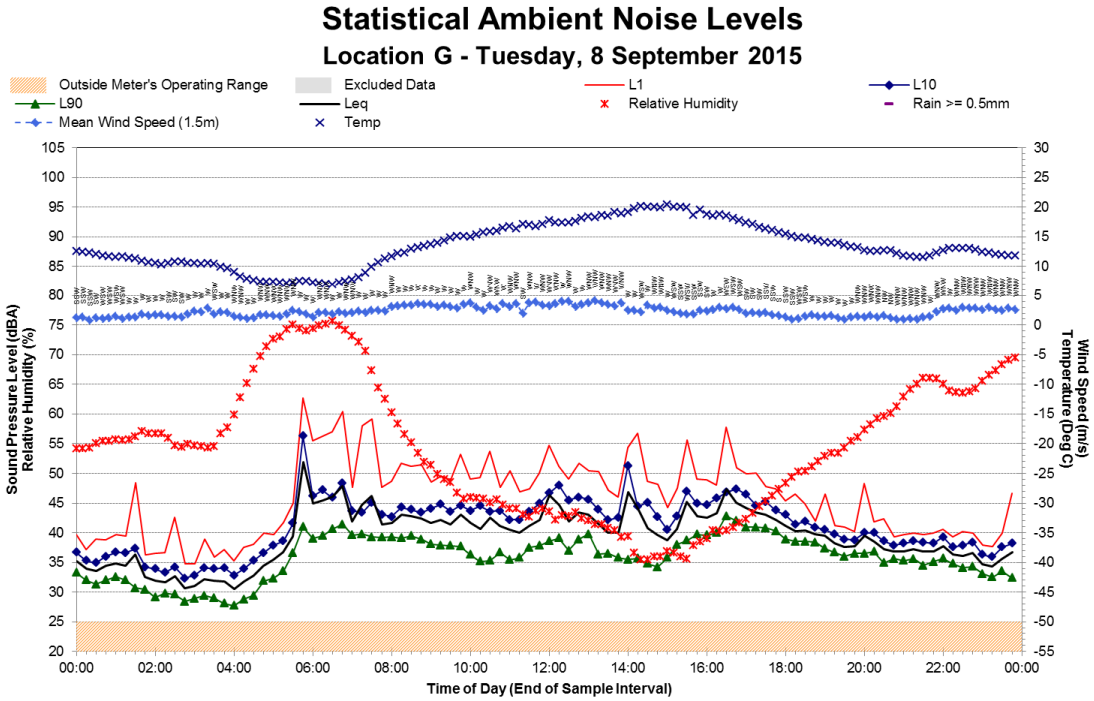




Appendix C3

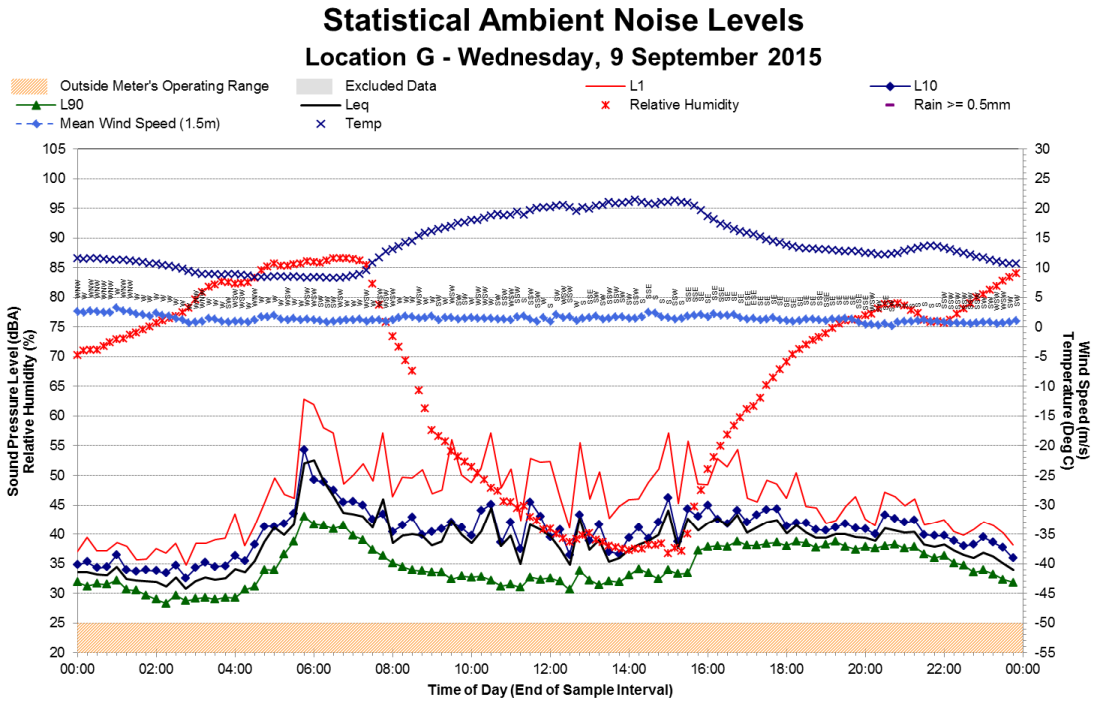
Statistical Ambient Noise Levels – Location G
Report Q59 630.01053-R1

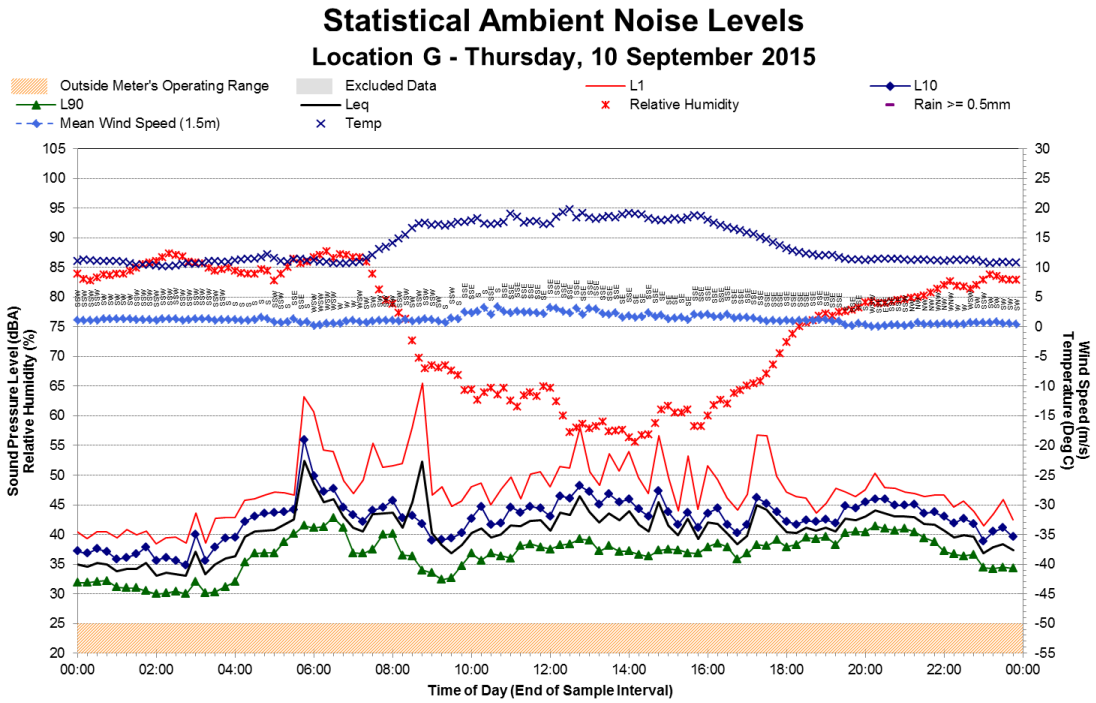




Appendix C3

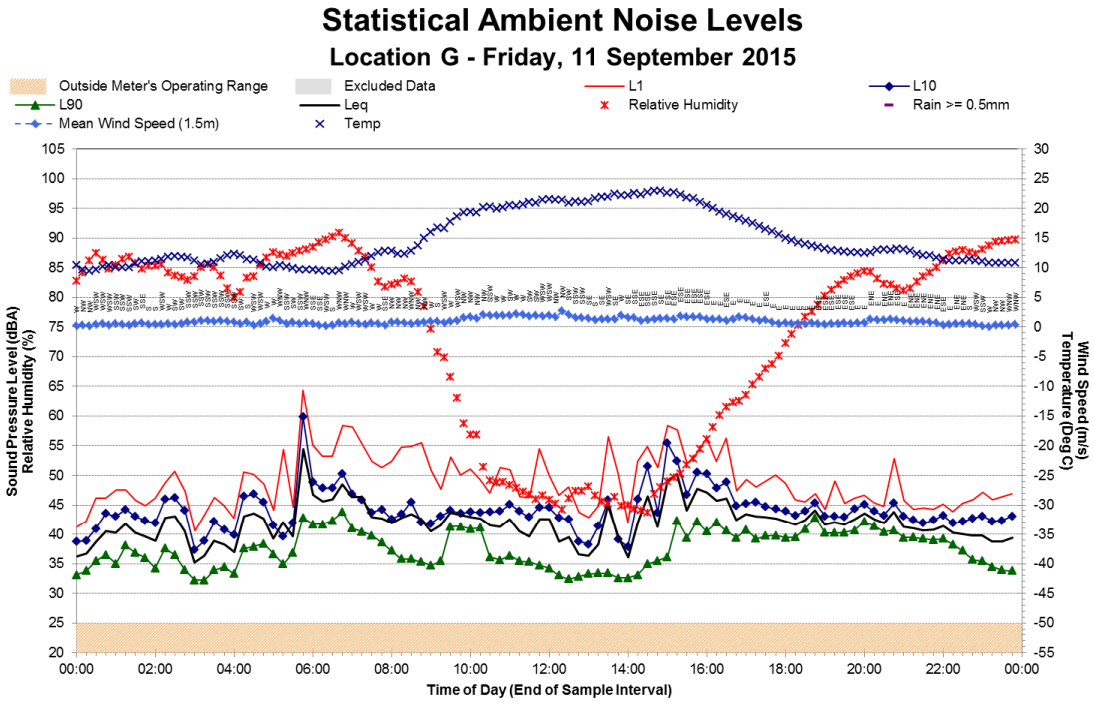
Statistical Ambient Noise Levels – Location G
Report Q59 630.01053-R1

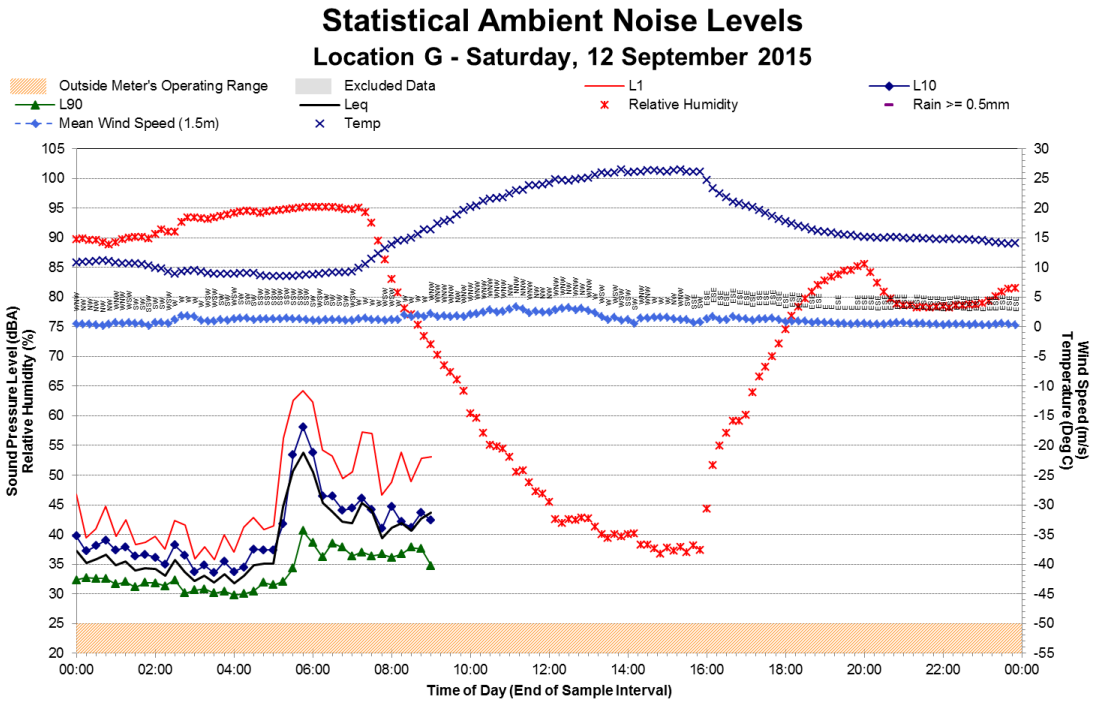




Appendix C3

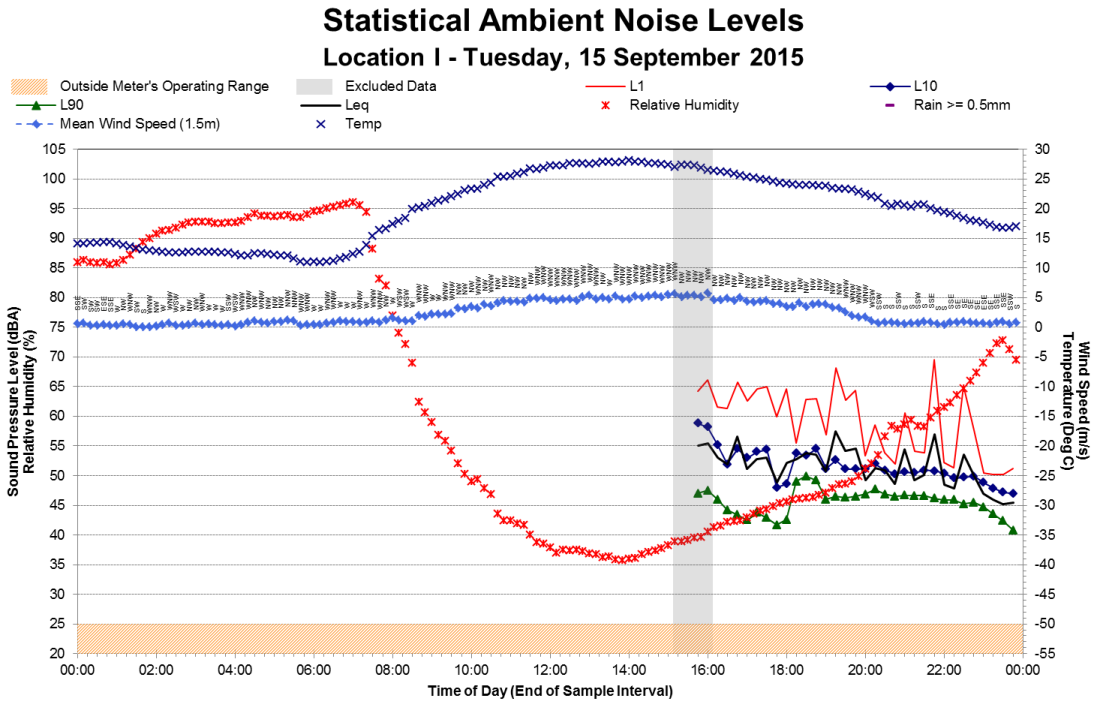
Statistical Ambient Noise Levels – Location G
Report Q59 630.01053-R1

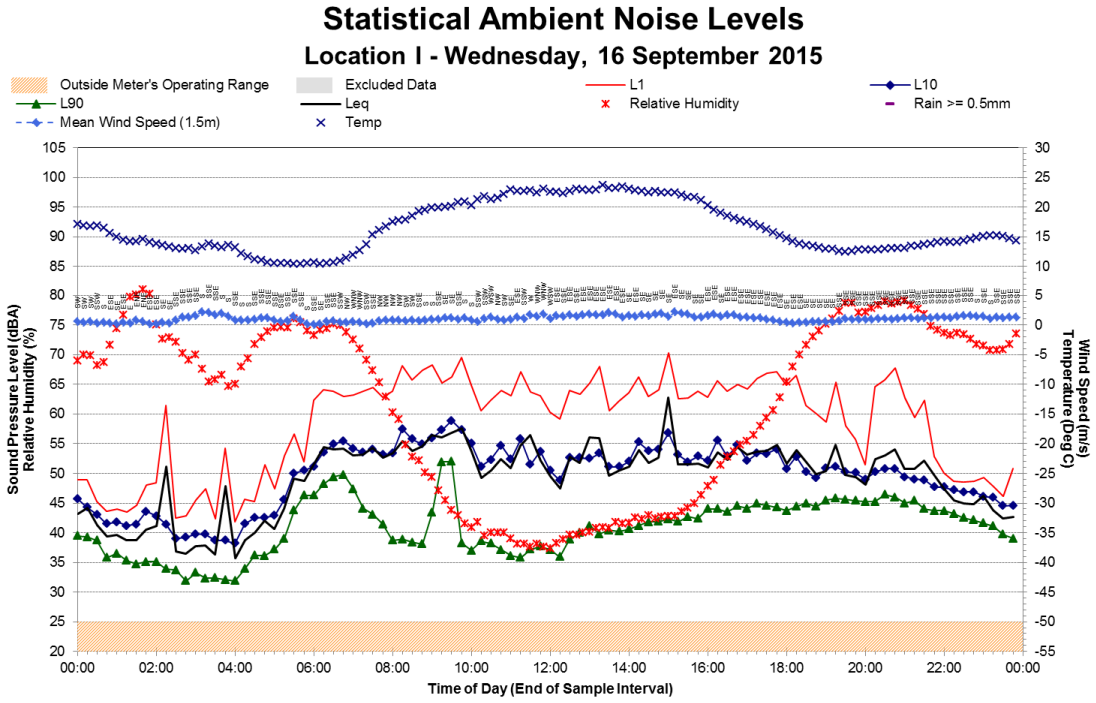


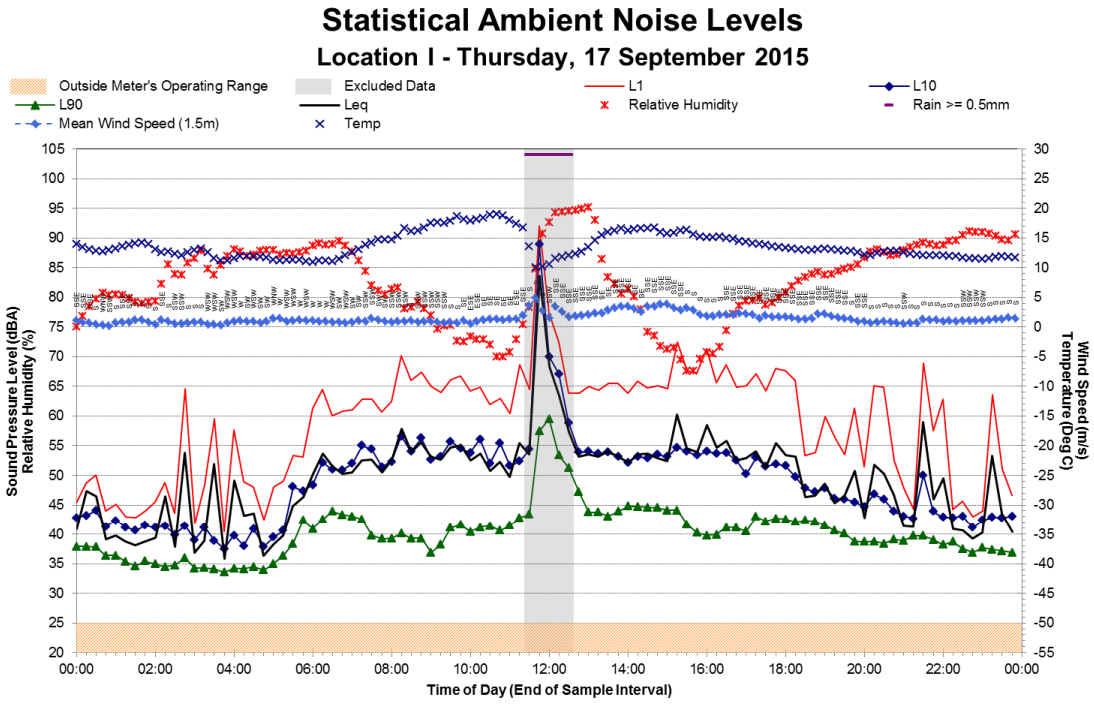


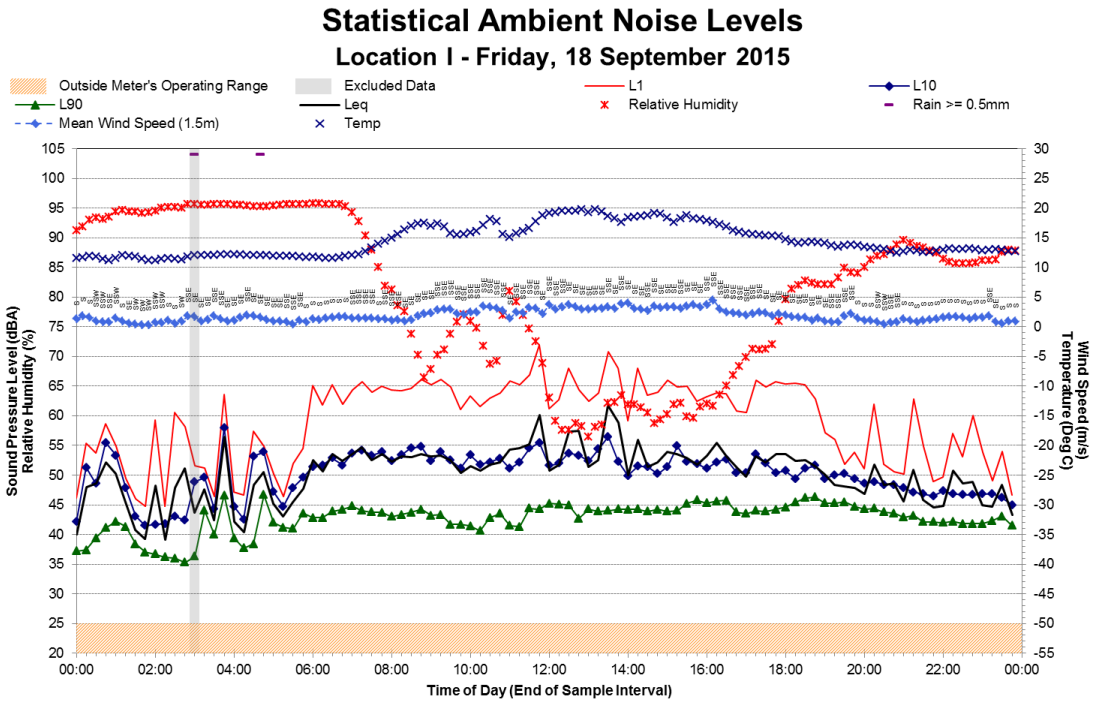
Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q59 630.01053-R1



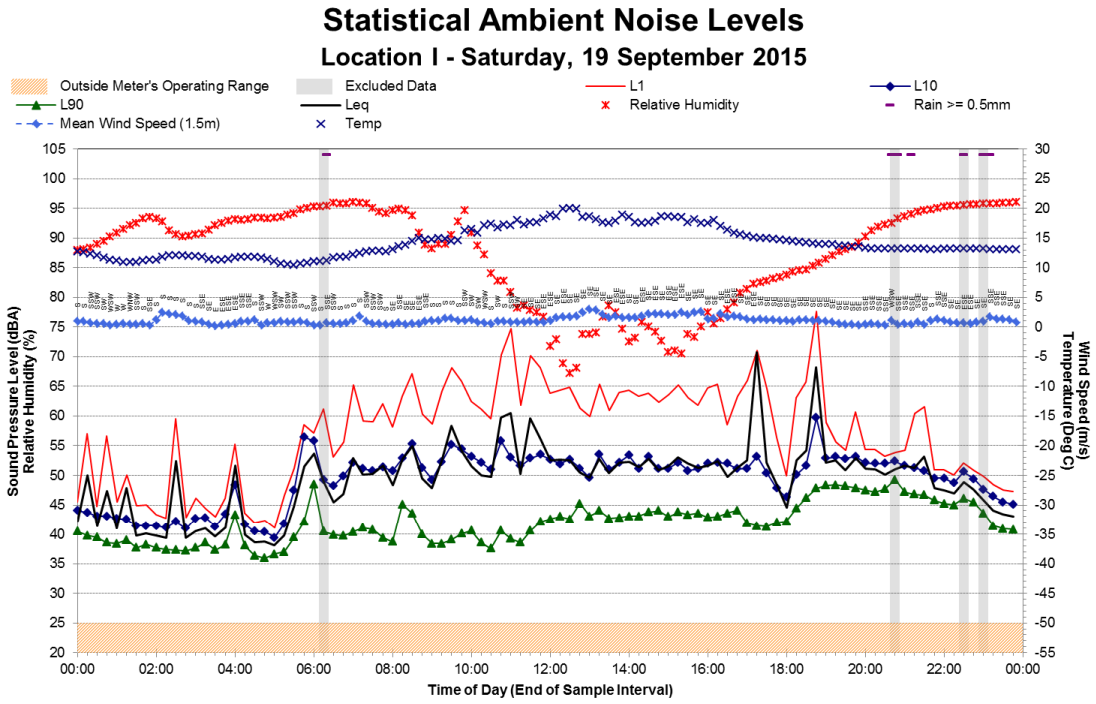


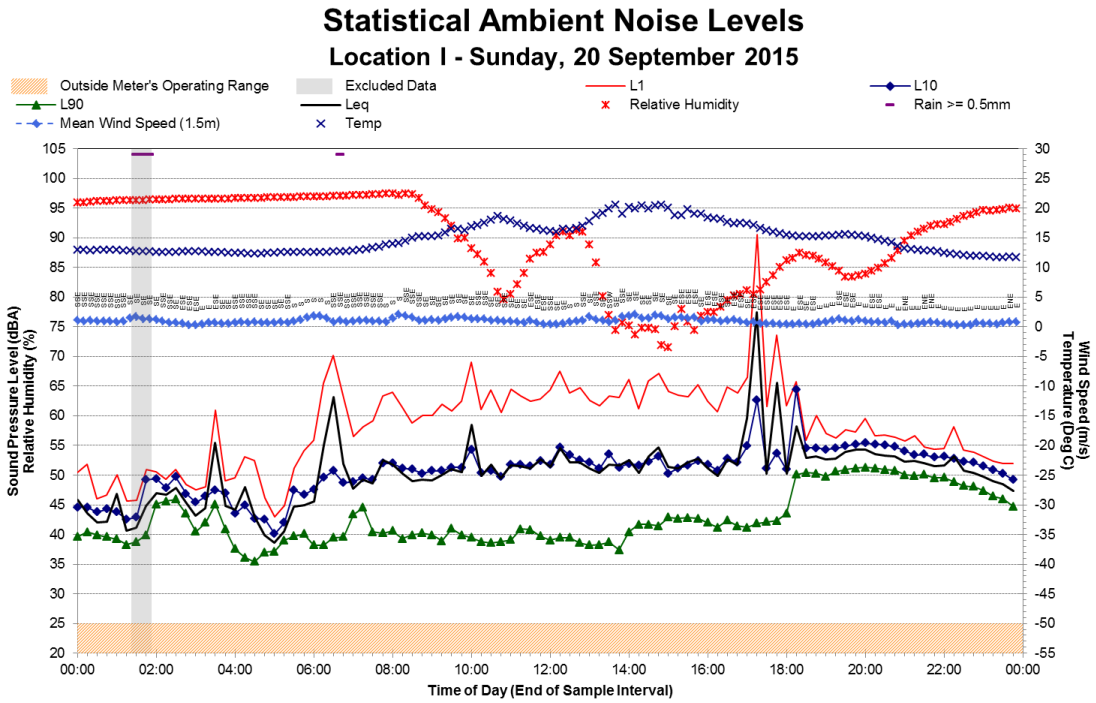

Statistical Ambient Noise Levels
Location I - Thursday, 17 September 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

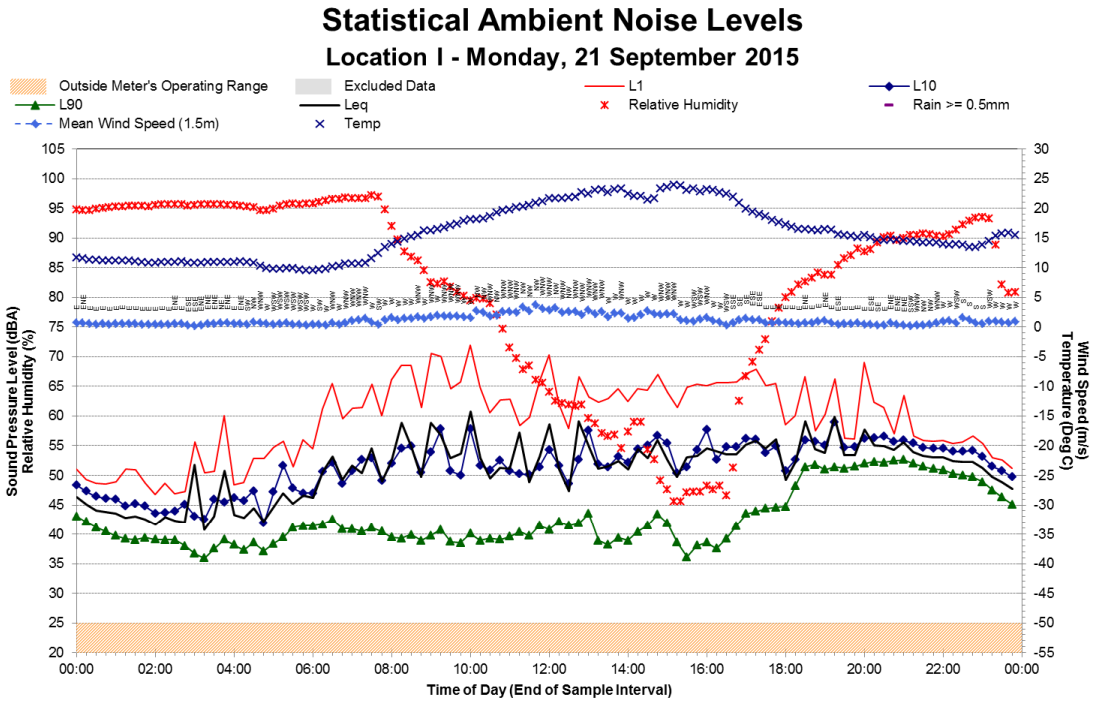

Statistical Ambient Noise Levels
Location I - Friday, 18 September 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

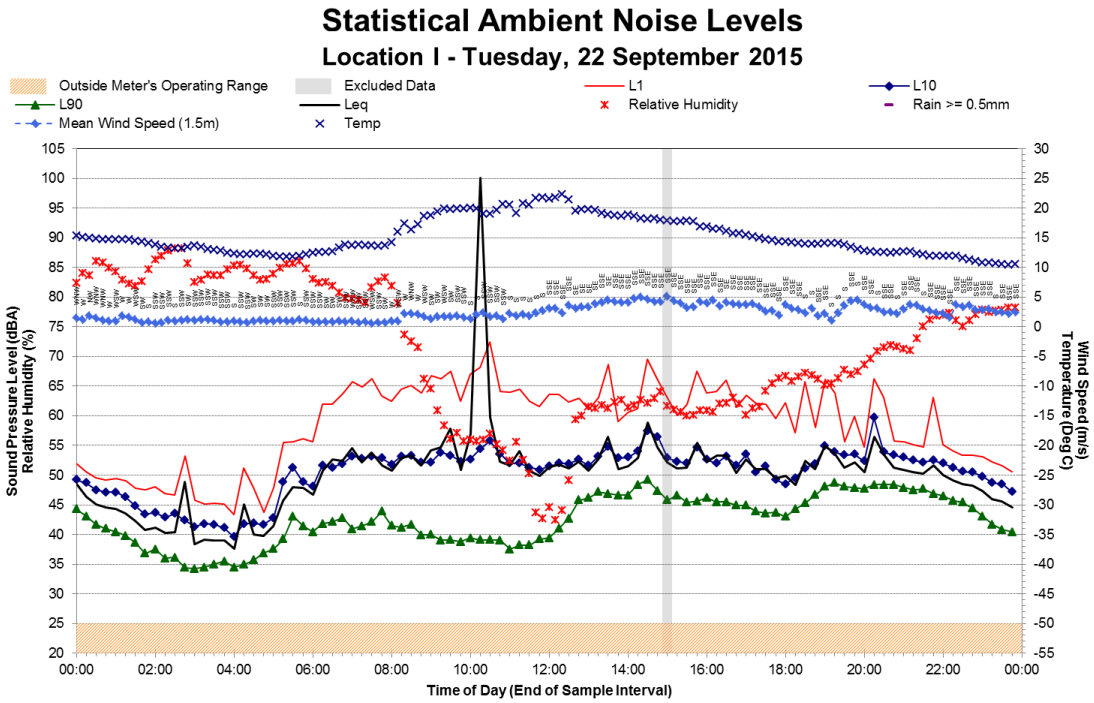
Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q59 630.01053-R1



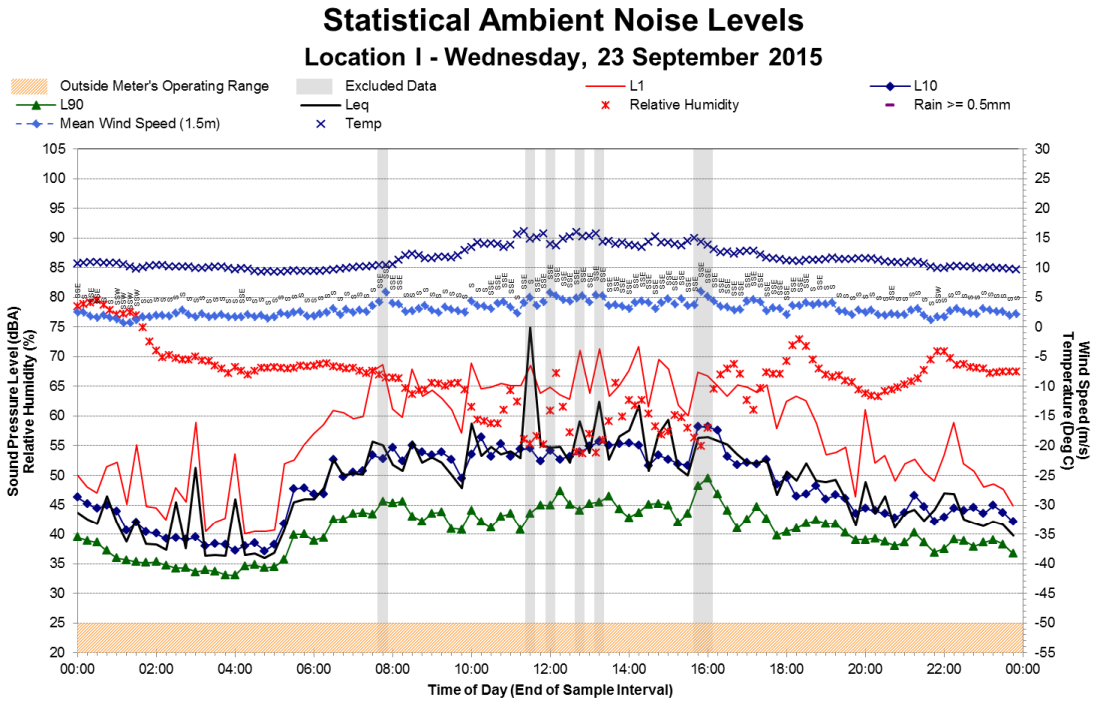


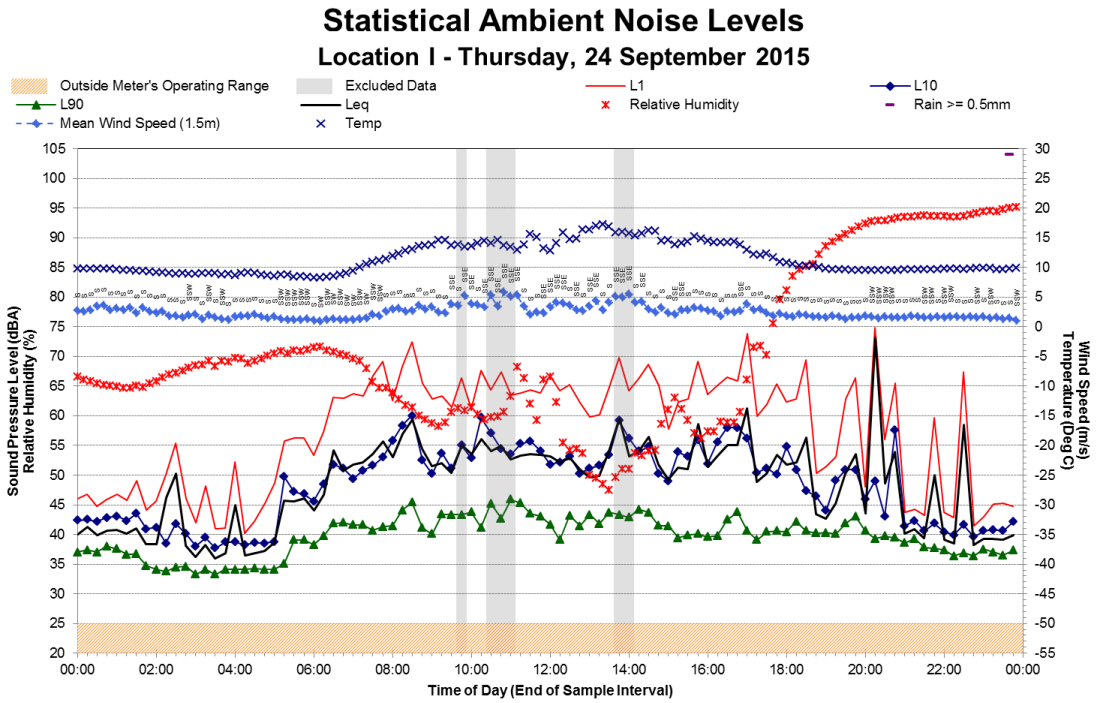

Statistical Ambient Noise Levels
Location I - Monday, 21 September 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location I - Tuesday, 22 September 2015
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

Appendix C4

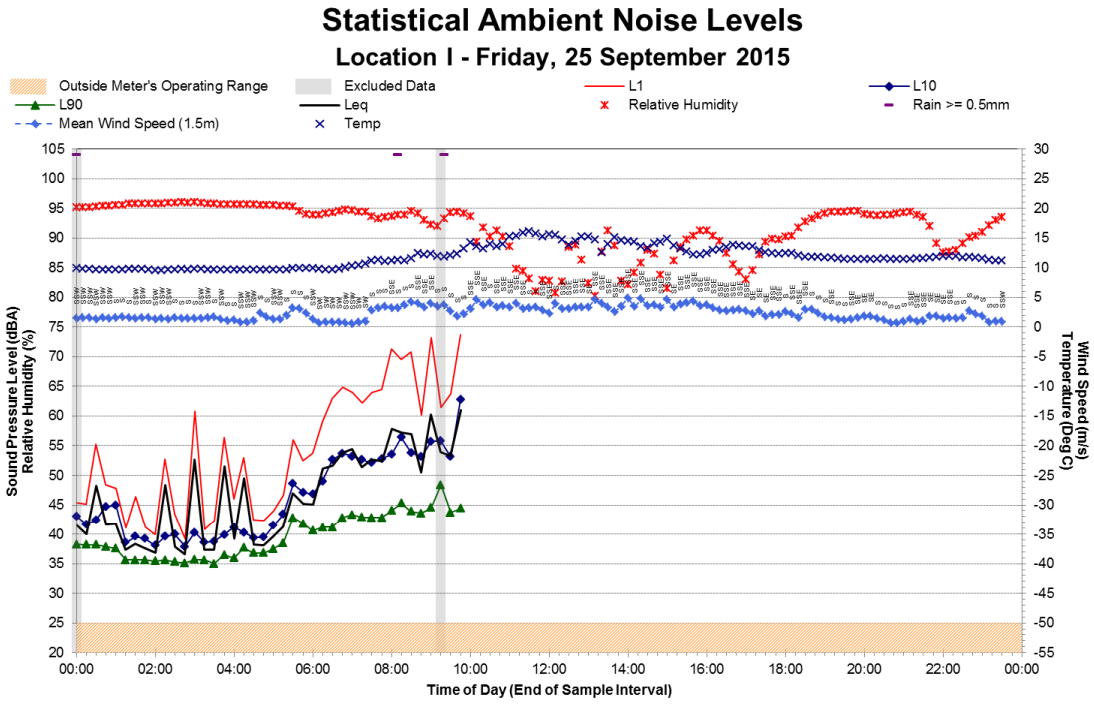
Statistical Ambient Noise Levels – Location I
Report Q59 630.01053-R1





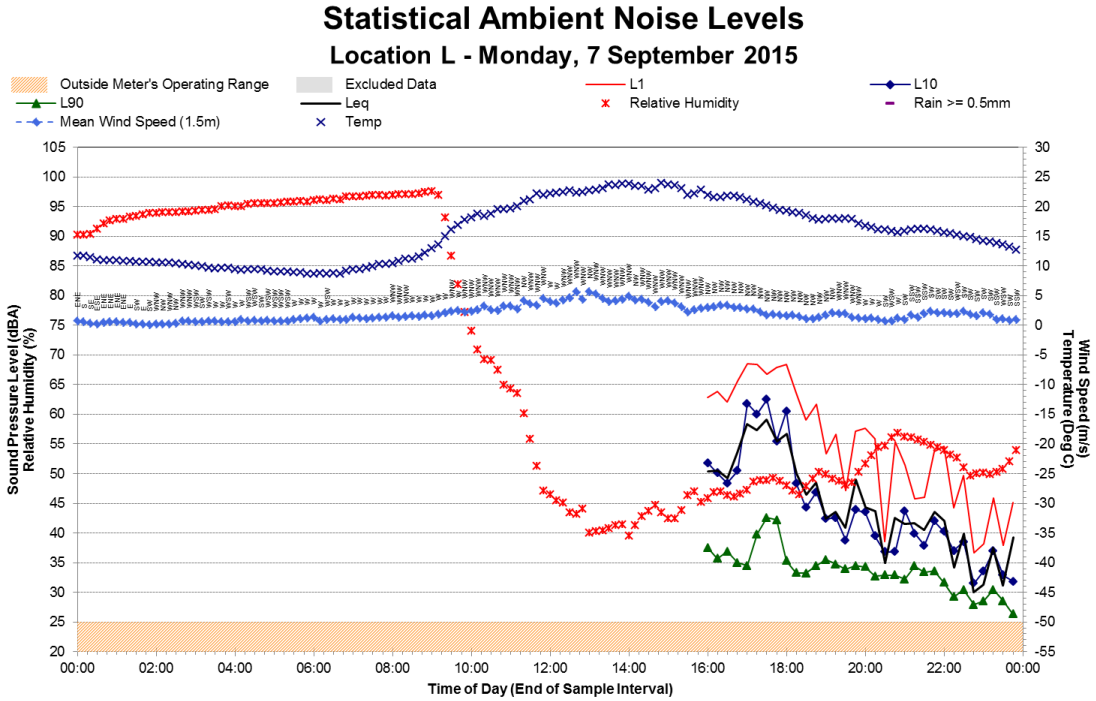
Appendix C4

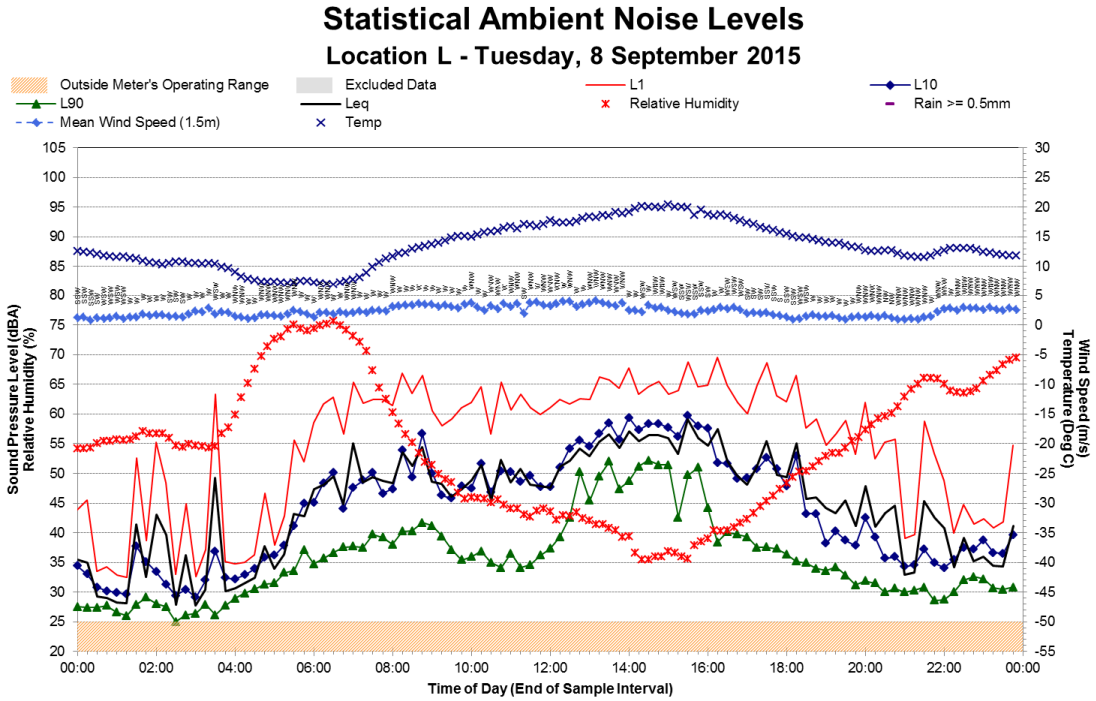
Statistical Ambient Noise Levels – Location I
Report Q59 630.01053-R1



Appendix C5

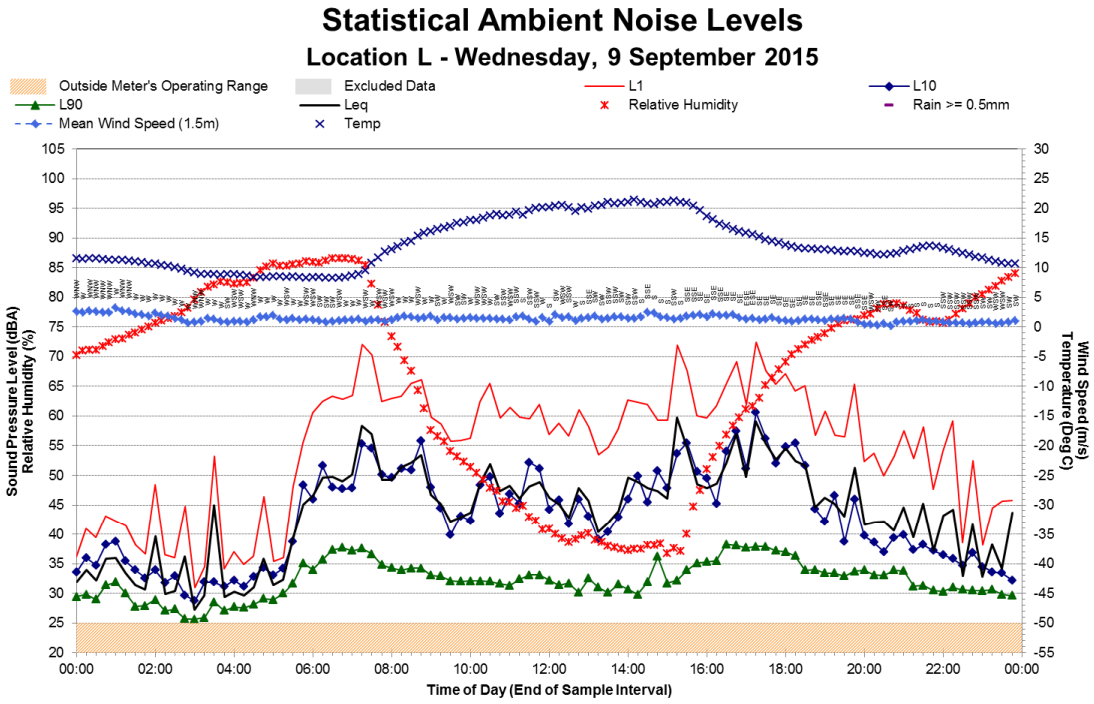
Statistical Ambient Noise Levels – Location L
Report Q59 630.01053-R1

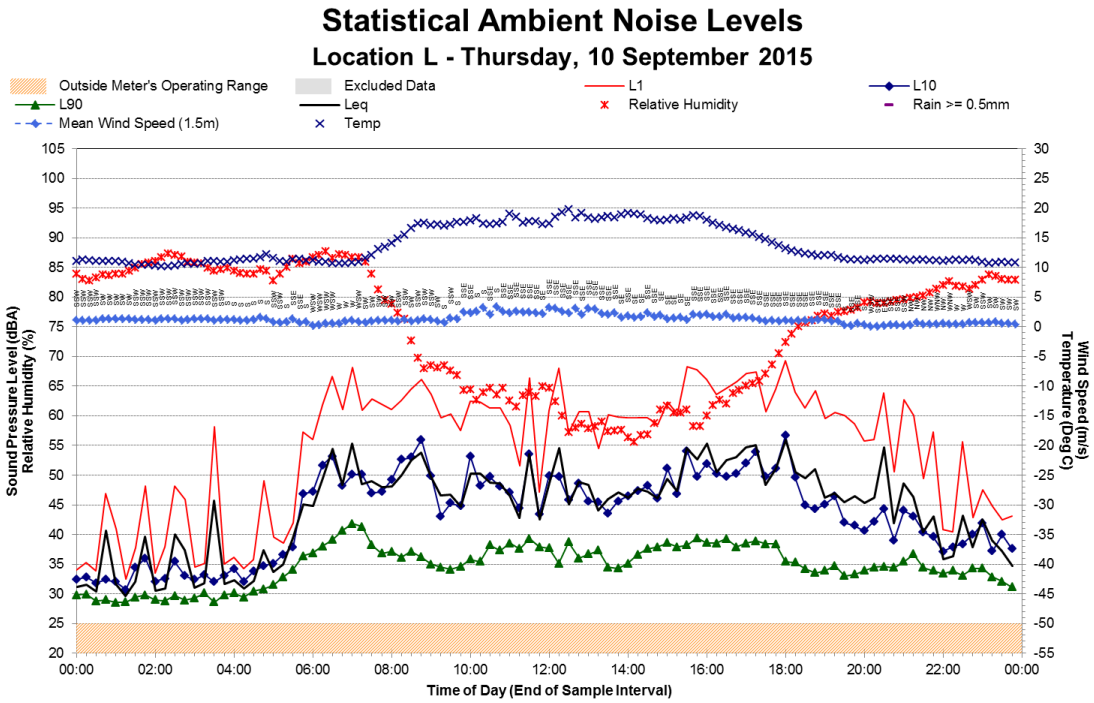




Appendix C5

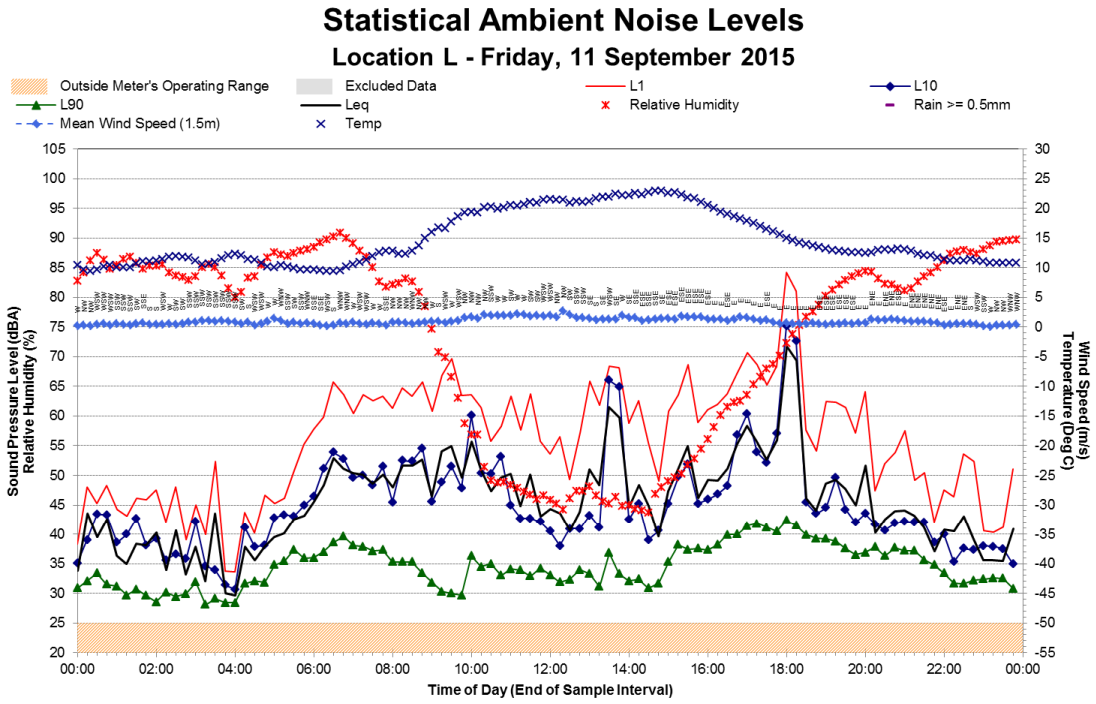
Statistical Ambient Noise Levels – Location L
Report Q59 630.01053-R1

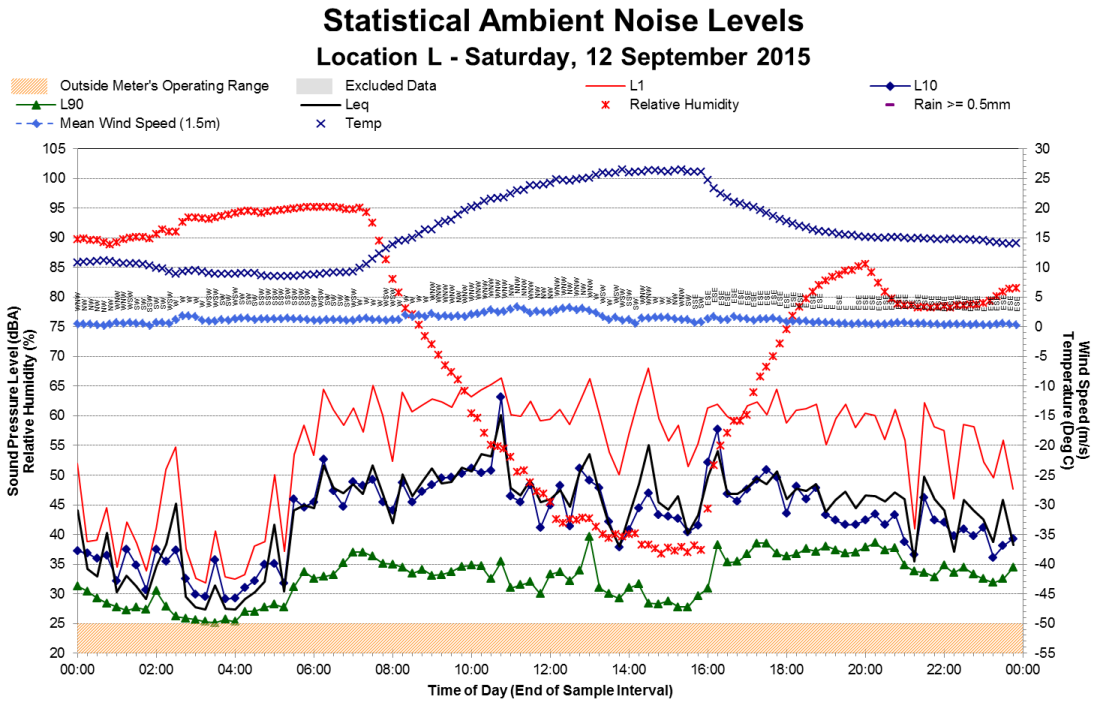




Appendix C5

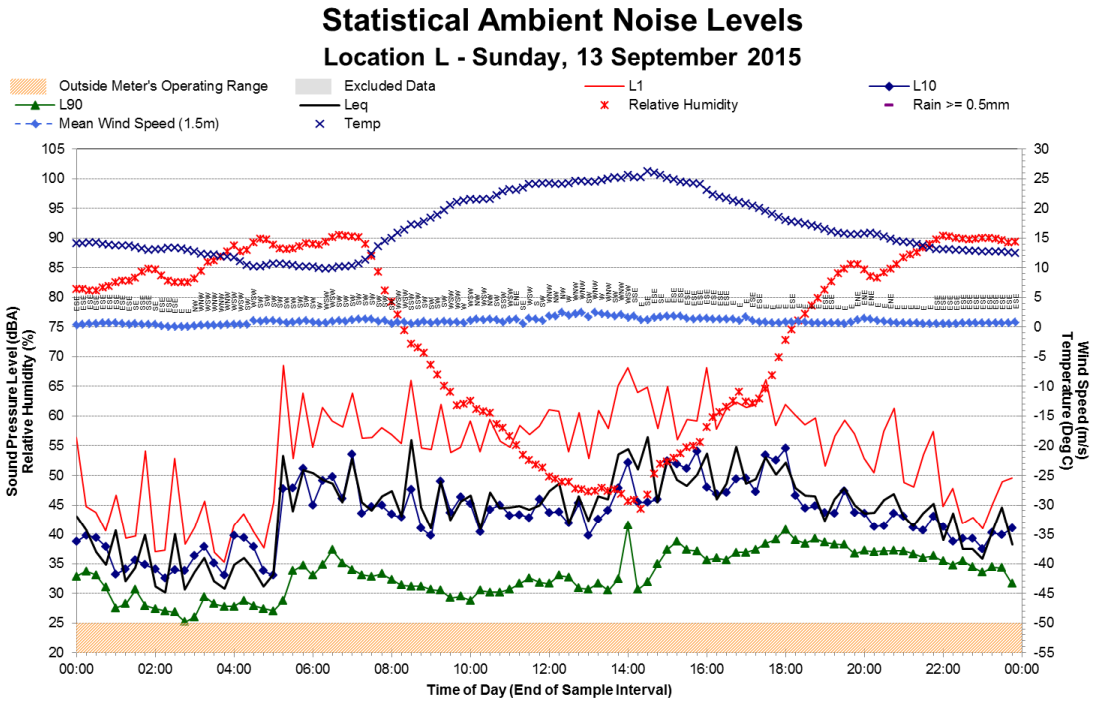
Statistical Ambient Noise Levels – Location L
Report Q59 630.01053-R1

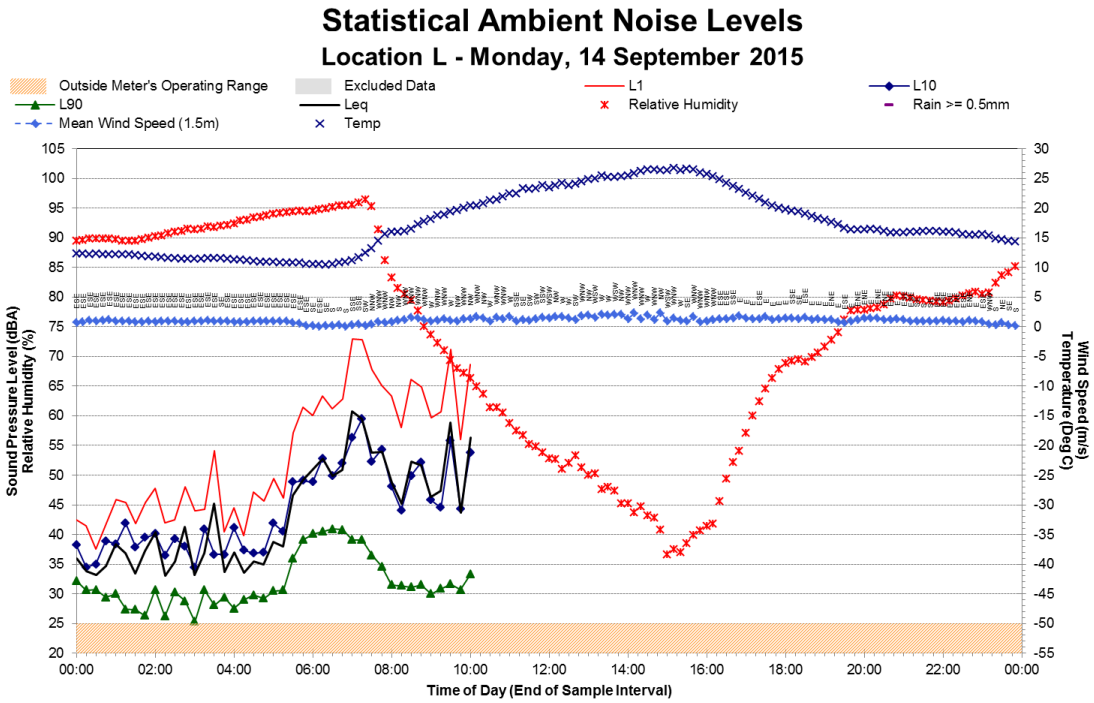




Appendix C5

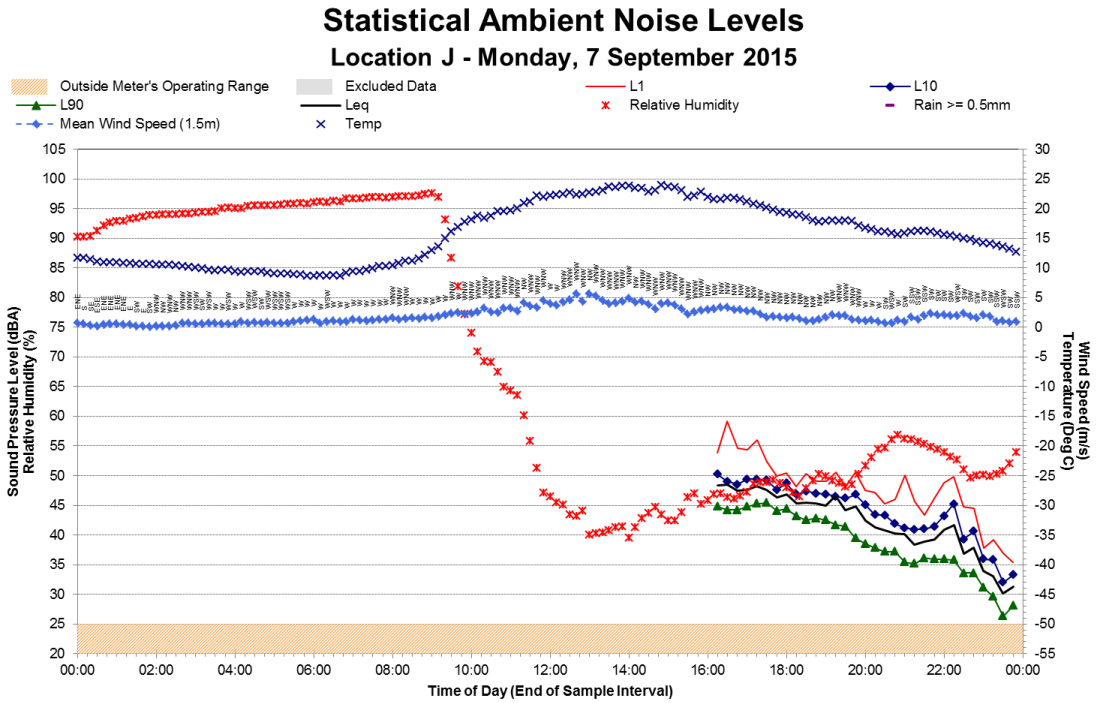
Statistical Ambient Noise Levels – Location L
Report Q59 630.01053-R1

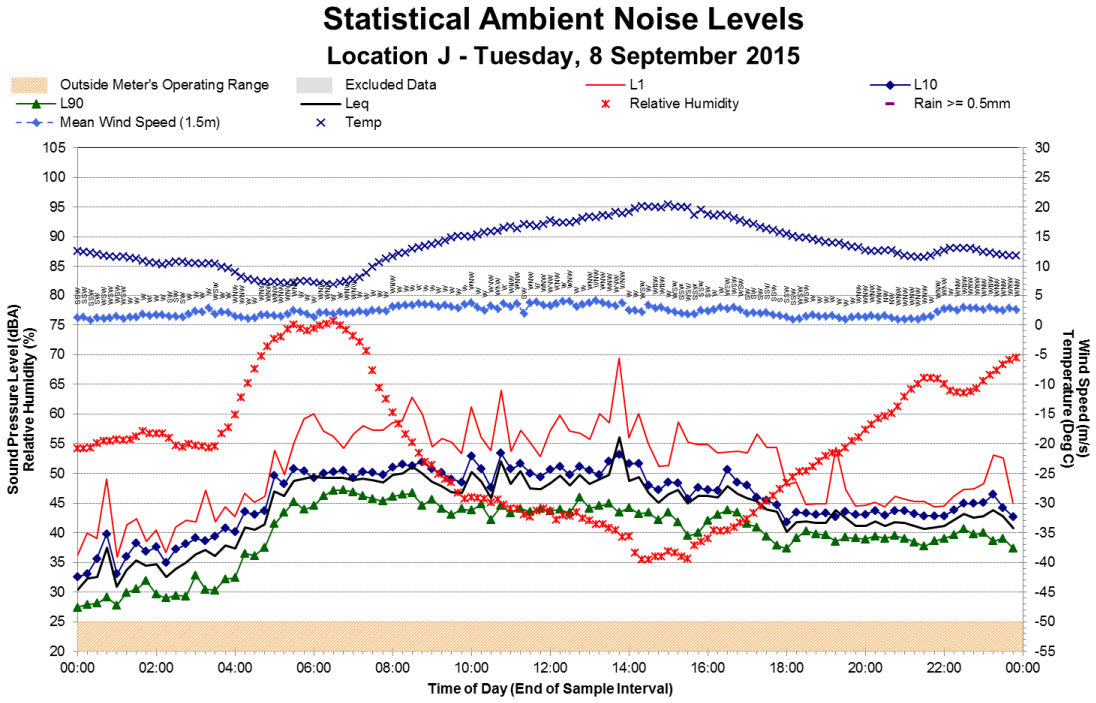




Appendix C6

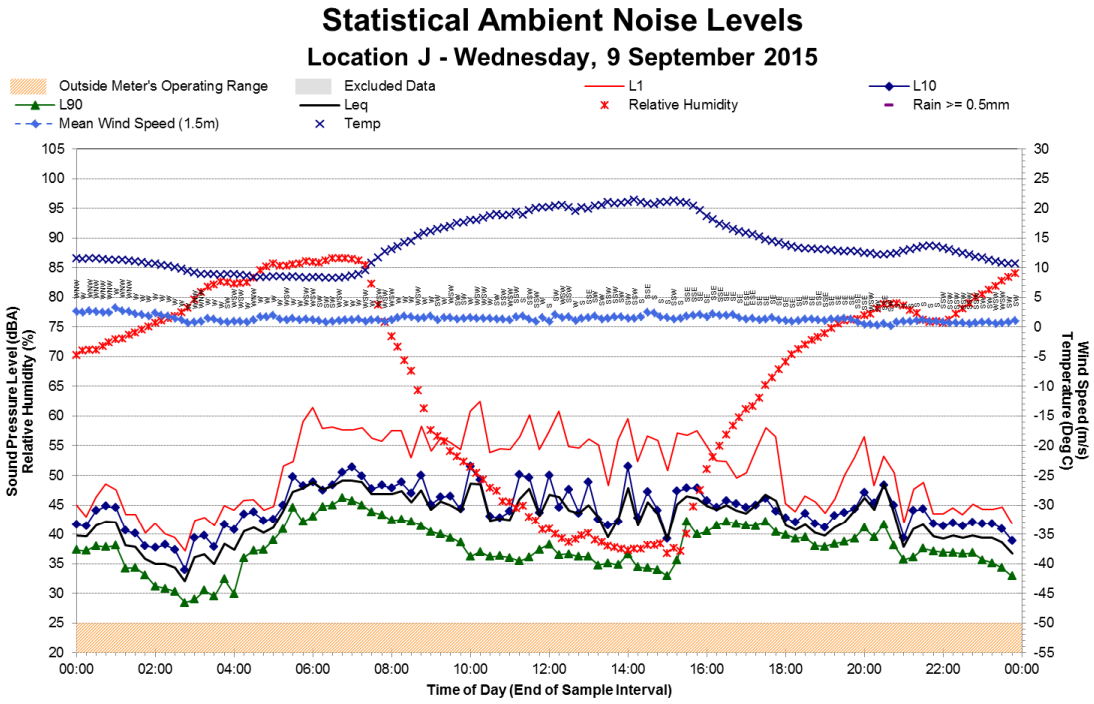
Statistical Ambient Noise Levels – Location J
Report Q59 630.01053-R1

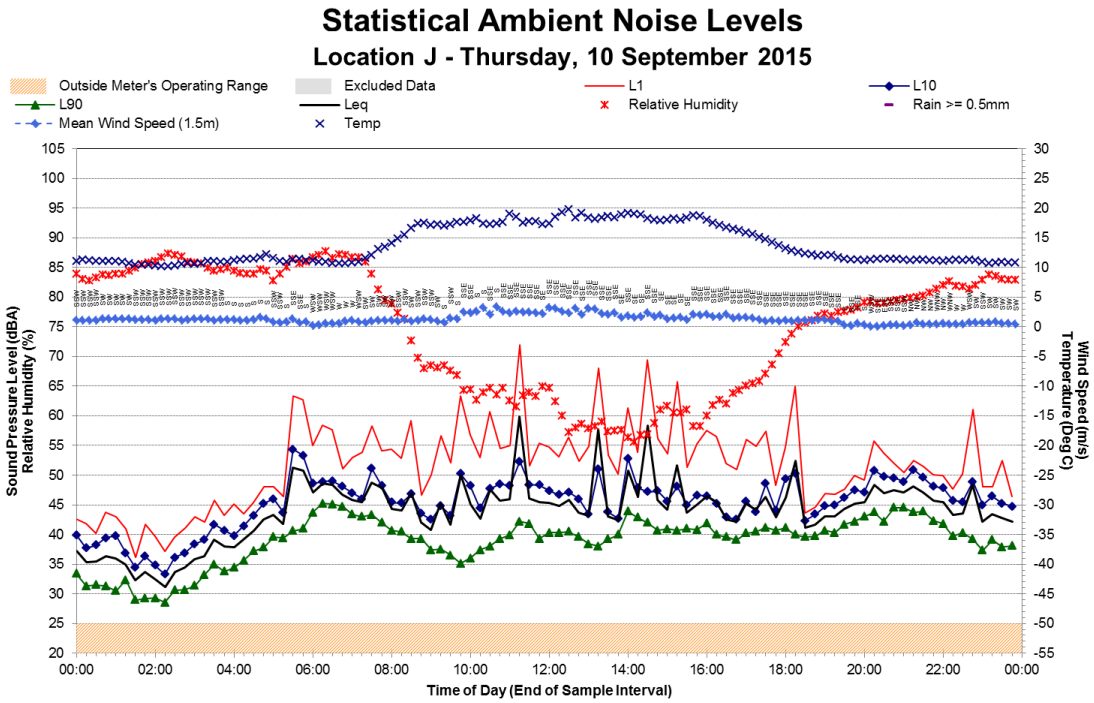




Appendix C6

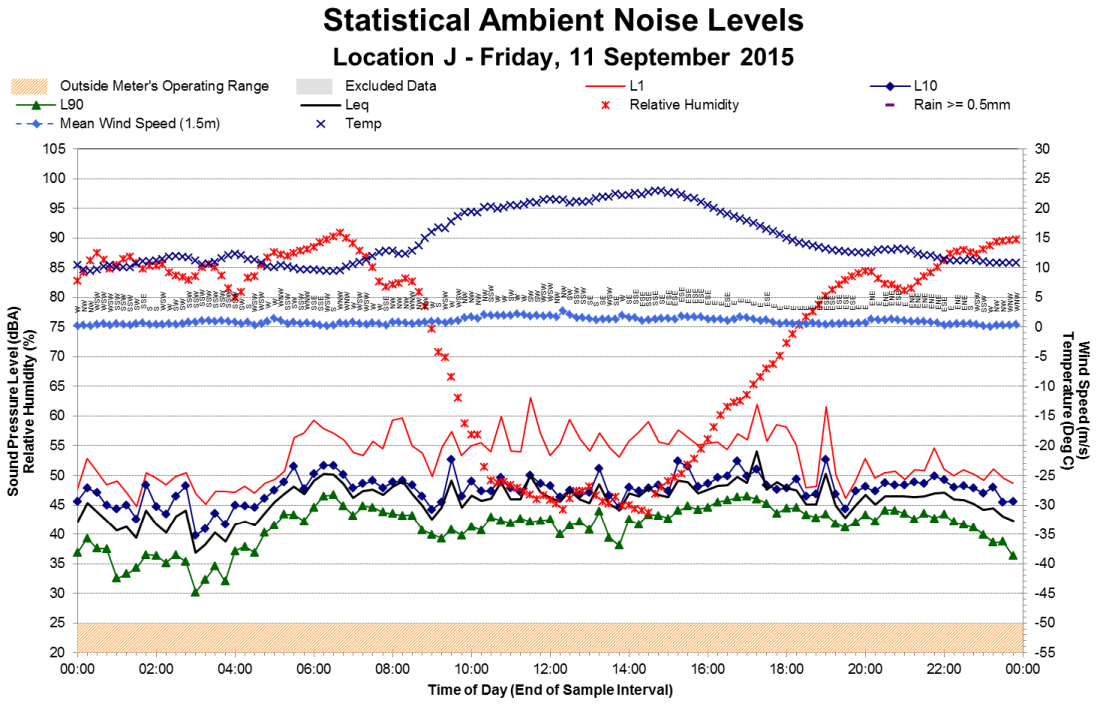
Statistical Ambient Noise Levels – Location J
Report Q59 630.01053-R1

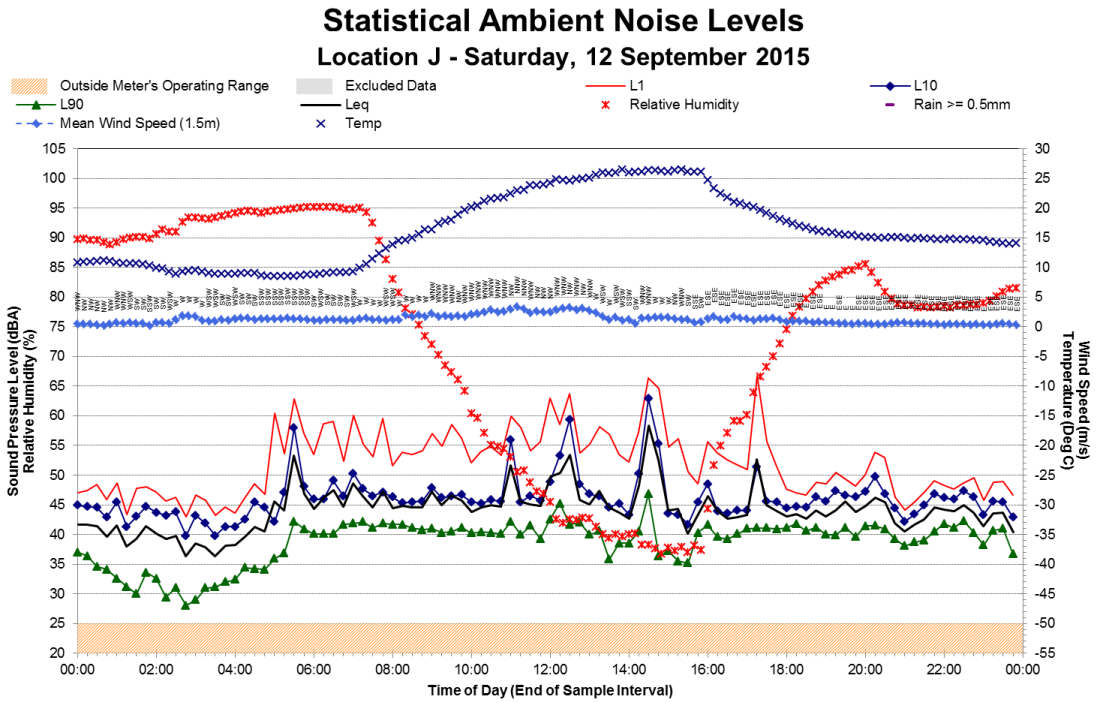




Appendix C6

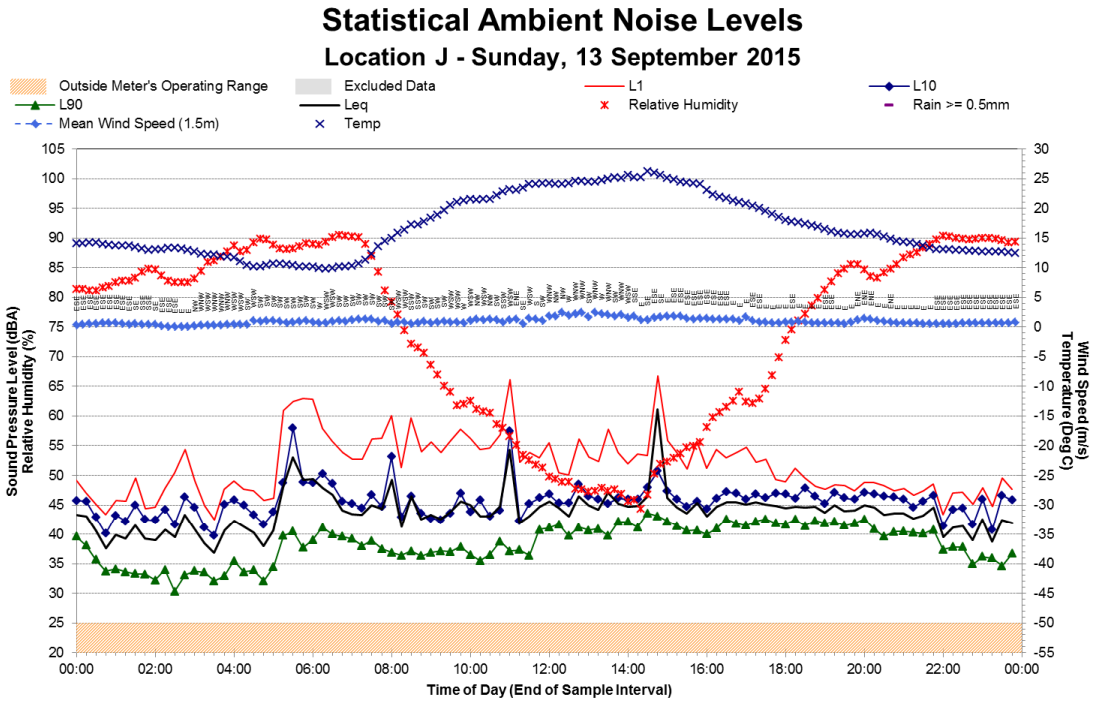
Statistical Ambient Noise Levels – Location J
Report Q59 630.01053-R1

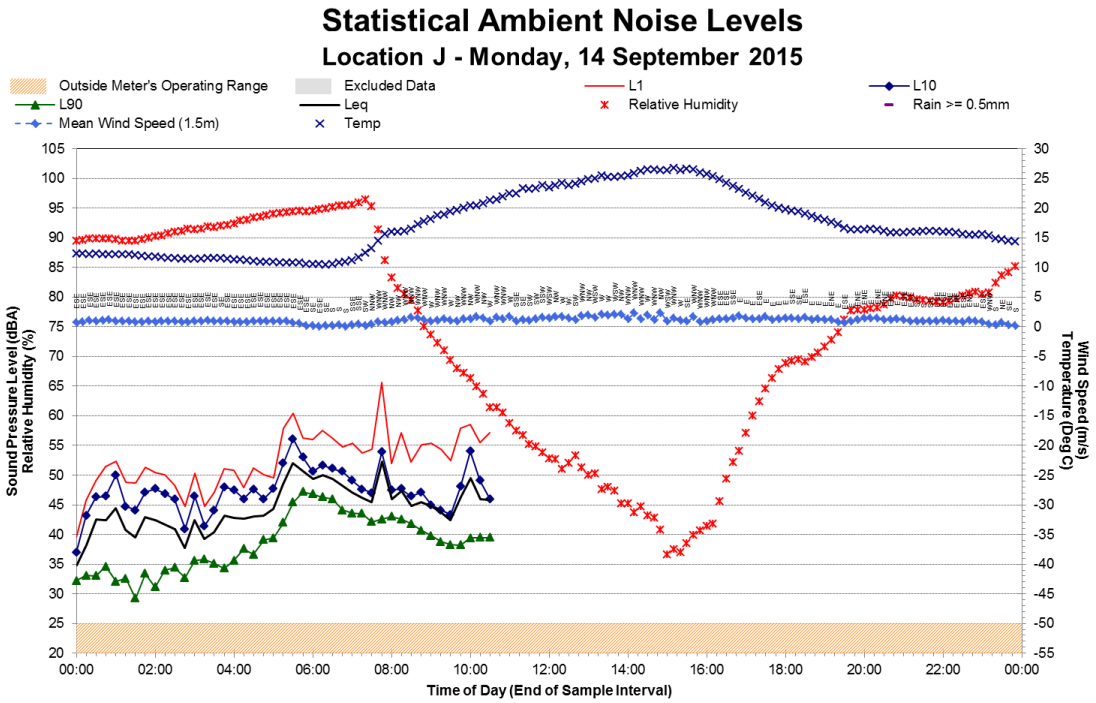




Appendix C6

Statistical Ambient Noise Levels – Location J
Report Q59 630.01053-R1





Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending December 2015

Report Number Q60 630.01053

9 February 2016

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

Version: Revision 0

Donaldson and Abel Coal Mines

Quarterly Noise Monitoring

Quarter Ending December 2015

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
Q60 630.01053	Revision 0	9 February 2016	Tristan Robertson	Martin Davenport	Tristan Robertson
Q60 630.01053	Draft 1	8 February 2016	Tristan Robertson	Martin Davenport	Tristan Robertson

Table of Contents

TABLES

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1 INTRODUCTION

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct quarterly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Mine Project Noise Monitoring Program, dated 27 May 2008.

The objectives of the noise monitoring survey for this operating quarter were as follows:

- Measure the ambient noise levels at six (6) focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 DEVELOPMENT CONSENT PROJECT APPROVAL

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)*", and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:

Location	***LA10(15minute) Noise Limits (dBA)***	
	Daytime	***Night-time***
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. *The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.*

19. *The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.*

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Coal Mine Project Approval:

- Extraction of up to 6.1 Mtpa of Run of Mine (ROM) coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield Coal Handling and Preparation Plant by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield Coal Handling Processing Plant (CHPP) to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The Project Approval was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the Project Approval was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the Project Approval was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the CHPP.

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Location I	*Lord Howe Drive, Ashtonfield*	*36*	*36*	*36*	*45*
Location K	*Catholic Diocese Land*	*37*	*37*	*37*	*45*
Location L	*Kilshanny Avenue, Ashtonfield*	*40*	*40*	*40*	*47*
All other Locations	*All other privately-owned Residences*	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3 (Appendix A).*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		LAeq(15minute)
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	Day	Evening	Night
		LAeq(period)	
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;*
    c. *Describe the proposed noise management system in detail; and*
    d. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*
        - *Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.*

Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*
4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*
    i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*
    ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*

b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*
    i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. *Implement all reasonable and feasible best practice noise mitigation measures on the site; and*

d. *Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.*

3 NOISE MONITORING METHODOLOGY

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), and in accordance with Heggies Report 30-1409-R2 dated 27 May 2008 (*Abel Mine Project Noise Monitoring Program)* and AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of IEC 61672.1-2004 *Electroacoustics – Sound Level Meters – Specifications* and carries current NATA or manufacturer calibration certificates.

3.2 Monitoring Locations

Baseline and preceding operational quarterly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six (6) focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Lord Howe Drive, Ashtonfield
J	Parish Drive, Thornton
L	17 Kilshanny Ave, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix B**.

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of seven (7) days between 10 December 2015 and 24 December 2015 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background 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. The L_{Amax} is the maximum noise level recorded over the interval.

Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six (6) monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 OPERATOR ATTENDED NOISE MONITORING

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were conducted during the daytime and evening on Thursday 17 December 2015 and during the night on Thursday 17 December 2015 and Thursday 24 December 2015. All operator attended noise surveys on 17 December 2015 were conducted using a Brüel & Kjær 2270 Type 1, integrating sound level meter (s/n: 2679354) and all operator attended noise surveys on 24 December 2015 were conducted using a Brüel & Kjær 2250L Type 1, integrating sound level meter (s/n: 3005908).

Results of the operator attended noise measurements are given in **Table 2** to **Table 9**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date and start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from the Abel Coal Mine and are stated only when a contribution could be quantified.

Mine noise at all monitoring locations was inaudible over the existing ambient noise levels. Where this is the case, noise levels from the source are typically 10 dB (or more) below the measured L_{A90} noise level. Therefore, subtracting 10 dB from the measured L_{A90} noise level gives an indication of the maximum contribution of Abel operations at these locations.

Table 2 Location D, Black Hill School, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 15:02 W = 2 m/s E Temp = 28°C Cloud cover = 2/8	Daytime Ambient	72	63	50	43	51	Local Road Traffic 56 to 72 dBA Distant Road traffic 43 to 51 dBA Trees in wind 48 to 49 dBA Birds 45 to 52 dBA Insects 35 to 40 dBA Aircraft Flyover 45 to 65 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <33 dBA[1]					
17/12/2015 18:04 W = Calm to 3 m/s ENE Temp = 25°C Cloud cover = 0/8	Evening Ambient	78	67	54	41	55	Local Road Traffic 52 to 78 dBA Distant road traffic noise 42 to 53 dBA Insects 35 to 40 dBA Birds 48 to 59 dBA Trees in wind 43 to 44 dBA
		Estimated Abel mine LAeq(15min) contribution <31 dBA[1]					Abel Mine not audible
17/12/2015 22:00 W = Calm to1.8 m/s NE Temp = 21°C Cloud cover = 0/8	Night-time Ambient	70	54	49	46	49	Distant road traffic noise 44 to 49 dBA Insects 47 to 48 dBA Birds 50 to 51 dBA Local Road traffic noise 55 to 70 dBA
		Estimated Abel mine LAeq(15min) contribution <36 dBA[1] LA1(1min) contribution <36 dBA[1]					Abel Mine not audible

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 15:21 W = Calm to 2 m/s ESE Temp = 27°C Cloud cover = 2/8	Daytime Ambient	80	71	59	51	59	John Renshaw Drive 55 to 67 dBA Local Road Traffic 77 to 80 dBA Birds 58 to 59 dBA Trees in wind 50 t0 52 dBA Insects 50 to 51 dBA
		Estimated Abel mine LAeq(15min) contribution <41 dBA[1]					Abel Mine not audible
17/12/2015 18:28 W = Calm to 3 m/s ENE Temp = 25°C Cloud cover = 0/8	Evening Ambient	79	68	60	48	58	John Renshaw Drive 47 to 72 dBA Local Road Traffic 68 to 79 dBA Insects/frogs 40 to 52 dBA Birds 58 to 61 dBA
		Estimated Abel mine LAeq(15min) contribution <38 dBA[1]					Abel Mine not audible
24/12/2015 04:33 W = Calm to 2 m/s S Temp = 20°C Cloud cover = 8/8	Night-time Ambient	74	64	56	40	53	John Renshaw Drive 61 to 74 dBA Birds 46 dBA Insects/frogs 41 to 46 dBA Trees in wind 38 dBA
		Estimated Abel mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					Abel Mine not audible

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 4 Location G, 156 Buchannan Road, Buchannan

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 16:25 W = Calm to 4 m/sESE Temp = 27^{0}C Cloud cover = 0/8	Daytime Ambient	53	49	47	43	45	Distant road traffic noise 42 to 44 dBA Insects 42 to 43 dBA Birds 40 to 53 dBA Trees in wind 44 to 49 dBA
		Estimated Abel mine LAeq(15min) contribution <33 dBA[1]					Abel Mine not audible
17/12/2015 19:27 W = Calm to 3m/s ENE Temp = 24^{0}C Cloud cover = 0/8	Evening Ambient	56	54	52	43	49	Distant road traffic noise 42 to 44 dBA Birds 50 to 51 dBA Insects 38 to 56 dBA Abel Mine not audible Bloomfield Colliery Haul trucks 36 to 38. Metal clanging 47 dBA
		Estimated Abel mine LAeq(15min) contribution <33 dBA[1]					
24/12/2015 05:31 W = Calm to 2 m/s S Temp = 20^{0}C Cloud cover = 8/8	Night-time Ambient	78	75	70	45	65	Distant road traffic noise 57 to 78 dBA Birds 45 to 49 dBA Insects 46 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <35 dBA[1] LA1(1min) contribution <35 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 5 Location I, Lord Howe Drive, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 17:10 W = calm to 4m/s ENE Temp = 26°C Cloud cover = 0/8	Daytime Ambient	83	67	55	45	57	Local Road Traffic 59 to 83 dBA Distant road traffic noise 42 to 53 dBA Birds 46 to 64 dBA
		Estimated Abel mine LAeq(15min) contribution <35 dBA[1]					Abel Mine not audible
17/12/2015 20:16 W = calm to 2.6m/s ENE Temp = 22°C Cloud cover = 0/8	Evening Ambient	82	69	67	55	64	local road traffic noise 67 to 82 dBA Insects 65 to 67 dBA Birds 55 dBA Distant Road traffic 41 to 42 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <45 dBA[1]					
24/12/2015 06:16 W = Calm to 1.8 m/s S Temp = 19°C Cloud cover = 7/8	Night-time Ambient	72	64	55	44	52	Distant road traffic noise 36 to 37 dBA Birds 56 to 69 dBA Local Road traffic 58 to 69 dBA Train horn 50 dBA
		Estimated Abel mine LAeq(15min) contribution <34 dBA[1] LA1(1min) contribution <34 dBA[1]					Abel Mine not audible

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 6 Location J, Parish Drive, Thornton

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 17:34 W = calm to 3m/s ENE Temp = 26°C Cloud cover = 0/8	Daytime Ambient	64	55	52	47	50	Distant road traffic noise 47 to 55 dBA Birds 48 to 50 dBA Trees in wind 50 to 51 dBA Insects 47 to 52 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <37 dBA[1]					
17/12/2015 20:38 W = Calm to 2m/s ENE Temp = 22°C Cloud cover = 0/8	Evening Ambient	60	54	51	45	48	Distant road traffic noise 45 to 46 dBA Birds 58 to 60 dBA Insects 51 to 52 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <35 dBA[1]					
24/12/2015 06:37 W = Calm to 1.8 m/s S Temp = 19°C Cloud cover = 7/8	Night-time/daytime Ambient	68	54	46	42	46	Distant road traffic noise 38 to 59 dBA Birds 45 to 68 dBA Abel Mine not audible
		Estimated Abel mine LAeq(15min) contribution <32 dBA[1] LA1(1min) contribution <32 dBA[1]					

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

Table 7 Location L, 17 Killshanny Ave, Ashtonfield

Date/Start Time/Weather	Measurement Description	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission and Typical Maximum Levels LAmax – dBA
		LAmax	LA1	LA10	LA90	LAeq	
17/12/2015 16:52 W = Calm to 4 m/s E Temp = 26°C Cloud cover = 0/8	Daytime Ambient	79	69	51	40	55	Local Road Traffic 42 to 79 dBA Trees in wind 43 to 51 dBA Birds 44 to 47 dBA Dog Barking 61 to 64 dBA Distant road traffic 37 to 43 dBA
		Estimated Abel Mine LAeq(15min) contribution <30 dBA[1]					Abel Mine not audible
17/12/2015 19:55 W = Calm to 3m/s ENE Temp = 23°C Cloud cover = 0/8	Evening Ambient	72	60	50	42	50	Birds 52 to 55 dBA Insects 30 to 35 dBA Dog barking 55 to 56 dBA Local road traffic 56 to 72 dBA Nearby residences playing 45 to 61 dBA
		Estimated Abel Mine LAeq(15min) contribution <32 dBA[1]					Distant road traffic 42 to 43 dBA Abel Mine not audible
24/12/2015 05:56 W = Calm to 2 m/s S Temp = 20°C Cloud cover = 7/8	Night-time Ambient	74	63	48	38	50	Distant road traffic noise 32 to 34 dBA Insects 37 to 38 dBA Birds 48 to 55 dBA Dog barking 47 dBA Local rod traffic 51 to 74 dBA
		Estimated Abel Mine LAeq(15min) contribution <30 dBA[1] LA1(1min) contribution <30 dBA[1]					Abel Mine not audible

Note 1: Mine operation remained inaudible during operator attended noise measurement suggesting that any contribution would be at least 10 dB below the overall LA90 noise level.

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as "natural" noises such as birds, insects and leaf rustle.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8.**

Table 8 Compliance Noise Assessment – Operations

Location	Estimated Abel LAeq(15minute) Contribution			Consent Conditions LAeq(15minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	<33	<31	<36	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
F – Black Hill Road, Black Hill	<41	<38	<30	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
G – Buchanan Road, Buchanan	<33	<33	<35	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<35	<45	<34	36	36	36	Yes[1,2]	Yes[1,2]	Yes[1,2]
J – Parish Drive, Thornton	<37	<35	<32	35	35	35	Yes[1,2]	Yes[1,2]	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<30	<32	<30	40	40	40	Yes[1,2]	Yes[1,2]	Yes[1,2]

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

The 'estimated Abel $L_{Aeq(15minute)}$ contributions' for locations D (night period), F (day and evening period), J (day period) and I (Evening period) shown in **Table 8** do not indicate non-compliance with the site specific noise conditions. In this case, the L_{Aeq} descriptor does not adequately describe the likely noise source contribution - inaudible and immeasurable. The 'estimated' contribution aims to numerically express in lay terms that any site contribution is acoustically insignificant (no contributory pressure) to the measured ambient noise at the monitoring locations.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Abel LA1(1minute) Contribution	Consent Conditions LA1(1minute)	Compliance
D – Black Hill School, Black Hill	<36	45	Yes[1,2]
F – Black Hill Road, Black Hill	<30	45	Yes[1,2]
G – Buchanan Road, Buchanan	<35	45	Yes[1,2]
I – Lord Howe Drive, Ashtonfield	<34	45	Yes[1,2]
J – Parish Drive, Thornton	<32	45	Yes[1,2]
L – Kilshanny Ave, Ashtonfield	<30	47	Yes[1,2]

1 – Abel operations inaudible/not measurable.
2 – Estimated contribution equals LA90 minus 10 dB.

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 UNATTENDED CONTINUOUS NOISE MONITORING

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between 10 December 2015 and 24 December 2015 at each of the six (6) monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	ARL EL- 316 16-203-505	10/12/2015-23/12/2015
F – Black Hill Road, Black Hill	ARL EL- 316 16-103-494	10/12/2015-23/12/2015
G – Buchanan Road, Buchanan	ARL EL- 316 16-203-509	17/12/2015-24/12/2015
I – Lord Howe Drive, Ashtonfield	SVAN 957 27522	10/12/2015-23/12/2015
L – Kilshanny Ave, Kilshanny	ARL EL- 316 16-203-508	10/12/2015-23/12/2015
J – Parish Drive, Thornton	SVAN 957 27578	10/12/2015-19/12/2015

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendices C1** to **C6**. A summary of the results of the unattended continuous noise monitoring is given in **Table 11**.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Industrial Noise Policy (INP). The day, evening and night periods replace the day and night periods defined under the Environmental Noise Control Manual (ENCM). However, as the Donaldson conditions of consent are under the ENCM, these periods have also been reported.

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA Re 20 µPa)

Location	Period	Primary Noise Descriptor (dBA re 20 µPa)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	ENCM Daytime	64	53	41	58
	Daytime	65	55	41	56
	Evening	63	50	40	54
	Night	53	49	37	49
F Lot 684 Black Hill Road, Black Hill	ENCM Daytime	65	57	45	58
	Daytime	67	58	47	57
	Evening	64	55	43	59
	Night	60	53	42	53
G 156 Buchanan Road, Buchanan	ENCM Daytime	57	55	44	56
	Daytime	58	55	44	53
	Evening	57	55	44	57
	Night	55	54	48	54
I 49 Magnetic Drive, Ashtonfield	ENCM Daytime	64	54	41	67
	Daytime	66	55	42	64
	Evening	62	53	40	68
	Night	54	49	37	62
L 17 Kilshanny Ave, Ashtonfield	ENCM Daytime	58	49	36	62
	Daytime	58	50	34	53
	Evening	57	48	37	64
	Night	51	46	35	46
J 220 Parish Drive, Thornton	ENCM Daytime	59	56	42	58
	Daytime	61	59	43	59
	Evening	55	50	39	56
	Night	48	43	34	46

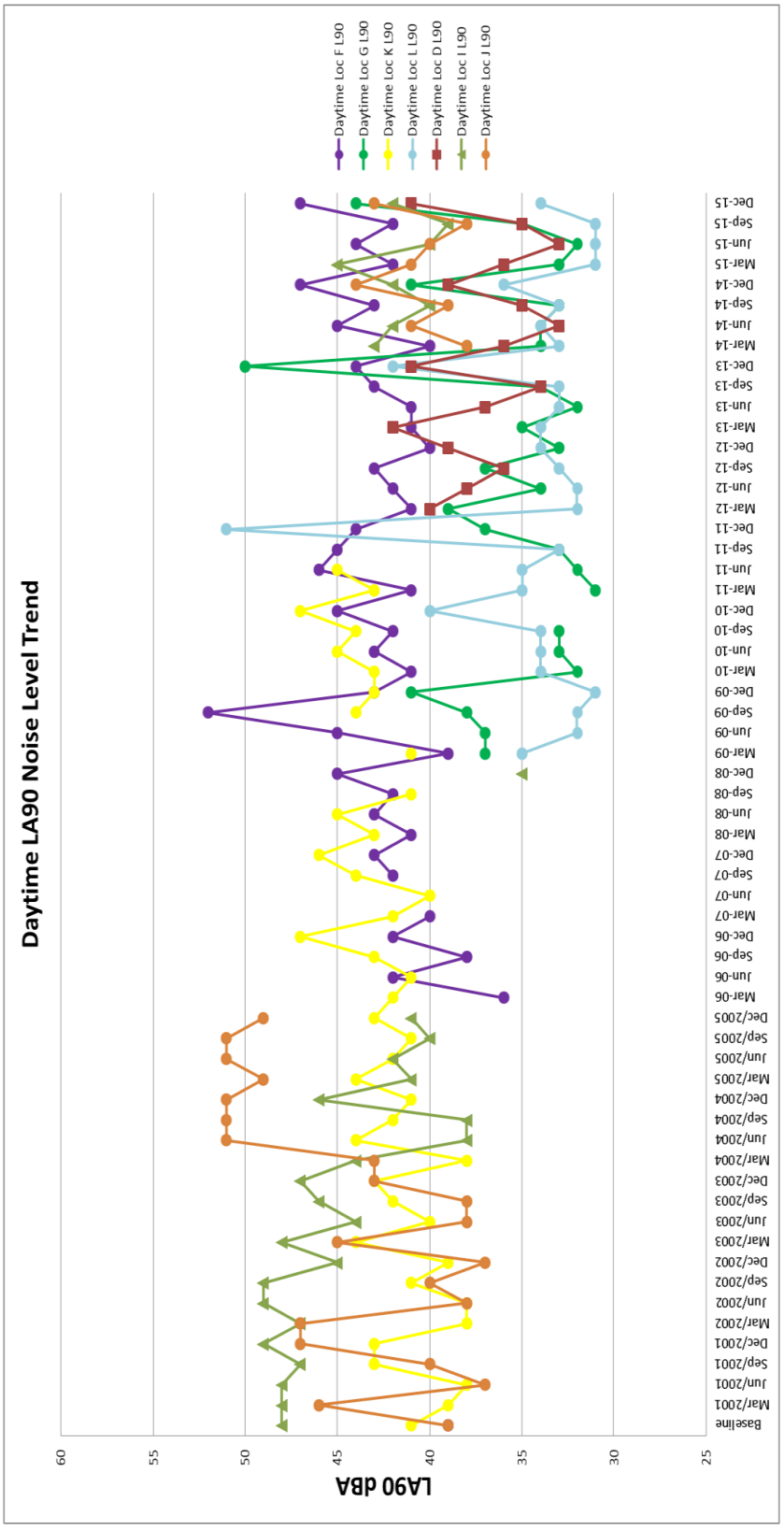
Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday. Environmental Noise Control Manual (ENCM) Daytime 7.00 am to 10.00 pm, Night 10.00 pm to 7.00 am.

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient LA90 Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1, Figure 2,** and **Figure 3** for the daytime, evening and night-time periods respectively.

Figure 1 Long term Daytime LA90 Noise Levels



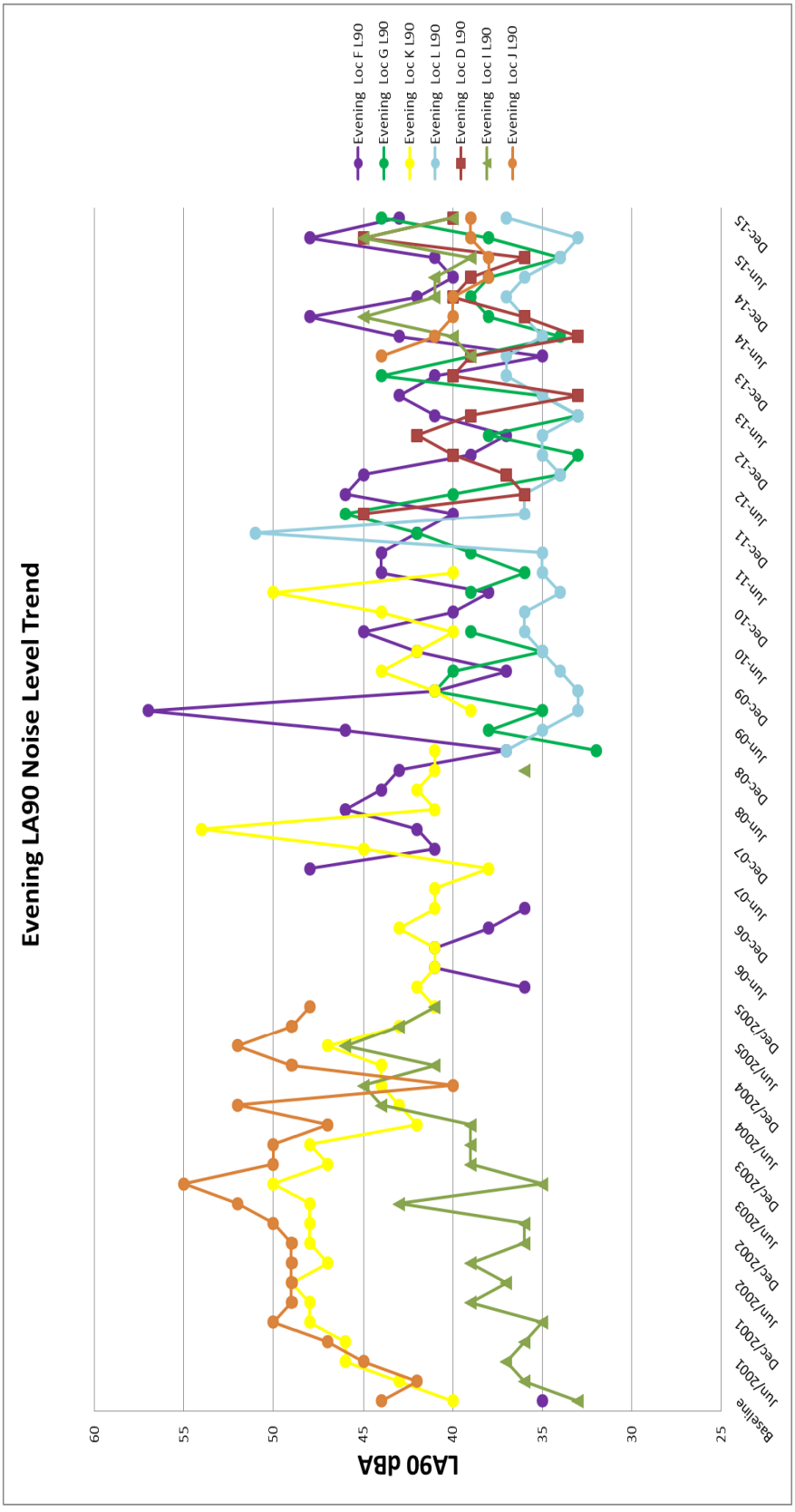
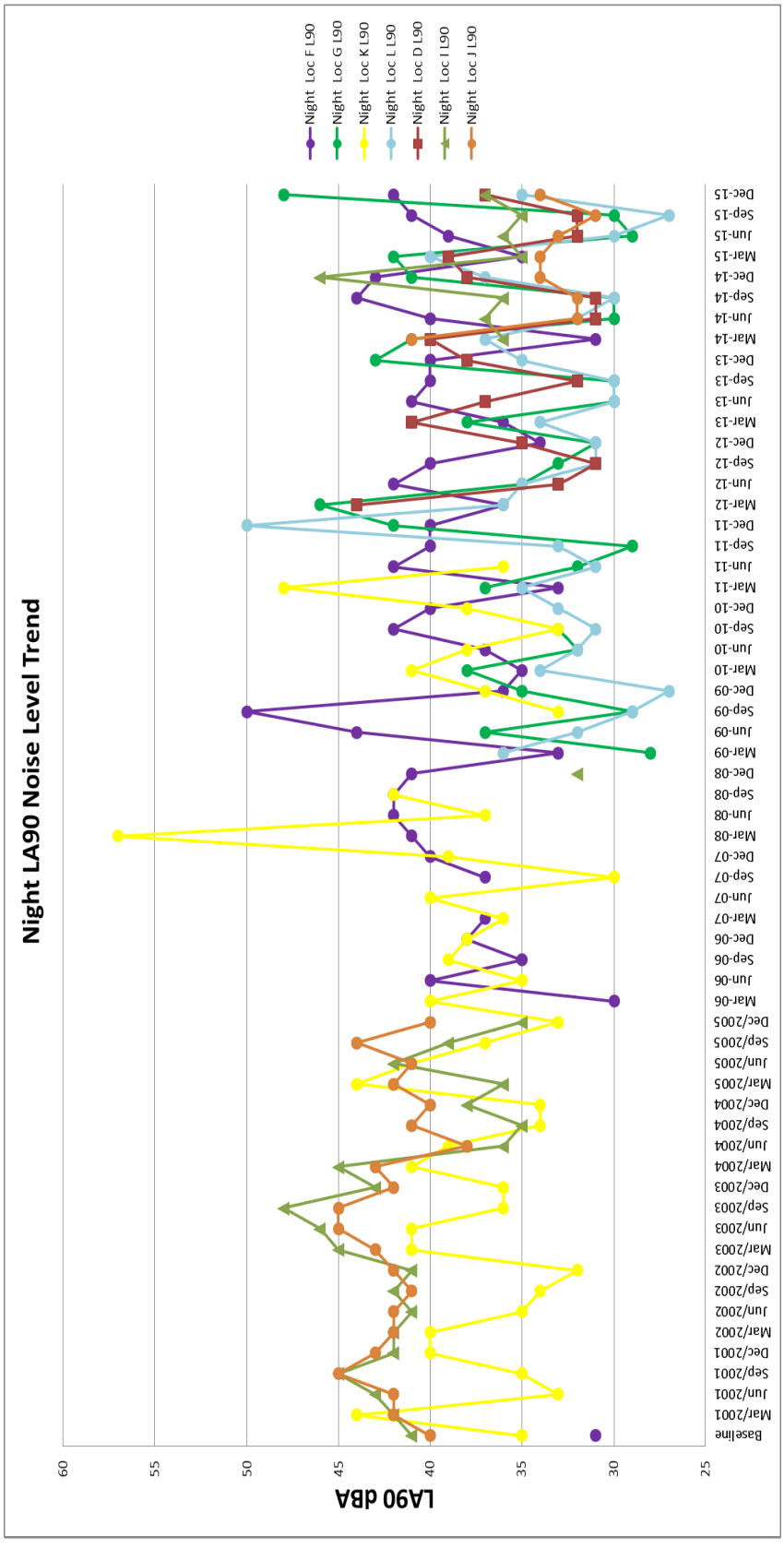


Figure 2 Long term Evening LA90 Noise Levels

Figure 3 Long term Night-time LA90 Noise Levels



Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the quarter ending December 2015 compared to the levels recorded during the baseline monitoring process (ie. Prior to commencement of mining operation at Donaldson).

Table 12 LA90 Results Comparison (quarter ending December 2015) – Baseline

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		Baseline	December 2015	
D Black Hill School, Black Hill	Day	N/A[1]	41	N/A[1]
	Evening	N/A[1]	40	N/A[1]
	Night	N/A[1]	37	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	39	47	8
	Evening	35	43	8
	Night	31	42	11
G 156 Buchanan Road, Buchanan	Day	N/A[1]	44	N/A[1]
	Evening	N/A[1]	44	N/A[1]
	Night	N/A[1]	48	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	48	42	-6
	Evening	33	40	7
	Night	41	37	-4
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	34	N/A[1]
	Evening	N/A[1]	37	N/A[1]
	Night	N/A[1]	35	N/A[1]
J 220 Parish Drive, Thornton	Day	39	43	4
	Evening	44	39	-5
	Night	40	34	-6

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday..

1. No data was available during baseline measurements, no comparisons can be made.

Previous Quarter (September 2015)

Table 13 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured in the previous monitoring period.

Table 13 LA90 Results Comparison – Previous Quarter (September 2015)

Monitoring Location	Period	Long term Night-time L_{A90} Noise Levels		Difference dB
		September 2015	December 2015	
D Black Hill School, Black Hill	Day	35	41	6
	Evening	45	40	-5
	Night	32	37	5
F Lot 684 Black Hill Road, Black Hill	Day	42	47	5
	Evening	48	43	-5
	Night	41	42	1
G 156 Buchanan Road, Buchanan	Day	35	44	9
	Evening	38	44	6
	Night	30	48	18
I 49 Magnetic Drive, Ashtonfield	Day	39	42	3
	Evening	45	40	-5
	Night	35	37	2
L 17 Kilshanny Ave, Ashtonfield	Day	31	34	3
	Evening	33	37	4
	Night	27	35	8
J 220 Parish Drive, Thornton	Day	38	43	5
	Evening	39	39	0
	Night	31	34	3

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.1.1 Coinciding Period Last Year (December 2014)

Table 14 presents the ambient LA90 noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 LA90 Results Comparison – Coinciding Period Last Year (December 2014)

Monitoring Location	Period	Long term Night-time LA90 Noise Levels		Difference dB
		December 2014	December 2015	
D Black Hill School, Black Hill	Day	39	41	2
	Evening	40	40	0
	Night	38	37	-1
F Lot 684 Black Hill Road, Black Hill	Day	47	47	0
	Evening	42	43	1
	Night	43	42	-1
G 156 Buchanan Road, Buchanan	Day	41	44	3
	Evening	39	44	5
	Night	41	48	7
I 49 Magnetic Drive, Ashtonfield	Day	42	42	0
	Evening	41	40	-1
	Night	46	37	-9
L 17 Kilshanny Ave, Ashtonfield	Day	36	34	-2
	Evening	37	37	0
	Night	37	35	-2
J 220 Parish Drive, Thornton	Day	44	43	-1
	Evening	40	39	-1
	Night	34	34	0

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time periods respectively.

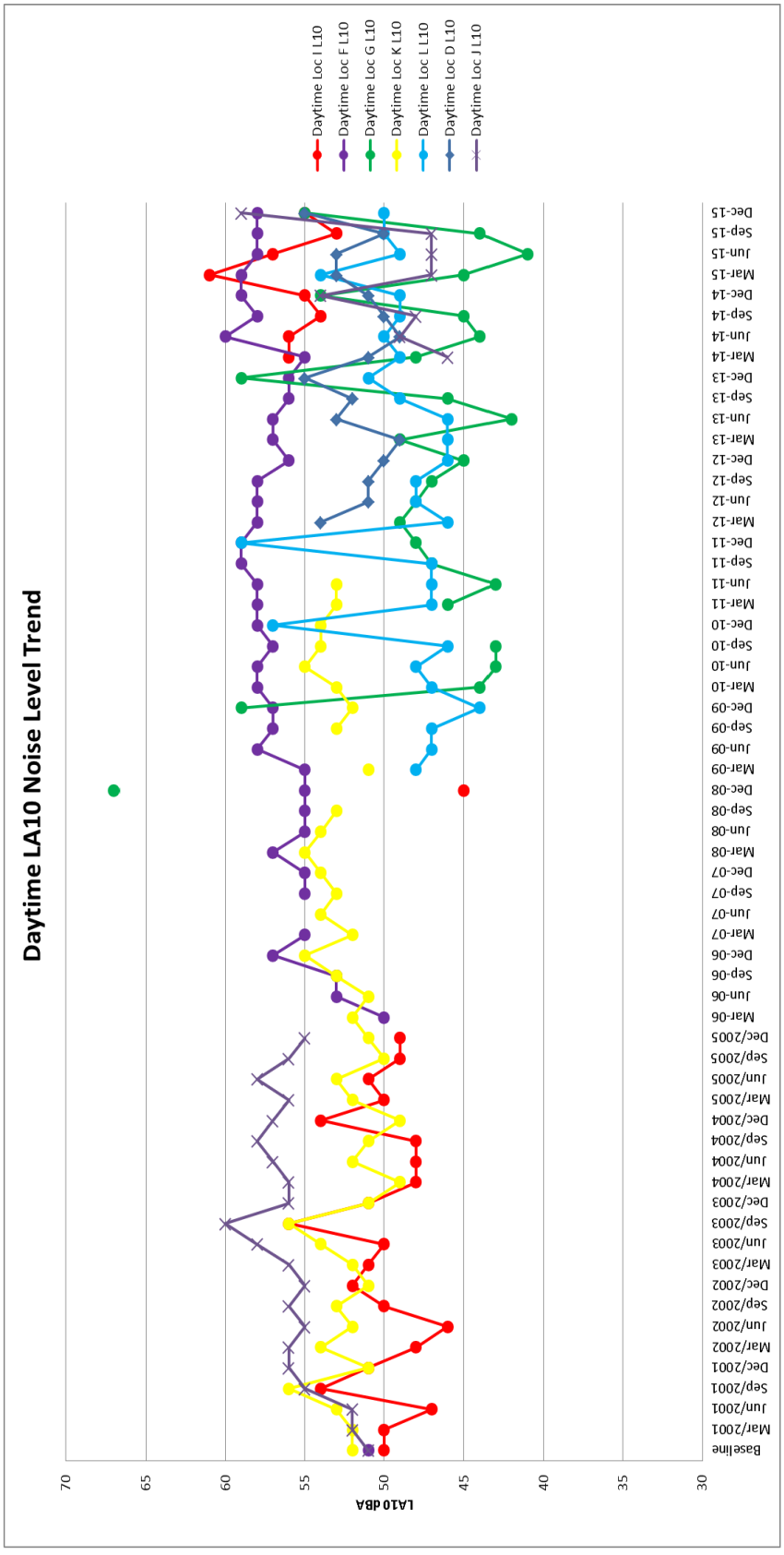


Figure 4 Long term Daytime LA10 Noise Levels

Donaldson Coal Pty Ltd

Quarter Ending December 2015

Figure 5 Long term Evening LA10 Noise Levels

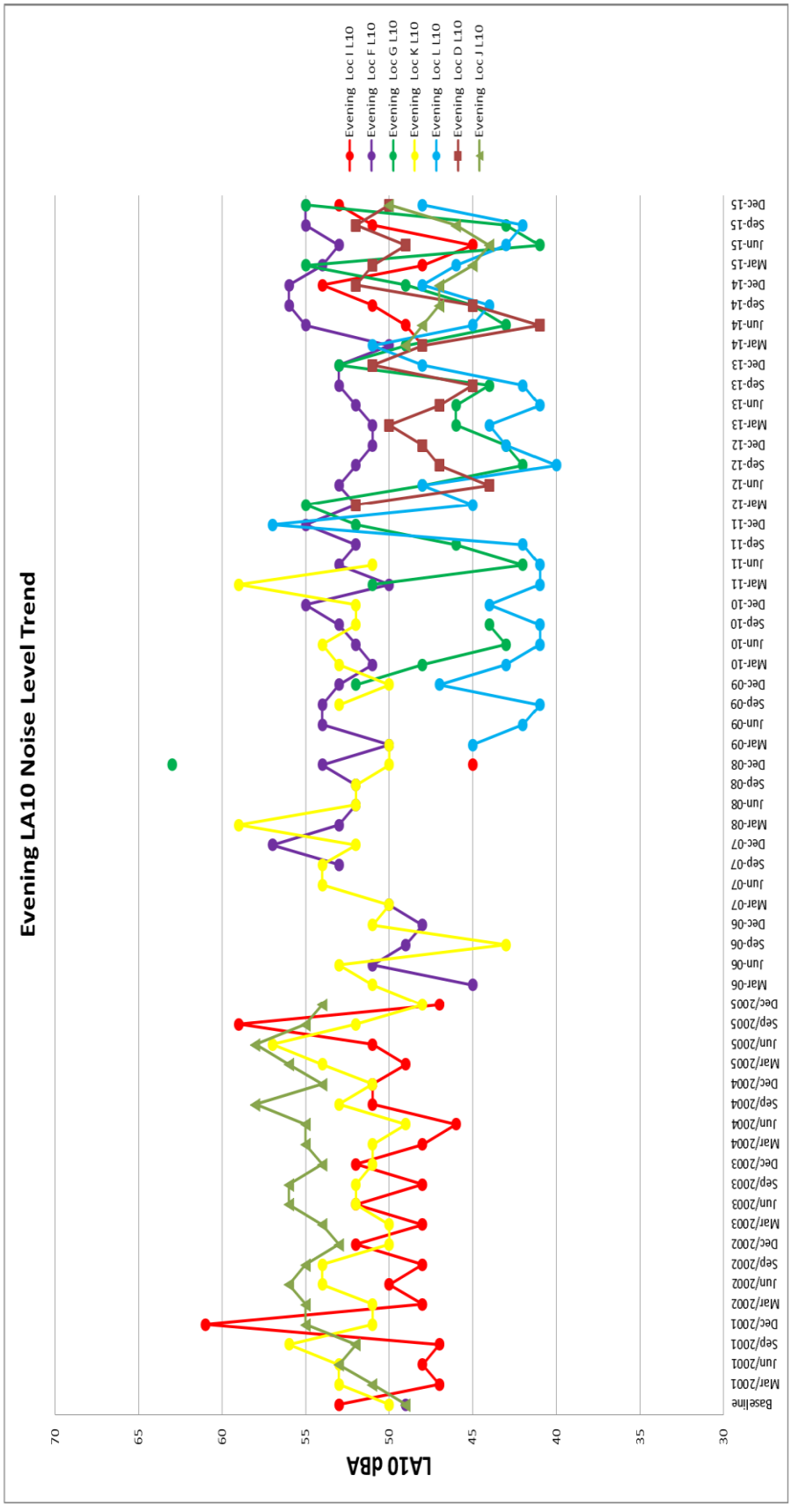


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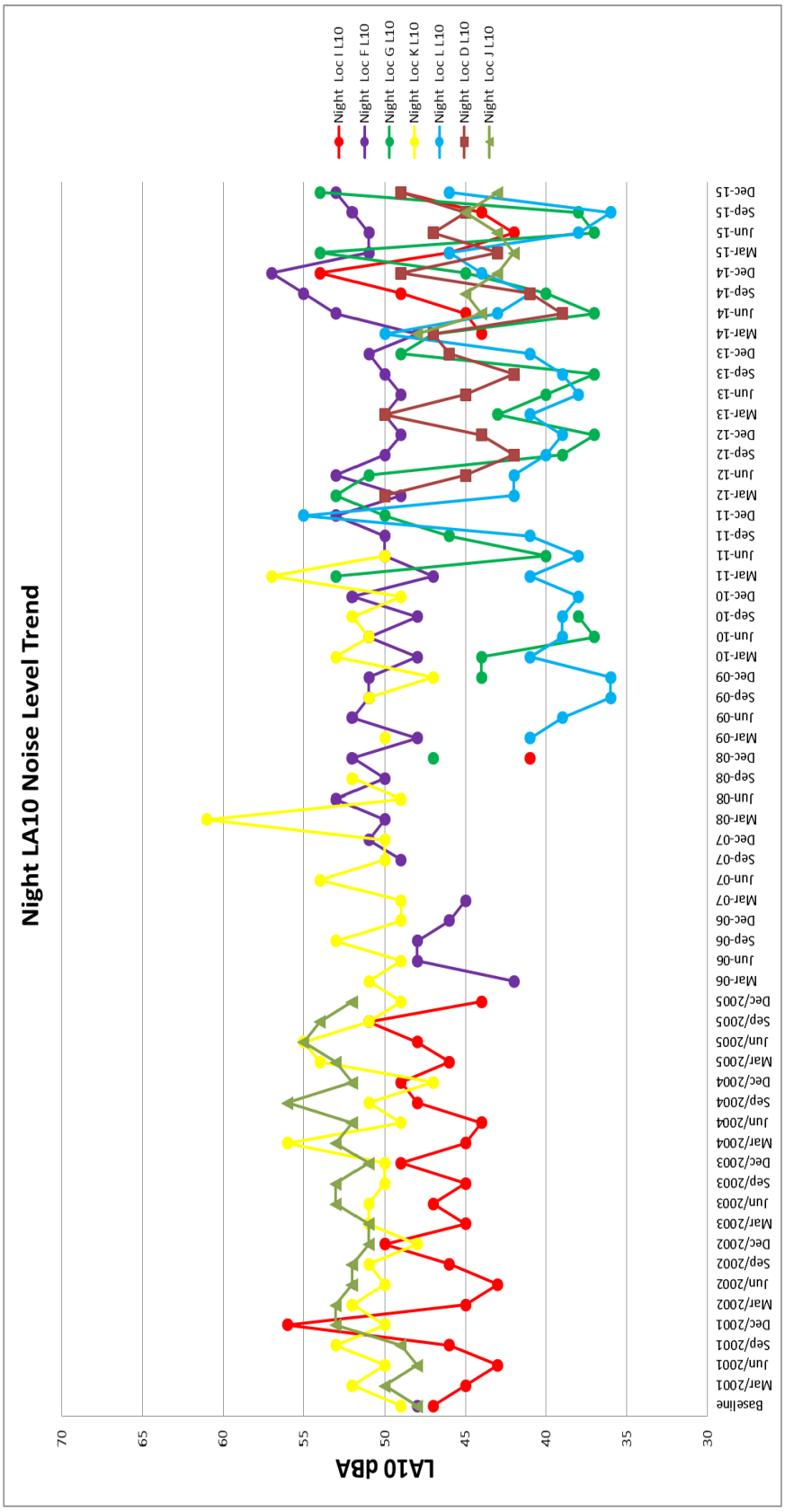
Figure 6 Long term Night-time LA10 Noise Levels



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Baseline

Table 15 presents the ambient LA10 noise levels recorded for the quarter ending December 2015 compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison (quarter ending December 2015) – Baseline

Monitoring Location	Period	Long term Night-time LA10 Noise Levels		Difference dB
		Baseline	December 2015	
D Black Hill School, Black Hill	Day	N/A[1]	55	N/A[1]
	Evening	N/A[1]	50	N/A[1]
	Night	N/A[1]	49	N/A[1]
F Lot 684 Black Hill Road, Black Hill	Day	51	58	7
	Evening	49	55	6
	Night	48	53	5
G 156 Buchanan Road, Buchanan	Day	N/A[1]	55	N/A[1]
	Evening	N/A[1]	55	N/A[1]
	Night	N/A[1]	54	N/A[1]
I 49 Magnetic Drive, Ashtonfield	Day	50	55	5
	Evening	53	53	0
	Night	47	49	2
L 17 Kilshanny Ave, Ashtonfield	Day	N/A[1]	50	N/A[1]
	Evening	N/A[1]	48	N/A[1]
	Night	N/A[1]	46	N/A[1]
J 220 Parish Drive, Thornton	Day	51	59	8
	Evening	49	50	1
	Night	48	43	-5

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

1. No data was available during baseline measurements, no comparisons can be made.

5.2.2.1 Previous Quarter (September 2015)

Table 16 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 LA10 Results Comparison – Previous Quarter (September 2015)

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		September 2015	December 2015	
D Black Hill School, Black Hill	Day	50	55	5
	Evening	52	50	-2
	Night	45	49	4
F Lot 684 Black Hill Road, Black Hill	Day	58	58	0
	Evening	55	55	0
	Night	52	53	1
G 156 Buchanan Road, Buchanan	Day	44	55	11
	Evening	43	55	12
	Night	38	54	16
I 49 Magnetic Drive, Ashtonfield	Day	53	55	2
	Evening	51	53	2
	Night	44	49	5
L 17 Kilshanny Ave, Ashtonfield	Day	50	50	0
	Evening	42	48	6
	Night	36	46	10
J 220 Parish Drive, Thornton	Day	47	59	12
	Evening	46	50	4
	Night	45	43	-2

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.2.2.2 Coinciding Period Last Year (December 2014)

Table 17 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 LA10 Results Comparison – Coinciding Period Last Year (December 2014)

Monitoring Location	Period	Long term Night-time L_{A10} Noise Levels		Difference dB
		December 2014	December 2015	
D Black Hill School, Black Hill	Day	51	55	4
	Evening	52	50	-2
	Night	49	49	0
F Lot 684 Black Hill Road, Black Hill	Day	59	58	-1
	Evening	56	55	-1
	Night	57	53	-4
G 156 Buchanan Road, Buchanan	Day	54	55	1
	Evening	49	55	6
	Night	45	54	9
I 49 Magnetic Drive, Ashtonfield	Day	55	55	0
	Evening	54	53	-1
	Night	54	49	-5
L 17 Kilshanny Ave, Ashtonfield	Day	49	50	1
	Evening	48	48	0
	Night	44	46	2
J 220 Parish Drive, Thornton	Day	54	59	5
	Evening	47	50	3
	Night	43	43	0

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

5.3 Rail Noise Impact

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**. Only twelve (12) trains were recorded to have passed the monitoring location J during the monitoring period.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
10/12/2015	16:15pm to 19:00pm	Day/evening
11/12/2015	16:55pm to 20:20pm	Day/evening
12/12/2015	06:20am to 09:30am	Day/night
12/12/2015	14:14pm to 17:10pm	Day
13/12/2015	09.00am to 11:34am	Day
13/12/2015	12:15pm to 15:05pm	Day
14/12/2015	05:00am to 09:40am	Night/Day
14/12/2015	13:45pm to 17:10pm	Day
15/12/2015	12:58pm to 18:05pm	Day/evening
16/12/2015	06:43am to 10:43am	Night/day
18/12/2015	11:35am to 15:30pm	Day
18/12/2015	18:55pm to 21:15pm	Evening

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19**.

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(Period)}$	Criteria $L_{Aeq(Period)}$	Compliance
Location J	10/12/2015	Day	48	55	Yes
	11/12/2015		45		Yes
	12/12/2015		49		Yes
	13/12/2015		49		Yes
	14/12/2015		52		Yes
	15/12/2015		49		Yes
	16/12/2015		46		Yes
	18/12/2015		45		Yes
	10/12/2015	Evening	44	45	Yes
	11/12/2015		40		Yes
	15/12/2015		41		Yes
	18/12/2015		44		Yes
	12/12/2015	Night	39	40	Yes
	14/12/2015		33		Yes
	16/12/2015		31		Yes

Note: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

The results contained in **Table 19** show that compliance with the rail noise criteria was achieved during the December 2015 Quarter.

6 CONCLUSION

SLR was engaged by Donaldson Coal Pty Ltd to conduct quarterly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the Abel Coal Mine Noise Monitoring Program, dated 27 May 2007.

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

The results of the operator-attended noise measurements conducted at six (6) focus locations surrounding the mine site are included in **Table 2** to **Table 7**.

Abel portal operations were not observed to be audible at any other locations during the monitoring period. Contributed noise levels from Abel Mine did not exceed noise emission goals (including night-time sleep arousal criteria) and were in compliance with the Abel Mine *Project Approval* at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (December 2015), the baseline monitoring period, the last monitoring period (September 2015), and the coinciding monitoring period from last year (December 2014) has been conducted.

An assessment of the rail noise impact was also undertaken, determining compliance with the criteria stated in **Section 2.2**.

Appendix A

Acoustic Terminology
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1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

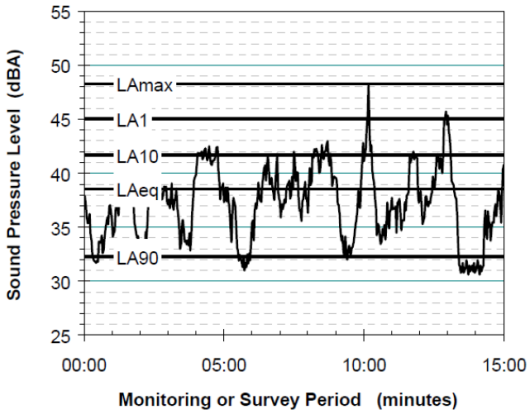
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 1E-12 W.
The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

Appendix A

Acoustic Terminology
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7 Frequency Analysis

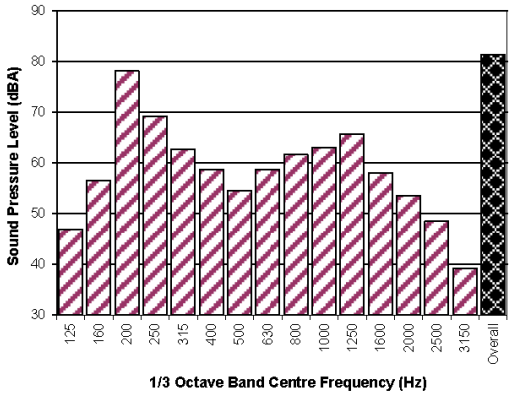
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

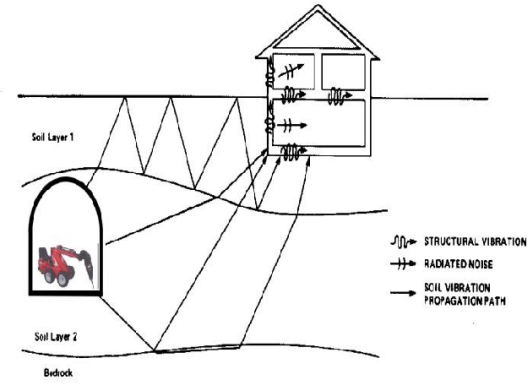
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

Appendix B
Noise Monitoring Location Map
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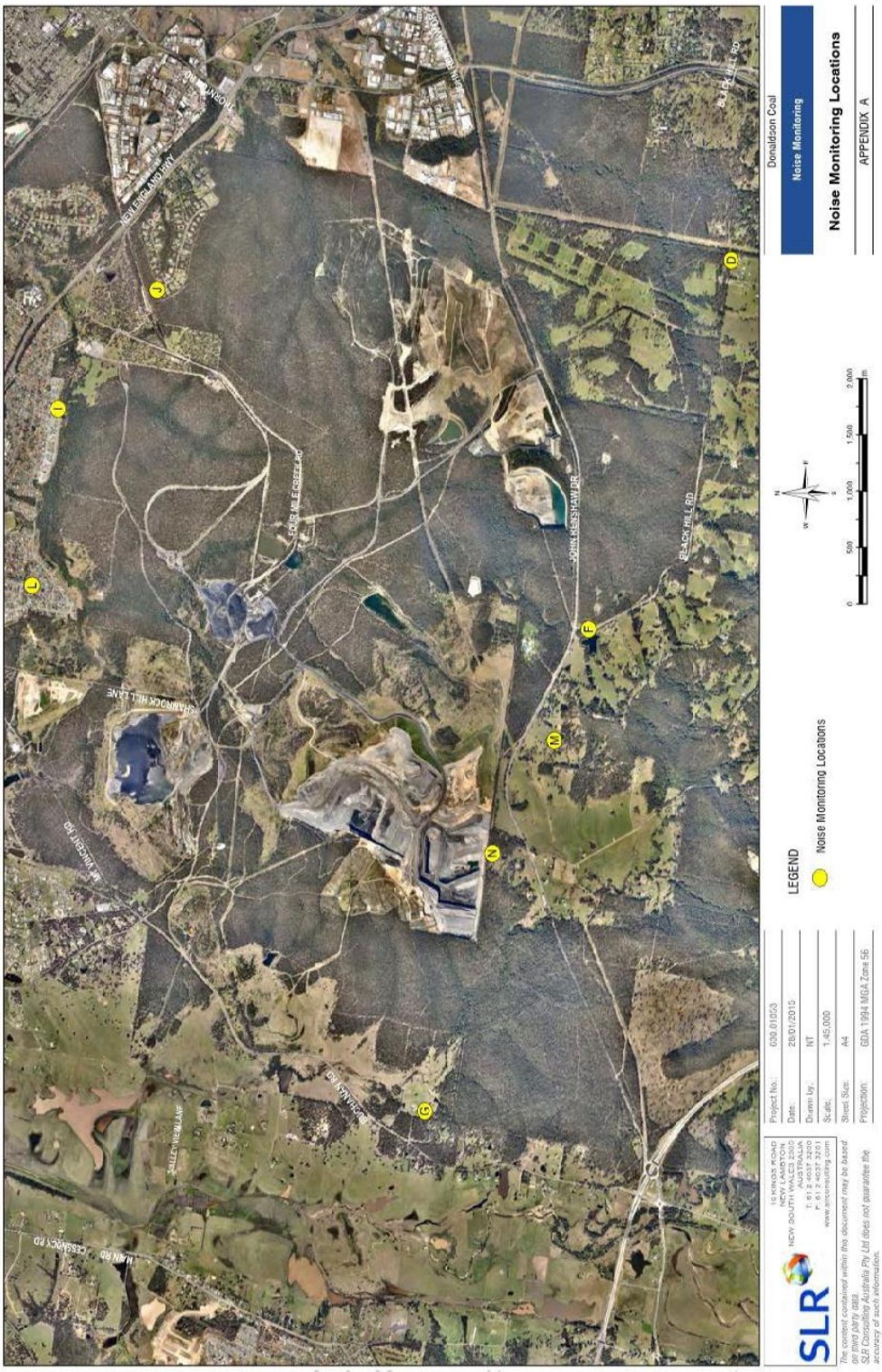

SLR Consulting Australia Pty Ltd

Appendix C1

Statistical Ambient Noise Levels – Location D
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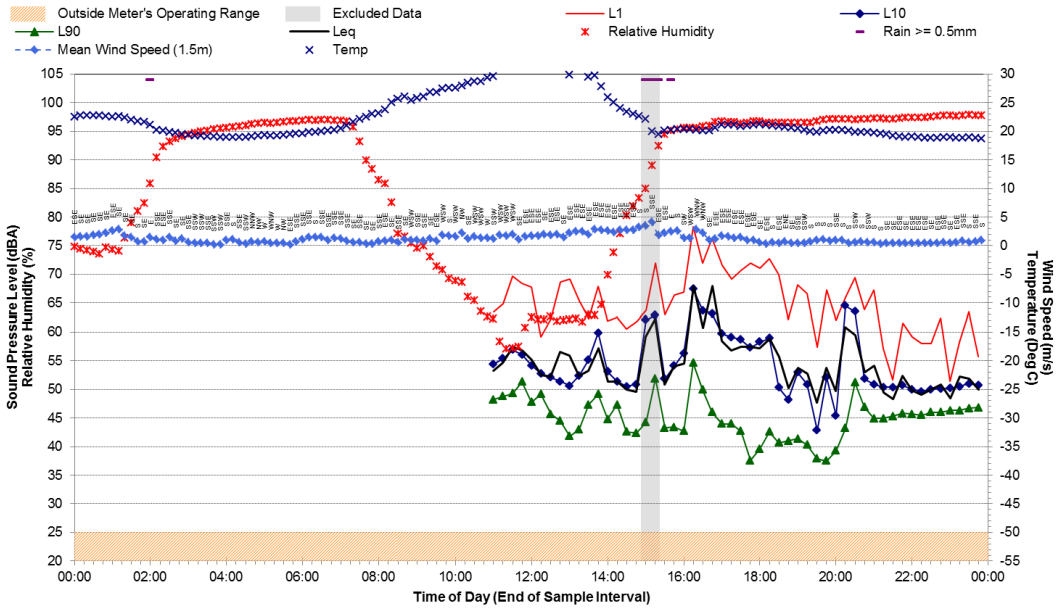
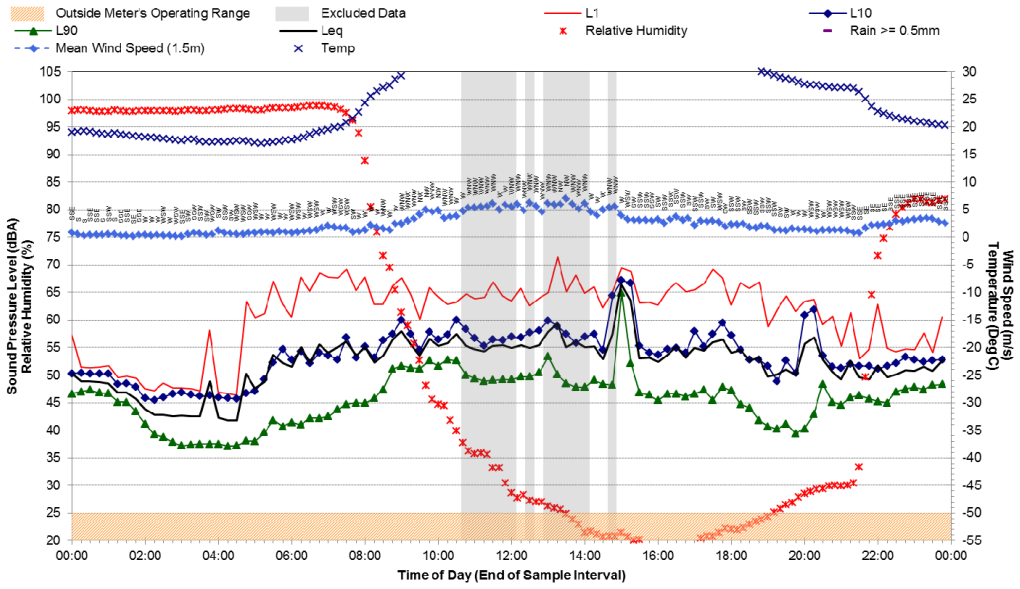
Statistical Ambient Noise Levels

Location D - Thursday, 10 December 2015



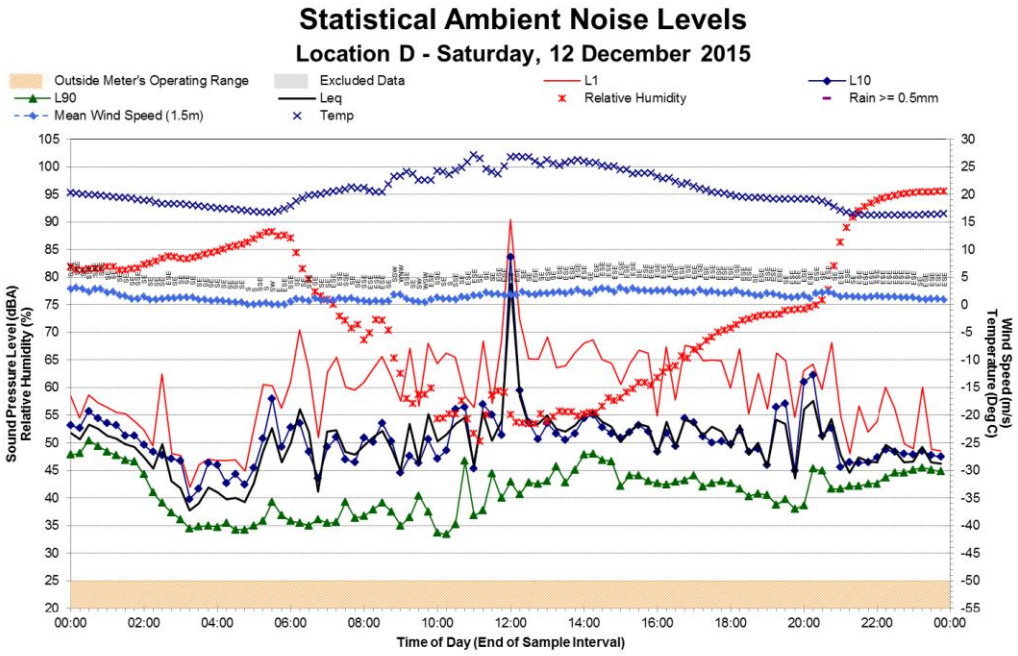
Statistical Ambient Noise Levels

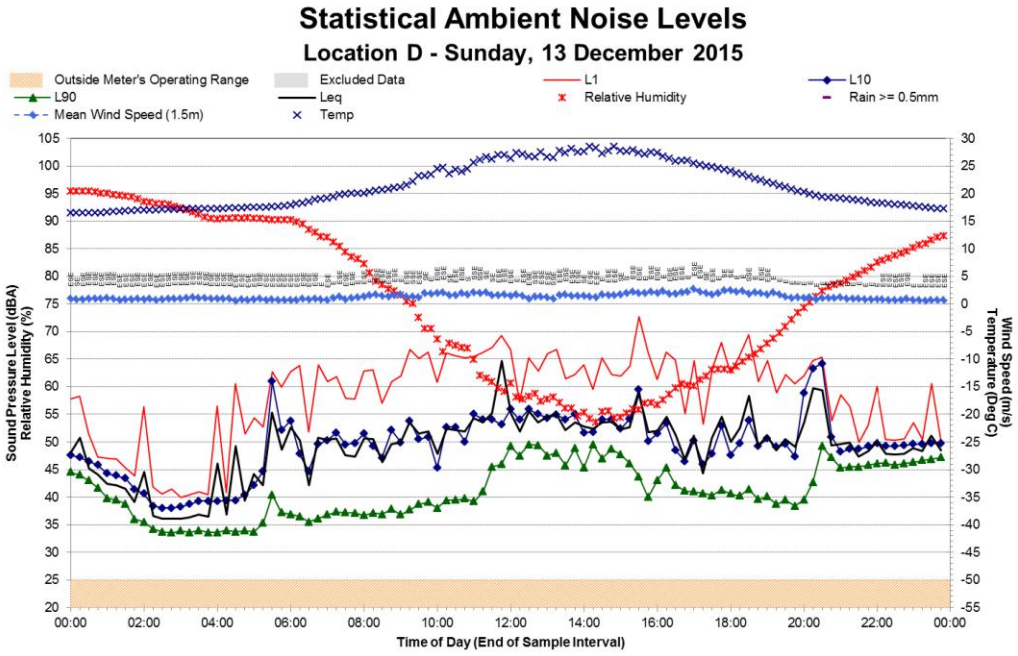
Location D - Friday, 11 December 2015



Appendix C1

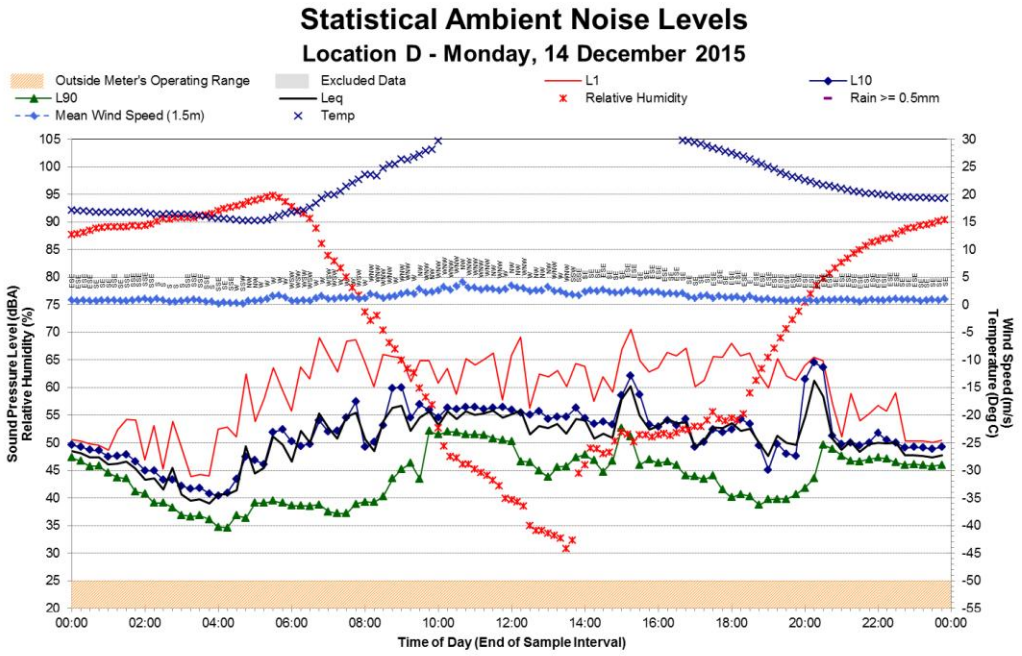
Statistical Ambient Noise Levels – Location D
Report Q60 630.01053

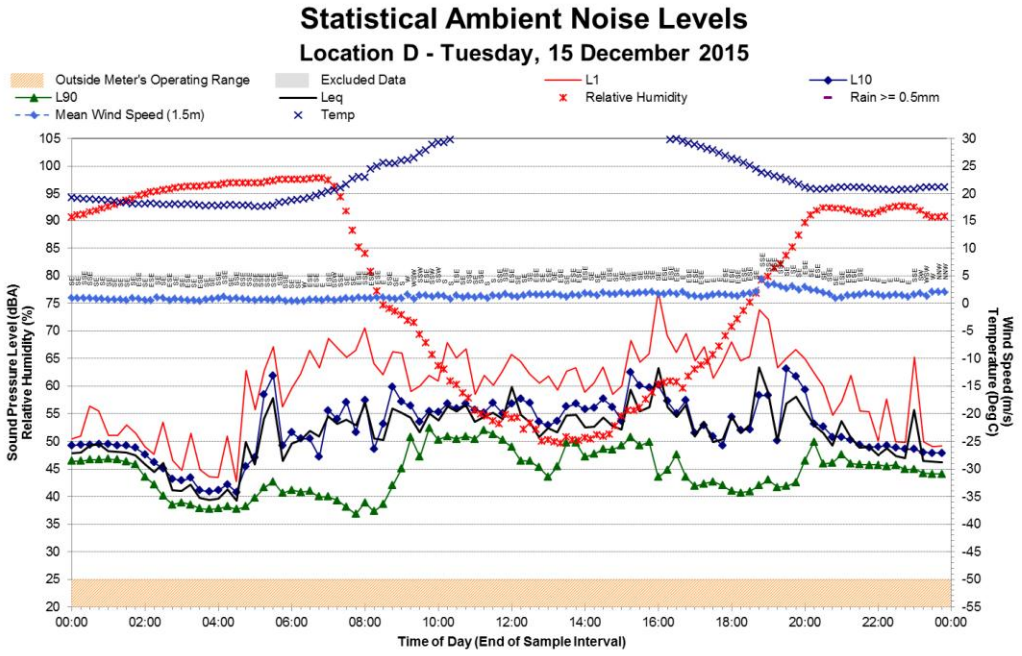




Appendix C1

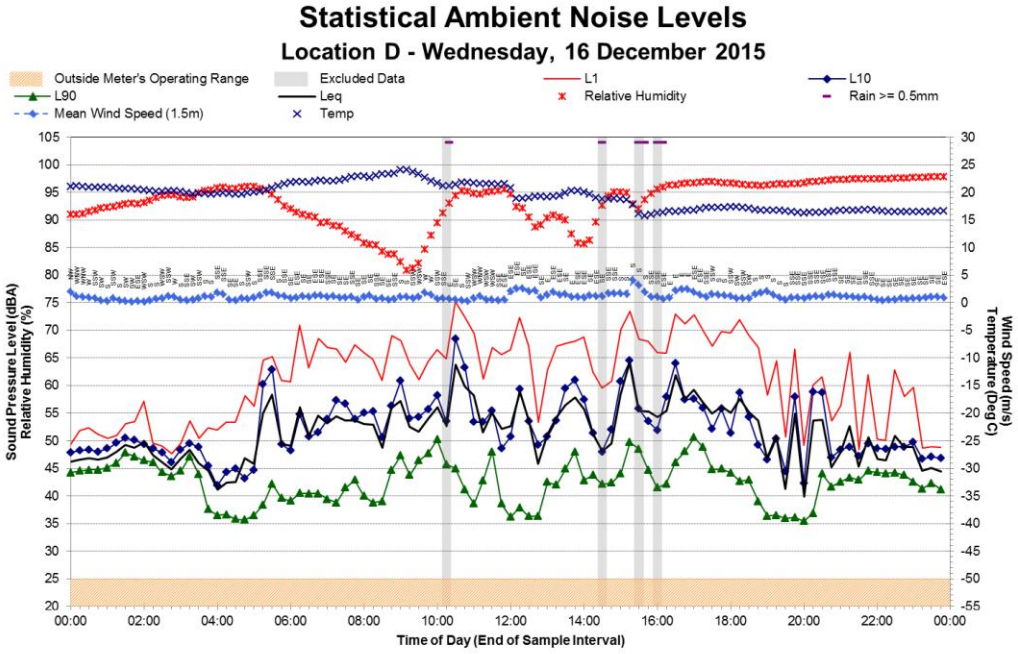
Statistical Ambient Noise Levels – Location D
Report Q60 630.01053

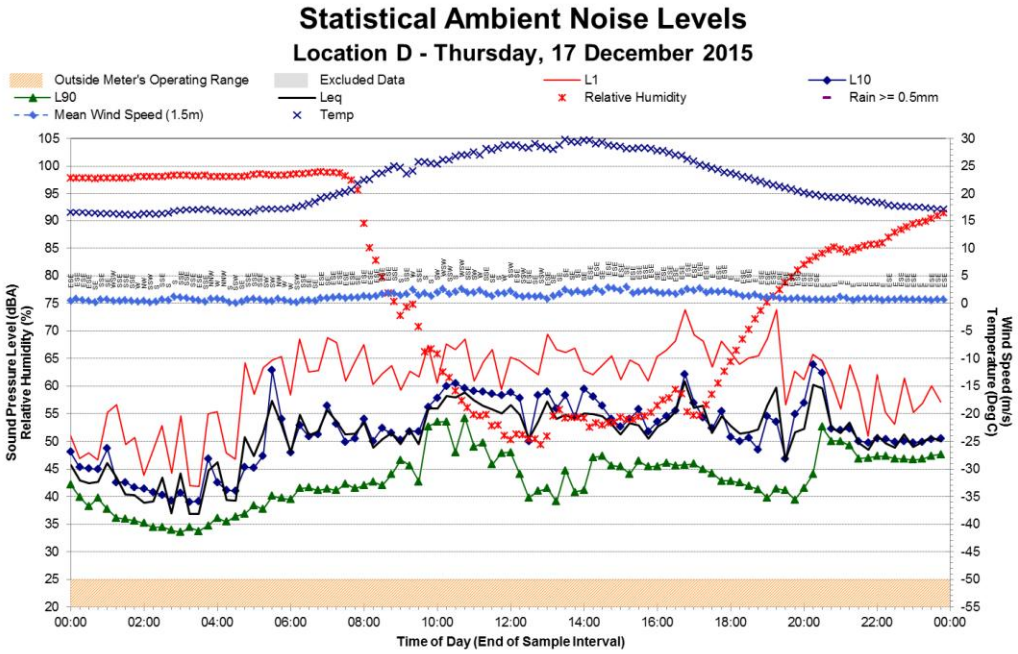




Appendix C1

Statistical Ambient Noise Levels – Location D
Report Q60 630.01053





Appendix C1

Statistical Ambient Noise Levels – Location D
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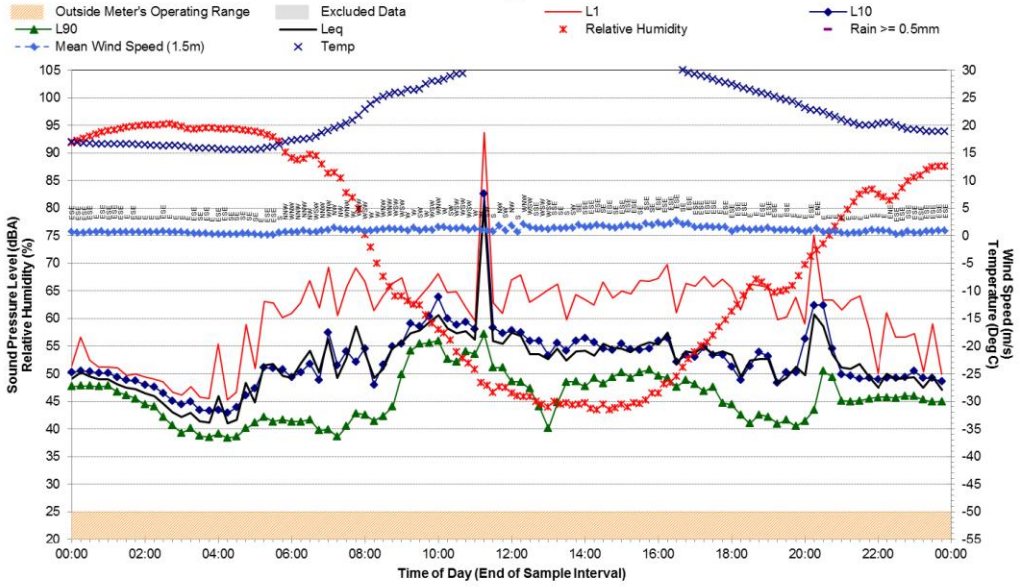
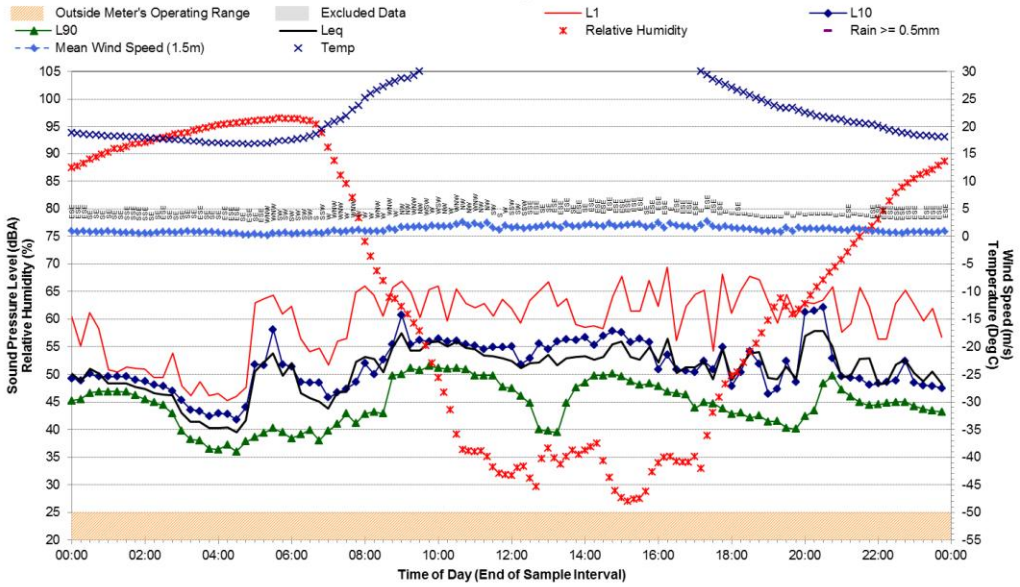
Statistical Ambient Noise Levels
Location D - Friday, 18 December 2015

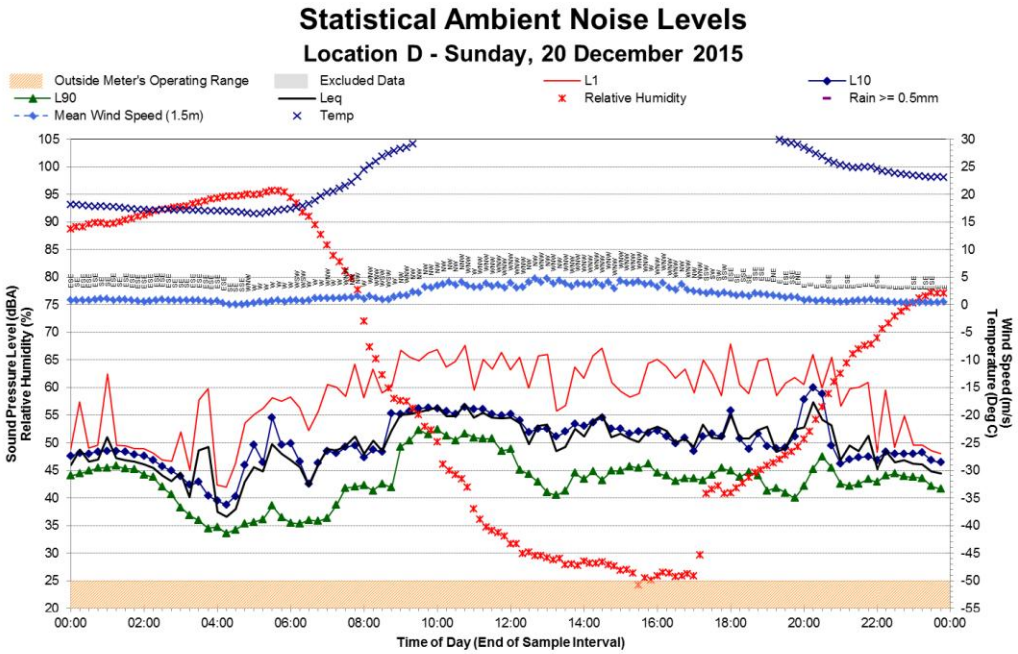


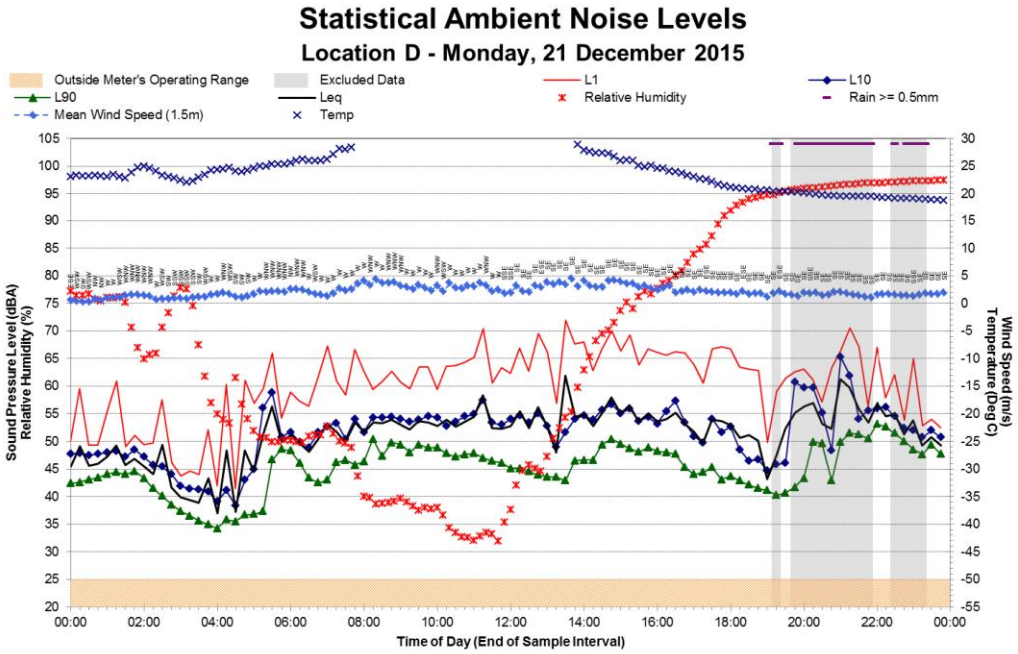
Statistical Ambient Noise Levels
Location D - Saturday, 19 December 2015



Appendix C1

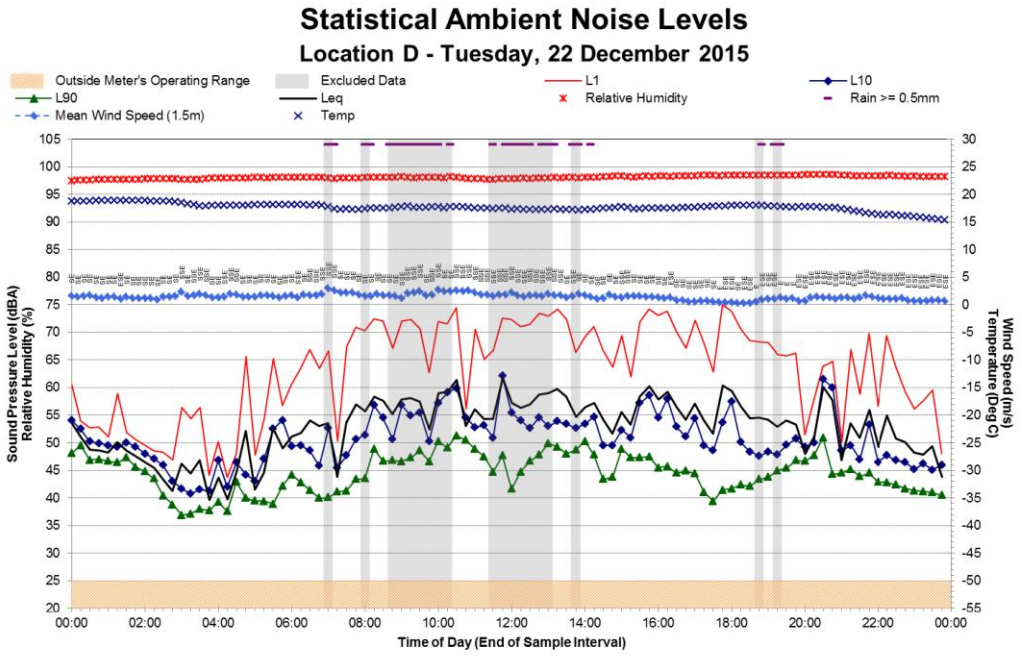
Statistical Ambient Noise Levels – Location D
Report Q60 630.01053

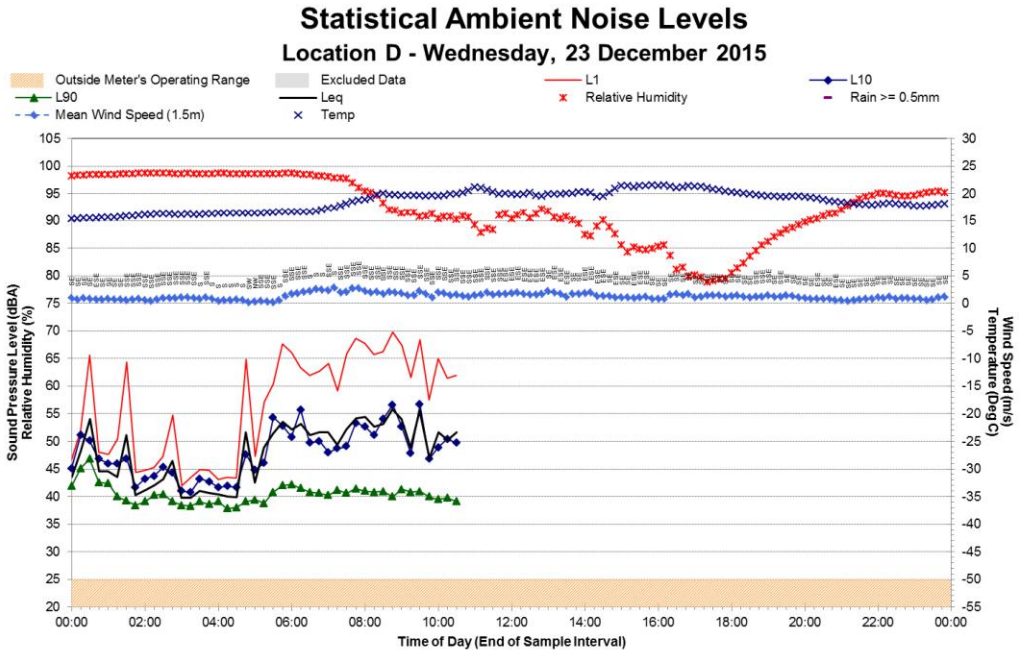




Appendix C1

Statistical Ambient Noise Levels – Location D
Report Q60 630.01053





Appendix C2

Statistical Ambient Noise Levels – Location F
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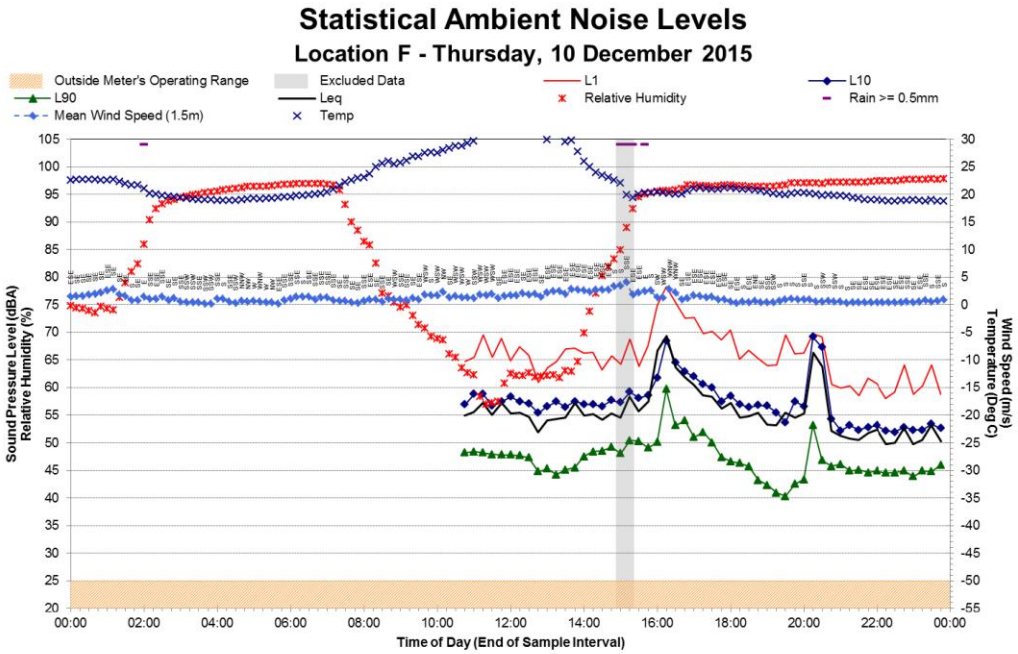

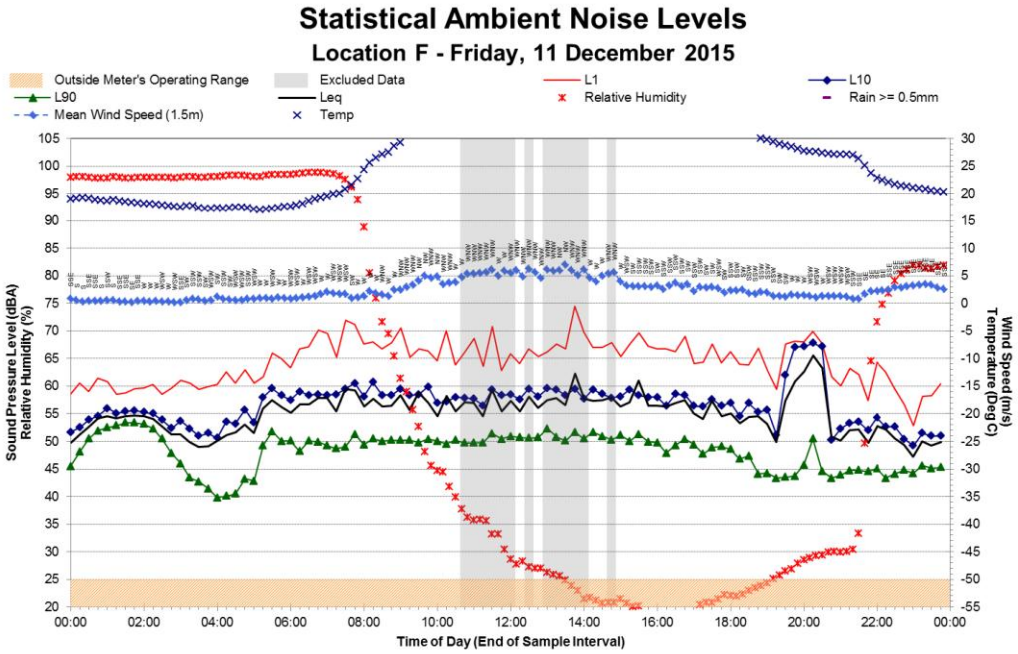

Appendix C2

Statistical Ambient Noise Levels – Location F
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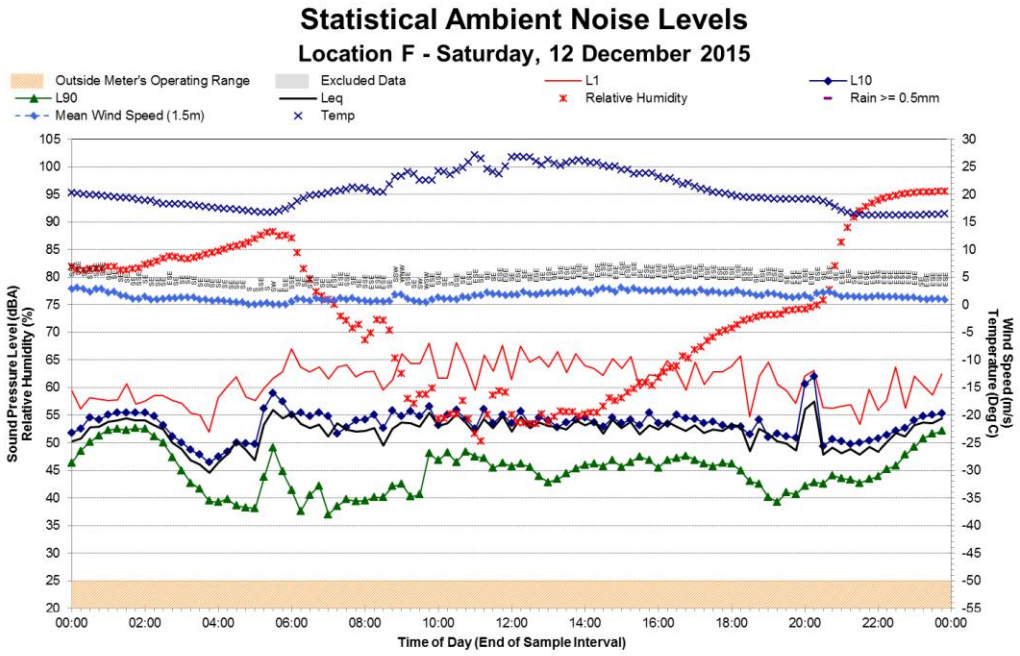
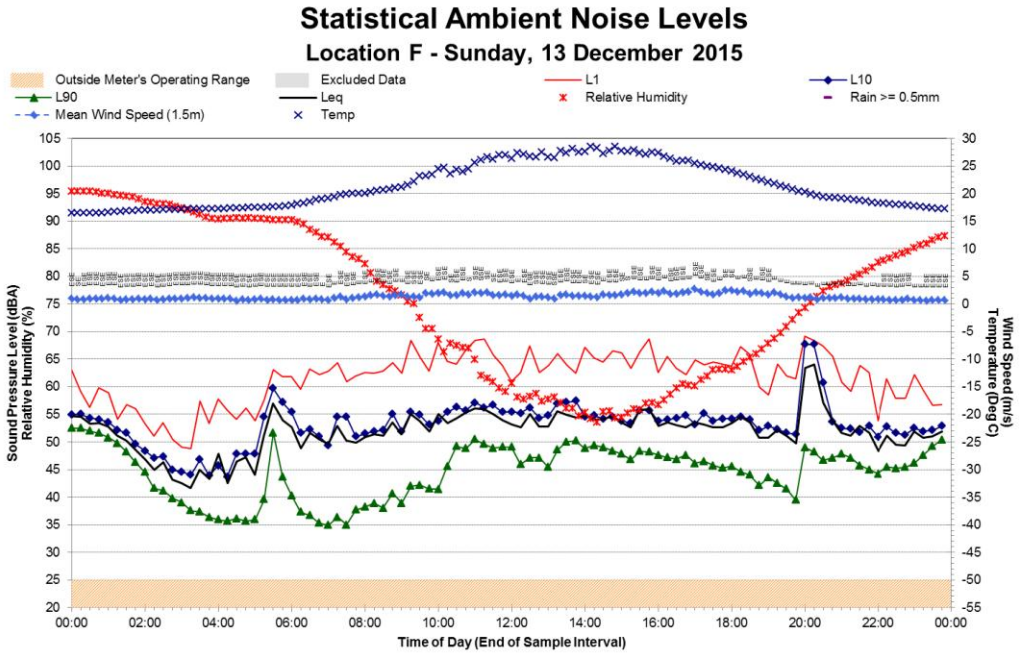
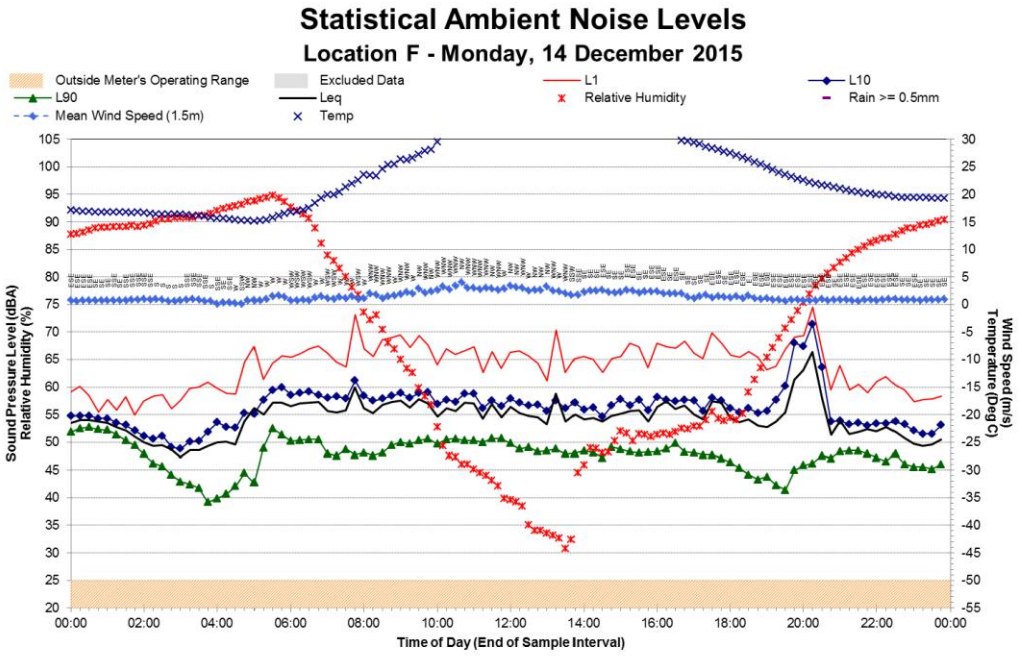
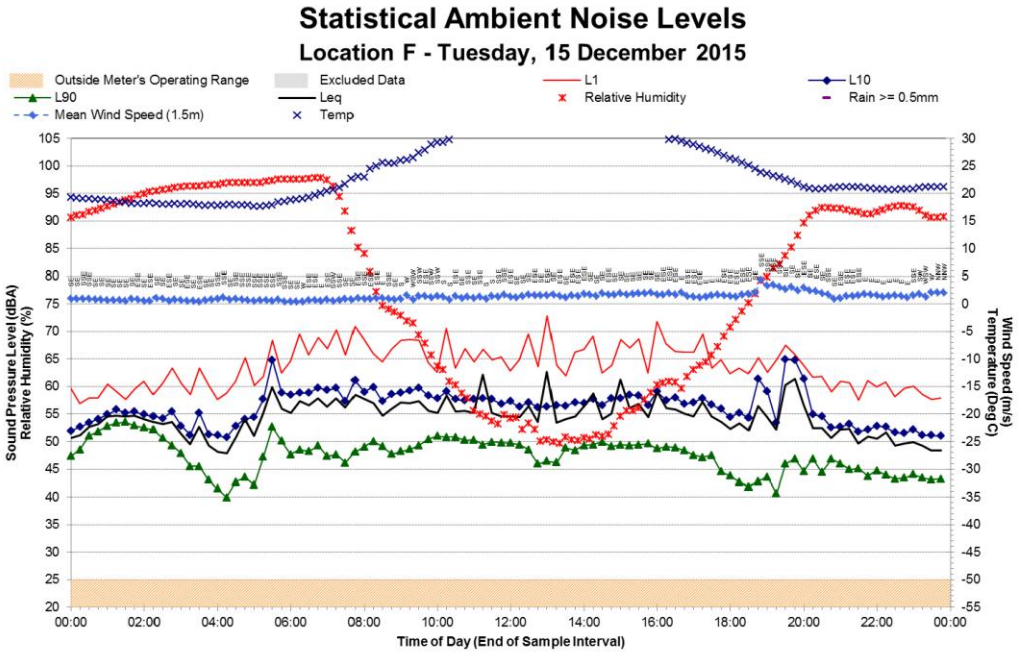




Appendix C2

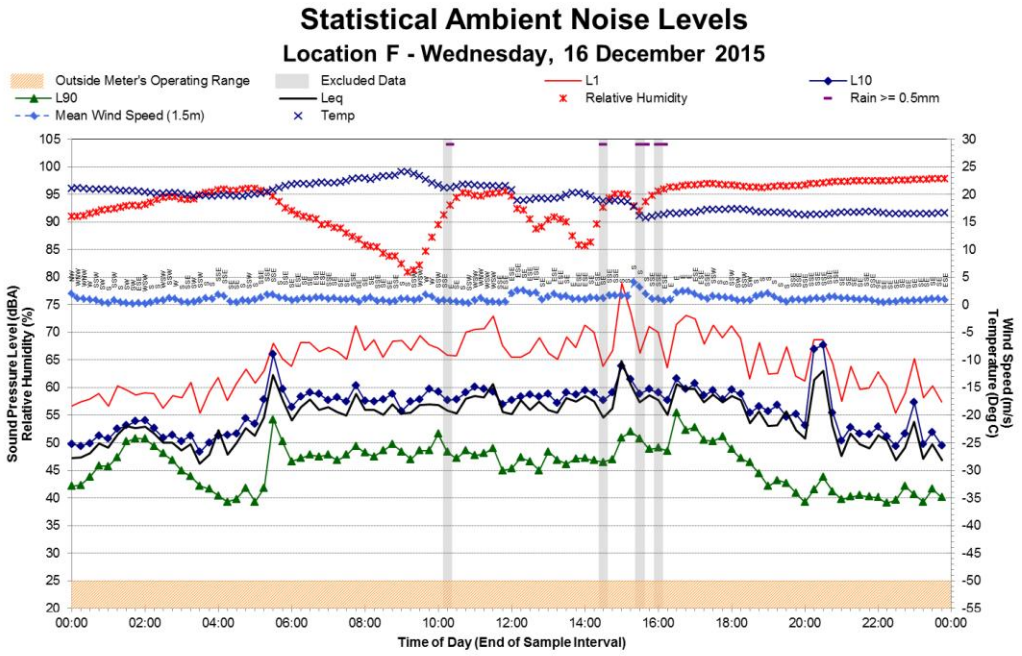
Statistical Ambient Noise Levels – Location F
Report Q60 630.01053

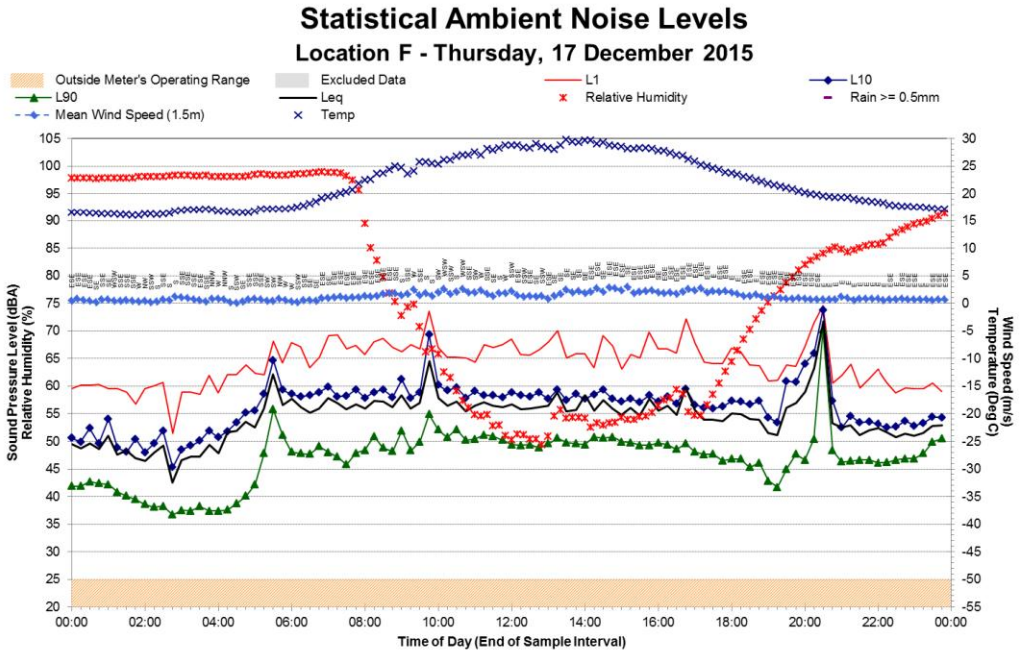




Appendix C2

Statistical Ambient Noise Levels – Location F
Report Q60 630.01053





Appendix C2

Statistical Ambient Noise Levels – Location F
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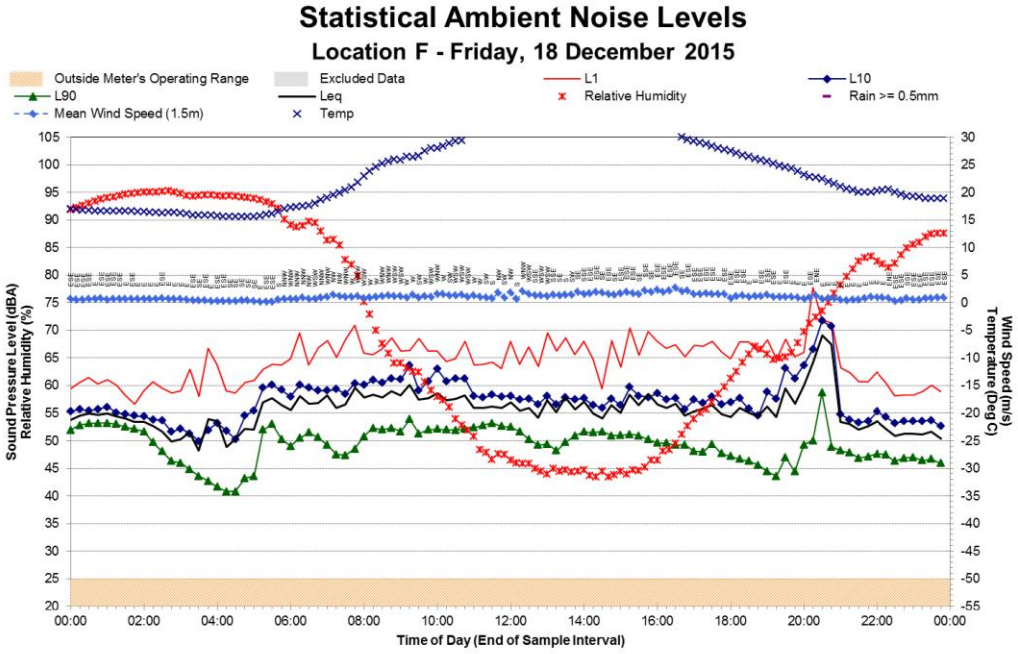

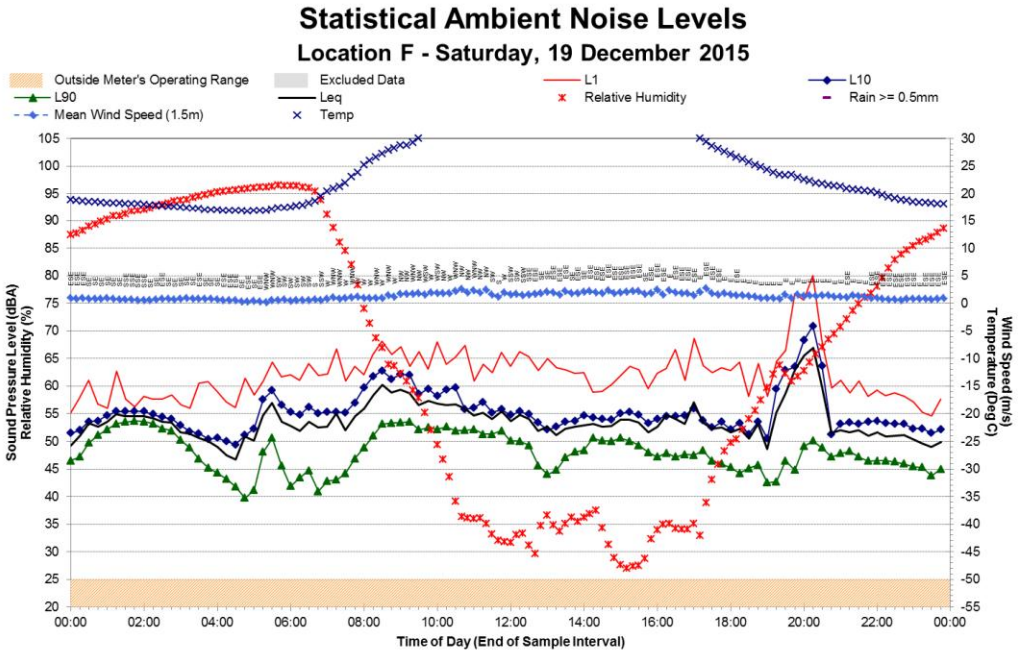

Appendix C2

Statistical Ambient Noise Levels – Location F
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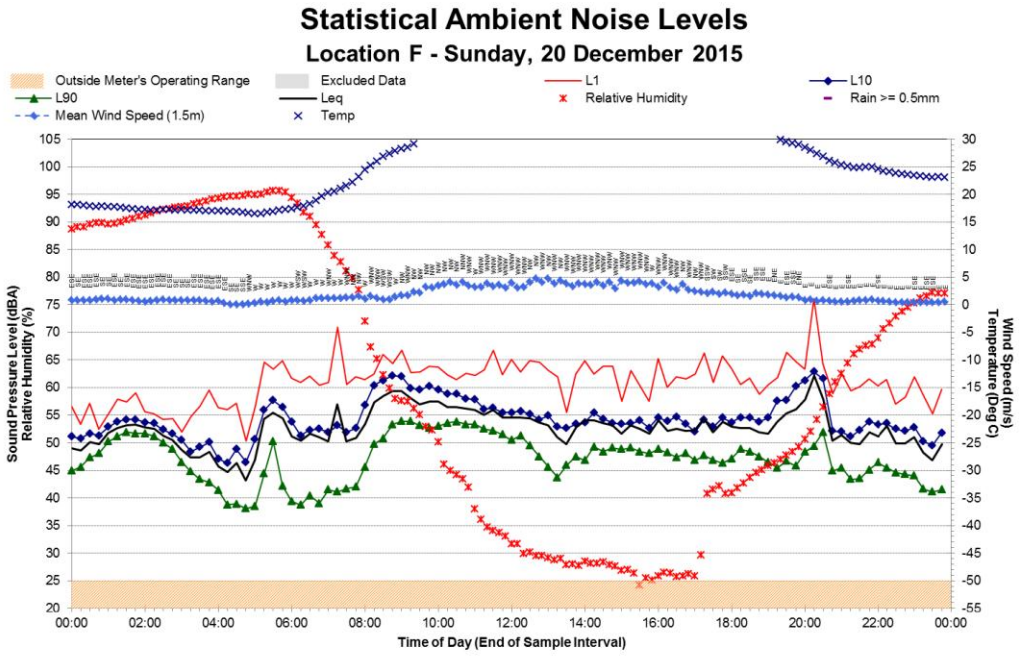

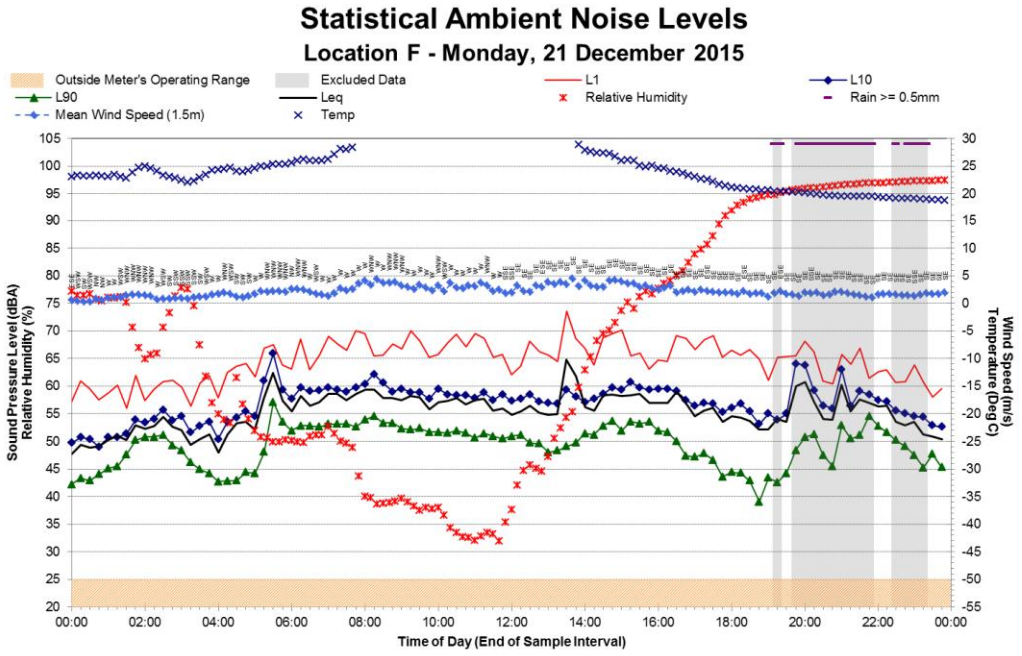

Appendix C2

Statistical Ambient Noise Levels – Location F
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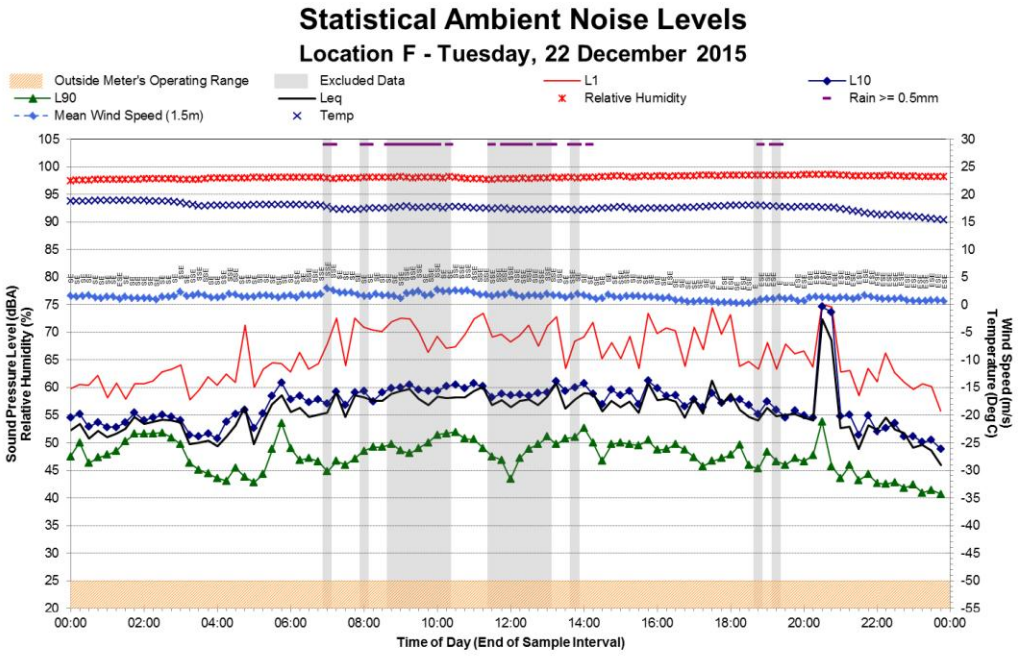

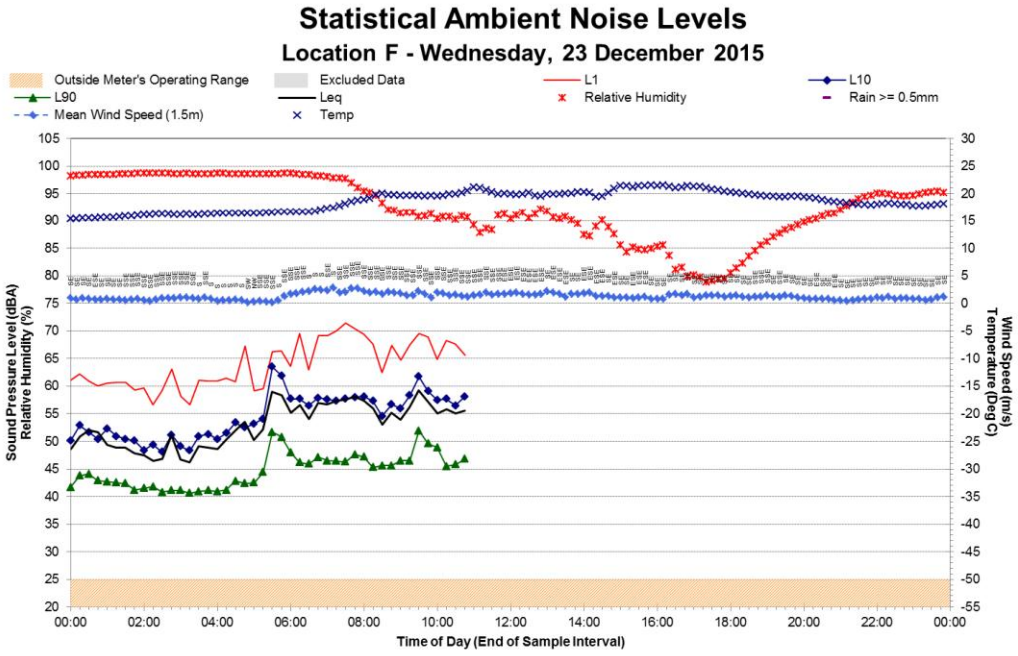

Appendix C3

Statistical Ambient Noise Levels – Location G
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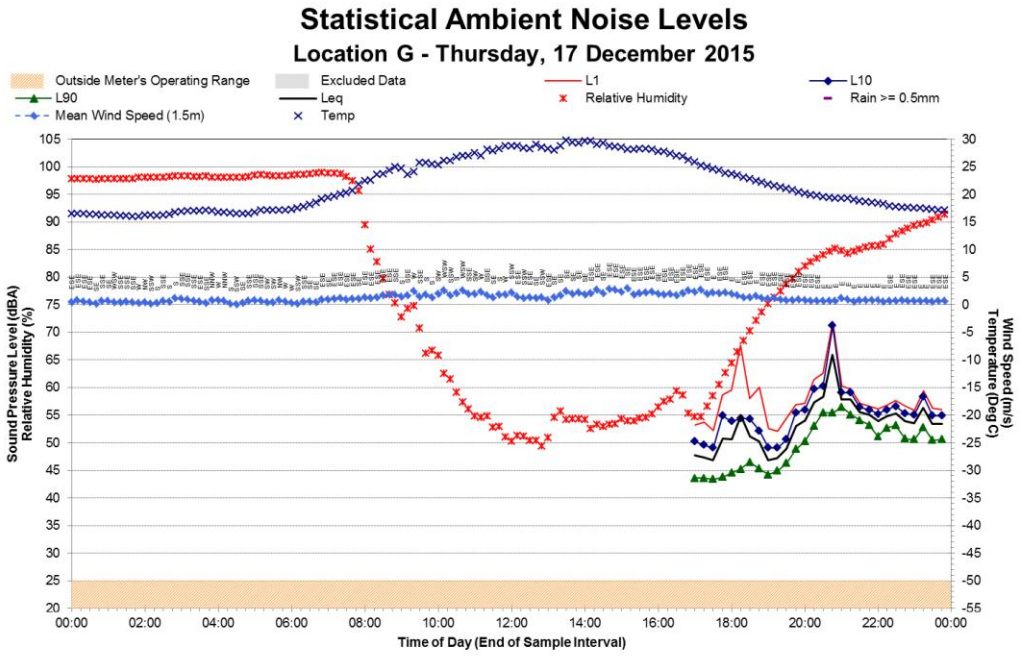

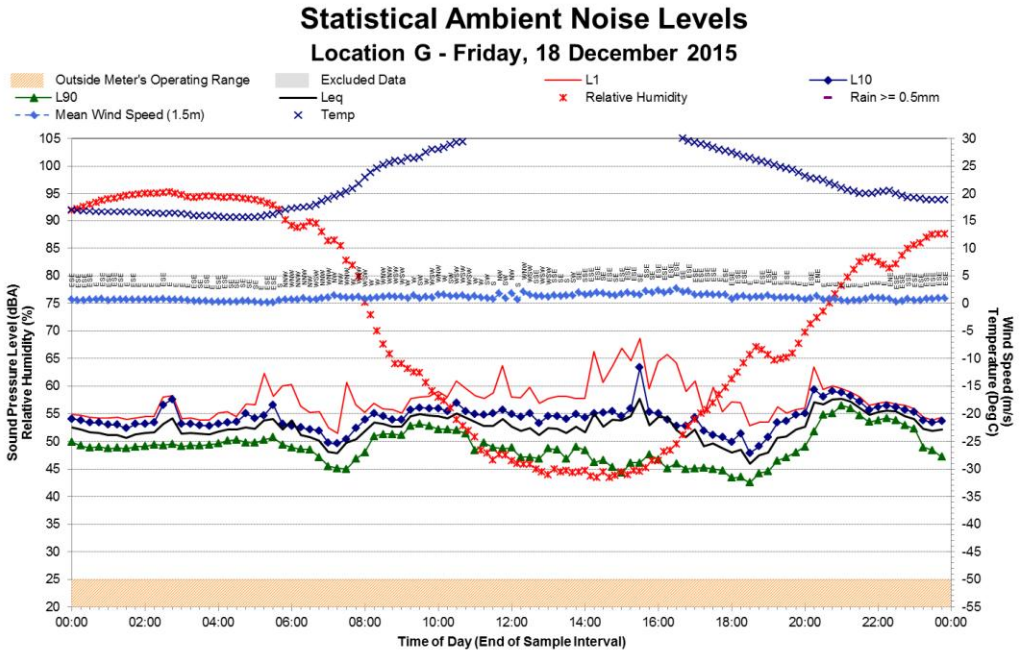

Appendix C3

Statistical Ambient Noise Levels – Location G
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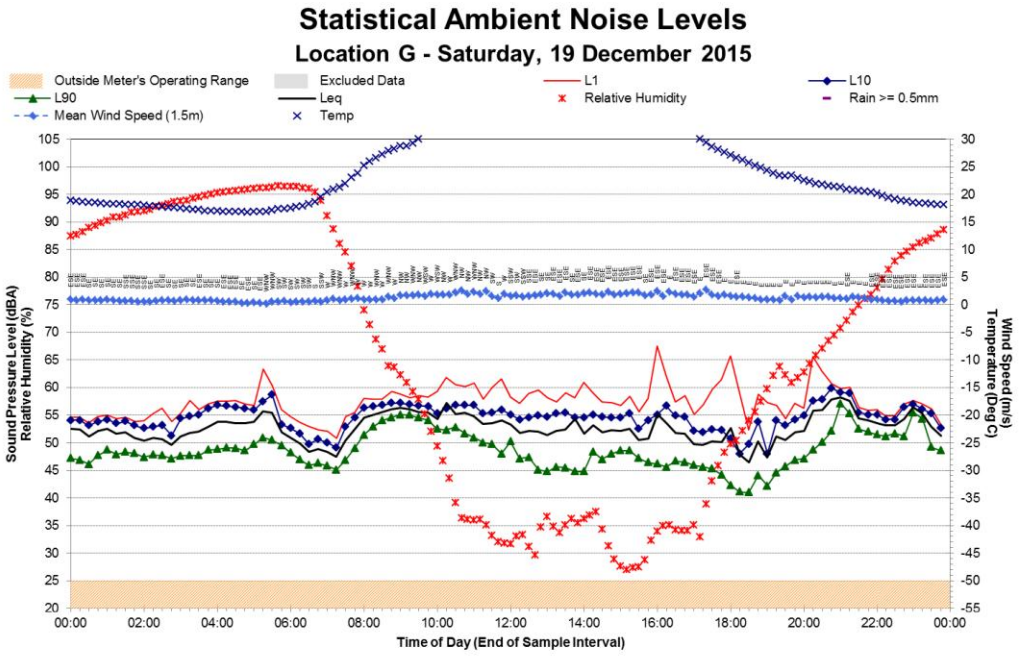

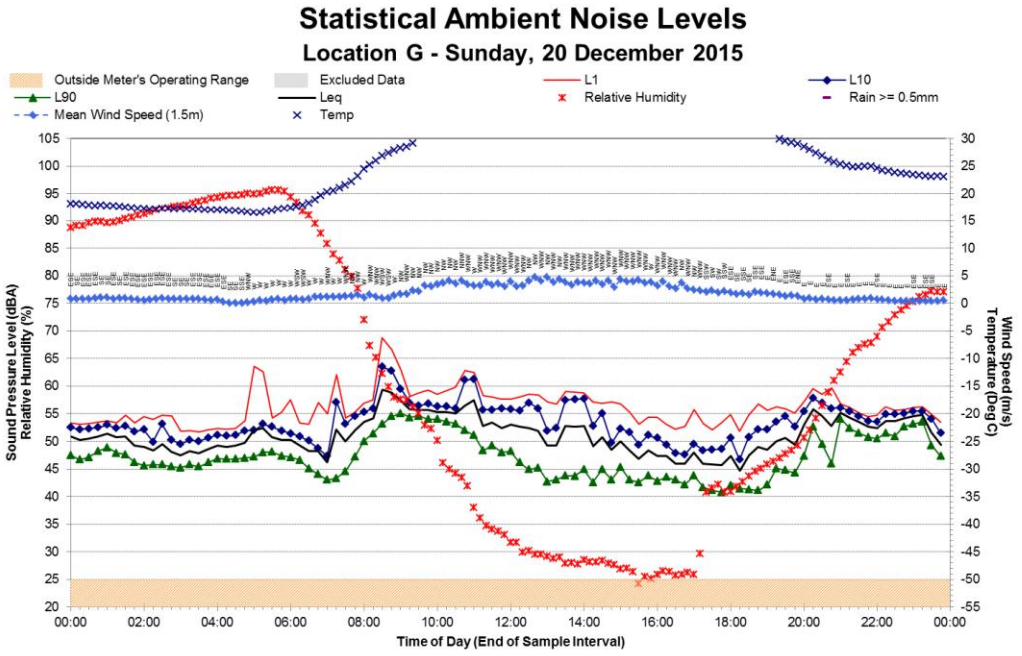

Appendix C3

Statistical Ambient Noise Levels – Location G
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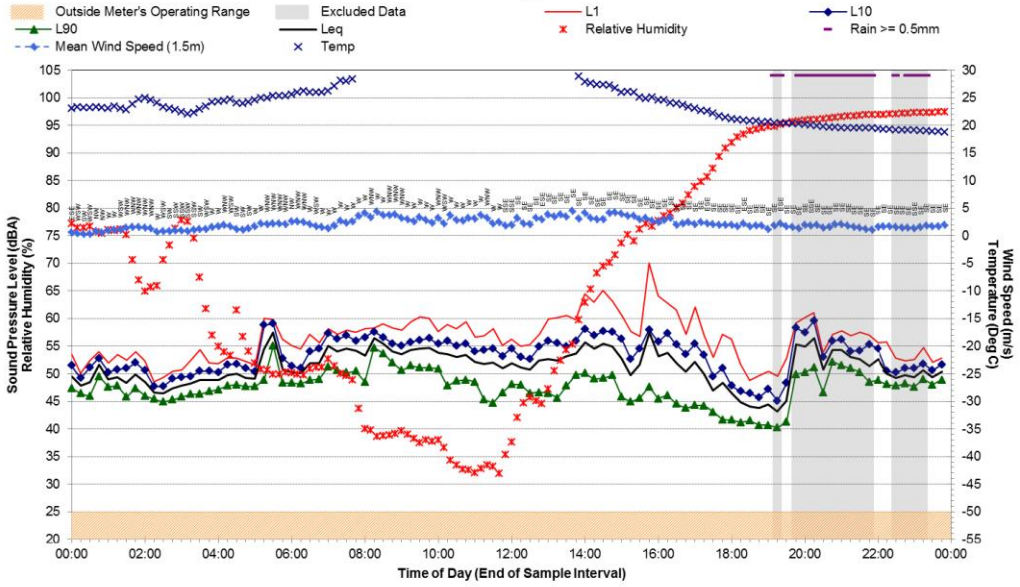
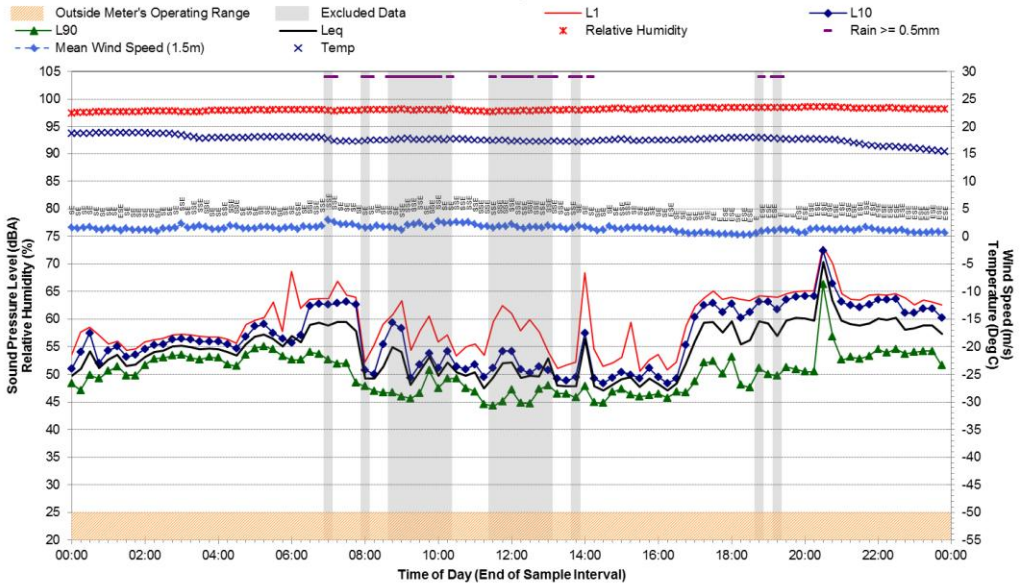
Statistical Ambient Noise Levels
Location G - Monday, 21 December 2015

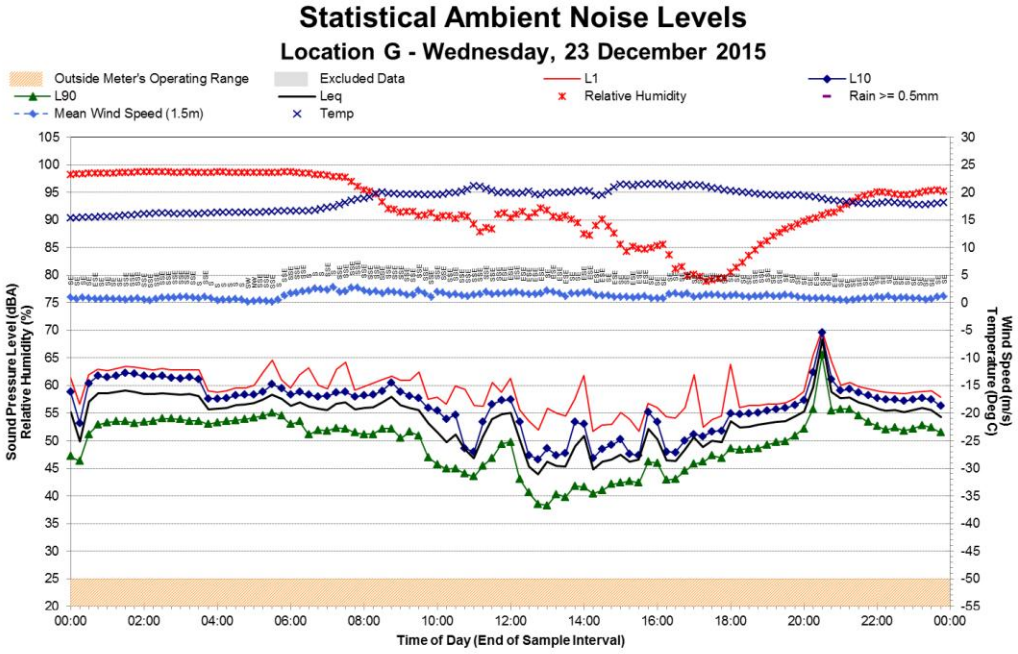


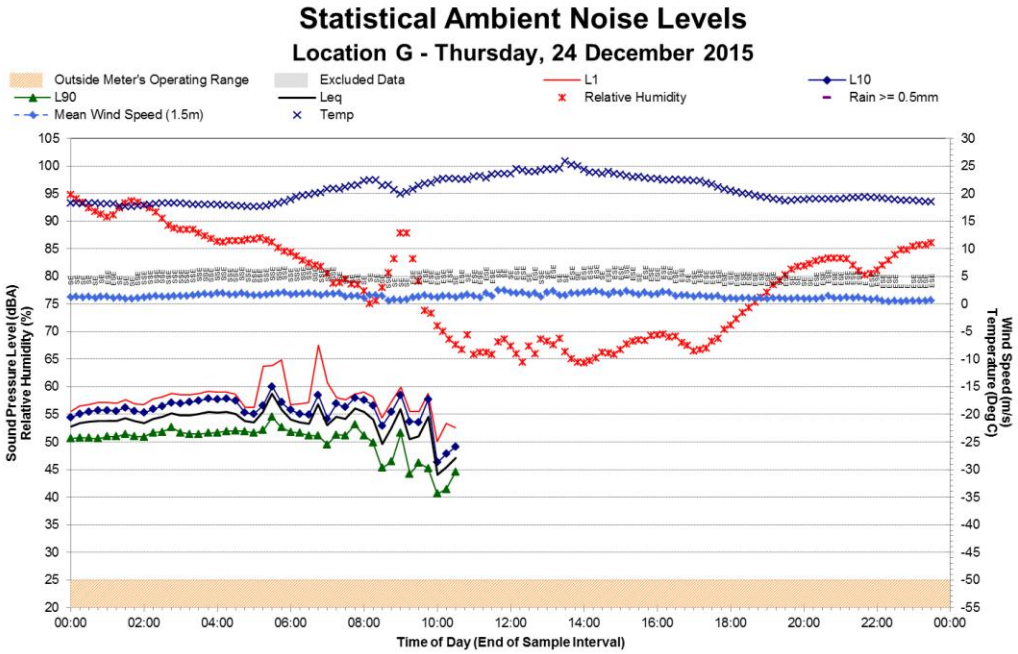
Statistical Ambient Noise Levels
Location G - Tuesday, 22 December 2015



Appendix C3

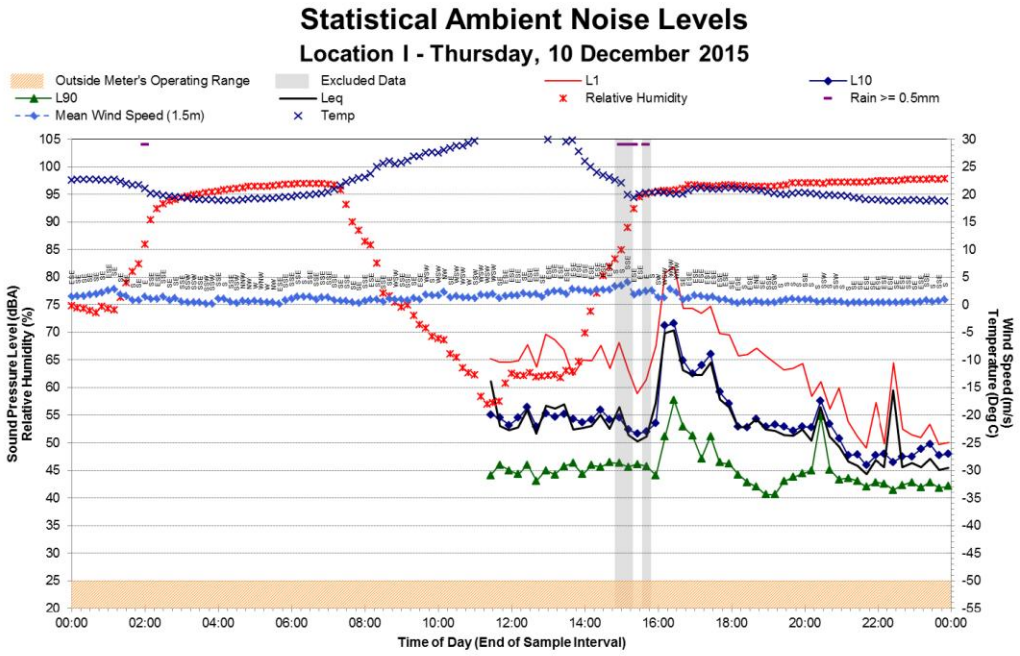
Statistical Ambient Noise Levels – Location G
Report Q60 630.01053

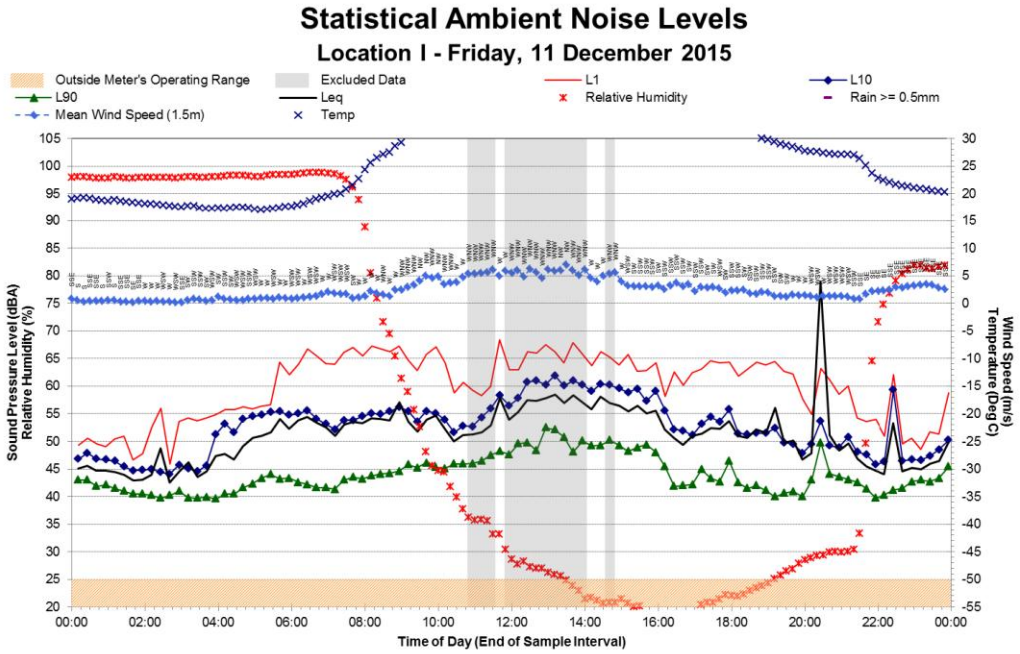




Appendix C4

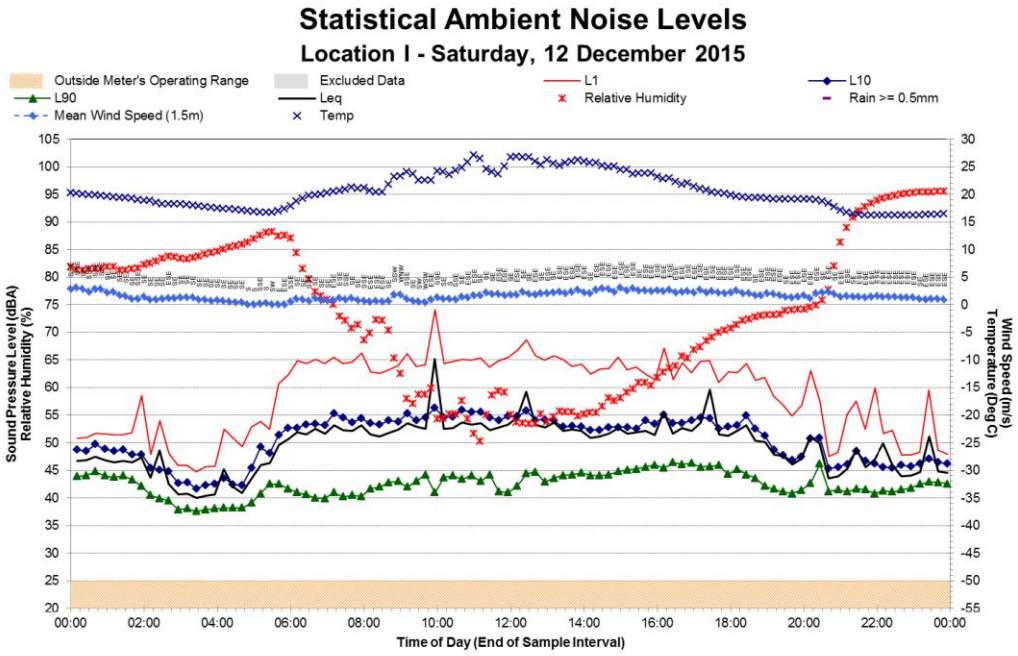
Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

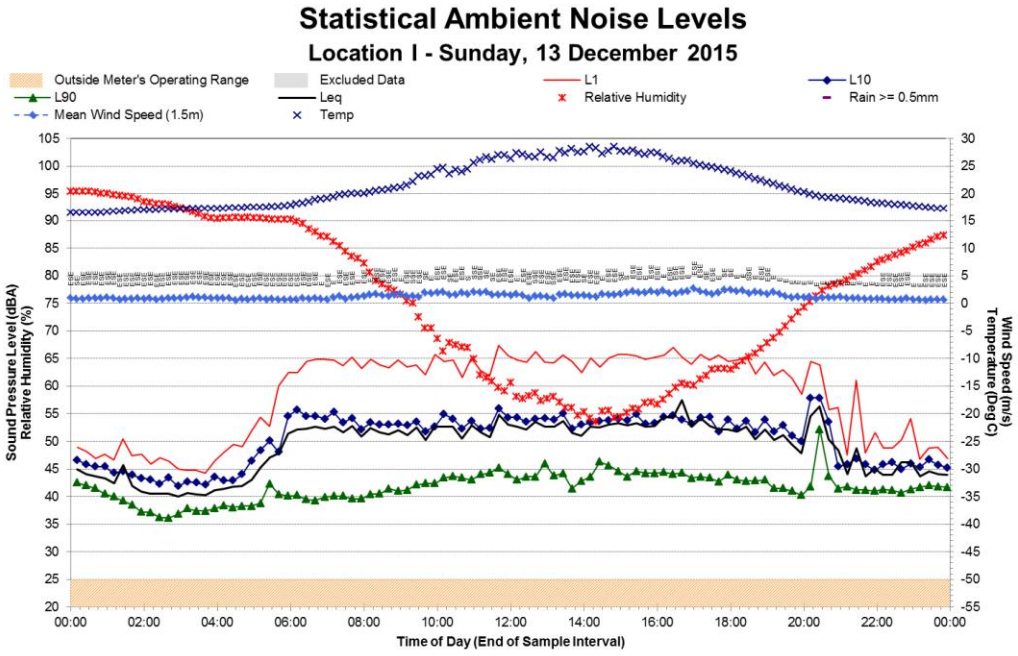




Appendix C4

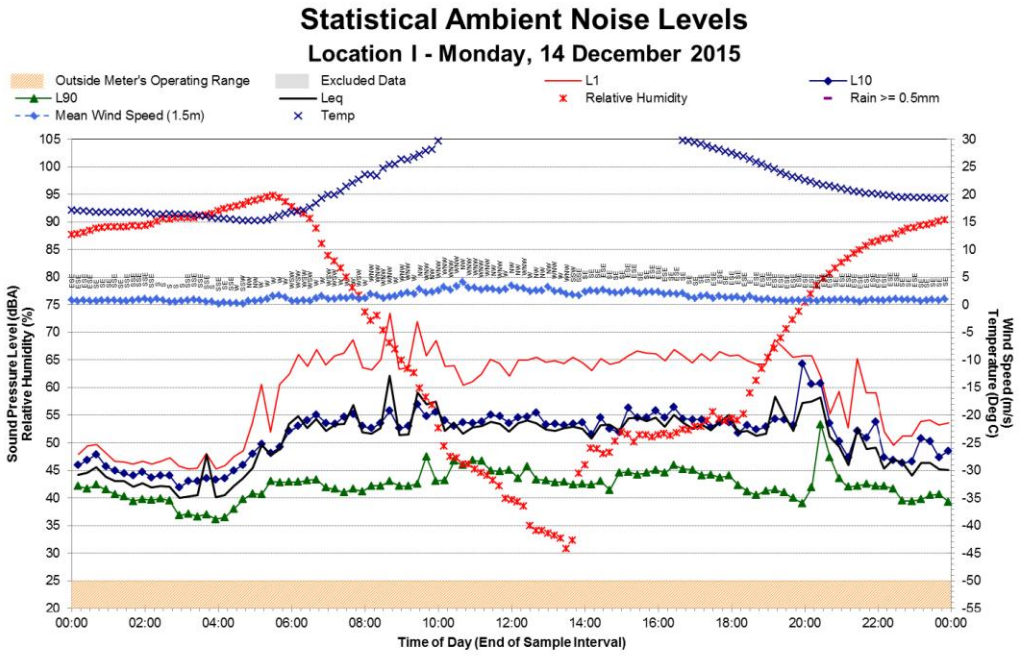
Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

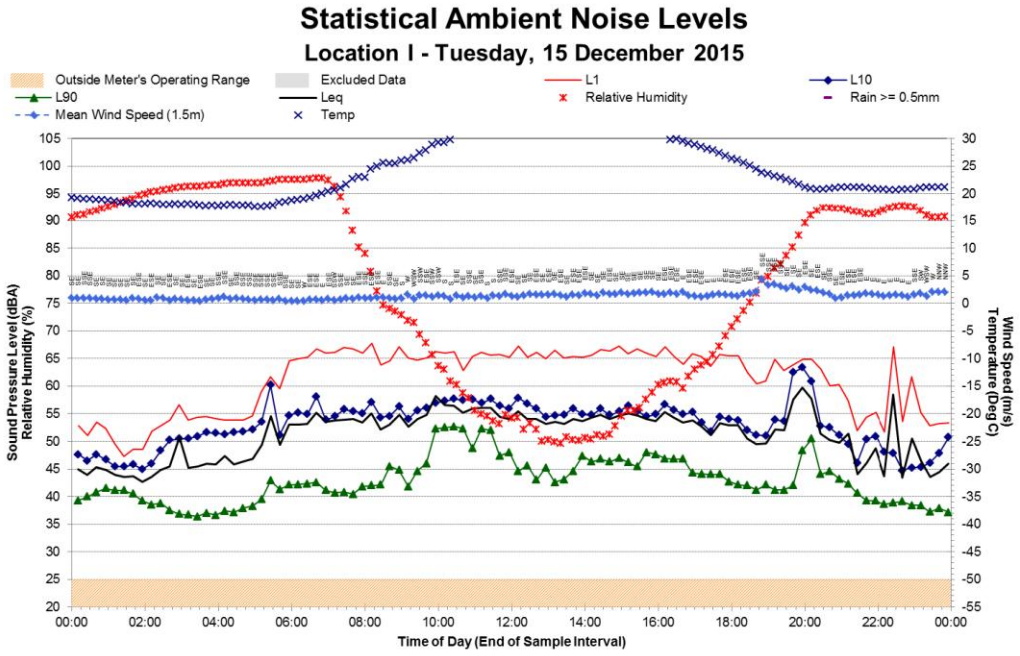




Appendix C4

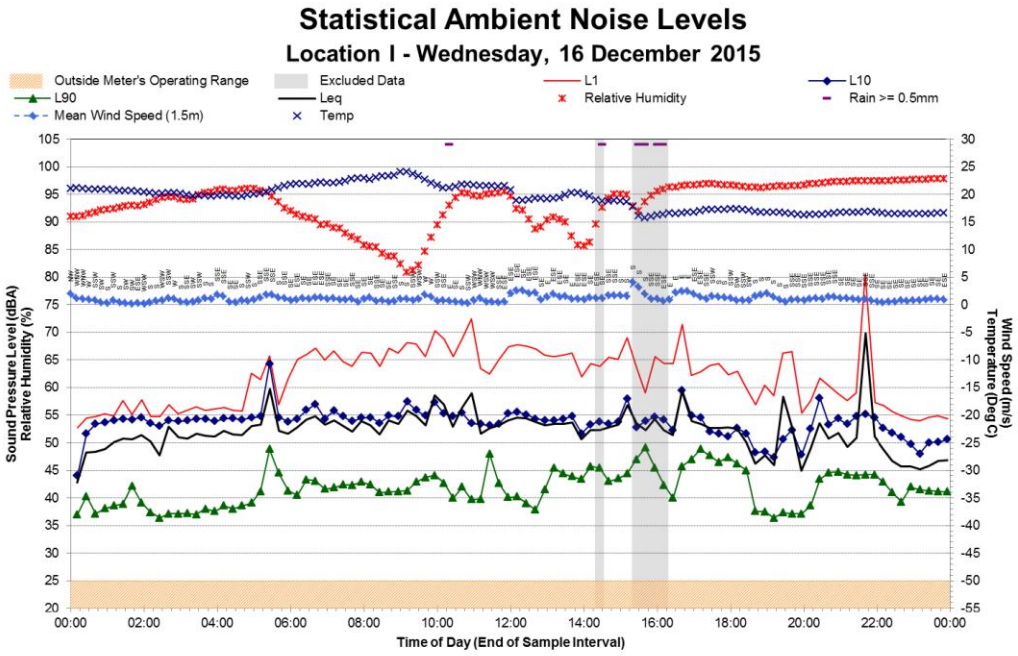
Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

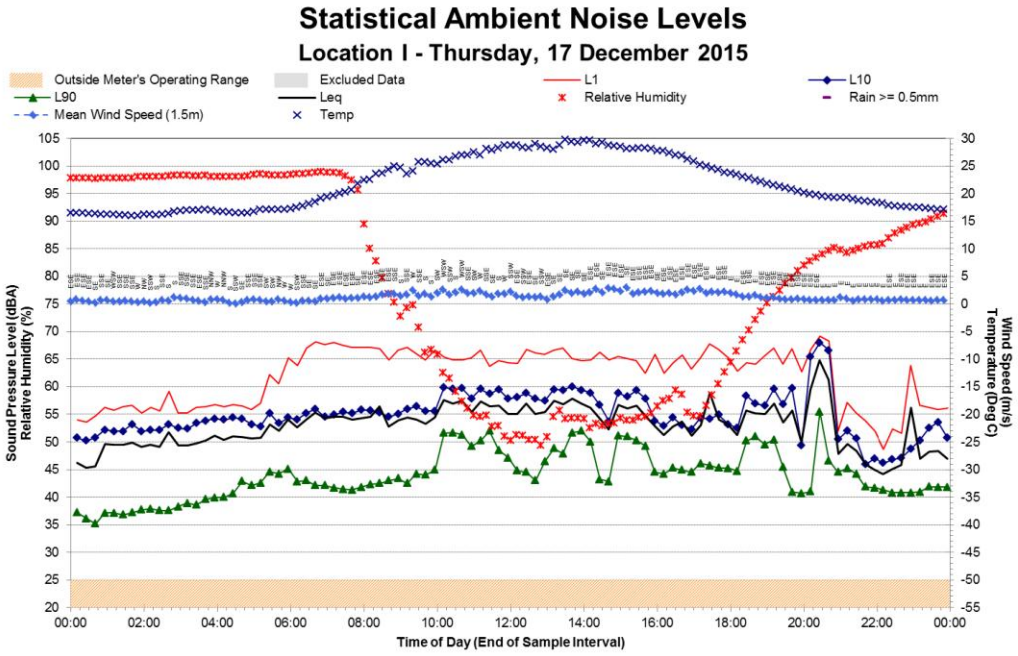




Appendix C4

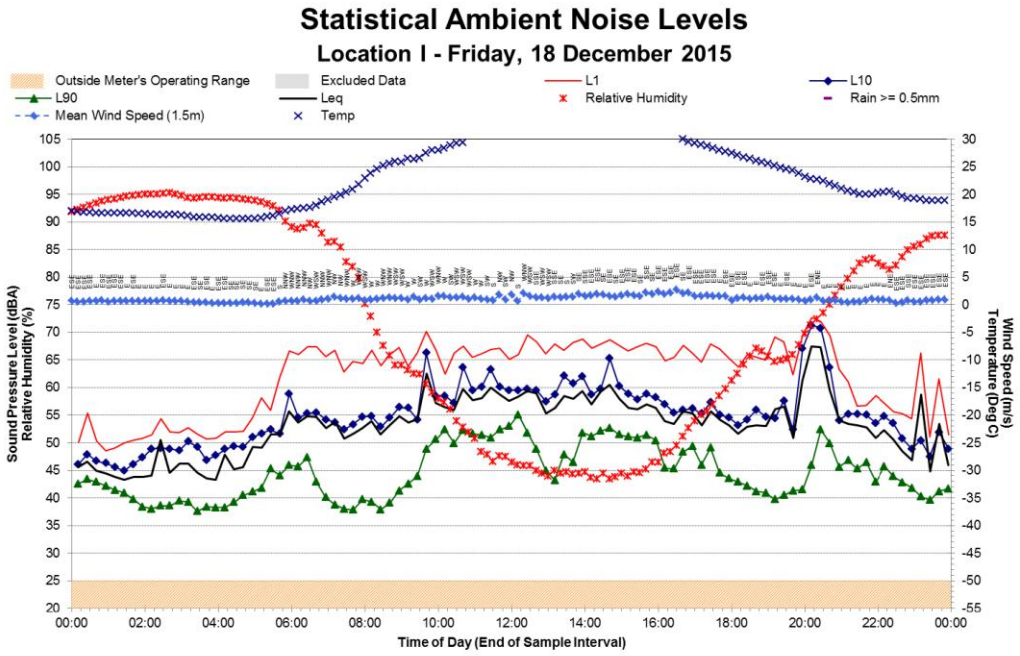
Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

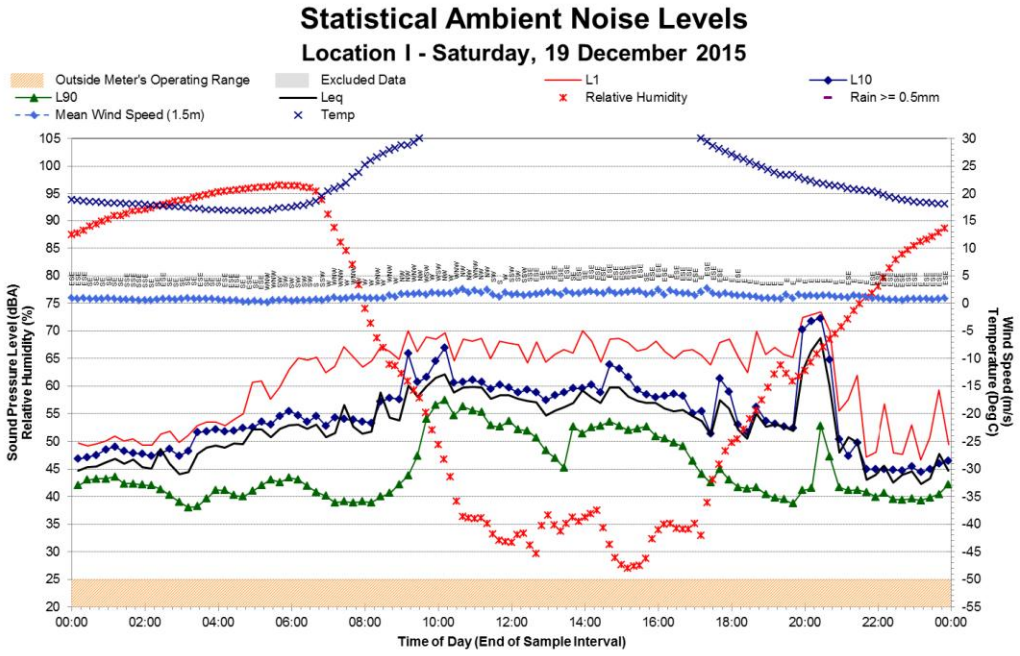




Appendix C4

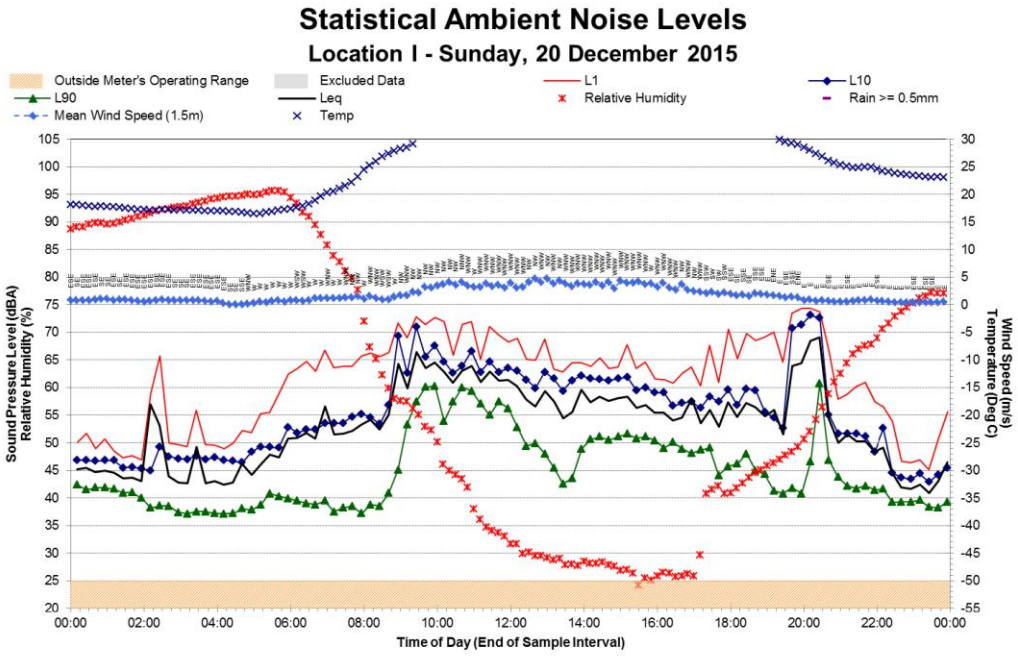
Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

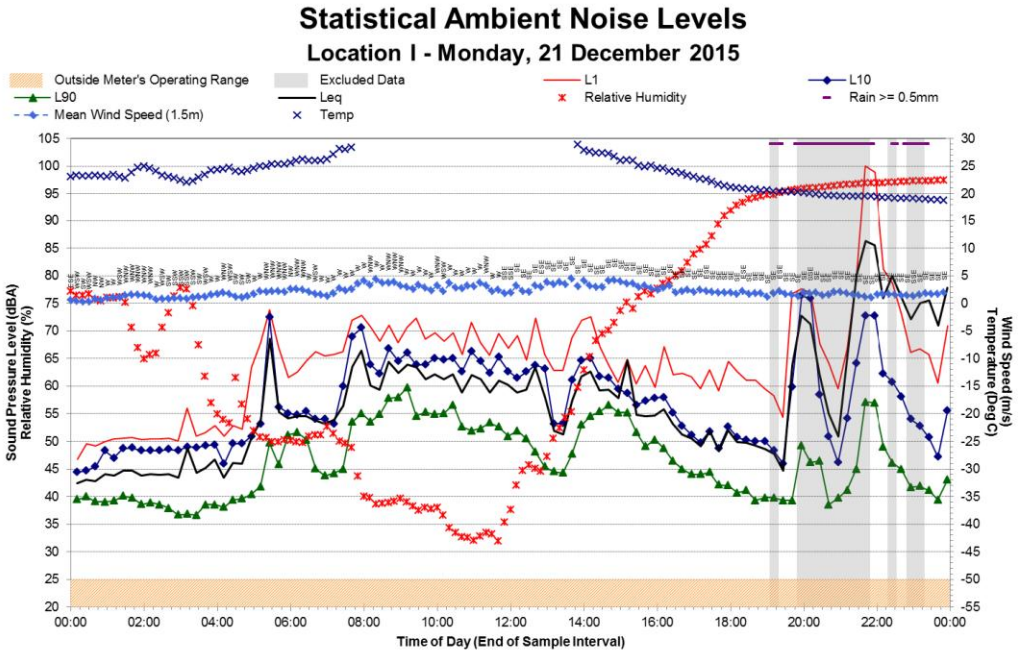




Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q60 630.01053



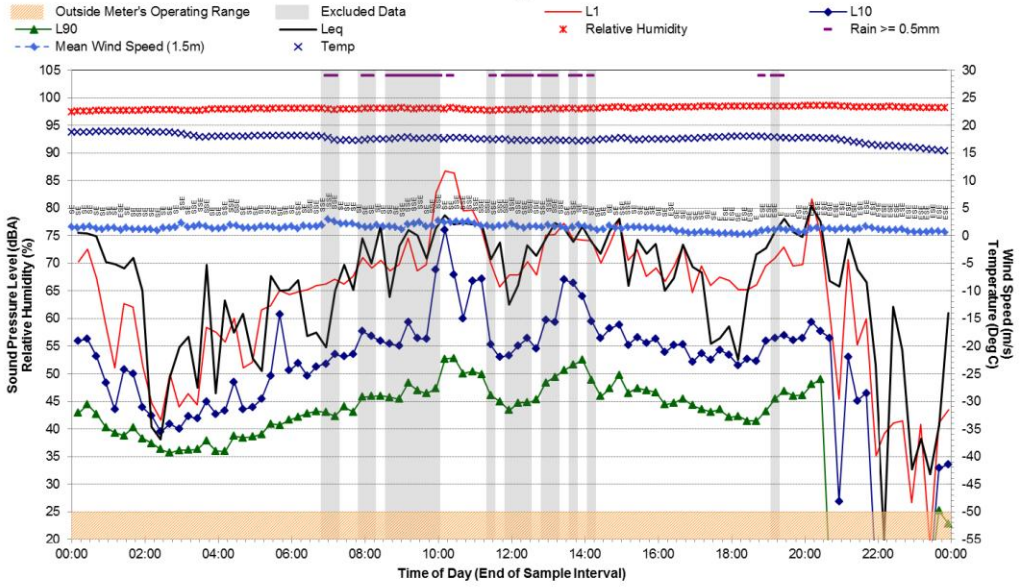


Appendix C4

Statistical Ambient Noise Levels – Location I
Report Q60 630.01053

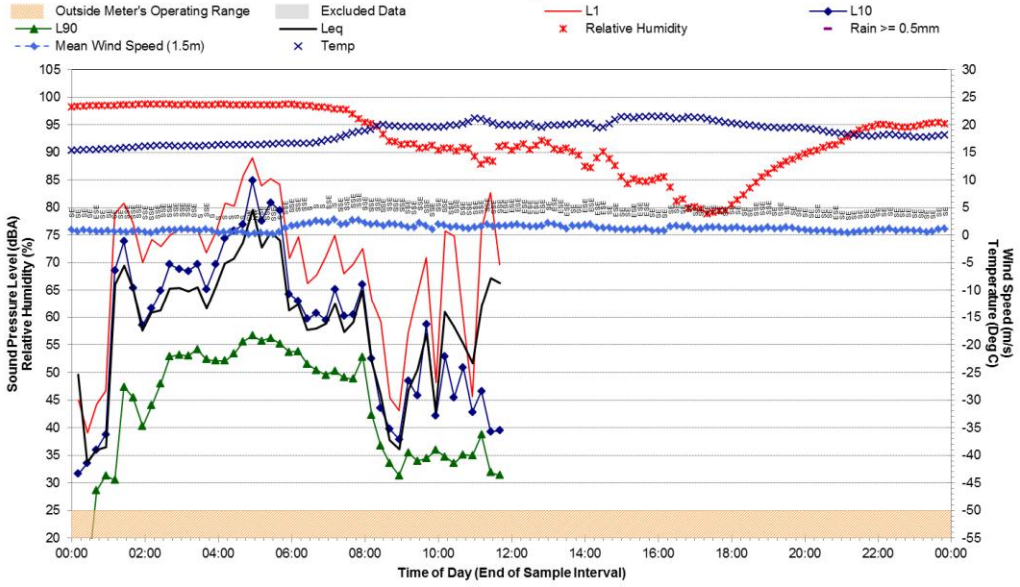
Statistical Ambient Noise Levels

Location I - Tuesday, 22 December 2015



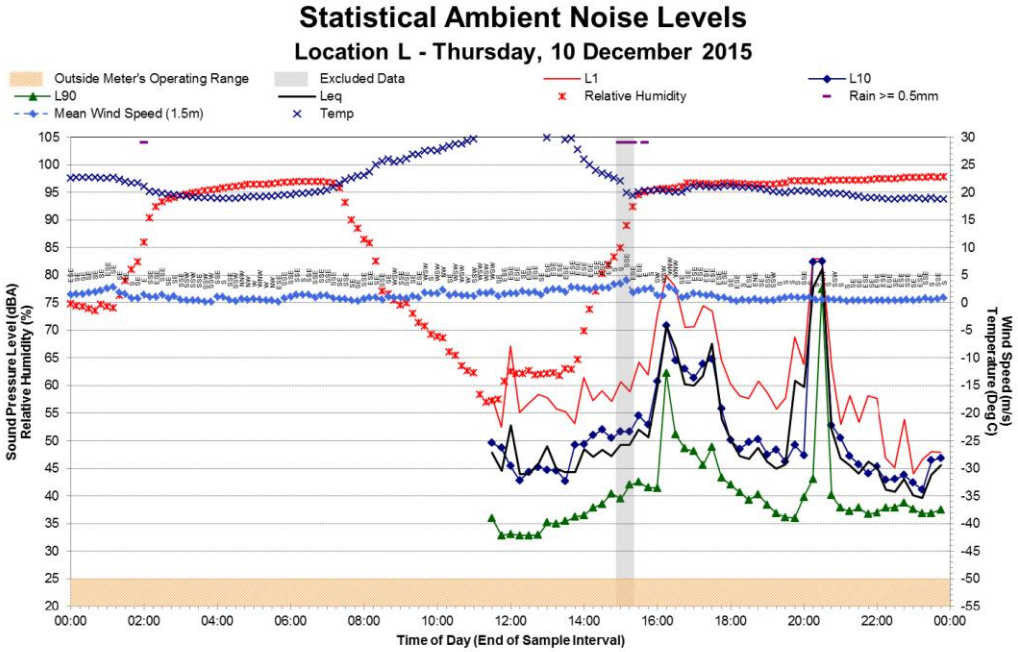
Statistical Ambient Noise Levels

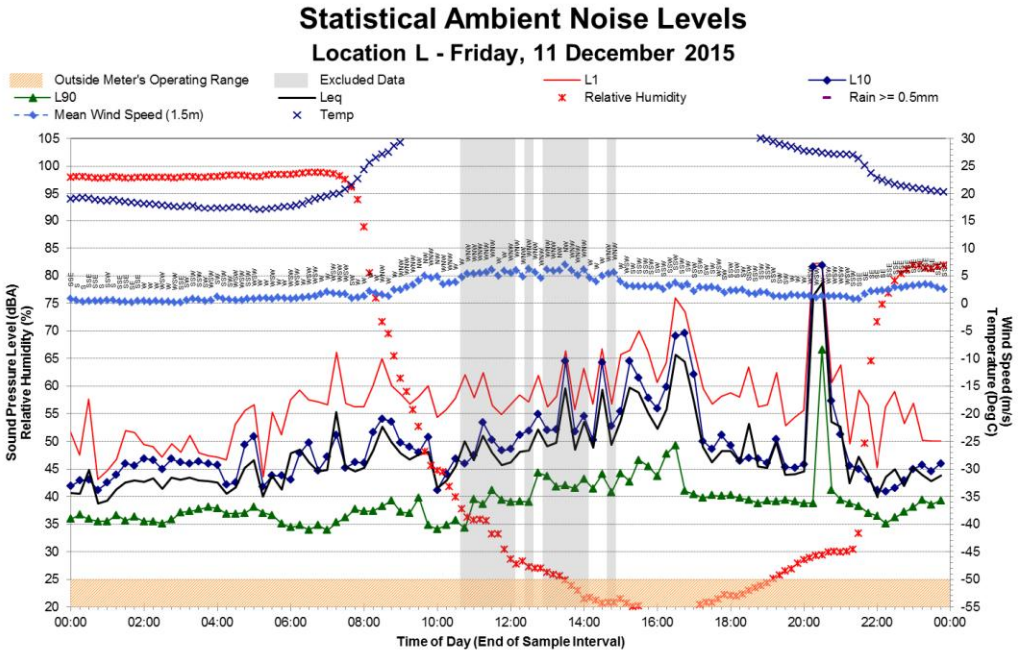
Location I - Wednesday, 23 December 2015



Appendix C5

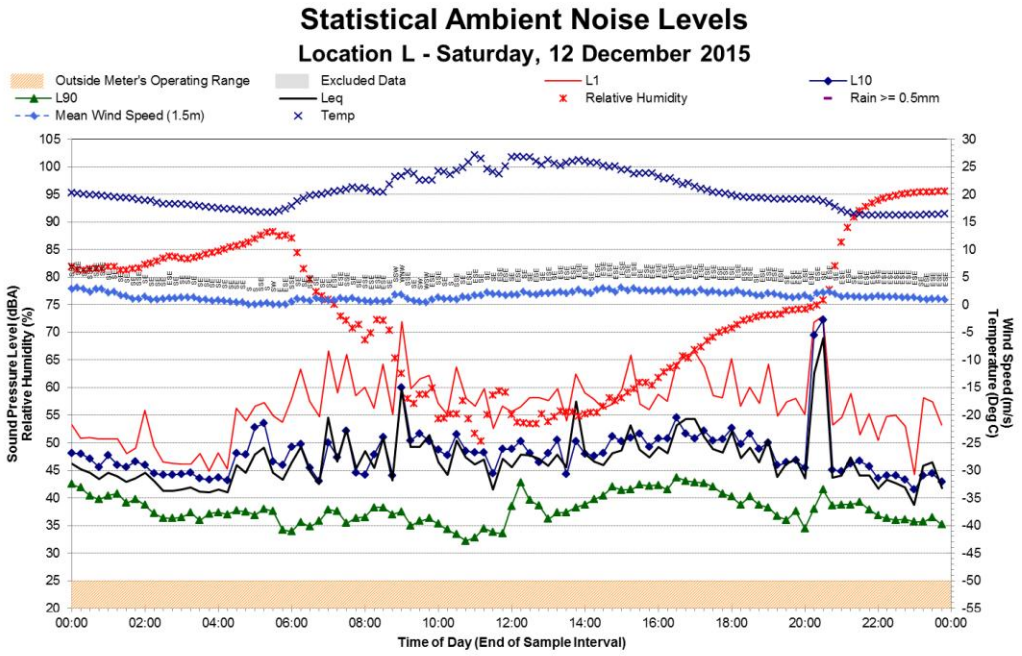
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

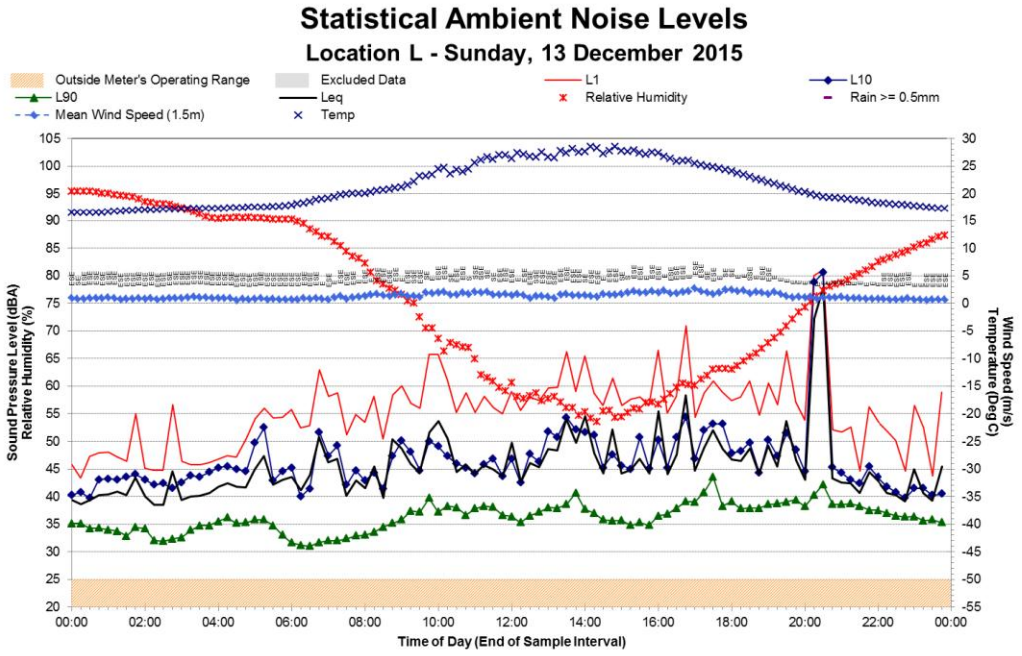




Appendix C5

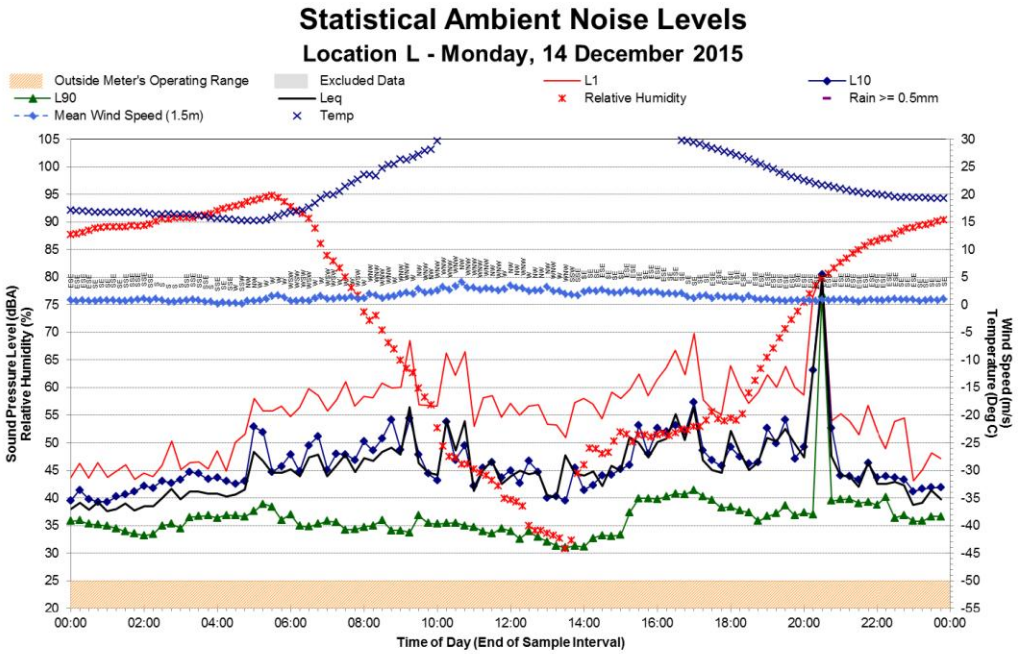
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

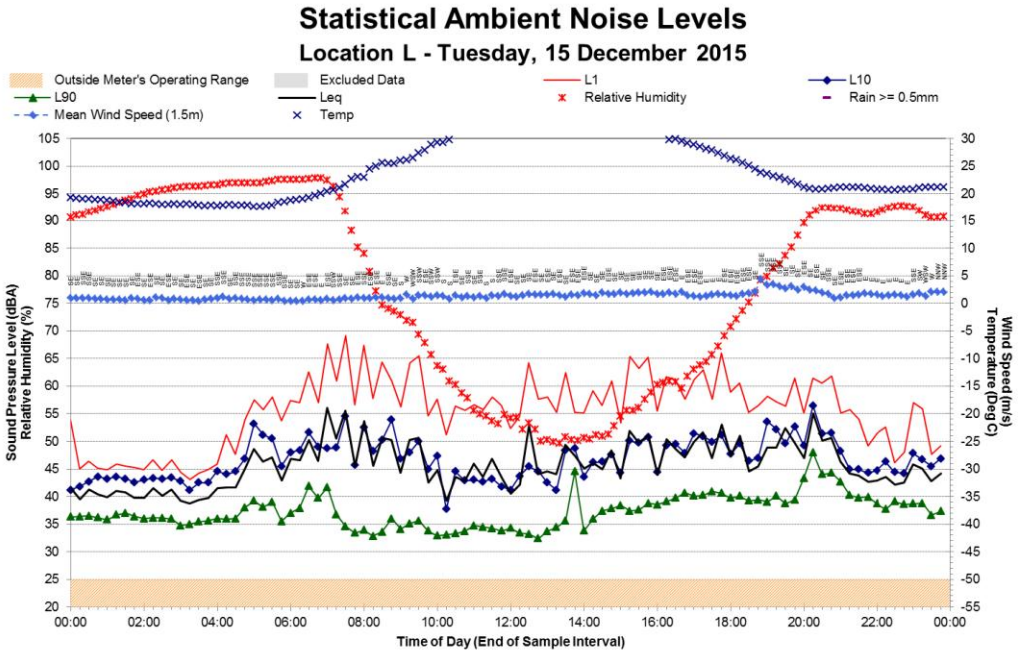




Appendix C5

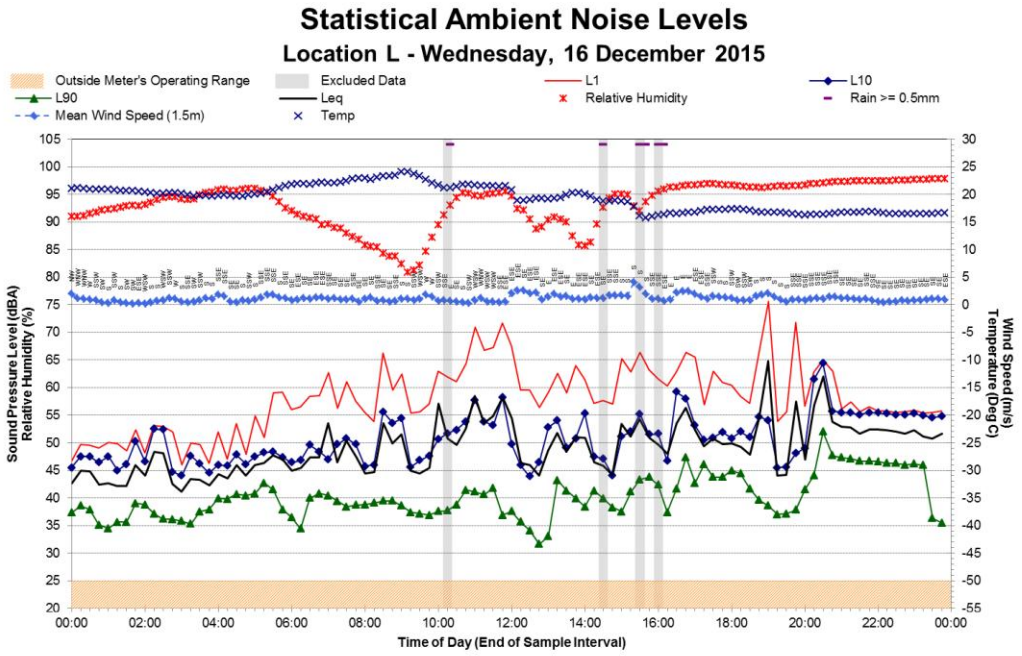
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

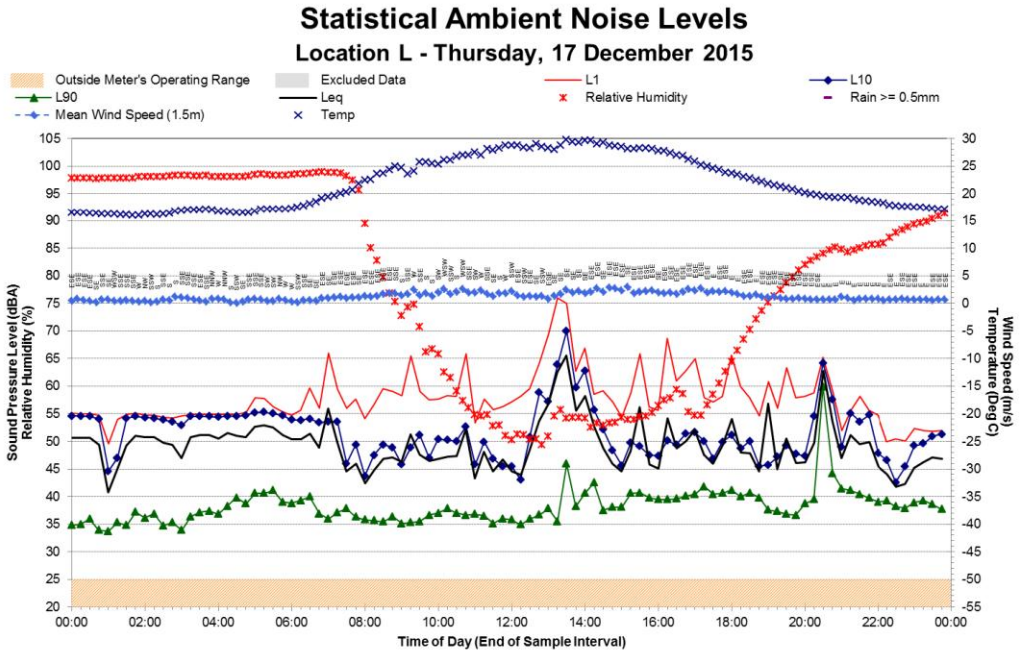




Appendix C5

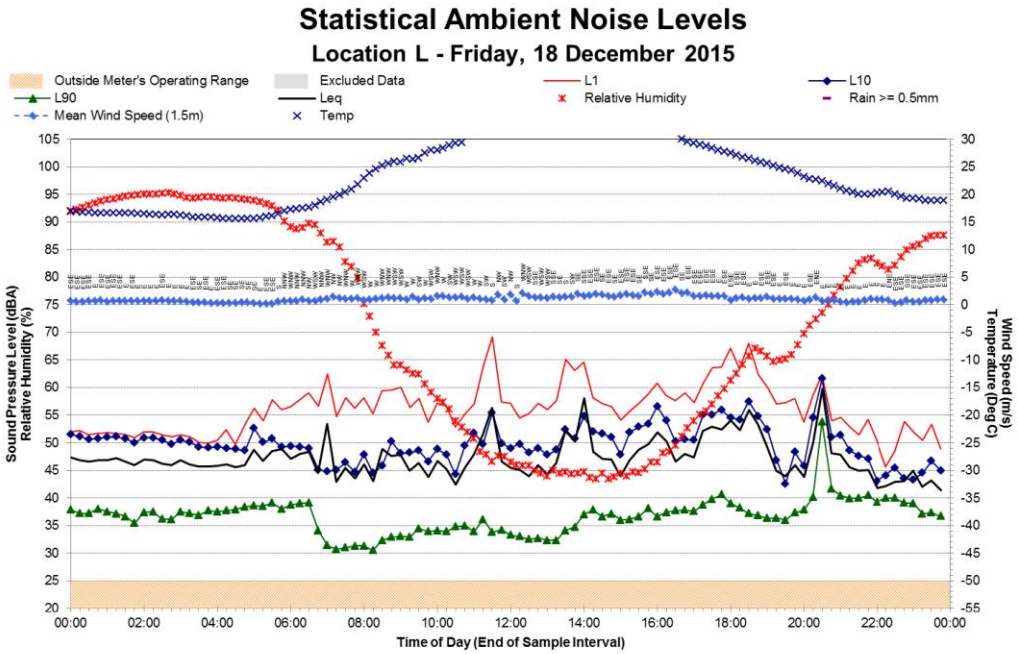
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

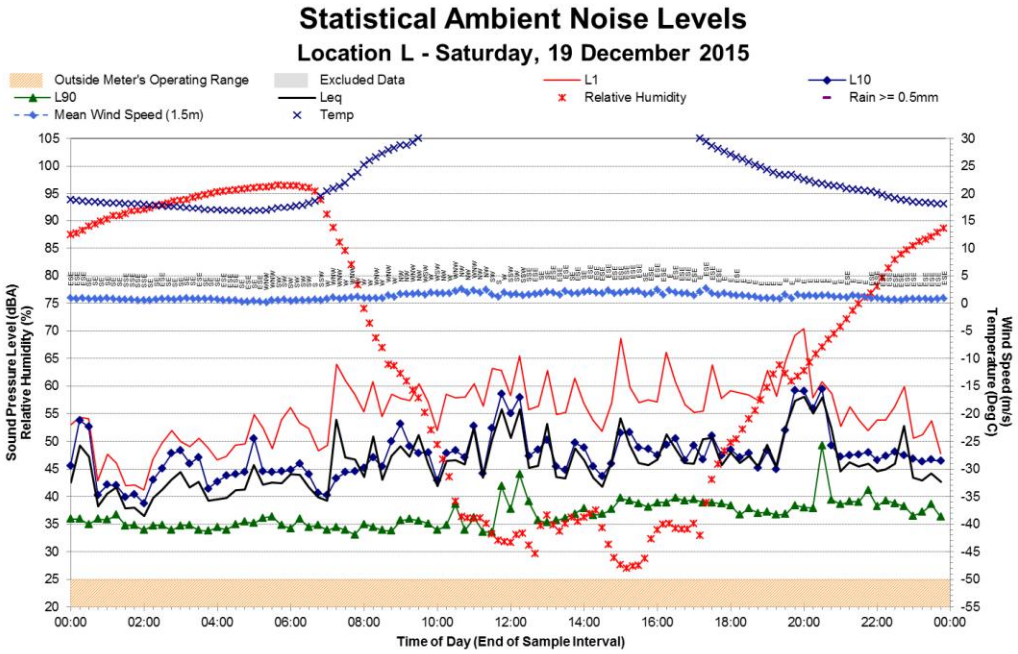




Appendix C5

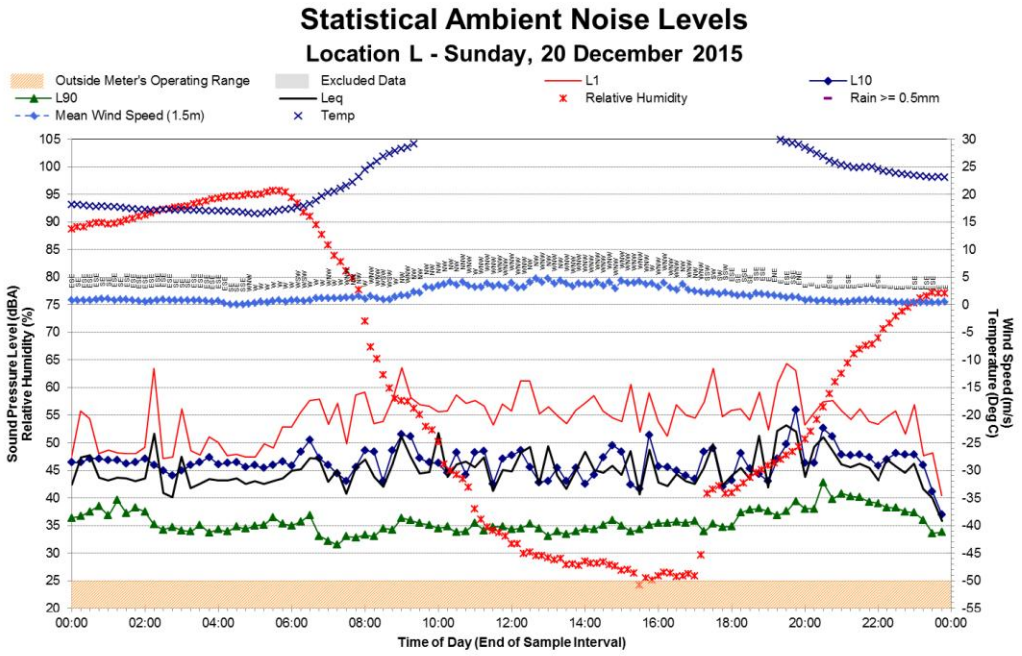
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

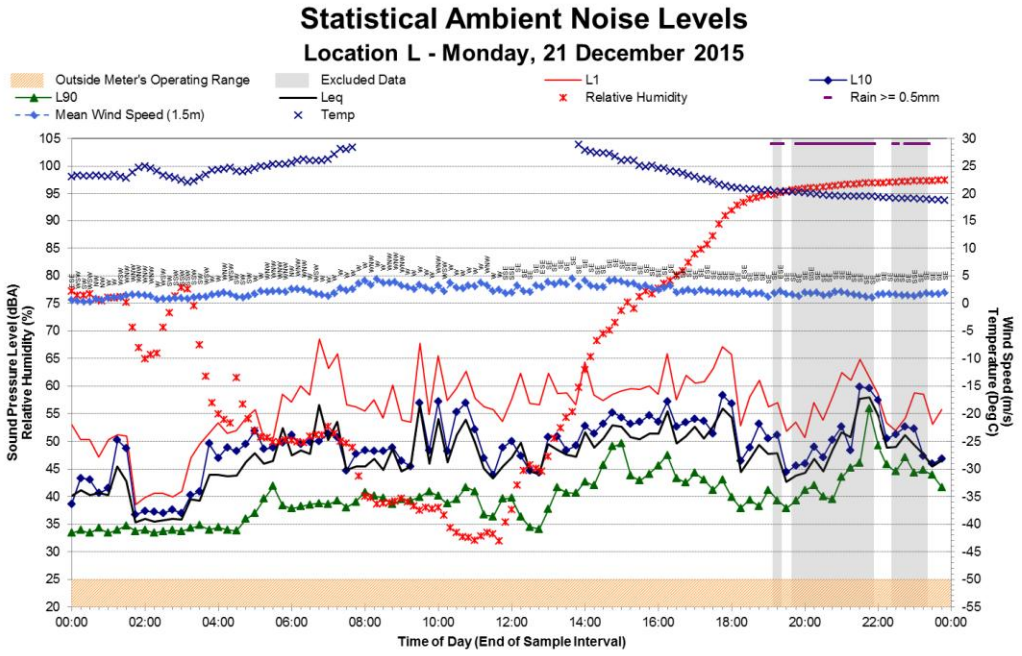




Appendix C5

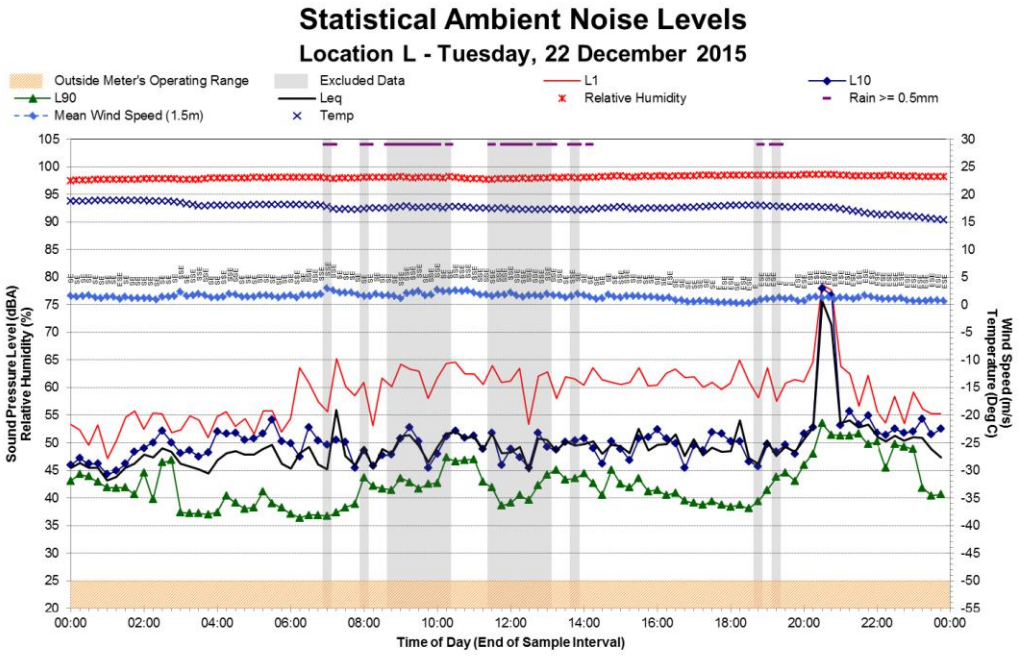
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

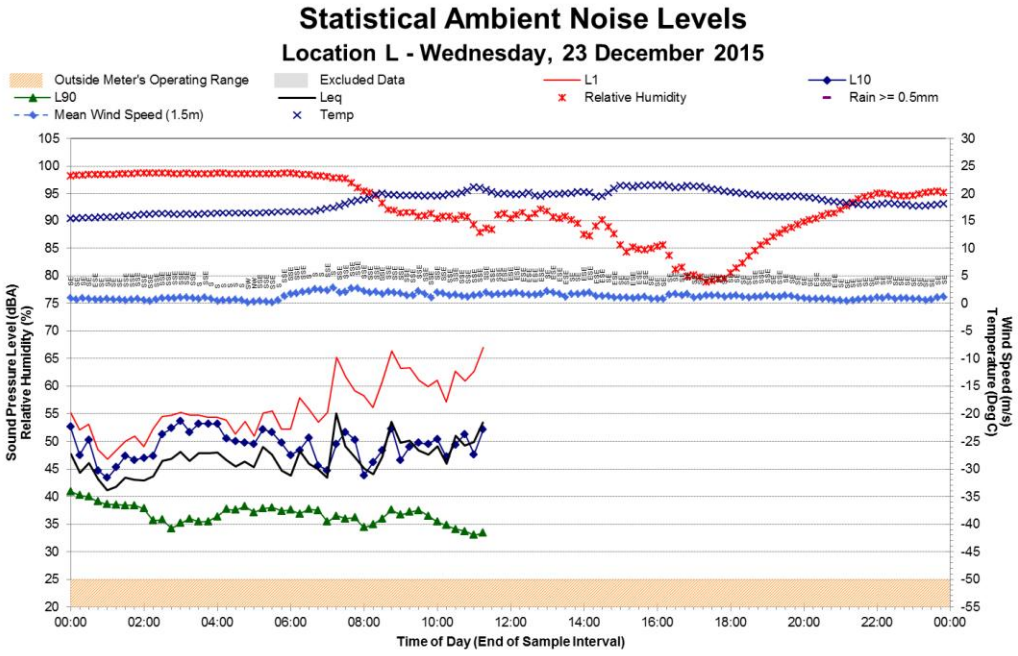




Appendix C5

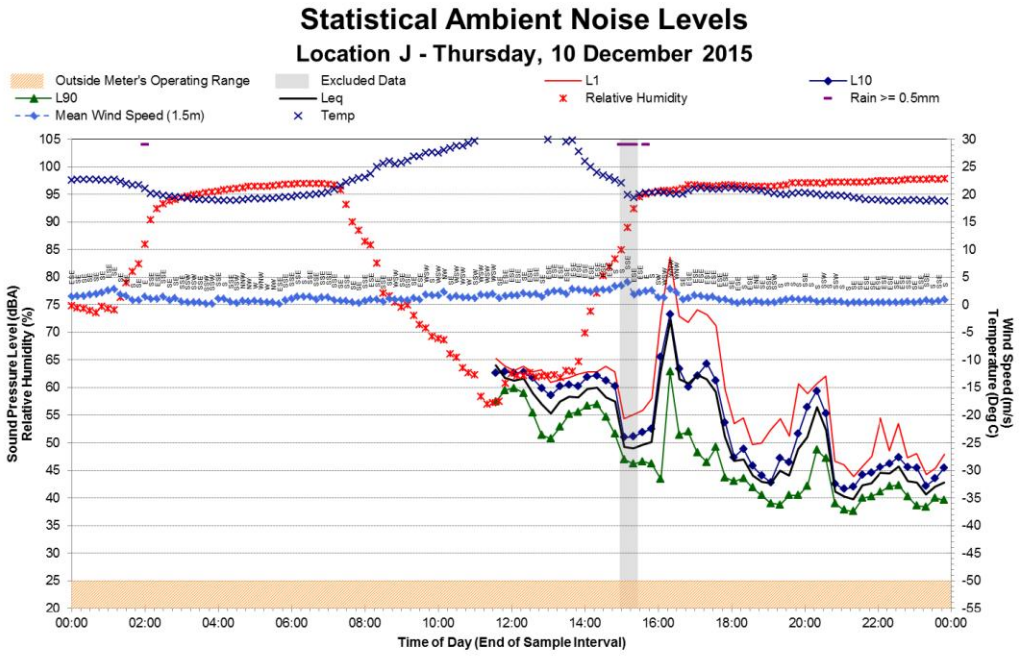
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

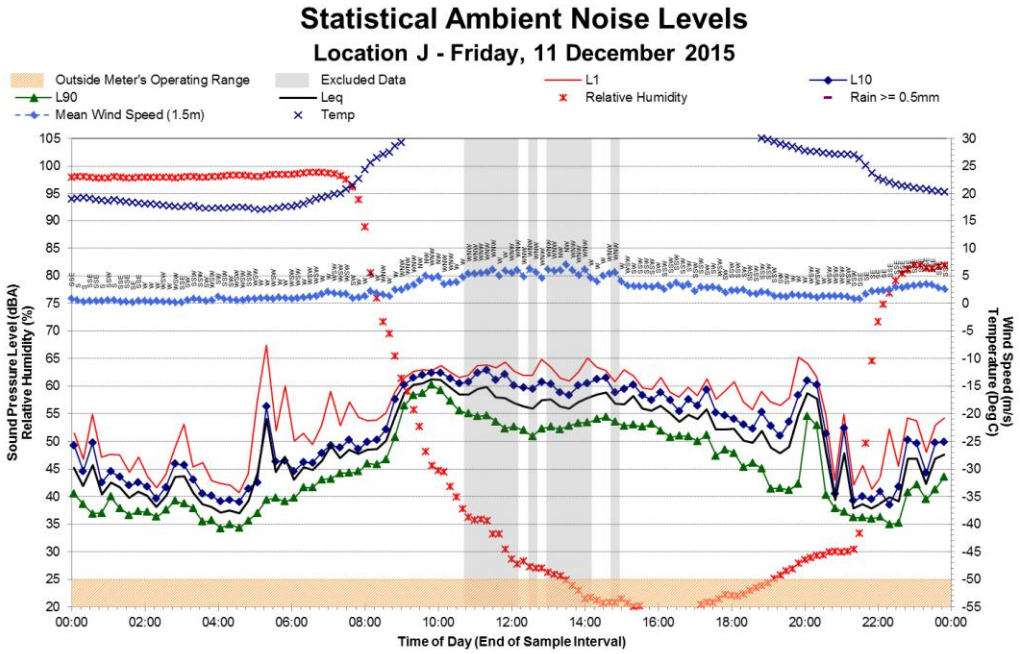




Appendix C6

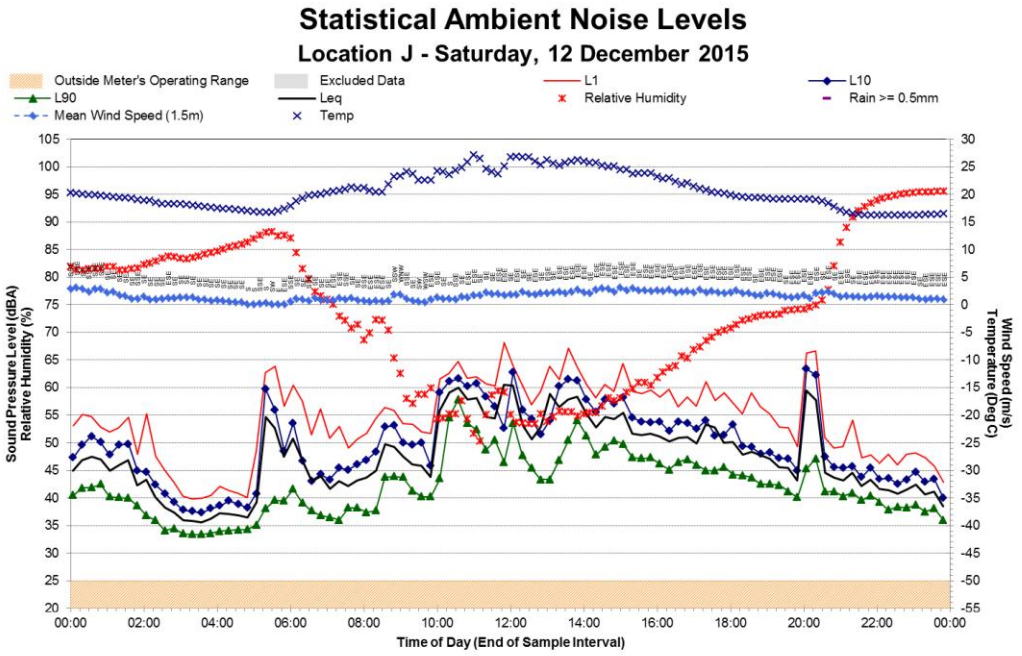
Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

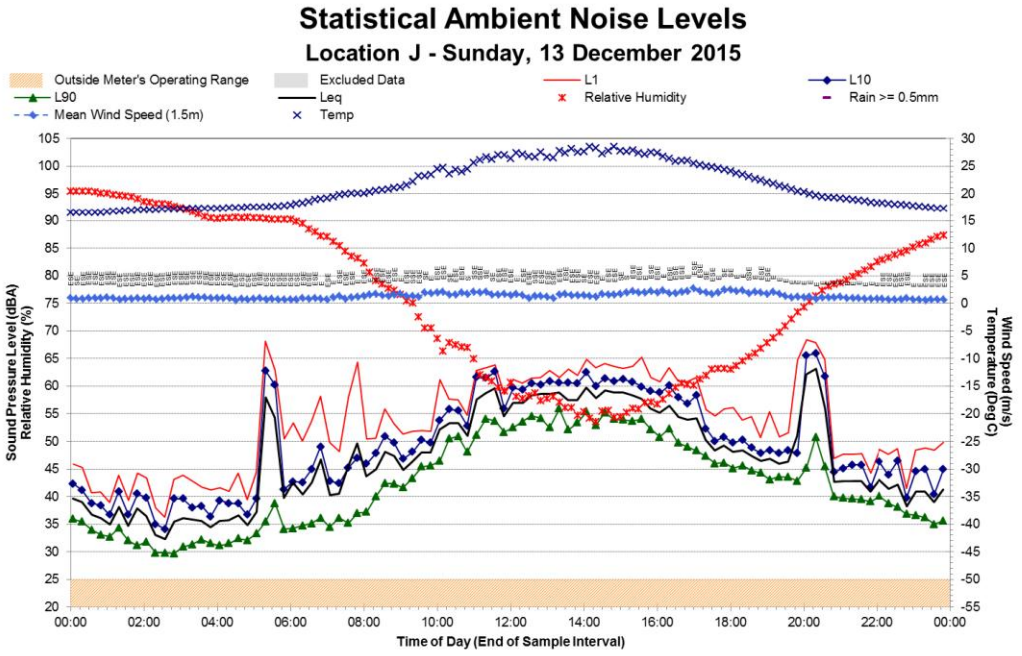




Appendix C6

Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

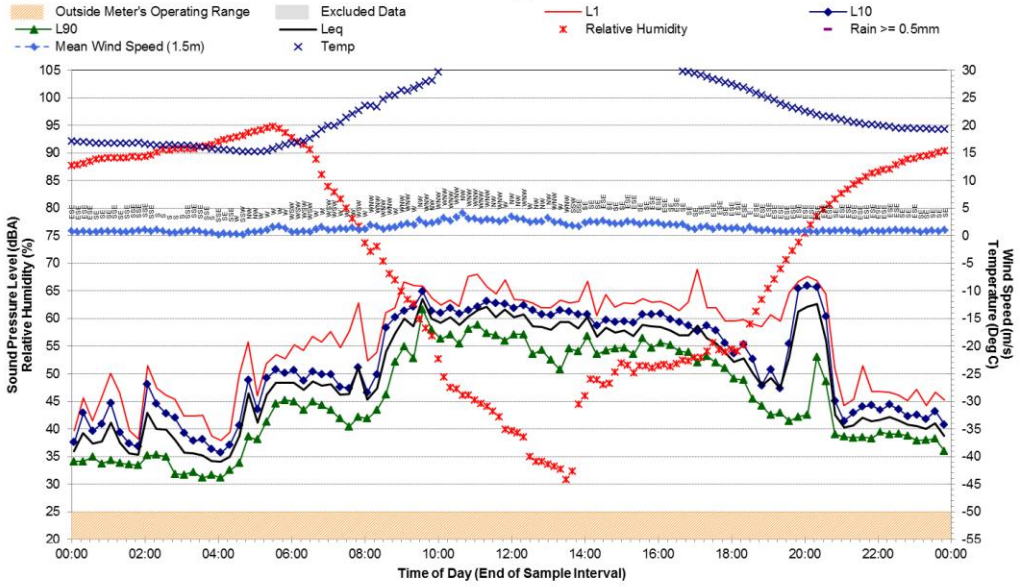




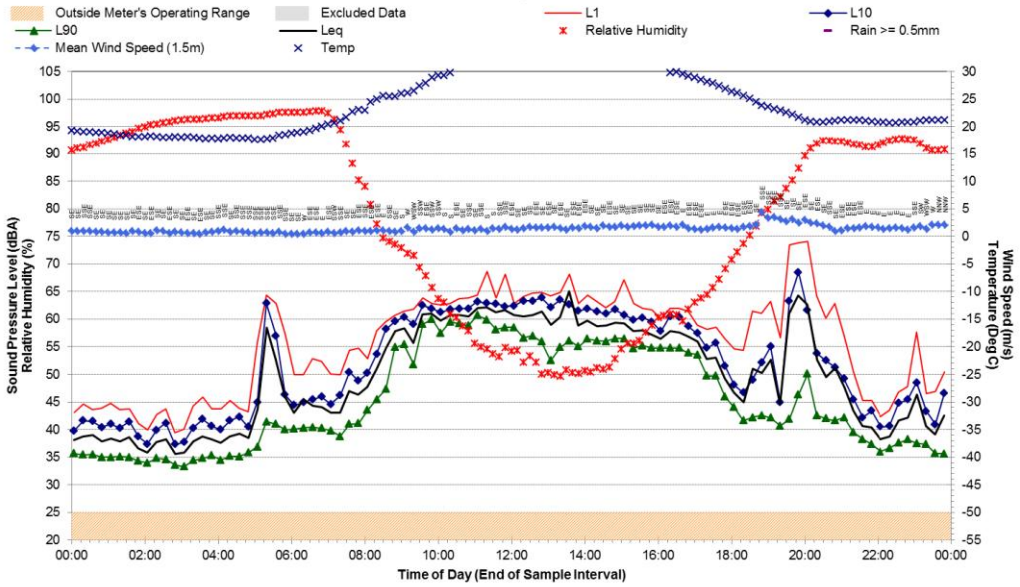
Appendix C6

Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

Statistical Ambient Noise Levels
Location J - Monday, 14 December 2015

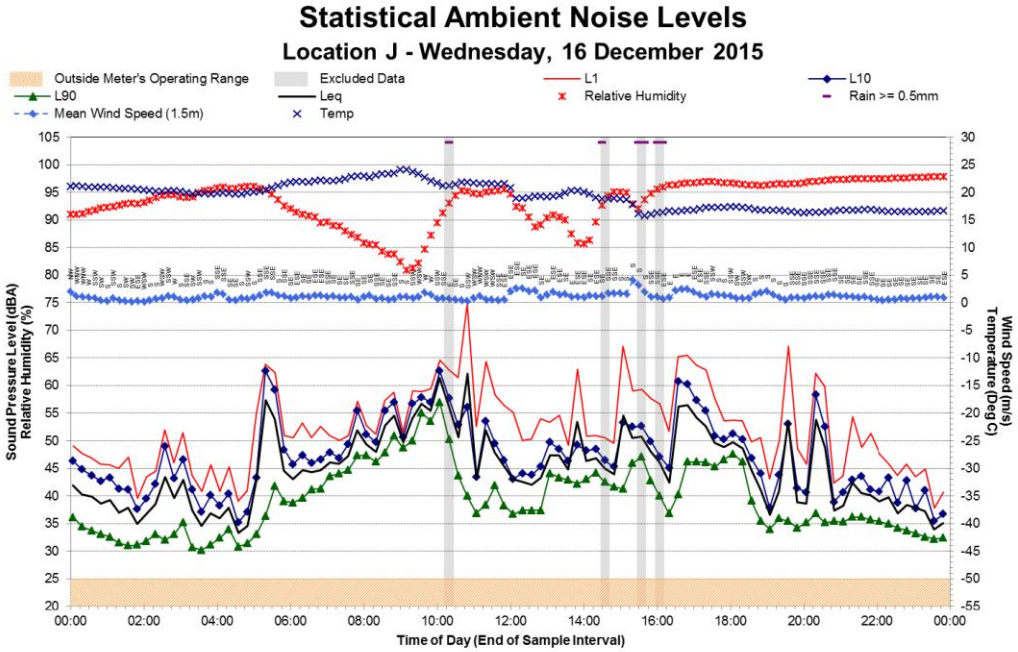


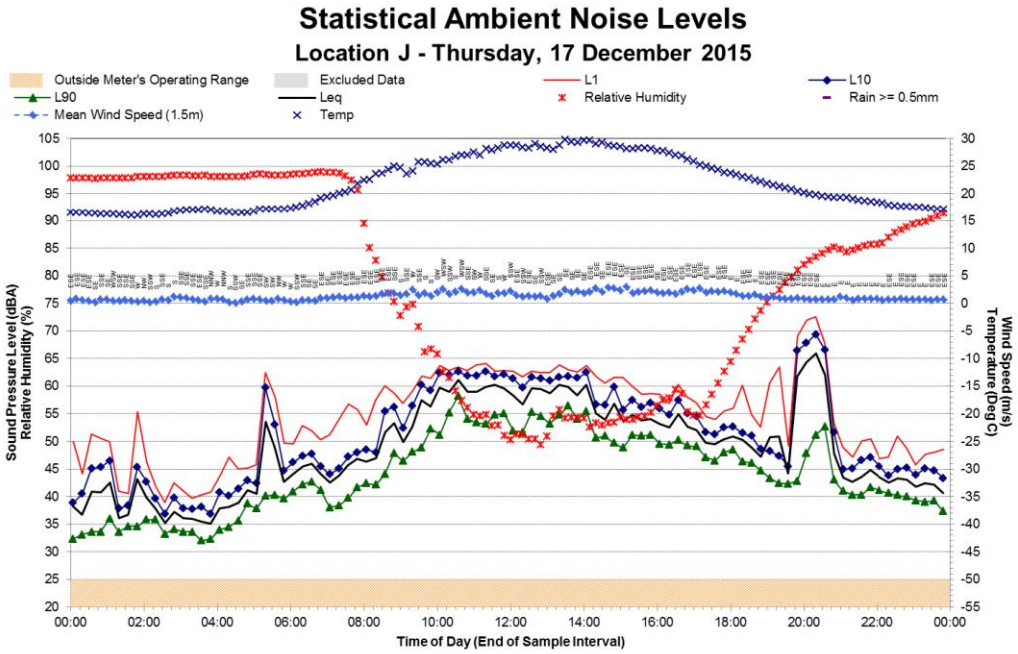
Statistical Ambient Noise Levels
Location J - Tuesday, 15 December 2015



Appendix C6

Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

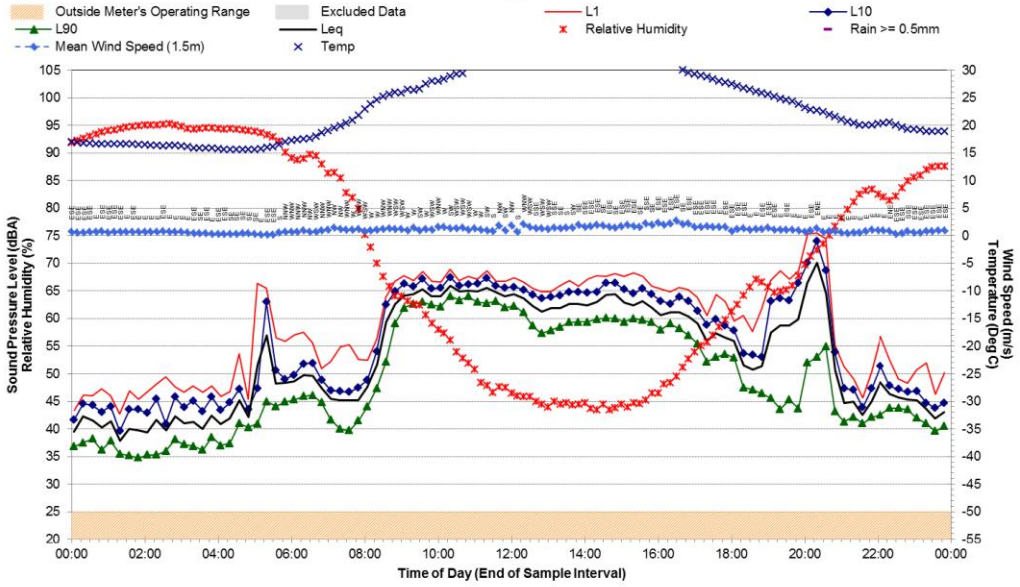




Appendix C6

Statistical Ambient Noise Levels – Location L
Report Q60 630.01053

Statistical Ambient Noise Levels
Location J - Friday, 18 December 2015



Statistical Ambient Noise Levels
Location J - Saturday, 19 December 2015