

Appendices

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- Appendix 1 Noise Monitoring Reports (330 pages)
- Appendix 2 Air and Water Monitoring Results (30 pages)
- Appendix 3 2018/2019 Annual Monitoring
Pambalong Nature Reserve (110 pages)
- Appendix 4 Aquatic Monitoring Report:
Autumn 2019 and Spring 2019 (54 pages)
- Appendix 5 Subsidence Management Plan
– End of Year Report 2019 (24 pages)

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Appendix 1

Noise Monitoring Reports

1. Quarterly Noise Monitoring, Quarter Ending March 2019
2. Quarterly Noise Monitoring, Quarter Ending June 2019
3. Quarterly Noise Monitoring, Quarter Ending September 2019
4. Quarterly Noise Monitoring, Quarter Ending December 2019

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DONALDSON AND ABEL COAL MINES

**Quarterly Noise Monitoring
Quarter Ending March 2019**

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
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BASIS OF REPORT

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

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

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
Q73-630.01053-R1D1	24 January 2020	Jordan Murray	Martin Davenport	Martin Davenport

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1 Introduction

1.1 Background

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 during the December 2018 quarter in accordance with the Abel Mine Project Noise Monitoring Program, dated 12 August 2014.

1.2 Objectives of this Report

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

- Measure the ambient noise levels at six 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.

1.3 Acoustic Terminology

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

2 Development Consent Project Approval

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.

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 Bloomfield 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(15minute)	LAeq(15minute)	LAeq(15minute)	LA1(1minute)
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

- 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

- 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

- 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; Describe the proposed noise management system in detail; and*
- c. *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 SLR's Report 630.01053.01300-R1 dated 12 August 2014 (*Noise Management Plan Abel Underground Mine*) 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 AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the March 2019 quarter is provided in **Appendix B**.

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

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 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.

Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the December 2018 noise monitoring period.

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	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	Kilshanny Ave, Ashtonfield

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

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of seven days between Wednesday 13 March 2019 and Thursday 21 March 2019 at each of the 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.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six 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 evening and night-time period on Tuesday 26 March 2019 and Wednesday 27 March 2019. Operator attended noise measurements were conducted during the daytime period on Wednesday 13 March 2019 and Thursday 21 March 2019. All operator attended noise surveys were conducted using a Brüel & Kjær 2250L integrating sound level meter (s/n: 3003389).

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 (°C) 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.

Table 2 Location D, Black Hill School, Black Hill

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	13/03/2019 13:00 26°C 2 m/s SE	78	68	56	44	56	Road traffic 50-78 Birdsong 45-60
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	26/03/2019 18:14 23°C 1.5 m/s SE	72	63	57	40	53	Road traffic 41-72 Birdsong 51-62 School air-conditioner 39
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	26/03/2019 22:00 18°C 1 m/s S	79	58	43	39	57	Insects 38 Traffic 40-79
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

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

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	13/03/2019 13:30 26°C 1 m/s SSE	83	66	56	45	55	Road Traffic 49-83 Birdsong 45-66
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	26/03/2019 18:39 22°C 1 m/s SE	74	67	58	38	55	Road Traffic 51-74 Insects 47
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	26/03/2019 22:22 18°C 1 m/s S	68	64	55	33	52	Road traffic 42-68 Insects 39-41
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 4 Location G, 156 Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	13/03/2019 16:10 27°C 2 m/s SE	67	58	54	46	51	Wind related noise 60-67 Road traffic 45-60
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	26/03/2019 19:54 20°C 1 m/s SE	71	66	62	37	57	Road traffic 38-71 Insects 38
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	27/03/2019 00:26 17°C 1 m/s SE	89	77	49	36	63	Road traffic 50-89 Insects 34
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	21/03/2019 11:15 25°C Calm	75	69	62	47	68	Road traffic 53-75 Birdsong 62-69
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	26/03/2019 20:51 19°C 1 m/s SE	68	53	45	41	45	Road traffic 42-68 Insects 39
		Estimated Abel Mine Noise Contribution Inaudible					Domestic noise 46-51 Abel Mine Inaudible
Night	27/03/2019 01:18 18°C 1 m/s S	70	58	50	36	47	Road traffic 40-48 Insects 36-38
		Estimated Abel Mine Noise Contribution Inaudible					Dog barking 68-70 Abel Mine Inaudible

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	21/03/2019 11:54 27°C 1 m/s SW	56	44	37	32	39	Electric fence 31-33 Birdsong 37-56 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	26/03/2019 20:51 19°C 1 m/s SE	59	44	40	37	39	Road traffic 37-41 Insects 35 Animal 59 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	27/03/2019 01:45 18°C 1 m/s S	50	44	41	34	38	Road traffic 43-46 Insects 38-42 Animal 50 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

Table 7 Location L, Kilshanny Ave, Ashtonfield

Period	Date/ Start time/ Period/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	13/03/2019 16:56 24°C 2 m/s SE	74	61	56	42	52	Road traffic 40-74 Birdsong 53-61
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	26/03/2019 20:26 19°C 1 m/s SE	80	65	47	41	59	Road traffic 41-80 Insects 42
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	27/03/2019 00:54 17°C 1 m/s SE	58	48	46	46	44	Road traffic 32-40 Insects 40-44 Dog barking 58
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

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

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP stockpile area was not audible during all operator attended noise surveys. 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.

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 dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	Inaudible	Inaudible	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	Inaudible	Inaudible	40	40	40	Yes	Yes	Yes

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 Bloomfield LA1(1minute) Contribution dBA	Consent Conditions LA1(1minute) dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Lord Howe Drive, Ashtonfield	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	47	Yes

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 13 March 2019 and Monday 21 March 2019 at each of the six 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 16-207-050	13 March 2019 - 21 March 2019
F – Black Hill Road, Black Hill	ARL EL-316 16-203-505	13 March 2019 - 21 March 2019
G – Buchanan Road, Buchanan	ARL EL-316 16-203-508	13 March 2019 - 21 March 2019
I – Magnetic Drive, Ashtonfield	ARL EL-316 16-203-525	13 March 2019 - 21 March 2019
L – Kilshanny Ave, Kilshanny	ARL EL-316 16-103-494	13 March 2019 - 21 March 2019
J – Parish Drive, Thornton	SVAN 957 27522	13 March 2019 - 21 March 2019

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendix C**. 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 Noise Policy for Industry (NPfI).

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 were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	Day	68	58	41	58
	Evening	62	52	41	54
	Night	55	50	40	52
F Lot 684 Black Hill Road, Black Hill	Day	71	57	43	59
	Evening	63	53	35	54
	Night	59	52	33	52
G 156 Buchanan Road, Buchanan	Day	51	48	38	49
	Evening	48	45	36	45
	Night	45	41	32	44
I 49 Magnetic Drive, Ashtonfield	Day	71	63	44	67
	Evening	61	47	39	57
	Night	52	48	38	50
L 17 Kilshanny Ave, Ashtonfield	Day	33	53	33	52
	Evening	3	50	33	53
	Night	43	61	43	59
J 220 Parish Drive, Thornton ¹	Day	-	-	-	-
	Evening	-	-	-	-
	Night	-	-	-	-

1. Due to a technical error, no unattended monitoring data was available for Location J.

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 LA90 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

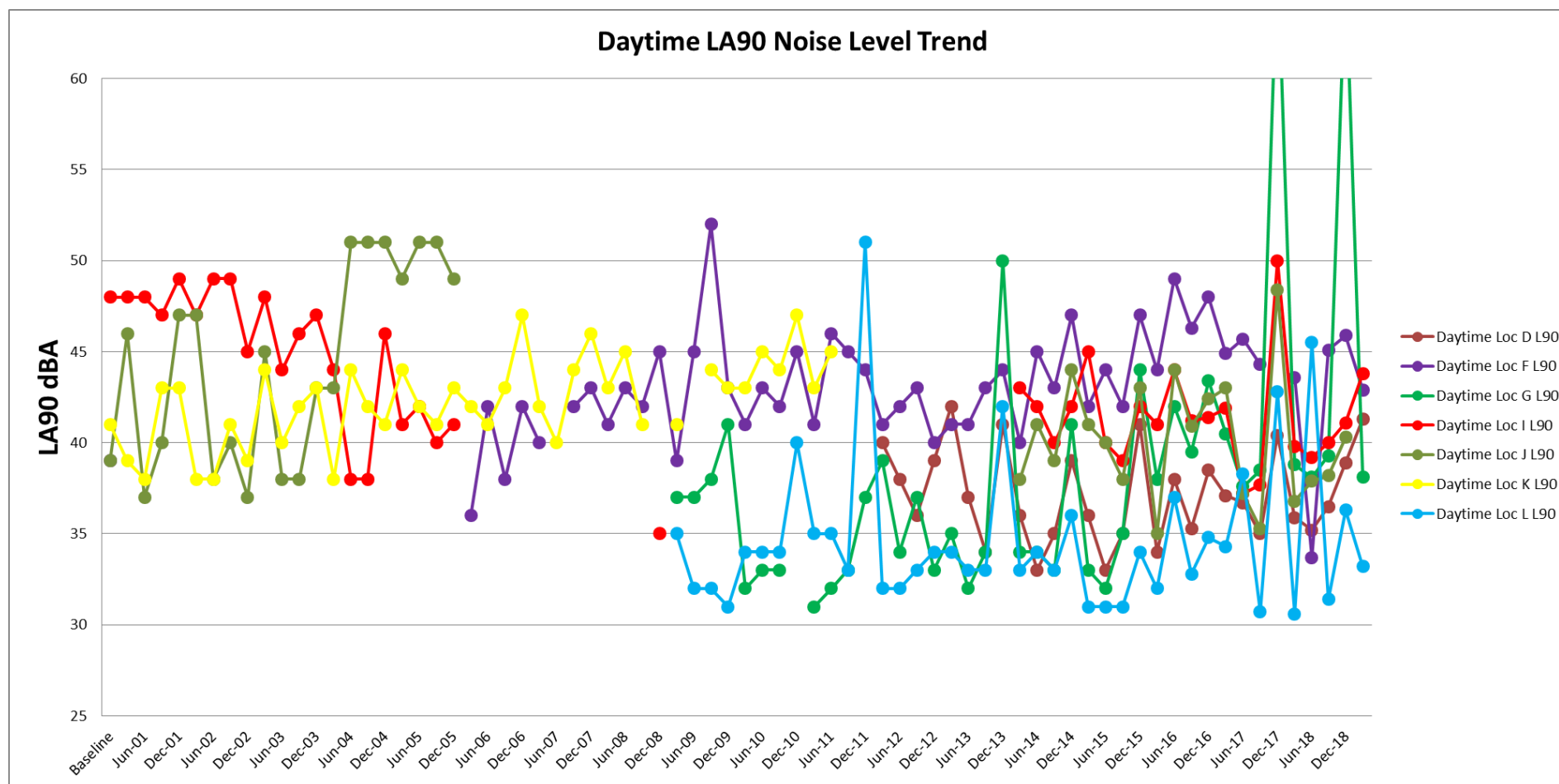


Figure 2 Long term Evening LA90 Noise Levels

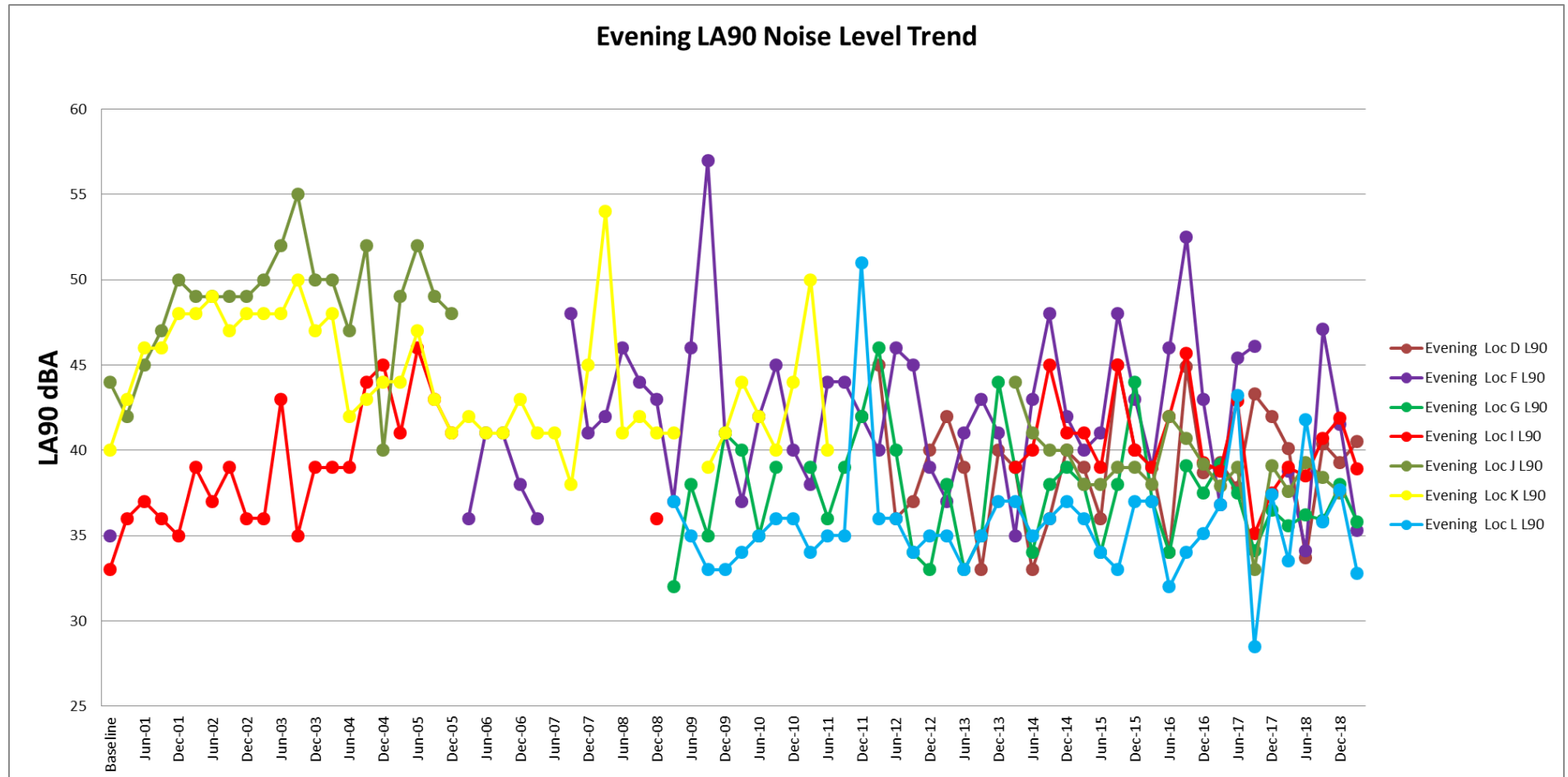
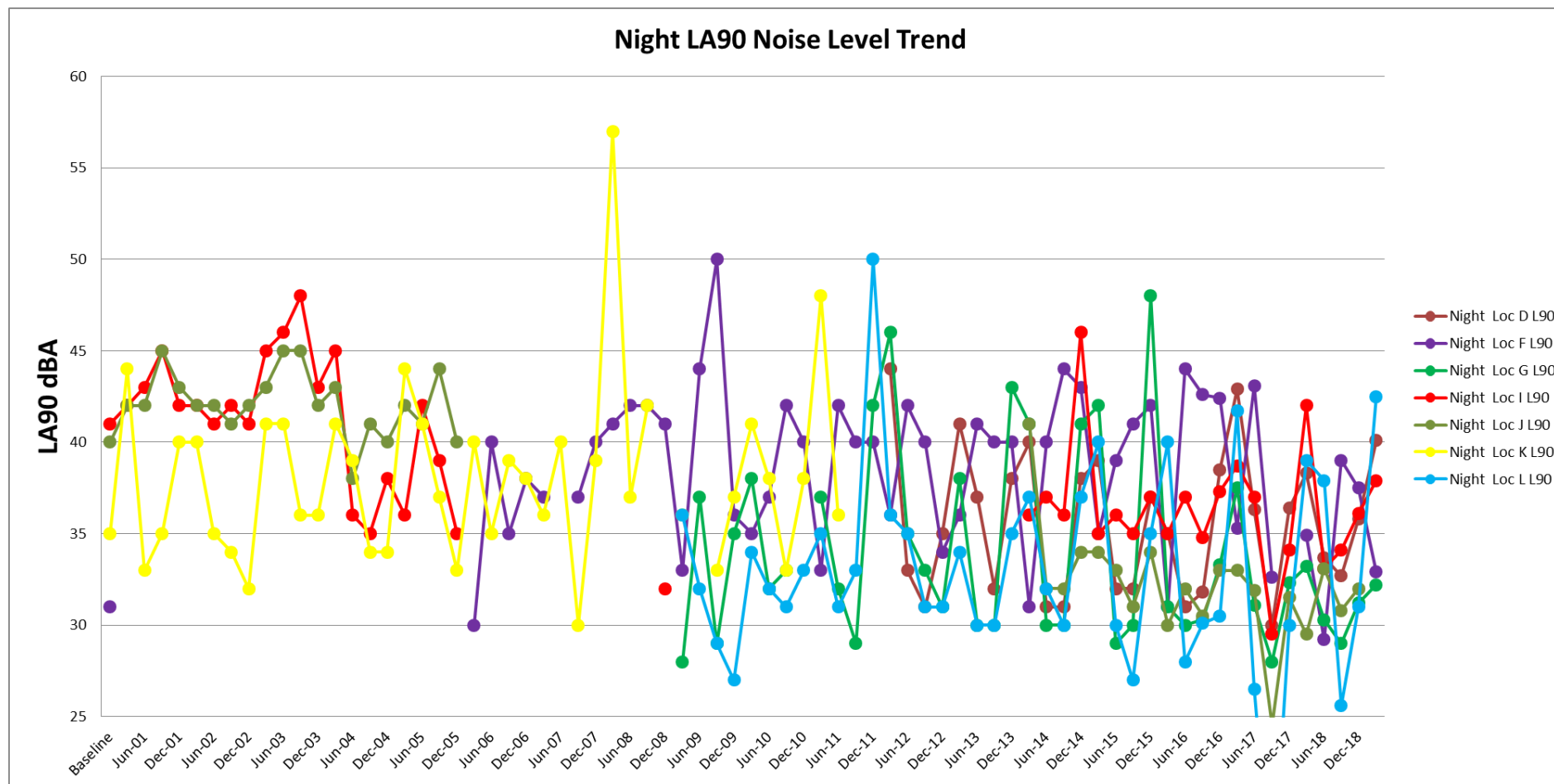


Figure 3 Long term Night-time LA90 Noise Levels



5.2.1.1 Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the current monitoring period 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 ¹	Long term Night-time LA90 Noise Levels		Difference dB ³
		Baseline	March 2019	
D Black Hill School, Black Hill	Day	N/A ²	41	N/A
	Evening	N/A ²	41	N/A
	Night	N/A ²	40	N/A
F Lot 684 Black Hill Road, Black Hill	Day	39	43	4
	Evening	35	35	0
	Night	31	33	2
G 156 Buchanan Road, Buchanan	Day	N/A ²	38	N/A
	Evening	N/A ²	36	N/A
	Night	N/A ²	32	N/A
I 49 Magnetic Drive, Ashtonfield	Day	48	44	-4
	Evening	33	39	6
	Night	41	38	-3
L 17 Kilshanny Ave, Ashtonfield	Day	N/A ²	33	N/A
	Evening	N/A ²	33	N/A
	Night	N/A ²	43	N/A
J 220 Parish Drive, Thornton	Day	39	-	-
	Evening	44	-	-
	Night	40	-	-

Note 1: Periods are as detailed the NPfI 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		December 2018	March 2019	
D Black Hill School, Black Hill	Day	39	41	2
	Evening	39	41	2
	Night	36	40	4
F Lot 684 Black Hill Road, Black Hill	Day	46	43	-3
	Evening	42	35	-7
	Night	38	33	-5
G 156 Buchanan Road, Buchanan	Day	66	38	-28
	Evening	38	36	-2
	Night	31	32	1
I 49 Magnetic Drive, Ashtonfield	Day	41	44	3
	Evening	42	39	-3
	Night	36	38	2
L 17 Kilshanny Ave, Ashtonfield	Day	36	33	-3
	Evening	38	33	-5
	Night	31	43	12
J 220 Parish Drive, Thornton	Day	40	-	-
	Evening	38	-	-
	Night	32	-	-

Note 1: 1. 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period Last Year

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		March 2018	March 2019	
D Black Hill School, Black Hill	Day	36	41	5
	Evening	40	41	1
	Night	38	40	2
F Lot 684 Black Hill Road, Black Hill	Day	44	43	-1
	Evening	39	35	-4
	Night	35	33	-2
G 156 Buchanan Road, Buchanan	Day	39	38	-1
	Evening	36	36	0
	Night	33	32	-1
I 49 Magnetic Drive, Ashtonfield	Day	40	44	4
	Evening	39	39	0
	Night	42	38	-4
L 17 Kilshanny Ave, Ashtonfield	Day	31	33	2
	Evening	34	33	-1
	Night	39	43	4
J ³ 220 Parish Drive, Thornton	Day	37	-	-
	Evening	38	-	-
	Night	30	-	-

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

Note 3: Due to a logger error no results are available at location J for the March 2019 quarter, as such a comparison cannot be made.

5.2.2 Ambient LA10 Noise Comparison

The long term ambient LA10 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 respectively.

Figure 4 Long term Daytime LA₁₀ Noise Levels

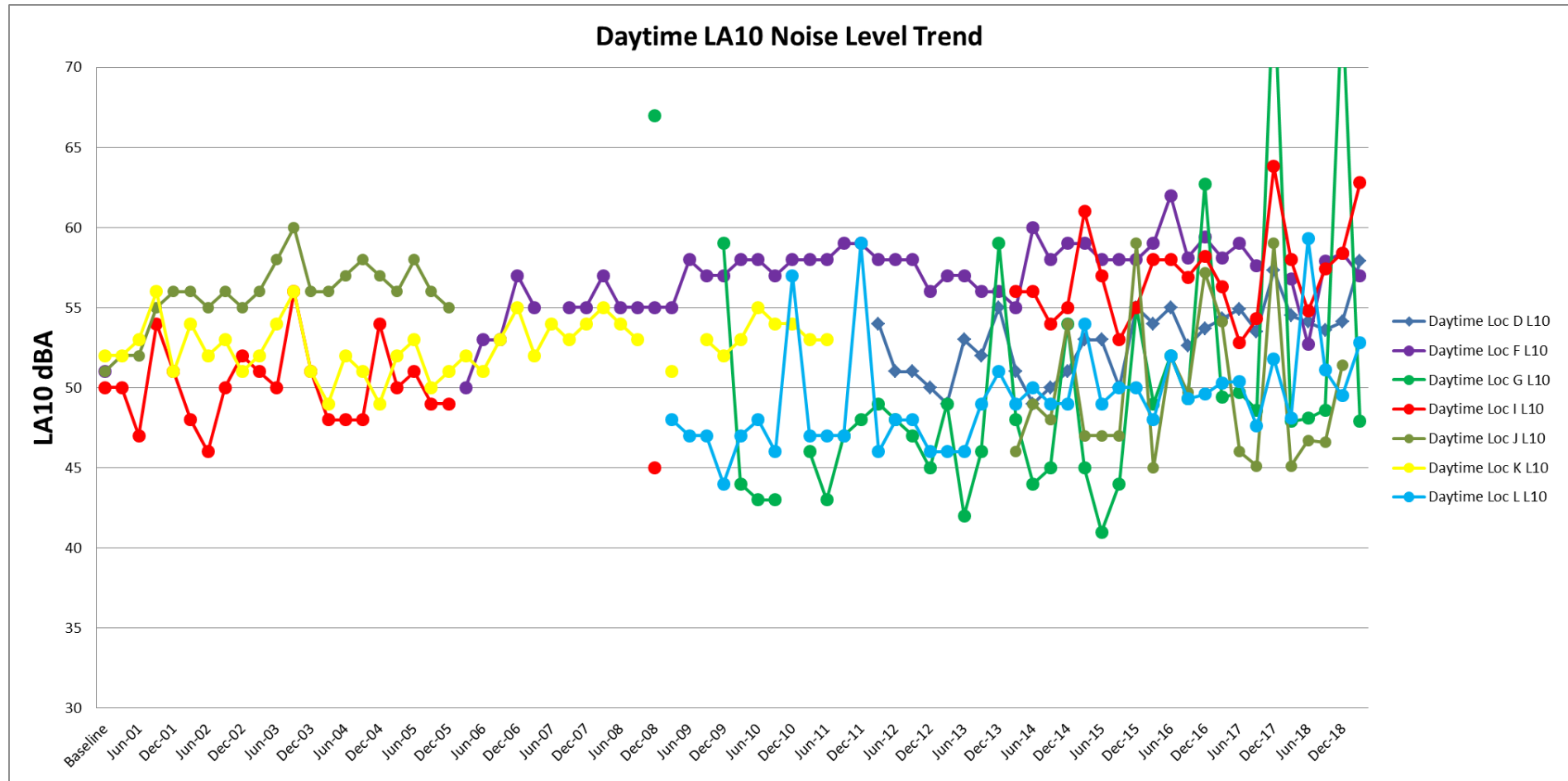


Figure 5 Long term Evening LA10 Noise Levels

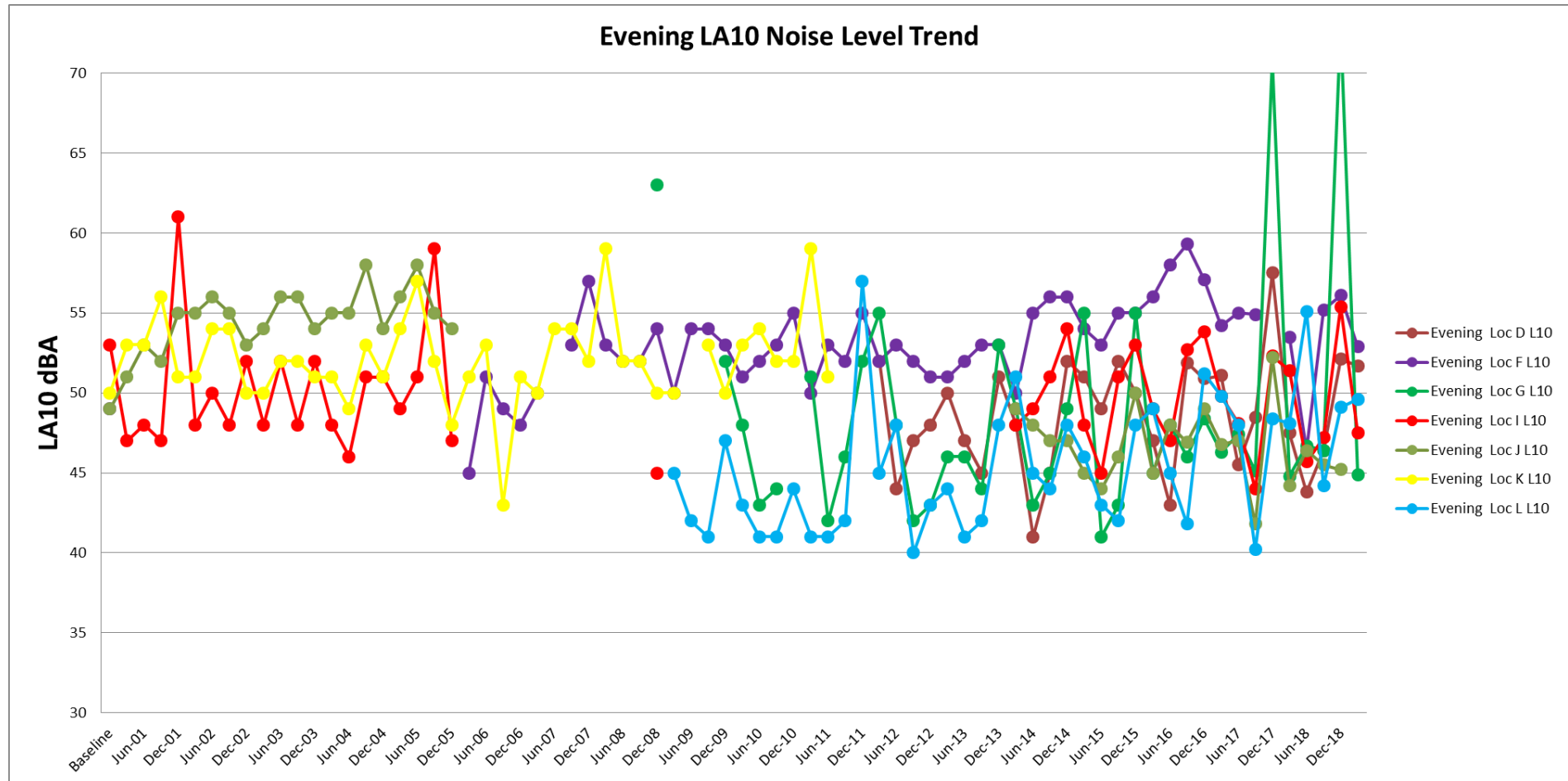
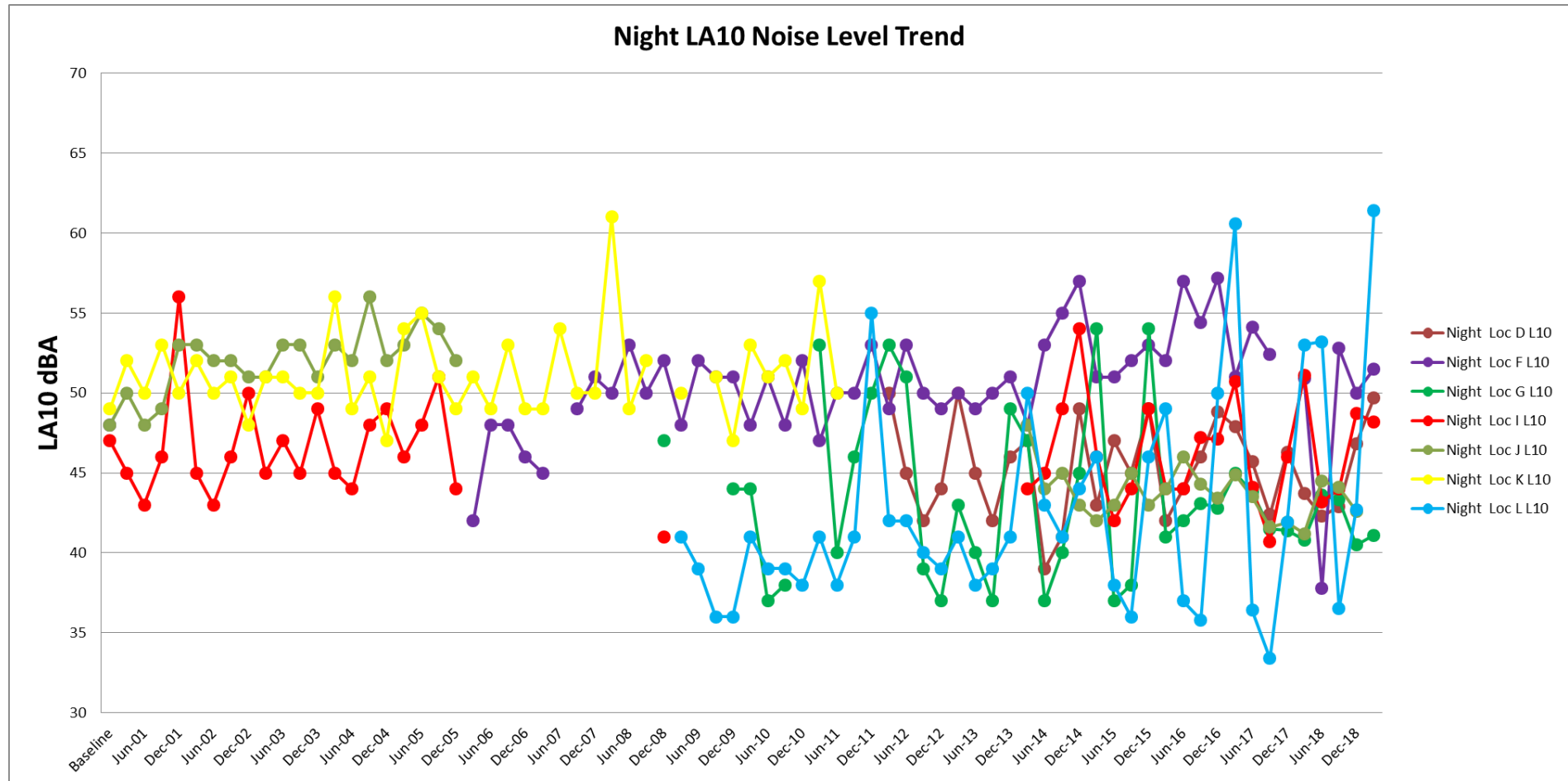


Figure 6 Long term Night-time LA10 Noise Levels



5.2.2.1 Baseline

Table 15 presents the ambient LA10 noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ³
		Baseline	March 2019	
D Black Hill School, Black Hill	Day	N/A ²	58	N/A
	Evening	N/A ²	52	N/A
	Night	N/A ²	50	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	57	6
	Evening	49	53	4
	Night	48	52	4
G 156 Buchanan Road, Buchanan	Day	N/A ²	48	N/A
	Evening	N/A ²	45	N/A
	Night	N/A ²	41	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	63	13
	Evening	53	48	-5
	Night	47	48	1
L 17 Kilshanny Ave, Ashtonfield	Day	N/A ²	53	N/A
	Evening	N/A ²	50	N/A
	Night	N/A ²	61	N/A
J 220 Parish Drive, Thornton	Day	51	-	-
	Evening	49	-	-
	Night	48	-	-

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ²
		December 2018	March 2019	
D Black Hill School, Black Hill	Day	54	58	4
	Evening	52	52	0
	Night	47	50	3
F Lot 684 Black Hill Road, Black Hill	Day	58	57	-1
	Evening	56	53	-3
	Night	50	52	2
G 156 Buchanan Road, Buchanan	Day	74	48	-26
	Evening	73	45	-28
	Night	41	41	0
I 49 Magnetic Drive, Ashtonfield	Day	58	63	5
	Evening	55	48	-7
	Night	49	48	-1
L 17 Kilshanny Ave, Ashtonfield	Day	50	53	3
	Evening	49	50	1
	Night	43	61	18
J 220 Parish Drive, Thornton	Day	51	-	-
	Evening	45	-	-
	Night	43	-	-

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

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 Result Comparison – Coinciding Period Last Year

Monitoring Location	Period ¹	Long term Night-time LA ₁₀ Noise Levels		Difference dB ²
		March 2018	March 2019	
D Black Hill School, Black Hill	Day	55	58	3
	Evening	48	52	4
	Night	44	50	6
F Lot 684 Black Hill Road, Black Hill	Day	57	57	0
	Evening	54	53	-1
	Night	51	52	1
G 156 Buchanan Road, Buchanan	Day	48	48	0
	Evening	45	45	0
	Night	41	41	0
I 49 Magnetic Drive, Ashtonfield	Day	58	63	5
	Evening	51	48	-3
	Night	51	48	-3
L 17 Kilshanny Ave, Ashtonfield	Day	48	53	5
	Evening	48	50	2
	Night	53	61	8
J ³ 220 Parish Drive, Thornton	Day	45	-	-
	Evening	44	-	-
	Night	41	-	-

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

Note 3: Due to a logger error no results are available at location J for the March 2019 quarter, as such a comparison can not be made.

5.3 Rail Noise Monitoring

Due to a logger error at Location J no unattended monitoring data was available for the March 2019 monitoring period. The train loading times during the noise monitoring period are presented in **Table 18**.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
13/03/19	12:45-16:15	Day
14/03/19	11:45-14:55	Day

Given the results of previous quarterly monitoring periods and that only one train movement occurred during each daytime period, it is considered likely that rail traffic noise was compliant during the March 2019 monitoring period.

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 12 August 2014.

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.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the March 2019 quarter at six focus locations surrounding the mine.

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

A comparison of ambient LA₁₀ and LA₉₀ noise levels recorded during the current monitoring period (March 2019), the baseline monitoring period, the last monitoring period (December 2018), and the coinciding monitoring period from last year (March 2018) has been conducted.

Given the results of previous quarterly monitoring periods, rail noise levels from the Bloomfield Rail Spur were considered to be in compliance with the Abel Mine Project Approval during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being 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 LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-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 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB 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	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	
90	Construction site with pneumatic hammering	Very noisy
80	Kerbside of busy street	
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	
30	Inside bedroom	Quiet to very quiet
20	Recording studio	

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

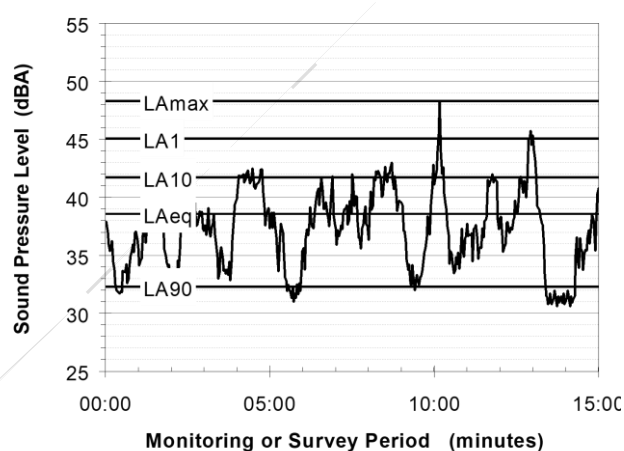
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of 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 LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 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:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 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.

LAeq 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.

5. Frequency Analysis

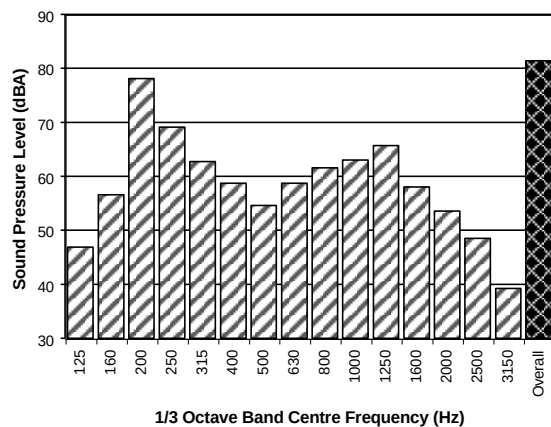
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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 (three 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.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. 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 (ie vertical, longitudinal 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 $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

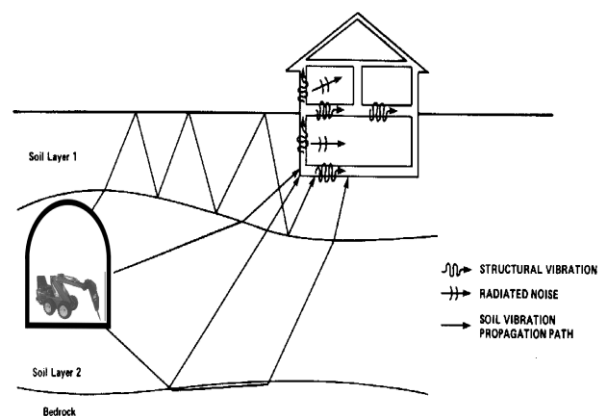
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience 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.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This 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 ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 23293 & FILT 4792**

Equipment Description: Sound & Vibration Analyser

Manufacturer: B&K

Model No: 2250 **Serial No:** 3003389

Microphone Type: 4950 **Serial No:** 2913816

Preamplifier Type: ZC0032 **Serial No:** 20519

Filter Type: 1/3 Octave **Serial No:** 3003389

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 990 hPa ± 1.5 hPa

Temperature: 25 °C $\pm 2^\circ$ C **Relative Humidity:** 29% $\pm 5\%$

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE: *[Signature]*

Jack Klett

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



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Mobile: 0413 809806
web site: www.acu-vib.com.au

CERTIFICATE No.: SLM 23293 & FILT 4792

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013. A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Checked by: 

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



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Level 7 Building 2 423 Pennant Hills Rd
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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number C17235

Client Details SLR Consulting Australia Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-207-050
Microphone Serial Number : 318219
Pre-amplifier Serial Number : 27911

Atmospheric Conditions

Ambient Temperature : 22.4°C
Relative Humidity : 36.6%
Barometric Pressure : 100.02kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 30/05/2017

Secondary Check: Riley Cooper
Report Issue Date : 31/05/2017

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.12dB	Temperature	±0.05°C
12.5kHz	±0.18dB	Relative Humidity	±0.46%
16kHz	±0.31dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C17217**

Client Details SLR Consulting Australia Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-525
Microphone Serial Number : 322080
Pre-amplifier Serial Number : 27089

Atmospheric Conditions

Ambient Temperature : 24.9°C
Relative Humidity : 46.4%
Barometric Pressure : 100.27kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 09/06/2017

Secondary Check: Riley Cooper
Report Issue Date : 13/06/2017

Approved Signatory :

PP

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests

31.5 Hz to 8kHz $\pm 0.16\text{dB}$
12.5kHz $\pm 0.2\text{dB}$
16kHz $\pm 0.29\text{dB}$

Electrical Tests

31.5 Hz to 20 kHz $\pm 0.12\text{dB}$

Environmental Conditions

Temperature $\pm 0.05^\circ\text{C}$
Relative Humidity $\pm 0.46\%$
Barometric Pressure $\pm 0.017\text{Pa}$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18314**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-508
Microphone Serial Number : 319092
Pre-amplifier Serial Number : 27474

Atmospheric Conditions

Ambient Temperature : 21.7°C
Relative Humidity : 43.3%
Barometric Pressure : 99.36kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz ±0.15dB
12.5kHz ±0.21dB
16kHz ±0.29dB
Electrical Tests
31.5 Hz to 20 kHz ±0.12dB

Environmental Conditions
Temperature ±0.3°C
Relative Humidity ±2.5%
Barometric Pressure ±0.017Pa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number C17277

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-505
Microphone Serial Number : 318370
Pre-amplifier Serial Number : 26962

Atmospheric Conditions

Ambient Temperature : 24.9°C
Relative Humidity : 44.3%
Barometric Pressure : 100.78kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 14/06/2017

Secondary Check: Riley Cooper
Report Issue Date : 15/06/2017

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests

31.5 Hz to 8kHz $\pm 0.16\text{dB}$
12.5kHz $\pm 0.2\text{dB}$
16kHz $\pm 0.29\text{dB}$

Electrical Tests

31.5 Hz to 20 kHz $\pm 0.12\text{dB}$

Environmental Conditions

Temperature $\pm 0.05^\circ\text{C}$
Relative Humidity $\pm 0.46\%$
Barometric Pressure $\pm 0.017\text{Pa}$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18311**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-103-494
Microphone Serial Number : 317150
Pre-amplifier Serial Number : 28022

Atmospheric Conditions

Ambient Temperature : 22.5°C
Relative Humidity : 42.4%
Barometric Pressure : 99.31kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.15dB	Temperature	±0.3°C
12.5kHz	±0.21dB	Relative Humidity	±2.5%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 23294 & FILT 4793**

Equipment Description: Sound & Vibration Analyser

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 27522

Microphone Type: 7052E **Serial No:** 62914

Preamplifier Type: SV12L **Serial No:** 49862

Filter Type: 1/1 Octave **Serial No:** 27522

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 996 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 27% $\pm 5\%$

Date of Calibration: 07/08/2018 **Issue Date:** 07/08/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE: *[Signature]*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



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web site: www.acu-vib.com.au

CERTIFICATE No.: SLM 23294 & FILT 4793

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	Pass
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013. A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 07/08/2018 **Issue Date:** 07/08/2018

Checked by: *[Signature]*

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



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Acoustic and Vibration
Measurements

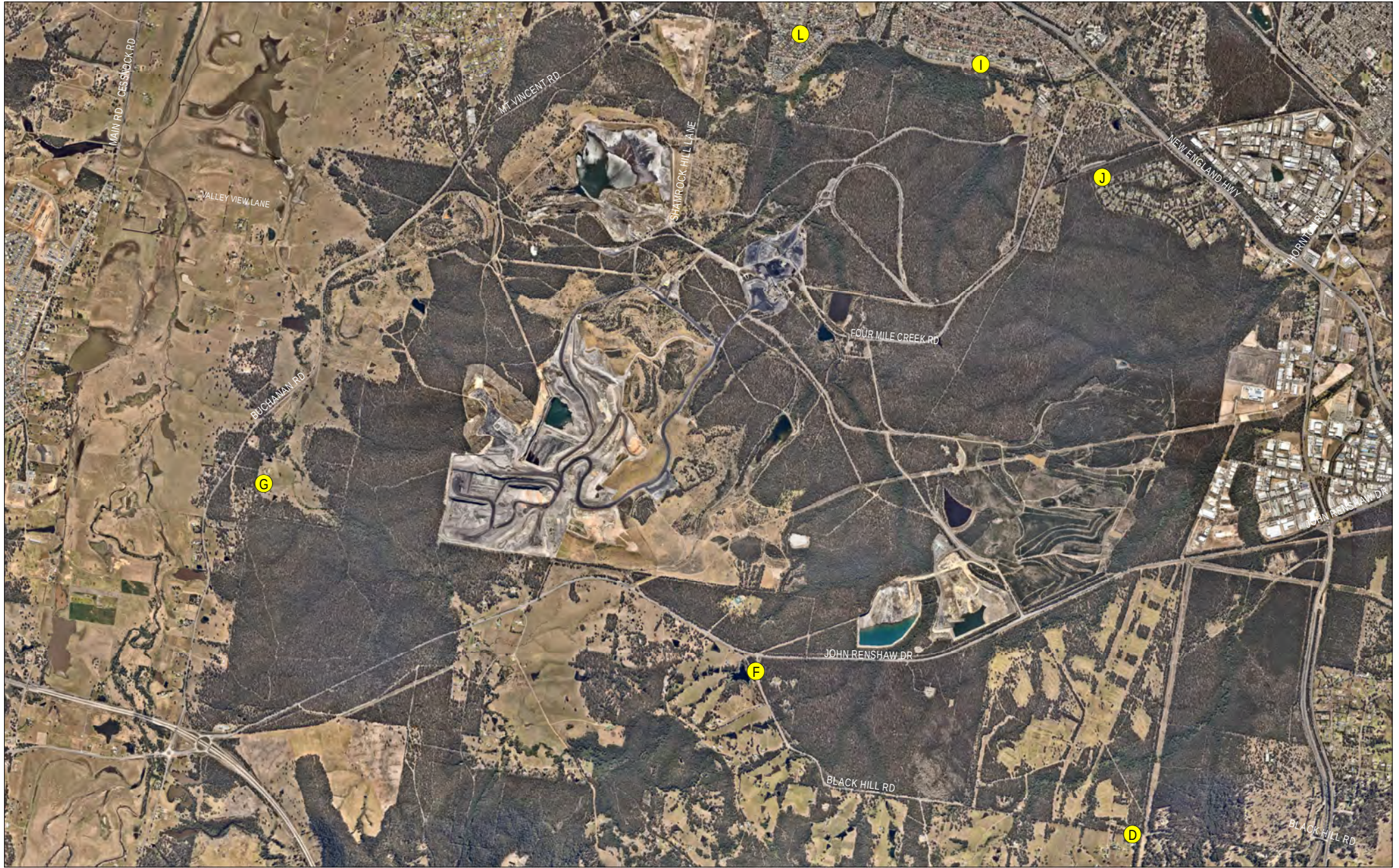


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APPENDIX C

Noise Monitoring Locations

D:\Quick_Jobs\Martin_Davenport\Donaldson\SLR\63001_0530\200_LAB_MonitoringLocations_01.mxd



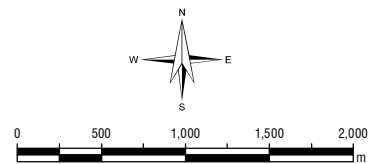
SLR  10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

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Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

 Noise Monitoring Locations



Donaldson Coal

Noise Monitoring

Noise Monitoring Locations

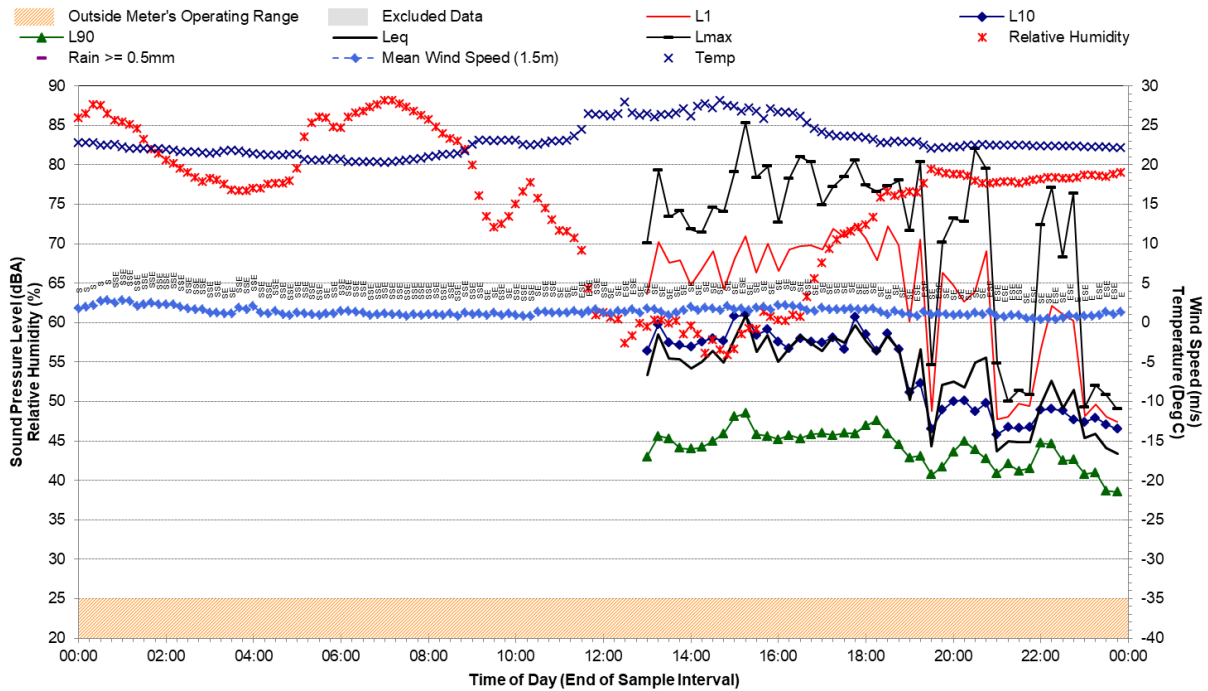
APPENDIX B

APPENDIX D

Statistical Ambient Noise Levels

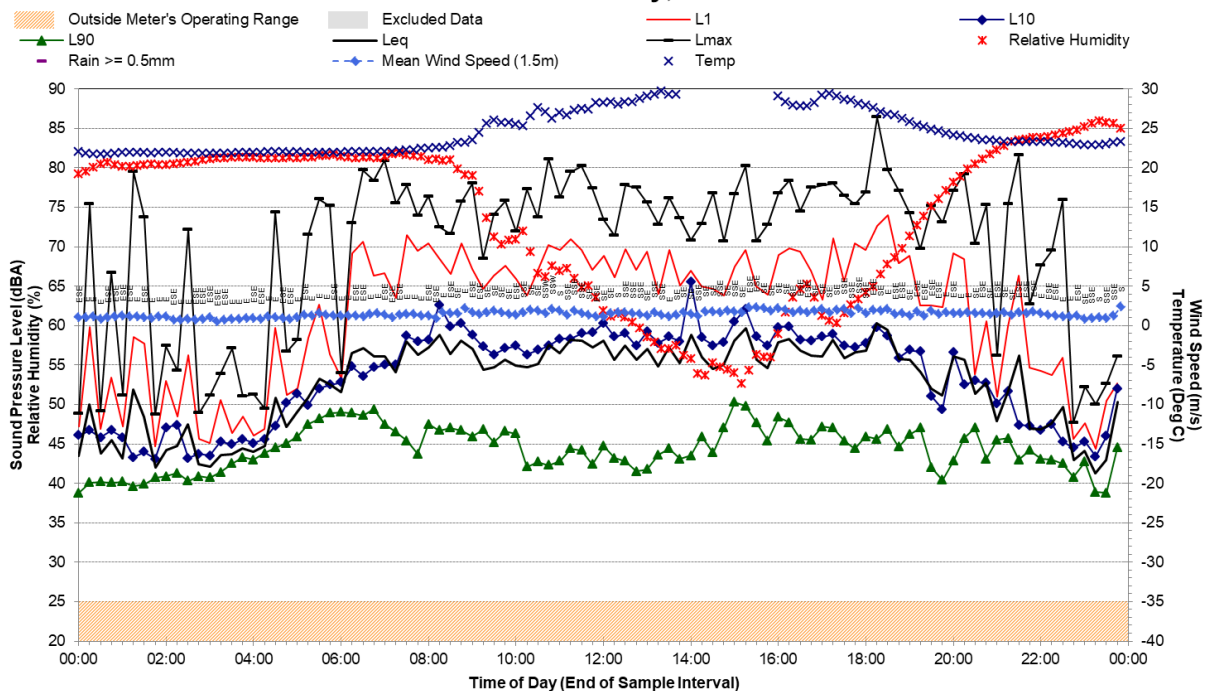
Statistical Ambient Noise Levels

Location D - Wednesday, 13 March 2019



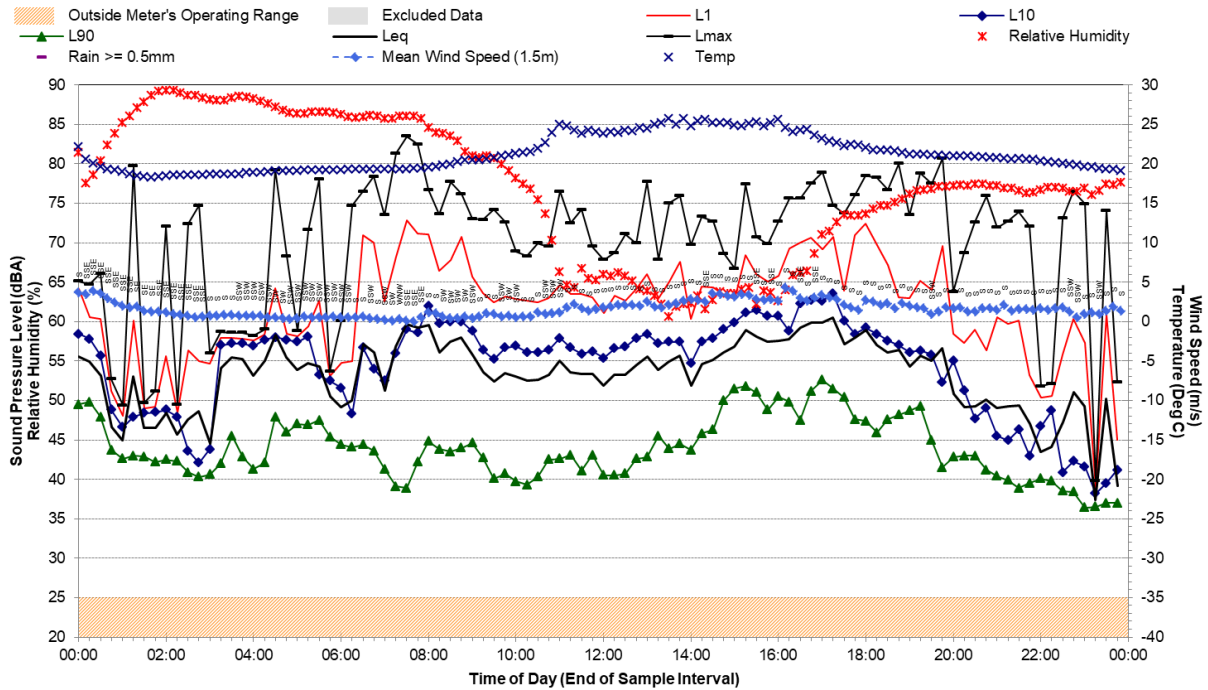
Statistical Ambient Noise Levels

Location D - Thursday, 14 March 2019



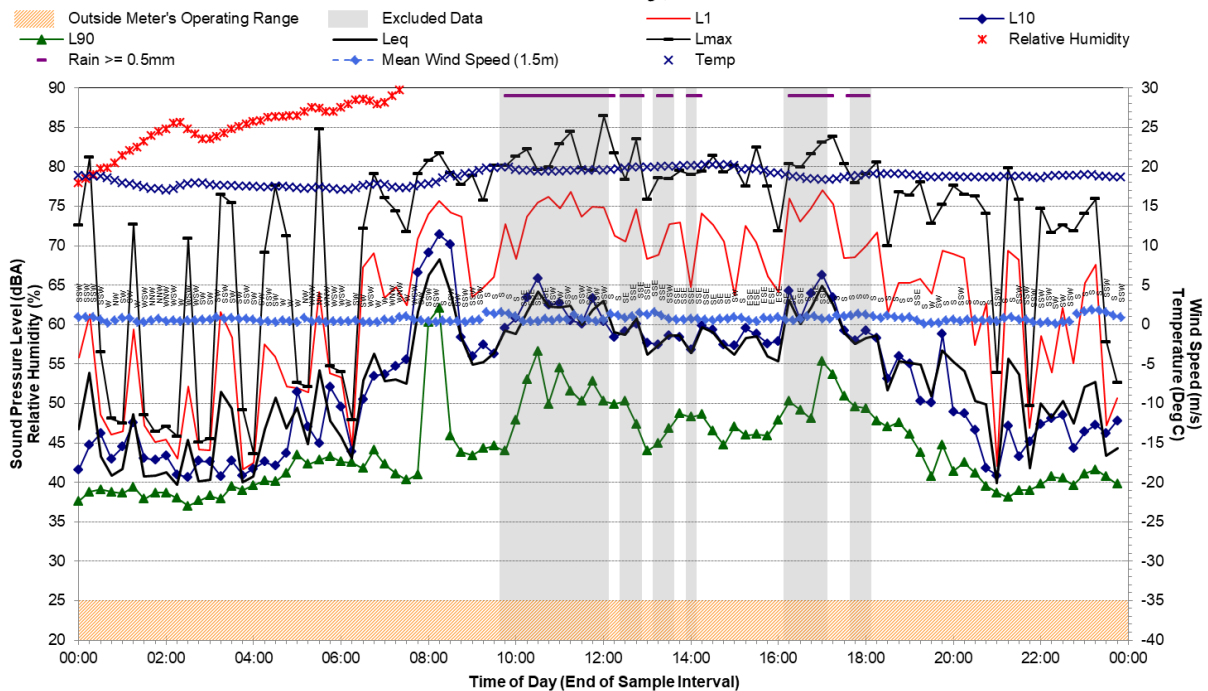
Statistical Ambient Noise Levels

Location D - Friday, 15 March 2019



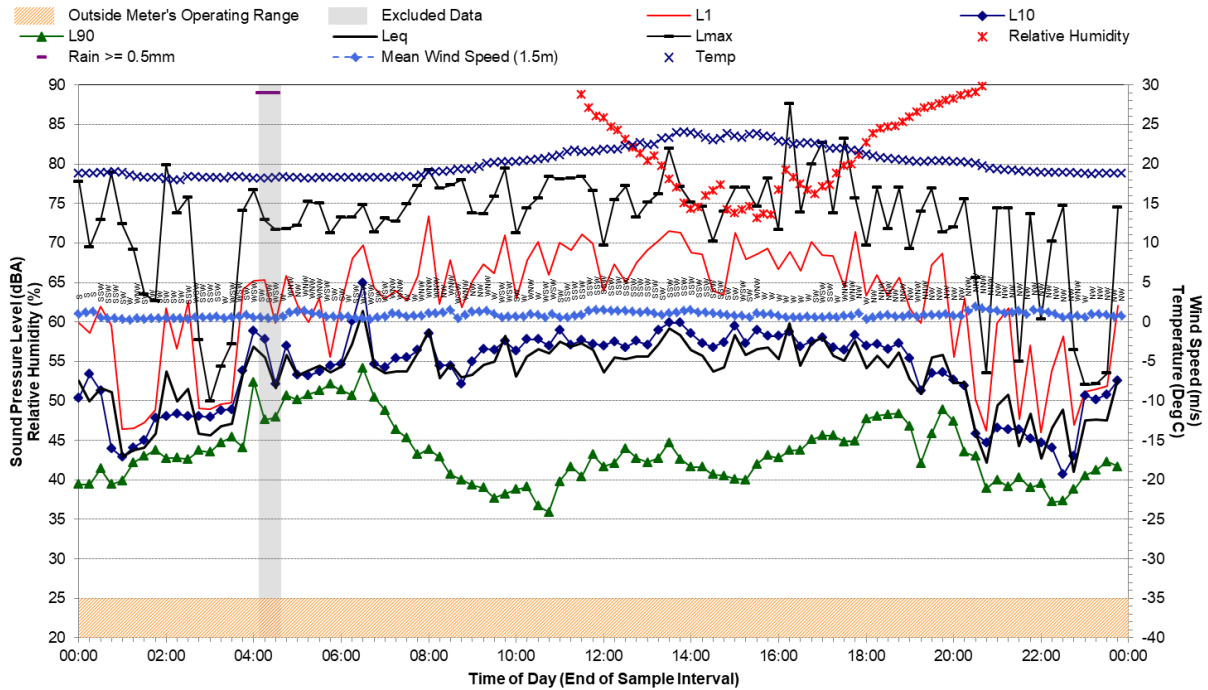
Statistical Ambient Noise Levels

Location D - Saturday, 16 March 2019



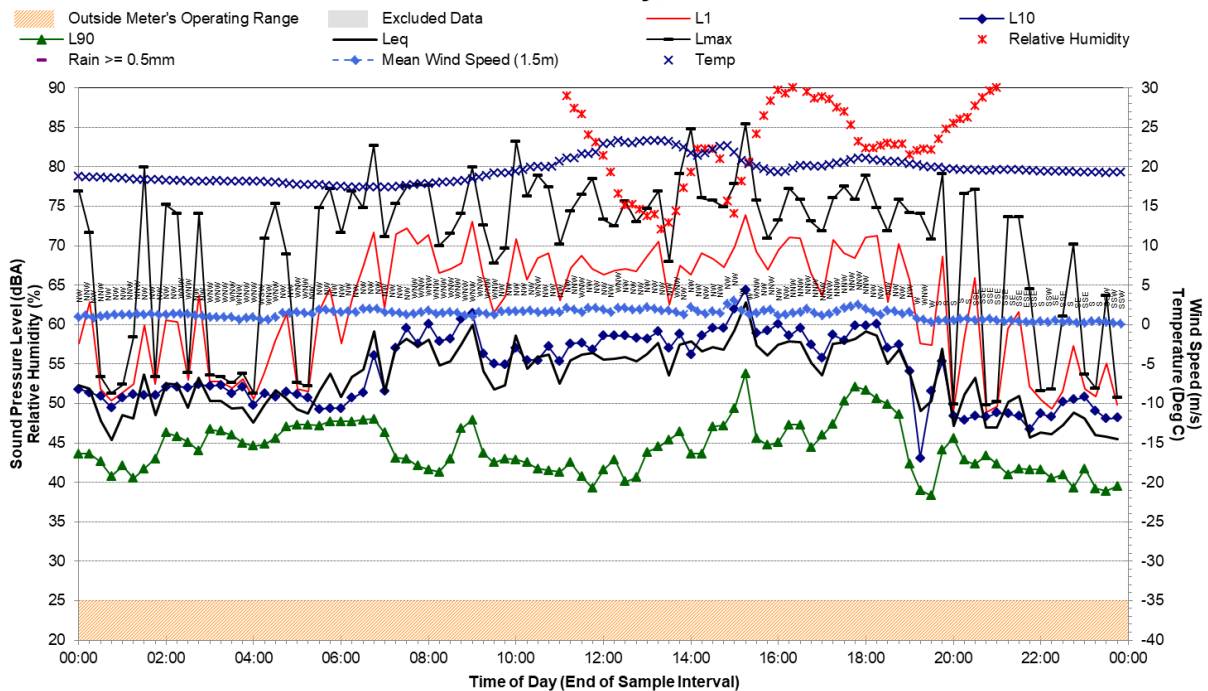
Statistical Ambient Noise Levels

Location D - Sunday, 17 March 2019



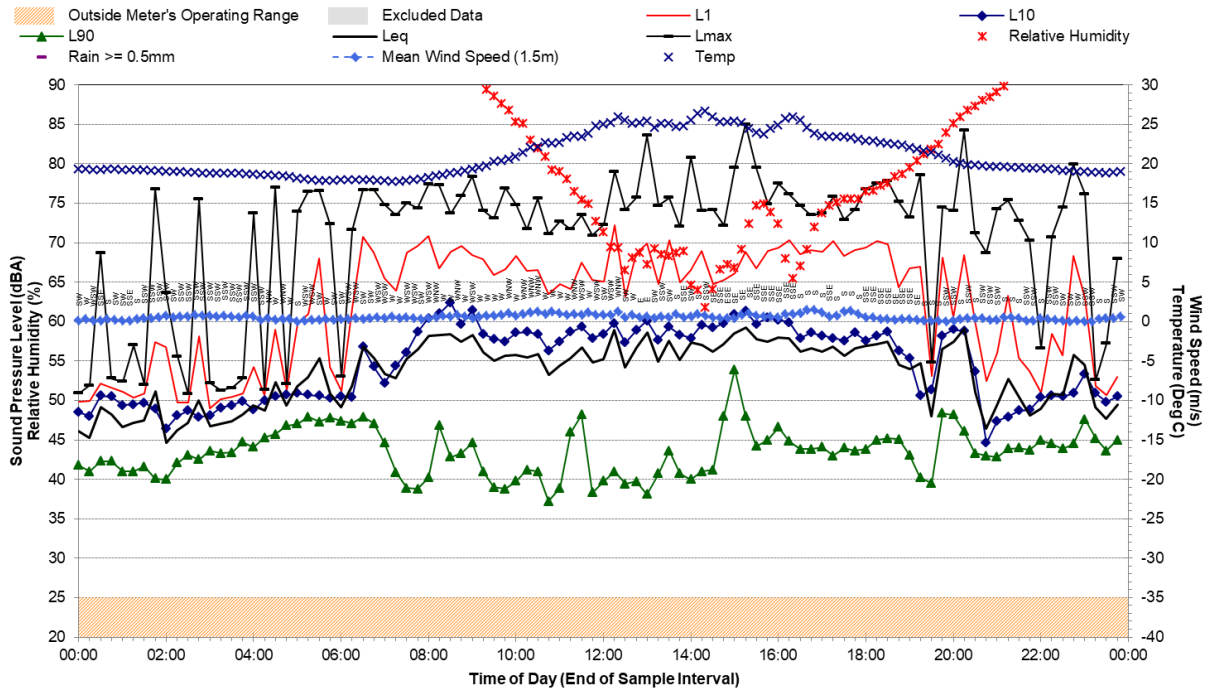
Statistical Ambient Noise Levels

Location D - Monday, 18 March 2019



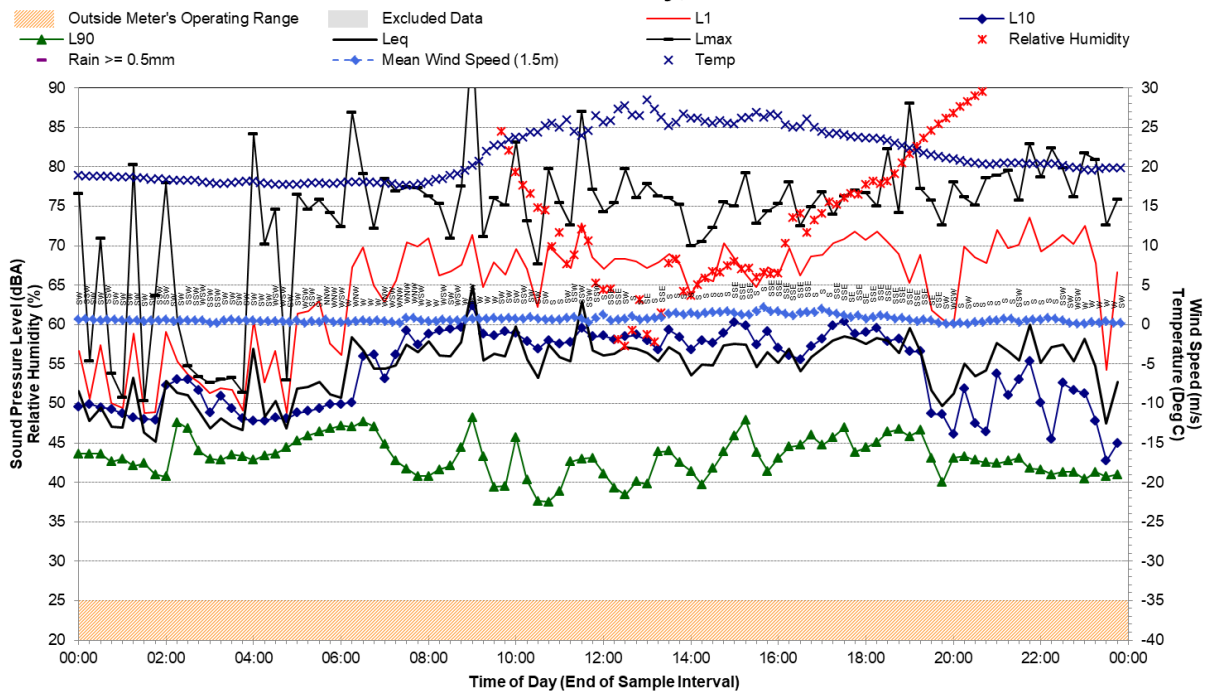
Statistical Ambient Noise Levels

Location D - Tuesday, 19 March 2019



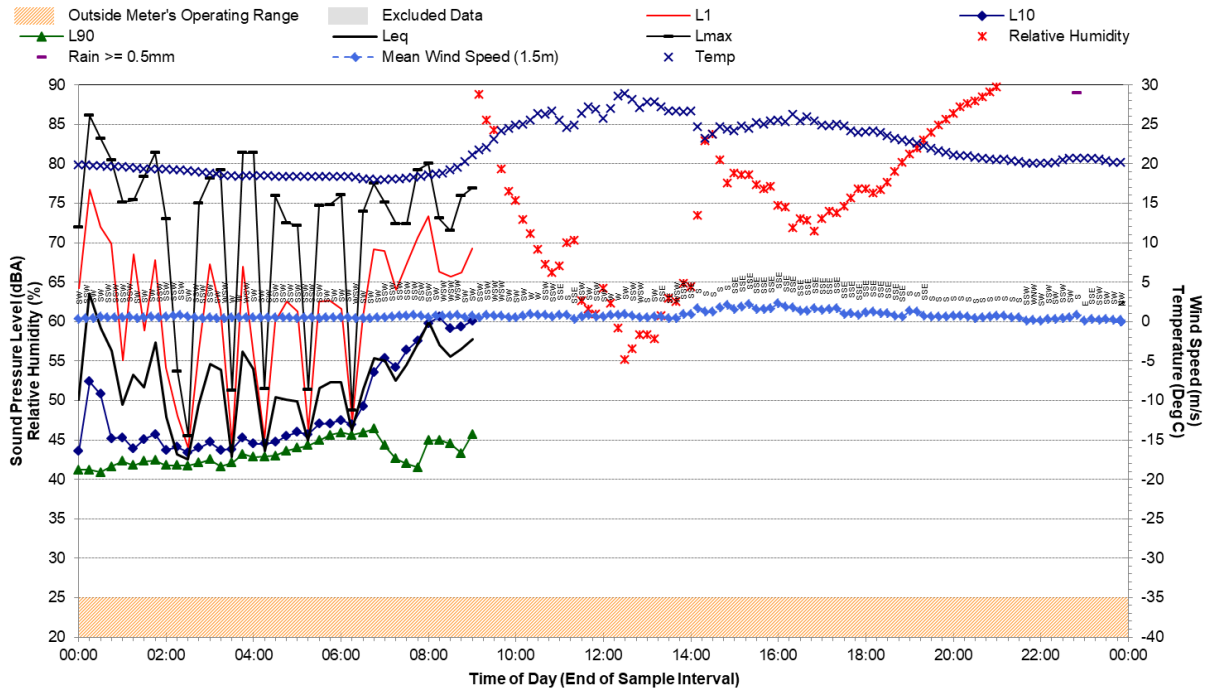
Statistical Ambient Noise Levels

Location D - Wednesday, 20 March 2019



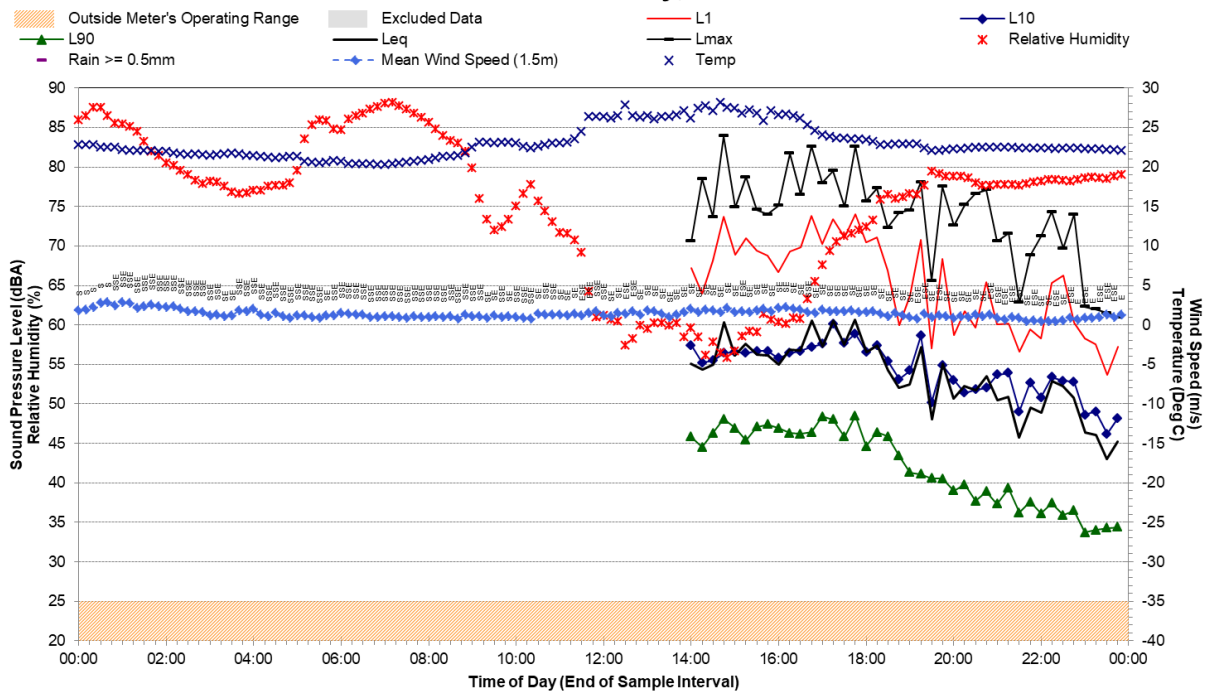
Statistical Ambient Noise Levels

Location D - Thursday, 21 March 2019



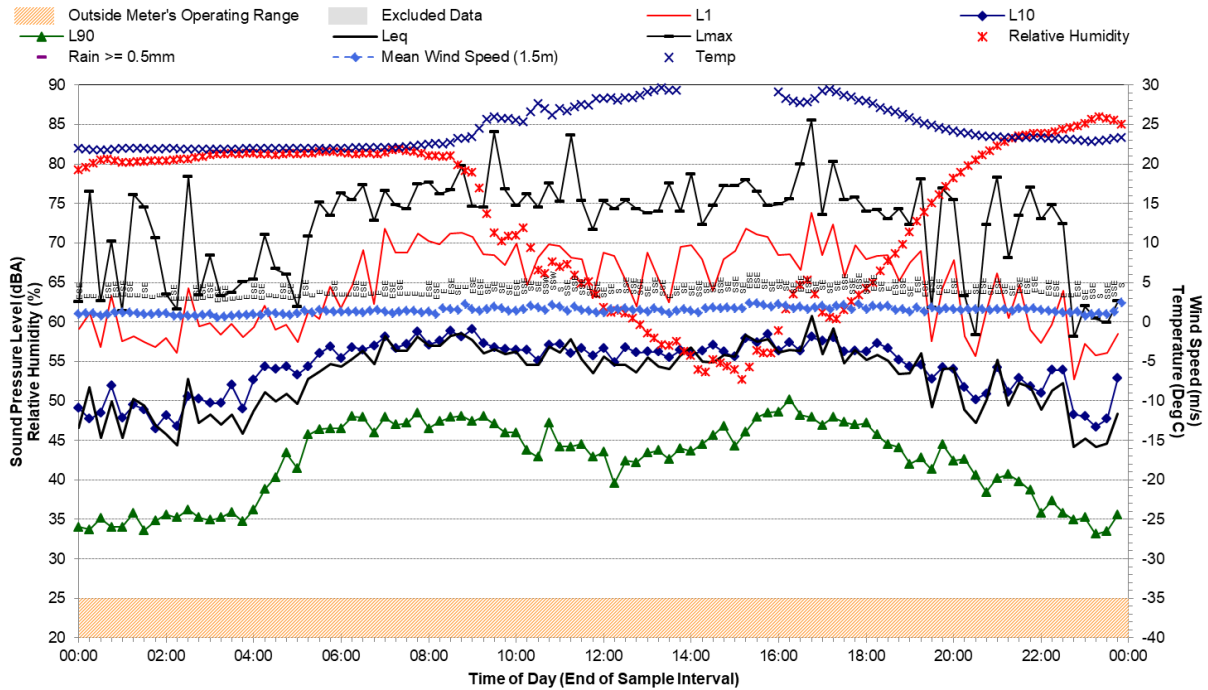
Statistical Ambient Noise Levels

Location F - Wednesday, 13 March 2019



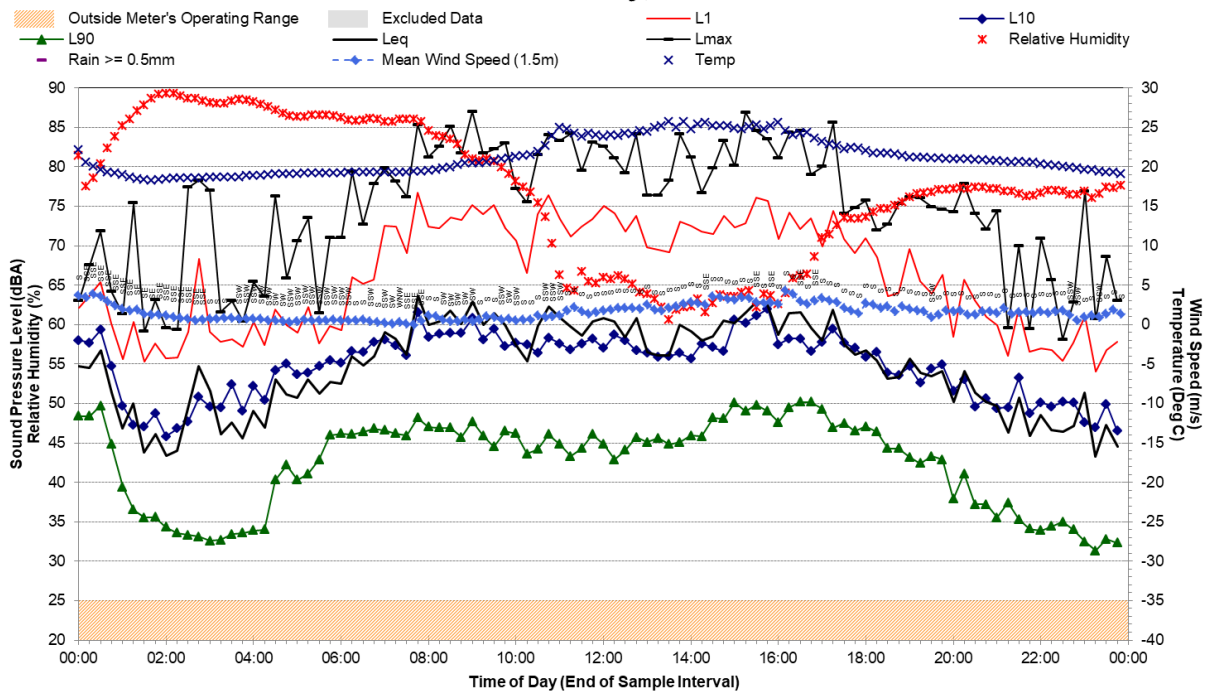
Statistical Ambient Noise Levels

Location F - Thursday, 14 March 2019



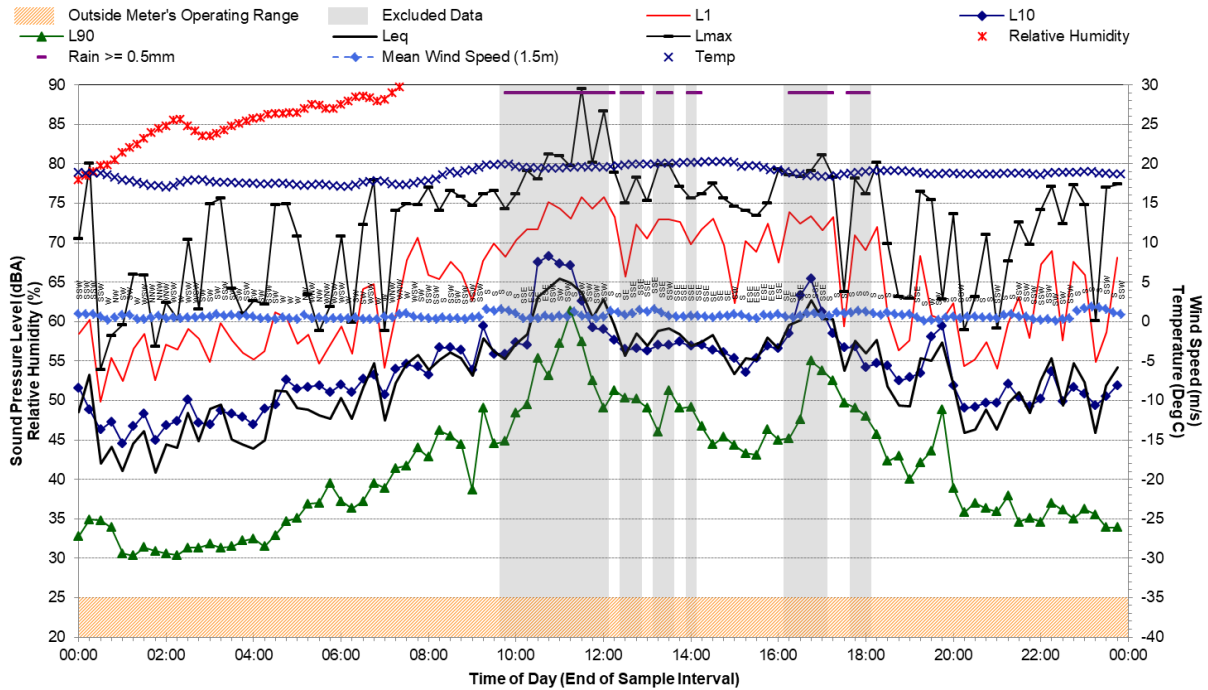
Statistical Ambient Noise Levels

Location F - Friday, 15 March 2019



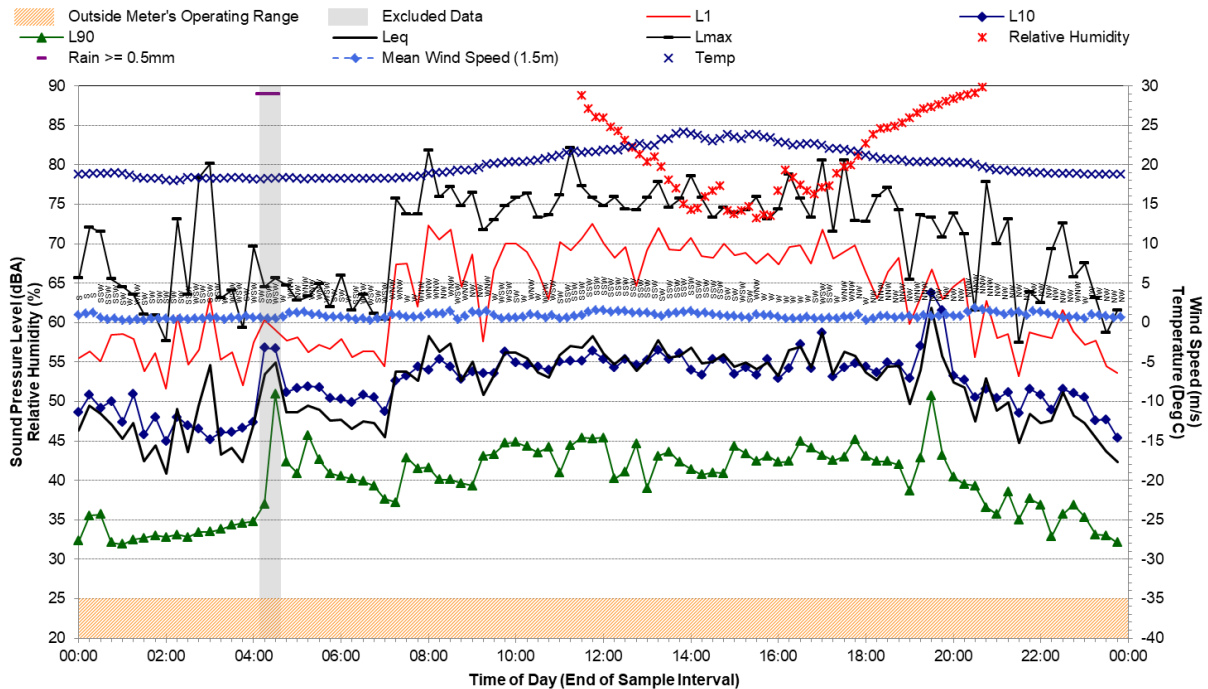
Statistical Ambient Noise Levels

Location F - Saturday, 16 March 2019



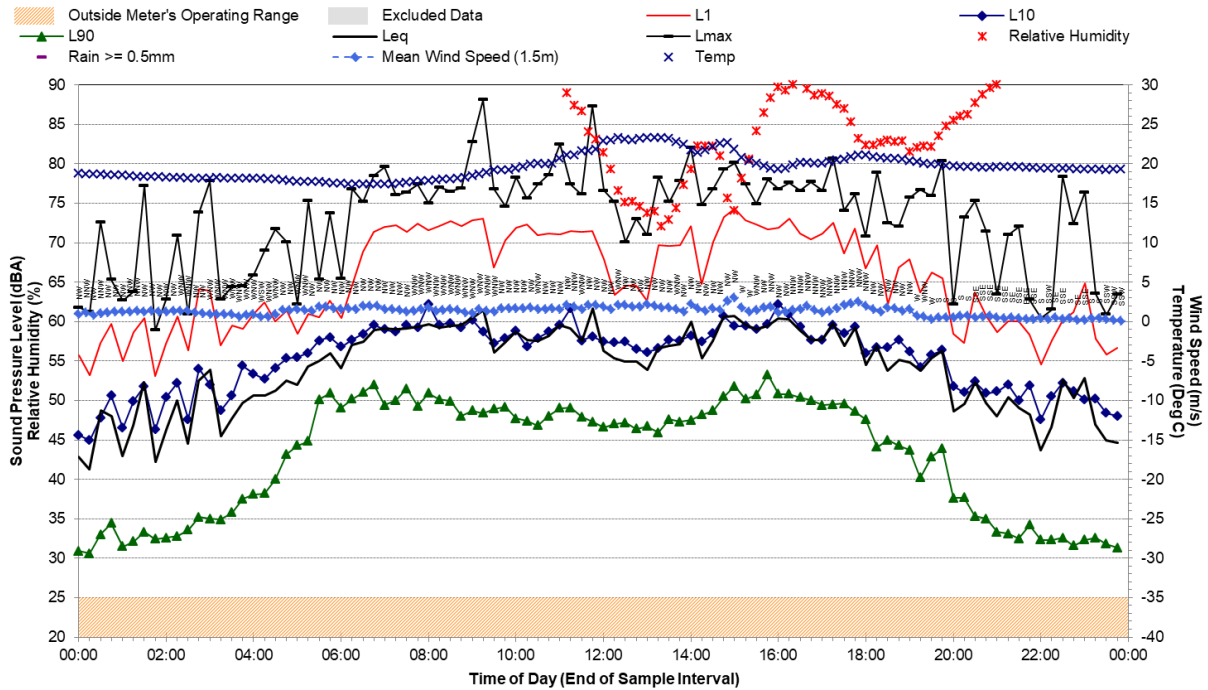
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Location F - Sunday, 17 March 2019



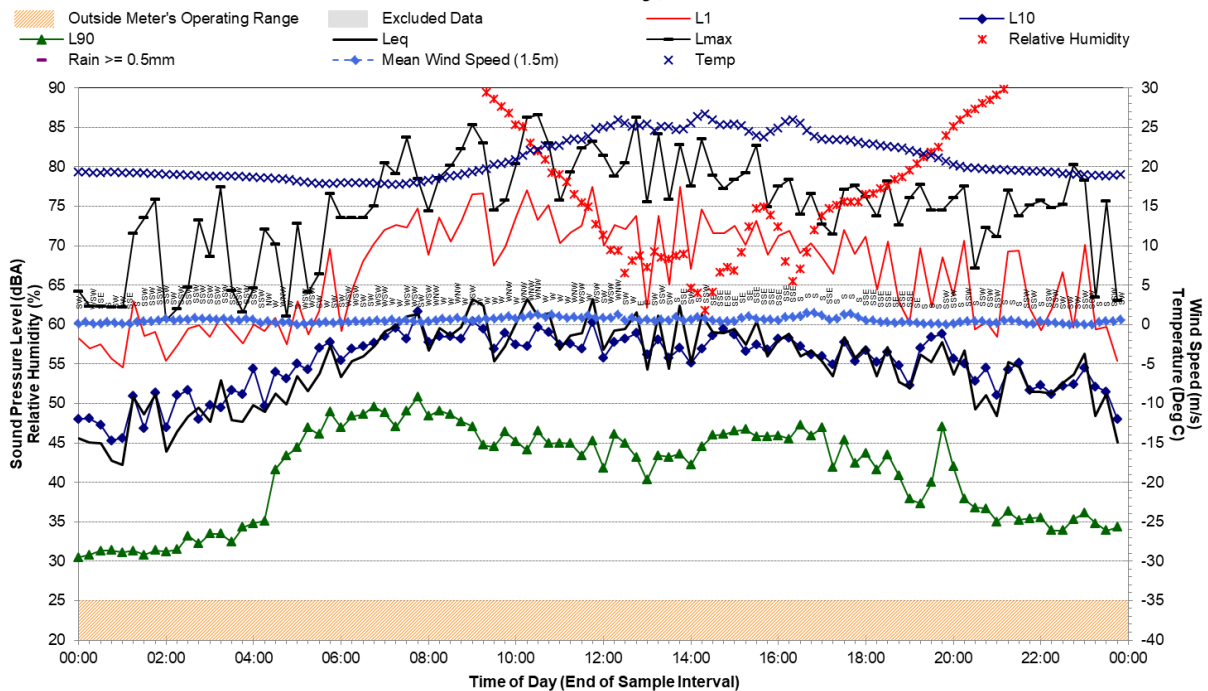
Statistical Ambient Noise Levels

Location F - Monday, 18 March 2019



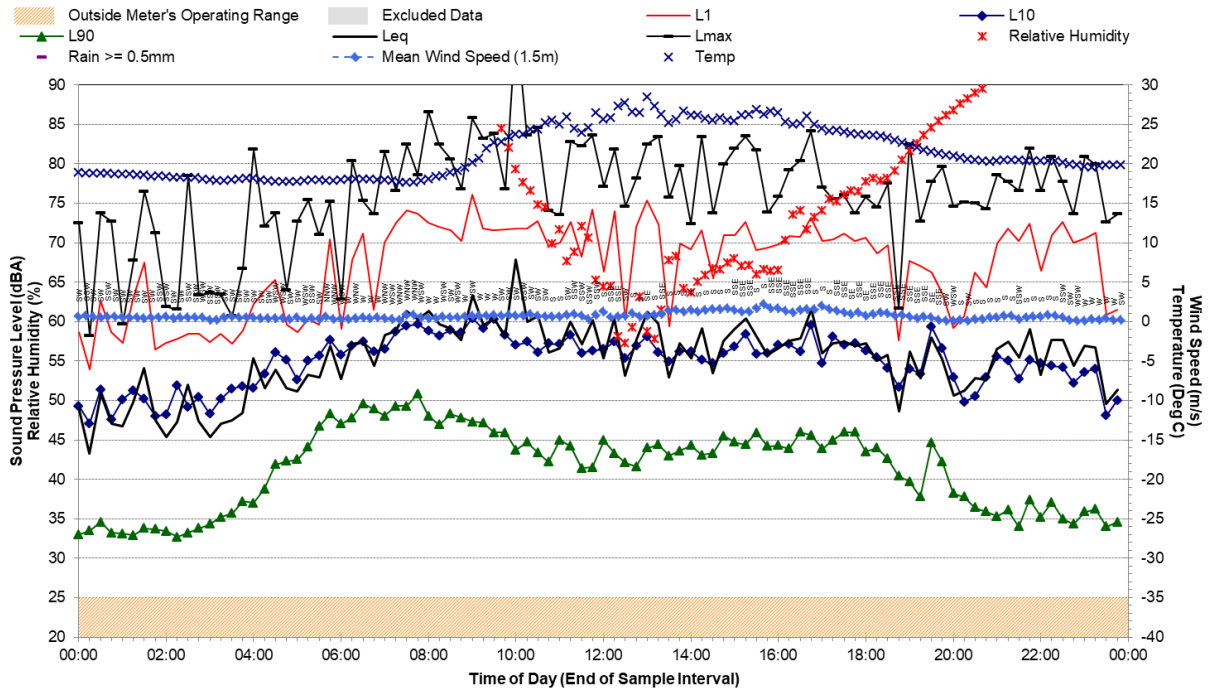
Statistical Ambient Noise Levels

Location F - Tuesday, 19 March 2019



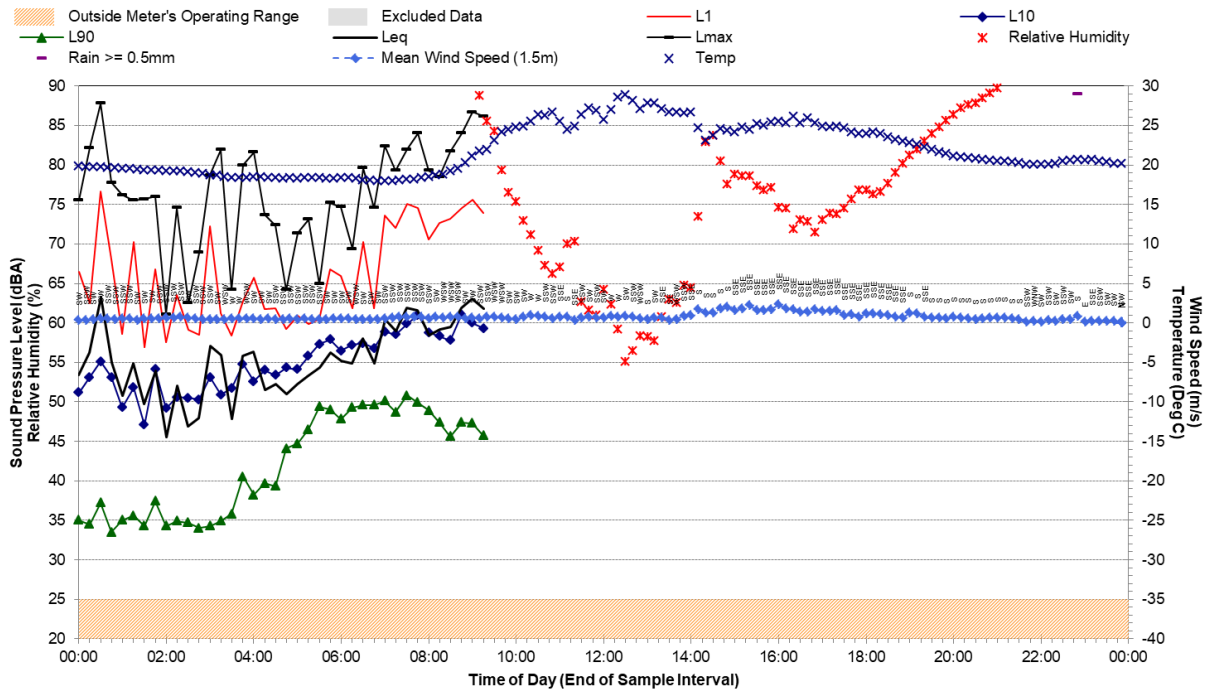
Statistical Ambient Noise Levels

Location F - Wednesday, 20 March 2019



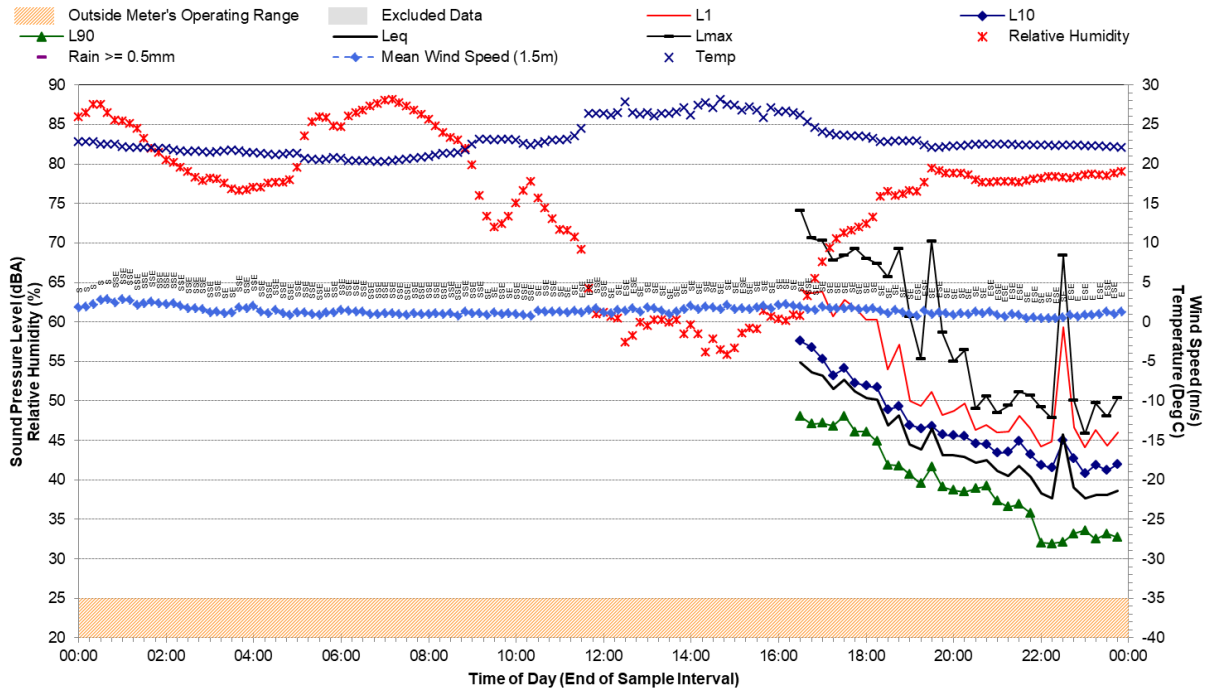
Statistical Ambient Noise Levels

Location F - Thursday, 21 March 2019



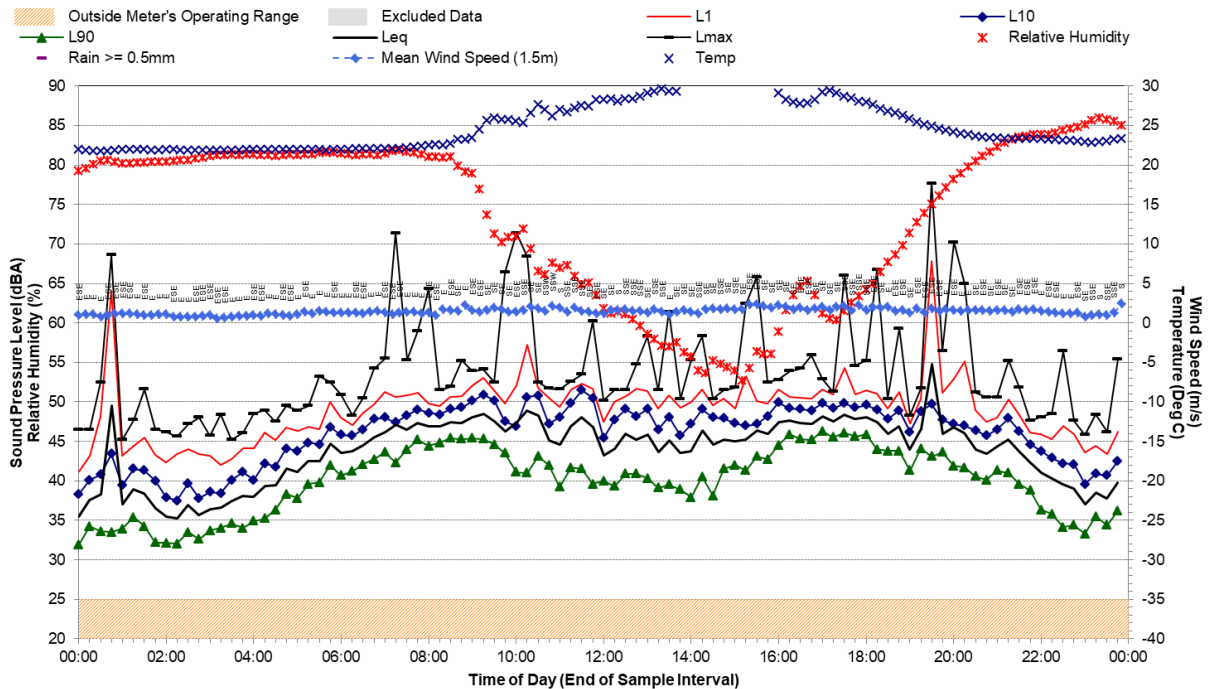
Statistical Ambient Noise Levels

Location G - Wednesday, 13 March 2019



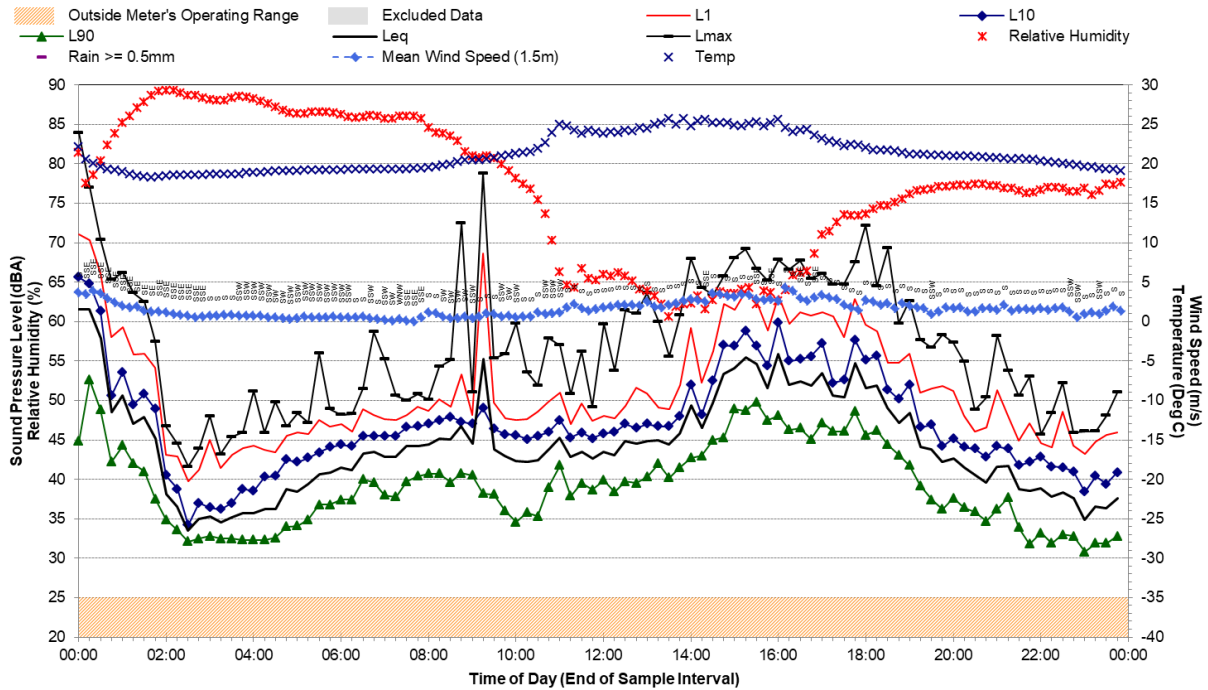
Statistical Ambient Noise Levels

Location G - Thursday, 14 March 2019



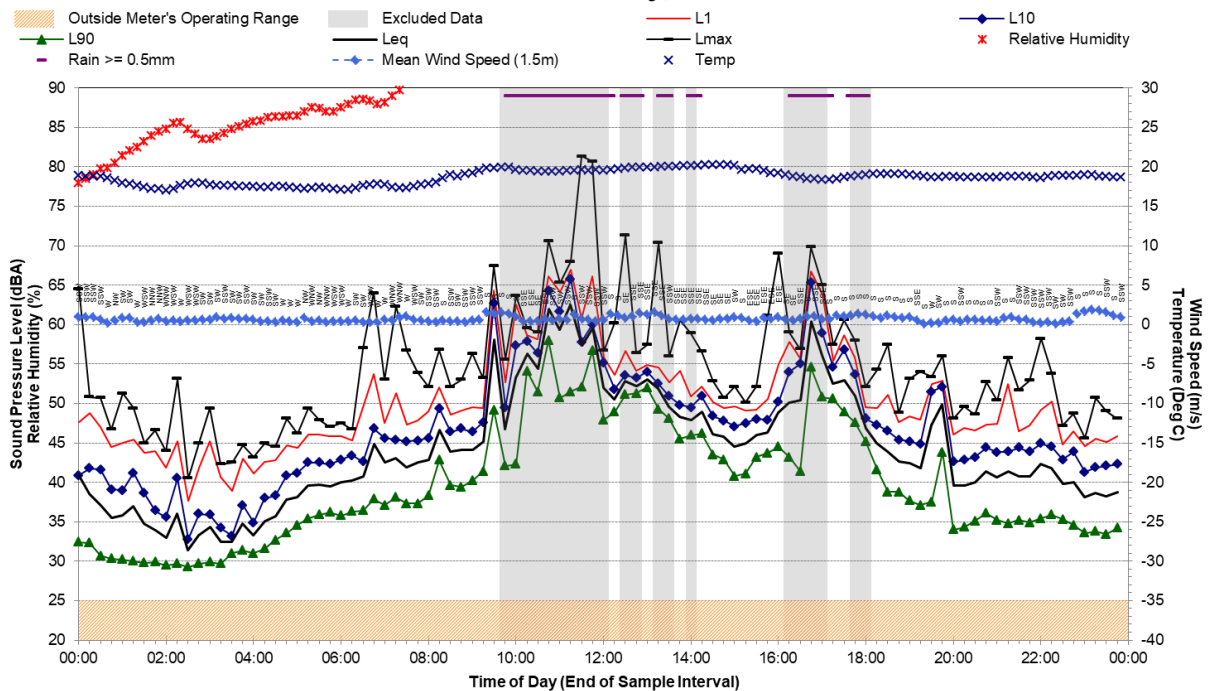
Statistical Ambient Noise Levels

Location G - Friday, 15 March 2019



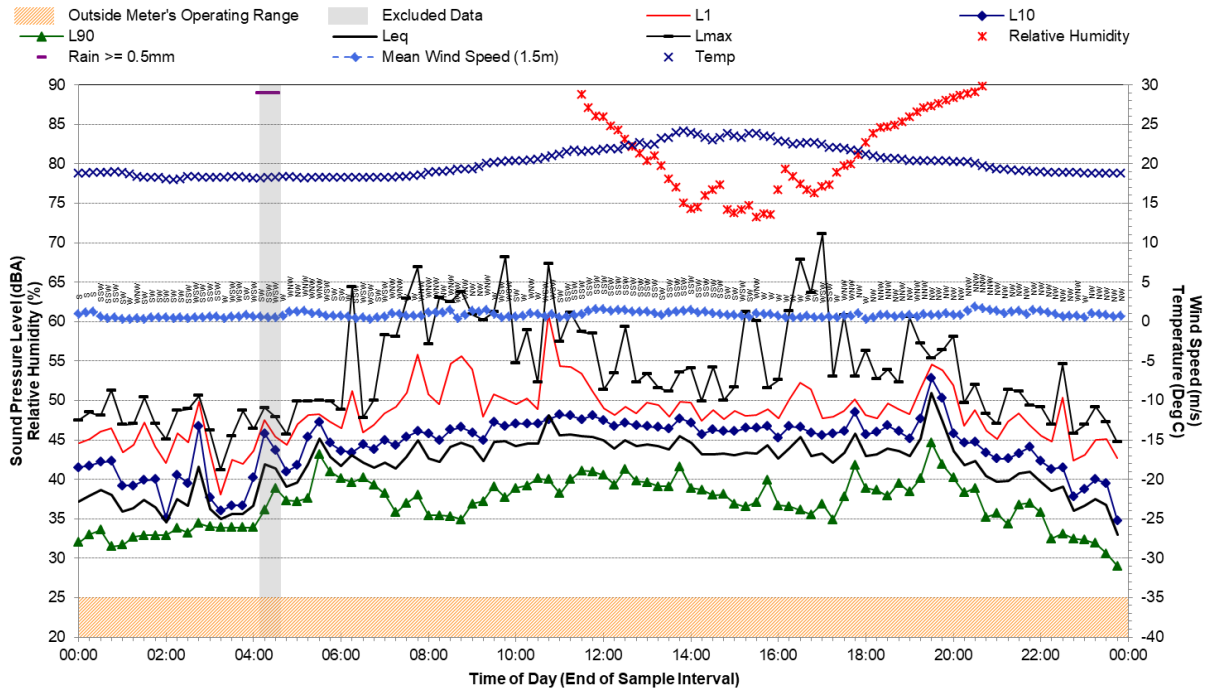
Statistical Ambient Noise Levels

Location G - Saturday, 16 March 2019



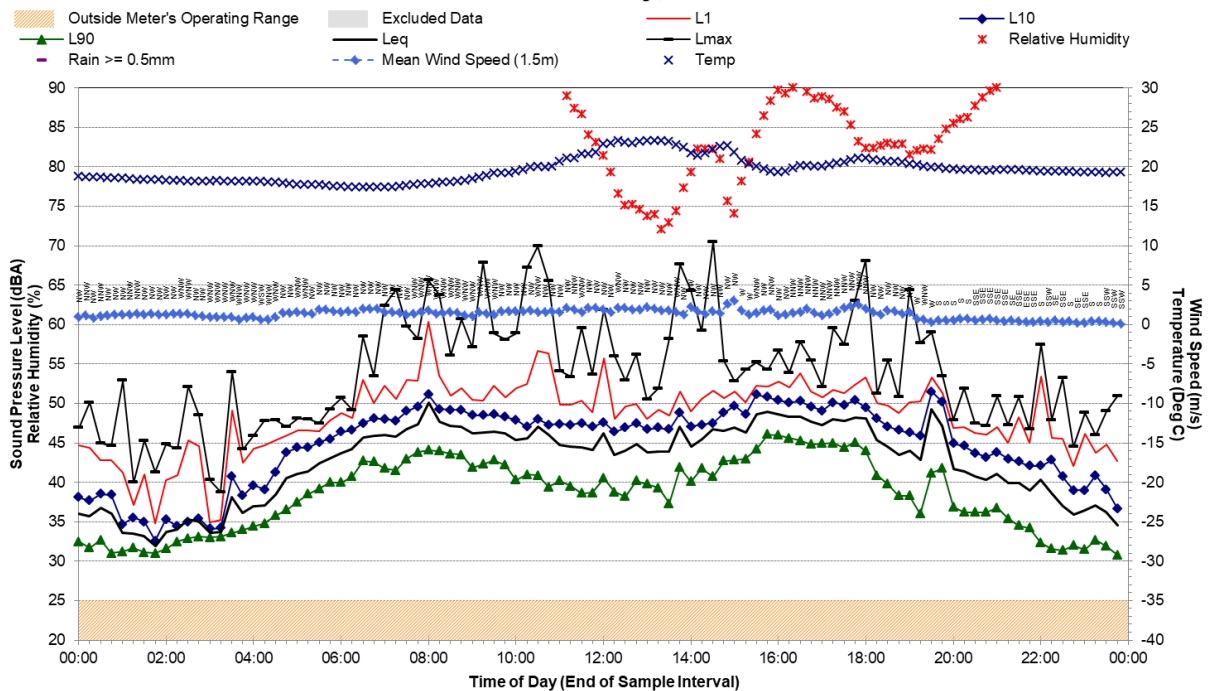
Statistical Ambient Noise Levels

Location G - Sunday, 17 March 2019



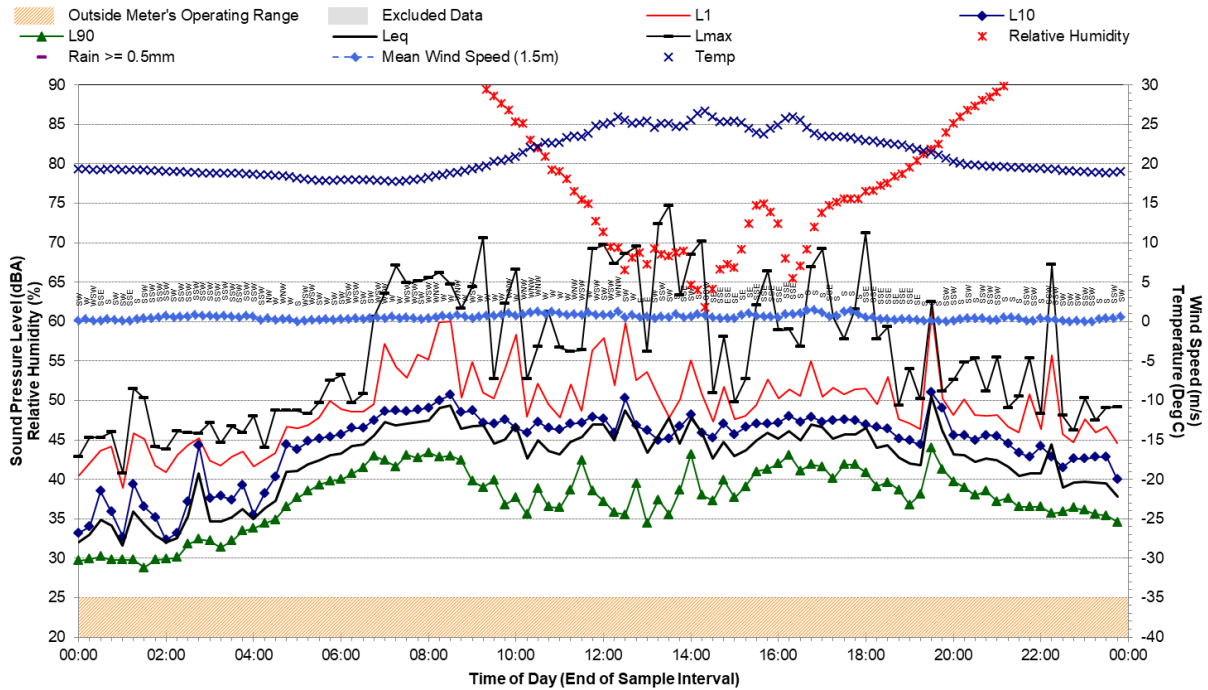
Statistical Ambient Noise Levels

Location G - Monday, 18 March 2019



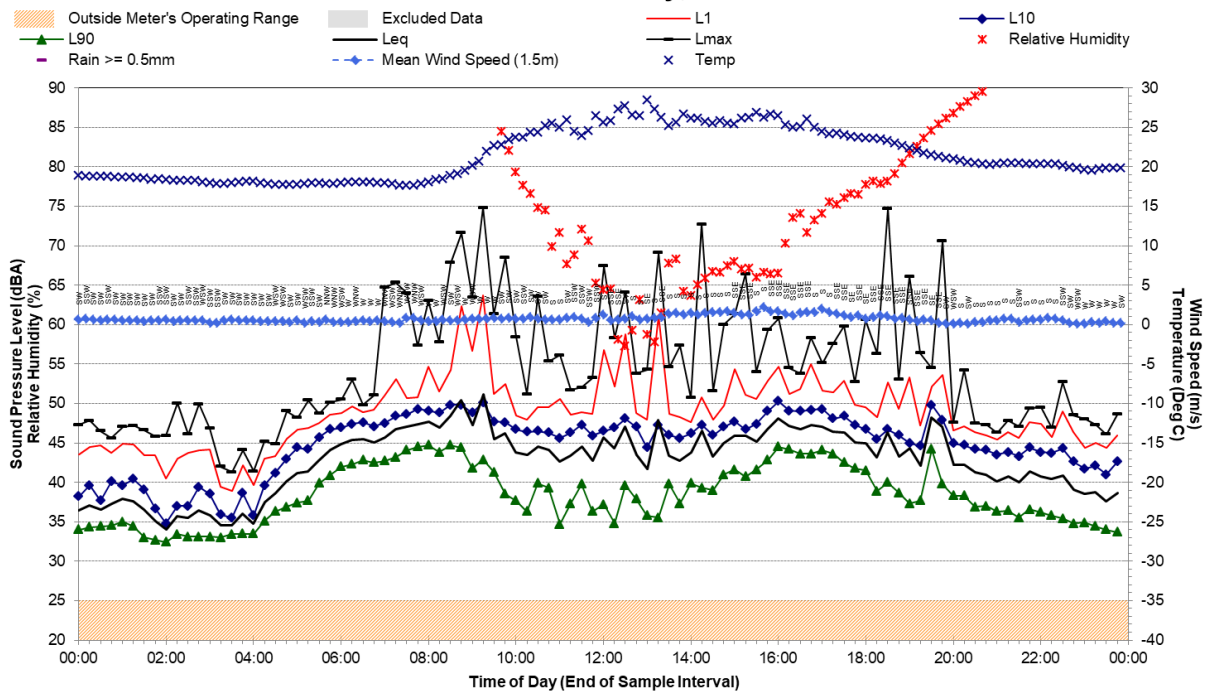
Statistical Ambient Noise Levels

Location G - Tuesday, 19 March 2019



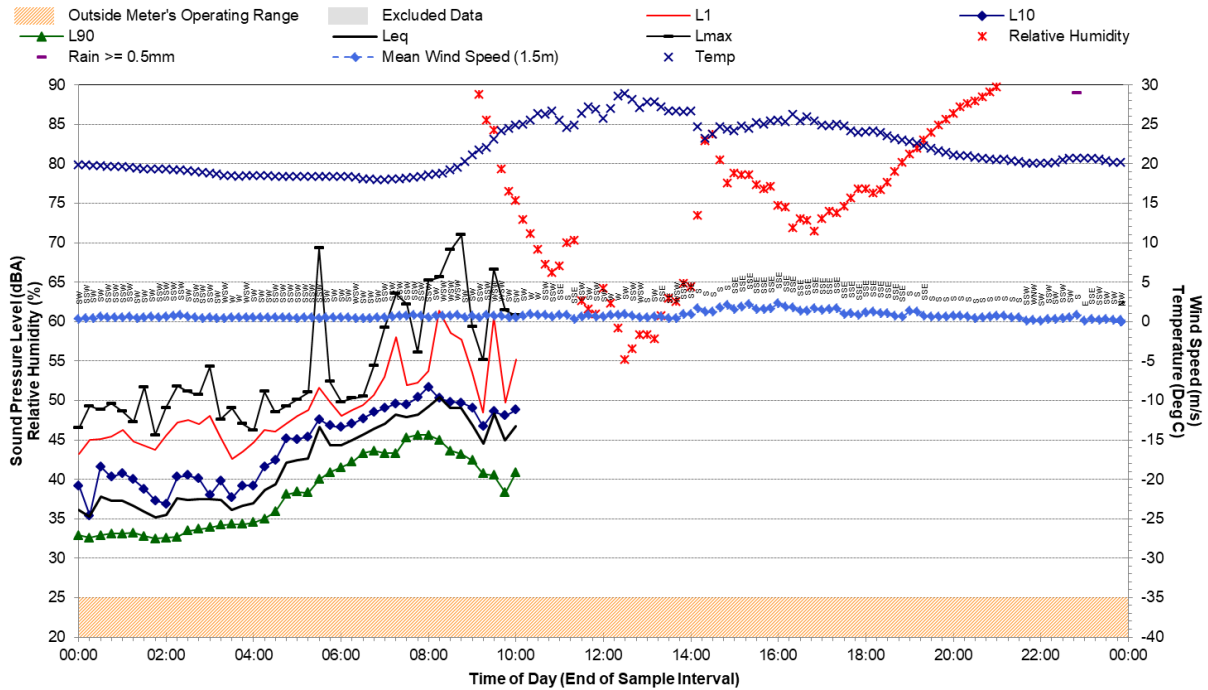
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Location G - Wednesday, 20 March 2019



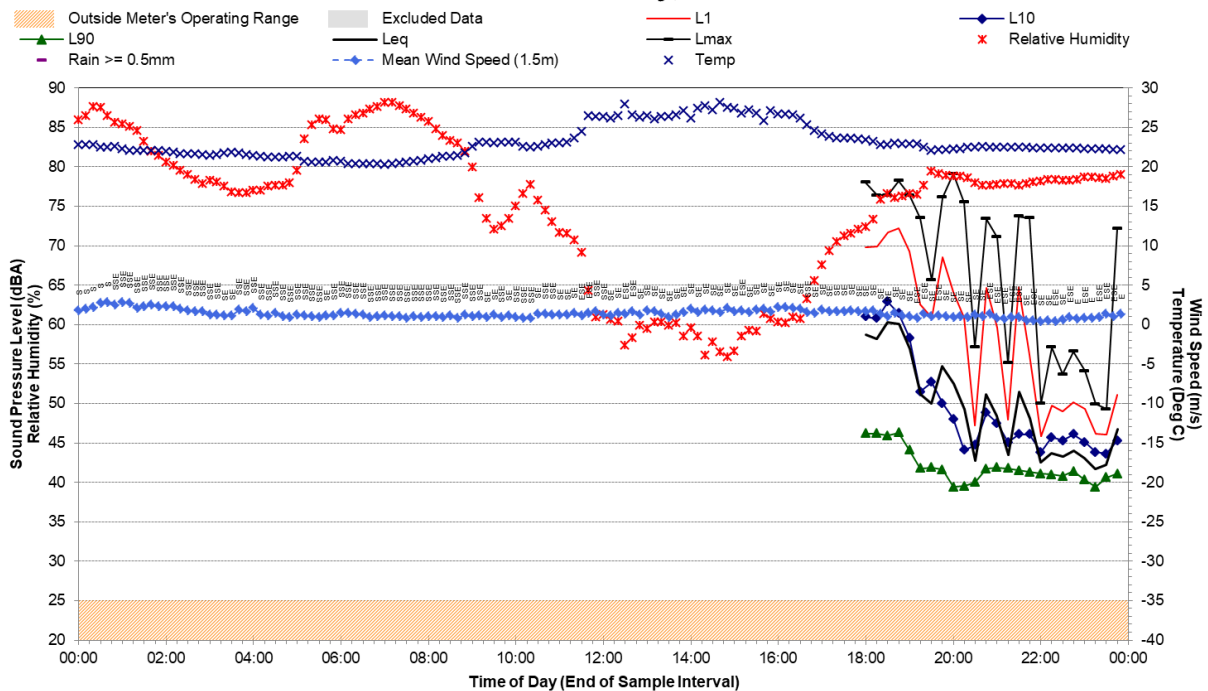
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Location G - Thursday, 21 March 2019



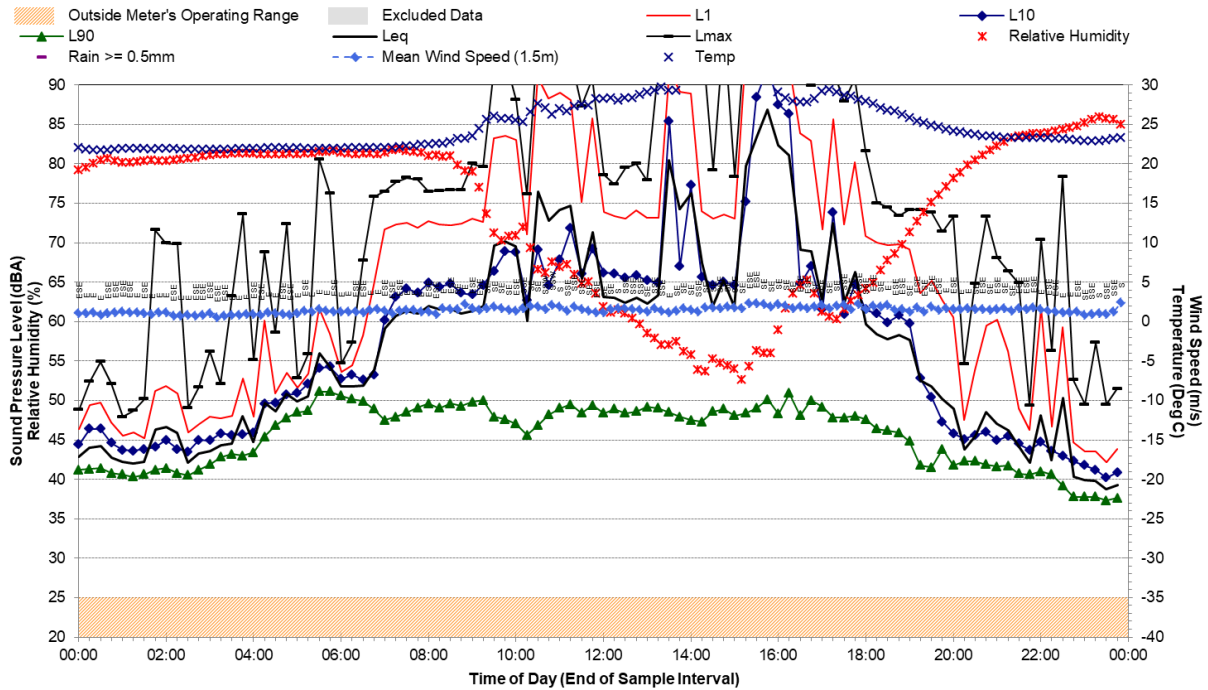
Statistical Ambient Noise Levels

Location I - Wednesday, 13 March 2019



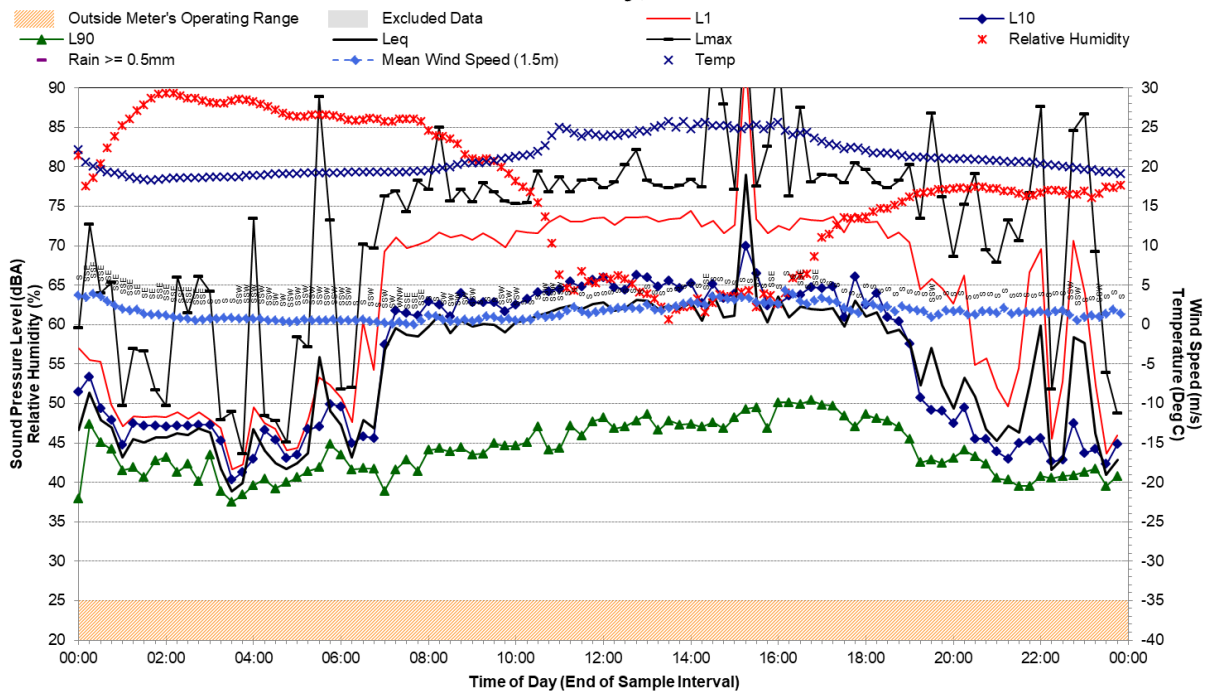
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Location I - Thursday, 14 March 2019



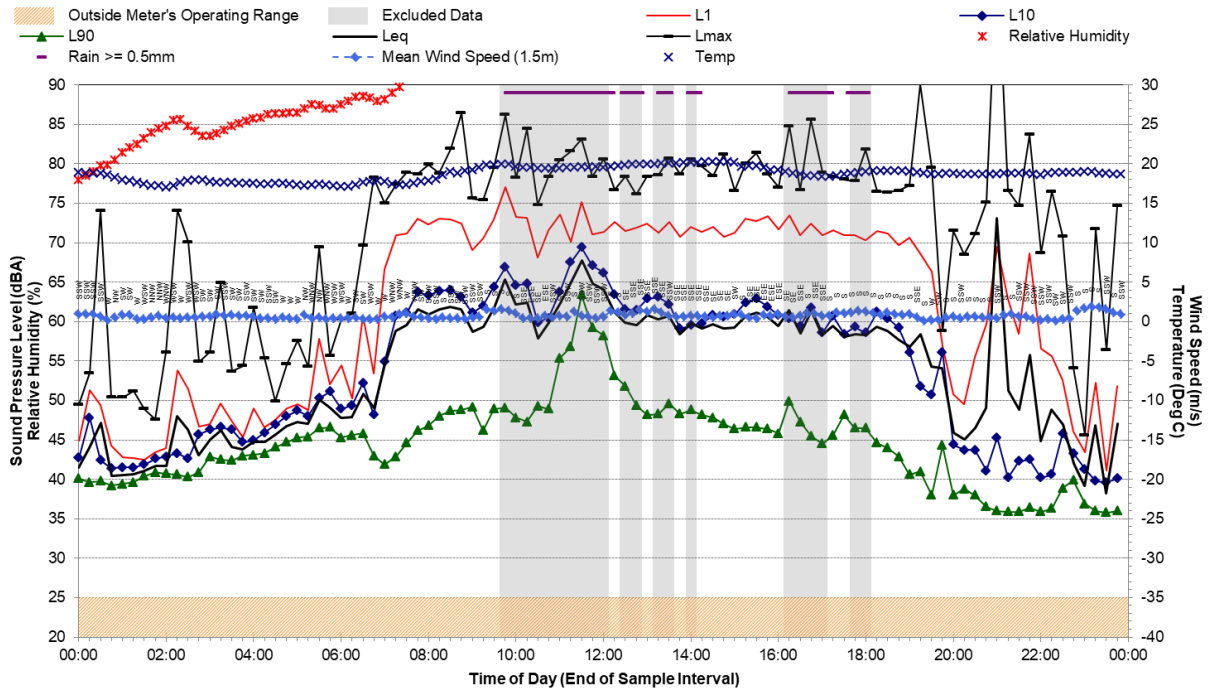
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Location I - Friday, 15 March 2019



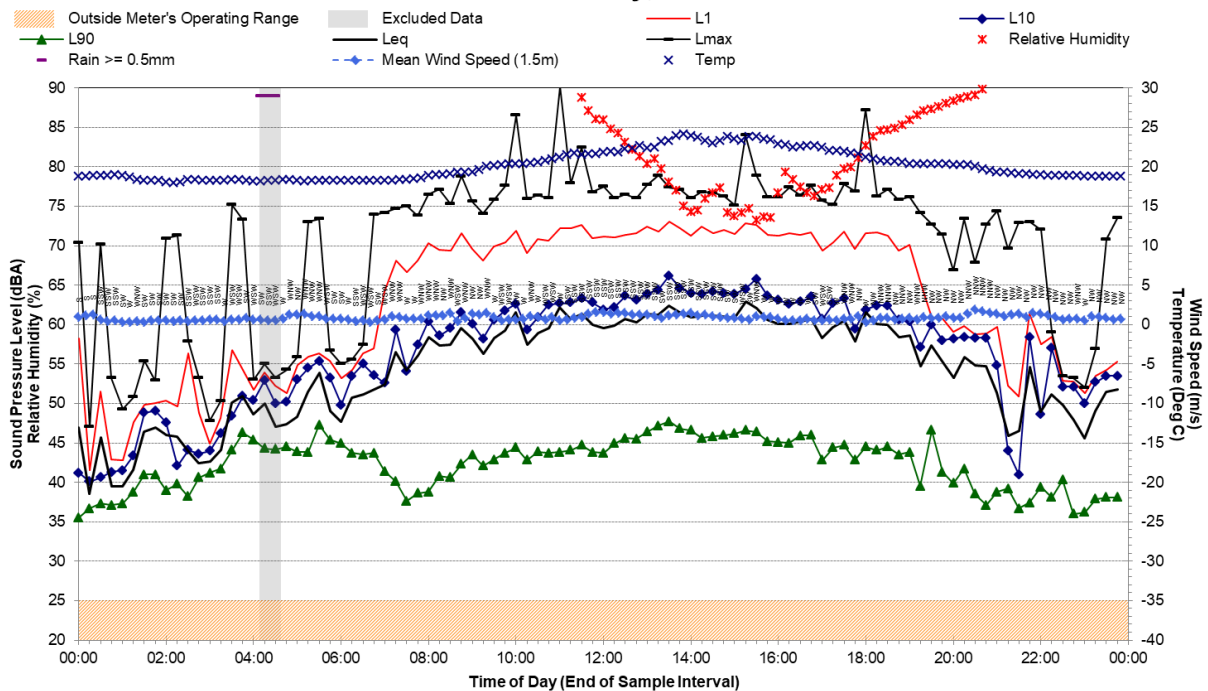
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Location I - Saturday, 16 March 2019



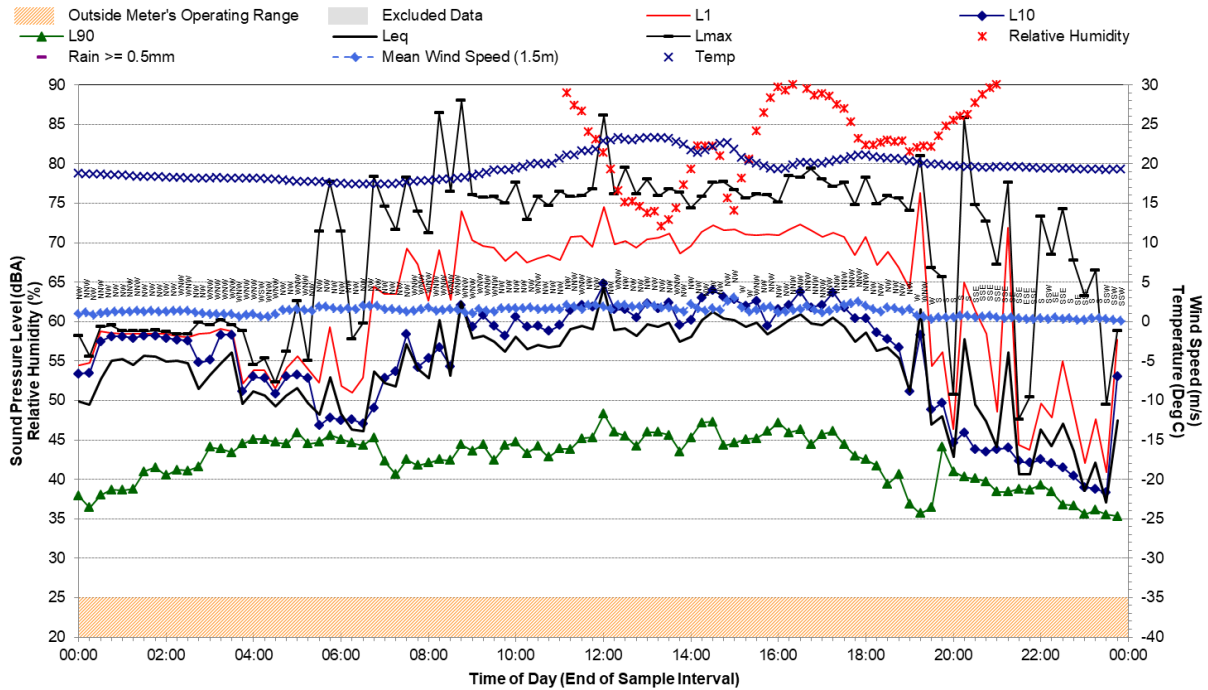
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Location I - Sunday, 17 March 2019



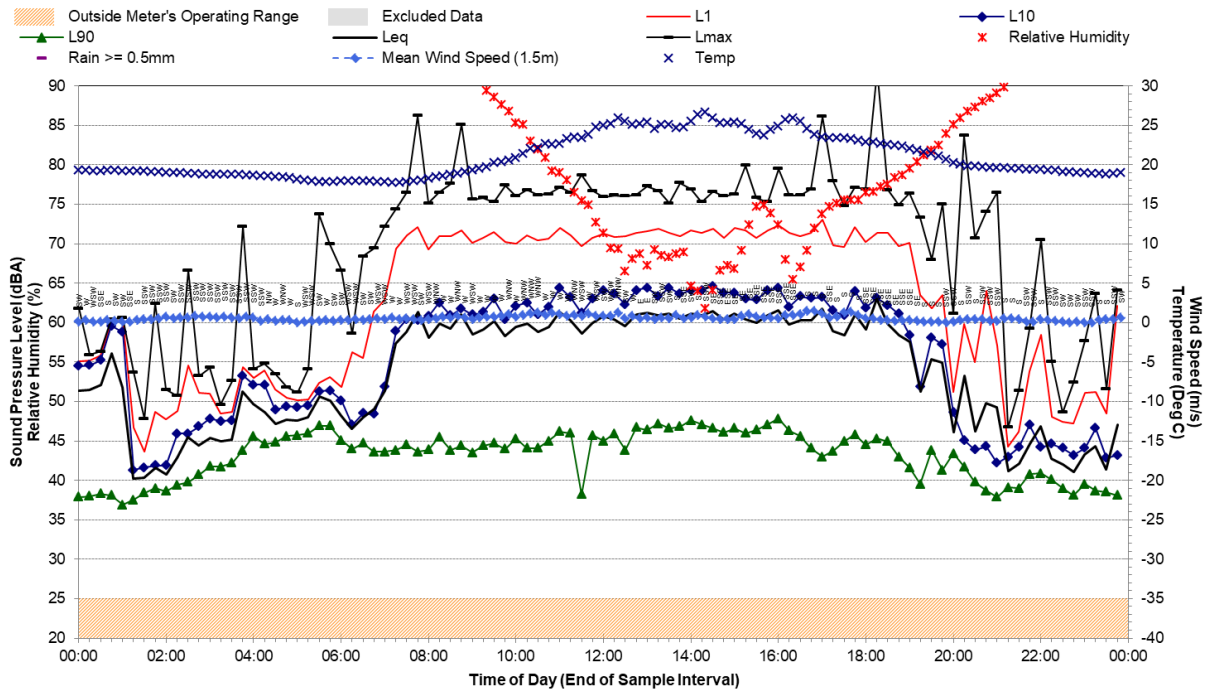
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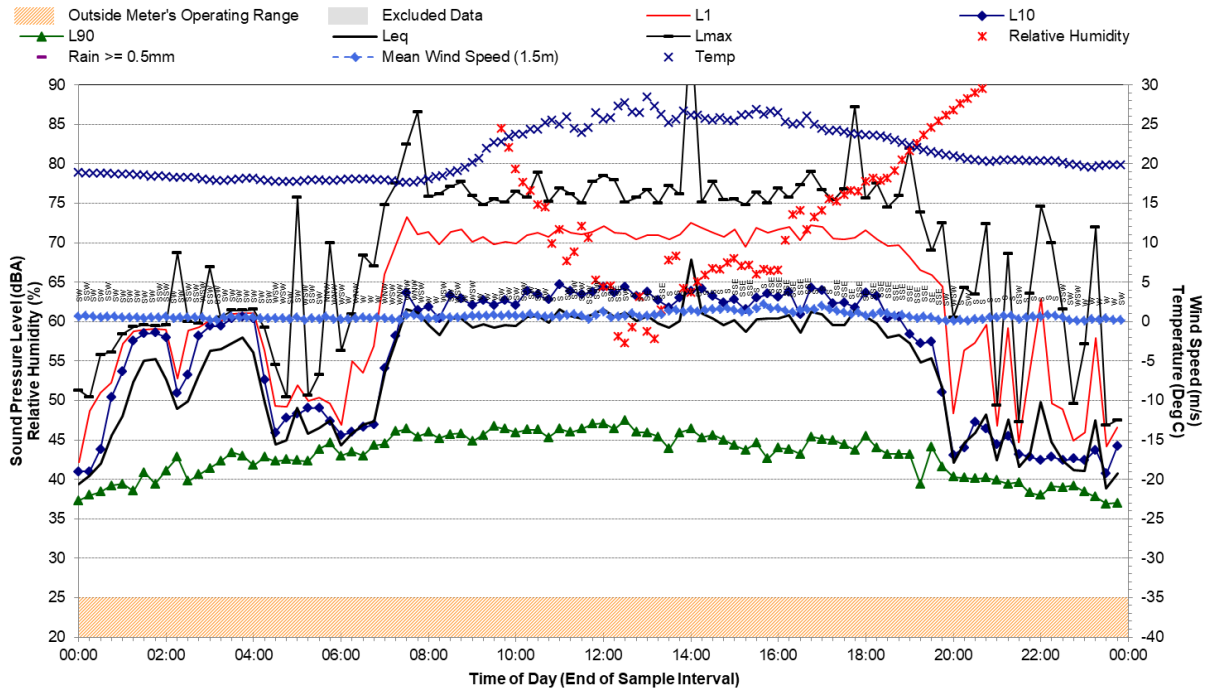
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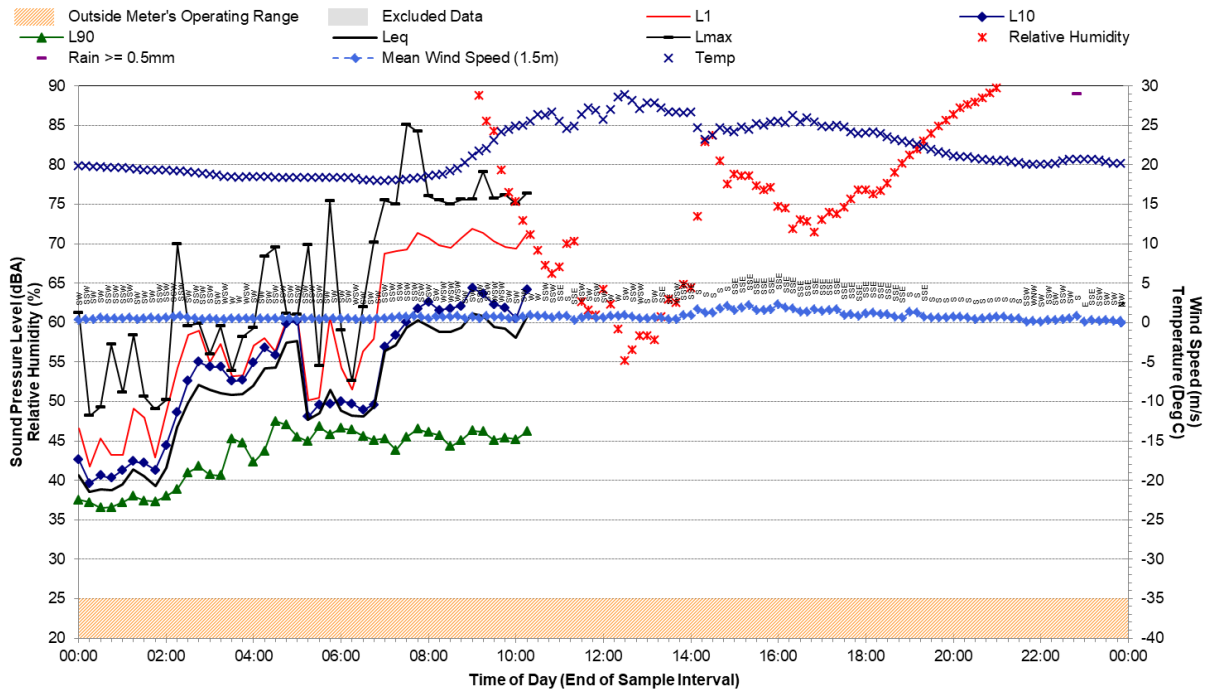
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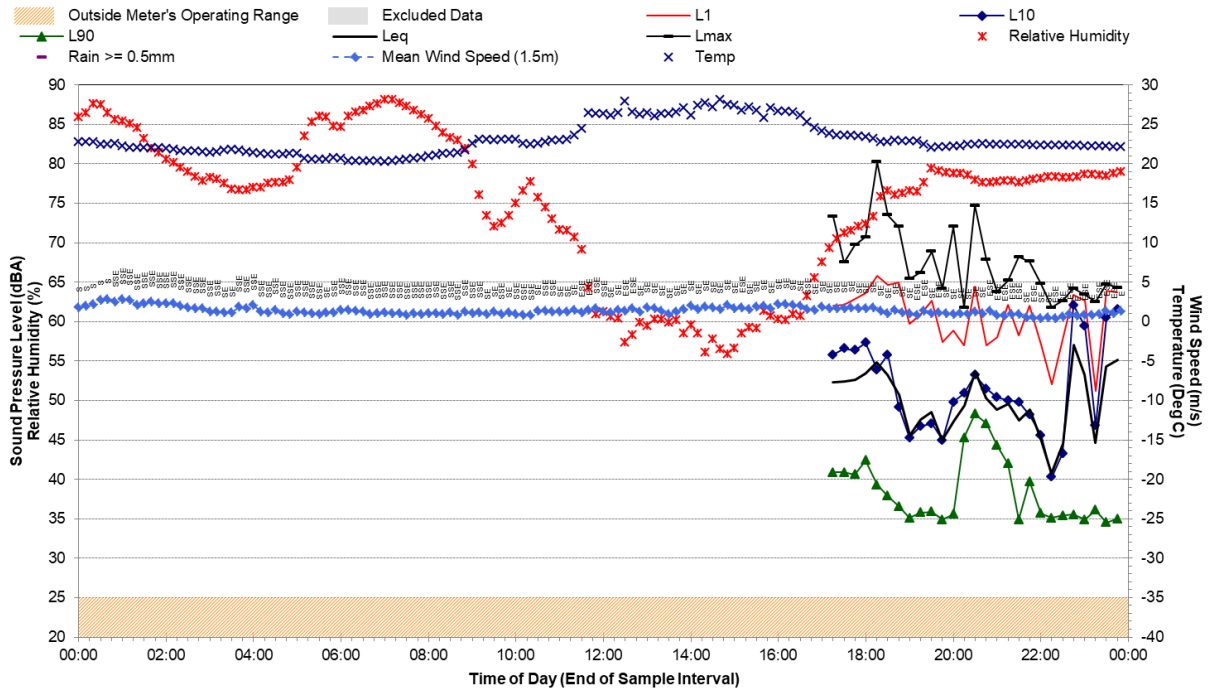
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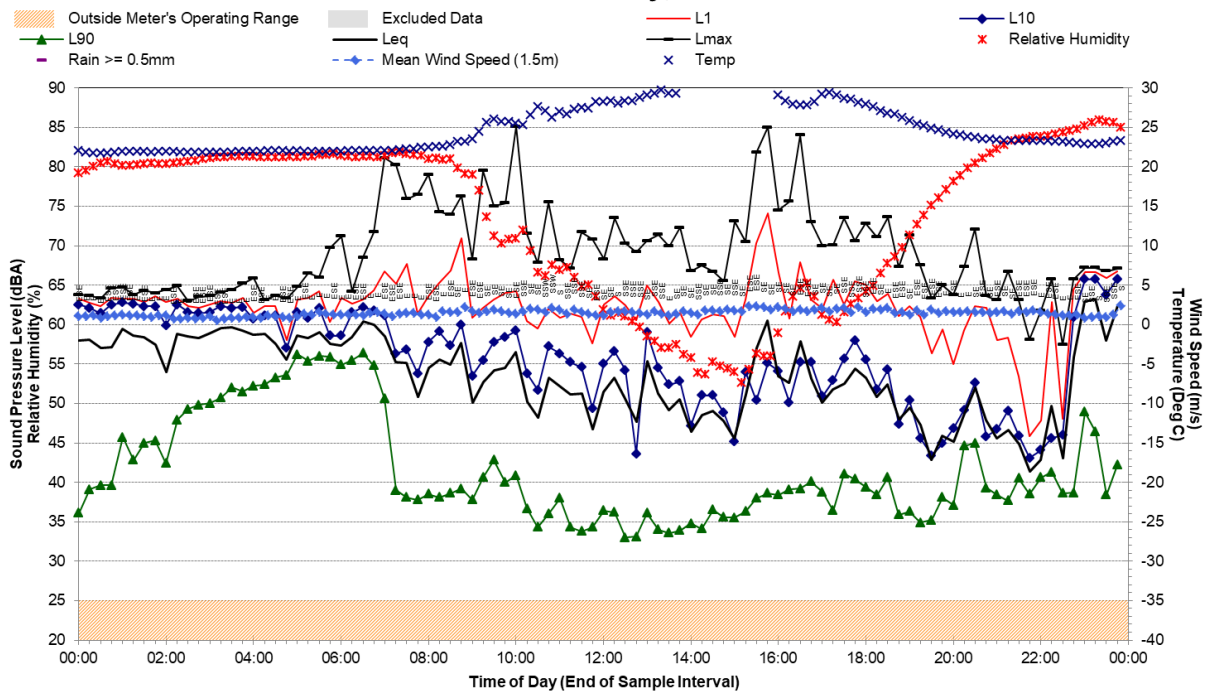
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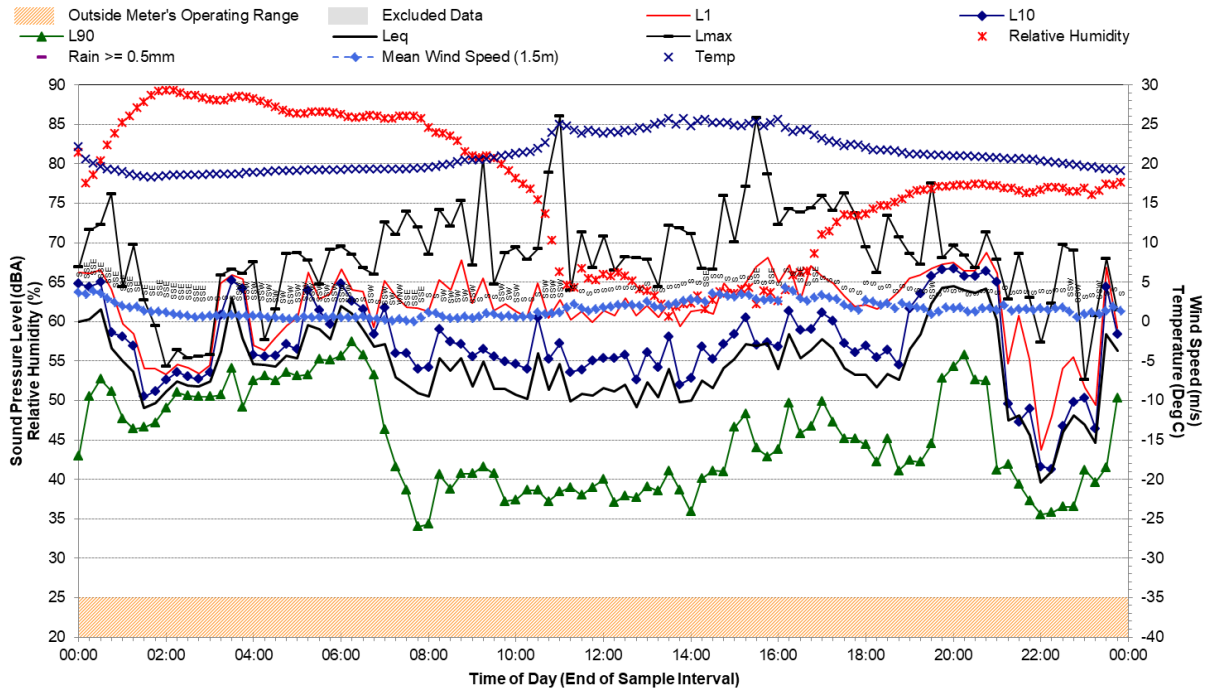
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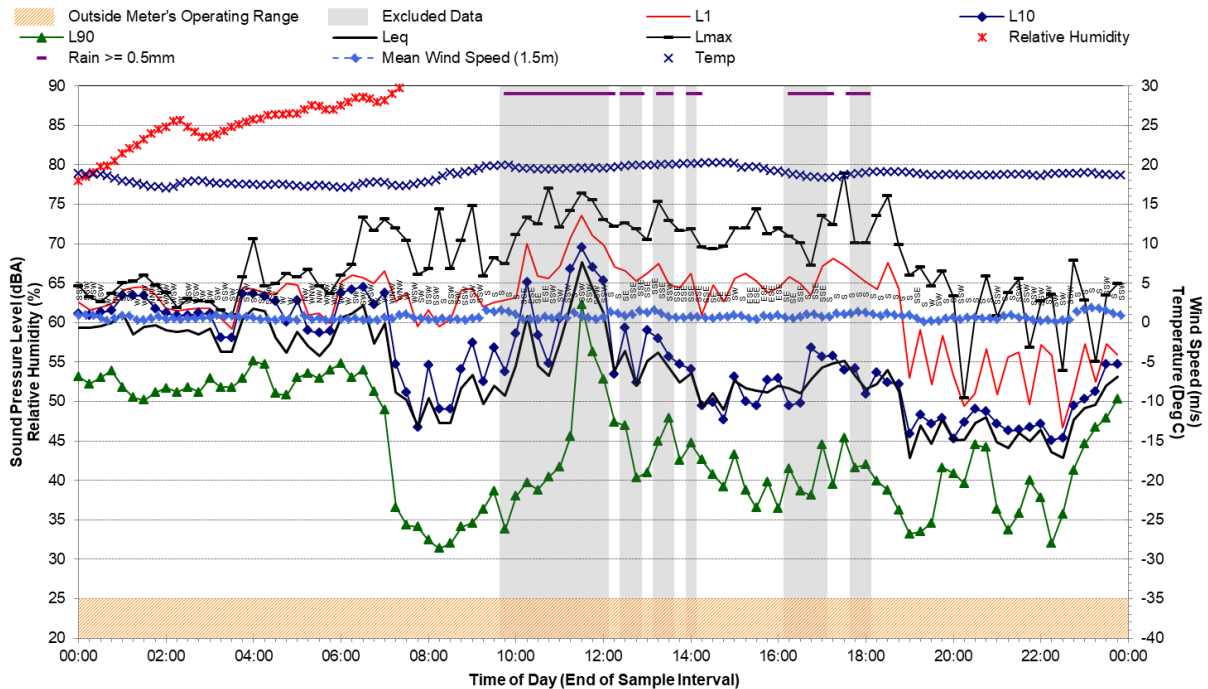
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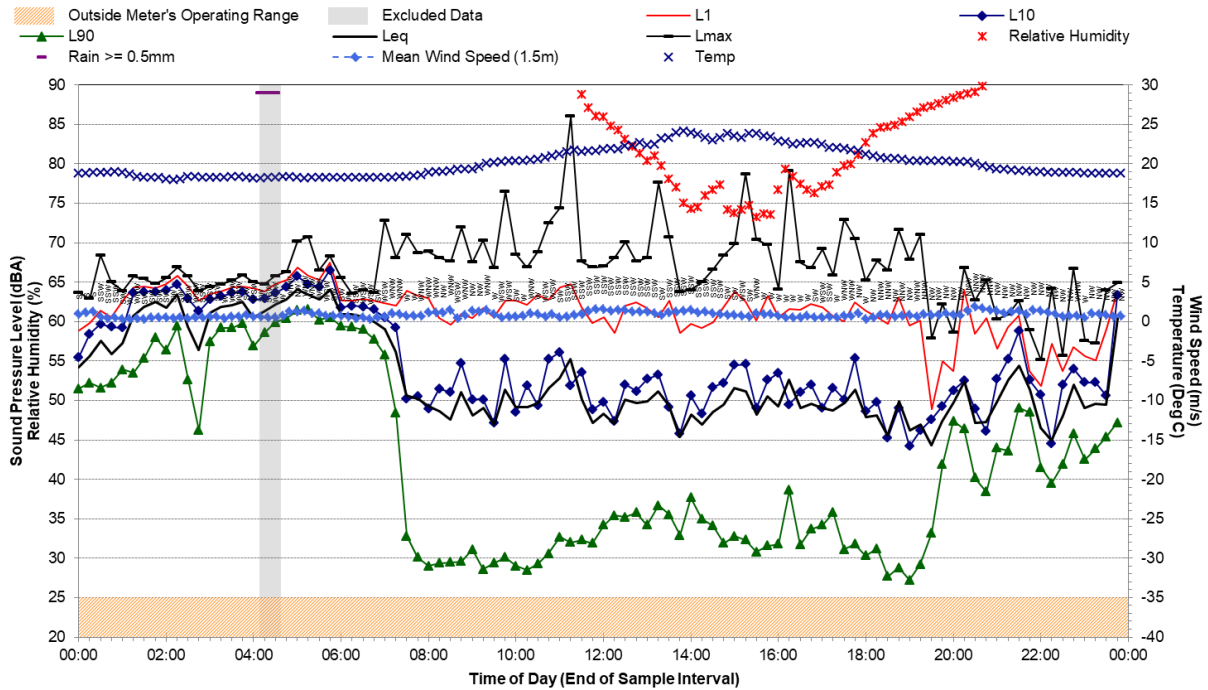
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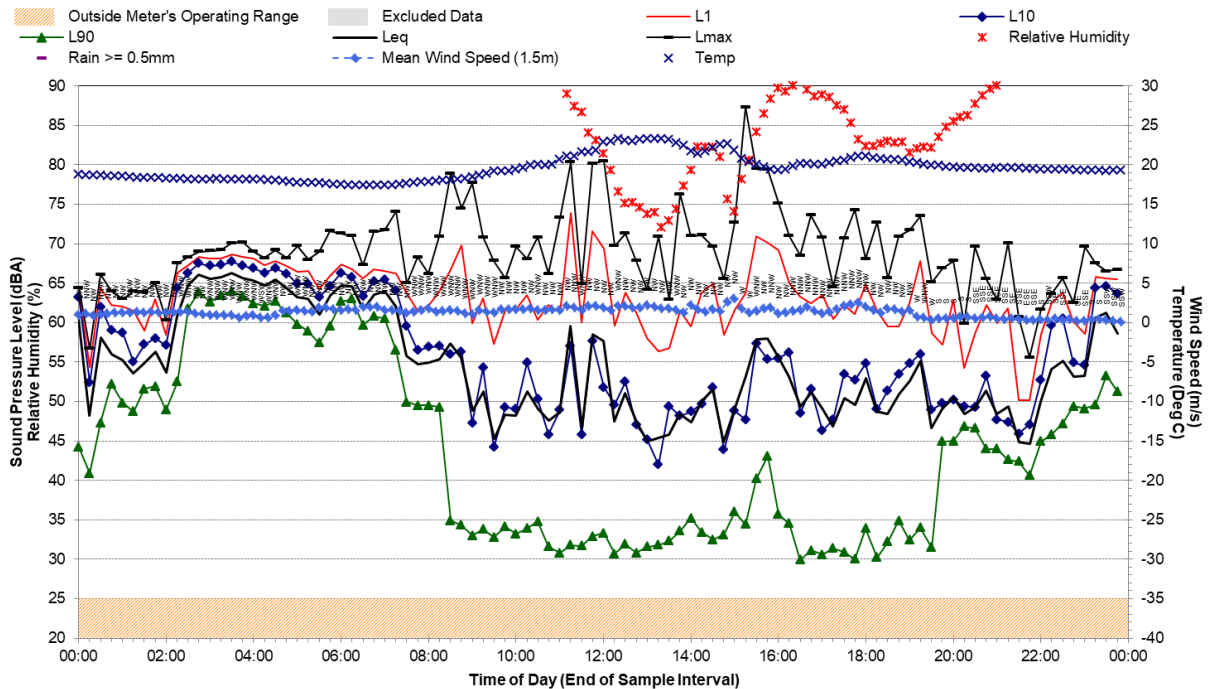
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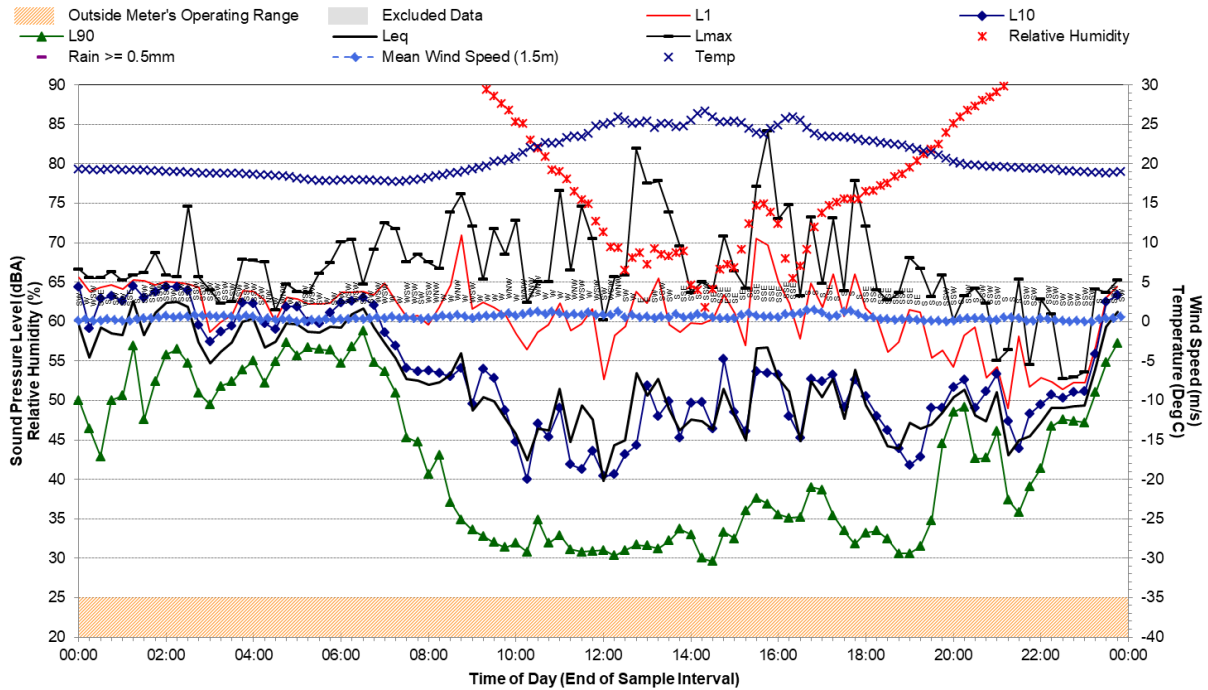
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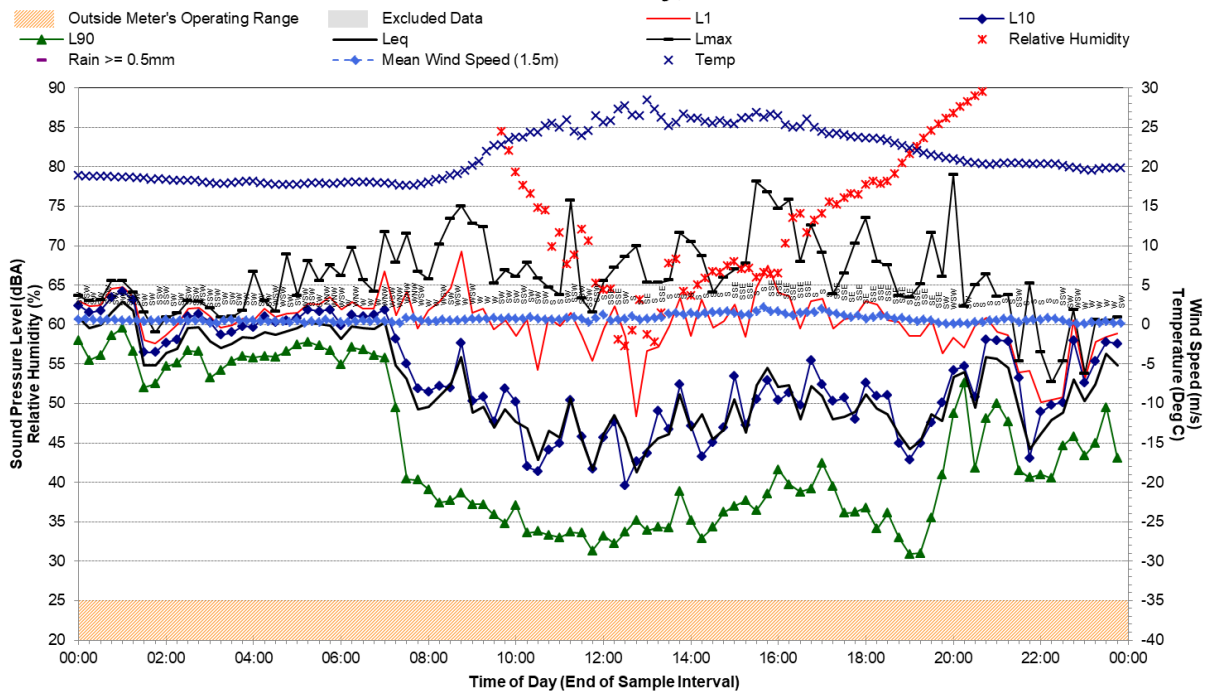
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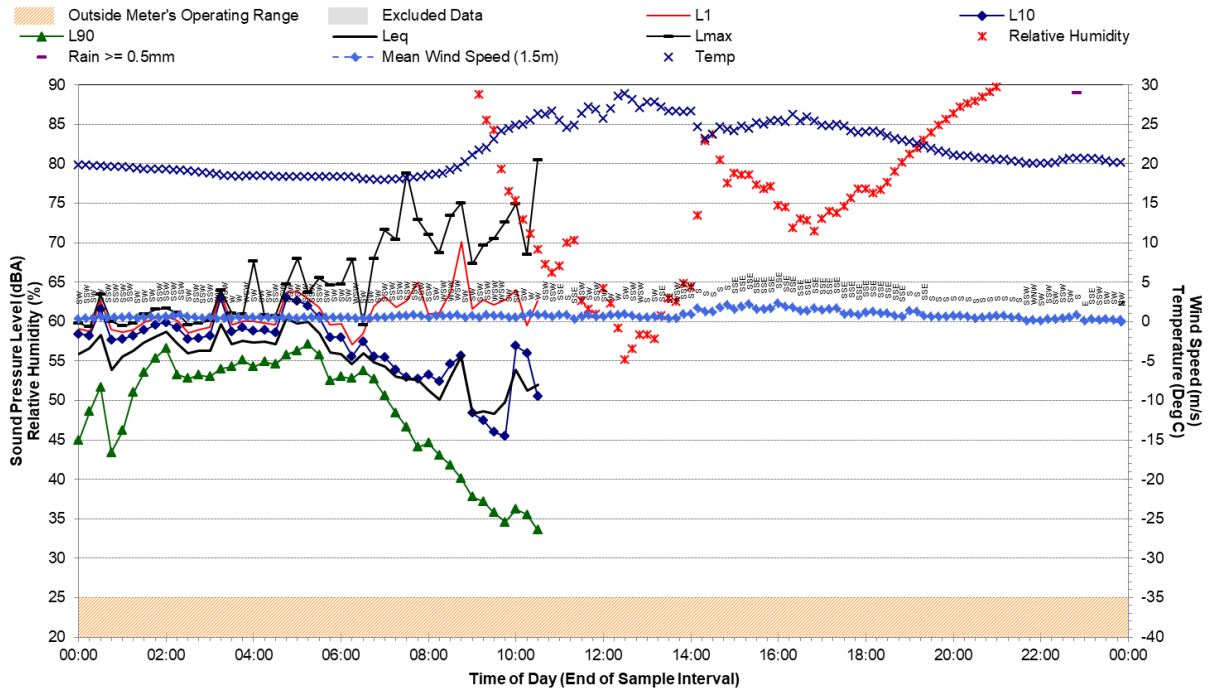
Statistical Ambient Noise Levels

Location L - Wednesday, 20 March 2019



Statistical Ambient Noise Levels

Location L - Thursday, 21 March 2019



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DONALDSON AND ABEL COAL MINES

**Quarterly Noise Monitoring
Quarter Ending June 2019**

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
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SLR Ref: Q74 630.01053-R01
Version No: -v1.0
October 2019



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BASIS OF REPORT

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

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

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
Q74 630.01053-R01-v1.0	14 October 2019	Jeff Sit	Martin Davenport	Martin Davenport

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1 Introduction

1.1 Background

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 during the June 2019 quarter in accordance with the Abel Mine Project Noise Monitoring Program, dated 12 August 2014.

1.2 Objectives of this Report

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

- Measure the ambient noise levels at six 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.

1.3 Acoustic Terminology

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

2 Development Consent Project Approval

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.

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:

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

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 Bloomfield 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(15minute)	LAeq(15minute)	LAeq(15minute)	LA1(1minute)
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
		L _{Aeq} (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
	L _{Aeq} (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
	L _{Aeq} (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; Describe the proposed noise management system in detail; and*
- c. *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 SLR's Report 630.01053.01300-R1 dated 12 August 2014 (*Noise Management Plan Abel Underground Mine*) 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 AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the June 2019 quarter is provided in **Appendix B**.

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

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 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.

Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the June 2019 noise monitoring period.

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	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	65 Tipperary Dr, Ashtonfield

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

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of a seven day period between Thursday 20 June 2019 and Friday 28 June 2019 at each of the six (6) nominated locations given in Table 1. Due to technical issues, the logger at location J was redeployed from 28 June 2019 to 5 July 2019.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax} , LA_1 , LA_{10} , LA_{90} , LA_{99} , L_{Amin} and LA_{eq} . The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The LA_{90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level. The LA_{10} is the level exceeded for 10% of the time and is usually referred to as the average maximum noise level. The LA_{eq} 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.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six 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 evening and night-time period on Thursday 20 June 2019 and Friday 21 June 2019. Operator attended noise measurements were conducted during the daytime period on Thursday 20 June 2019 and Friday 28 June 2019. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2270 (serial number 2679354) and Brüel & Kjær Type 2250L integrating sound level meter (serial number 3003389).

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 (°C) 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.

Table 2 Location D, Black Hill Public School, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	20/06/2019 15:45 14°C 1.3 m/s SSE	72	67	55	38	54	Road Traffic 60-72 Birdsong 55-61 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	20/06/2019 20:46 11.7°C 2.4 m/s S	59	43	40	35	38	Trees 38-41 Insects 42 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	20/06/2019 22:39 10°C 1.2 m/s SW	57	42	39	35	38	Road Traffic 35-42 Insects/Frogs 30-35 Operator 57 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

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

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	20/06/2019 16:21 13.2°C 0.5 m/s S	86	74	57	49	61	Road Traffic 75-86 Birdsong 37-45 Insects 40-47
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	20/06/2019 20:22 11.2°C 1 m/s S	66	61	55	37	51	Road Traffic 64-66 Insects 34-36
		Estimated Abel Mine Noise Contribution Inaudible					Birdsong 48-53 Abel Mine Inaudible
Night	20/06/2019 23:00 9.5°C 0.5 m/s WSW	58	55	51	35	47	Road Traffic 43-58 Insects/Frogs 30-35
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 4 Location G, Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	28/06/2019 11:48 18.3°C 1 m/s NNE	58	50	46	40	44	Bird Noise 43-58 Insect 42-45 Road traffic 56
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	20/06/2019 19:40 11.7°C 1 m/s S	53	50	48	42	46	Road traffic 45-53 Insects 32-39
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	21/06/2019 00:13 10.7°C 0.5 m/s SSW	52	44	39	32	36	Road traffic 45-52 Insects 28-33 Other industry 32-39
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	20/06/2019 13:30 15.5°C 0.5 m/s SSE	71	59	54	48	52	Road Traffic 47-71 Insects 46-48
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	20/06/2019 21:41 10.6°C 0.5 m/s NNW	70	55	47	42	47	Road Traffic 46 70 Insects 41-43
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	20/06/2019 22:24 10°C 0.5 m/s WSW	62	51	47	38	44	Operator 62 Road Traffic 40-43 Insects 38-41
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	20/06/2019 13:30 15.5°C 0.5 m/s SSE	63	50	45	42	44	Road Traffic 54 Birdsong 48-63
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	20/06/2019 21:15 11.4°C 0.5 m/s S	58	46	44	40	42	Road Traffic 45 58 Dog Barking 43
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	20/06/2019 22:08 10.2°C 0.5 m/s NNW	64	50	45	39	43	Road Traffic 43-64
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

1 Table 7 Location L, 65 Tipperary Dr, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _A max – dBA)
		L _A max	L _A 1	L _A 10	L _A 90	L _A eq	
Day	28/06/2019 12:26 19.4°C 1 m/s NE	76	61	44	35	50	Lawnmower 37 Road traffic 67-76 Birdsong 40-60 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	20/06/2019 18:24 11.6°C 0.5 m/s S	70	64	50	35	50	Road Traffic 56-70 Dog Barking 37-42 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	21/06/2019 00:45 8.9°C 1 m/s SW	52	38	32	25	30	Road Traffic 33 Birdsong 49 Operator 52 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

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

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP and stockpile area was inaudible during all operator attended noise surveys. 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.

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 dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	Inaudible	Inaudible	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	Inaudible	Inaudible	40	40	40	Yes	Yes	Yes

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 Bloomfield LA1(1minute) Contribution dBA	Consent Conditions LA1(1minute) dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	47	Yes

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 Thursday 20 June 2019 and Friday 28 June 2019 at each of the six monitoring locations given in **Table 10**. Due to technical issues, the unattended continuous noise monitoring equipment was redeployed from Friday 28 June 2019 to Monday 8 July 2019.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	SVAN 957 23241	20 June 2019 - 28 June 2019
F – Black Hill Road, Black Hill	SVAN 957 23815	20 June 2019 - 28 June 2019
G – Buchanan Road, Buchanan	SVAN 957 27579	20 June 2019 - 28 June 2019
I – Magnetic Drive, Ashtonfield	ARL EL-316 16-103-494	20 June 2019 - 28 June 2019
L – 65 Tipperary Dr, Ashtonfield	ARL EL-316 16-203-508	20 June 2019 - 28 June 2019
J – Parish Drive, Thornton ¹	SVAN 957 21425 ARL EL-316 16-203-508	20 June 2019 - 28 June 2019 28 June 2019 – 8 July 2019

Note 1 - Due to a logger error no results are available from the SVAN 957 21425 logger at this location.

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendix C**. 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 Noise Policy for Industry (NPfI).

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 were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	Day	67	54	35	64
	Evening	60	44	36	51
	Night	51	42	34	49
F Lot 684 Black Hill Road, Black Hill	Day	71	57	42	59
	Evening	64	54	39	54
	Night	59	52	38	52
G 156 Buchanan Road, Buchanan	Day	51	48	39	47
	Evening	49	46	37	45
	Night	47	43	30	43
I 49 Magnetic Drive, Ashtonfield	Day	68	58	42	58
	Evening	59	45	41	52
	Night	49	43	37	47
L 65 Tipperary Dr, Ashtonfield	Day	62	51	41	52
	Evening	59	43	32	47
	Night	45	37	29	44
J 220 Parish Drive, Thornton	Day	51	47	38	49
	Evening	49	46	40	46
	Night	48	44	33	44

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 LA90 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

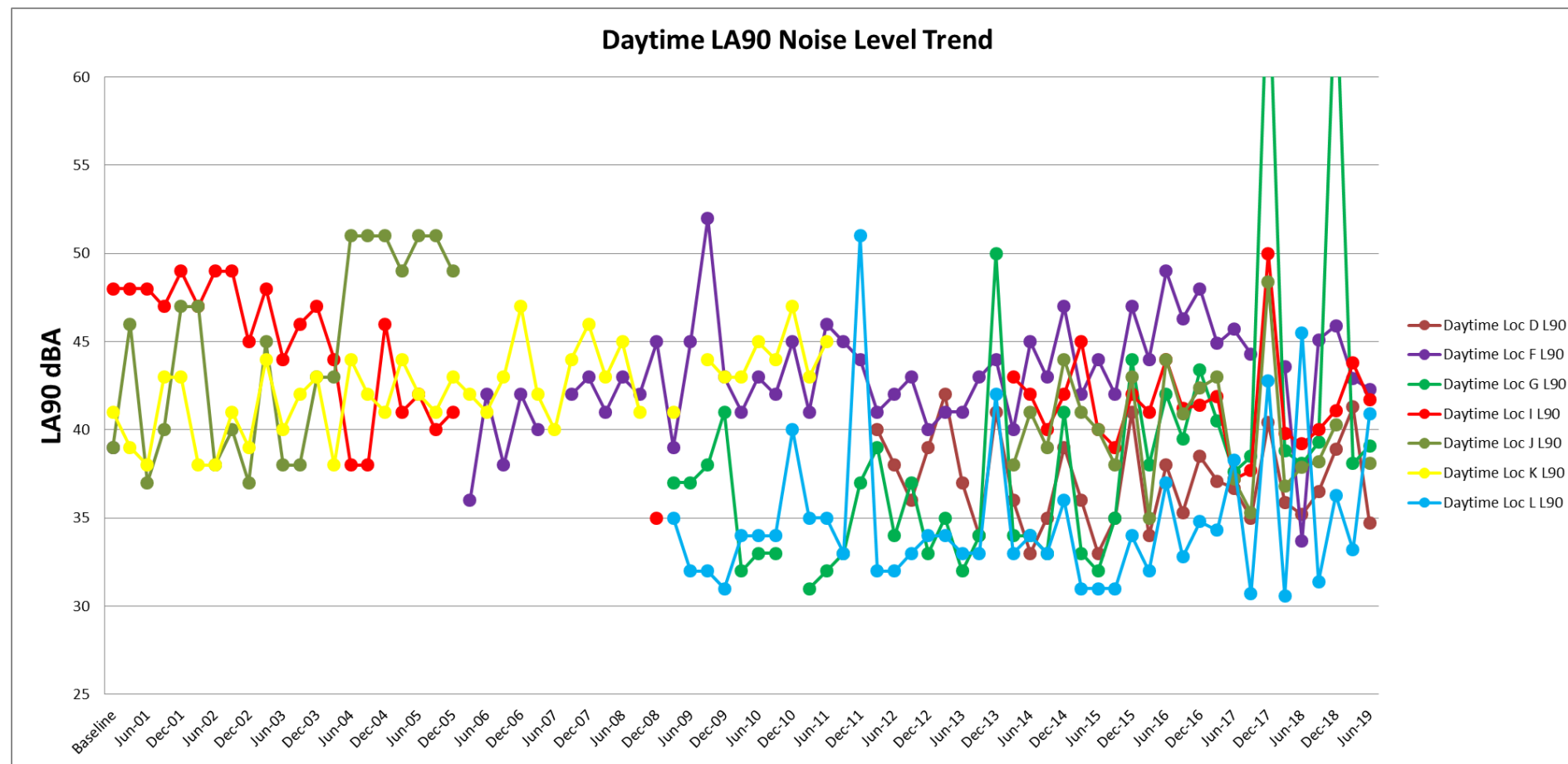


Figure 2 Long term Evening LA90 Noise Levels

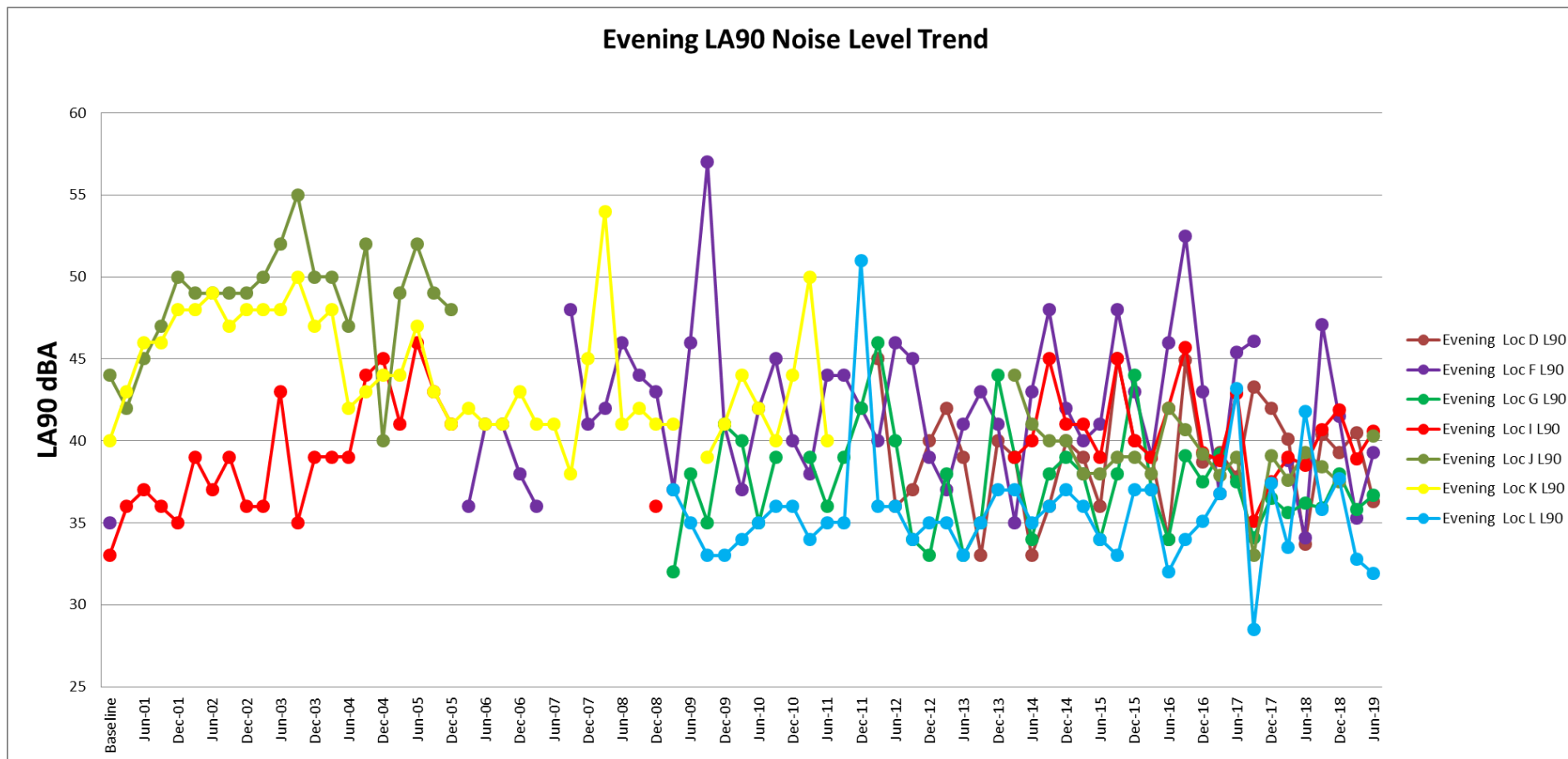
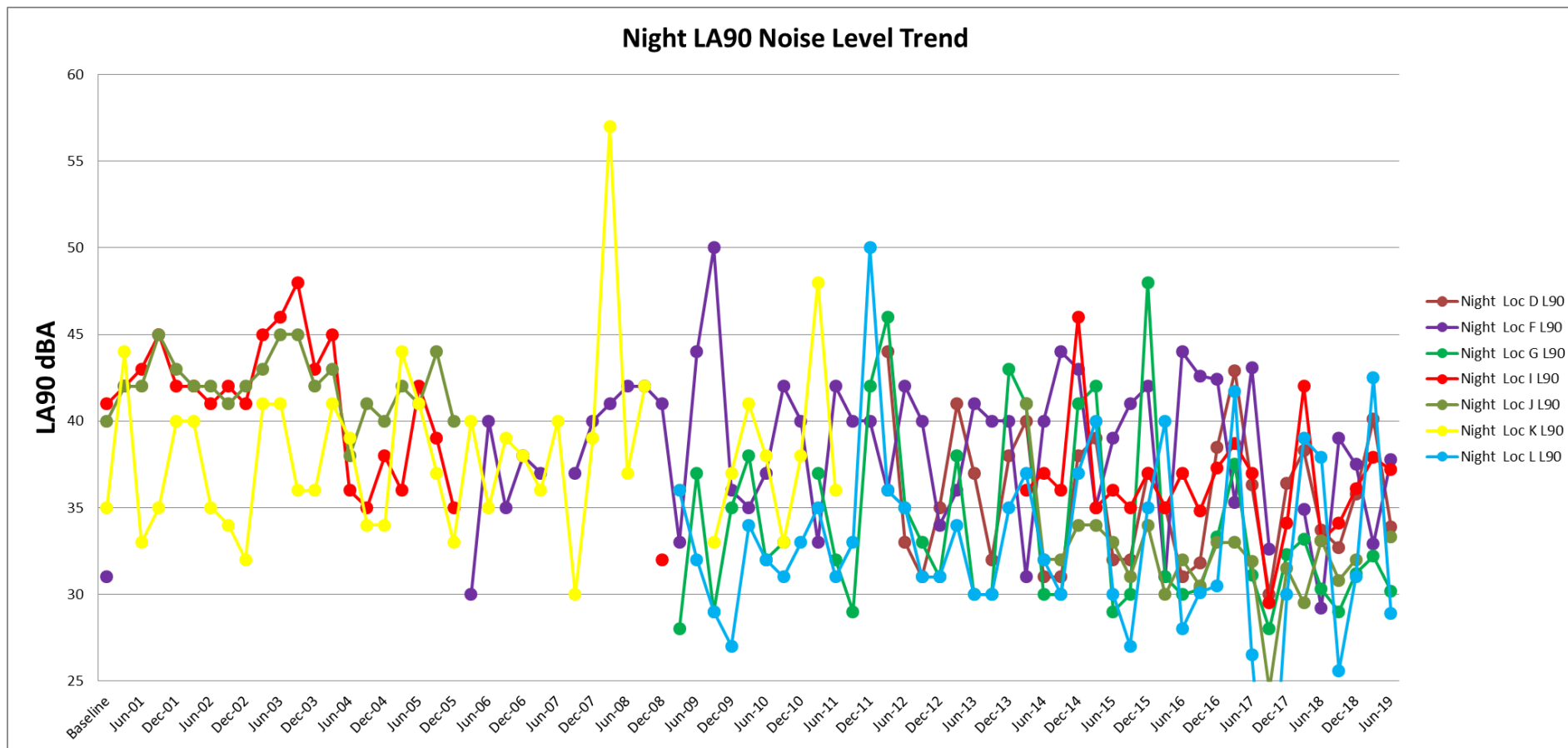


Figure 3 Long term Night-time LA90 Noise Levels



5.2.1.1 Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the current monitoring period 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 ¹	Long term Night-time LA90 Noise Levels		Difference dB ³
		Baseline	June 2019	
D Black Hill School, Black Hill	Day	N/A ²	35	N/A ²
	Evening	N/A ²	36	N/A ²
	Night	N/A ²	34	N/A ²
F Lot 684 Black Hill Road, Black Hill	Day	39	42	3
	Evening	35	39	4
	Night	31	38	7
G 156 Buchanan Road, Buchanan	Day	N/A ²	39	N/A ²
	Evening	N/A ²	37	N/A ²
	Night	N/A ²	30	N/A ²
I 49 Magnetic Drive, Ashtonfield	Day	48	42	-6
	Evening	33	41	8
	Night	41	37	-4
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	41	N/A ²
	Evening	N/A ²	32	N/A ²
	Night	N/A ²	29	N/A ²
J 220 Parish Drive, Thornton	Day	39	38	-1
	Evening	44	40	-4
	Night	40	33	-7

Note 1: Periods are as detailed the NPfl 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		March 2019	June 2019	
D Black Hill School, Black Hill	Day	41	35	-5
	Evening	41	36	-4
	Night	40	34	-6
F Lot 684 Black Hill Road, Black Hill	Day	43	42	-1
	Evening	35	39	4
	Night	33	38	5
G 156 Buchanan Road, Buchanan	Day	38	39	1
	Evening	36	37	1
	Night	32	30	-2
I 49 Magnetic Drive, Ashtonfield	Day	44	42	-2
	Evening	39	41	2
	Night	38	37	-1
L 65 Tipperary Drive, Ashtonfield	Day	33	41	8
	Evening	33	32	-1
	Night	43	29	-14
J 220 Parish Drive, Thornton	Day	N/A ²	38	N/A
	Evening	N/A ²	40	N/A
	Night	N/A ²	33	N/A

Note 1: 1. 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during this quarter's measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period Last Year

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		June 2018	June 2019	
D Black Hill School, Black Hill	Day	35	35	1
	Evening	34	36	3
	Night	34	34	0
F Lot 684 Black Hill Road, Black Hill	Day	34	42	9
	Evening	34	39	5
	Night	29	38	9
G 156 Buchanan Road, Buchanan	Day	38	39	1
	Evening	36	37	1
	Night	30	30	0
I 49 Magnetic Drive, Ashtonfield	Day	39	42	3
	Evening	39	41	2
	Night	33	37	4
L 65 Tipperary Drive, Ashtonfield	Day	46	41	-5
	Evening	42	32	-10
	Night	38	29	-9
J 220 Parish Drive, Thornton	Day	38	38	0
	Evening	39	40	1
	Night	33	33	0

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient LA10 Noise Comparison

The long term ambient LA10 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 respectively.

Figure 4 Long term Daytime LA₁₀ Noise Levels

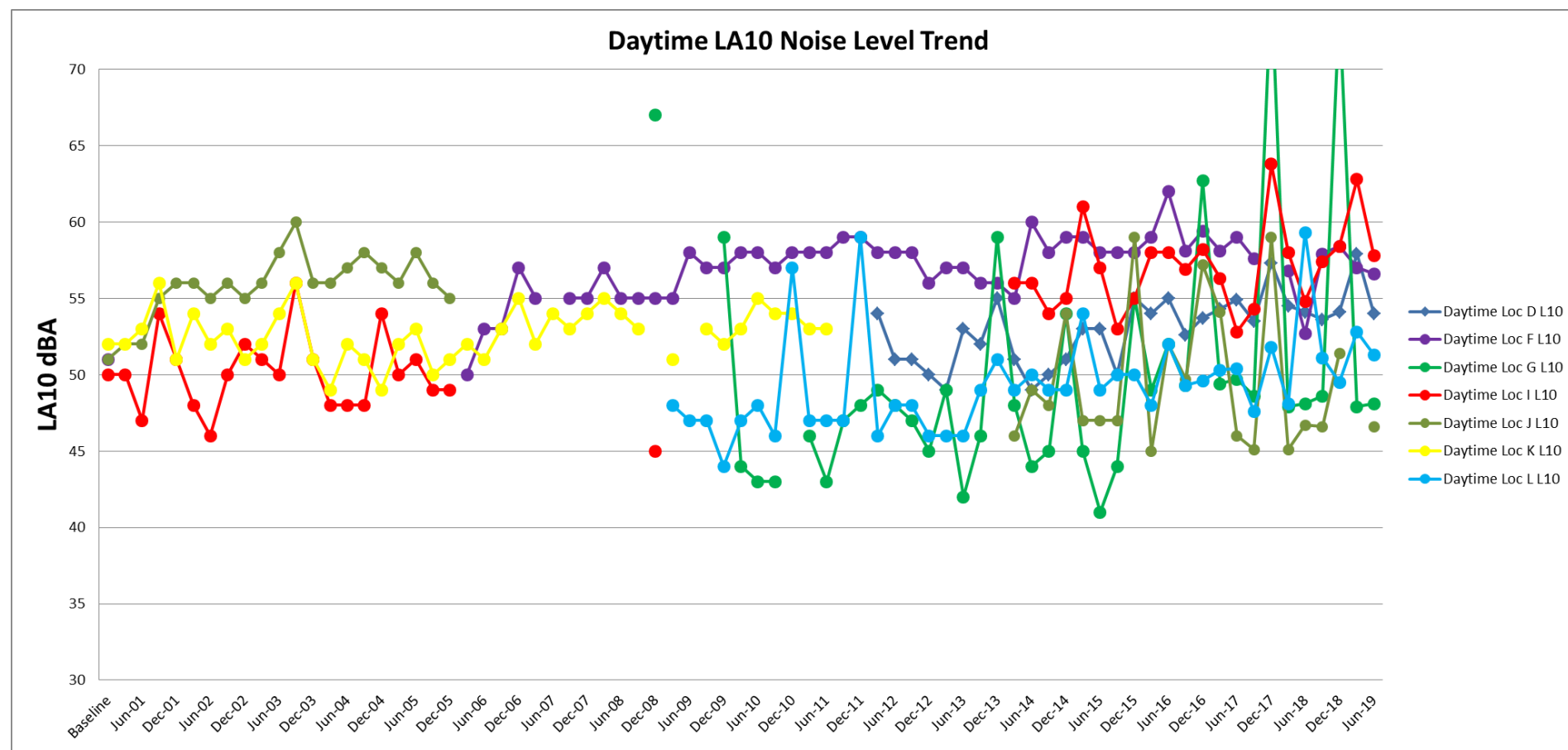


Figure 5 Long term Evening LA10 Noise Levels

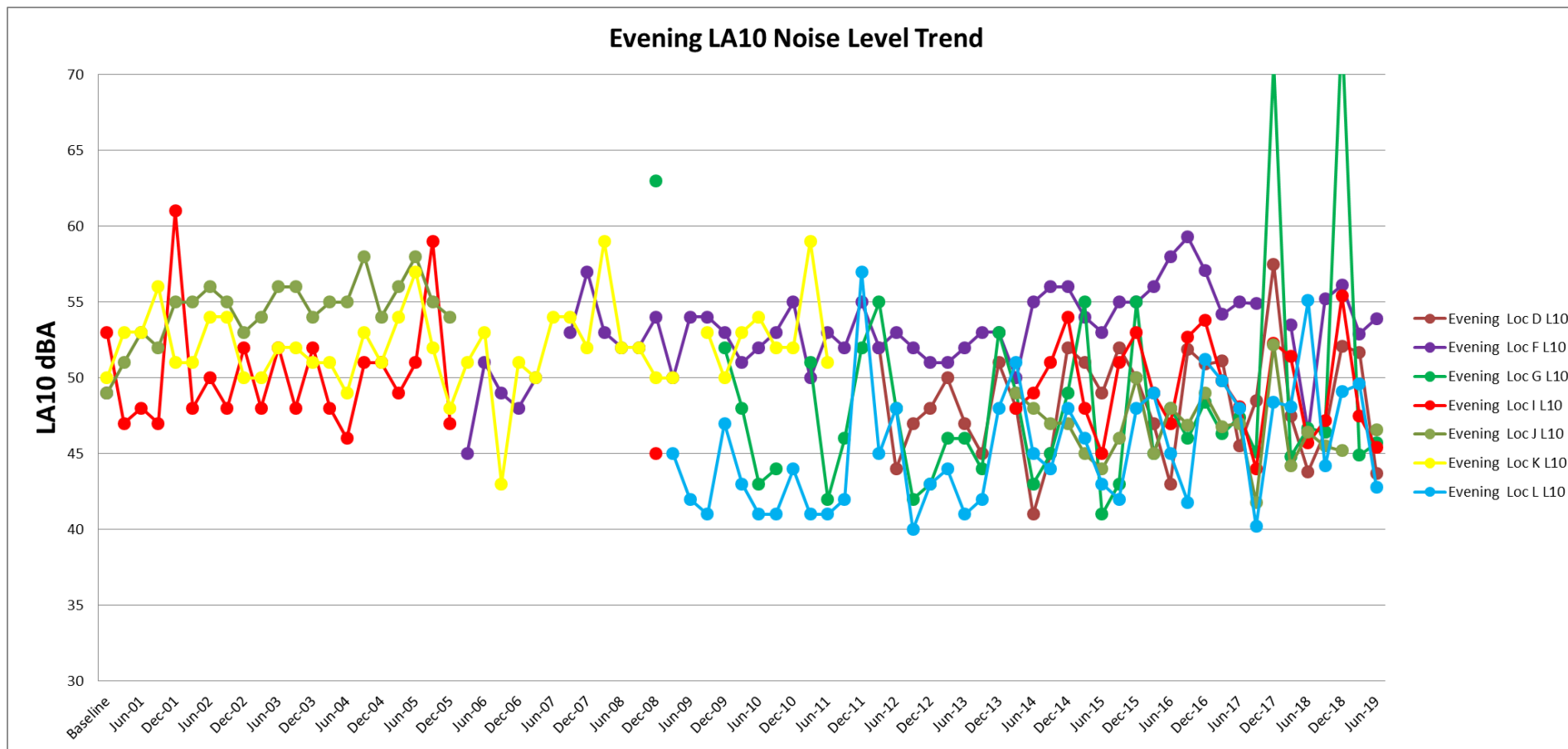
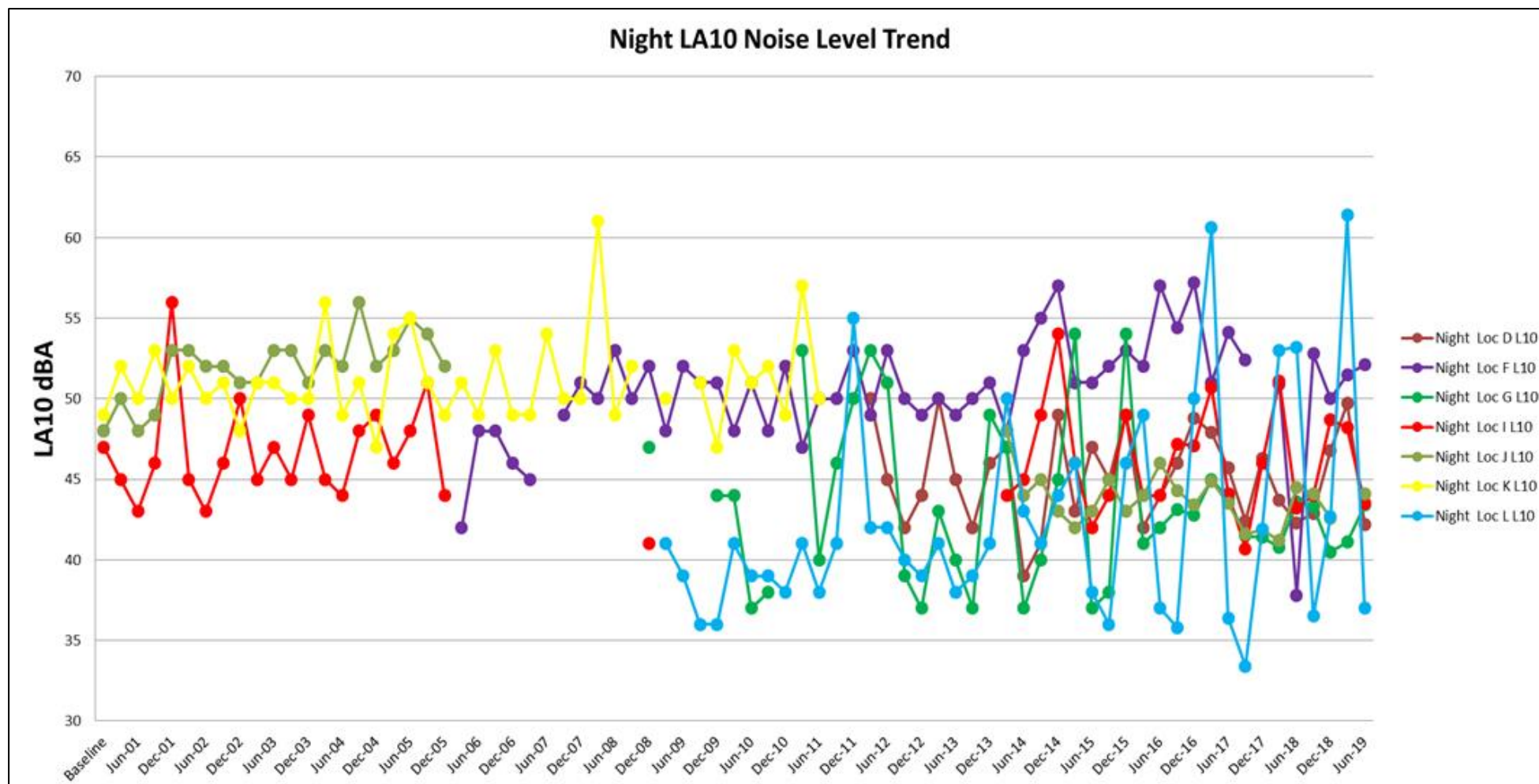


Figure 6 Long term Night LA10 Noise Levels



5.2.2.1 Baseline

Table 15 presents the ambient LA10 noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ³
		Baseline	June 2019	
D Black Hill School, Black Hill	Day	N/A ²	54	N/A
	Evening	N/A ²	44	N/A
	Night	N/A ²	42	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	57	6
	Evening	49	54	5
	Night	48	52	4
G 156 Buchanan Road, Buchanan	Day	N/A ²	48	N/A
	Evening	N/A ²	46	N/A
	Night	N/A ²	43	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	58	8
	Evening	53	45	-8
	Night	47	43	-4
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	51	N/A
	Evening	N/A ²	43	N/A
	Night	N/A ²	37	N/A
J 220 Parish Drive, Thornton	Day	51	47	-4
	Evening	49	46	-3
	Night	48	44	-4

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ³
		March 2019	June 2019	
D Black Hill School, Black Hill	Day	58	54	-4
	Evening	52	44	-8
	Night	50	42	-8
F Lot 684 Black Hill Road, Black Hill	Day	57	57	0
	Evening	53	54	1
	Night	52	52	1
G 156 Buchanan Road, Buchanan	Day	48	48	0
	Evening	45	46	1
	Night	41	43	2
I 49 Magnetic Drive, Ashtonfield	Day	63	58	-5
	Evening	48	45	-2
	Night	48	43	-5
L 65 Tipperary Drive, Ashtonfield	Day	53	51	-2
	Evening	50	43	-7
	Night	61	37	-24
J 220 Parish Drive, Thornton	Day	N/A ²	47	N/A
	Evening	N/A ²	46	N/A
	Night	N/A ²	44	N/A

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

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 Result Comparison – Coinciding Period Last Year

Monitoring Location	Period ¹	Long term Night-time LA ₁₀ Noise Levels		Difference dB ²
		June 2018	June 2019	
D Black Hill School, Black Hill	Day	54	54	0
	Evening	44	44	0
	Night	42	42	0
F Lot 684 Black Hill Road, Black Hill	Day	53	57	4
	Evening	46	54	8
	Night	38	52	14
G 156 Buchanan Road, Buchanan	Day	48	48	0
	Evening	47	46	-1
	Night	44	43	0
I 49 Magnetic Drive, Ashtonfield	Day	55	58	3
	Evening	46	45	0
	Night	43	43	0
L 65 Tipperary Dr, Ashtonfield	Day	59	51	-8
	Evening	55	43	-12
	Night	53	37	-16
J 220 Parish Drive, Thornton	Day	47	47	0
	Evening	46	46	0
	Night	45	44	0

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.3 Rail Noise Monitoring

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**.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
2/07/19	09:57-13:11	Day
04/07/19	13:21-16:15	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
J	2/07/19	Day	37	55	Yes
	04/07/19	Day	34	55	Yes

Results presented in **Table 19** indicate that rail noise levels from the Bloomfield Rail Spur were in compliance with the Abel Mine Project Approval during the noise monitoring period.

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 12 August 2014.

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.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the June 2019 quarter at six focus locations surrounding the mine.

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

A comparison of ambient LA_{10} and LA_{90} noise levels recorded during the current monitoring period (June 2019), the baseline monitoring period, the last monitoring period (March 2019), and the coinciding monitoring period from last year (June 2018) has been conducted.

Rail noise levels from the Bloomfield Rail Spur were considered to be in compliance with the Abel Mine Project Approval during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being 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 LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-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 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB 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	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	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

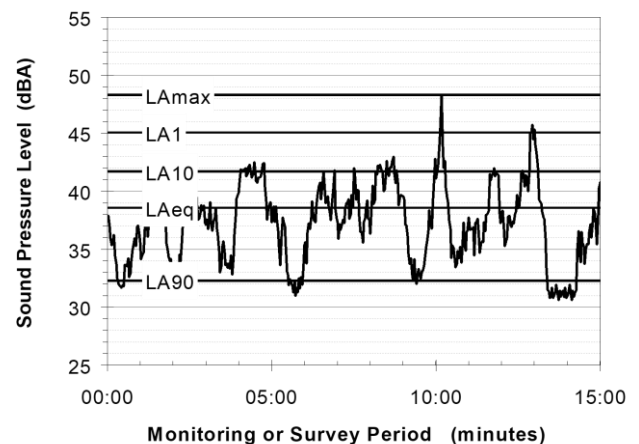
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of 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 LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 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:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 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.

LAeq 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.

5. Frequency Analysis

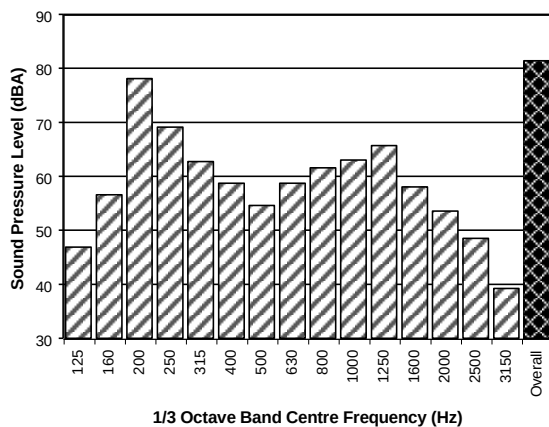
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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 (three 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.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. 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 (ie vertical, longitudinal 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 $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

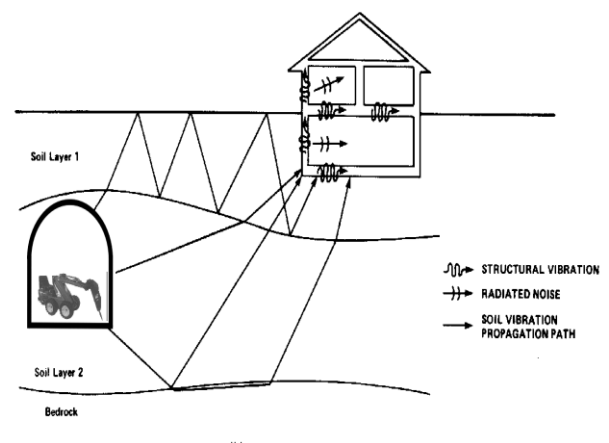
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience 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.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This 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 ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.

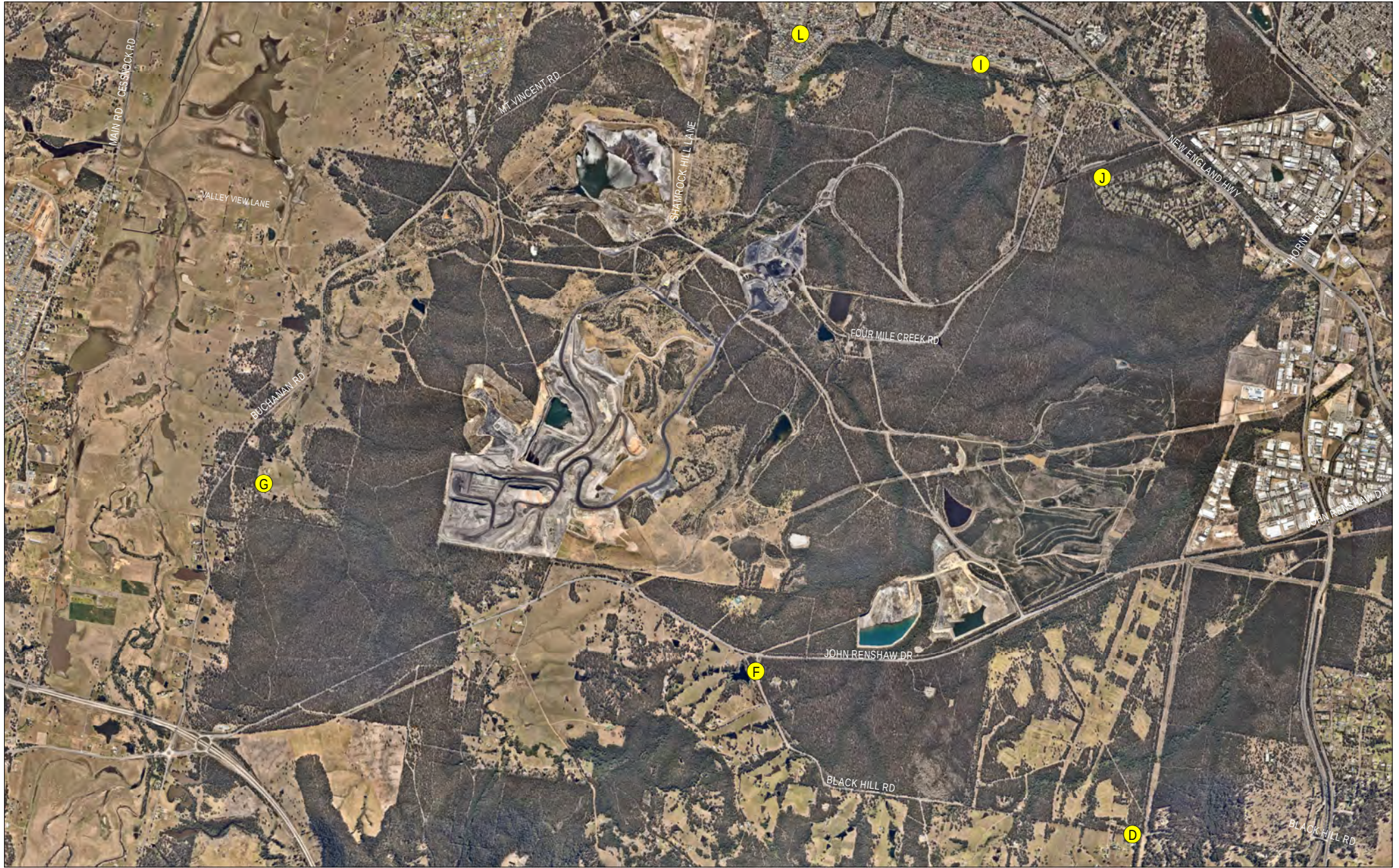


The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Locations

D:\Quick_Jobs\Martin_Davenport\Donaldson\SLR\63001_0530\200_LAB_MonitoringLocations_01.mxd





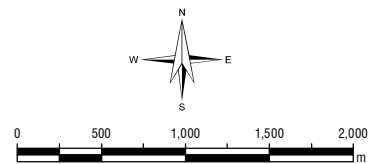
10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

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SLR Consulting Australia Pty Ltd does not guarantee the accuracy of such information.

Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

-  Noise Monitoring Locations



Donaldson Coal

Noise Monitoring

Noise Monitoring Locations

APPENDIX B

APPENDIX C

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 23293 & FILT 4792**

Equipment Description: Sound & Vibration Analyser

Manufacturer: B&K

Model No: 2250 **Serial No:** 3003389

Microphone Type: 4950 **Serial No:** 2913816

Preamplifier Type: ZC0032 **Serial No:** 20519

Filter Type: 1/3 Octave **Serial No:** 3003389

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 990 hPa ± 1.5 hPa

Temperature: 25 °C $\pm 2^\circ$ C **Relative Humidity:** 29% $\pm 5\%$

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE: *[Signature]*

Jack Klett

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CERTIFICATE No.: SLM 23293 & FILT 4792

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013. A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Checked by: 

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CALIBRATION OF:

Manufacturer:	Brüel & Kjær		
Hand-held Analyzer Type:	Type: 2270	Serial No.:	2679354
Application:	Type: BZ-7233	Version No.:	4.6.3
Intensity Probe Type:	Type: 3654	Serial No.:	2783762
Customer identification:	-		

CUSTOMER:

SLR Consulting Australia Pty Ltd
PO Box 176
2066 Lane Cove
New South Wales
Australia

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$		
Environment conditions:	Air Temperature:	$23^{\circ}\text{C} \pm 3^{\circ}\text{C}$	
	Air Pressure:	101,3 kPa $\pm$ 5 kPa	
	Relative Humidity:	50% RH $\pm$ 25% RH	

PROCEDURE:

The pressure residual intensity index for the complete system is then calibrated in accordance with the demands in IEC 1043 class 1 using the Brüel & Kjær calibration procedure P_3654_A05.

RESULTS:

Calibration after repair or adjustment

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA-4/02

Date of Calibration: 2017-09-01

Certificate Issued: 2017-09-01



Nicki Eriksen

Calibration Technician

RESULTS:

List of performed (sub)tests with status:

"OK" Means the result of the test is within tolerances.

"- " Means the result of the test is outside these tolerances.

Visual inspection:

	Result accepted?
Visual inspection	OK

Status of System Elements:

	Calibration Date	Result accepted?
Calibration of microphones	2017-09-01	OK ²

¹⁾ **Accredited calibration**, Environmental conditions 23°C ± 3°C, 1013 hPa ± 5 hPa²⁾ **Factory calibration**, Environmental conditions 23°C ± 2°C, > 960 hPa

Sound Pressure Calibration:

Measured Value Channel A [dB re 1V/Pa]	Measured Value Channel B [dB re 1V/Pa]	Deviation [dB]	Maximum Deviation [±dB]	Calibration Uncertainty [dB]
-38,75	-38,39	0,35	1,00	0,24

3654 Gain Diviation	Open-circuit Sensitivity [dB re 1V/Pa]	Measured Value [dB re 1V/Pa]	Deviation [dB]	Calibration Uncertainty [dB]
Mic. Part 1	-38,40	-38,75	-0,35	0,24
Mic. Part 2	-38,20	-38,39	-0,19	0,24

CERTIFICATE OF CALIBRATION



The Calibration Laboratory
Skodsborgvej 307 DK-2850 Nærum Denmark

No.: CDK1706457

Page 3 of 3

Measurement of the P-I index for the system:

Minimum levels are in accordance with IEC 1043 class 1 limits, with a 12 spacer

Frequency [Hz]	Min. Level [dB]	Direction	Measured P-I index [dB]	Calibration Uncertainty [dB]
50	9		23,6	< 1
63	10		25,1	< 1
80	11		25,6	< 1
100	12		27,2	< 1
125	13		29,6	< 1
160	14		33,2	< 1
200	15		37,7	< 1
250	16		40,7	< 1
315	16	-	36,8	< 1
400	16	-	45,6	< 1
500	16		40,5	< 1
630	16		27,7	< 1
800	16	-	27,2	< 1
1000	16	-	27,1	< 1
1250	16	-	35,9	< 1
1600	16	-	26,8	< 1
2000	16	-	33,5	< 1
2500	16		34,6	< 1
3150	16		32,6	< 1
4000	16		29,1	< 1
5000	16		27,8	< 1

System configuration:

Part 1 to channel: A

Part 2 to channel: B

Notes:

CALIBRATION EQUIPMENT:

Description	Type	Serial No.
Pistonphone	4228	1908475
Intensity Coupler	UA-0914	1913431
Sound Source	ZI-0055	-
Vaisala Barometer	PTB100A	U2450020
Vaisala Thermometer	HMT331	C1750032



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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18311**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-103-494
Microphone Serial Number : 317150
Pre-amplifier Serial Number : 28022

Atmospheric Conditions

Ambient Temperature : 22.5°C
Relative Humidity : 42.4%
Barometric Pressure : 99.31kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.15dB	Temperature	±0.3°C
12.5kHz	±0.21dB	Relative Humidity	±2.5%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18314**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-508
Microphone Serial Number : 319092
Pre-amplifier Serial Number : 27474

Atmospheric Conditions

Ambient Temperature : 21.7°C
Relative Humidity : 43.3%
Barometric Pressure : 99.36kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz $\pm 0.15dB$
12.5kHz $\pm 0.21dB$
16kHz $\pm 0.29dB$
Electrical Tests
31.5 Hz to 20 kHz $\pm 0.12dB$

Environmental Conditions
Temperature $\pm 0.3^{\circ}C$
Relative Humidity $\pm 2.5\%$
Barometric Pressure $\pm 0.017Pa$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 24613 & FILT 5164**

Equipment Description: Sound & Vibration Analyser

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 23241

Microphone Type: 7052H **Serial No:** 43035

Preamplifier Type: SV12L **Serial No:** 29858

Filter Type: 1/3 Octave **Serial No:** 23241

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1003 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 65% $\pm 5\%$

Date of Calibration: 03/05/2019 **Issue Date:** 09/05/2019

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *YKB*

AUTHORISED SIGNATURE:

Jack Kieft

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ELECTRONICS

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Acoustic and Vibration
Measurements

Page 1 of 2
AVCERT10 Rev. 1.3 15.05.18

CERTIFICATE No.: SLM 24613 & FILT 5164

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	<i>Clause</i>	<i>Result</i>
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	Pass
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 03/05/2019 **Issue Date:** 09/05/2019

Checked by: *LAB*

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 21303 & FILT 4154**

Equipment Description: Sound & Vibration Analyzer

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 23815

Microphone Type: 7052E **Serial No:** 47873

Filter Type: 1/3 Octave **Serial No:** 23815

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1004 hPa ± 1.5 hPa

Temperature: 24 °C $\pm 2^\circ$ C **Relative Humidity:** 34% $\pm 5\%$

Date of Calibration: 24/08/2017 **Issue Date:** 25/08/2017

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE: *[Signature]*

Jack Kieft

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 23295 & FILT 4794**

Equipment Description: Sound & Vibration Analyser

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 27579

Microphone Type: 7052E **Serial No:** 50613

Preamplifier Type: SV12L **Serial No:** 58524

Filter Type: 1/3 Octave **Serial No:** 27579

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 997 hPa ± 1.5 hPa

Temperature: 25 °C $\pm 2^\circ$ C **Relative Humidity:** 25% $\pm 5\%$

Date of Calibration: 07/08/2018 **Issue Date:** 07/08/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *IK*

AUTHORISED SIGNATURE:

Jack Kieft

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Tel: (02) 96808133 Fax: (02) 96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

CERTIFICATE No.: SLM 23295 & FILT 4794

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	Pass
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 07/08/2018 **Issue Date:** 07/08/2018

Checked by: *JK*

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



HEAD OFFICE
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Mobile: 0413 809806
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CERTIFICATE OF CALIBRATION

CERTIFICATE No: 23450

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Svantek

Type No: SV-30A

Serial No: 39482

Owner:

SLR Consulting Australia Pty Ltd

Level 2, 2 Lincoln Street

Lane Cove, NSW 2066

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 μ Pa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	94.02	1000.21	2.00
Level 2:	NA	N	114.01	1000.06	0.40
Uncertainty:			± 0.11 dB	$\pm 0.05\%$	$\pm 0.20\%$
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:

Ambient Pressure: 1015 hPa ± 1.5 hPa **Relative Humidity:** 41% $\pm 5\%$

Temperature: 23 $^{\circ}$ C $\pm 2^{\circ}$ C

Date of Calibration: 04/09/2018

Issue Date: 04/09/2018

Acu-Vib Test Procedure: AVP02 (Calibrators)

Test Method: AS IEC 60942 - 2004

CHECKED BY: **AUTHORISED SIGNATURE:**

Jack Rielt

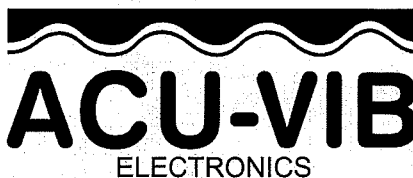
Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



Accredited Lab. 9262
Acoustic and Vibration
Measurements



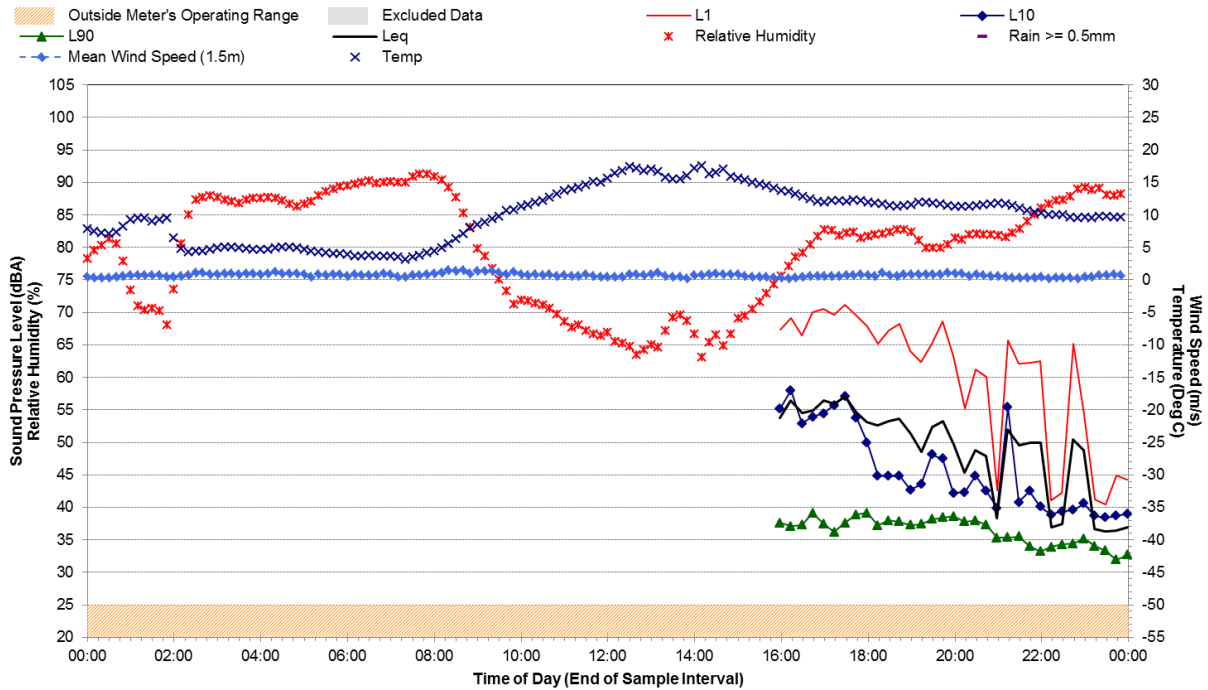
HEAD OFFICE
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Mobile: 0413 809806
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APPENDIX D

Statistical Ambient Noise Levels

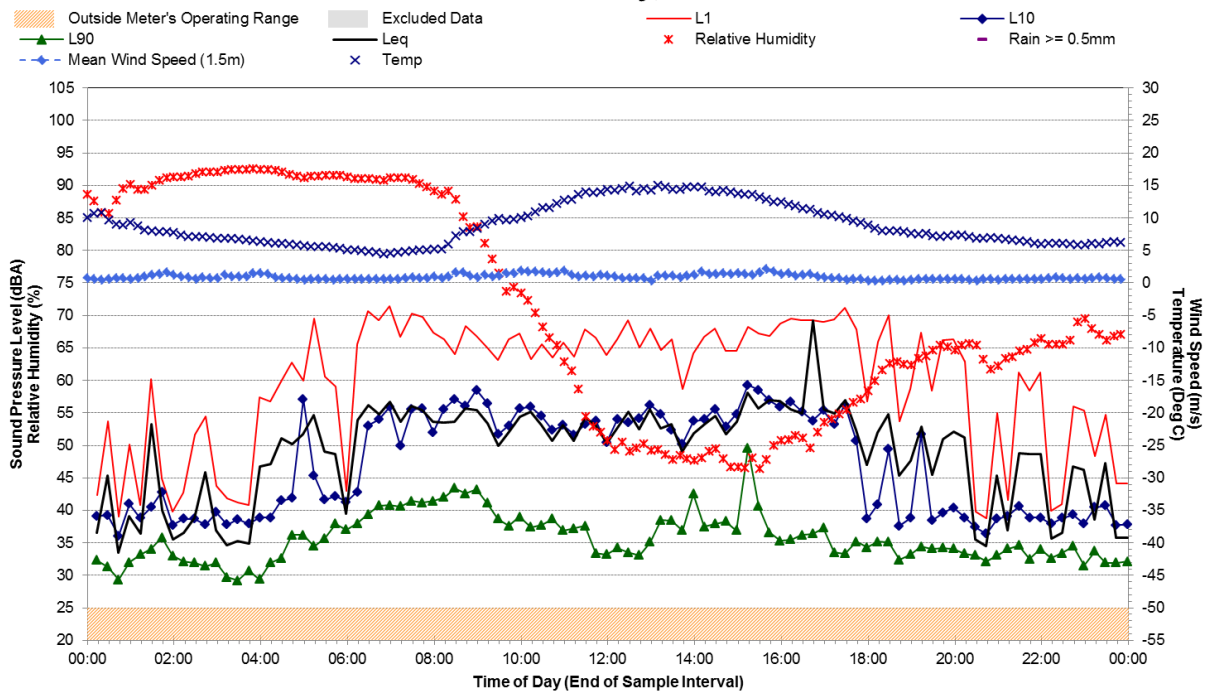
Statistical Ambient Noise Levels

Location D - Thursday, 20 June 2019



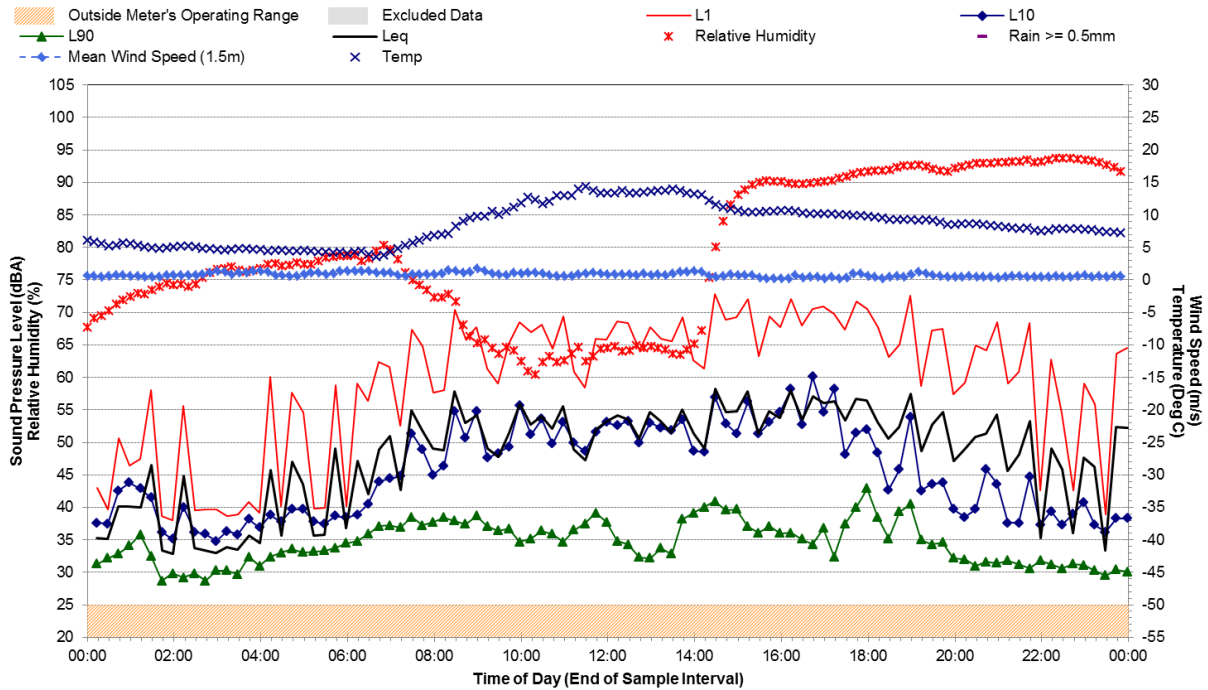
Statistical Ambient Noise Levels

Location D - Friday, 21 June 2019



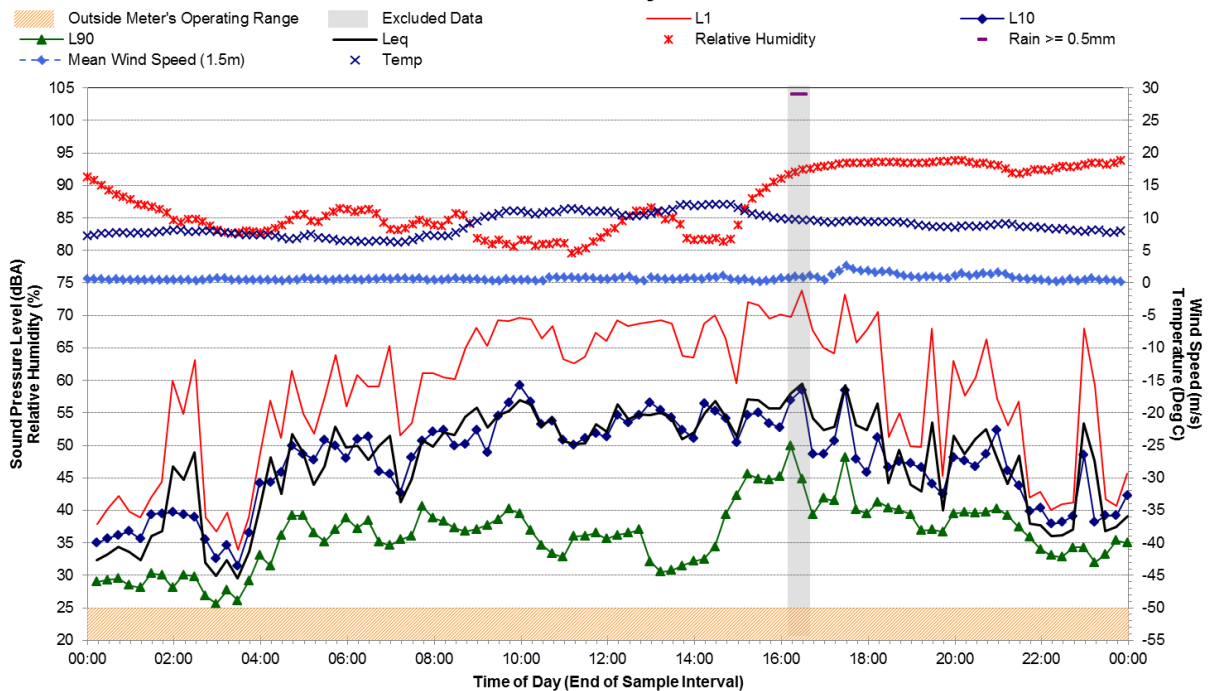
Statistical Ambient Noise Levels

Location D - Saturday, 22 June 2019



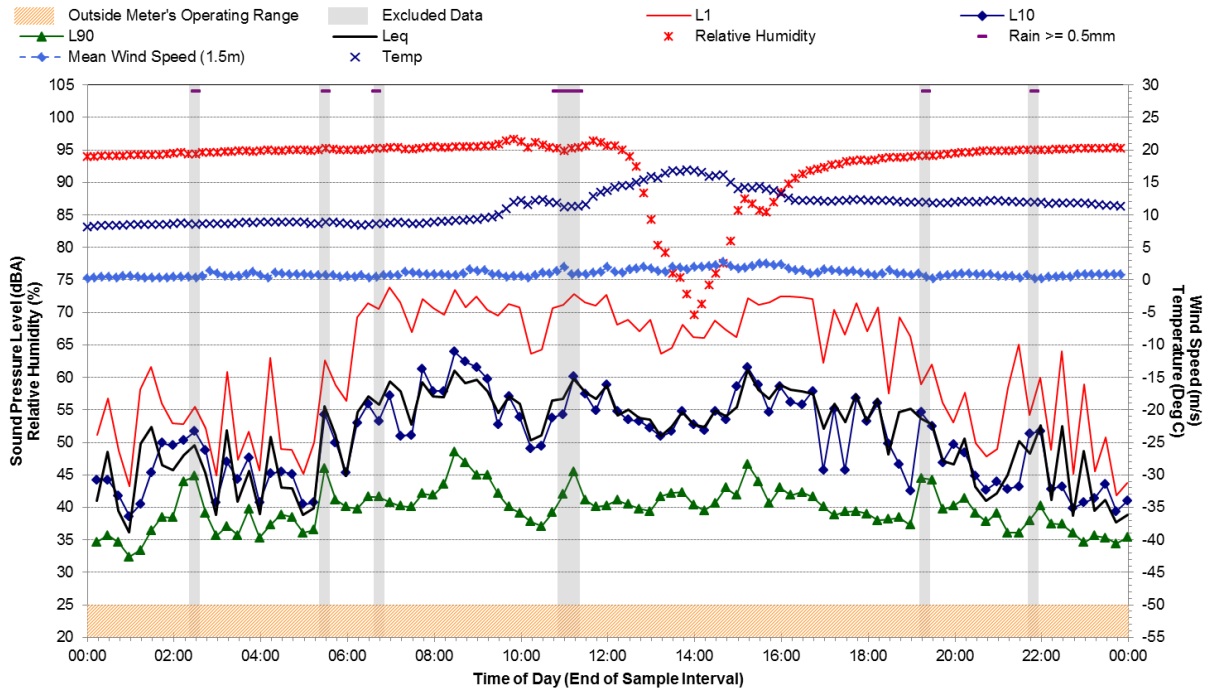
Statistical Ambient Noise Levels

Location D - Sunday, 23 June 2019



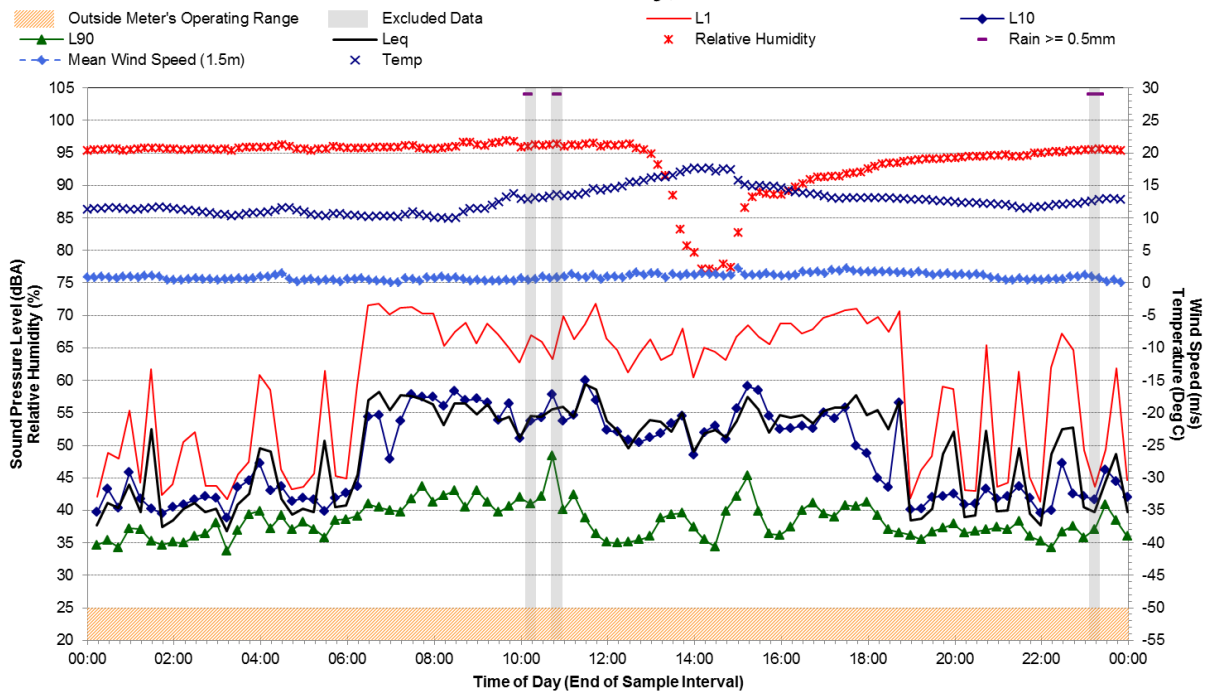
Statistical Ambient Noise Levels

Location D - Monday, 24 June 2019



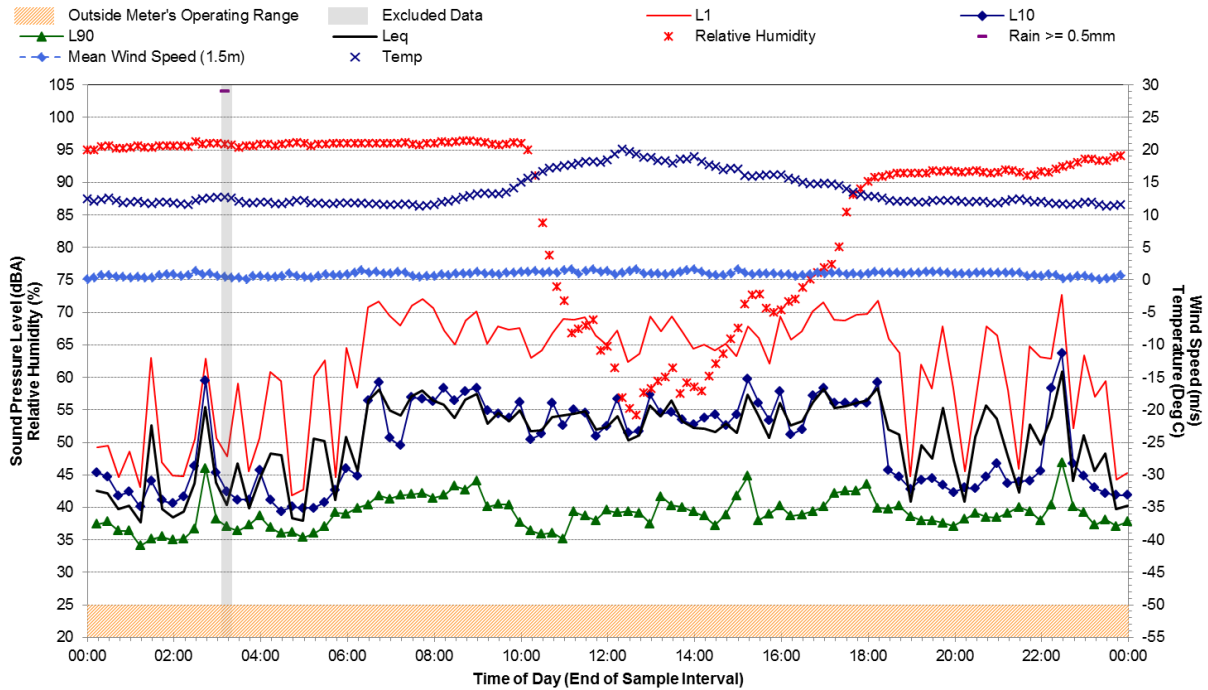
Statistical Ambient Noise Levels

Location D - Tuesday, 25 June 2019



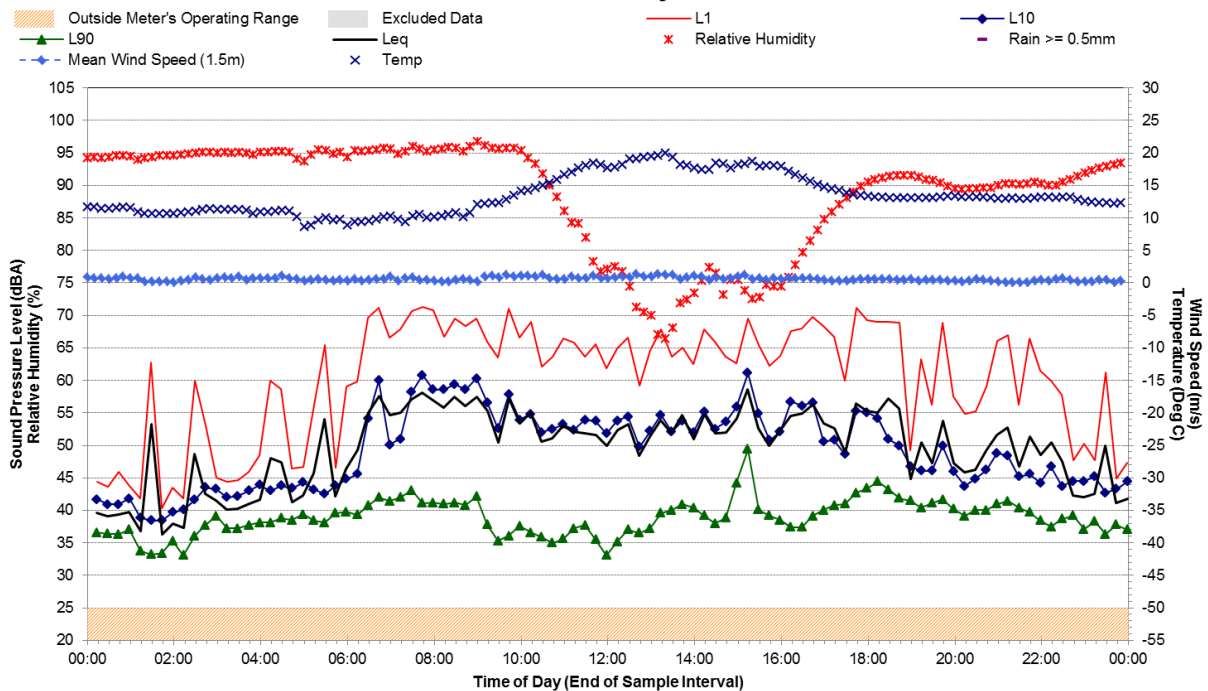
Statistical Ambient Noise Levels

Location D - Wednesday, 26 June 2019



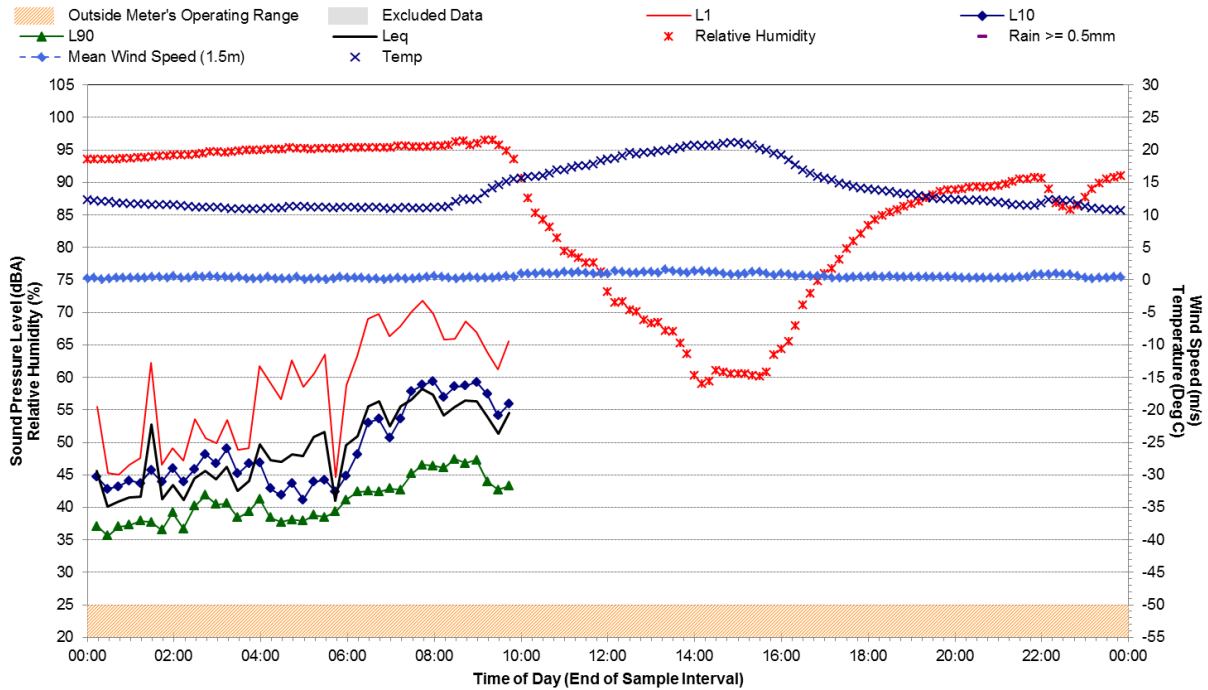
Statistical Ambient Noise Levels

Location D - Thursday, 27 June 2019



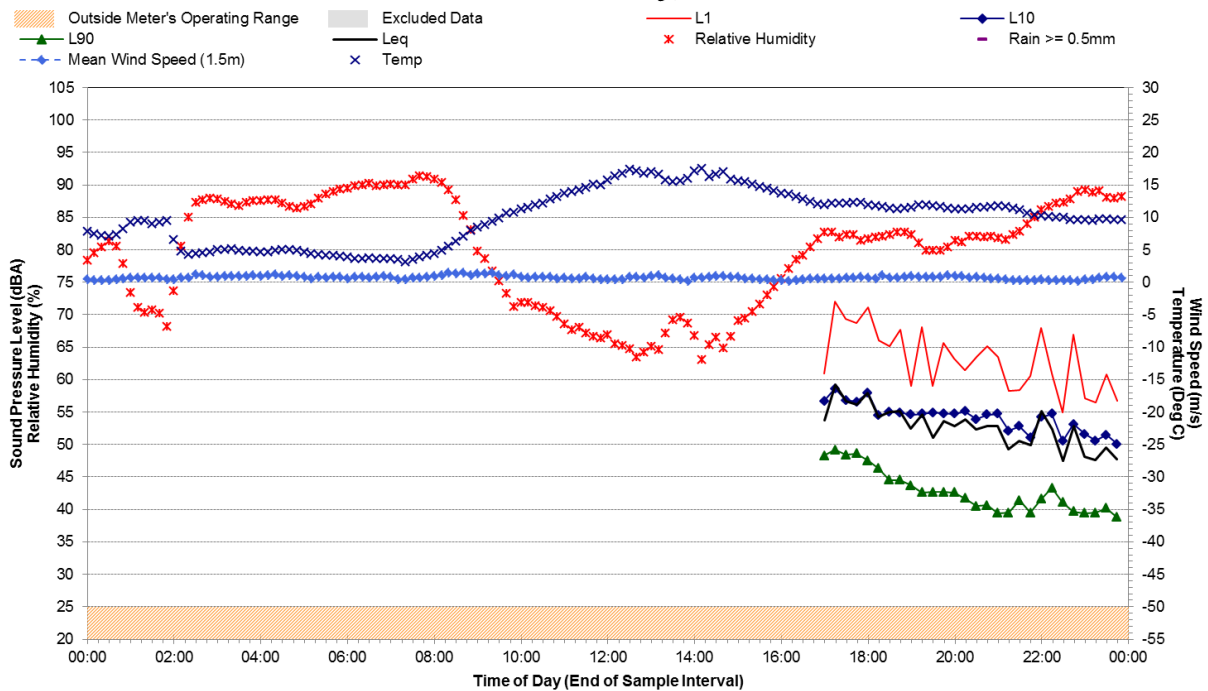
Statistical Ambient Noise Levels

Location D - Friday, 28 June 2019



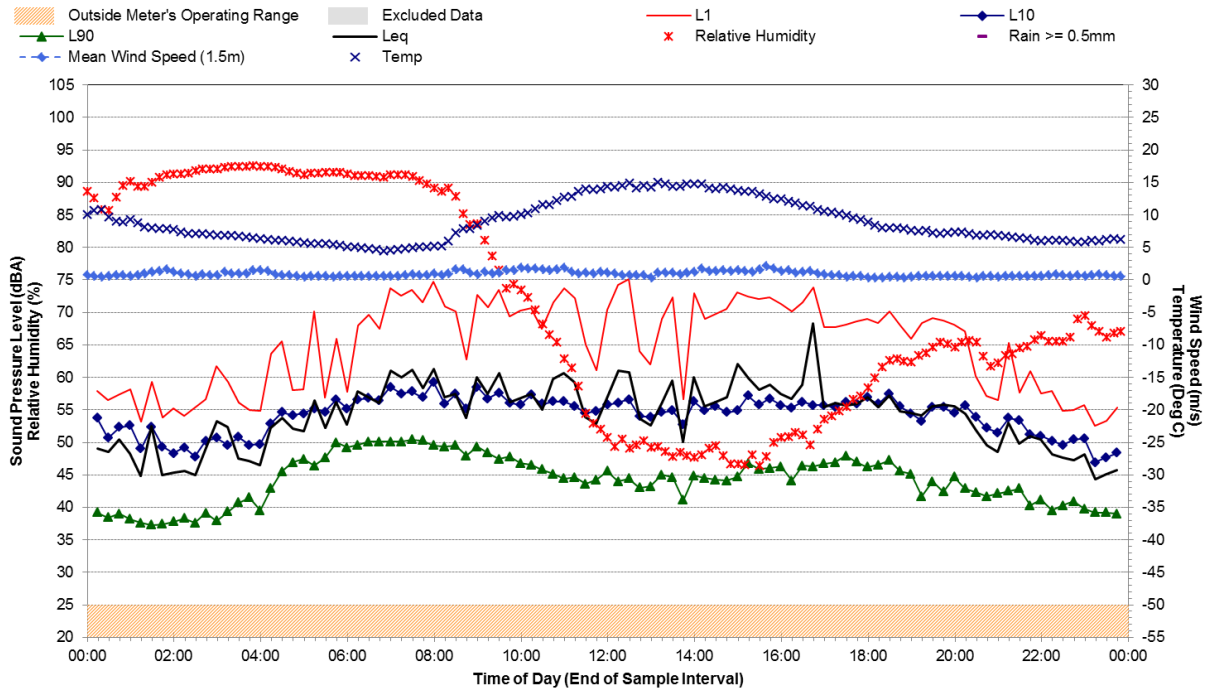
Statistical Ambient Noise Levels

Location F - Thursday, 20 June 2019



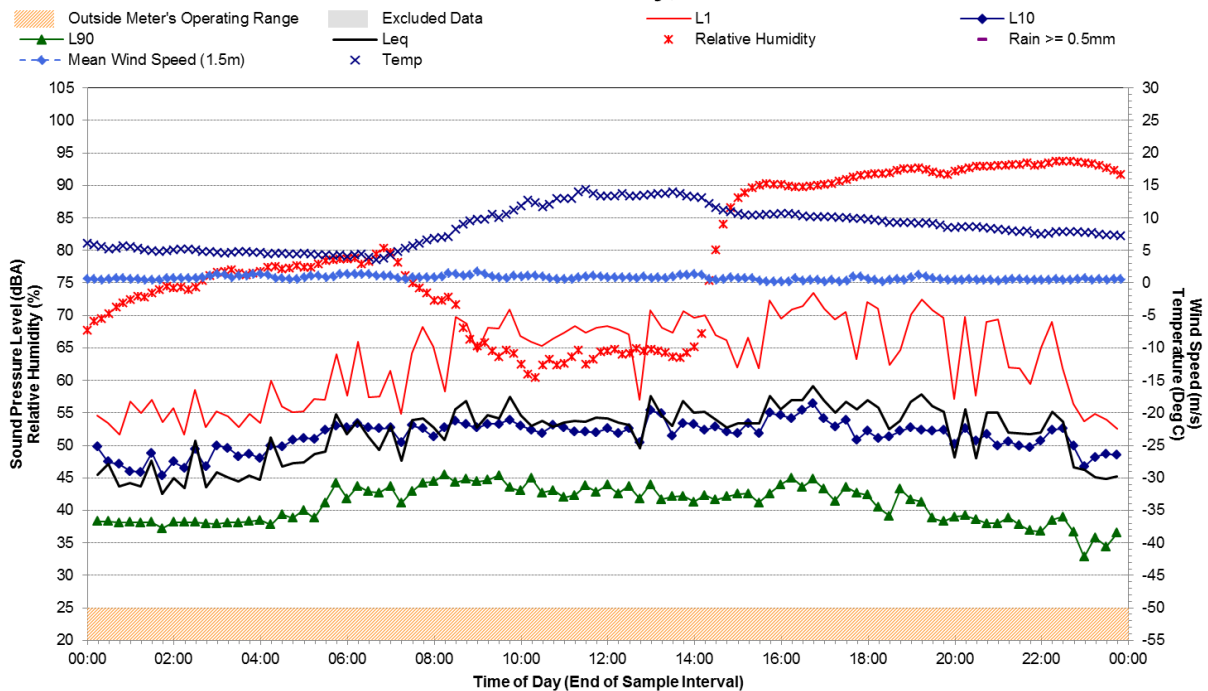
Statistical Ambient Noise Levels

Location F - Friday, 21 June 2019



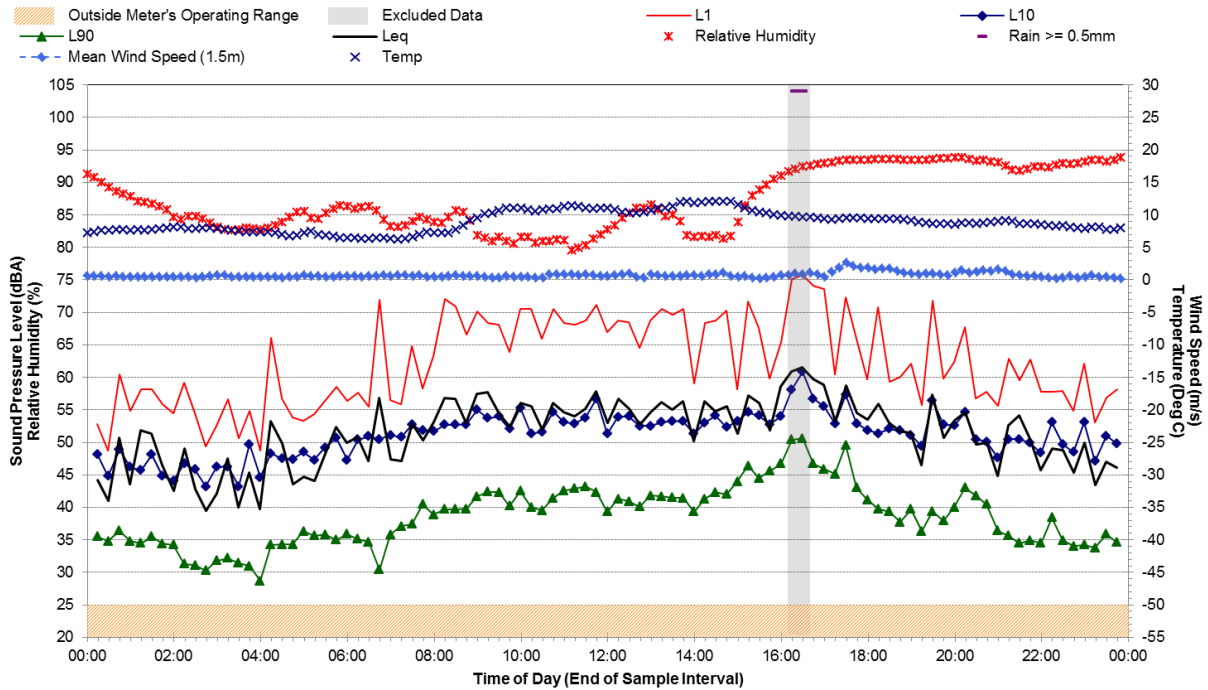
Statistical Ambient Noise Levels

Location F - Saturday, 22 June 2019



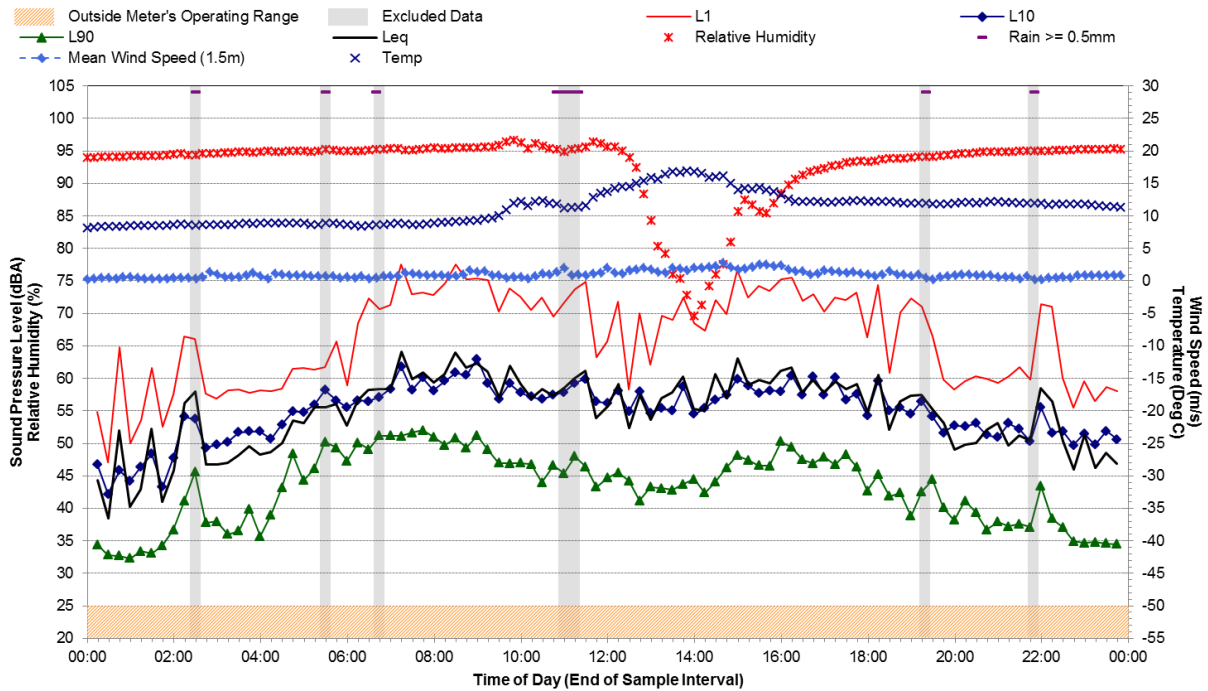
Statistical Ambient Noise Levels

Location F - Sunday, 23 June 2019



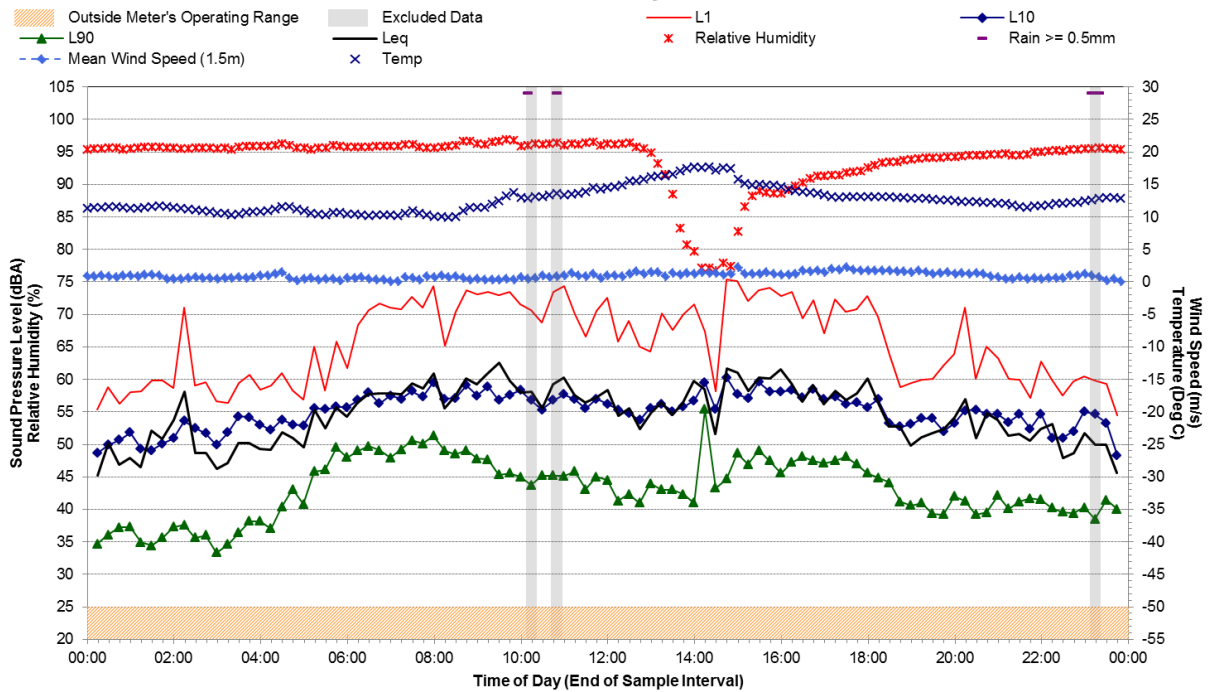
Statistical Ambient Noise Levels

Location F - Monday, 24 June 2019



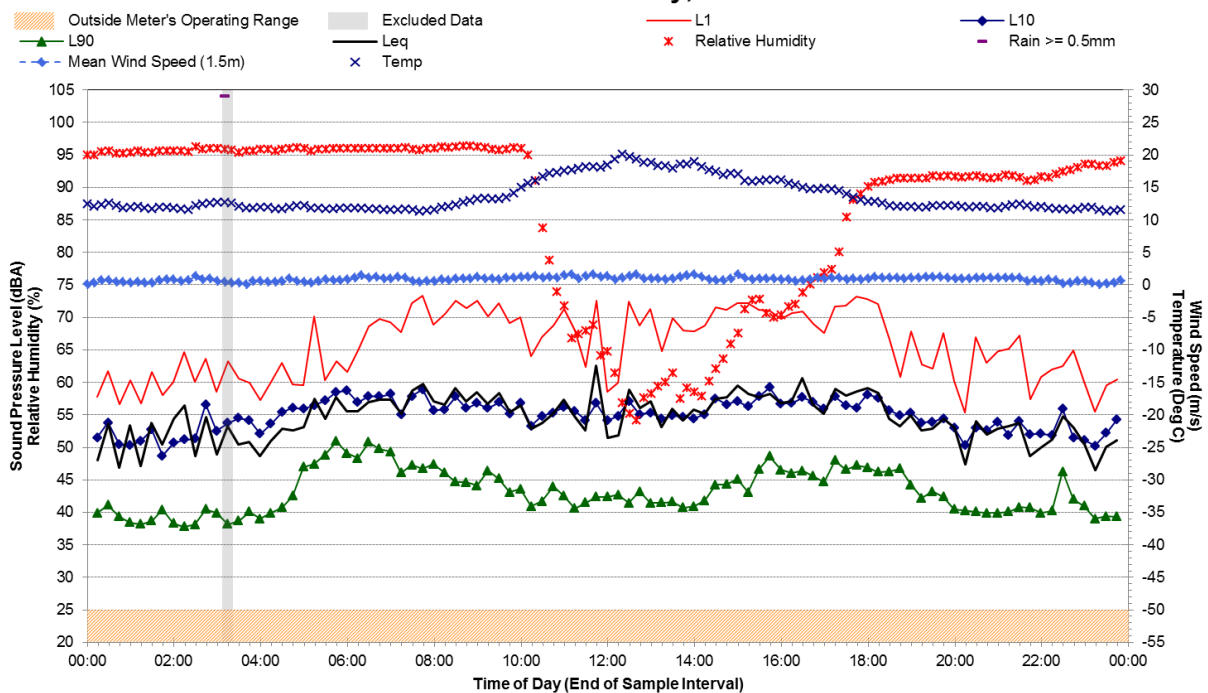
Statistical Ambient Noise Levels

Location F - Tuesday, 25 June 2019



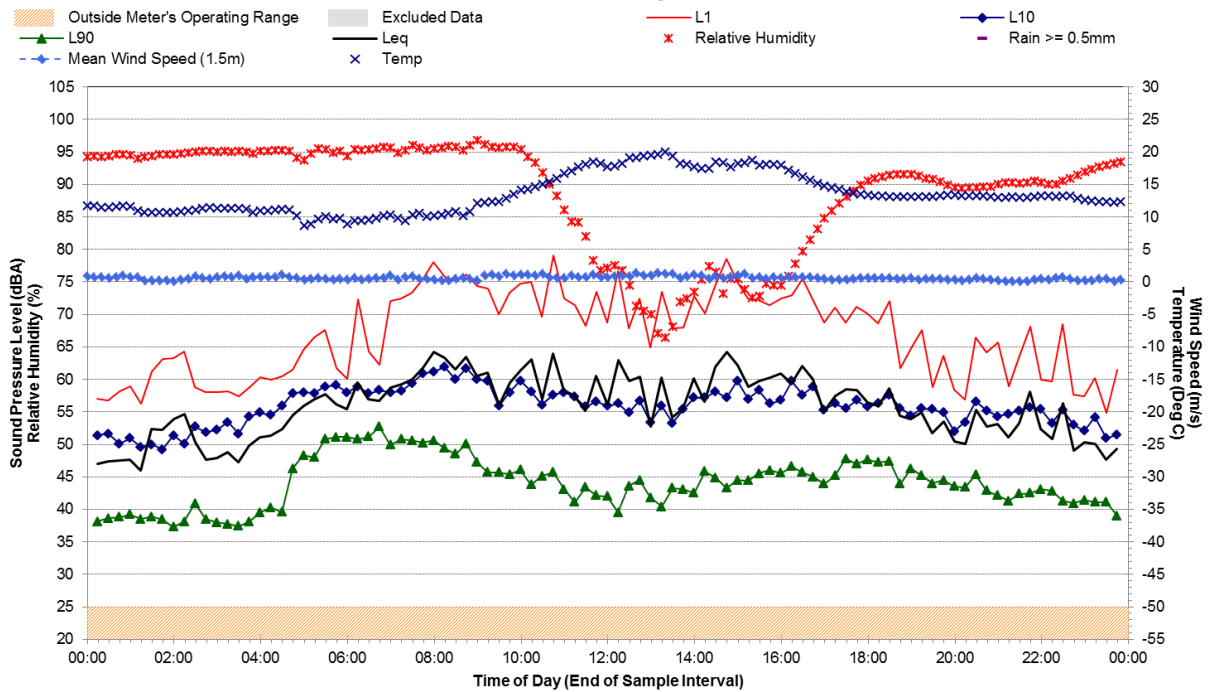
Statistical Ambient Noise Levels

Location F - Wednesday, 26 June 2019



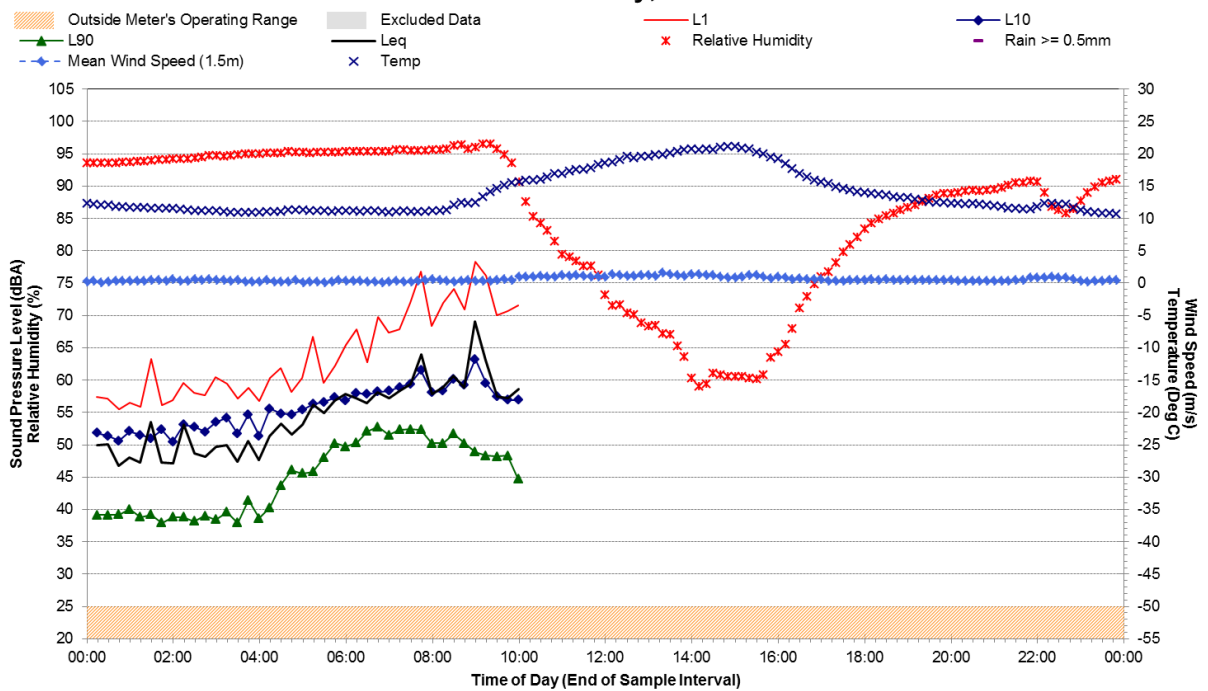
Statistical Ambient Noise Levels

Location F - Thursday, 27 June 2019



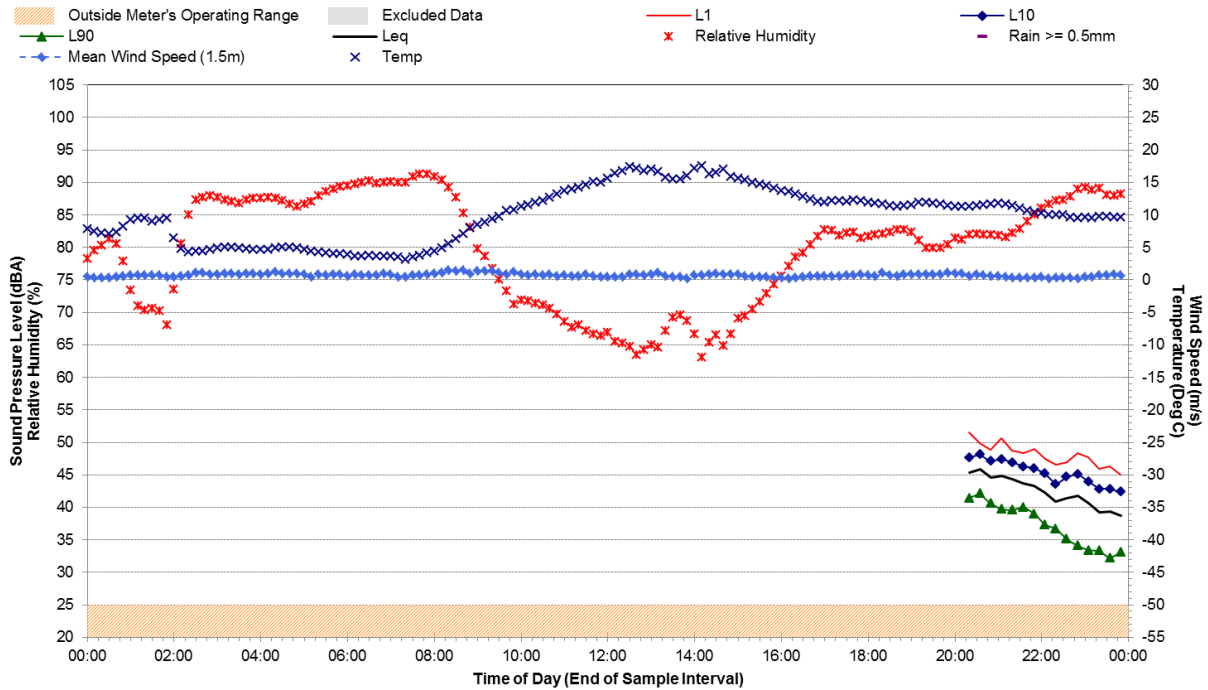
Statistical Ambient Noise Levels

Location F - Friday, 28 June 2019



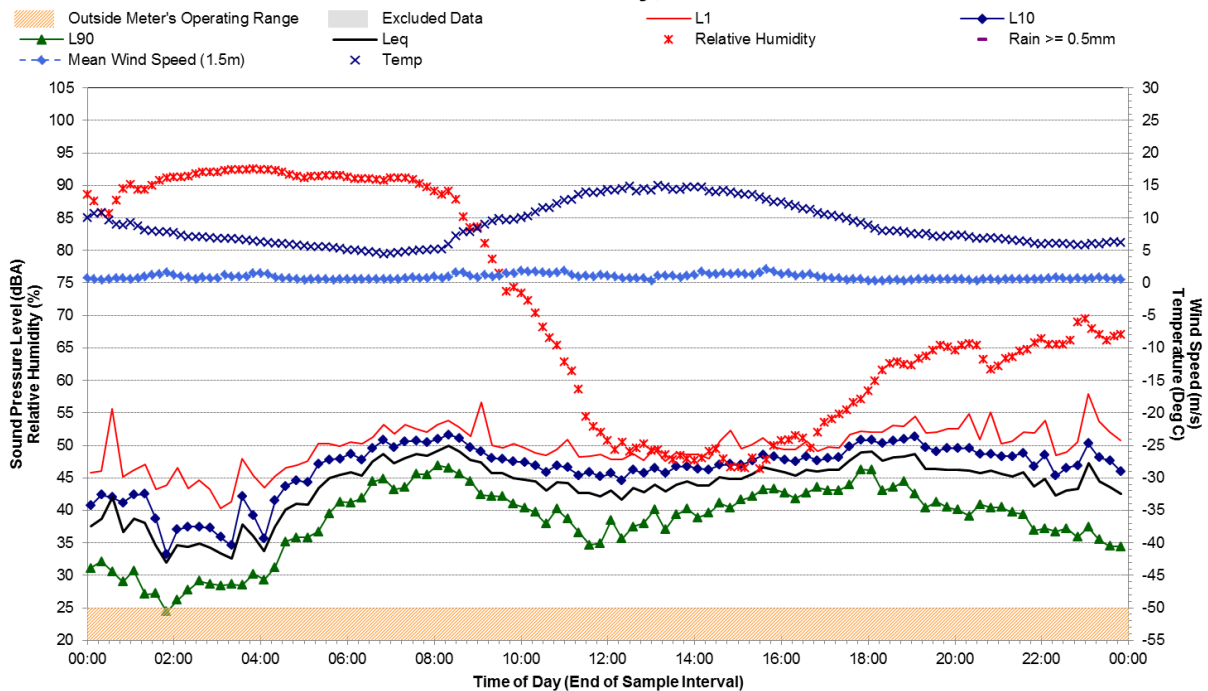
Statistical Ambient Noise Levels

Location G - Thursday, 20 June 2019



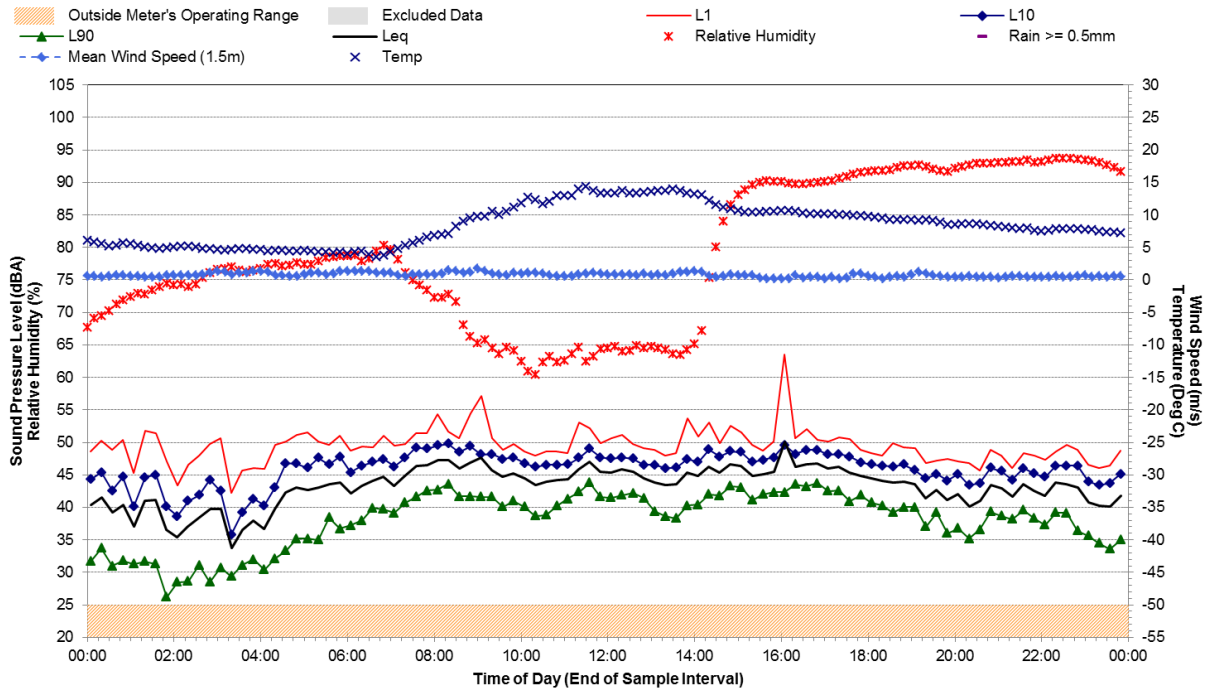
Statistical Ambient Noise Levels

Location G - Friday, 21 June 2019



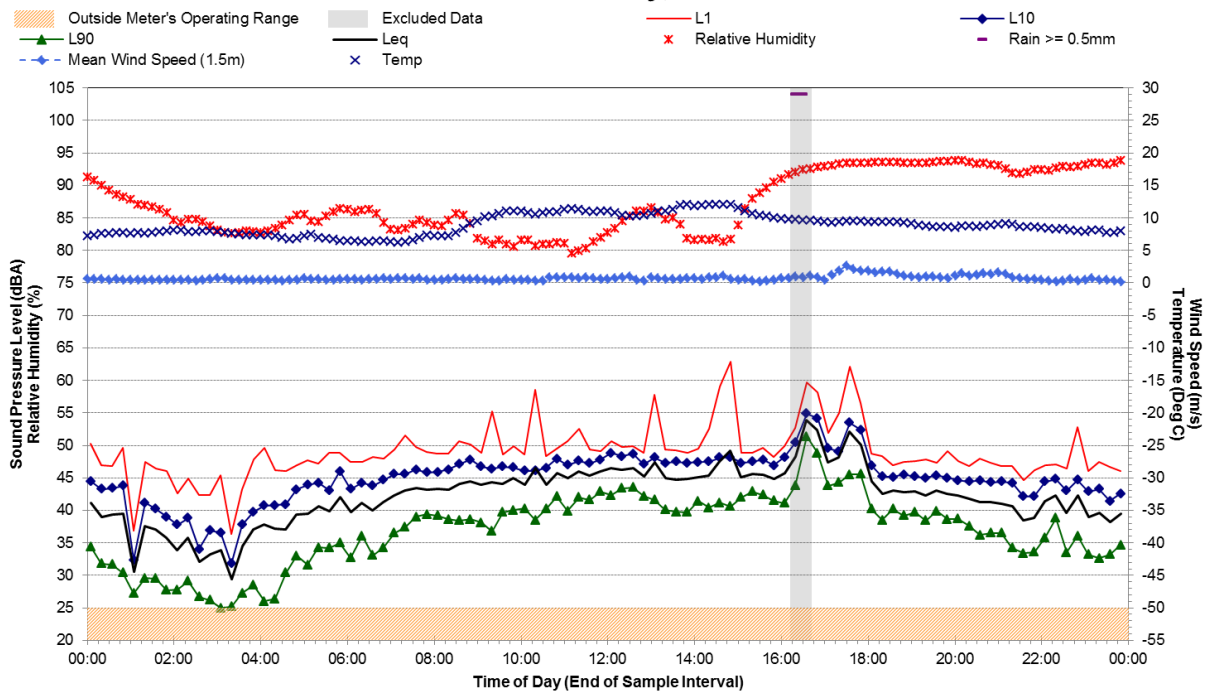
Statistical Ambient Noise Levels

Location G - Saturday, 22 June 2019



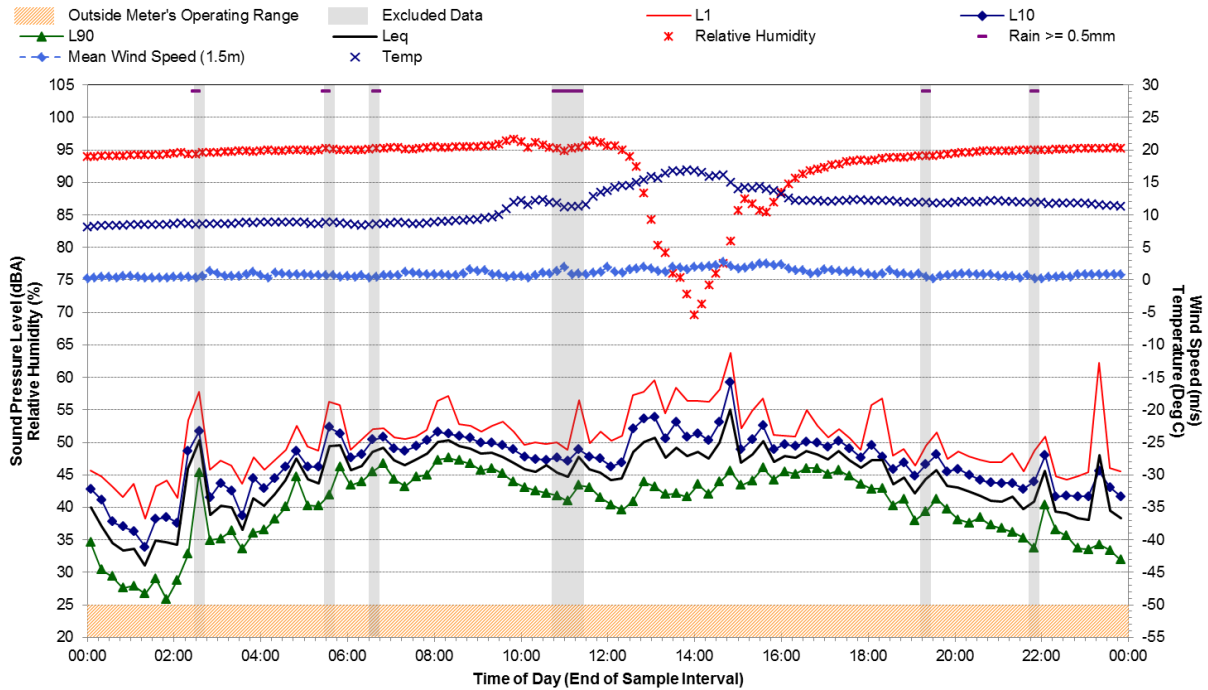
Statistical Ambient Noise Levels

Location G - Sunday, 23 June 2019



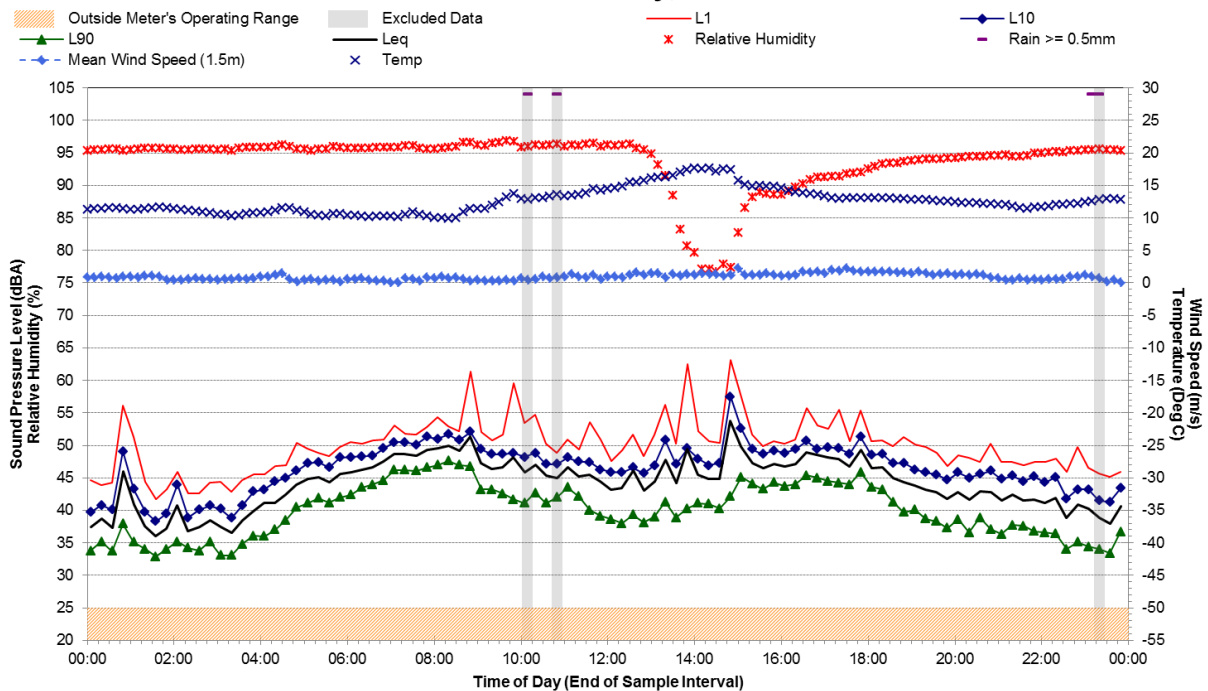
Statistical Ambient Noise Levels

Location G - Monday, 24 June 2019



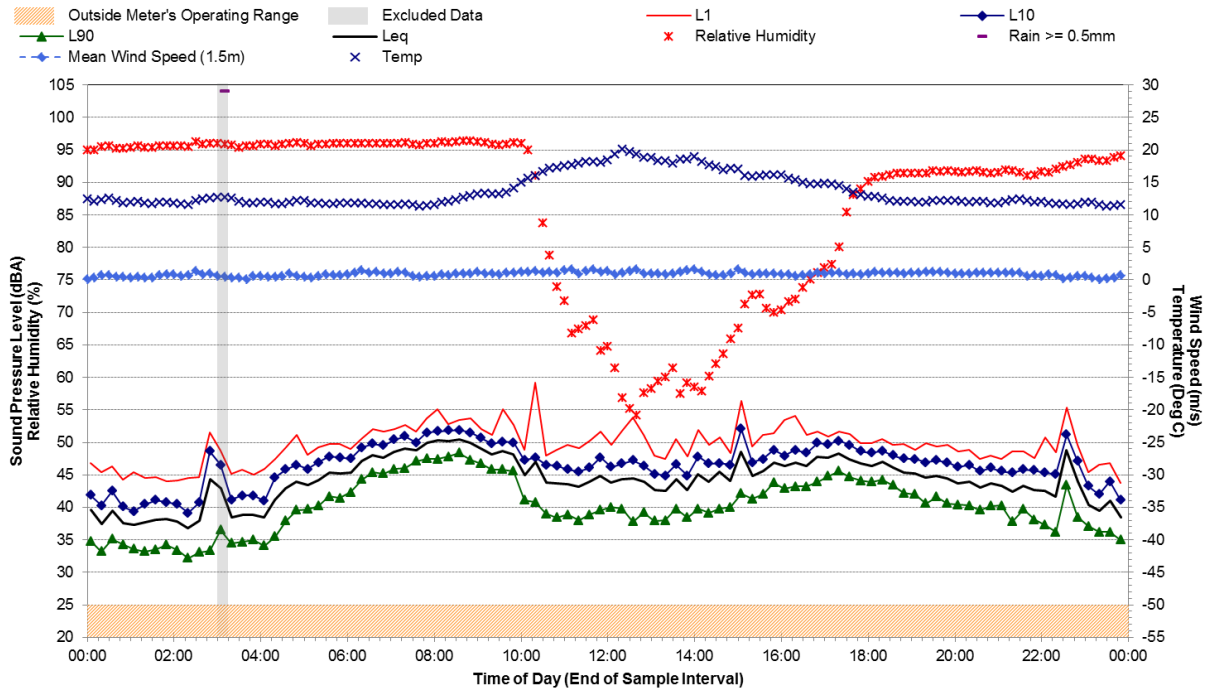
Statistical Ambient Noise Levels

Location G - Tuesday, 25 June 2019



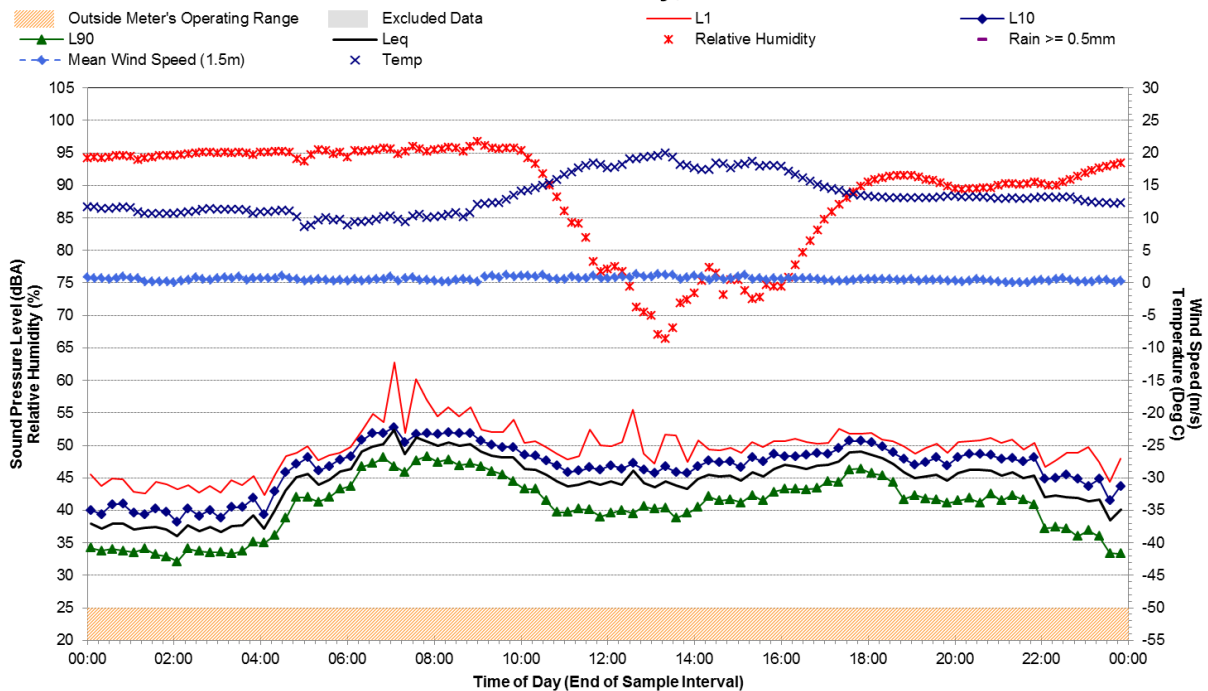
Statistical Ambient Noise Levels

Location G - Wednesday, 26 June 2019



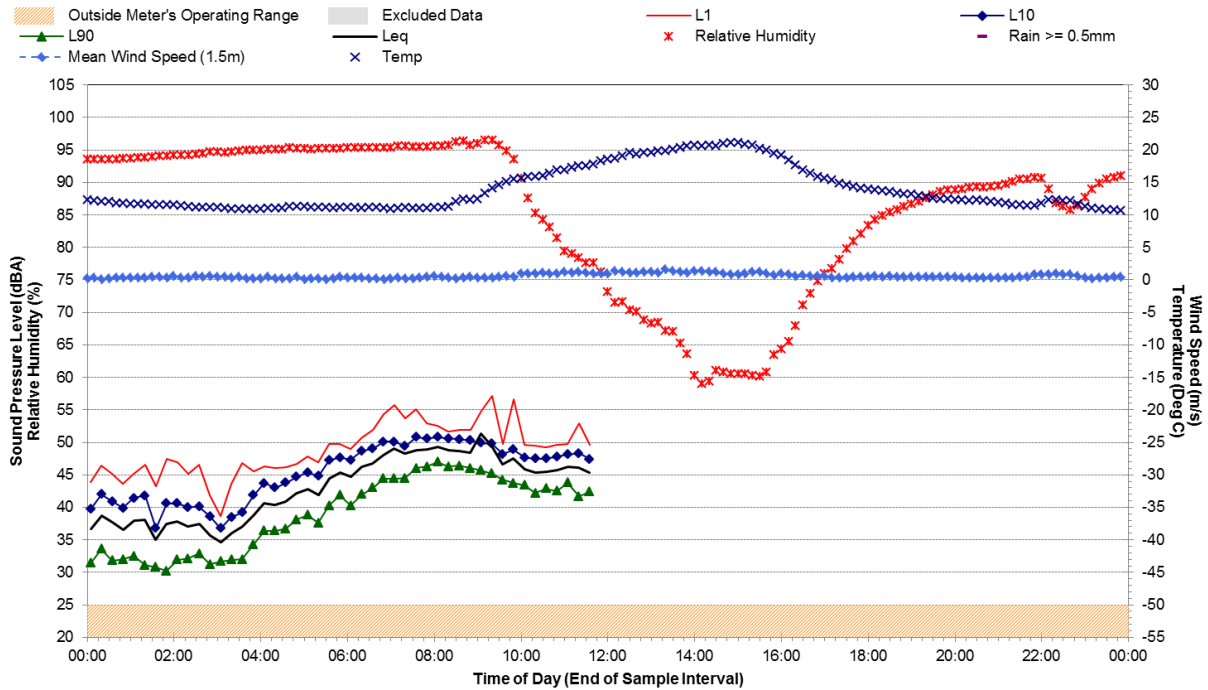
Statistical Ambient Noise Levels

Location G - Thursday, 27 June 2019



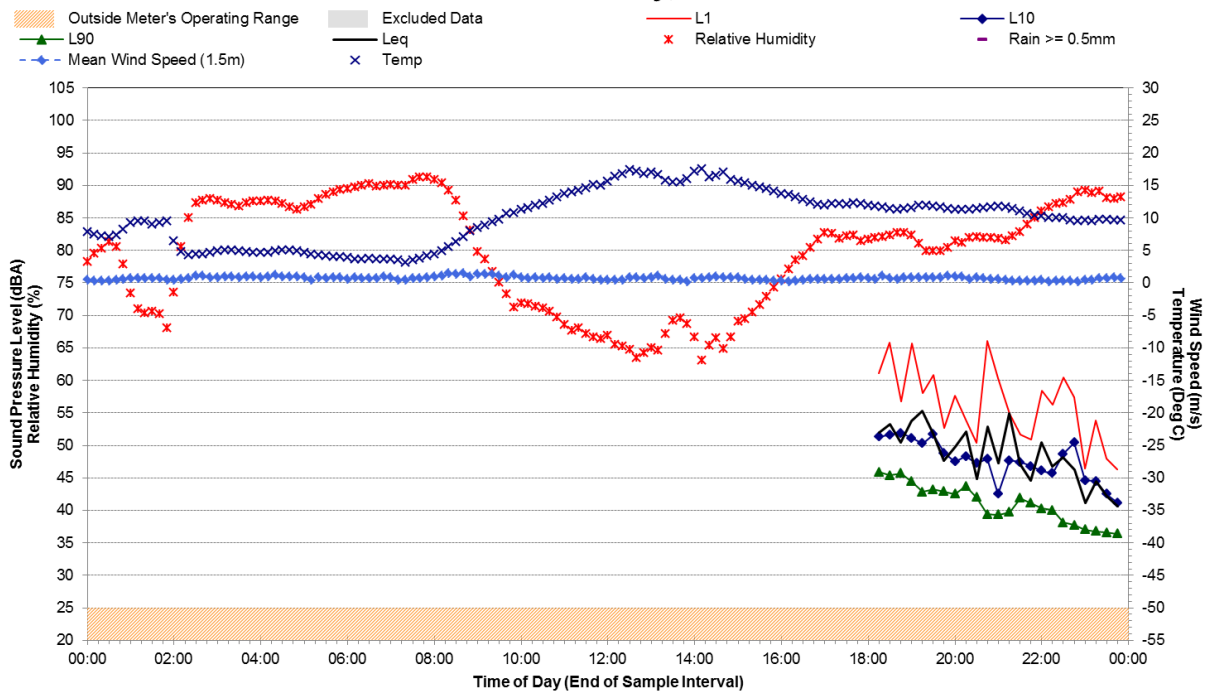
Statistical Ambient Noise Levels

Location G - Friday, 28 June 2019



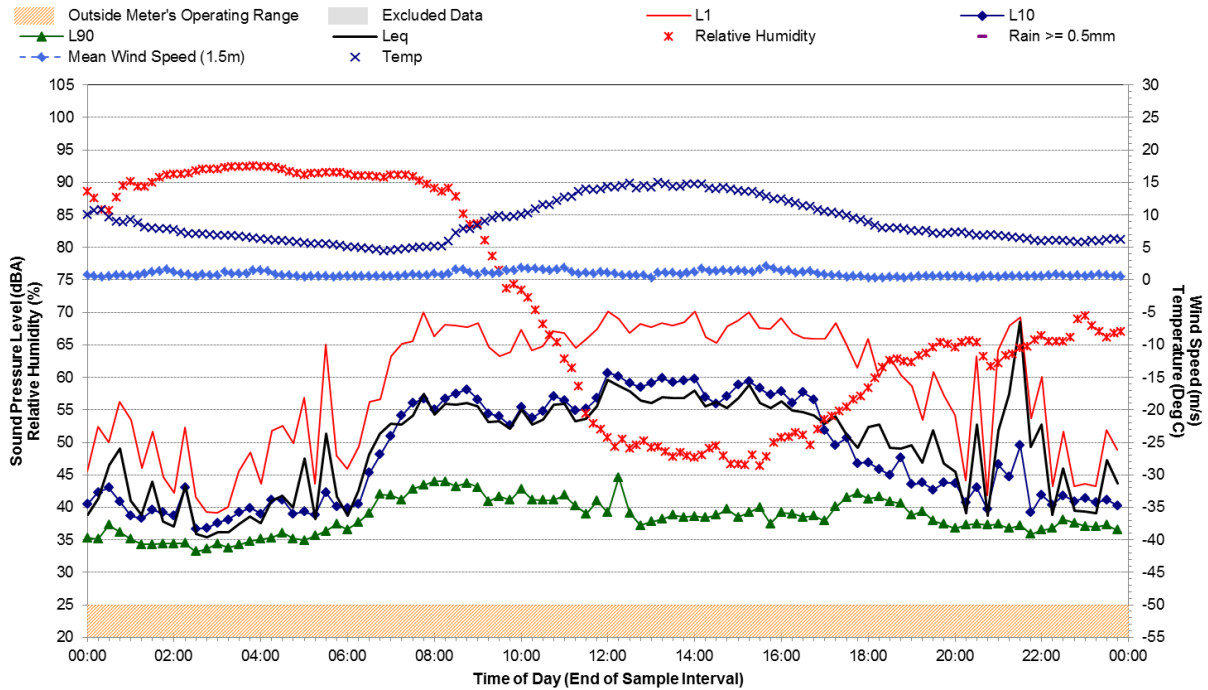
Statistical Ambient Noise Levels

Location I - Thursday, 20 June 2019



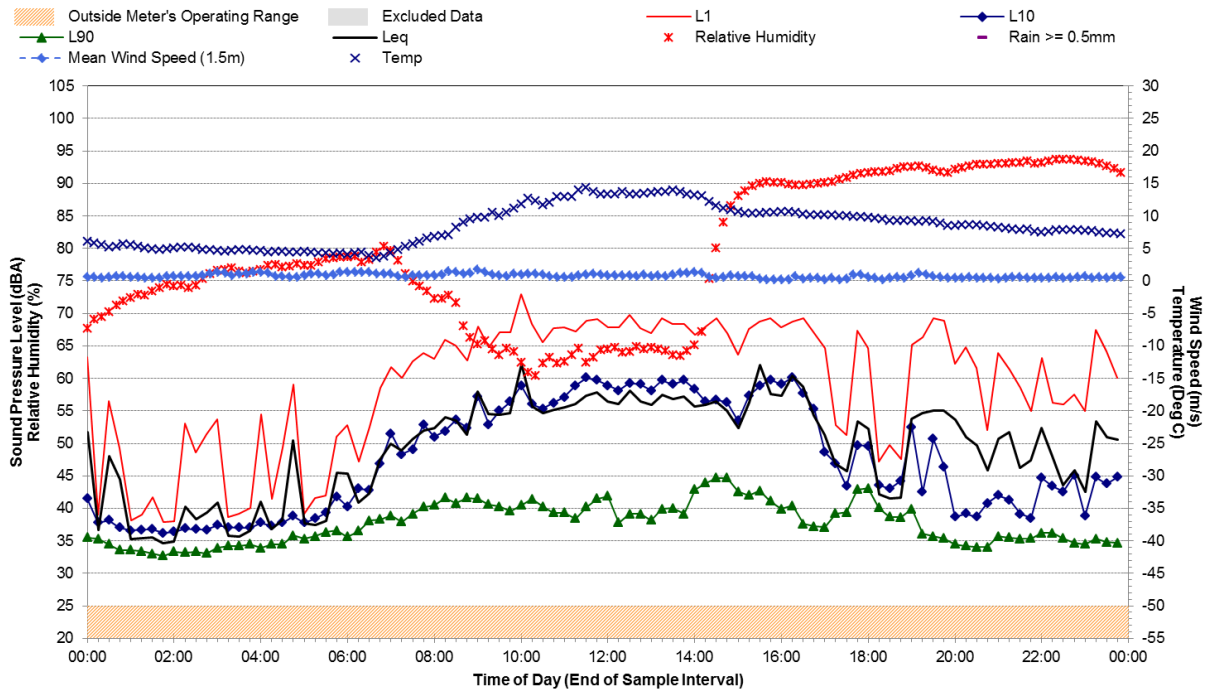
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Location I - Friday, 21 June 2019



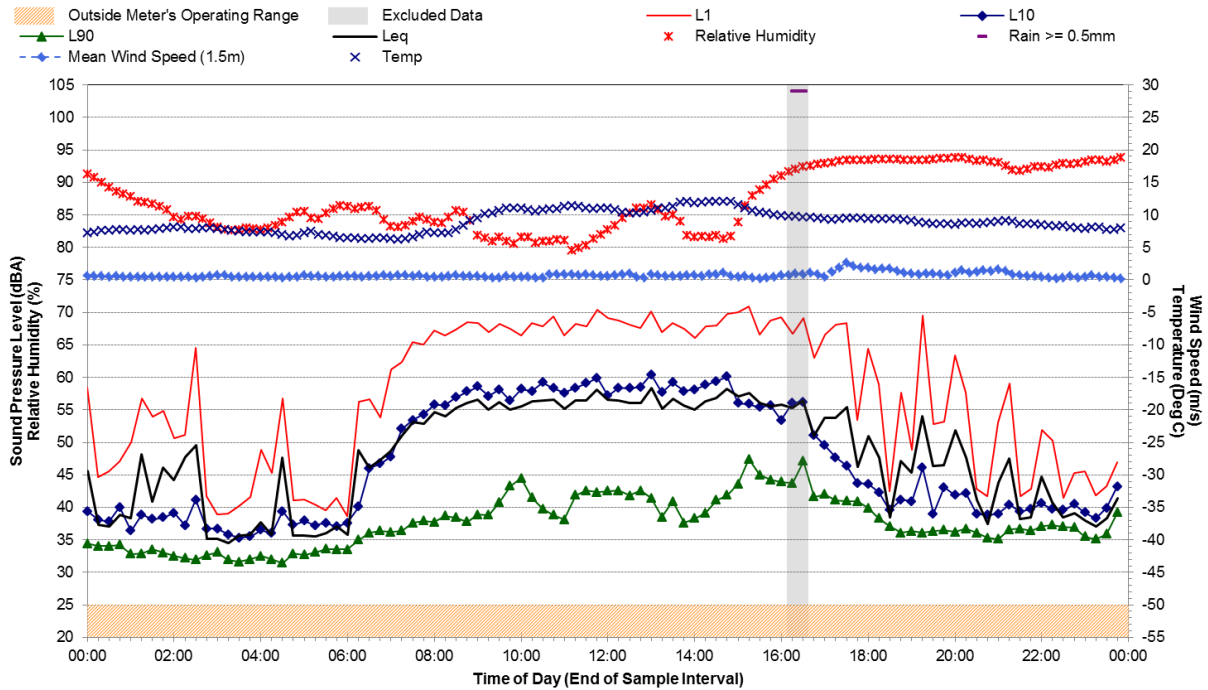
Statistical Ambient Noise Levels

Location I - Saturday, 22 June 2019



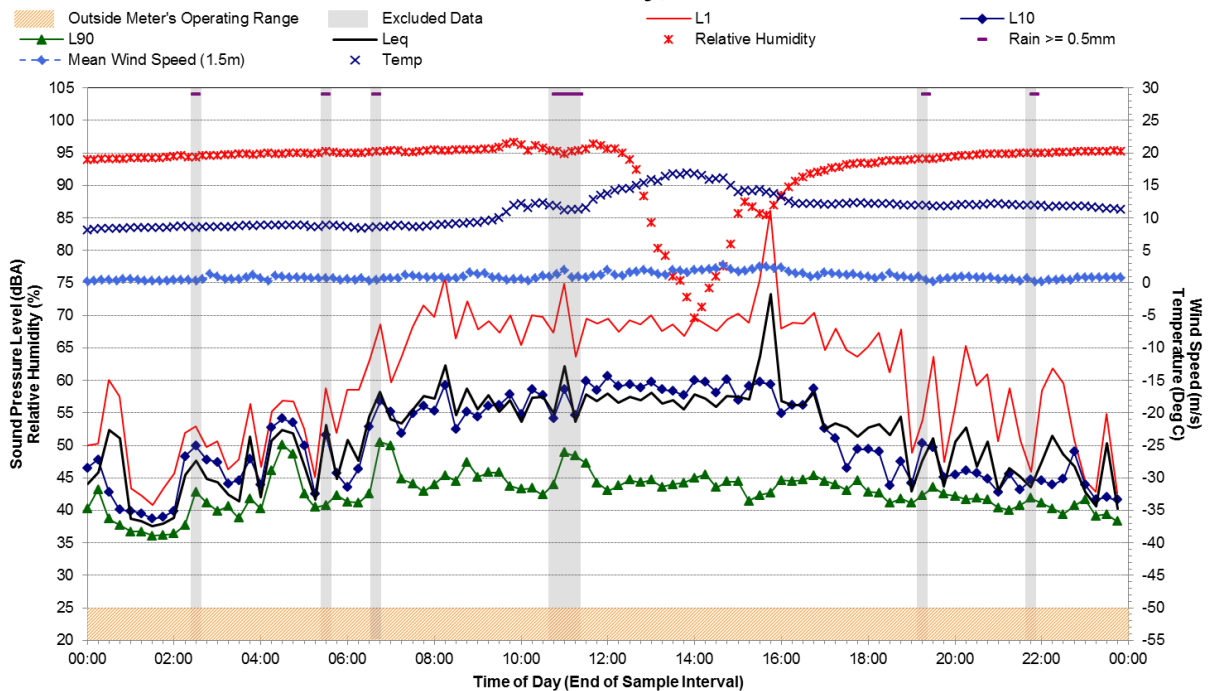
Statistical Ambient Noise Levels

Location I - Sunday, 23 June 2019



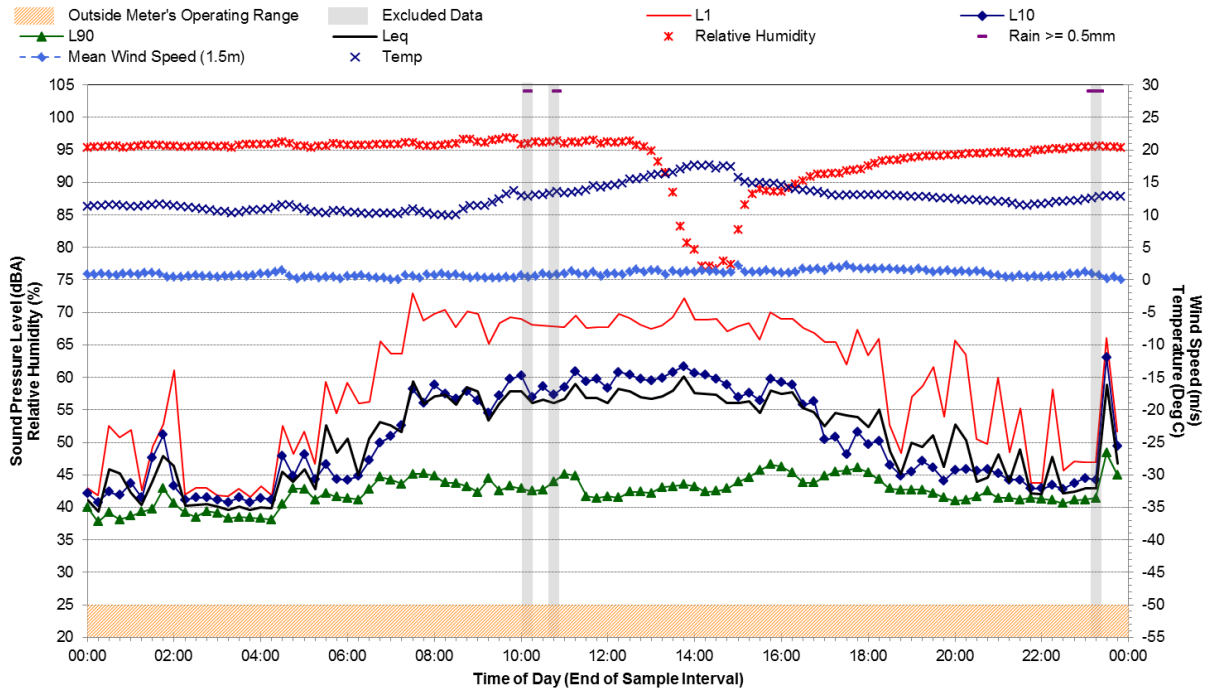
Statistical Ambient Noise Levels

Location I - Monday, 24 June 2019



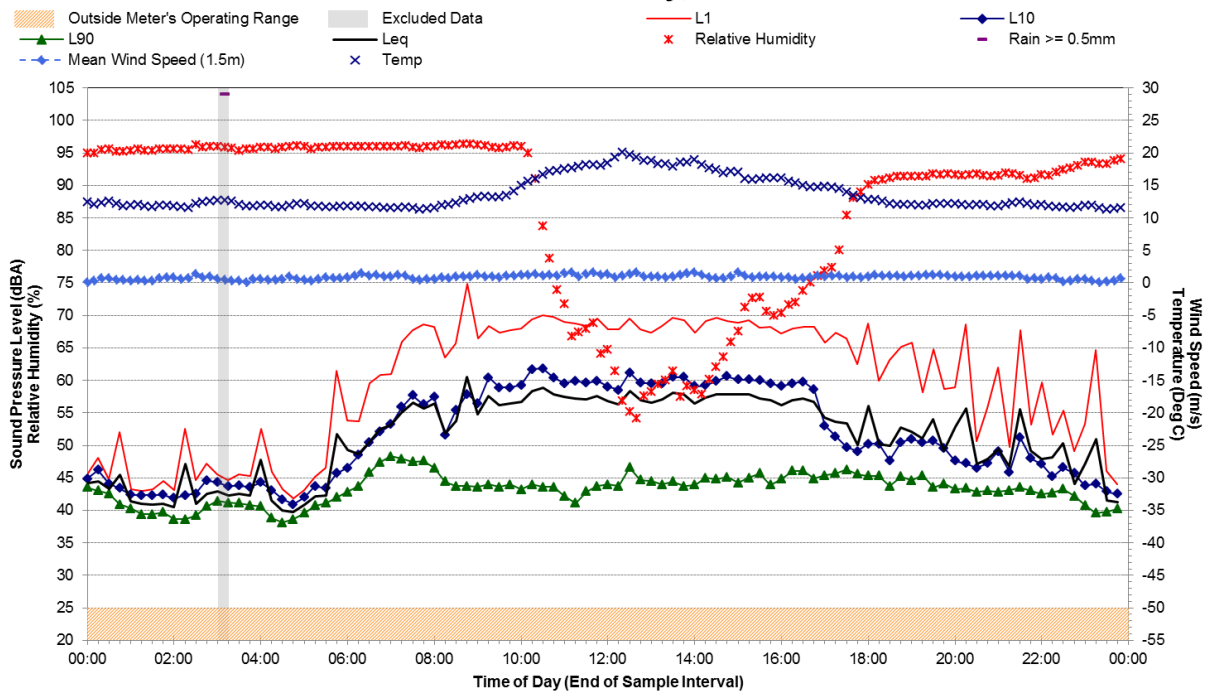
Statistical Ambient Noise Levels

Location I - Tuesday, 25 June 2019



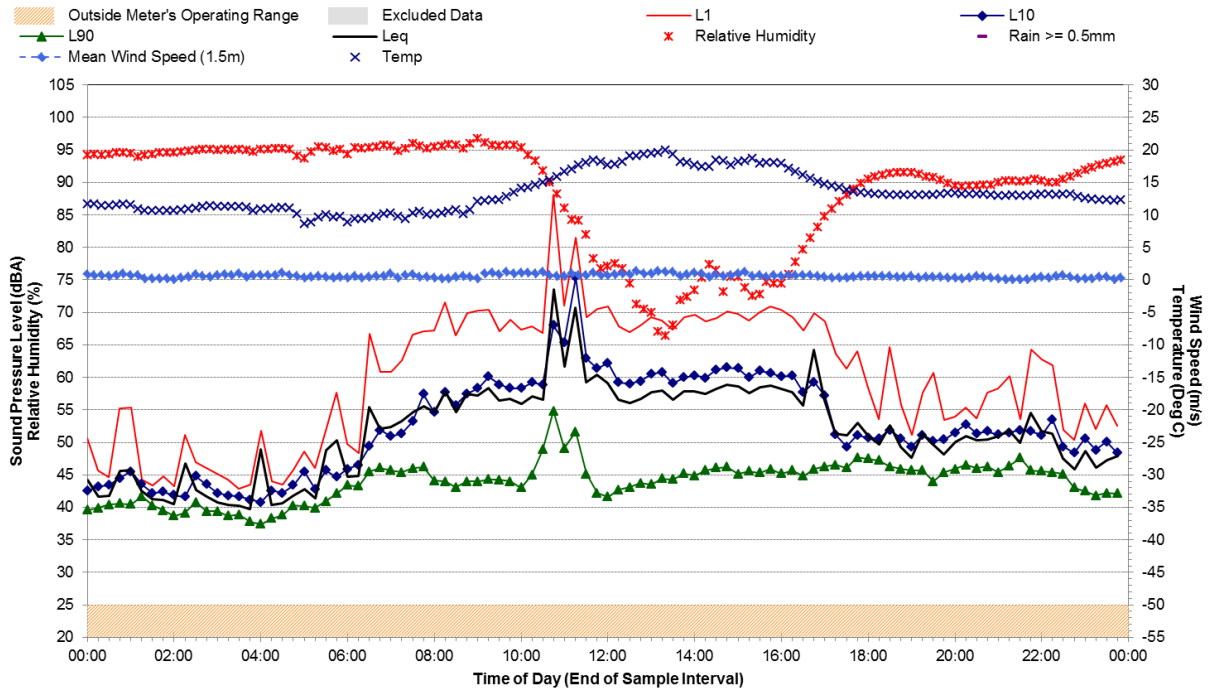
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Location I - Wednesday, 26 June 2019



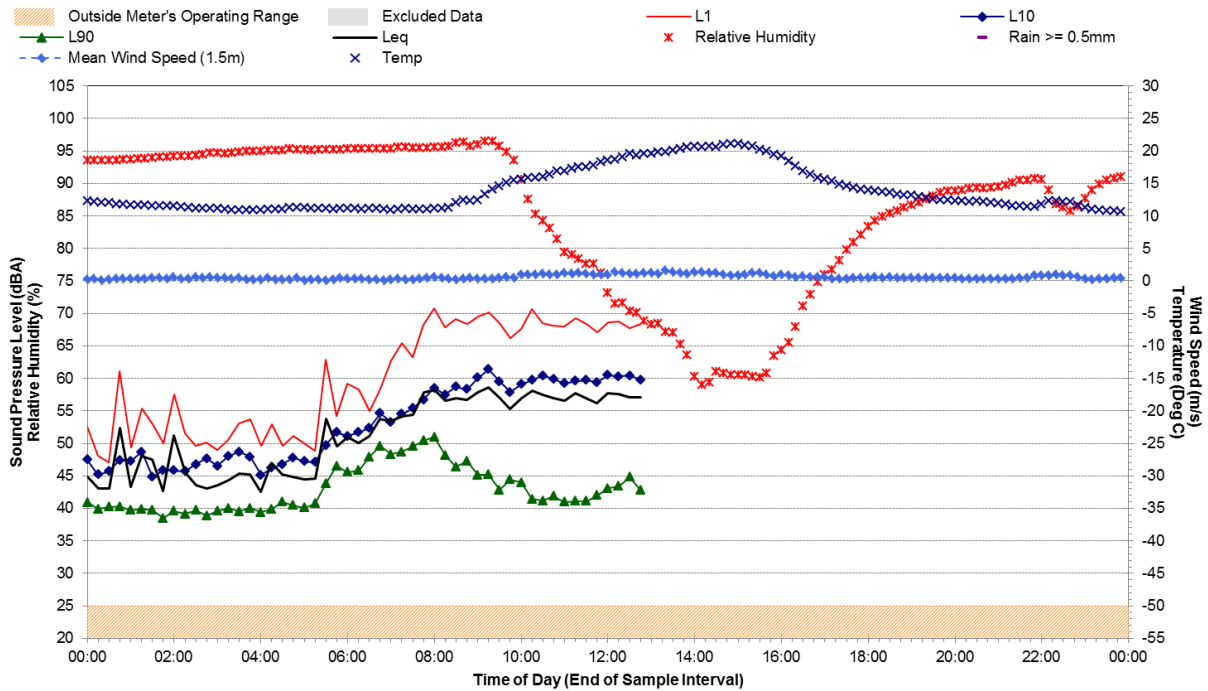
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Location I - Thursday, 27 June 2019



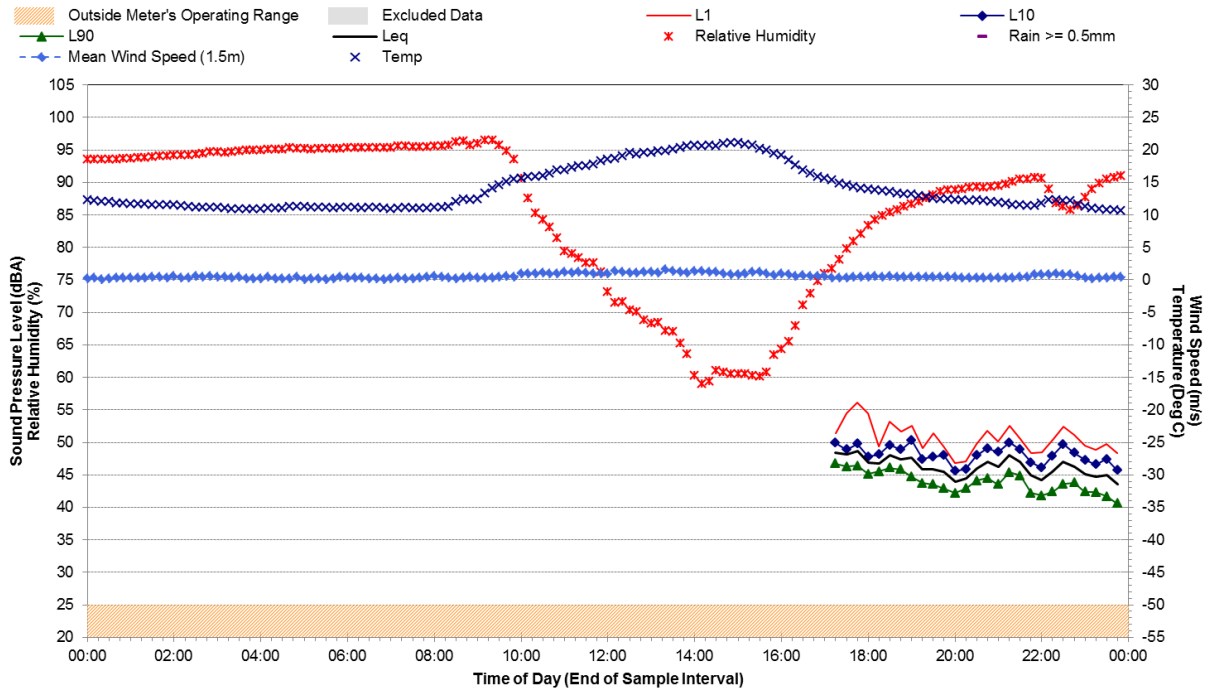
Statistical Ambient Noise Levels

Location I - Friday, 28 June 2019



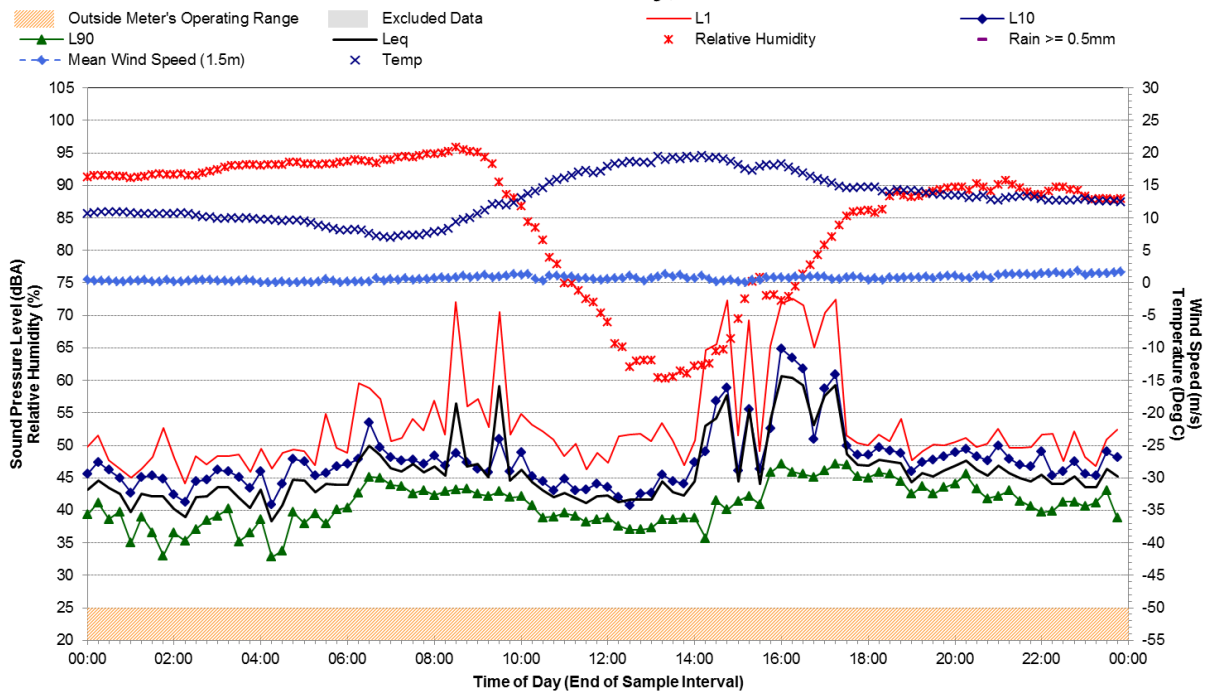
Statistical Ambient Noise Levels

Location J - Friday, 28 June 2019



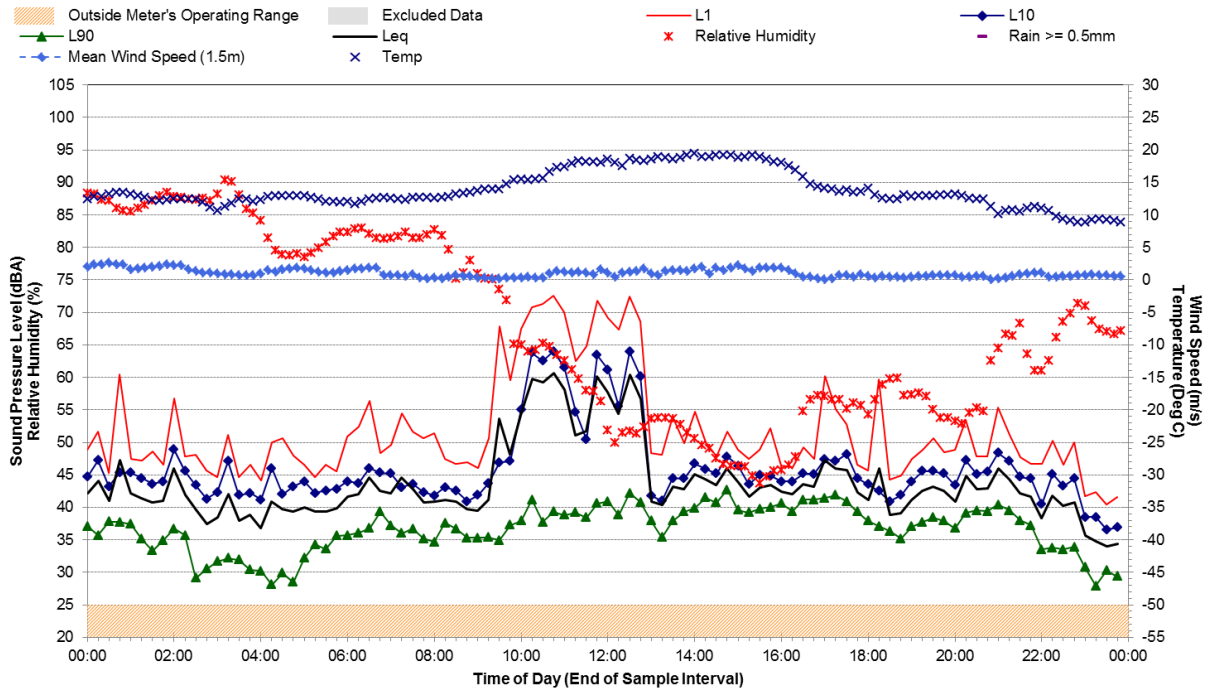
Statistical Ambient Noise Levels

Location J - Saturday, 29 June 2019



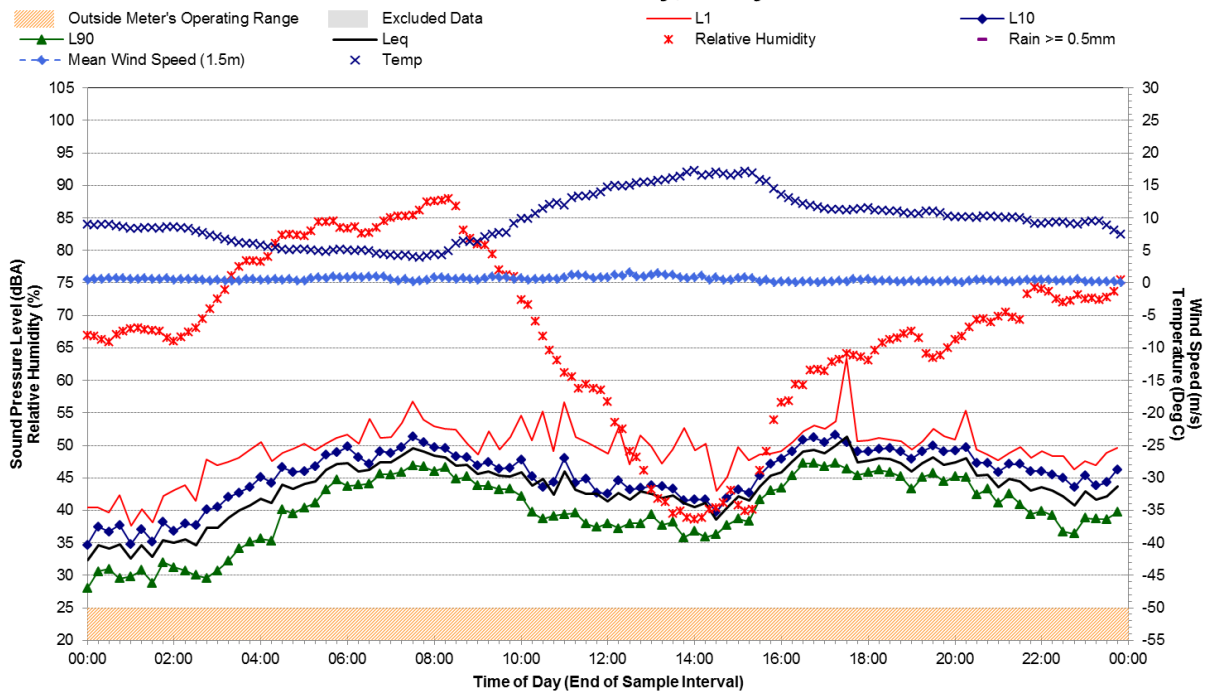
Statistical Ambient Noise Levels

Location J - Sunday, 30 June 2019



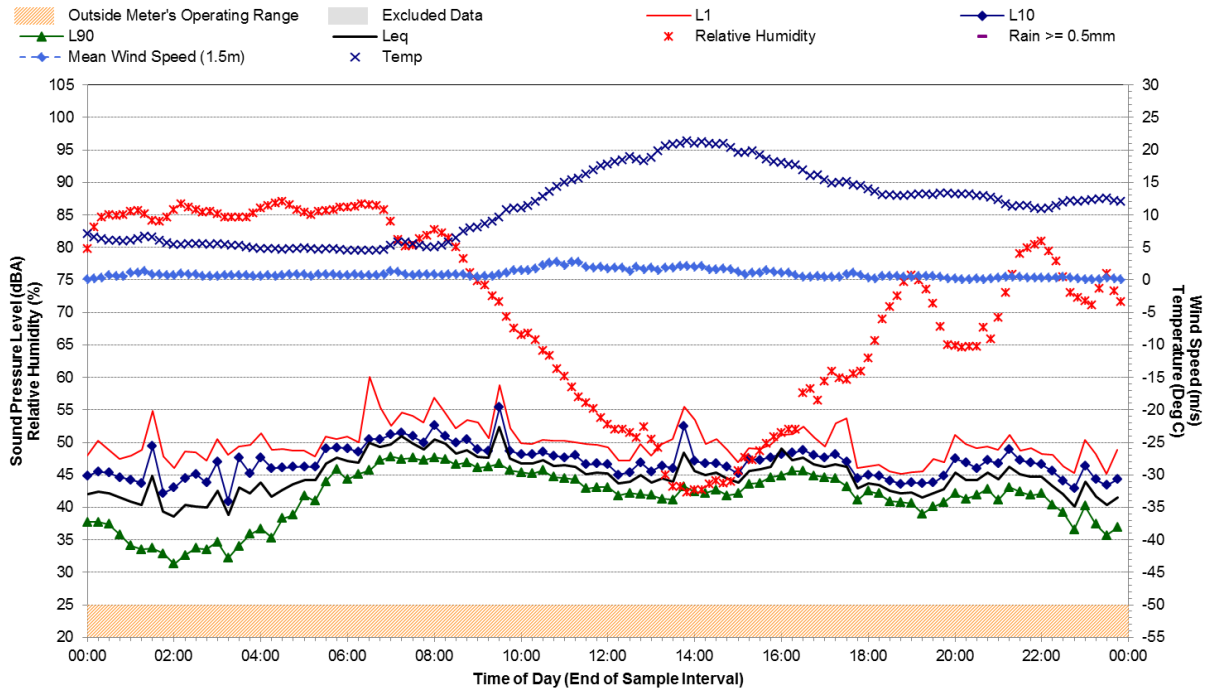
Statistical Ambient Noise Levels

Location J - Monday, 1 July 2019



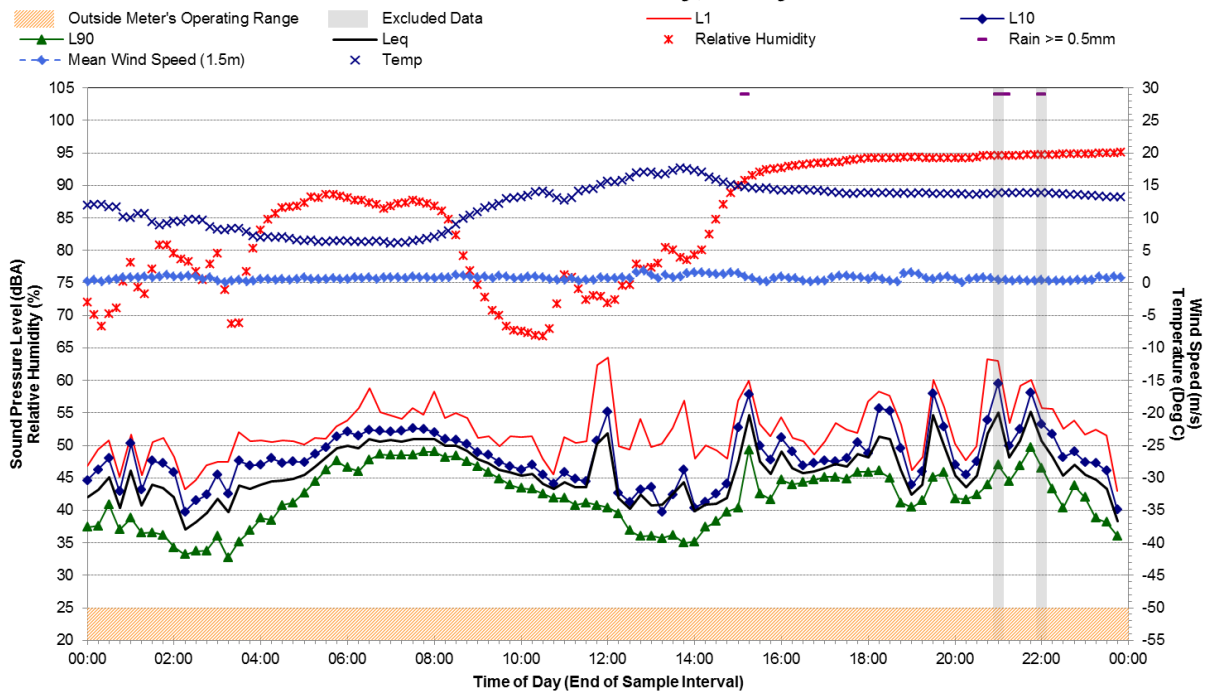
Statistical Ambient Noise Levels

Location J - Tuesday, 2 July 2019



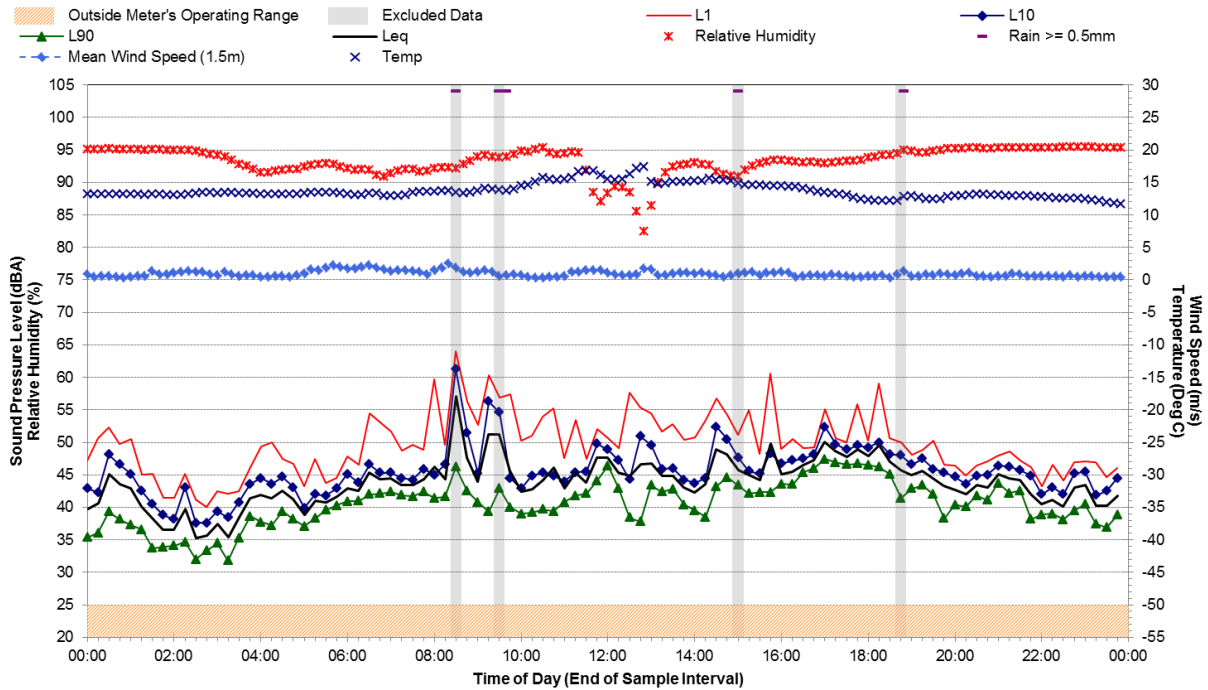
Statistical Ambient Noise Levels

Location J - Wednesday, 3 July 2019



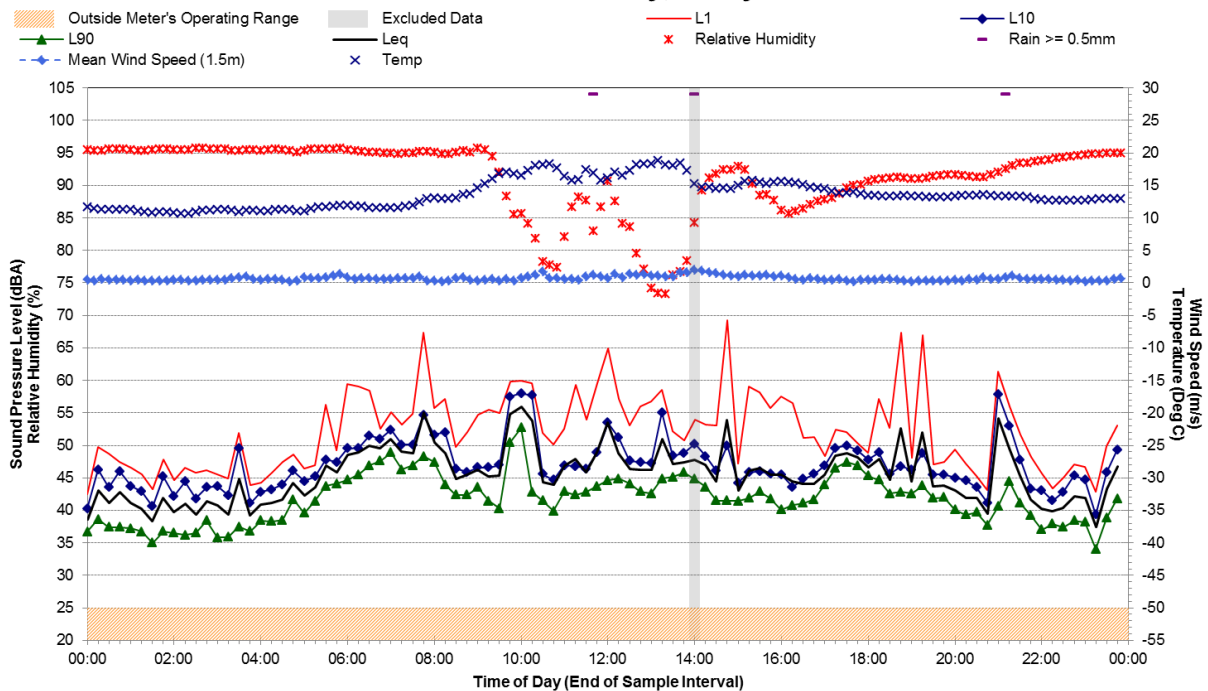
Statistical Ambient Noise Levels

Location J - Thursday, 4 July 2019



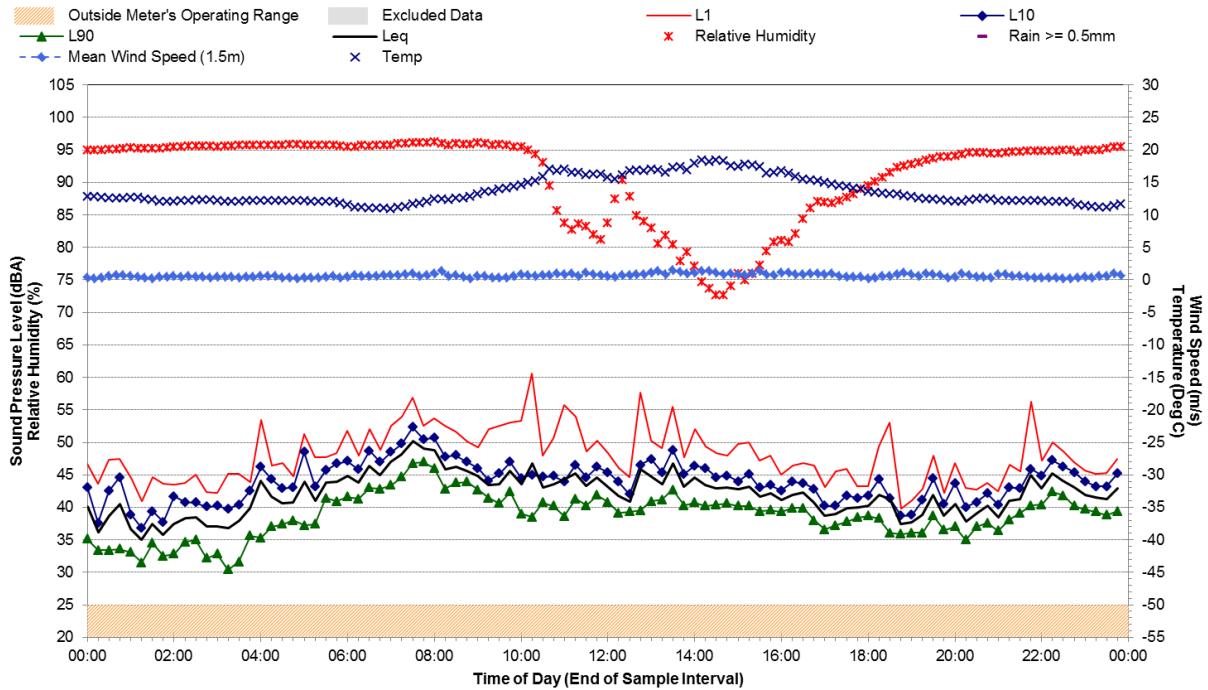
Statistical Ambient Noise Levels

Location J - Friday, 5 July 2019



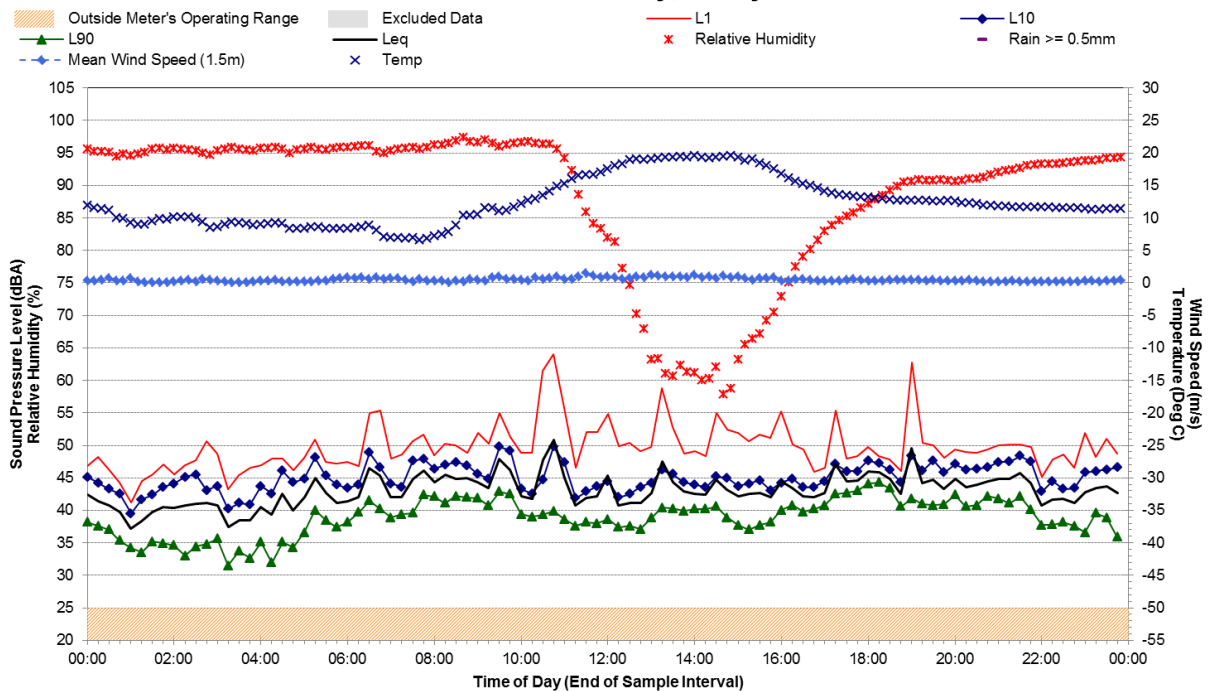
Statistical Ambient Noise Levels

Location J - Saturday, 6 July 2019



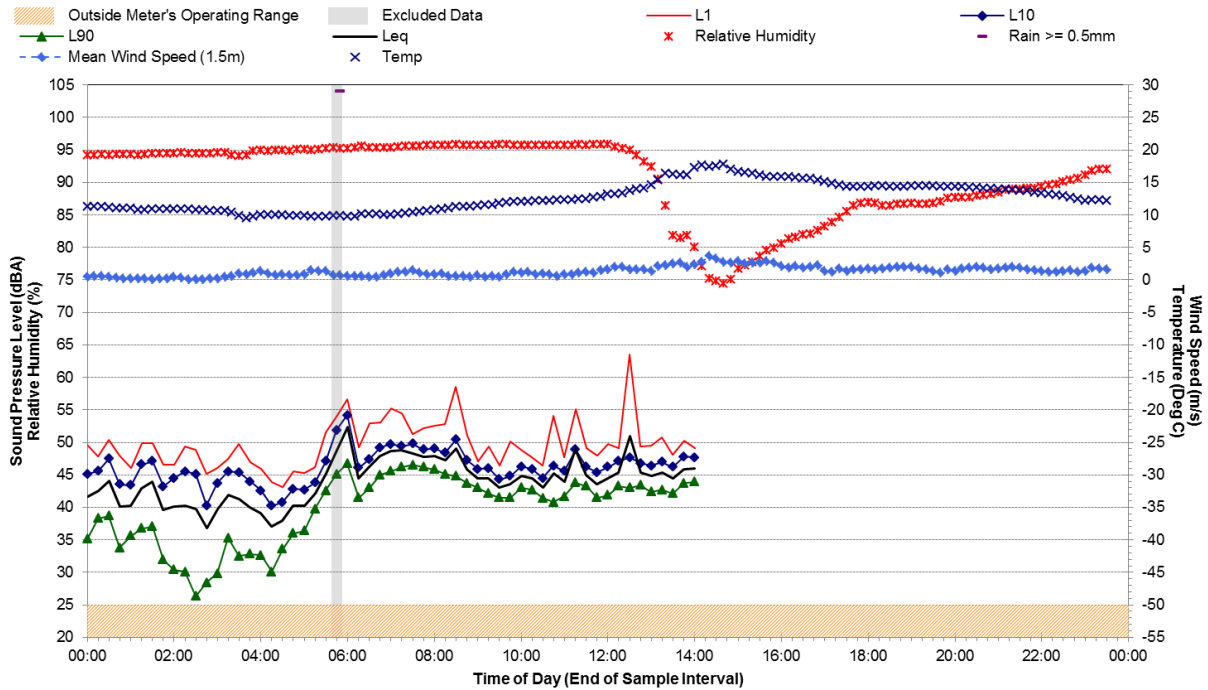
Statistical Ambient Noise Levels

Location J - Sunday, 7 July 2019



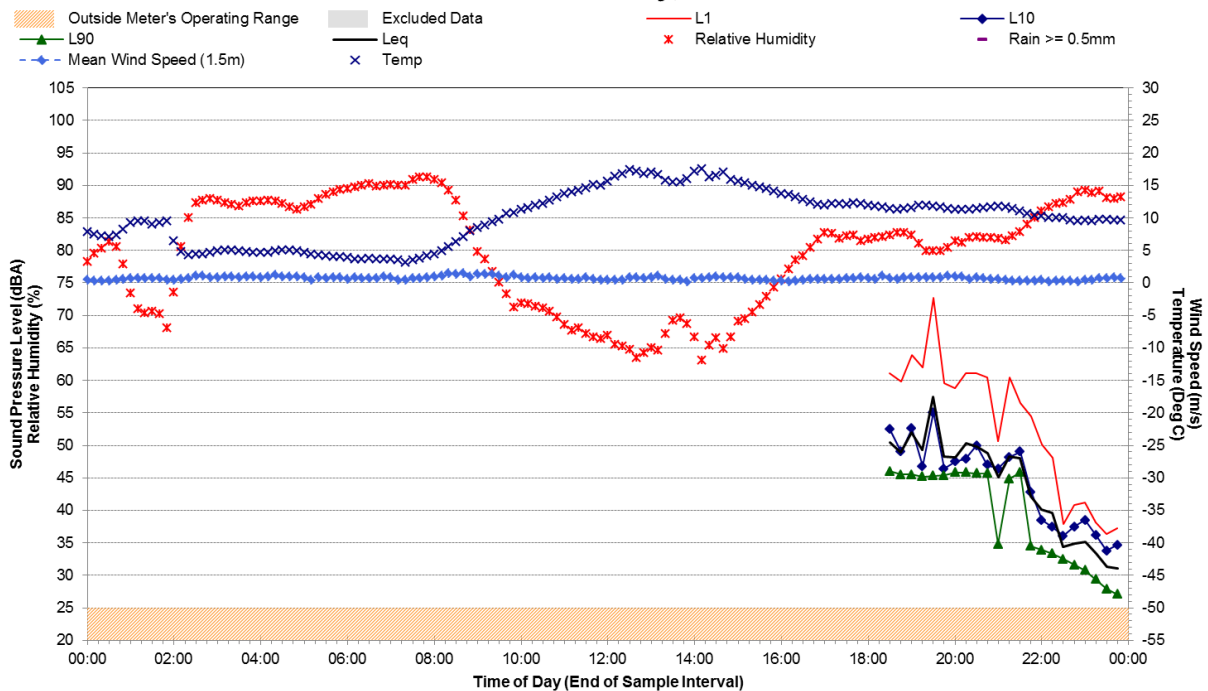
Statistical Ambient Noise Levels

Location J - Monday, 8 July 2019



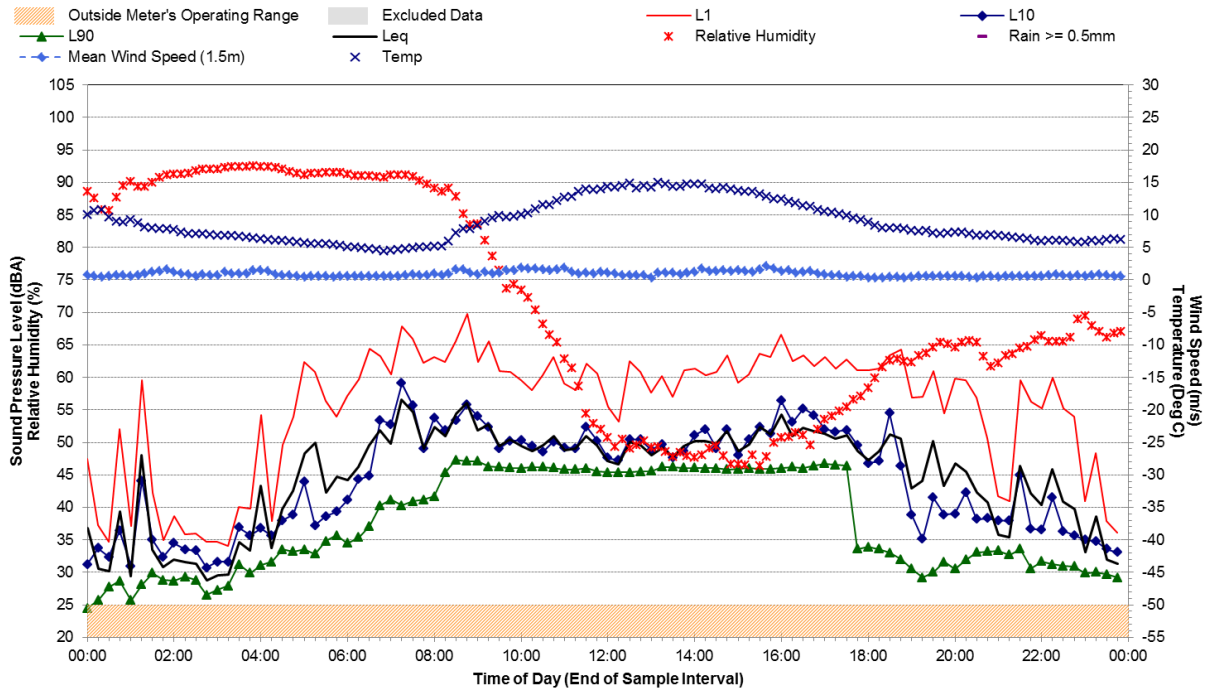
Statistical Ambient Noise Levels

Location L - Thursday, 20 June 2019



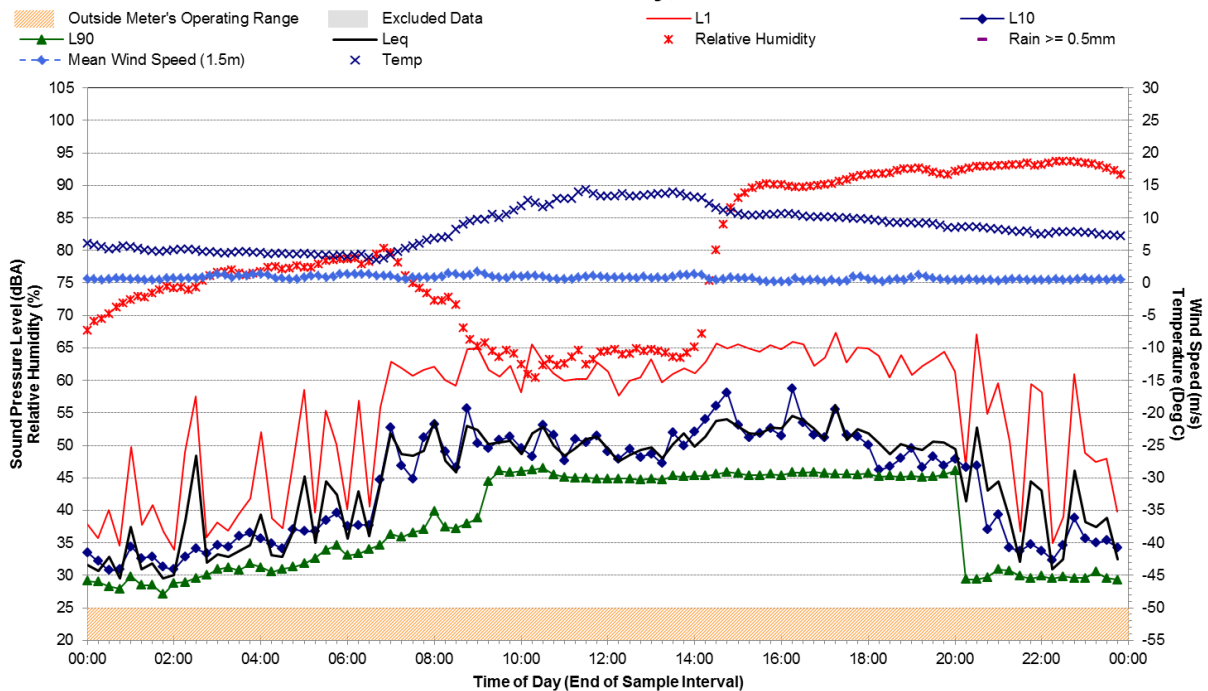
Statistical Ambient Noise Levels

Location L - Friday, 21 June 2019



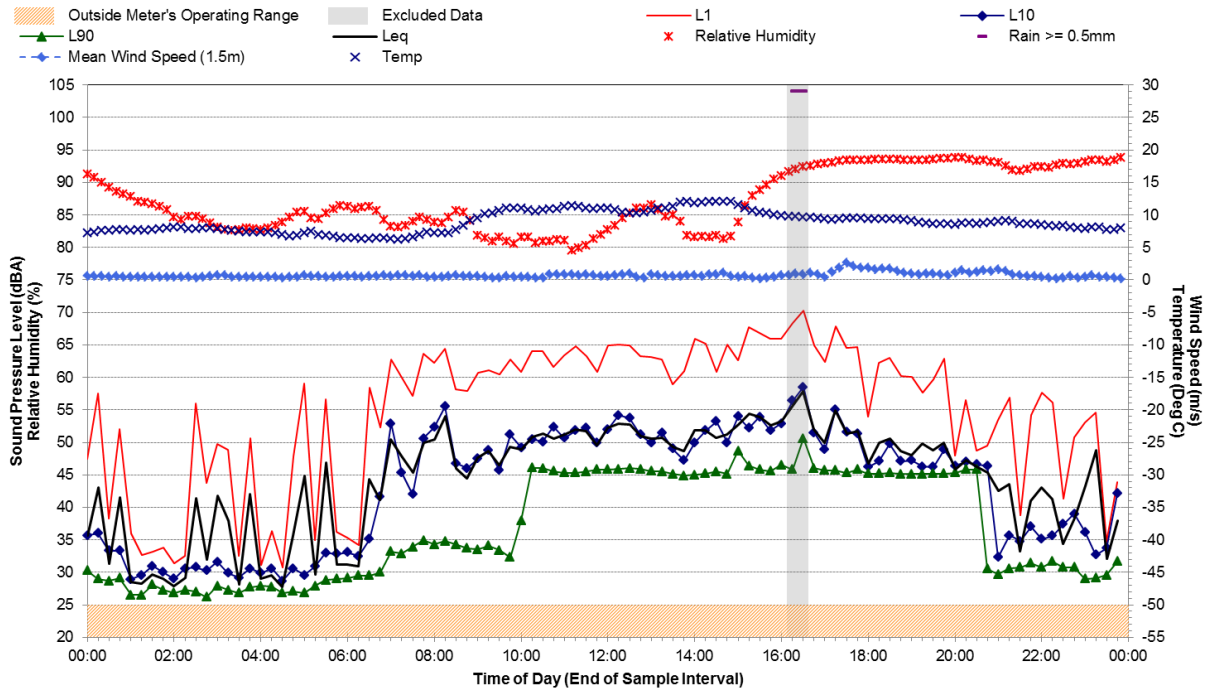
Statistical Ambient Noise Levels

Location L - Saturday, 22 June 2019



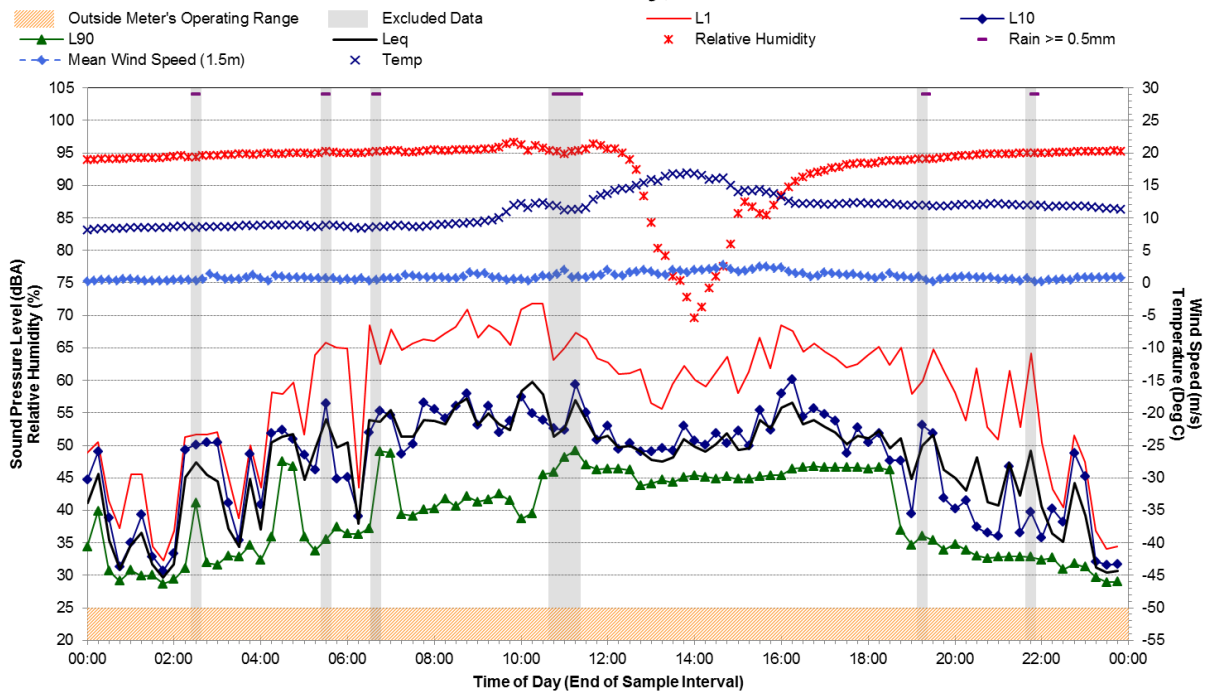
Statistical Ambient Noise Levels

Location L - Sunday, 23 June 2019



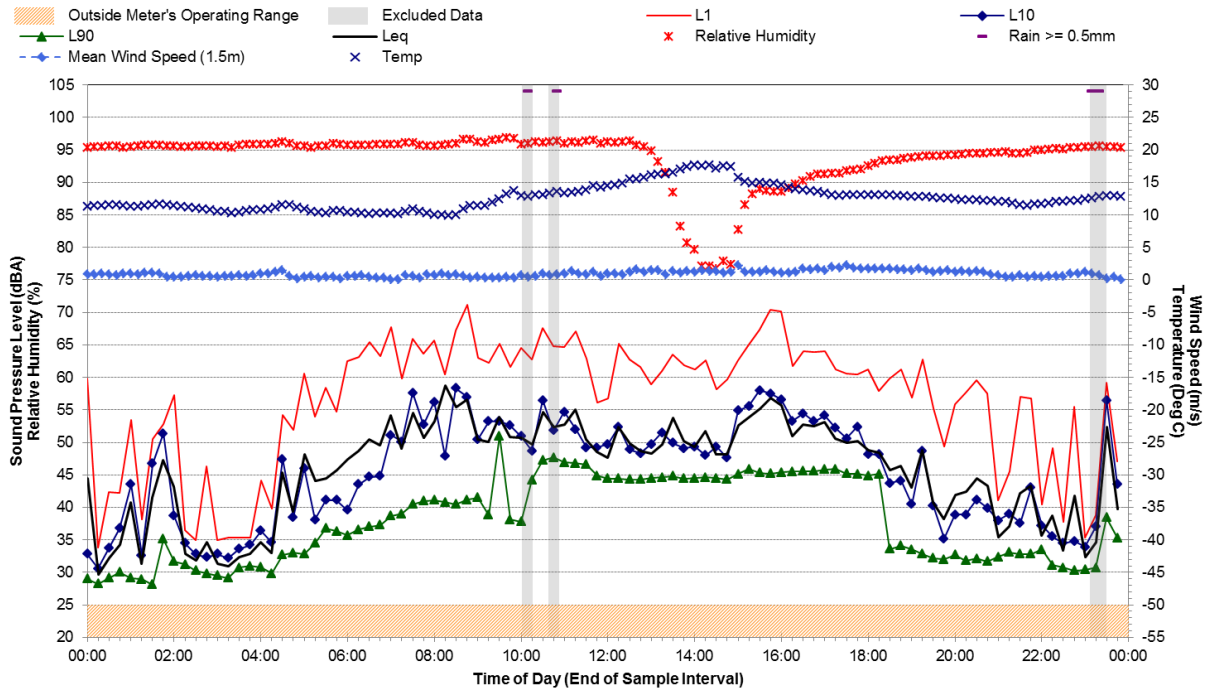
Statistical Ambient Noise Levels

Location L - Monday, 24 June 2019



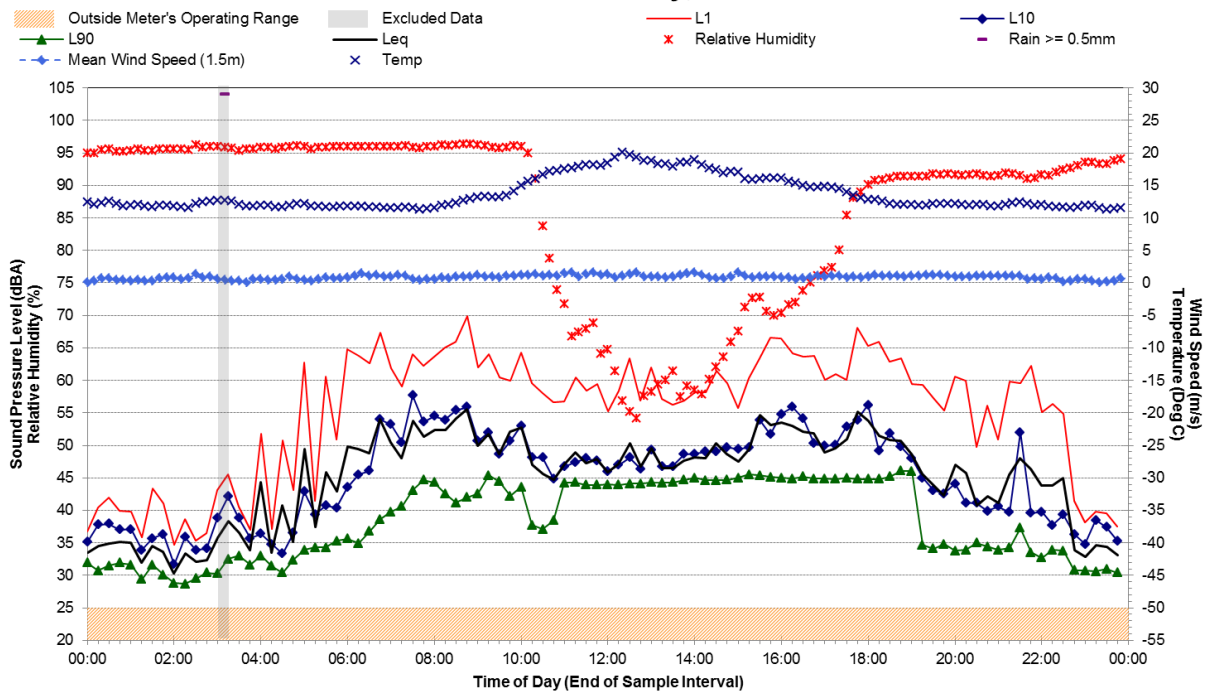
Statistical Ambient Noise Levels

Location L - Tuesday, 25 June 2019



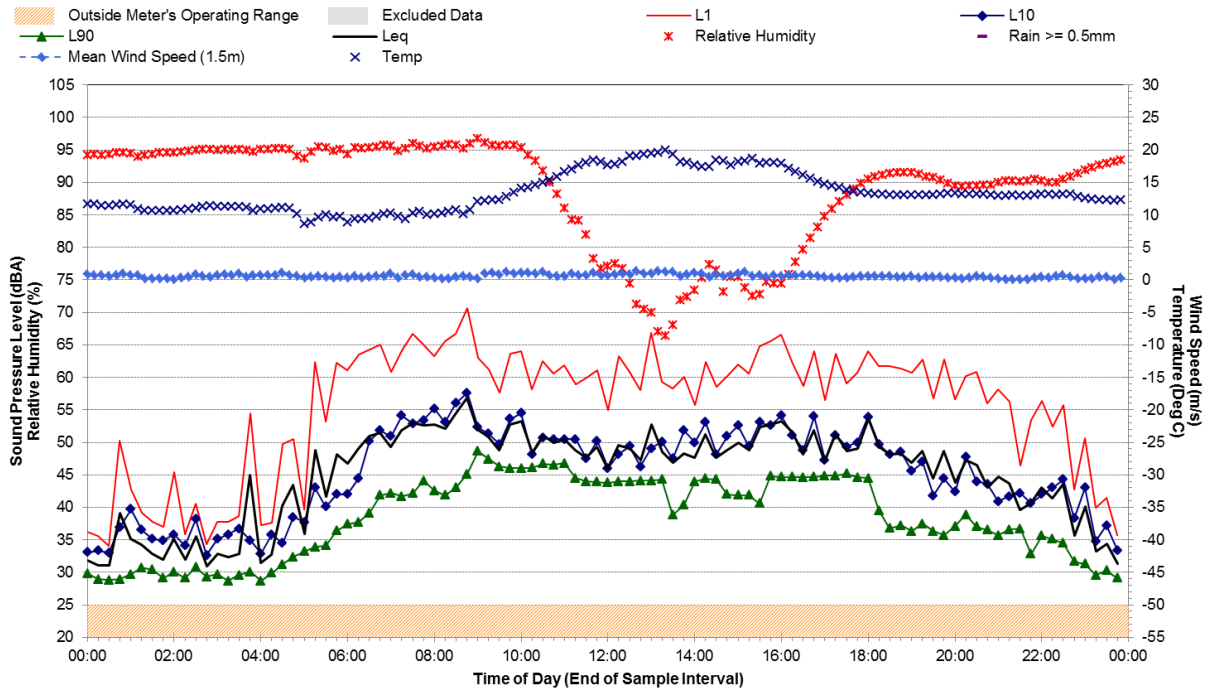
Statistical Ambient Noise Levels

Location L - Wednesday, 26 June 2019



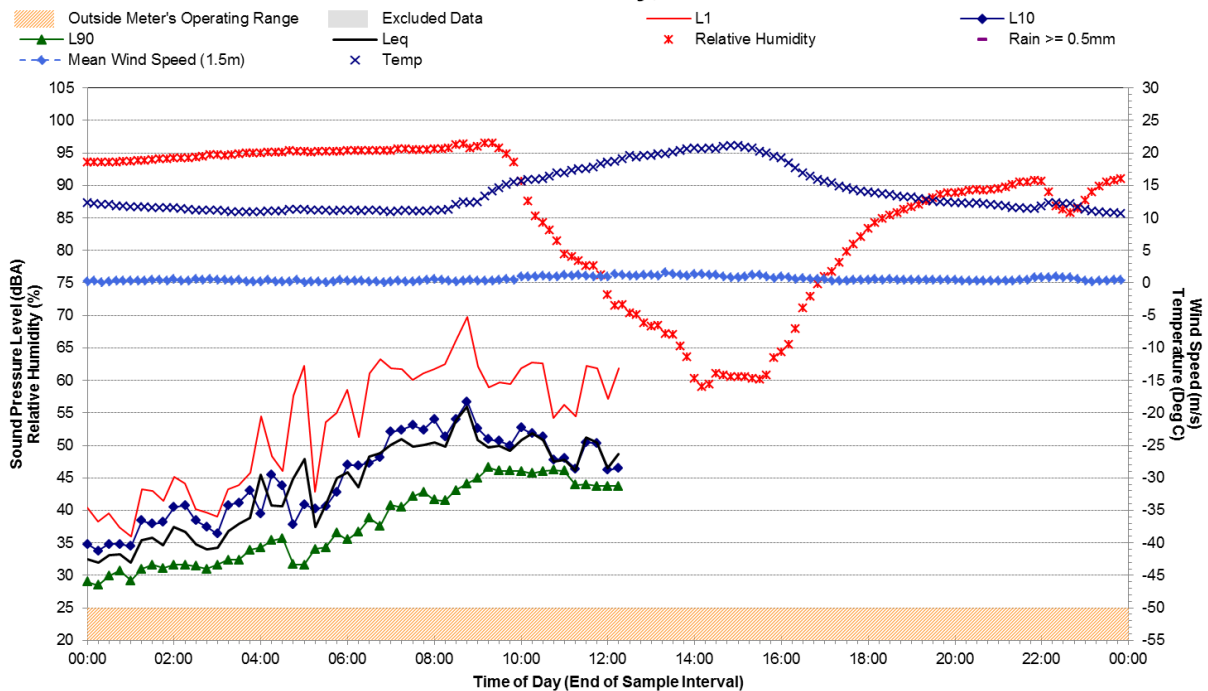
Statistical Ambient Noise Levels

Location L - Thursday, 27 June 2019



Statistical Ambient Noise Levels

Location L - Friday, 28 June 2019



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DONALDSON AND ABEL COAL MINES

**Quarterly Noise Monitoring
Quarter Ending September 2019**

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

SLR Ref: Q75 630.01053-R01
Version No: -v1.0
January 2020



PREPARED BY

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(PO Box 447 New Lambton NSW 2305 Australia)
T: +61 2 4037 3200
E: newcastleau@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

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

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

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
Q75 630.01053-R01-v1.0	24 January 2020	Martin Davenport	Jordan Murray	Martin Davenport

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APPENDICES

Appendix A	Acoustic Terminology
Appendix B	Noise Monitoring Locations
Appendix C	Calibration Certificates
Appendix D	Statistical Ambient Noise Levels

1 Introduction

1.1 Background

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 during the September 2019 quarter in accordance with the *Donaldson Coal Mine and Abel Underground Coal Mine - Noise Management Plan Care and Maintenance* (the NMP) dated 3 June 2019.

1.2 Objectives of this Report

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

- Measure the ambient noise levels at six 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.

1.3 Acoustic Terminology

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

2 Development Consent Project Approval

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.

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 Bloomfield 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(15minute)	LAeq(15minute)	LAeq(15minute)	LA1(1minute)
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.
- 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. Appendix 4 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

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

- 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

- 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

- 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; Describe the proposed noise management system in detail; and*
- c. *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), the NMP and AS 1055-2018 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the September 2019 quarter is provided in **Appendix B**.

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

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 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. Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the September 2019 noise monitoring period.

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	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	65 Tipperary Dr, Ashtonfield

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

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of a seven day period between Tuesday 24 September 2019 and Tuesday 1 October 2019 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.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six 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 period on Tuesday 24 September 2019 and the evening and night-time on Monday 30 September 2019. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2270 (serial number 2679354) and Brüel & Kjær Type 2250L integrating sound level meter (serial number 3003389).

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 (°C) 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.

Table 2 Location D, Black Hill Public School, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmaz	LA1	LA10	LA90	LAeq	
Day	24/09/2019 13:48 21°C 1.3 m/s WNW	71	62	53	36	51	School playground 47-52 Road traffic 49-71 Birds 36-62 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	30/09/2019 18:55 14°C 0.3 m/s SSE	76	57	45	41	50	Insects/frogs 42-50 Road traffic 40-76 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	30/09/2019 22:33 15°C 0.3 m/s SSE	75	63	44	41	50	Insects/frogs 40-43 Road traffic 38-75 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

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

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	24/09/2019 14:11 21°C 1.2 m/s W	88	72	59	45	62	Road traffic 44-88 Birdsong 39-52
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	30/09/2019 19:15 14°C 0.7 m/s SSE	74	60	52	43	50	Aeroplane 61 Frogs/insects 39-48 Road traffic 40-74
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	30/09/2019 22:54 15°C 0.2 m/s SSE	64	57	48	41	46	Frogs/insects 40-46 Road traffic 41-64
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 4 Location G, Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	24/09/2019 15:31 21°C 1.2 m/s W	68	57	46	39	45	Road traffic 37-49 Birds 43-68
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	30/09/2019 20:20 15°C 0.4 m/s SSE	60	50	46	37	43	Road traffic 35-57 Insects 32-36
		Estimated Abel Mine Noise Contribution Inaudible					Other industry 32-43 Abel Mine Inaudible
Night	01/10/2019 00:00 14°C 0.5 m/s SSE	47	46	40	33	37	Road traffic 35-47 Insects 25-30
		Estimated Abel Mine Noise Contribution Inaudible					Other industry 28-43 Abel Mine Inaudible

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	24/09/2019 12:52 21°C 0.5 m/s SSE	63	55	51	37	42	Road traffic 51-63 Birds 35-44
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	30/09/2019 21:11 15°C 0.4 m/s SSE	67	52	47	42	46	Insects 42-47 Road Traffic 63-67
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	01/10/2019 00:49 14°C 0.5 m/s SSE	52	43	39	32	36	Insects 30-52 Distant road traffic 30-40
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	24/09/2019 13:51 21°C 0.8 m/s WNW	61	49	41	35	39	Road traffic 34-41 Birds 40-61
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	30/09/2019 21:47 15°C 0.4 m/s SSE	50	40	37	34	36	Road traffic 34-50
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	30/09/2019 22:04 15°C 0.3 m/s SSE	60	42	40	34	37	Road traffic 34-60
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible

1 Table 7 Location L, 65 Tipperary Dr, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	24/09/2019 12:25 20°C 1.3 m/s WSW	70	59	47	33	46	Road traffic 50-70 Birds 31-46 Wind in trees 30-33 Domestic noise 40-53
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Evening	30/09/2019 20:48 15°C 0.4 m/s SSE	67	47	36	33	42	Insects 25 Traffic 36-67
		Estimated Abel Mine Noise Contribution Inaudible					Abel Mine Inaudible
Night	01/10/2019 00:27 14°C 0.5 m/s SSE	47	38	32	26	30	Insects 23-25 Traffic 25-47
		Estimated Bloomfield Colliery Noise Contribution Inaudible					Abel Mine Inaudible

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

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP and stockpile area was inaudible during all operator attended noise surveys. 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.

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 dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	Inaudible	Inaudible	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	Inaudible	Inaudible	40	40	40	Yes	Yes	Yes

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 Bloomfield LA1(1minute) Contribution dBA	Consent Conditions LA1(1minute) dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	47	Yes

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 Tuesday 24 September 2019 and Tuesday 1 October 2019 at each of the six 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 16-207-044	24 September 2019 - 1 October 2019
F – Black Hill Road, Black Hill	ARL EL-316 16-203-508	24 September 2019 - 1 October 2019
G – Buchanan Road, Buchanan	ARL EL-316 16-207-050	24 September 2019 - 1 October 2019
I – Magnetic Drive, Ashtonfield	SVAN 957 20665	24 September 2019 - 1 October 2019
L – 65 Tipperary Dr, Ashtonfield	SVAN 957 21423	24 September 2019 - 1 October 2019
J – Parish Drive, Thornton ¹	ARL EL-316 16-103-494	24 September 2019 - 1 October 2019

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendix C**. 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 Noise Policy for Industry (NPfI).

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 were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		LA1	LA10	LA90	LAeq
D Black Hill School, Black Hill	Day	66	53	35	54
	Evening	58	48	42	50
	Night	51	43	31	48
F Lot 684 Black Hill Road, Black Hill	Day	71	56	43	58
	Evening	65	54	44	55
	Night	60	52	36	53
G 156 Buchanan Road, Buchanan	Day	54	50	41	48
	Evening	48	46	37	44
	Night	47	43	30	44
I 49 Magnetic Drive, Ashtonfield	Day	66	56	40	56
	Evening	62	57	43	55
	Night	56	47	30	51
L 65 Tipperary Dr, Ashtonfield	Day	60	49	32	51
	Evening	57	41	33	46
	Night	44	33	20	45
J 220 Parish Drive, Thornton	Day	50	46	37	45
	Evening	46	43	37	42
	Night	45	41	30	42

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 LA90 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

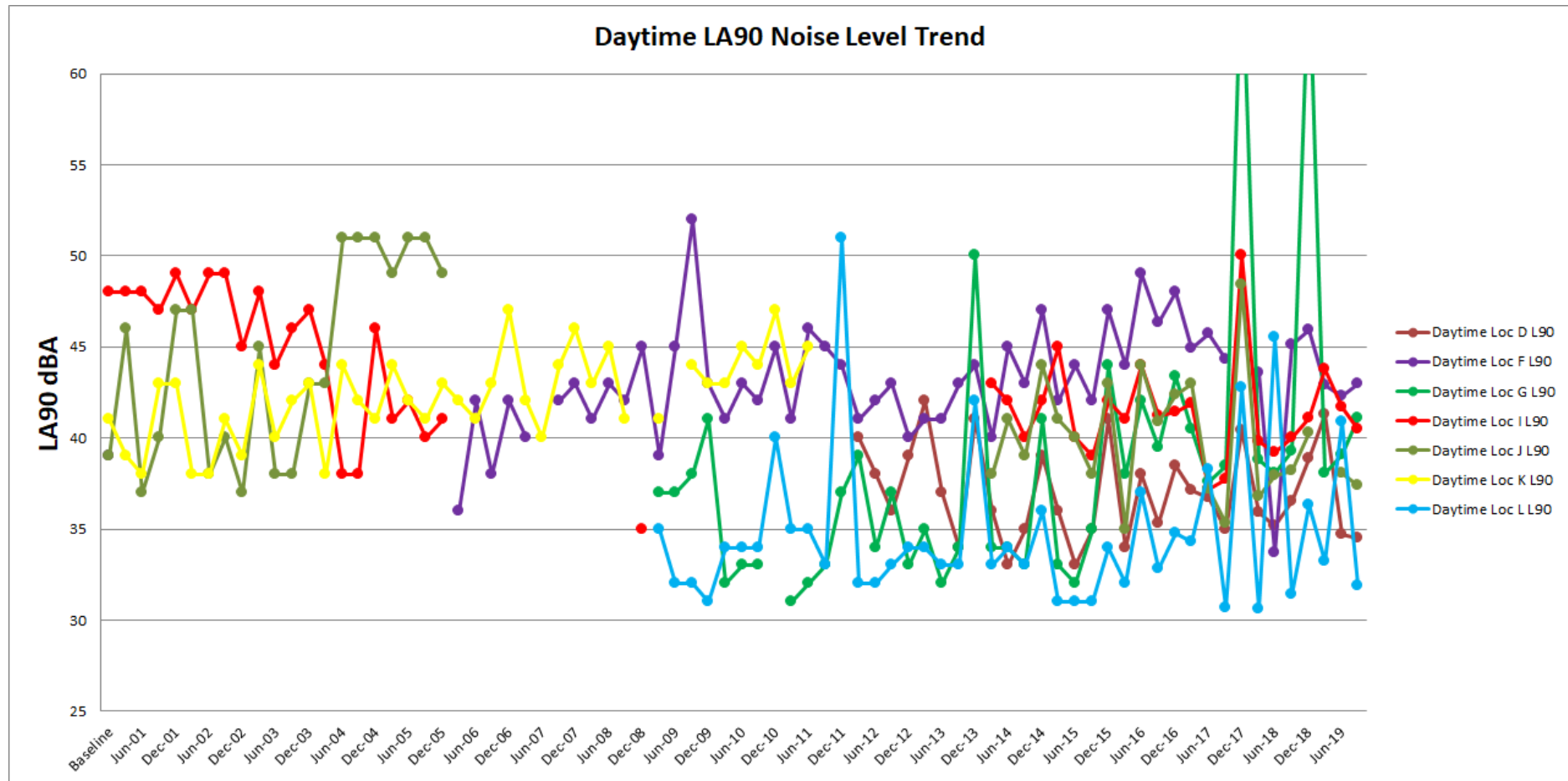


Figure 2 Long term Evening LA90 Noise Levels

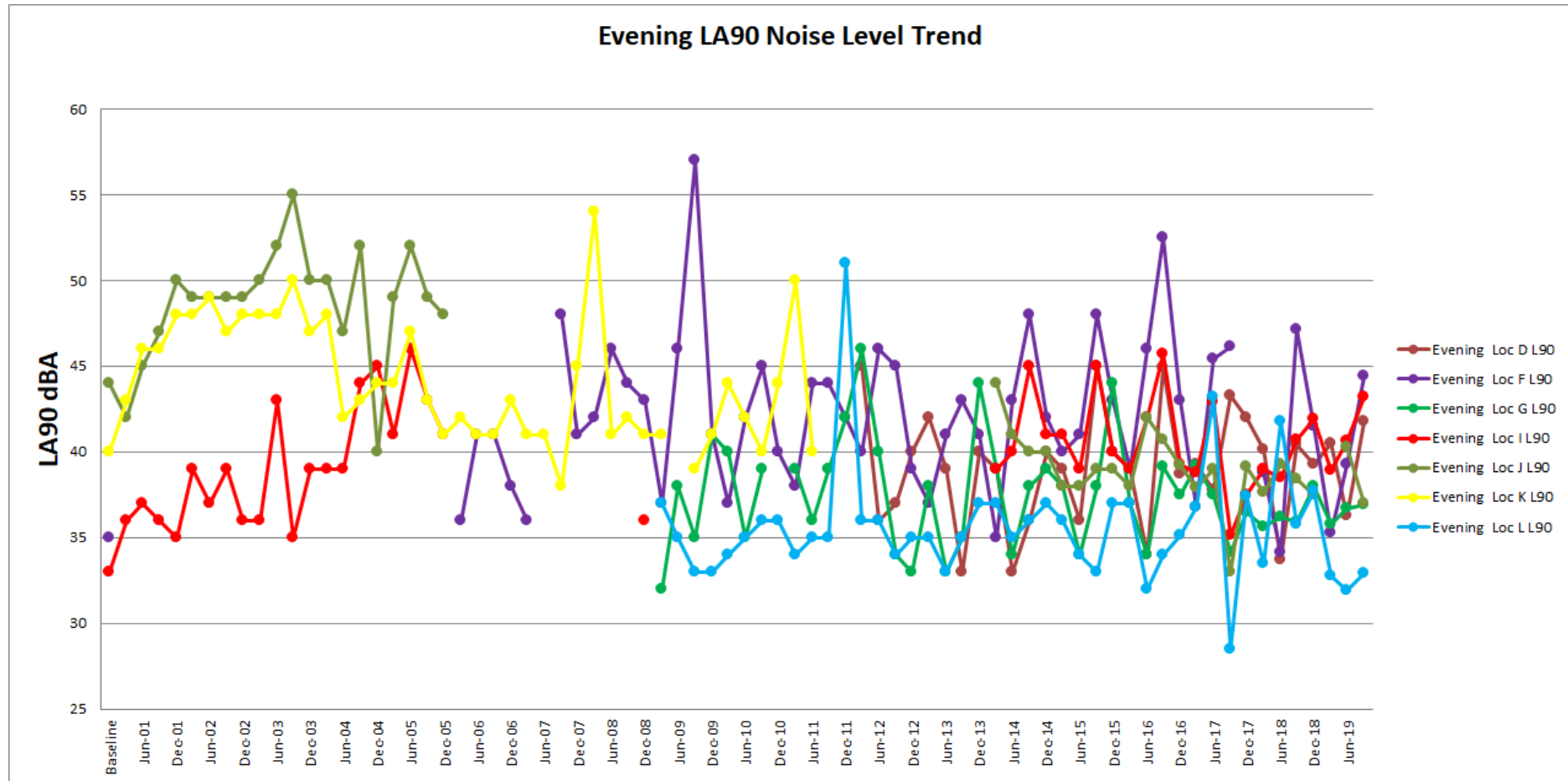
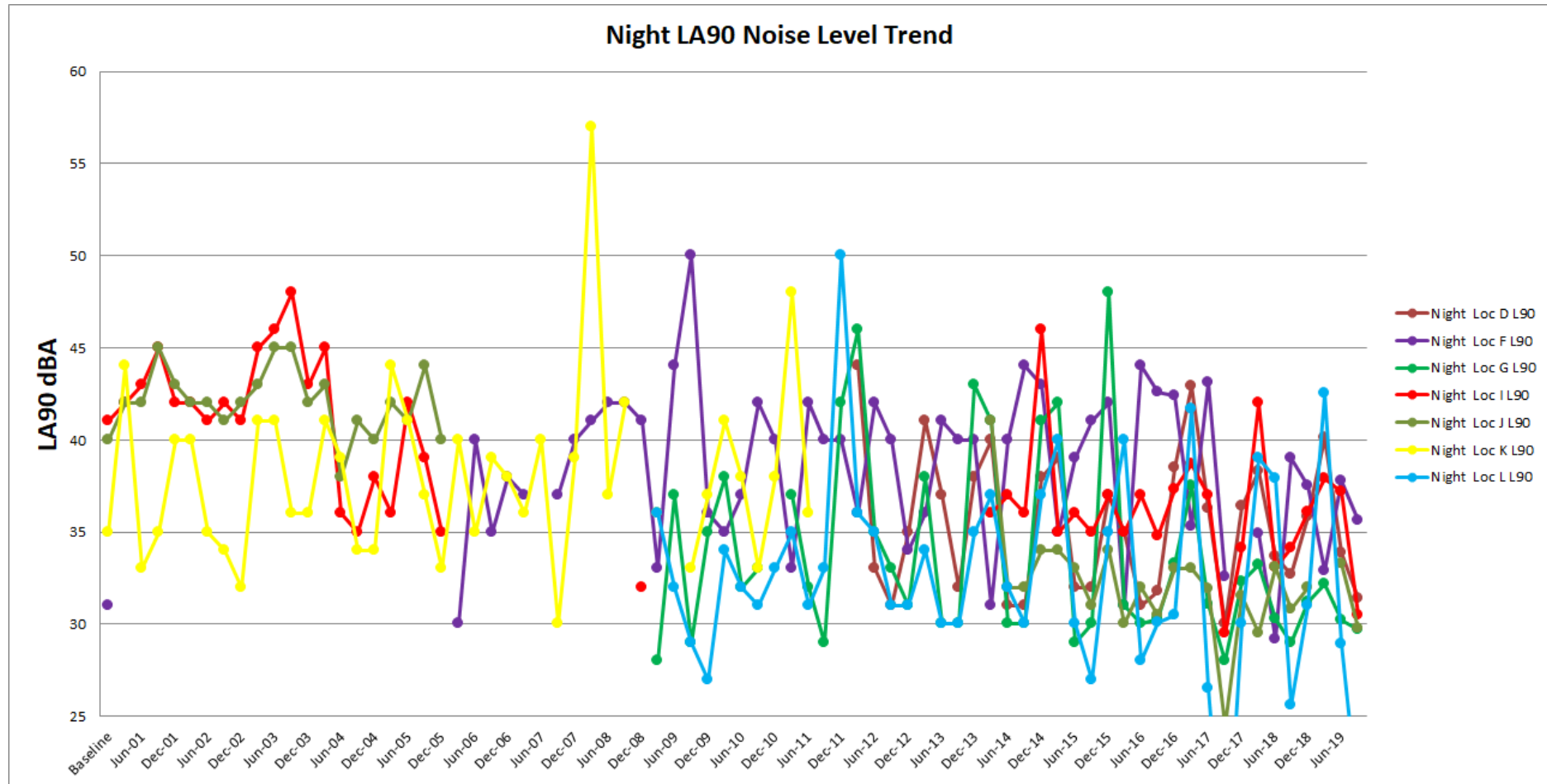


Figure 3 Long term Night-time LA90 Noise Levels



5.2.1.1 Baseline

The summary of results in **Table 12** shows the ambient LA90 noise levels recorded for the current monitoring period 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 ¹	Long term Night-time LA90 Noise Levels		Difference dB ³
		Baseline	September 2019	
D Black Hill School, Black Hill	Day	N/A ²	35	N/A ²
	Evening	N/A ²	42	N/A ²
	Night	N/A ²	31	N/A ²
F Lot 684 Black Hill Road, Black Hill	Day	39	43	4
	Evening	35	44	9
	Night	31	36	5
G 156 Buchanan Road, Buchanan	Day	N/A ²	41	N/A ²
	Evening	N/A ²	37	N/A ²
	Night	N/A ²	30	N/A ²
I 49 Magnetic Drive, Ashtonfield	Day	48	41	-8
	Evening	33	43	10
	Night	41	31	-11
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	32	N/A ²
	Evening	N/A ²	33	N/A ²
	Night	N/A ²	20	N/A ²
J 220 Parish Drive, Thornton	Day	39	37	-2
	Evening	44	37	-7
	Night	40	30	-10

Note 1: Periods are as detailed the NPfI 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		June 2019	September 2019	
D Black Hill School, Black Hill	Day	35	35	0
	Evening	36	42	6
	Night	34	31	-3
F Lot 684 Black Hill Road, Black Hill	Day	42	43	1
	Evening	39	44	5
	Night	38	36	-2
G 156 Buchanan Road, Buchanan	Day	39	41	2
	Evening	37	37	0
	Night	30	30	-1
I 49 Magnetic Drive, Ashtonfield	Day	42	41	-1
	Evening	41	43	3
	Night	37	31	-7
L 65 Tipperary Drive, Ashtonfield	Day	41	32	-9
	Evening	32	33	1
	Night	29	20	-9
J 220 Parish Drive, Thornton	Day	38	37	-1
	Evening	40	37	-3
	Night	33	30	-4

Note 1: 1. 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period Last Year

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

Monitoring Location	Period ¹	Long term Night-time LA90 Noise Levels		Difference dB ²
		September 2018	September 2019	
D Black Hill School, Black Hill	Day	37	35	-2
	Evening	40	42	1
	Night	33	31	-1
F Lot 684 Black Hill Road, Black Hill	Day	45	43	-2
	Evening	47	44	-3
	Night	39	36	-3
G 156 Buchanan Road, Buchanan	Day	39	41	2
	Evening	36	37	1
	Night	29	30	1
I 49 Magnetic Drive, Ashtonfield	Day	40	41	1
	Evening	41	43	3
	Night	34	31	-4
L 65 Tipperary Drive, Ashtonfield	Day	31	32	1
	Evening	36	33	-3
	Night	26	20	-5
J 220 Parish Drive, Thornton	Day	38	37	-1
	Evening	38	37	-1
	Night	31	30	-1

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient LA10 Noise Comparison

The long term ambient LA10 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 respectively.

Figure 4 Long term Daytime LA₁₀ Noise Levels

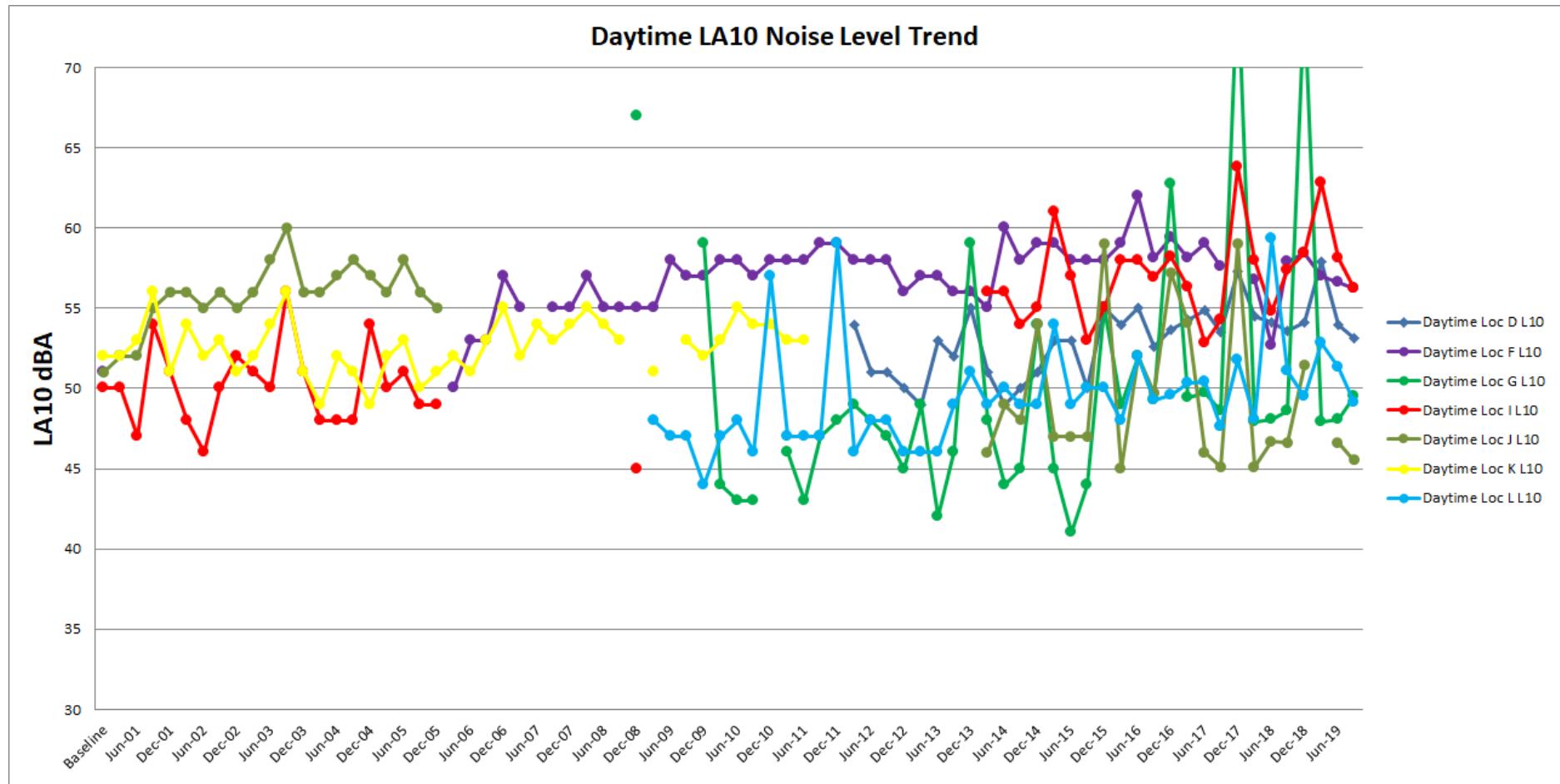


Figure 5 Long term Evening LA10 Noise Levels

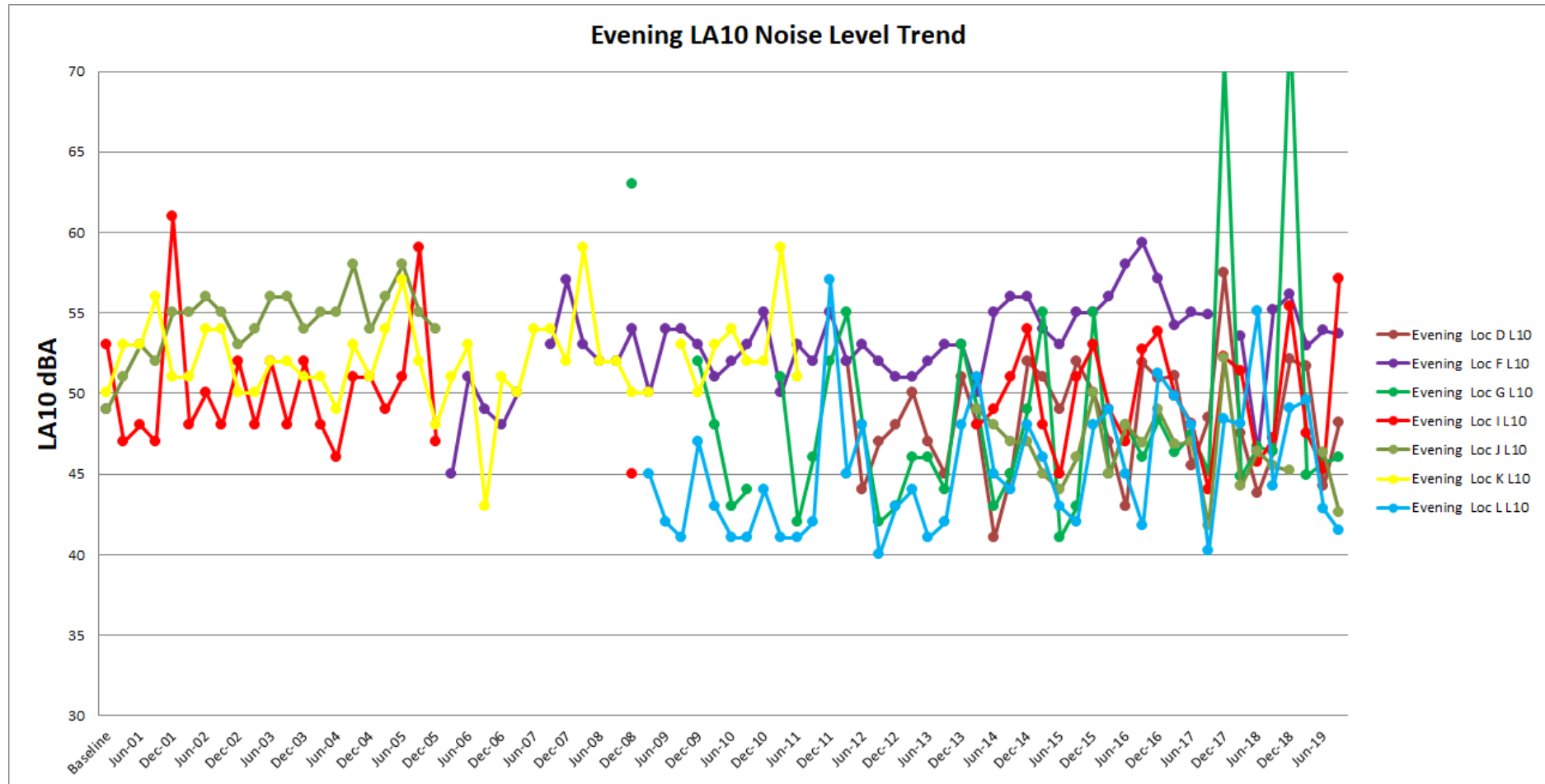
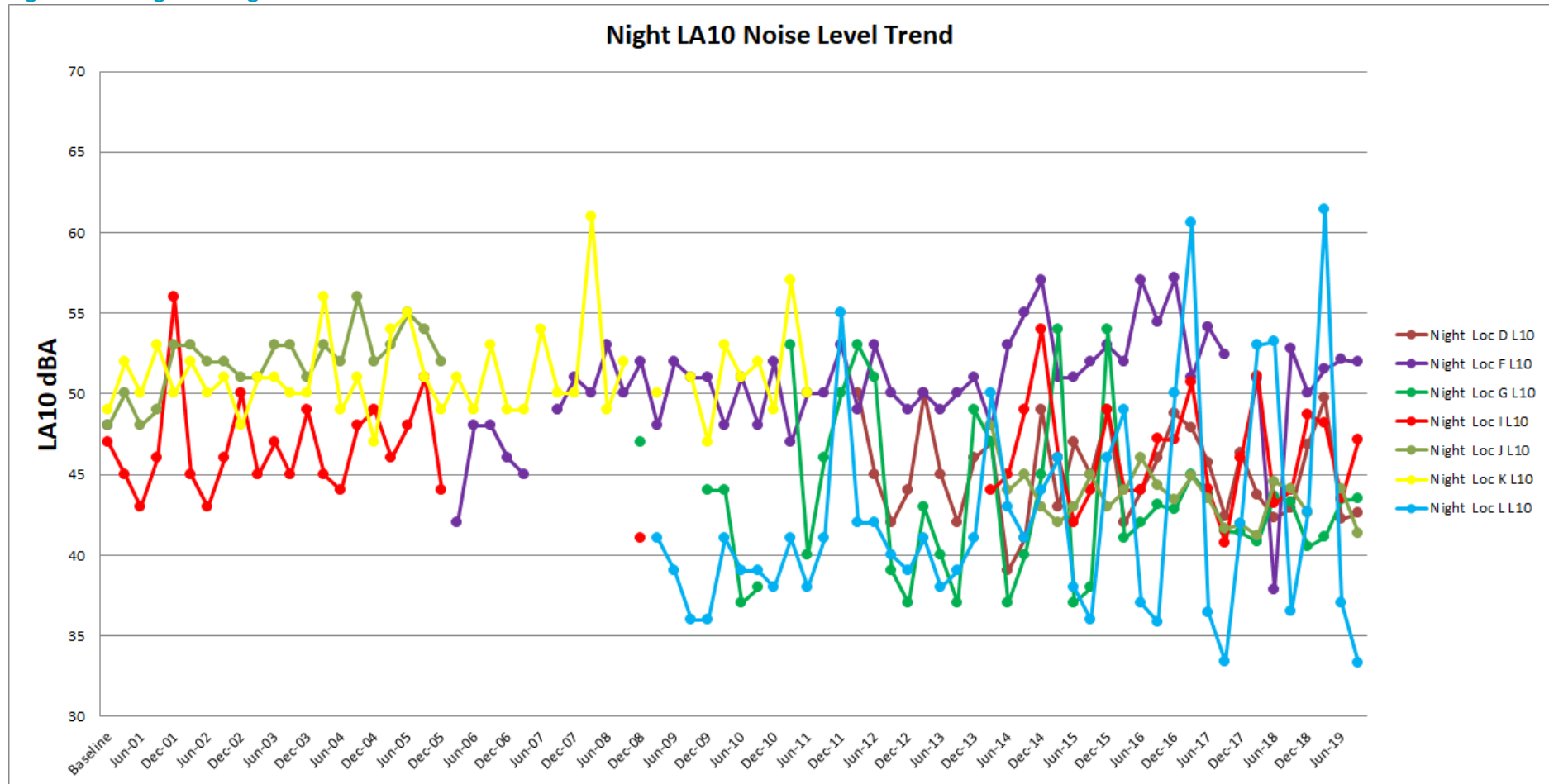


Figure 6 Long term Night LA10 Noise Levels



Baseline

Table 15 presents the ambient LA10 noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ³
		Baseline	September 2019	
D Black Hill School, Black Hill	Day	N/A ²	53	N/A
	Evening	N/A ²	48	N/A
	Night	N/A ²	43	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	56	5
	Evening	49	54	5
	Night	48	52	4
G 156 Buchanan Road, Buchanan	Day	N/A ²	50	N/A
	Evening	N/A ²	46	N/A
	Night	N/A ²	44	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	56	6
	Evening	53	57	4
	Night	47	47	0
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	49	N/A
	Evening	N/A ²	42	N/A
	Night	N/A ²	33	N/A
J 220 Parish Drive, Thornton	Day	51	46	-6
	Evening	49	43	-6
	Night	48	41	-7

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ²
		June 2019	September 2019	
D Black Hill School, Black Hill	Day	54	53	-1
	Evening	44	48	4
	Night	42	43	0
F Lot 684 Black Hill Road, Black Hill	Day	57	56	0
	Evening	54	54	0
	Night	52	52	0
G 156 Buchanan Road, Buchanan	Day	48	50	1
	Evening	46	46	0
	Night	43	44	0
I 49 Magnetic Drive, Ashtonfield	Day	58	56	-2
	Evening	45	57	12
	Night	44	47	4
L 65 Tipperary Drive, Ashtonfield	Day	51	49	-2
	Evening	43	42	-1
	Night	37	33	-4
J 220 Parish Drive, Thornton	Day	47	46	-1
	Evening	46	43	-4
	Night	44	41	-3

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

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 Result Comparison – Coinciding Period Last Year

Monitoring Location	Period ¹	Long term Night-time LA ₁₀ Noise Levels		Difference dB ²
		September 2018	September 2019	
D Black Hill School, Black Hill	Day	54	53	-1
	Evening	46	48	2
	Night	43	43	0
F Lot 684 Black Hill Road, Black Hill	Day	58	56	-2
	Evening	55	54	-2
	Night	53	52	-1
G 156 Buchanan Road, Buchanan	Day	49	50	1
	Evening	46	46	0
	Night	43	44	0
I 49 Magnetic Drive, Ashtonfield	Day	57	56	-1
	Evening	47	57	10
	Night	44	47	3
L 65 Tipperary Dr, Ashtonfield	Day	51	49	-2
	Evening	44	42	-3
	Night	37	33	-3
J 220 Parish Drive, Thornton	Day	47	46	-1
	Evening	46	43	-3
	Night	44	41	-3

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.3 Rail Noise Monitoring

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J, however no train movements occurred during the monitoring period.

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 NMP, dated 3 June 2019.

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.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the September 2019 quarter at six focus locations surrounding the mine.

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

A comparison of ambient LA₁₀ and LA₉₀ noise levels recorded during the current monitoring period (September 2019), the baseline monitoring period, the last monitoring period (June 2019), and the coinciding monitoring period from last year (September 2018) has been conducted.

No rail movements occurred on the Bloomfield Rail Spur during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being 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 LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-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 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB 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	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	Loud
80	Kerbside of busy street	
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	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

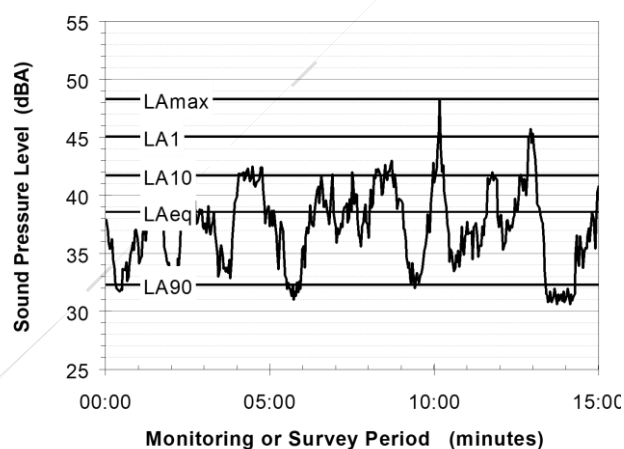
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of 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 LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 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:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 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.

LAeq 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.

5. Frequency Analysis

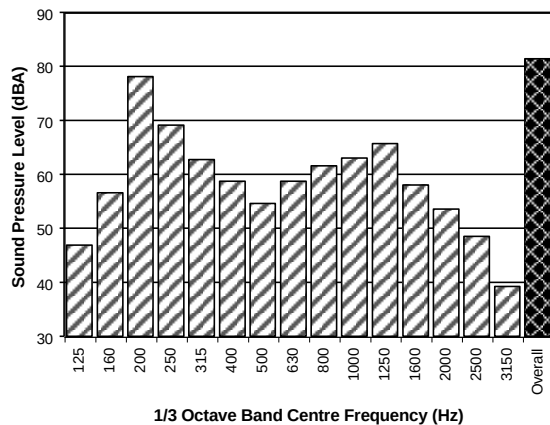
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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 (three 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.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. 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 (ie vertical, longitudinal 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 $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

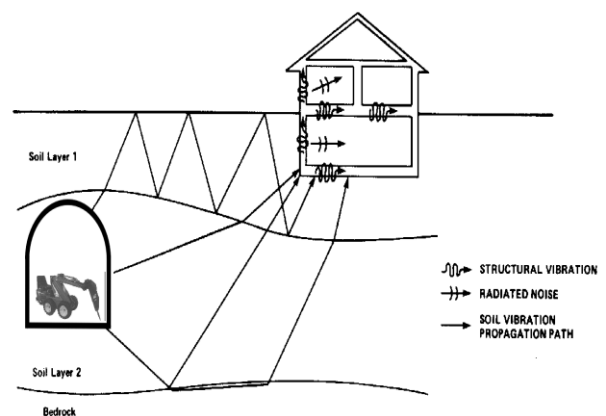
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience 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.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This 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 ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.

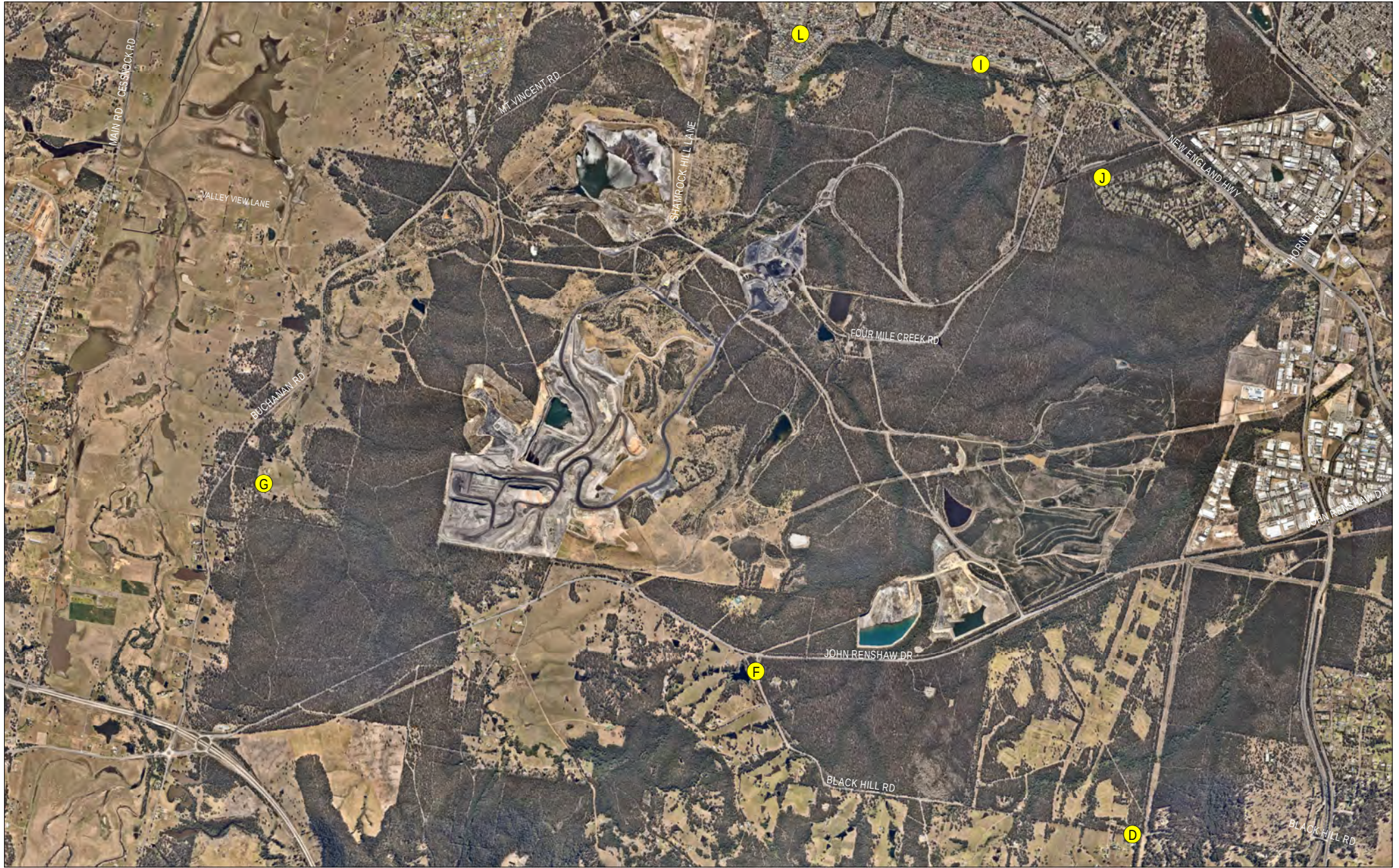


The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Locations

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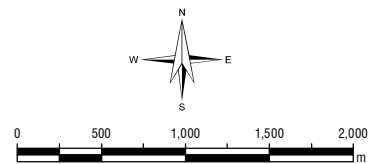
SLR  10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

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SLR Consulting Australia Pty Ltd does not guarantee the accuracy of such information.

Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

 Noise Monitoring Locations



Donaldson Coal
Noise Monitoring
Noise Monitoring Locations
APPENDIX B

APPENDIX C

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 25532 & FILT 5408**

Equipment Description: Sound Level Meter

Manufacturer: B & K

Model No: 2270 **Serial No:** 2679354

Microphone Type: 4189 **Serial No:** 2695417

Preamplifier Type: ZC0032 **Serial No:** 12254

Filter Type: 1/3 Octave **Serial No:** 2679354

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 998 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 26% $\pm 5\%$

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

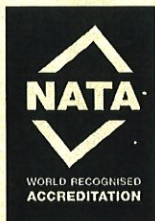
Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *AKB*

AUTHORISED SIGNATURE:

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.



ACU-VIB
ELECTRONICS

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Accredited Lab. No. 9262
Acoustic and Vibration
Measurements

Page 1 of 2
AVCERT10 Rev. 1.3 15.05.18

CERTIFICATE NO.: SLM 25532 & FILT 5408

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

Checked by: *KB*

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



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Mobile: 0413 809806
web site: www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE No: **25534**

EQUIPMENT TESTED: 1/2" Microphone

Manufacturer: B & K

Type No: 4197

Serial No: 3077697 (Part 2)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Tests Performed: Acoustic Microphone Frequency
Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure: 997 hPa ± 1.5 hPa **Relative Humidity:** 24 % ± 5 %

Temperature: 23 °C $\pm 2^\circ$ C

Date of Calibration: 09/09/2019

Issue Date 09/09/2019

Acu-Vib Test Procedure: AVP05 (Microphone Acoustic Frequency
Response)

CHECKED BY: *IKB* **AUTHORISED SIGNATURE:** *Jack Keelt*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



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Measurements

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ELECTRONICS

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Mobile: 0413 809806

Web site: www.acu-vib.com.au

Acoustic Tests, Microphone response

Job No: 13678

Test No: 255334

Microphone type: B&K 4197

Serial No,: 3077697 (Part 2)

Preamplifier type: 2683

Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE

Serial No: 4396

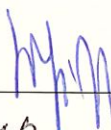
Ambient Temperature: 23C $\pm$ 2° C, Relative Humidity: 997 RH $\pm$ 5% RH,Ambient Pressure: 24 hPa $\pm$ 1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	$\pm$ 3.0 dB	$\pm$ 1.5 dB dB	0.12	P
63 Hz	-0.01dB	$\pm$ 2.0 dB	$\pm$ 1.5 dB dB	0.10	P
125 Hz	-0.08dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
250 Hz	-0.15dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
500 Hz	-0.14dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
2 kHz	0.05dB	$\pm$ 2.0 dB	$\pm$ 1.0 dB dB	0.07	P
4 kHz	-0.25dB	$\pm$ 3.0 dB	$\pm$ 1.0 dB dB	0.13	P
8 kHz	-0.21dB	$\pm$ 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.10dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.61dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer)




Date:09/09/2019

Checked by:

Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE No: 25533

EQUIPMENT TESTED: 1/2" Microphone

Manufacturer: B & K

Type No: 4197

Serial No: 3077697 (Part 1)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Tests Performed: Acoustic Microphone Frequency
Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure: 997 hPa ± 1.5 hPa **Relative Humidity:** 24% $\pm 5\%$

Temperature: 23 $^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Date of Calibration: 09/09/2019

Issue Date 09/09/2019

Acu-Vib Test Procedure: AVP05 (Microphone Acoustic Frequency
Response)

CHECKED BY: *RKB*

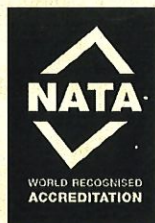
AUTHORISED SIGNATURE:

Jack Rielt

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Acoustic Tests, Microphone response

Job No: 13678

Test No: 25533

Microphone type: B&K 4197

Serial No.: 3077697 (Part 1)

Preamplifier type: 2683

Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE

Serial No: 4396

Ambient Temperature: 23C $\pm$ 2° C, Relative Humidity: 99% RH $\pm$ 5% RH,Ambient Pressure: 24 hPa $\pm$ 1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	$\pm$ 3.0 dB	$\pm$ 1.5 dB dB	0.12	P
63 Hz	-0.11dB	$\pm$ 2.0 dB	$\pm$ 1.5 dB dB	0.10	P
125 Hz	-0.18dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
250 Hz	-0.25dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
500 Hz	-0.24dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
2 kHz	0.05dB	$\pm$ 2.0 dB	$\pm$ 1.0 dB dB	0.07	P
4 kHz	-0.25dB	$\pm$ 3.0 dB	$\pm$ 1.0 dB dB	0.13	P
8 kHz	-0.31dB	$\pm$ 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.20dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.51dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer)



Date:09/09/2019

Checked by:



Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 23293 & FILT 4792**

Equipment Description: Sound & Vibration Analyser

Manufacturer: B&K

Model No: 2250 **Serial No:** 3003389

Microphone Type: 4950 **Serial No:** 2913816

Preamplifier Type: ZC0032 **Serial No:** 20519

Filter Type: 1/3 Octave **Serial No:** 3003389

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 990 hPa ± 1.5 hPa

Temperature: 25 °C $\pm 2^\circ$ C **Relative Humidity:** 29% $\pm 5\%$

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE: *[Signature]*

Jack Klett

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CERTIFICATE No.: SLM 23293 & FILT 4792

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013. A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 06/08/2018 **Issue Date:** 07/08/2018

Checked by: 

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 42109**

Equipment Description: Noise Logger

Manufacturer: ARL

Model No: EL-316 **Serial No:** 16-207-050

Microphone Type: UC-53A **Serial No:** 318219

Preamplifier Type: NA **Serial No:** NA

Comments: All tests passed for type 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1019 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 53 % $\pm 5\%$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

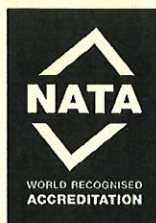
Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: *MB* **AUTHORISED SIGNATURE:** *Jack Kieft*

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CERTIFICATE No.: SLM 42109

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3 NA
4. Time Weighting P	clause 10.4.4 NA
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 95.8 dB and adjusted to 94.0 dB

Uncertainty: $\pm 0.13\text{dB}$ (at 95% c.l.) $k=2$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

Checked by: *VKB*

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 42108**

Equipment Description: Noise Logger

Manufacturer: ARL

Model No: EL-316 **Serial No:** 16-207-044

Microphone Type: UC-53A **Serial No:** 321979

Preamplifier Type: NA **Serial No:** NA

Comments: All tests passed for type 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1019 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 53 % $\pm 5\%$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: *NKB*

AUTHORISED SIGNATURE:

Jack Kielt

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CERTIFICATE NO.: SLM 42108

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3 NA
4. Time Weighting P	clause 10.4.4 NA
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 88.1 dB and adjusted to 94.0 dB

Uncertainty: $\pm 0.13\text{dB}$ (at 95% c.l.) $k=2$

Date of Calibration: 27/06/2019

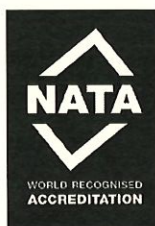
Issue Date: 27/06/2019

Checked by: *IKB*

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Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C18314

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-508
Microphone Serial Number : 319092
Pre-amplifier Serial Number : 27474

Atmospheric Conditions

Ambient Temperature : 21.7°C
Relative Humidity : 43.3%
Barometric Pressure : 99.36kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz $\pm 0.15\text{dB}$
12.5kHz $\pm 0.21\text{dB}$
16kHz $\pm 0.29\text{dB}$
Electrical Tests
31.5 Hz to 20 kHz $\pm 0.12\text{dB}$

Environmental Conditions
Temperature $\pm 0.3^\circ\text{C}$
Relative Humidity $\pm 2.5\%$
Barometric Pressure $\pm 0.017\text{Pa}$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

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NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18311**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-103-494
Microphone Serial Number : 317150
Pre-amplifier Serial Number : 28022

Atmospheric Conditions

Ambient Temperature : 22.5°C
Relative Humidity : 42.4%
Barometric Pressure : 99.31kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.15dB	Temperature	±0.3°C
12.5kHz	±0.21dB	Relative Humidity	±2.5%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 25138 & FILT 5298**

Equipment Description: Sound & Vibration Analyser

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 20665

Microphone Type: 7052E **Serial No:** 50614

Preamplifier Type: SV12L **Serial No:** 18987

Filter Type: 1/1 Octave **Serial No:** 20665

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 999 hPa ± 1.5 hPa

Temperature: 25 °C $\pm 2^\circ$ C **Relative Humidity:** 32% $\pm 5\%$

Date of Calibration: 12/07/2019 **Issue Date:** 15/07/2019

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *KB*

AUTHORISED SIGNATURE:

Jack Kiet

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AVCERT10 Rev. 1.3 15.05.18

CERTIFICATE No.: SLM 25138 & FILT 5298

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	Pass
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.

A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

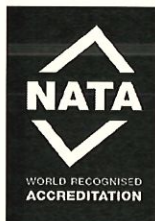
1. Relative attenuation clause 5.3

Date of Calibration: 12/07/2019 **Issue Date:** 15/07/2019

Checked by: *VKB*

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 25127 & FILT 5297**

Equipment Description: Sound & Vibration Analyser

Manufacturer: Svantek

Model No: Svan-957 **Serial No:** 21423

Microphone Type: 7052H **Serial No:** 74013

Preamplifier Type: SV12L **Serial No:** 22284

Filter Type: 1/3 Octave **Serial No:** 21423

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 996 hPa ± 1.5 hPa

Temperature: 24 °C $\pm 2^\circ$ C **Relative Humidity:** 32% $\pm 5\%$

Date of Calibration: 11/07/2019 **Issue Date:** 11/07/2019

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *[Signature]*

AUTHORISED SIGNATURE:

[Signature]
Jack Kiell

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AVCERT10 Rev. 1.3 15.05.18

CERTIFICATE No.: SLM 25127 & FILT 5297

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	Pass
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

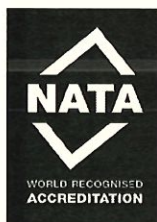
1. Relative attenuation clause 5.3

Date of Calibration: 11/07/2019 **Issue Date:** 11/07/2019

Checked by: 

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



HEAD OFFICE

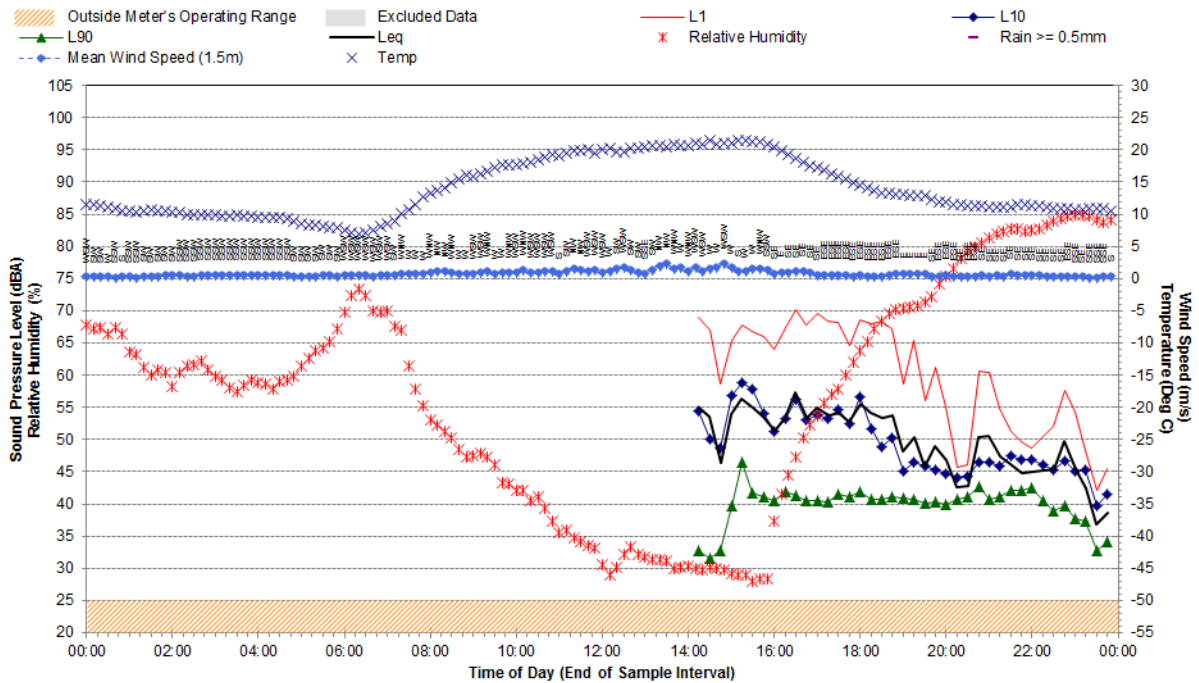
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02) 96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

APPENDIX D

Statistical Ambient Noise Levels

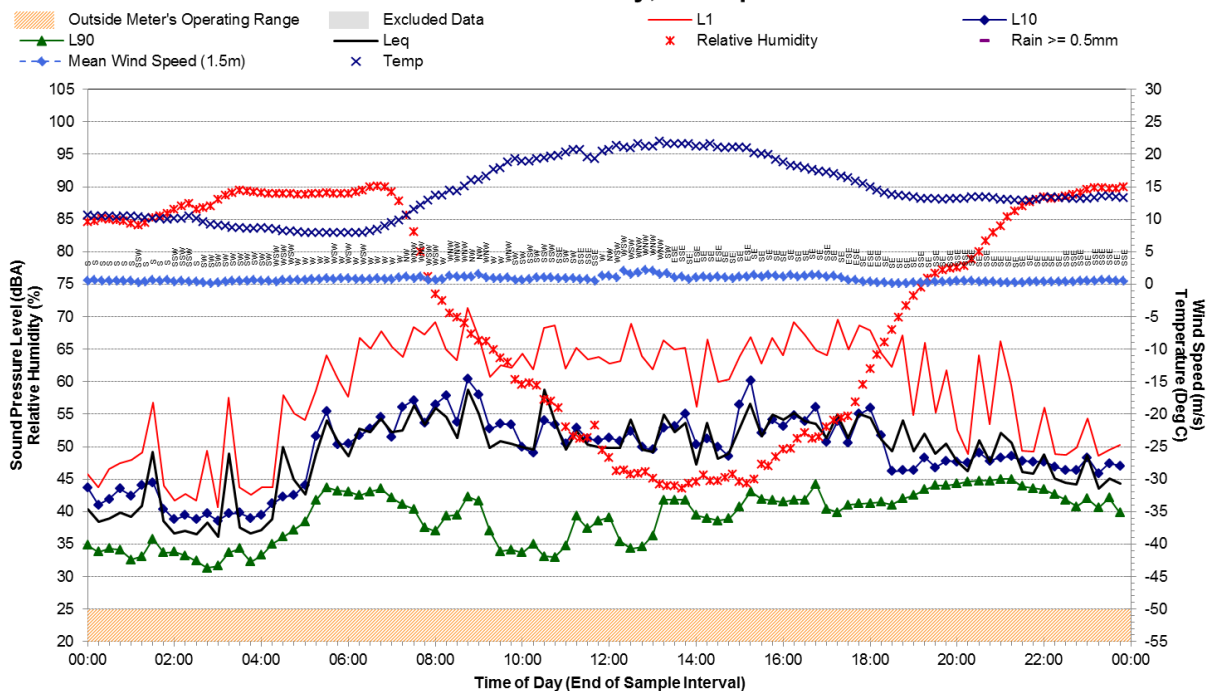
Statistical Ambient Noise Levels

Location D - Tuesday, 24 September 2019

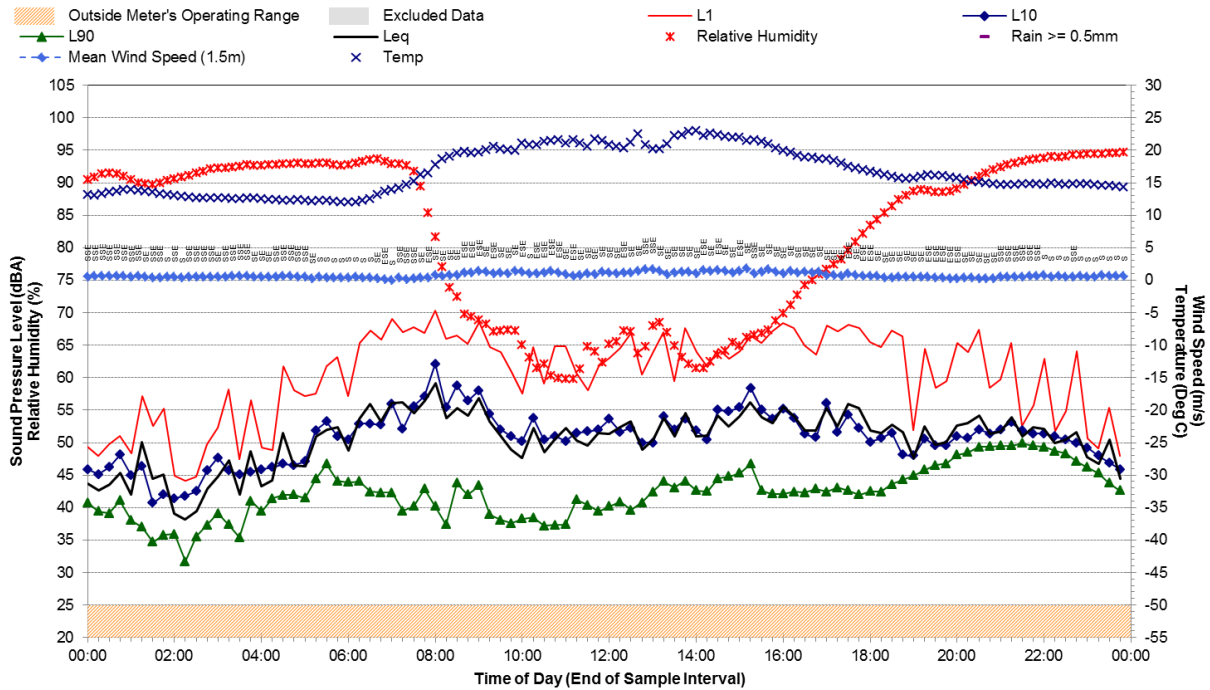


Statistical Ambient Noise Levels

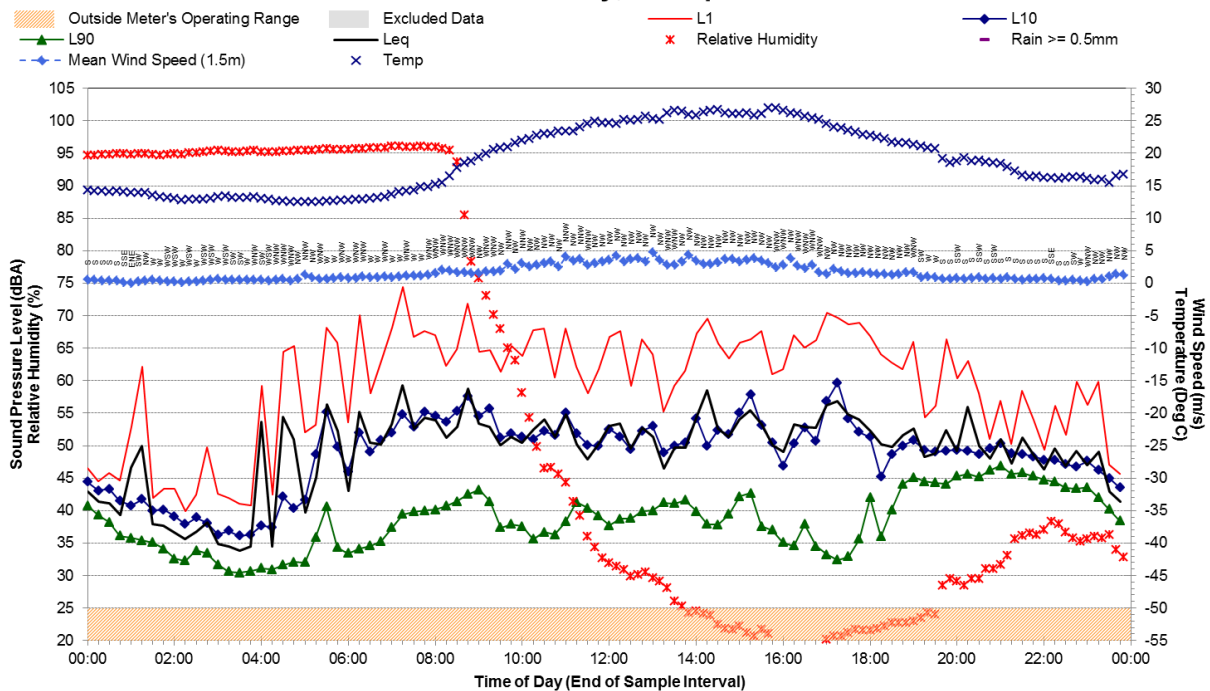
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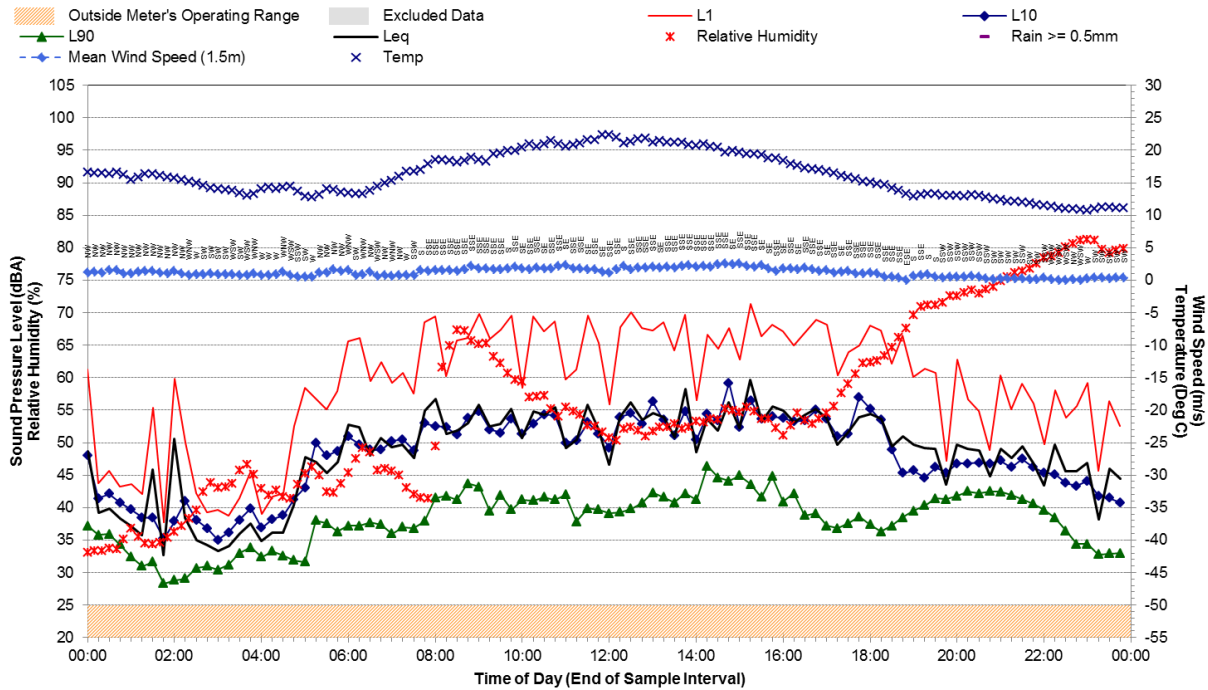
Statistical Ambient Noise Levels Location D - Thursday, 26 September 2019



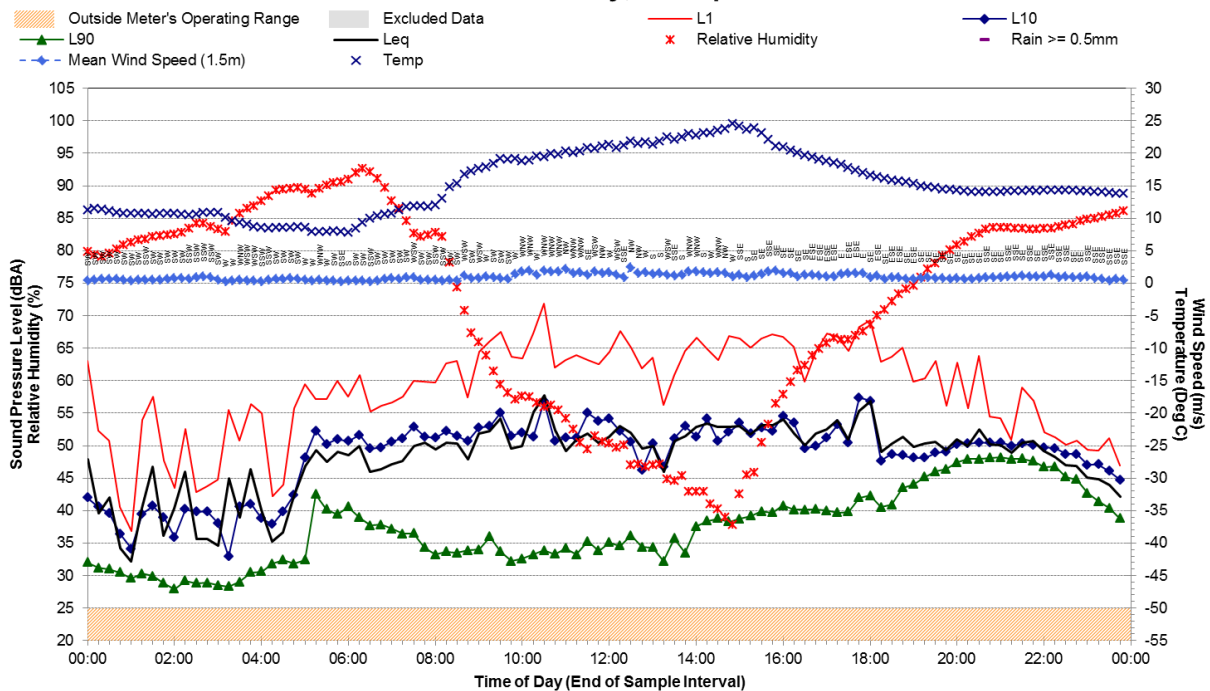
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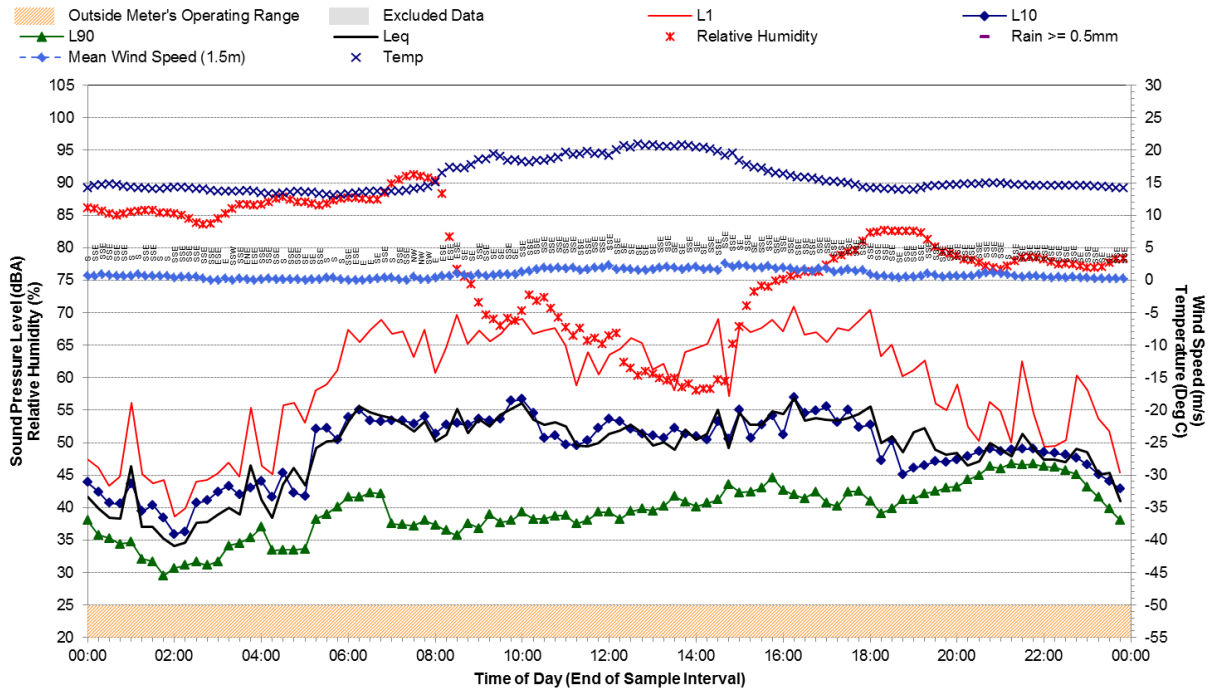
Statistical Ambient Noise Levels Location D - Saturday, 28 September 2019



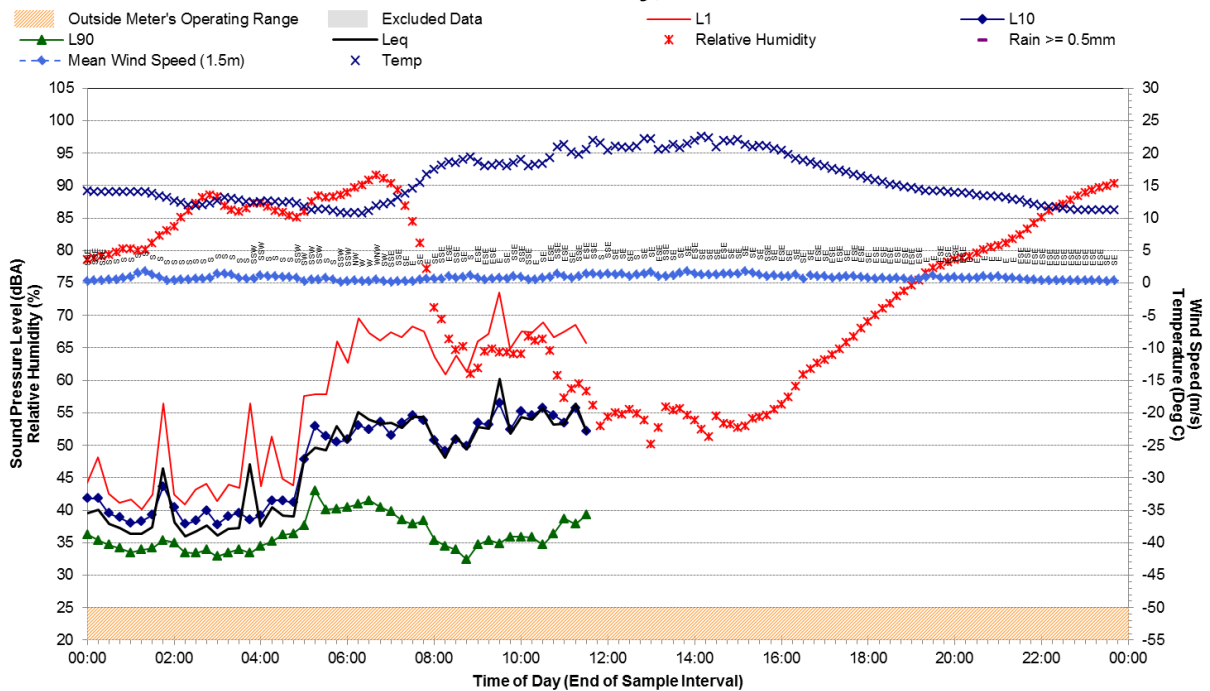
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Statistical Ambient Noise Levels Location D - Monday, 30 September 2019

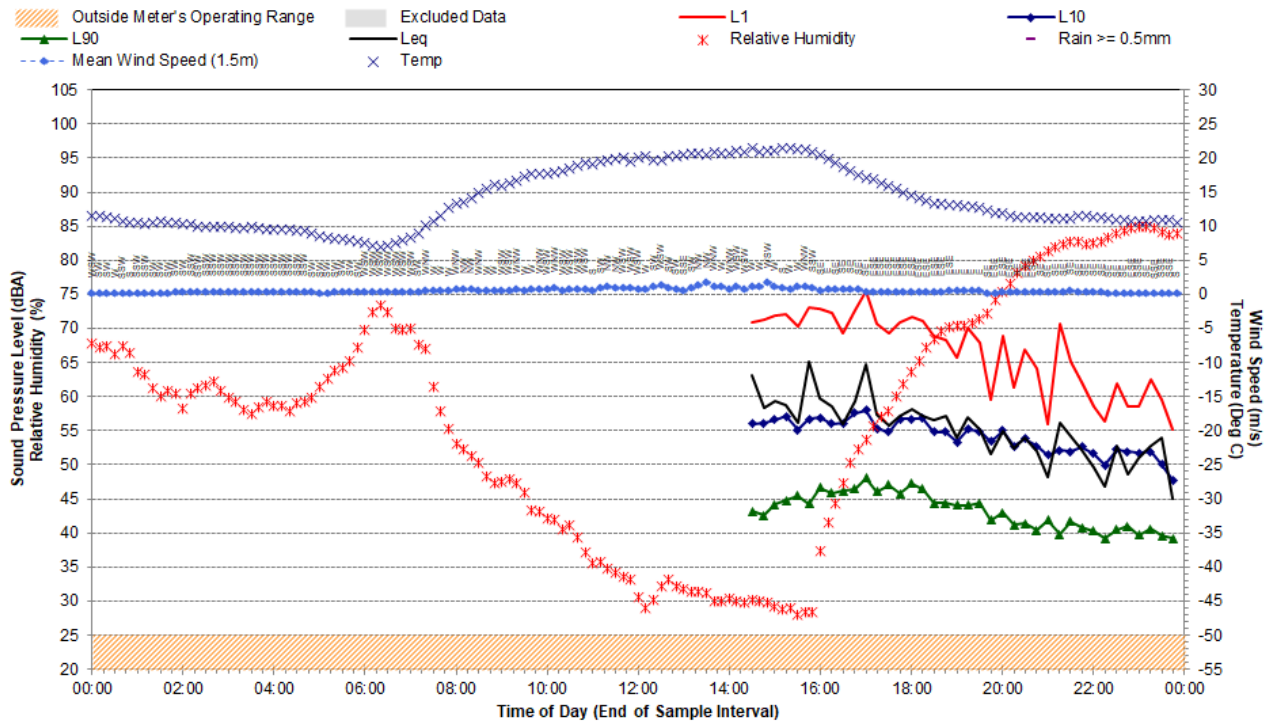


Statistical Ambient Noise Levels Location D - Tuesday, 1 October 2019



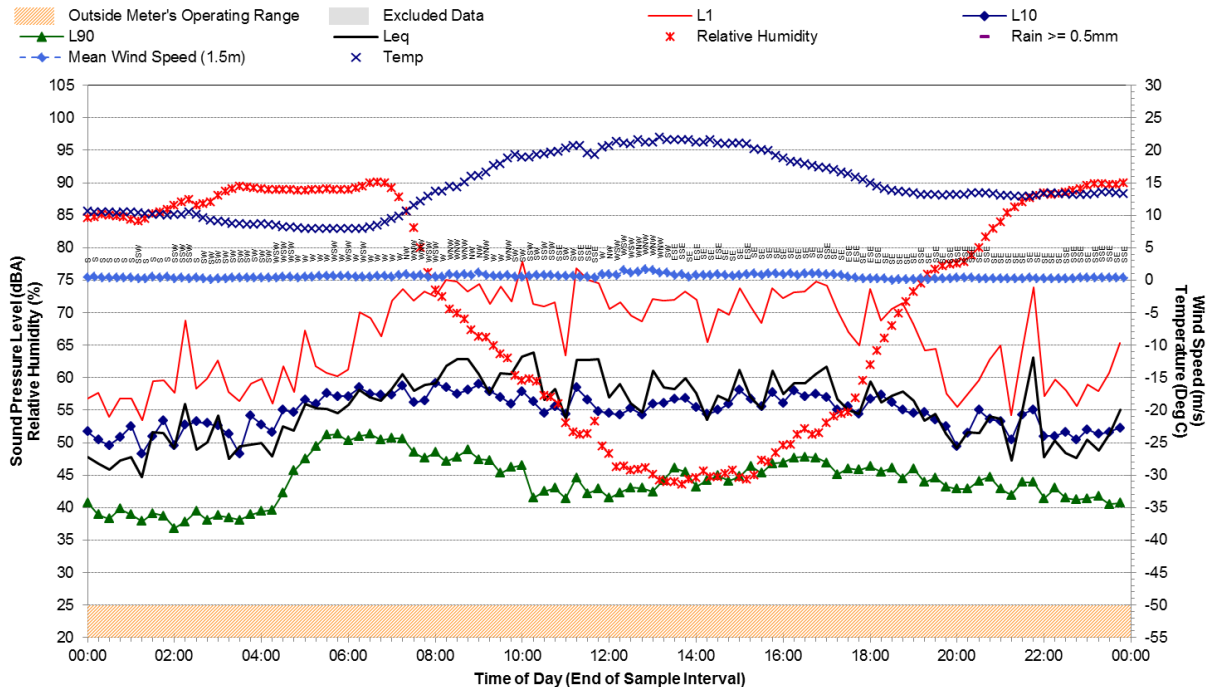
Statistical Ambient Noise Levels

Location F - Tuesday, 24 September 2019



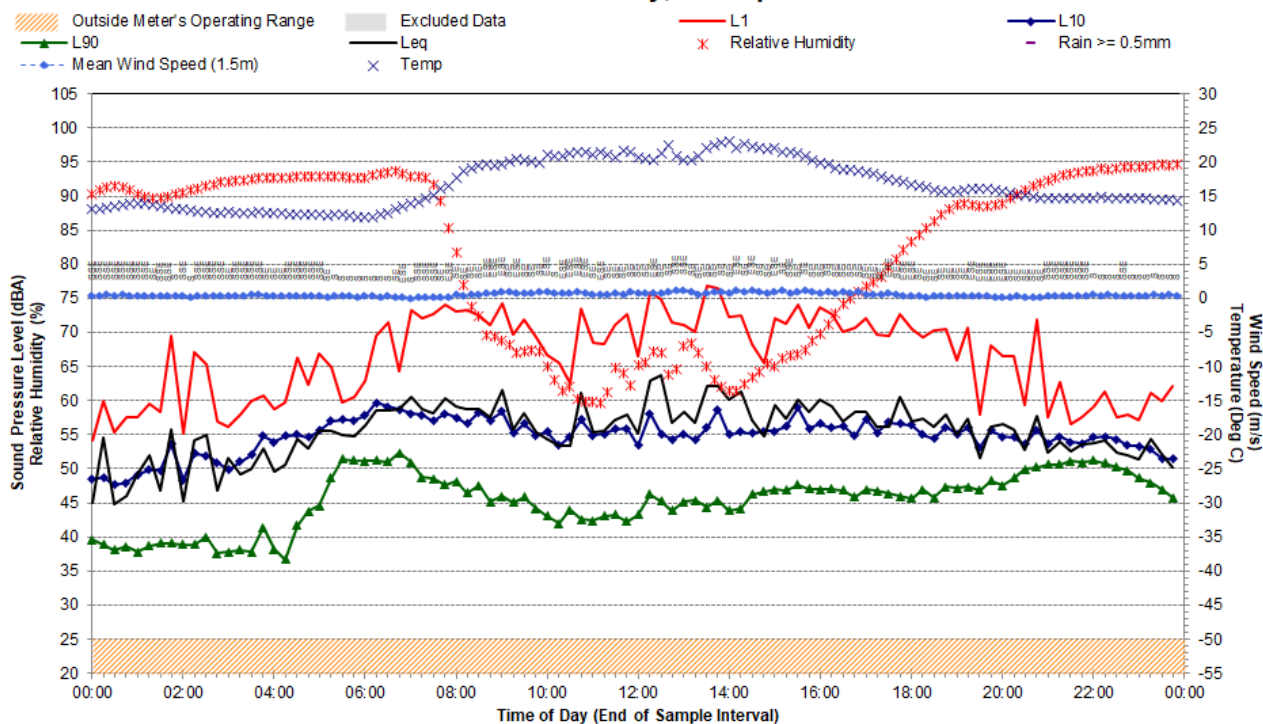
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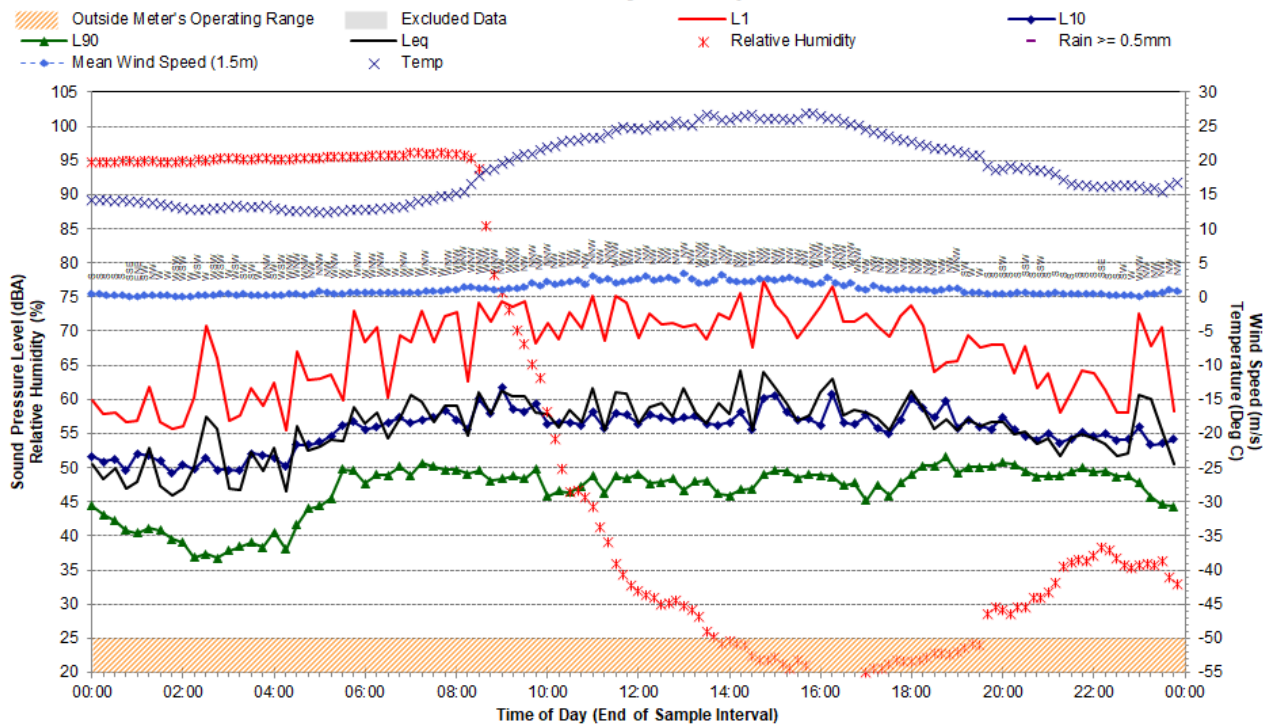
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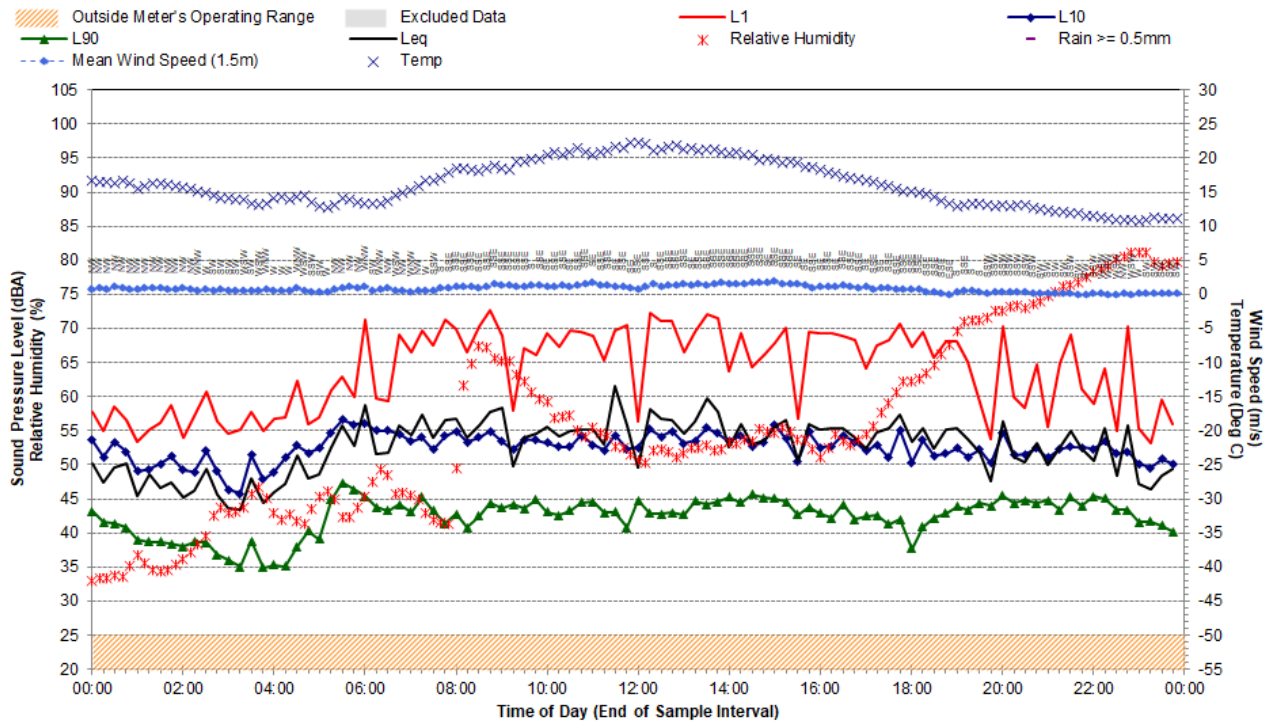
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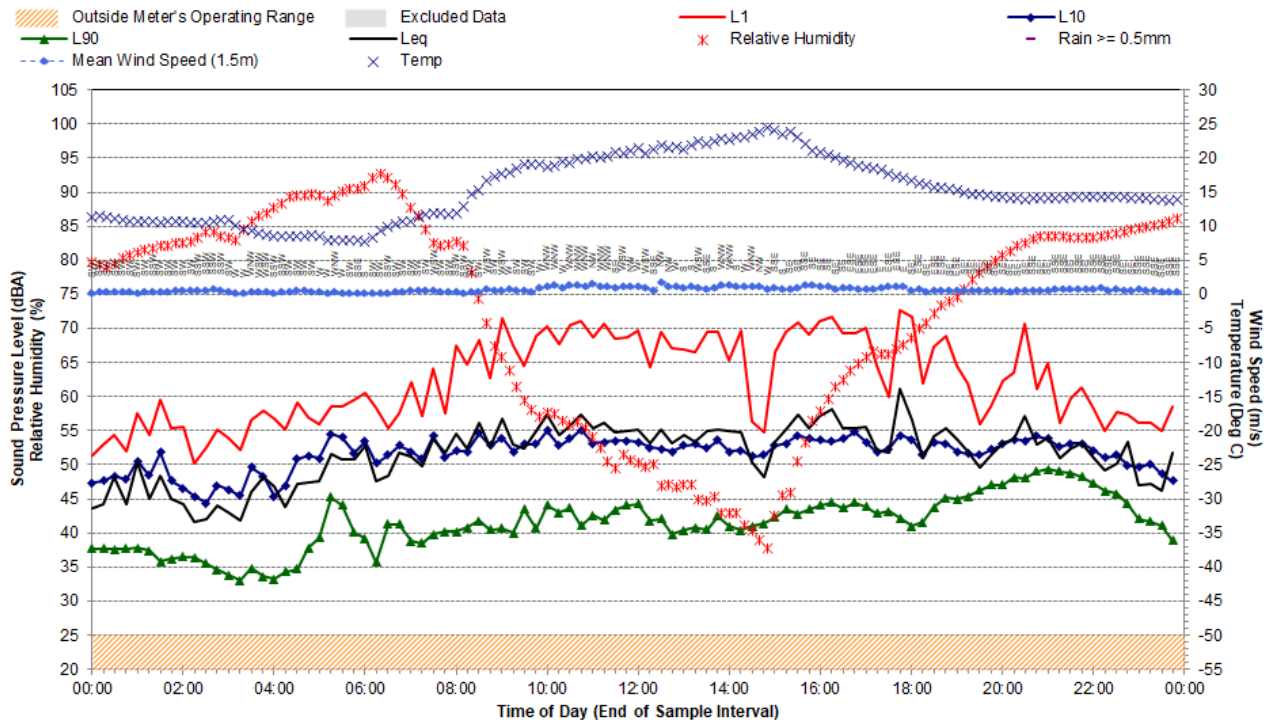
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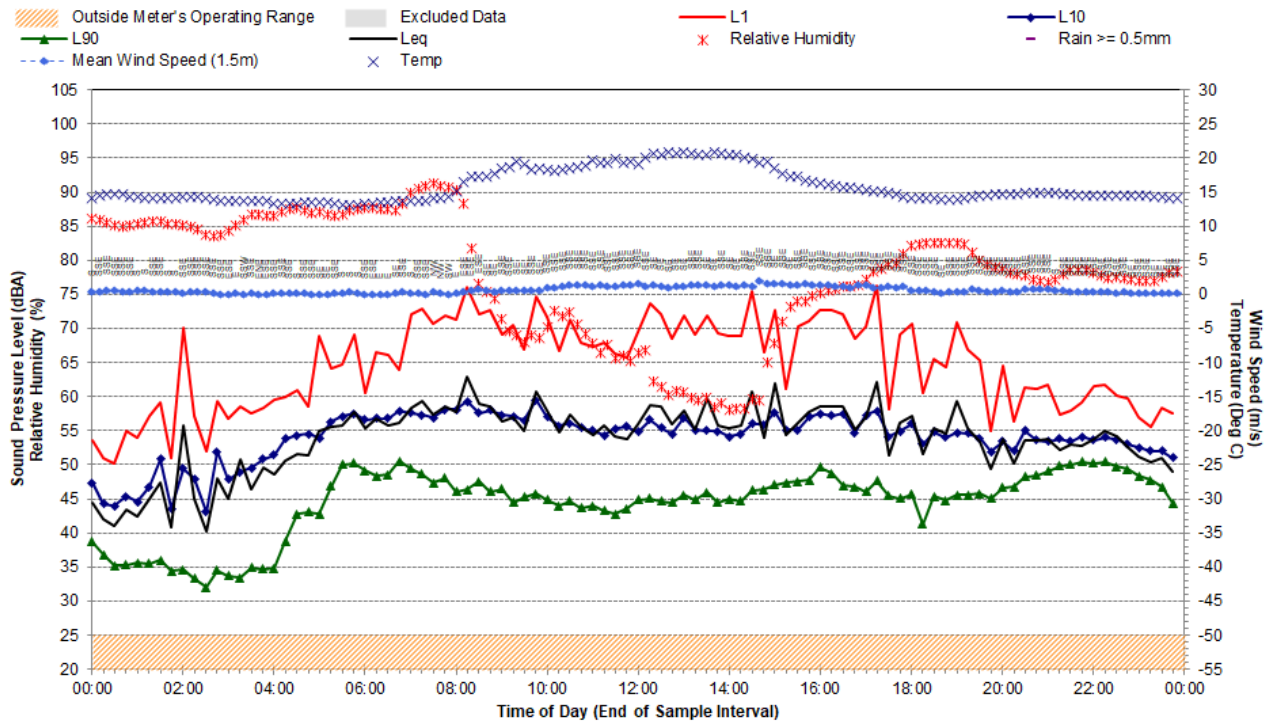
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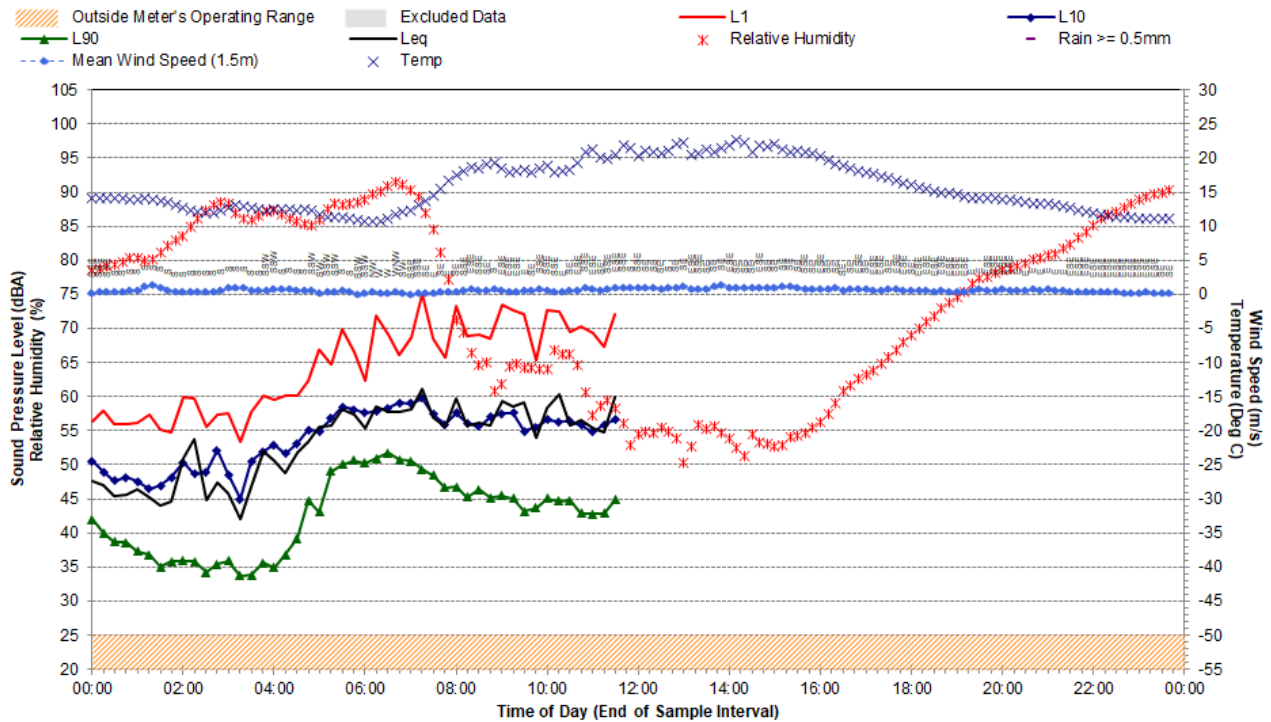
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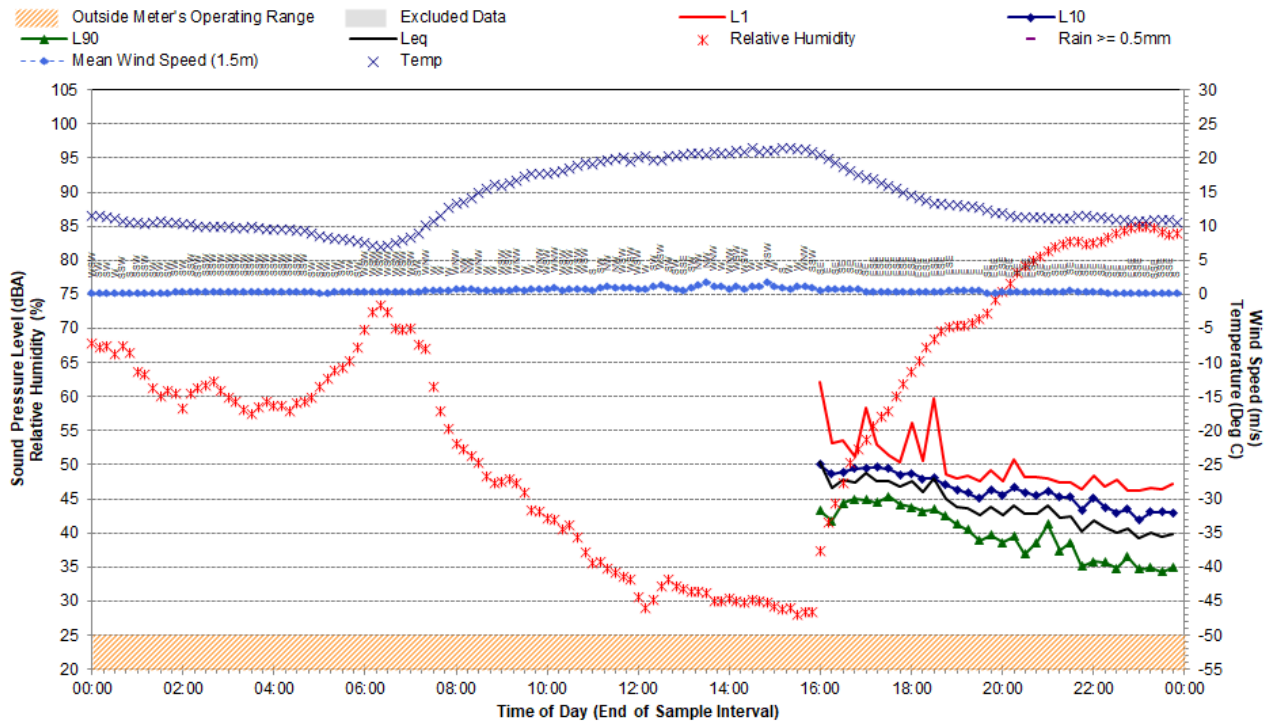
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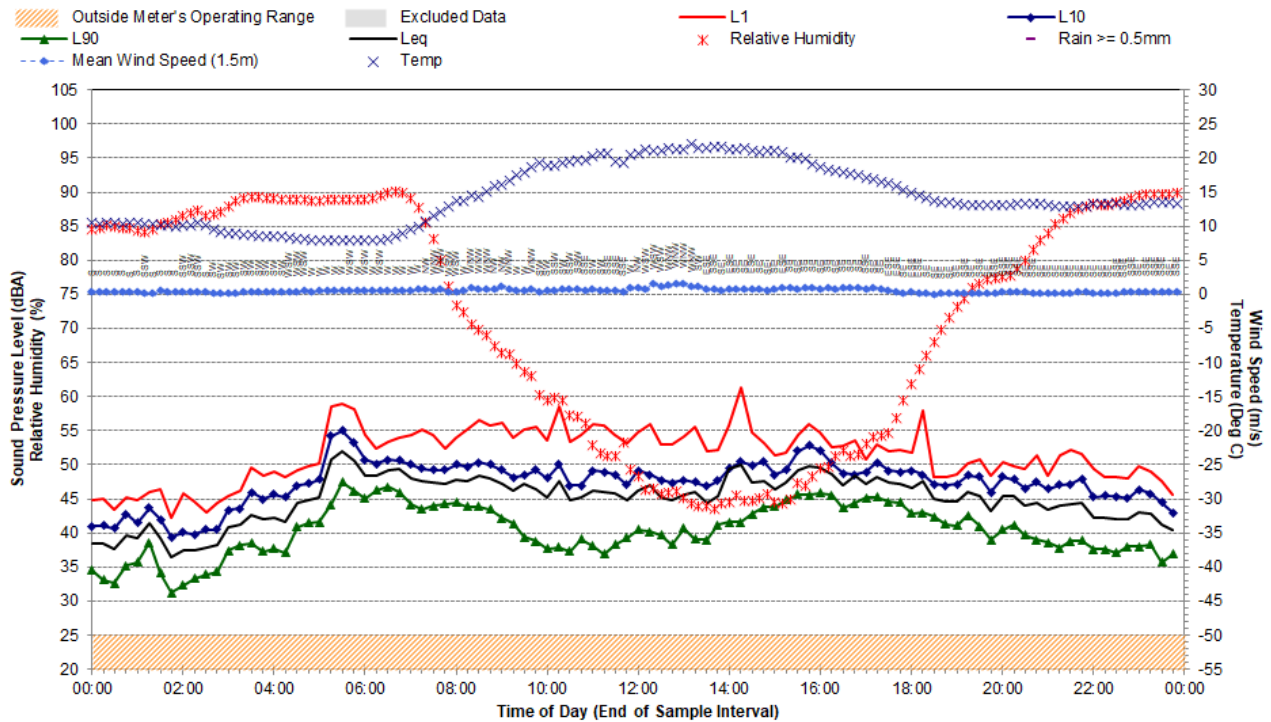
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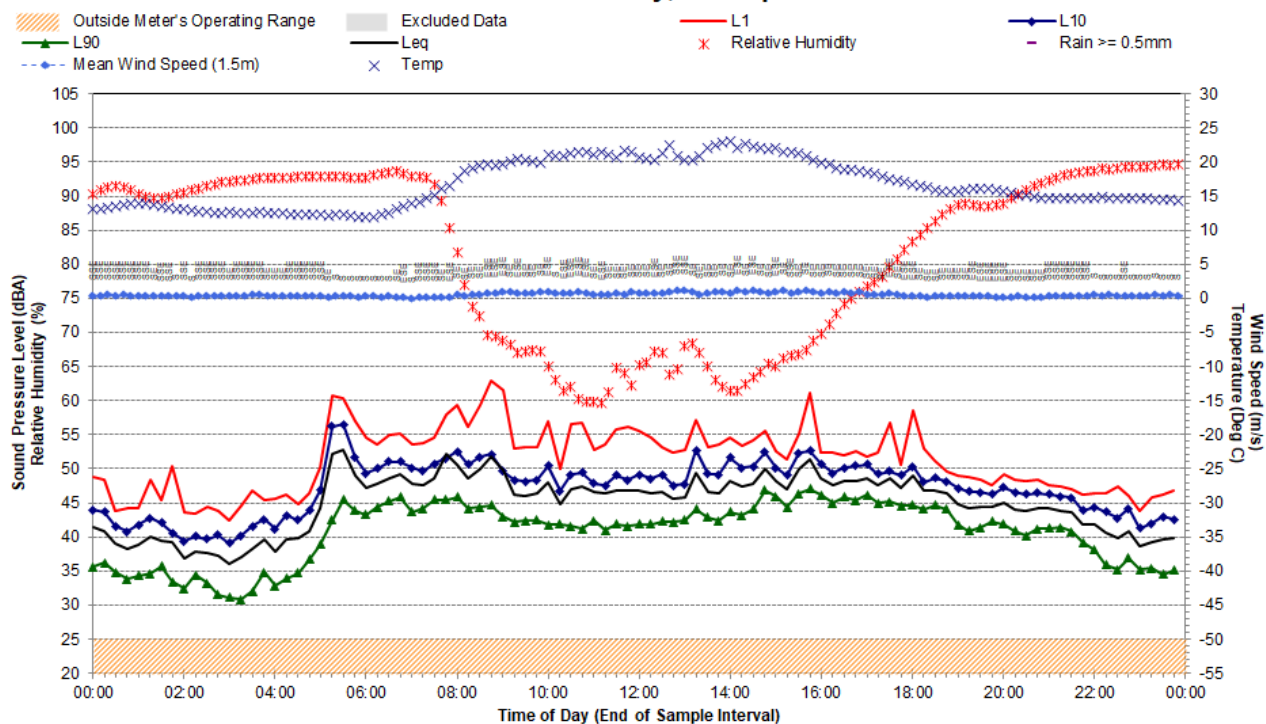
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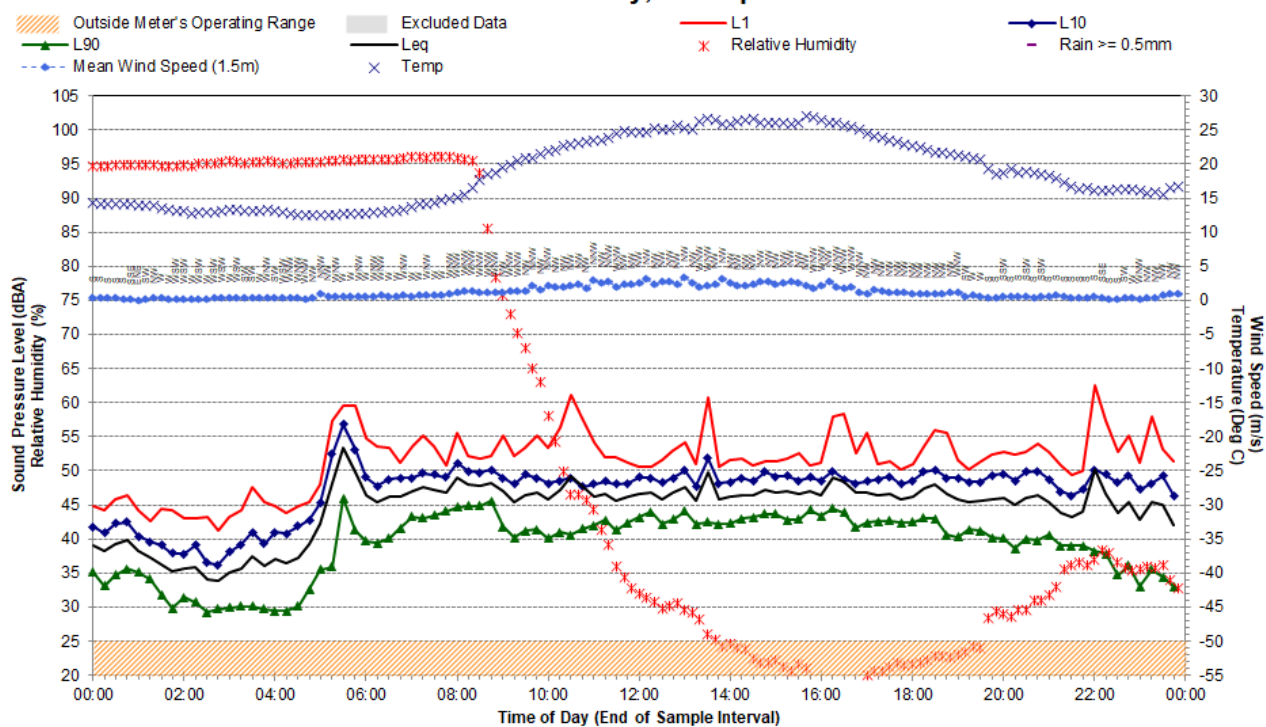
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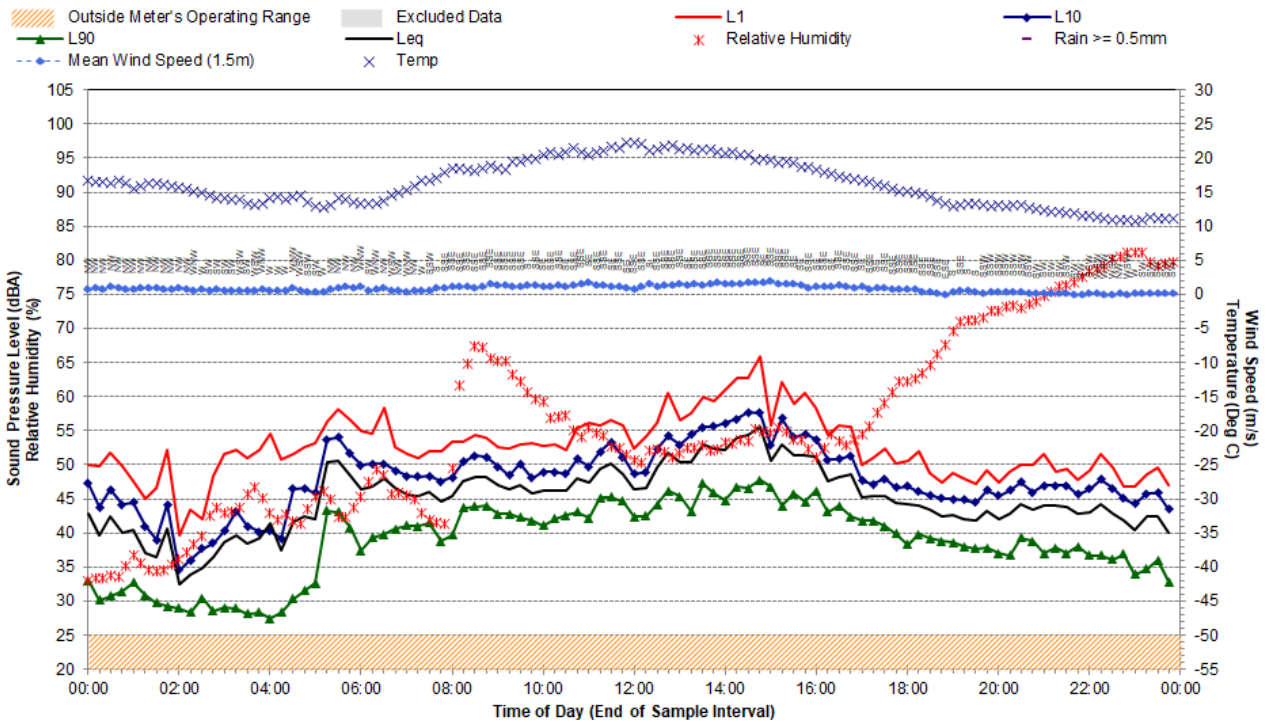
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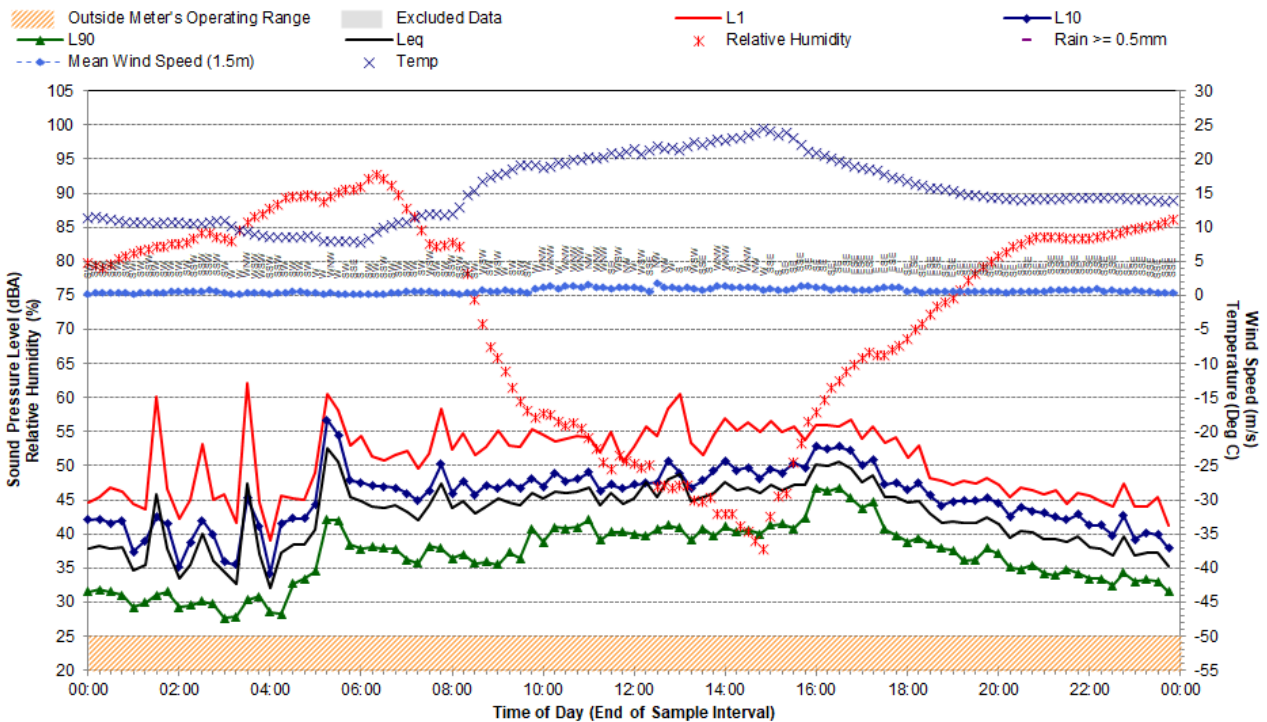
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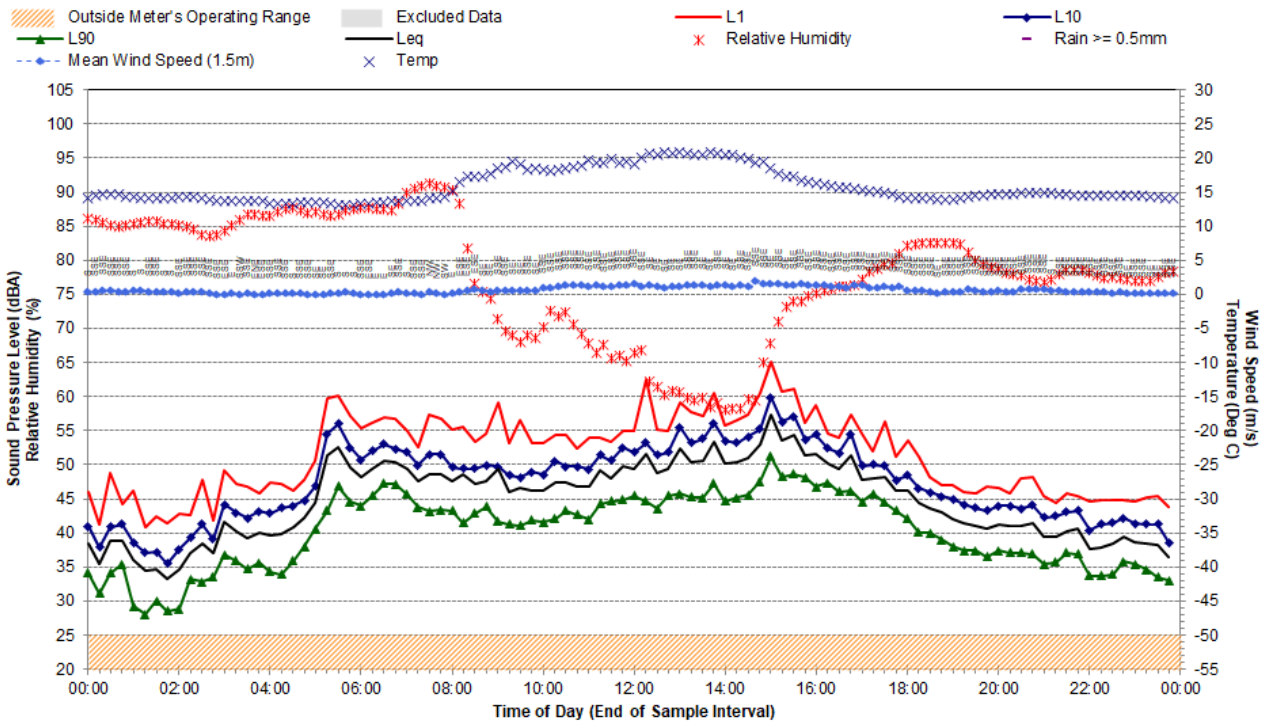
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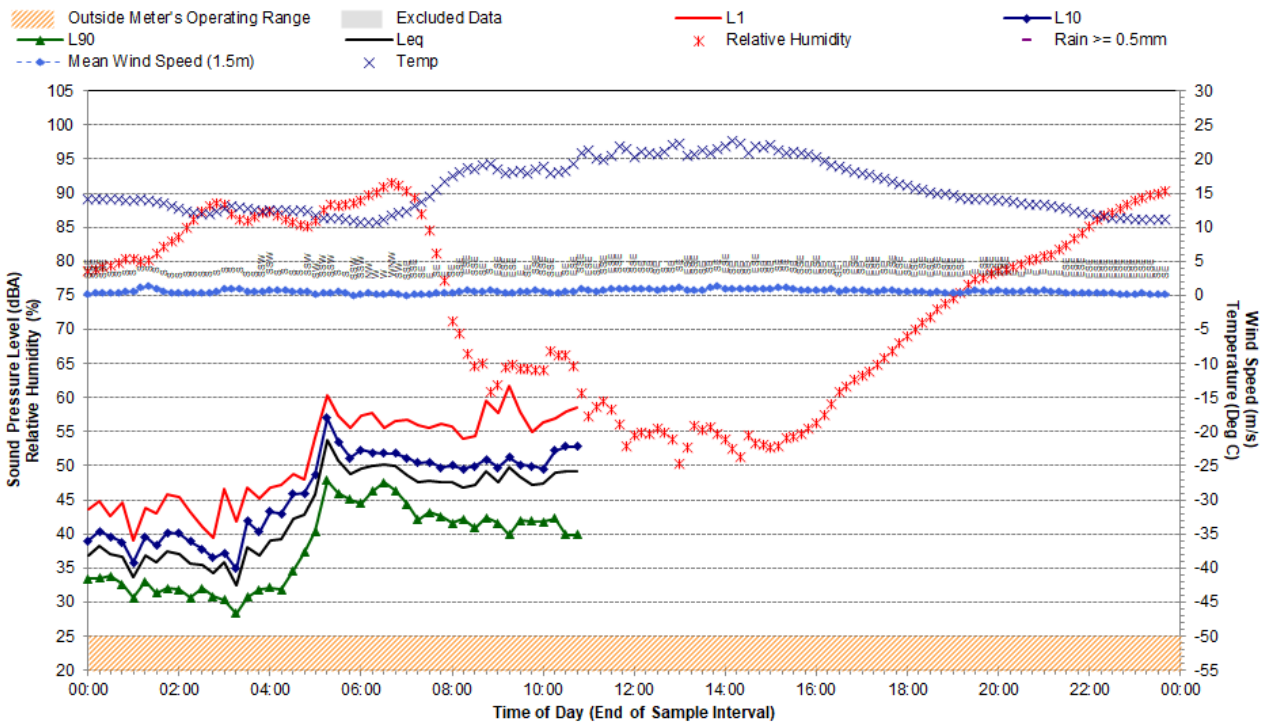
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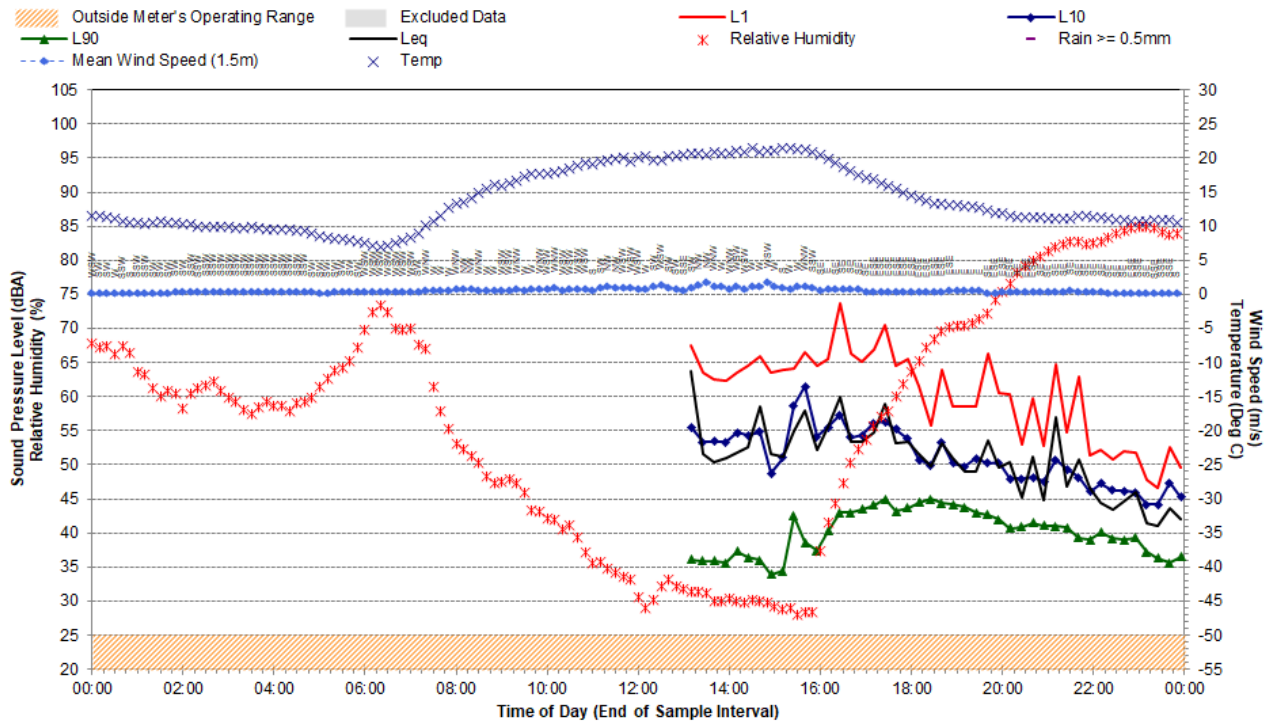
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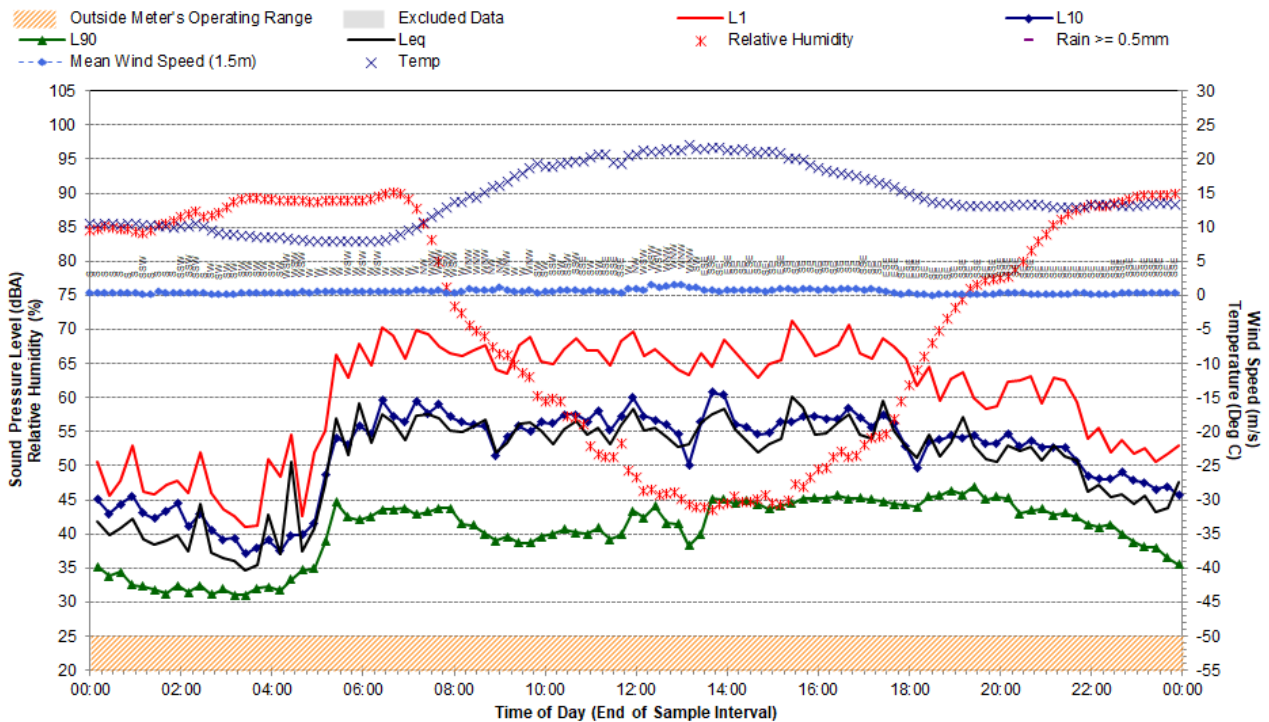
Statistical Ambient Noise Levels

Location I - Tuesday, 24 September 2019



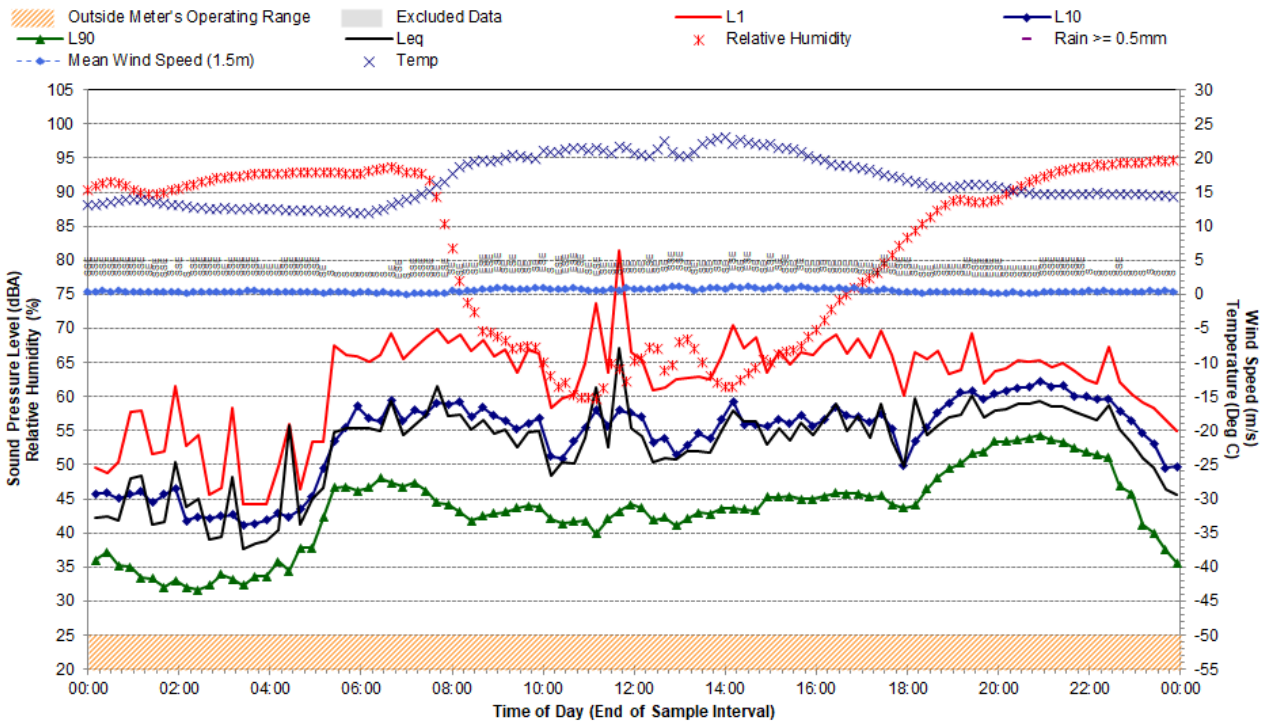
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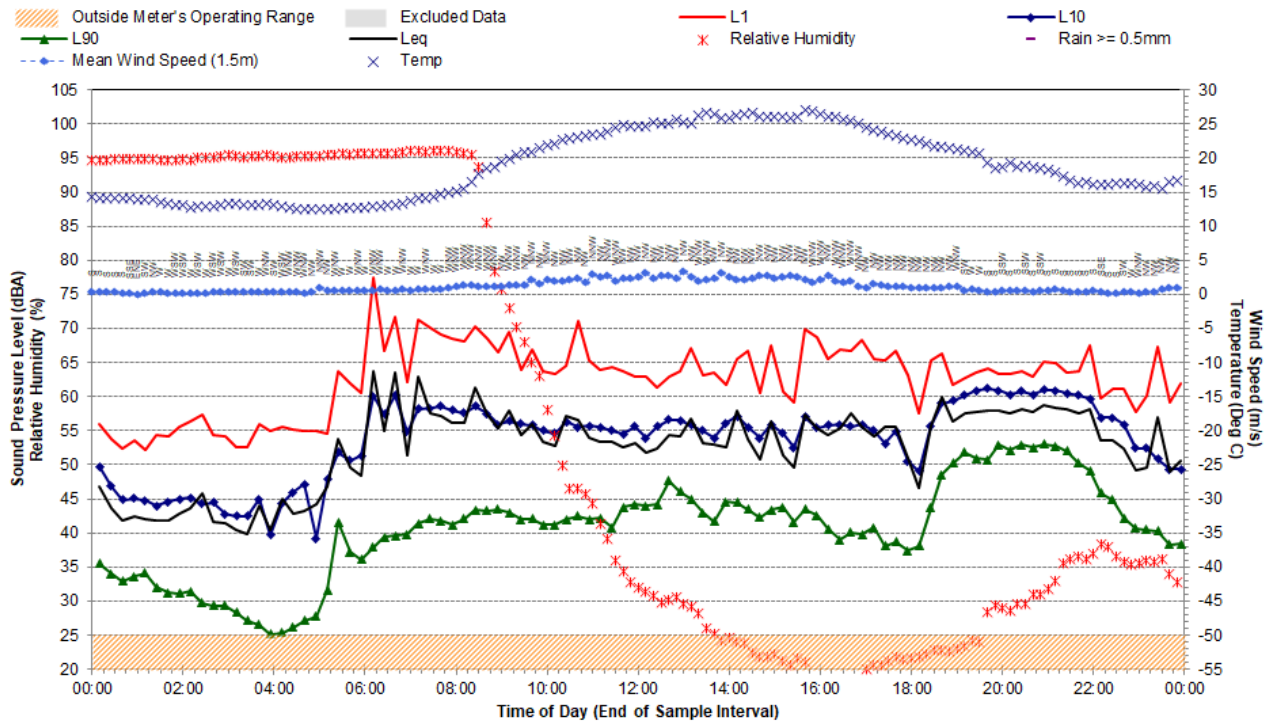
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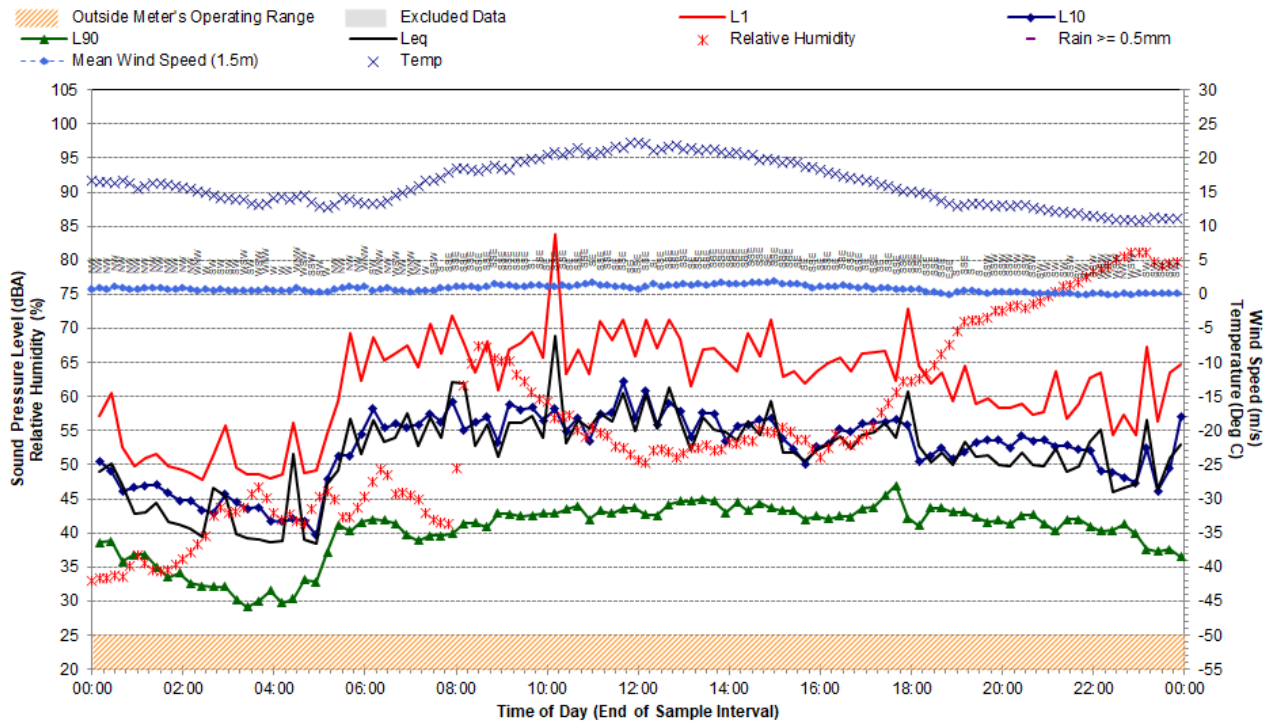
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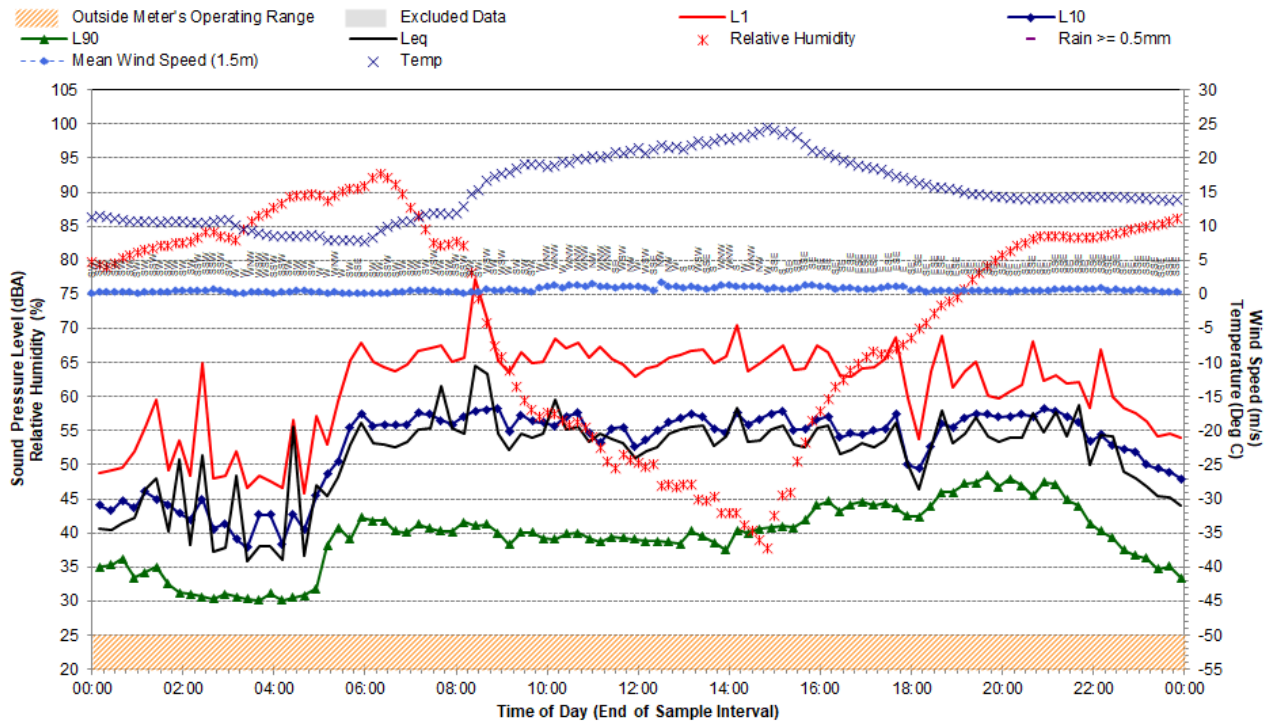
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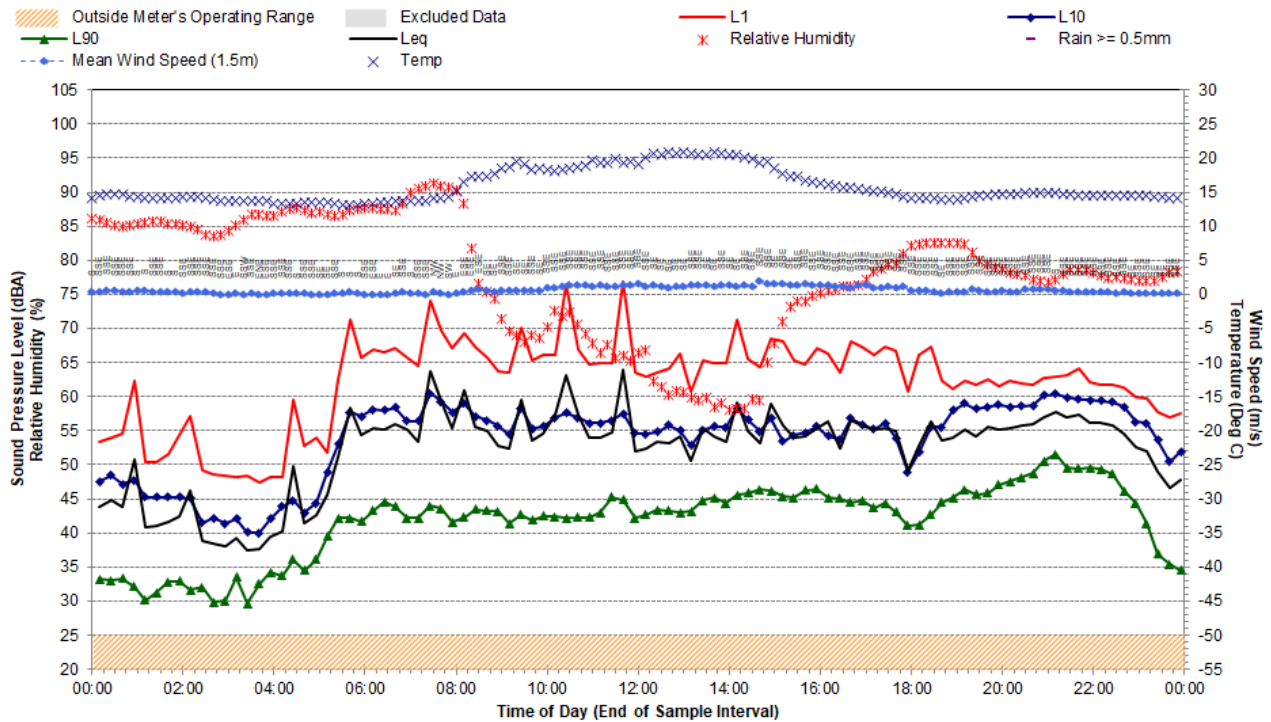
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Location I - Sunday, 29 September 2019



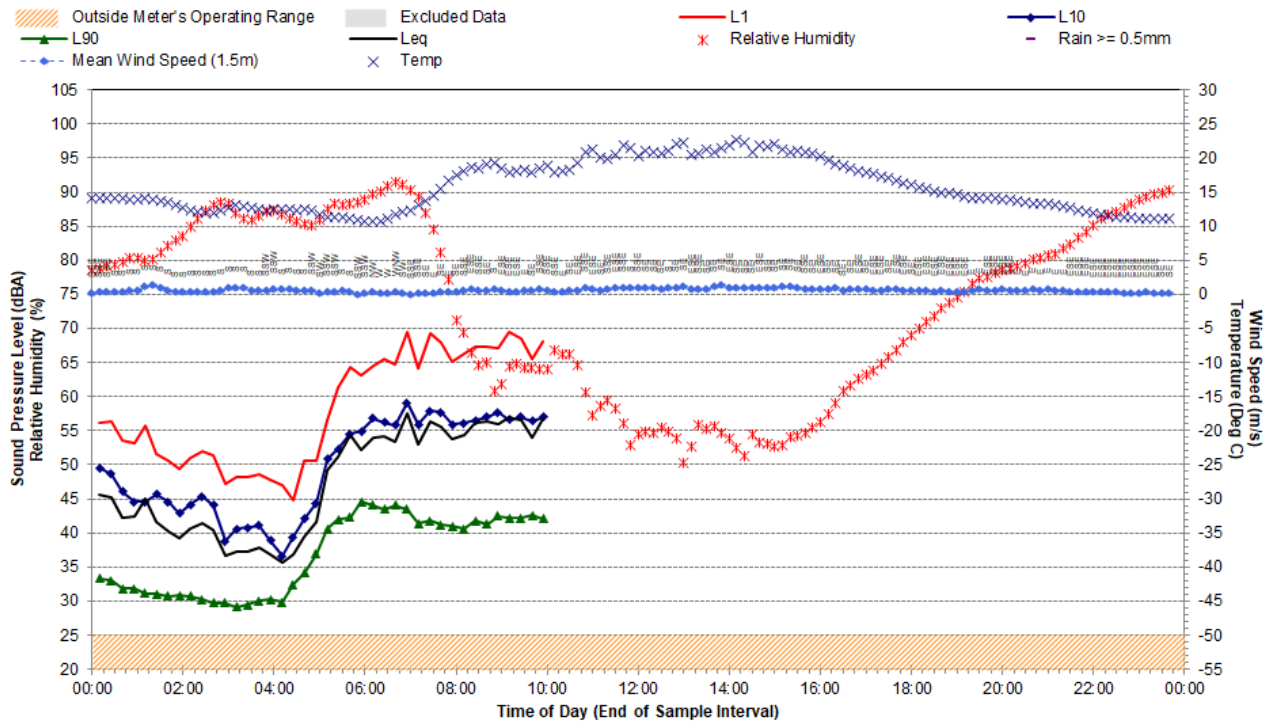
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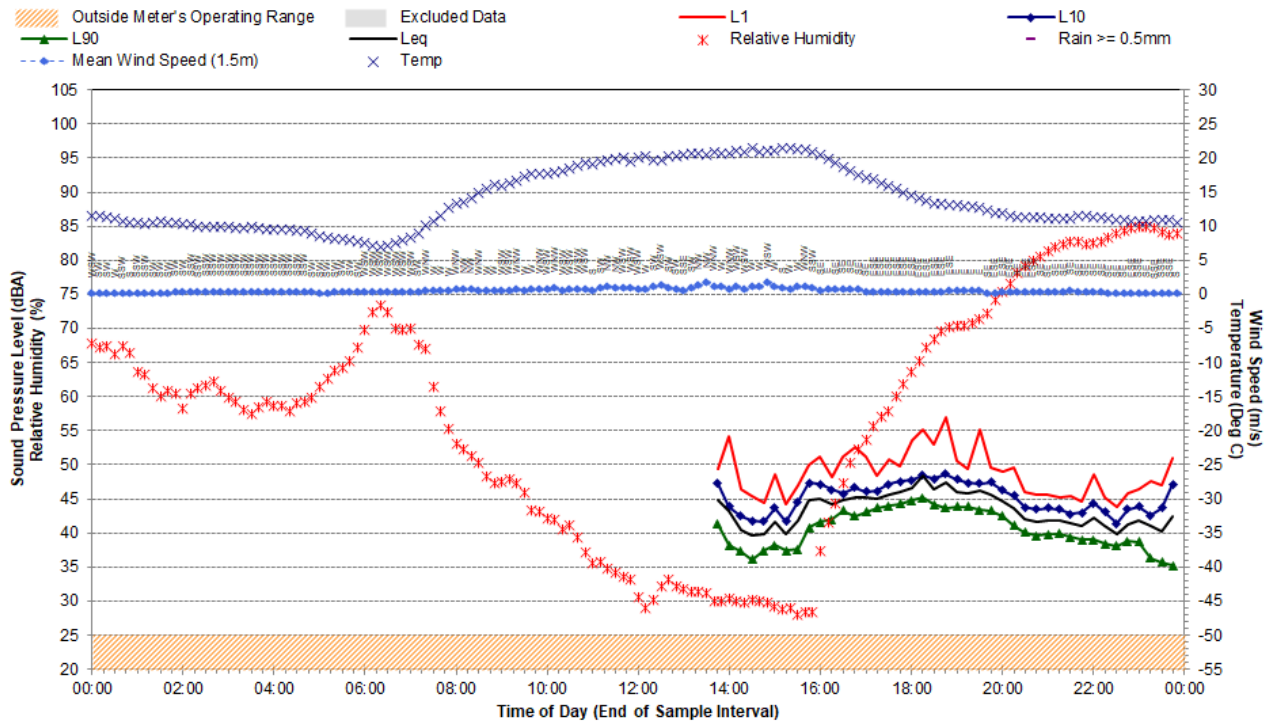
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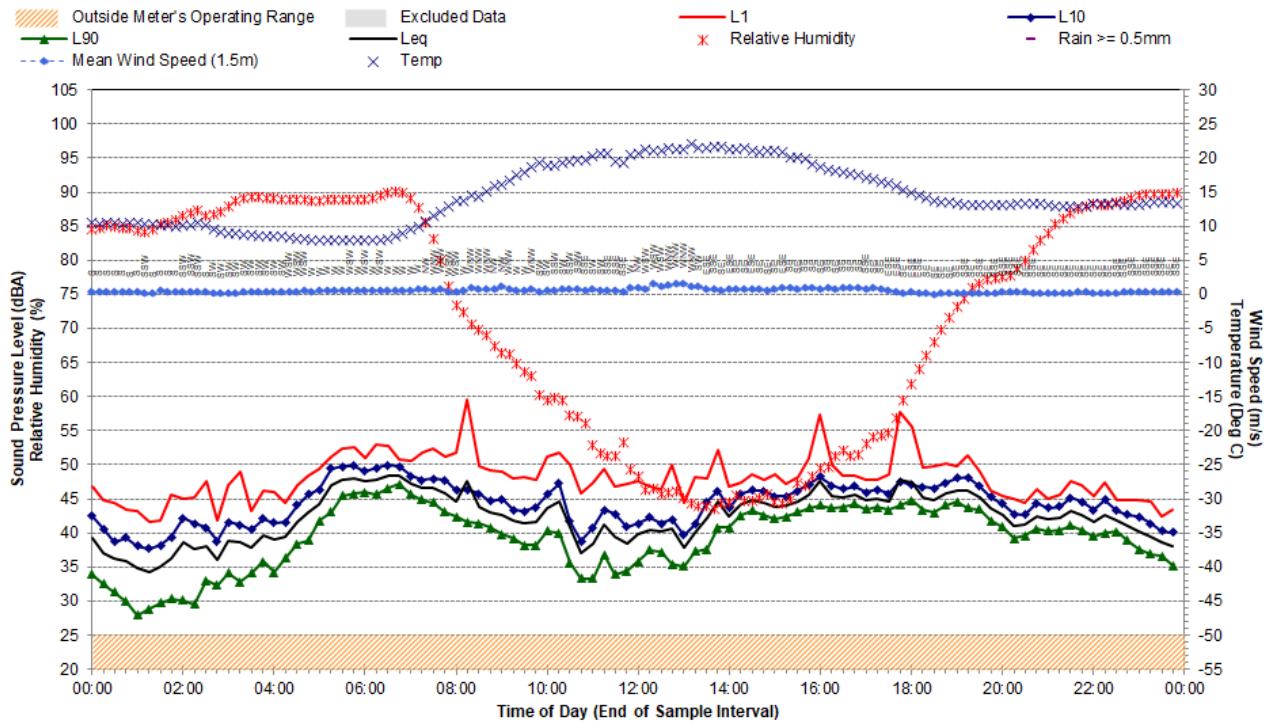
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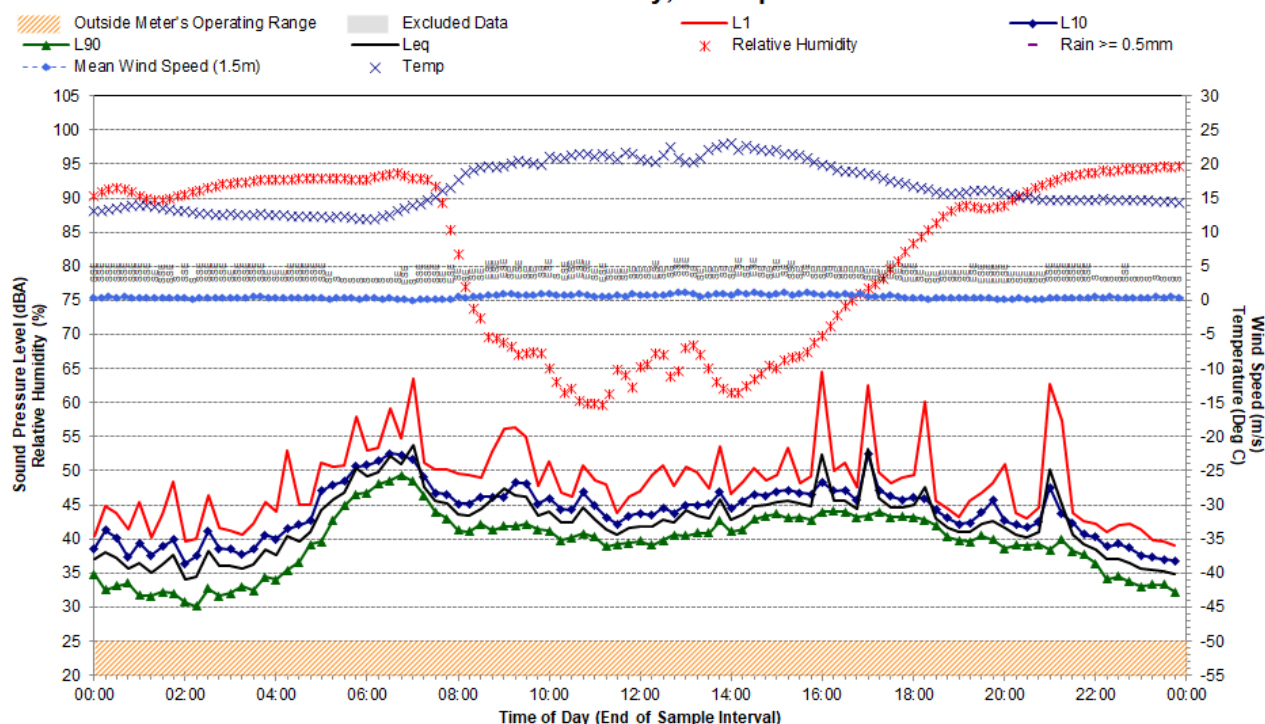
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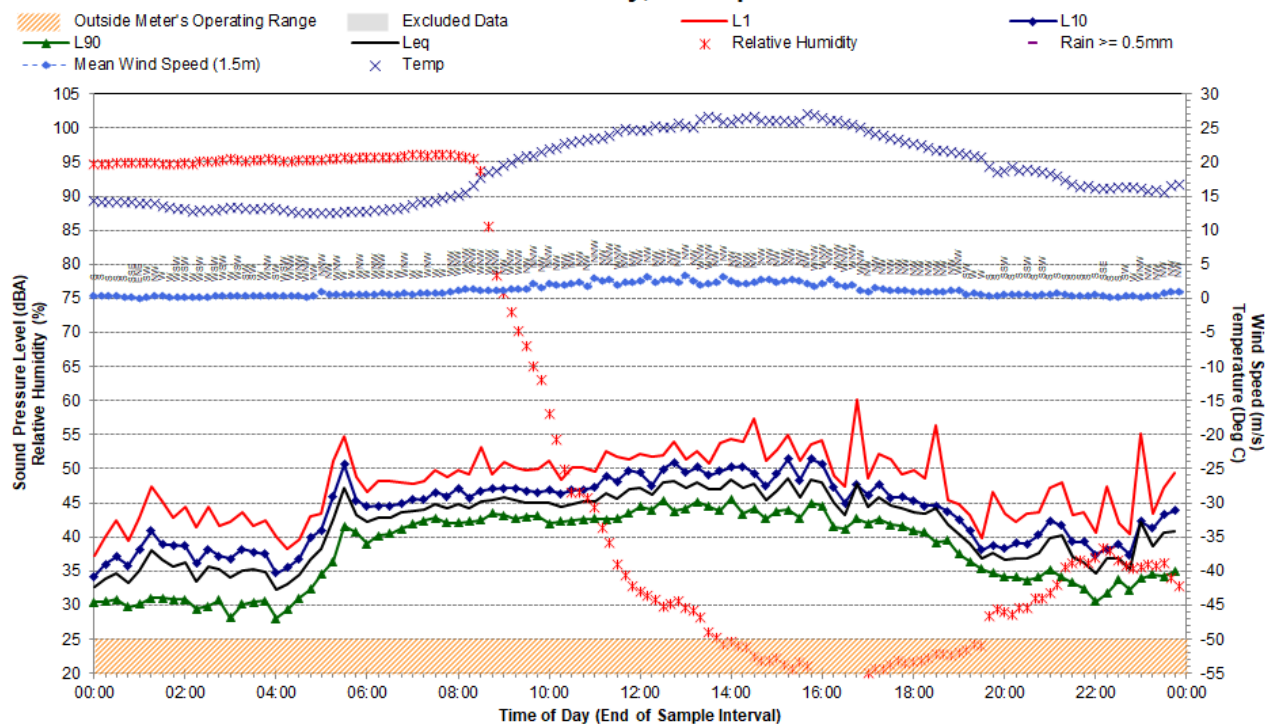
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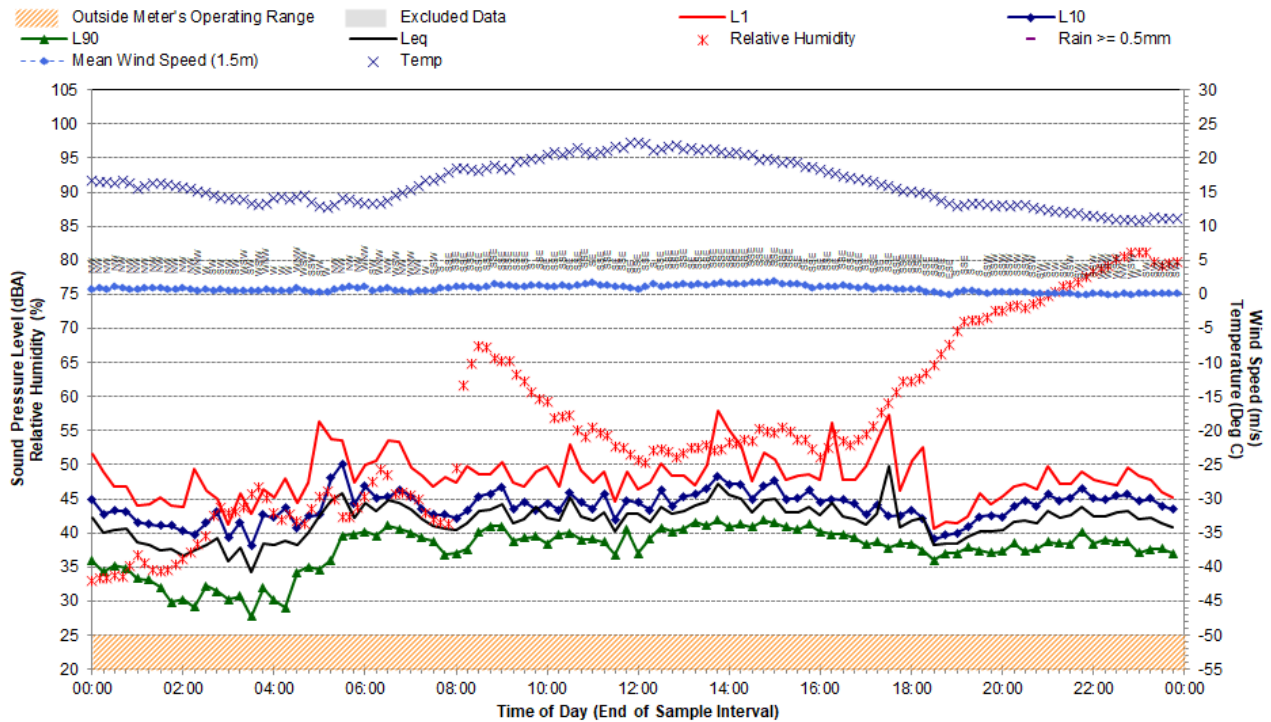
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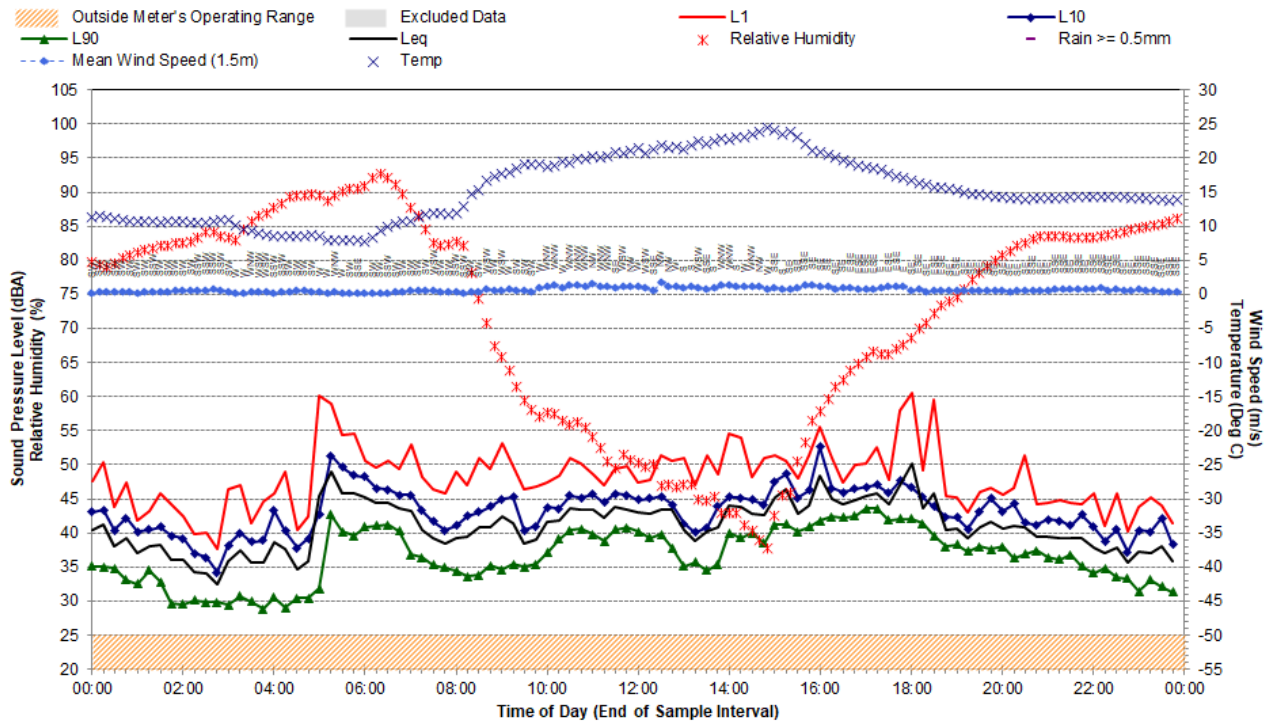
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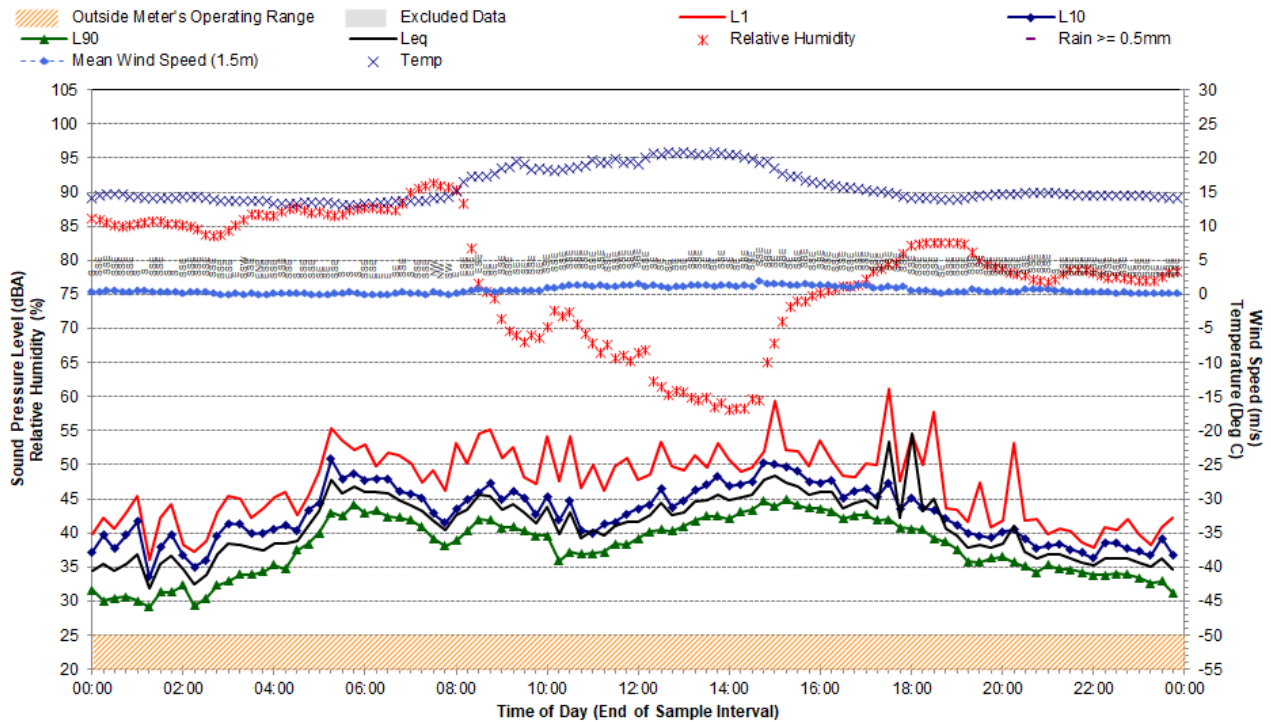
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Location J - Sunday, 29 September 2019



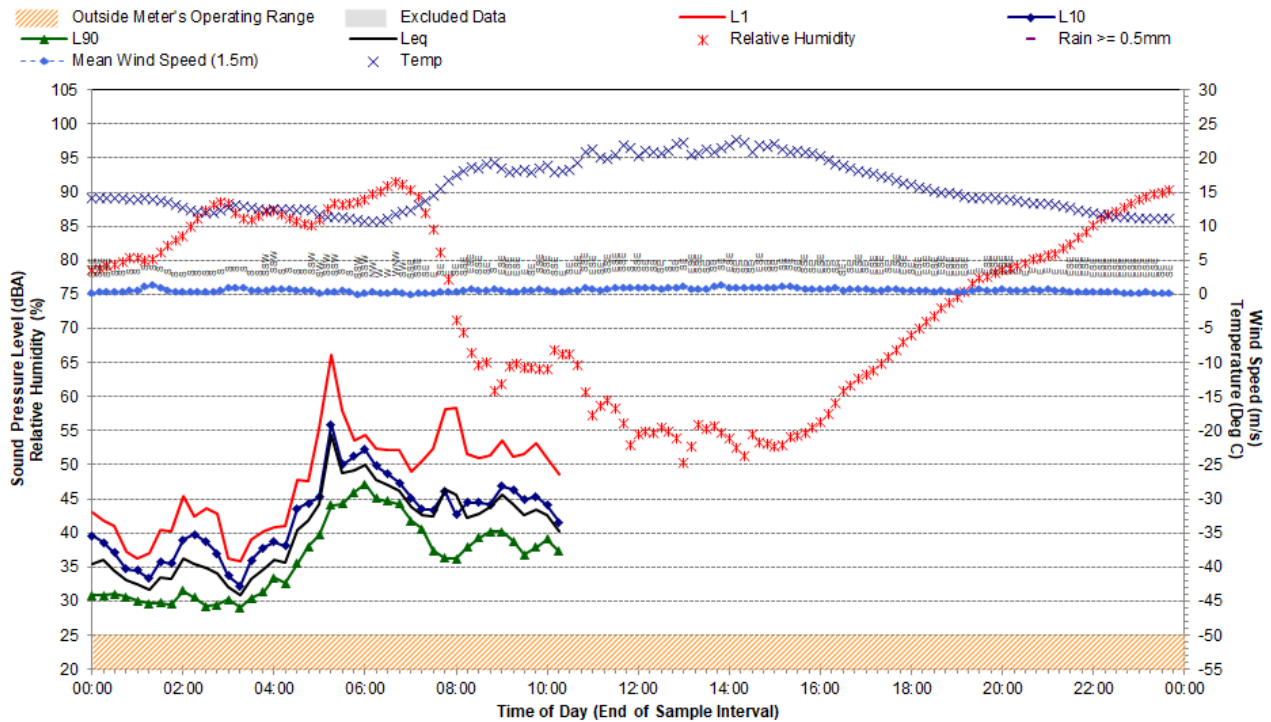
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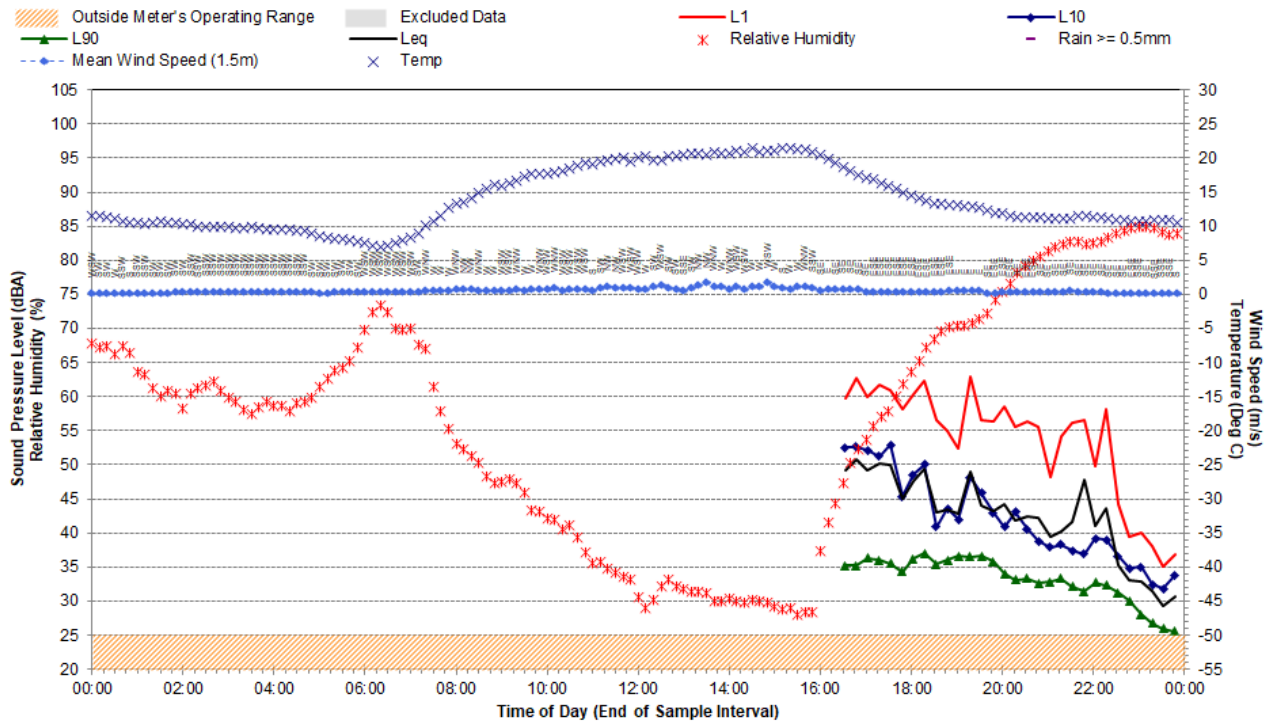
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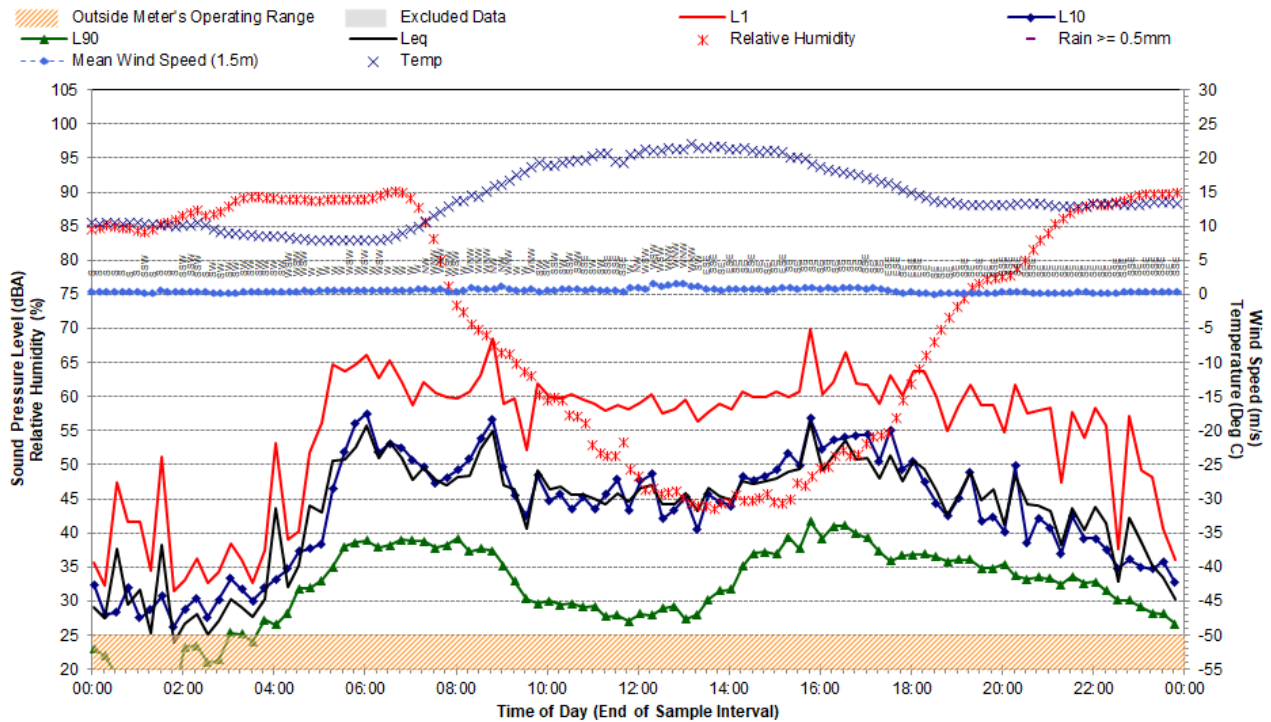
Statistical Ambient Noise Levels

Location L - Tuesday, 24 September 2019



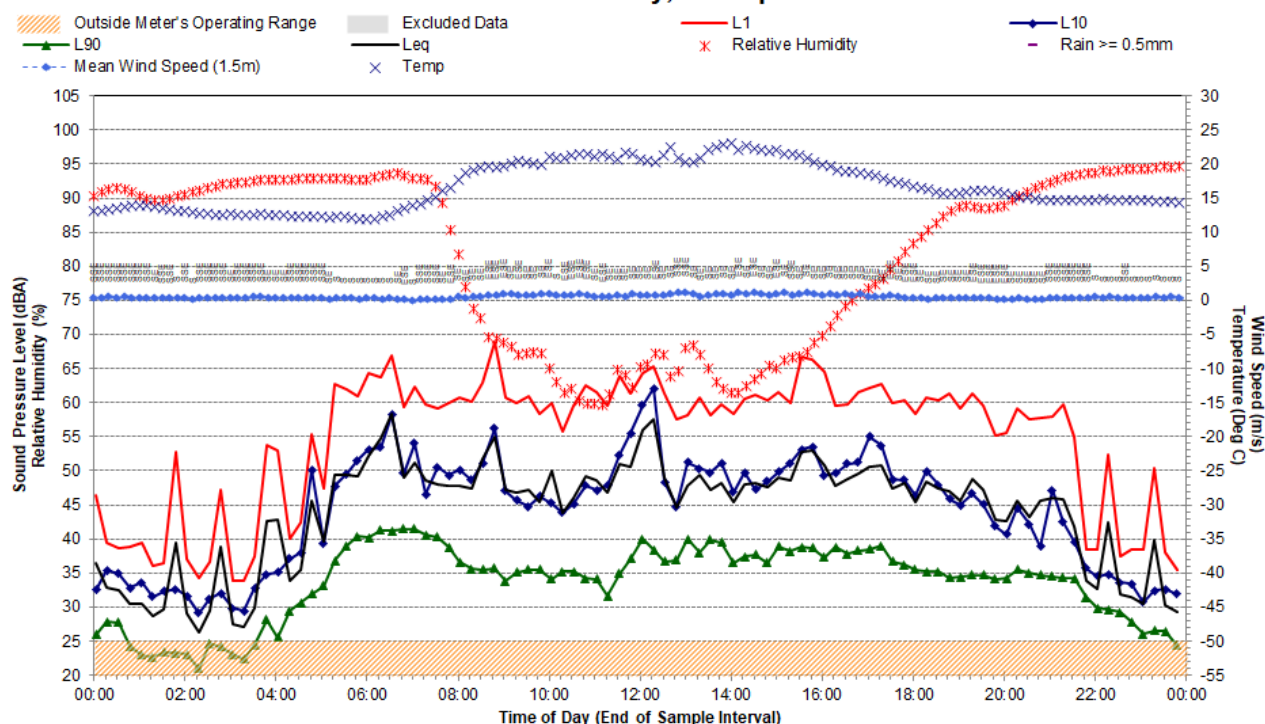
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Location L - Wednesday, 25 September 2019



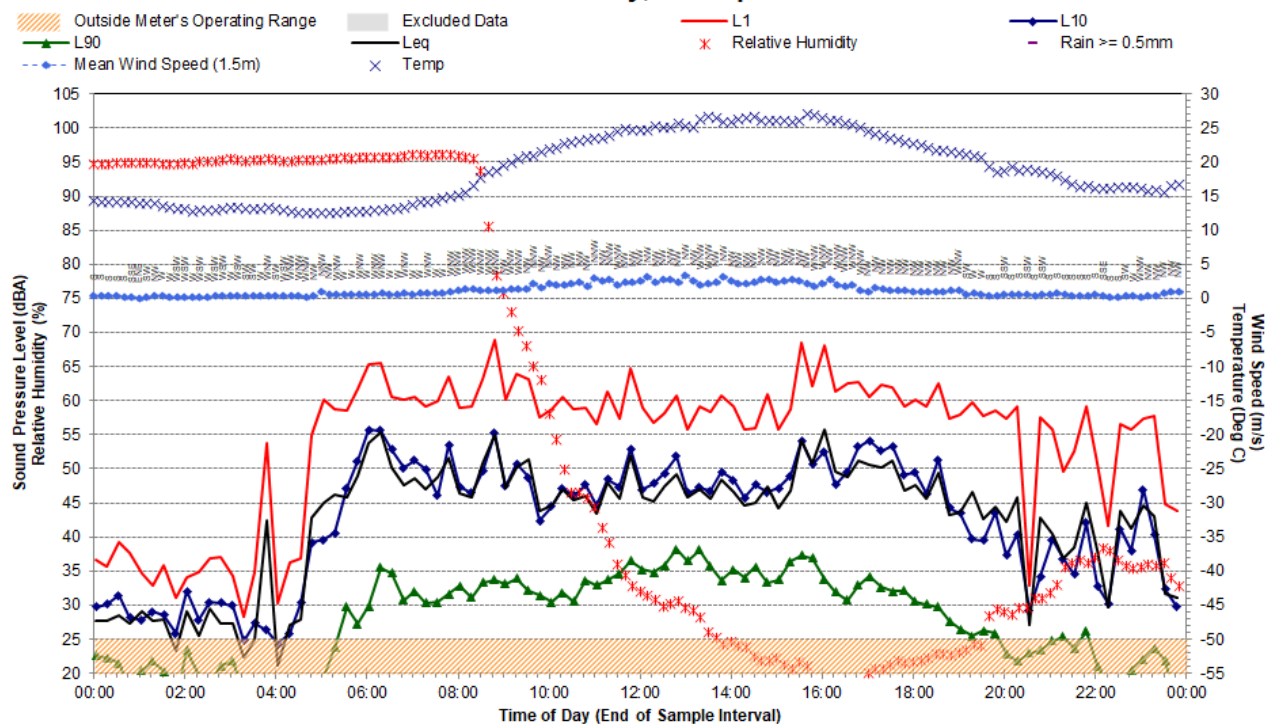
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Location L - Thursday, 26 September 2019



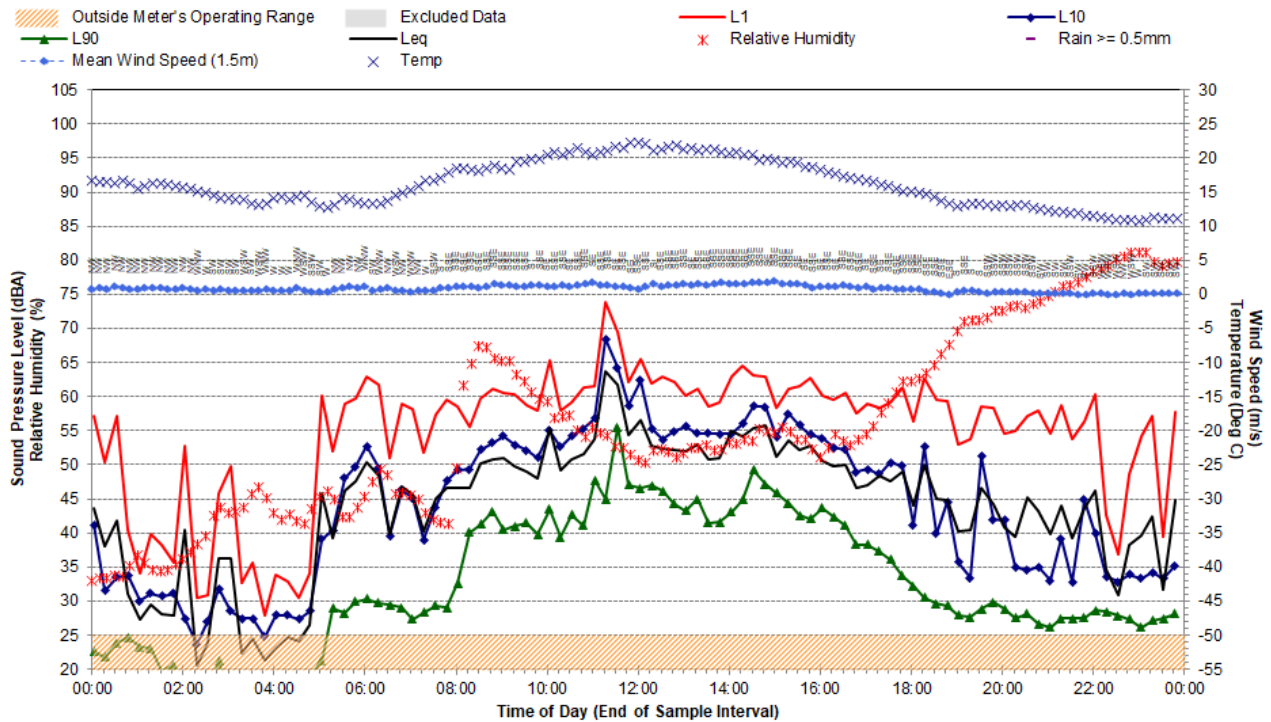
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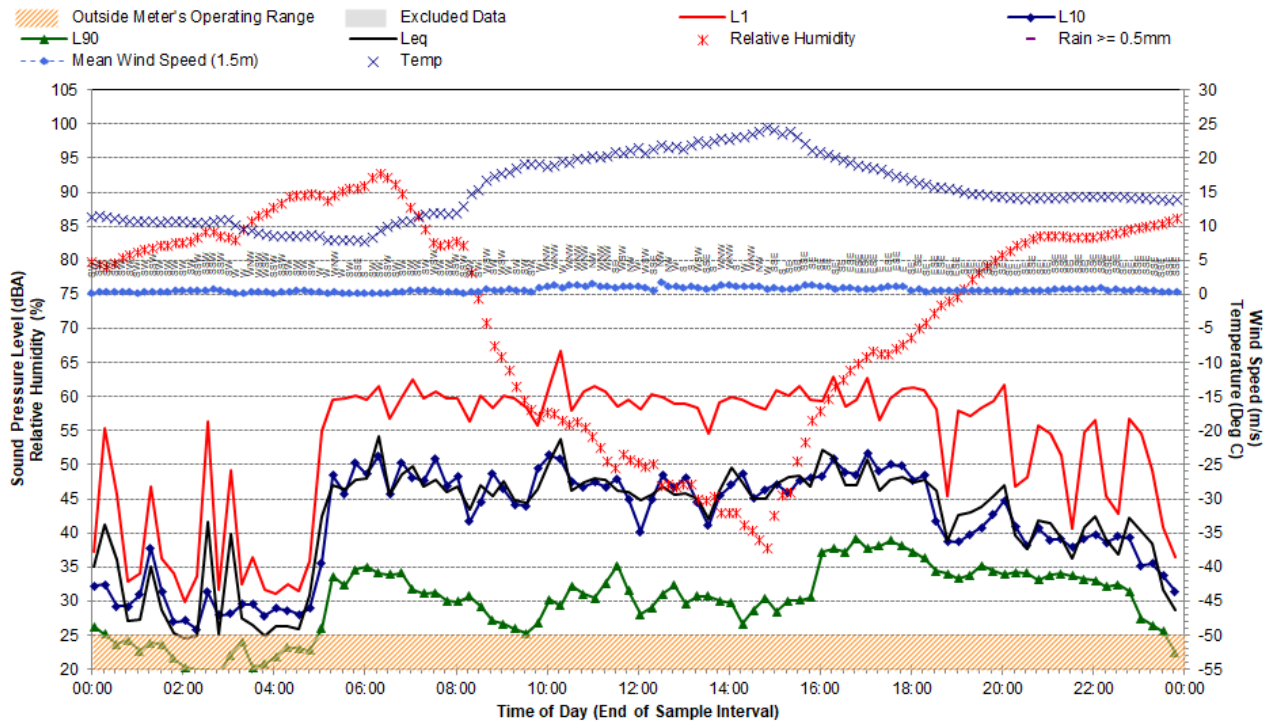
Statistical Ambient Noise Levels

Location L - Saturday, 28 September 2019



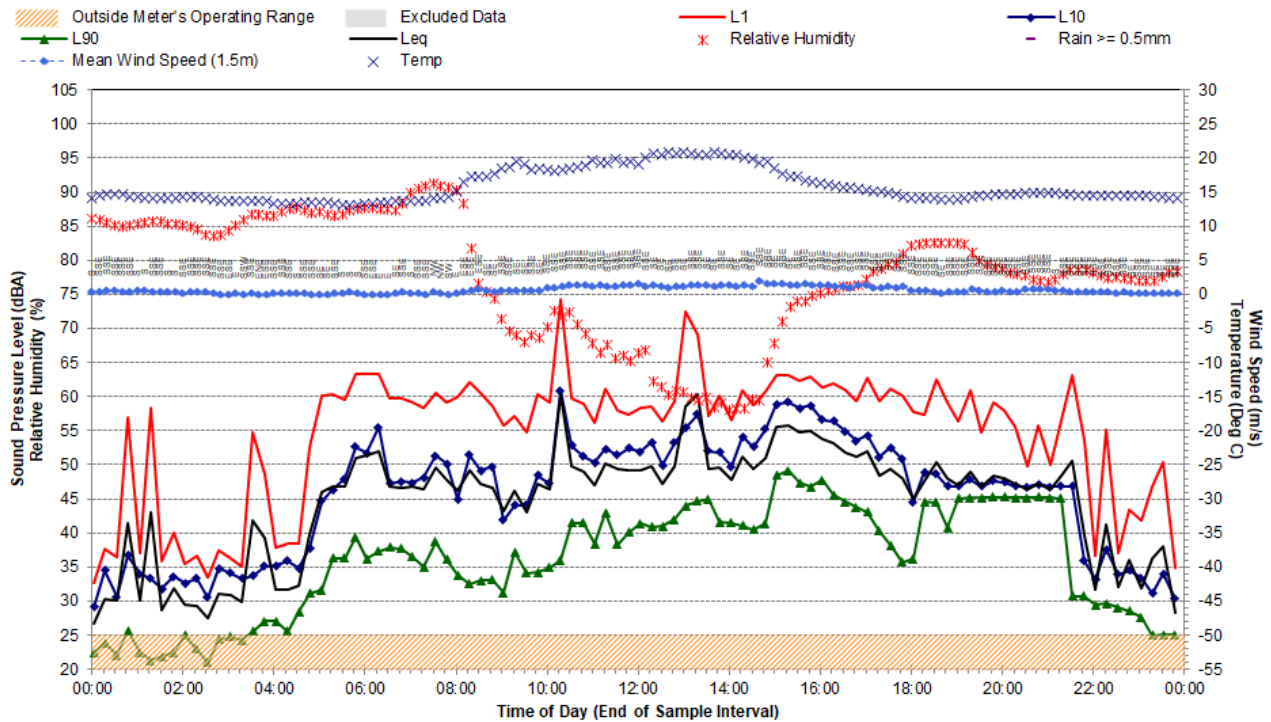
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Location L - Sunday, 29 September 2019



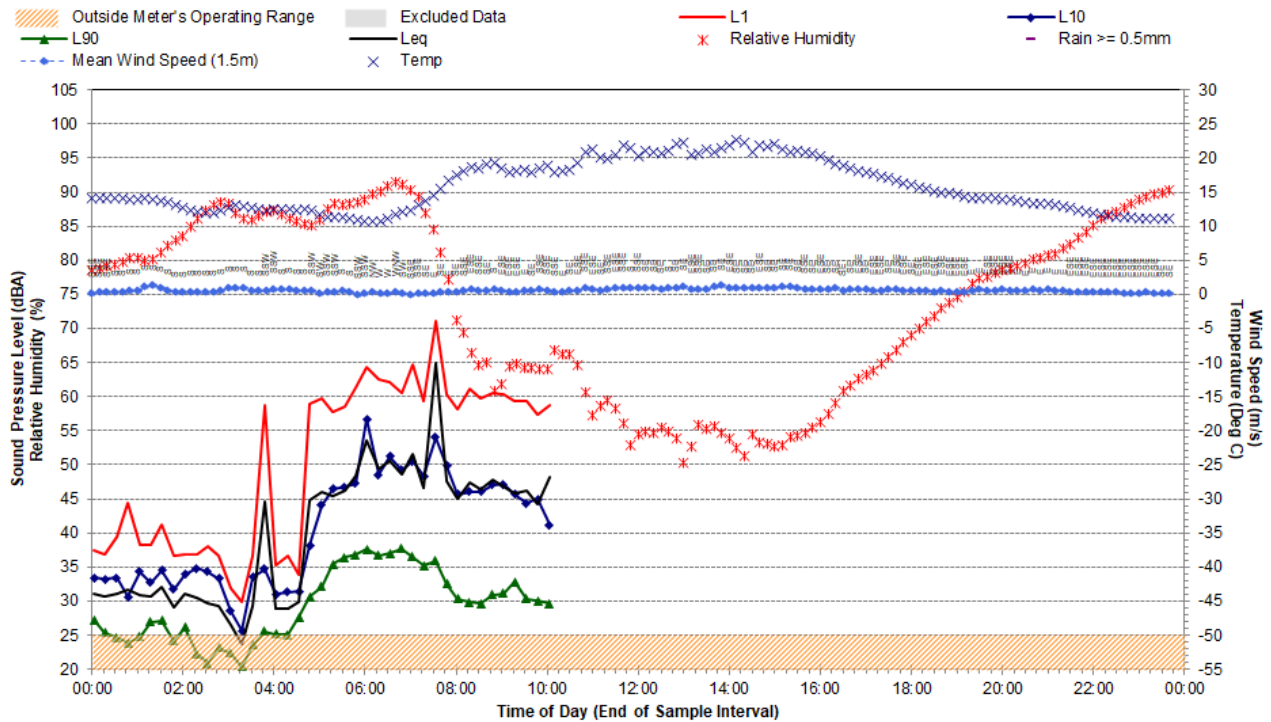
Statistical Ambient Noise Levels

Location L - Monday, 30 September 2019



Statistical Ambient Noise Levels

Location L - Tuesday, 1 October 2019



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DONALDSON AND ABEL COAL MINES

Quarterly Noise Monitoring
Quarter Ending December 2019

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

SLR Ref: Q75 630.01053-R01
Version No: -v1.0
February 2020



PREPARED BY

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BASIS OF REPORT

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

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

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
Q75 630.01053-R01-v1.0	24 February 2020	Martin Davenport	Jordan Murray	Martin Davenport

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1 Introduction

1.1 Background

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 during the December 2019 quarter in accordance with the Donaldson Coal Mine and Abel Underground Coal Mine - Noise Management Plan Care and Maintenance (the NMP) dated 3 June 2019.

1.2 Objectives of this Report

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

- Measure the ambient noise levels at six 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.

1.3 Acoustic Terminology

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

2 Development Consent Project Approval

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.

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 Bloomfield 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(15minute)	LAeq(15minute)	LAeq(15minute)	LA1(1minute)
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.
- 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. Appendix 4 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

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
		L _{Aeq} (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
	L _{Aeq} (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
	L _{Aeq} (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; Describe the proposed noise management system in detail; and
- c. 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:
 - o The effectiveness of the on-site noise management system; and
 - o 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), the NMP and AS 1055-2018 Acoustics - Description and Measurement of Environmental Noise.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of AS IEC 61672.1 – 2004 Electroacoustics—Sound level meters – Specifications, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the December 2019 quarter is provided in Appendix B.

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

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 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. Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the December 2019 noise monitoring period.

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	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	65 Tipperary Dr, Ashtonfield

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

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of a seven day period between Thursday 12 December 2019 and Friday 20 December 2019 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.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six 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 commenced on Thursday 19 December 2019 finishing on Friday 20 December 2019. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2270 (serial number 2679354).

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 (°C) 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.

Table 2 Location D, Black Hill Public School, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	20/12/2019 15:10 28°C 2.0 m/s ESE	81	70	53	41	57	Road traffic 49-81 Birds 43-60 Wind in trees 41-43 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 18:40 28°C 6 m/s S	72	65	60	52	57	Wind in trees 52-64 Road traffic 72 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	19/12/2019 22:50 23°C 3 m/s S	76	64	47	39	52	Insects/frogs 32-38 Road traffic 35-66 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

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

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	20/12/2019 15:30 28°C 1.8 m/s SE	73	66	55	45	54	Road traffic 45-73 Birdsong 39-49 Insects 35 Wind in trees 45-55 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 19:02 26°C 5 m/s SSE	72	65	60	52	57	Road traffic 72 Wind 52-64 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	19/12/2019 22:50 22°C 3 m/s S	66	60	50	35	48	Frogs/insects 40-46 Road traffic 41-66 Wind in trees 41 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

Table 4 Location G, Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmx	LA1	LA10	LA90	LAeq	
Day	20/12/2019 16:43 27°C 2.2 m/s SSE	74	58	54	46	51	Branch 74 Road traffic 42-52 Wind in trees 46-54 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 20:06 24°C 4 m/s S	64	63	58	47	55	Road traffic 40-57 Insects 50-64 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	19/12/2019 23:56 22°C 1.4 m/s S	45	41	39	33	36	Road traffic 35-45 Wind in trees 35 Insects 25-35 Other Industry 25-32 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmaz	LA1	LA10	LA90	LAeq	
Day	20/12/2019 17:30 25°C 1.8 m/s SSE	72	66	57	43	54	Road traffic 51-68 Birds 60-72 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 20:56 24°C 4 m/s S	72	62	48	40	50	Insects 32-38 Road Traffic 63-72 Wind in trees 40-45 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	20/12/2019 00:47 21°C 1.3 m/s S	56	47	38	33	37	Birdsong 56 Insects 30-52 Distant road traffic 30-47 Abel Mine Barely Audible
		Estimated Abel Mine Noise Contribution LAeq(15minute) <25 dB LA1(1minute) <25 dB					

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (L _{Amax} – dBA)
		L _{Amax}	L _{A1}	L _{A10}	L _{A90}	L _{Aeq}	
Day	20/12/2019 17:53 24°C 2 m/s SE	67	55	49	43	47	Road traffic 40-45 Wind in trees 40-54 Insects 36 Birds 50-67 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 21:35 23°C 3 m/s S	50	49	45	36	42	Wind in trees 38-48 Birdsong 50 Insects 47 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	19/12/2019 22:00 23°C 2.8 m/s S	52	45	42	35	39	Wind in trees 38-48 Birdsong 40-52 Insects 39 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					

1 Table 7 Location L, 65 Tipperary Dr, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmix	LA1	LA10	LA90	LAeq	
Day	20/12/2019 17:09 26C 1.8 m/s SE	73	68	51	38	54	Road traffic 45-73 Wind in trees 30-33 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	19/12/2019 20:34 24°C 3.3 m/s S	74	61	52	44	52	Wind in trees 44-52 Traffic 70-74 Abel Mine Inaudible
		Estimated Abel Mine Noise Contribution Inaudible					
Night	20/12/2019 00:23 14°C 0.5 m/s SSE	57	45	39	32	37	Insects 28-32 Birdsong 41-57 Road traffic 35-49 Abel Mine Audible CHPP operations 30-41
		Estimated Abel Mine Noise Contribution LAeq(15minute) 33 dB LA1(1minute) 41 dB					

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

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP and stockpile area was inaudible during all operator attended noise surveys with the exception of Location I and Location L during the night-time period. 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.

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 dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	Inaudible	Barely Audible <25	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	Inaudible	33	40	40	40	Yes	Yes	Yes

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 Bloomfield LA1(1minute) Contribution dBA	Consent Conditions LA1(1minute) dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Magnetic Drive, Ashtonfield	Barely Audible <25	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – 65 Tipperary Dr, Ashtonfield	41	47	Yes

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 Thursday 12 December 2019 and Friday 20 December 2019 at each of the six 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 16-203-525	12 December 2019 -20 December 2019
F – Black Hill Road, Black Hill	ARL EL-316 16-207-050	12 December 2019 -20 December 2019
G – Buchanan Road, Buchanan	SVAN 977 69756	12 December 2019 -20 December 2019
I – Magnetic Drive, Ashtonfield	ARL EL-316 16-103-494	12 December 2019 -20 December 2019
L – 65 Tipperary Dr, Ashtonfield	ARL EL-316 16-203-508	12 December 2019 -20 December 2019
J – Parish Drive, Thornton ¹	ARL EL-316 16-207-044	12 December 2019 -20 December 2019

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as Appendix C. A summary of the results of the unattended continuous noise monitoring is given in Table 11. Due to a technical issue no results are available for Location D.

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 Noise Policy for Industry (NPfI).

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 were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		LA1	LA10	LA90	LAeq
F Lot 684 Black Hill Road, Black Hill	Day	79	63	49	66
	Evening	74	60	43	63
	Night	65	57	35	59
G 156 Buchanan Road, Buchanan	Day	58	52	39	53
	Evening	50	46	35	50
	Night	45	41	28	43
I 49 Magnetic Drive, Ashtonfield	Day	68	58	42	57
	Evening	64	53	39	53
	Night	48	42	30	49
L 65 Tipperary Dr, Ashtonfield	Day	60	49	33	52
	Evening	58	48	33	54
	Night	50	45	28	45
J 220 Parish Drive, Thornton	Day	53	48	39	47
	Evening	49	44	38	47
	Night	44	38	29	42

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 LA90 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

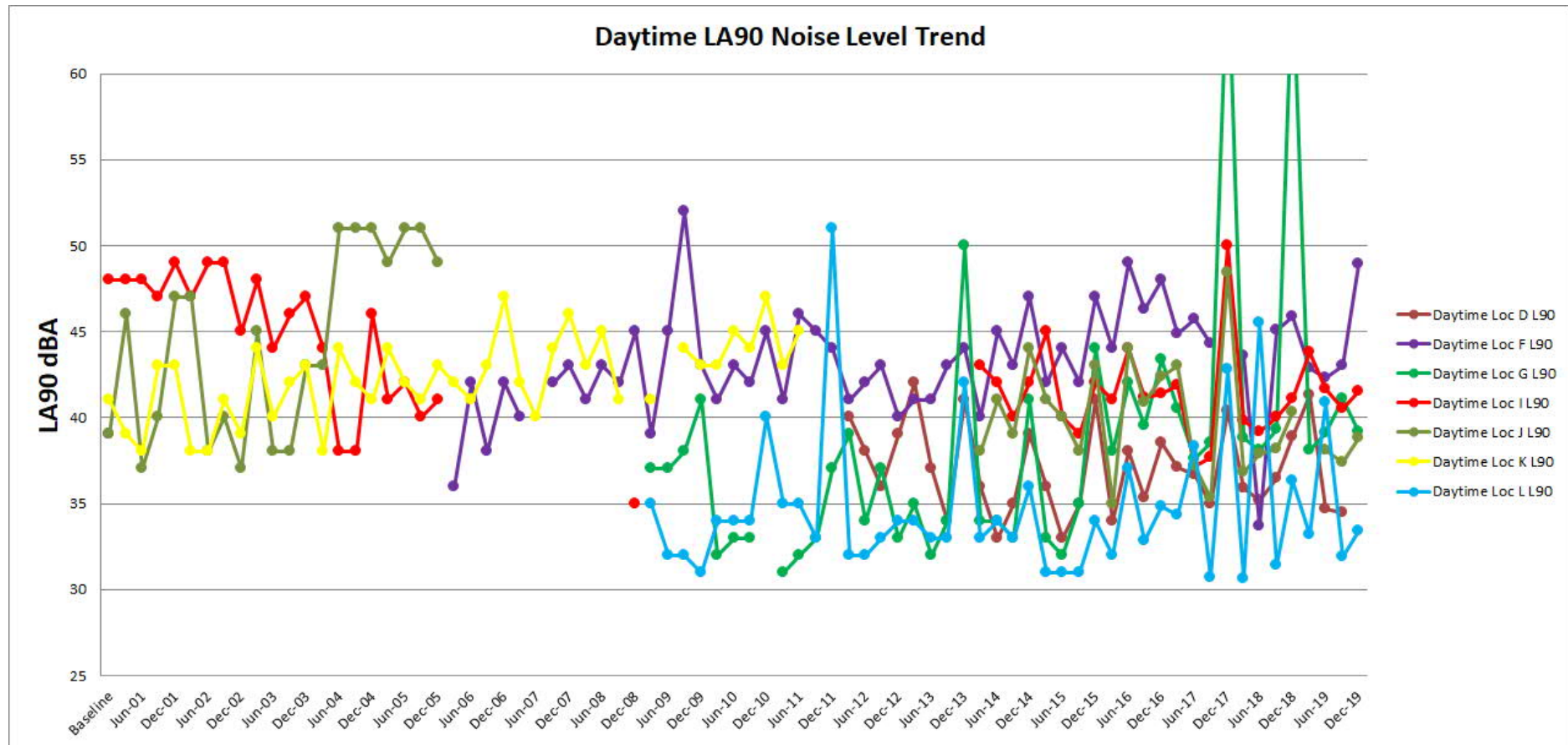


Figure 2 Long term Evening LA90 Noise Levels

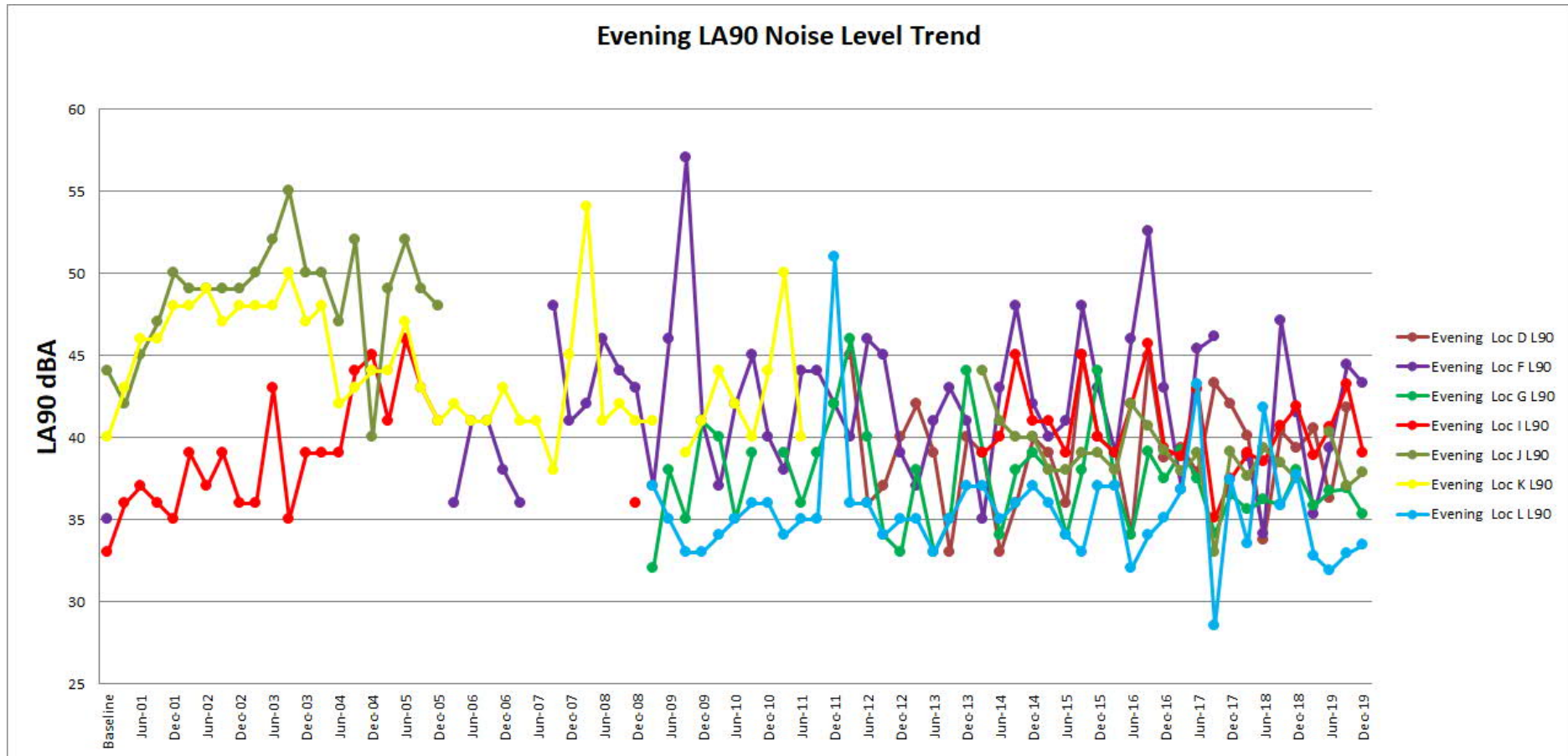
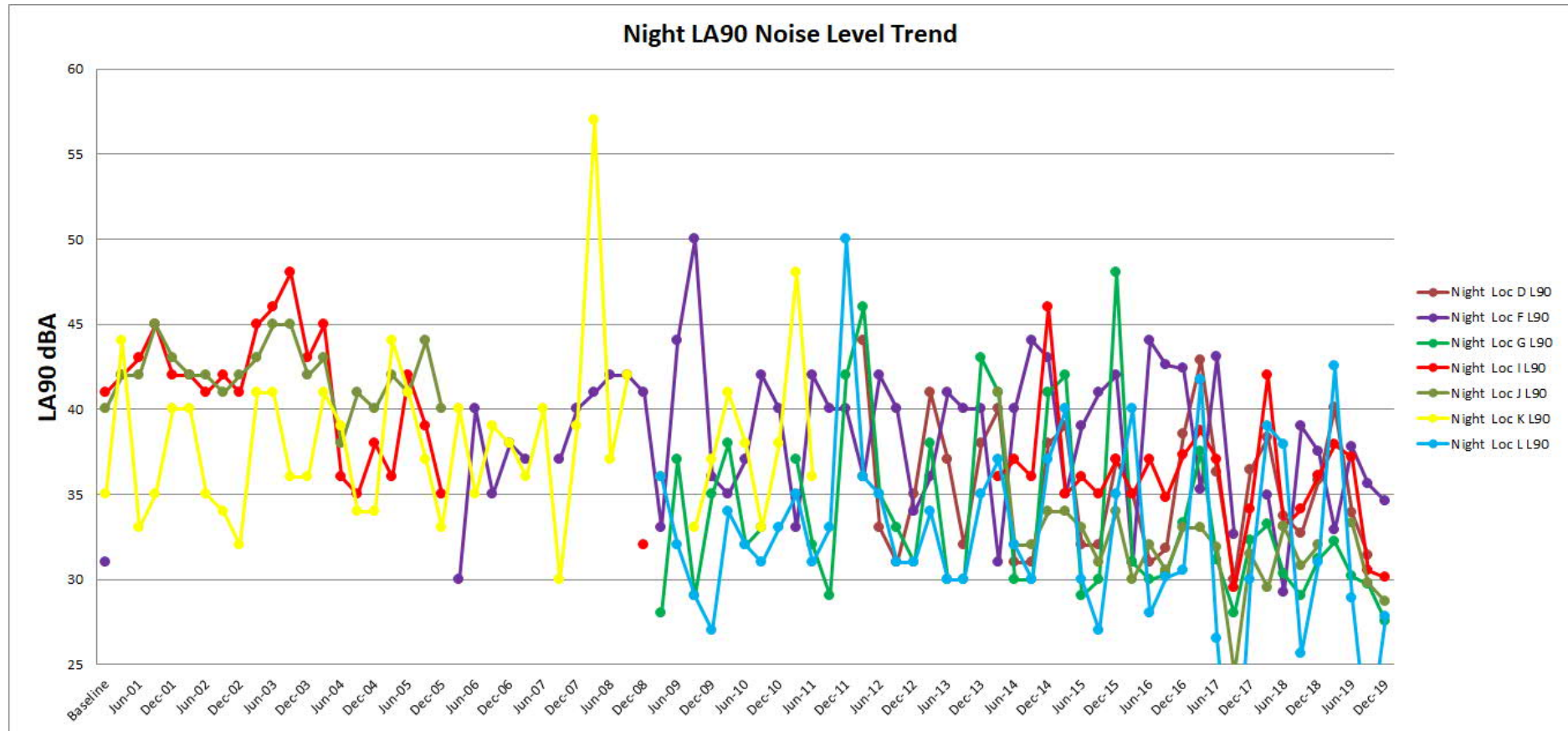


Figure 3 Long term Night-time LA90 Noise Levels



5.2.1.1 Baseline

The summary of results in Table 12 shows the ambient LA90 noise levels recorded for the current monitoring period 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 ¹	Long term Night-time LA90 Noise Levels		Difference dB ³
		Baseline	December 2019	
D Black Hill School, Black Hill	Day	N/A ²	No result	N/A ²
	Evening	N/A ²	No result	N/A ²
	Night	N/A ²	No result	N/A ²
F Lot 684 Black Hill Road, Black Hill	Day	39	49	10
	Evening	35	43	8
	Night	31	35	4
G 156 Buchanan Road, Buchanan	Day	N/A ²	39	N/A ²
	Evening	N/A ²	35	N/A ²
	Night	N/A ²	28	N/A ²
I 49 Magnetic Drive, Ashtonfield	Day	48	42	-7
	Evening	33	39	6
	Night	41	30	-11
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	33	N/A ²
	Evening	N/A ²	33	N/A ²
	Night	N/A ²	28	N/A ²
J 220 Parish Drive, Thornton	Day	39	39	0
	Evening	44	38	-6
	Night	40	29	-11

Note 1: Periods are as detailed the NPfI 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA ₉₀ Noise Levels		Difference dB ²
		September 2019	December 2019	
D Black Hill School, Black Hill	Day	35	No result	-
	Evening	42	No result	-
	Night	31	No result	-
F Lot 684 Black Hill Road, Black Hill	Day	43	49	6
	Evening	44	43	-1
	Night	36	35	-1
G 156 Buchanan Road, Buchanan	Day	41	39	-2
	Evening	37	35	-2
	Night	30	28	-2
I 49 Magnetic Drive, Ashtonfield	Day	41	42	1
	Evening	43	39	-4
	Night	31	30	0
L 65 Tipperary Drive, Ashtonfield	Day	32	33	2
	Evening	33	33	1
	Night	20	28	8
J 220 Parish Drive, Thornton	Day	37	39	1
	Evening	37	38	1
	Night	30	29	-1

Note 1: 1. 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period Last Year

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

Monitoring Location	Period ¹	Long term Night-time LA ₉₀ Noise Levels		Difference dB ²
		December 2018	December 2019	
D Black Hill School, Black Hill	Day	39	No result	-
	Evening	39	No result	-
	Night	36	No result	-1
F Lot 684 Black Hill Road, Black Hill	Day	46	49	3
	Evening	42	43	2
	Night	38	35	-3
G 156 Buchanan Road, Buchanan	Day	66	39	-27
	Evening	38	35	-3
	Night	31	28	-4
I 49 Magnetic Drive, Ashtonfield	Day	41	42	0
	Evening	42	39	-3
	Night	36	30	-6
L 65 Tipperary Drive, Ashtonfield	Day	36	33	-3
	Evening	38	33	-4
	Night	31	28	-3
J 220 Parish Drive, Thornton	Day	40	39	-2
	Evening	38	38	0
	Night	32	29	-3

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient LA₁₀ Noise Comparison

The long term ambient LA₁₀ 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 respectively.

Figure 4 Long term Daytime LA₁₀ Noise Levels

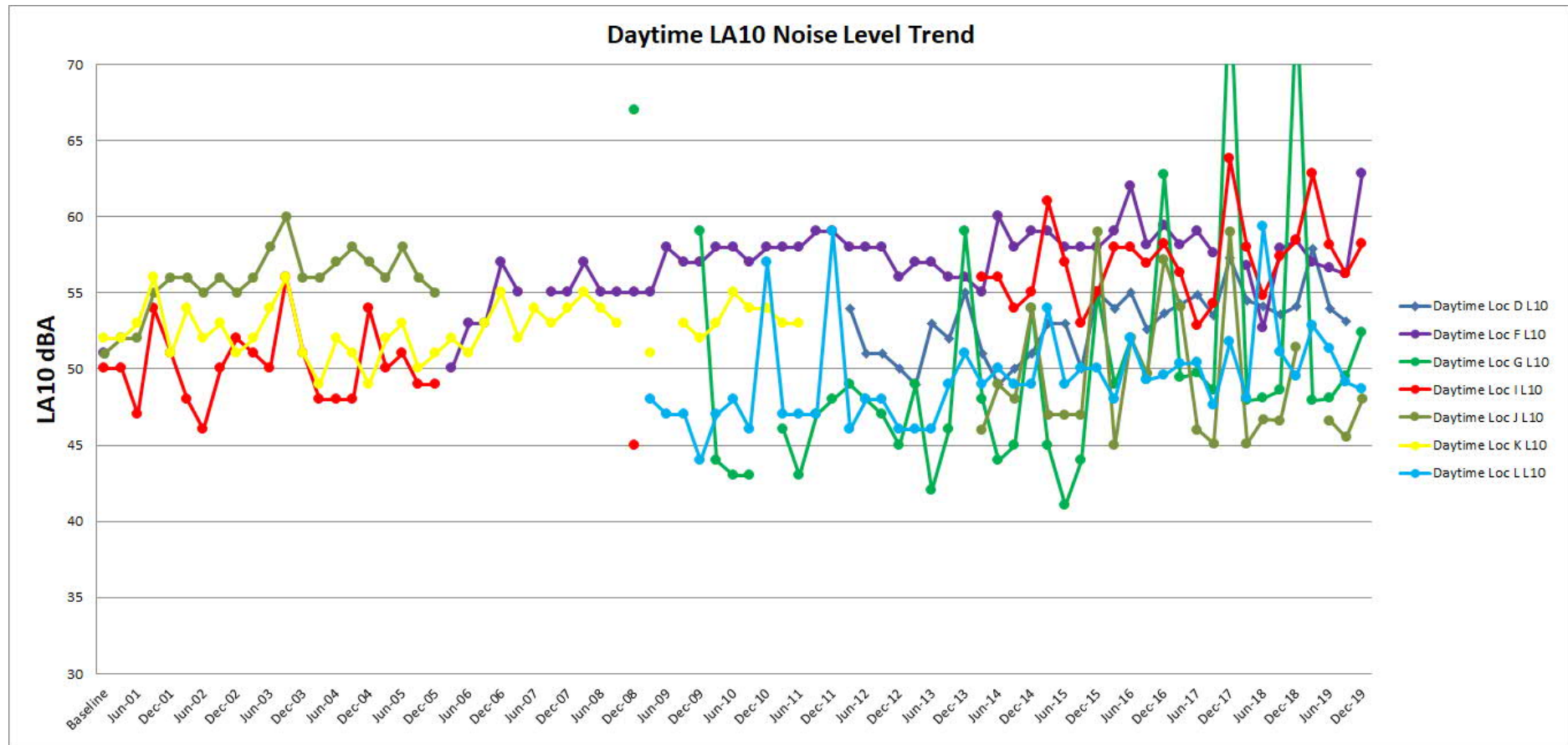


Figure 5 Long term Evening LA10 Noise Levels

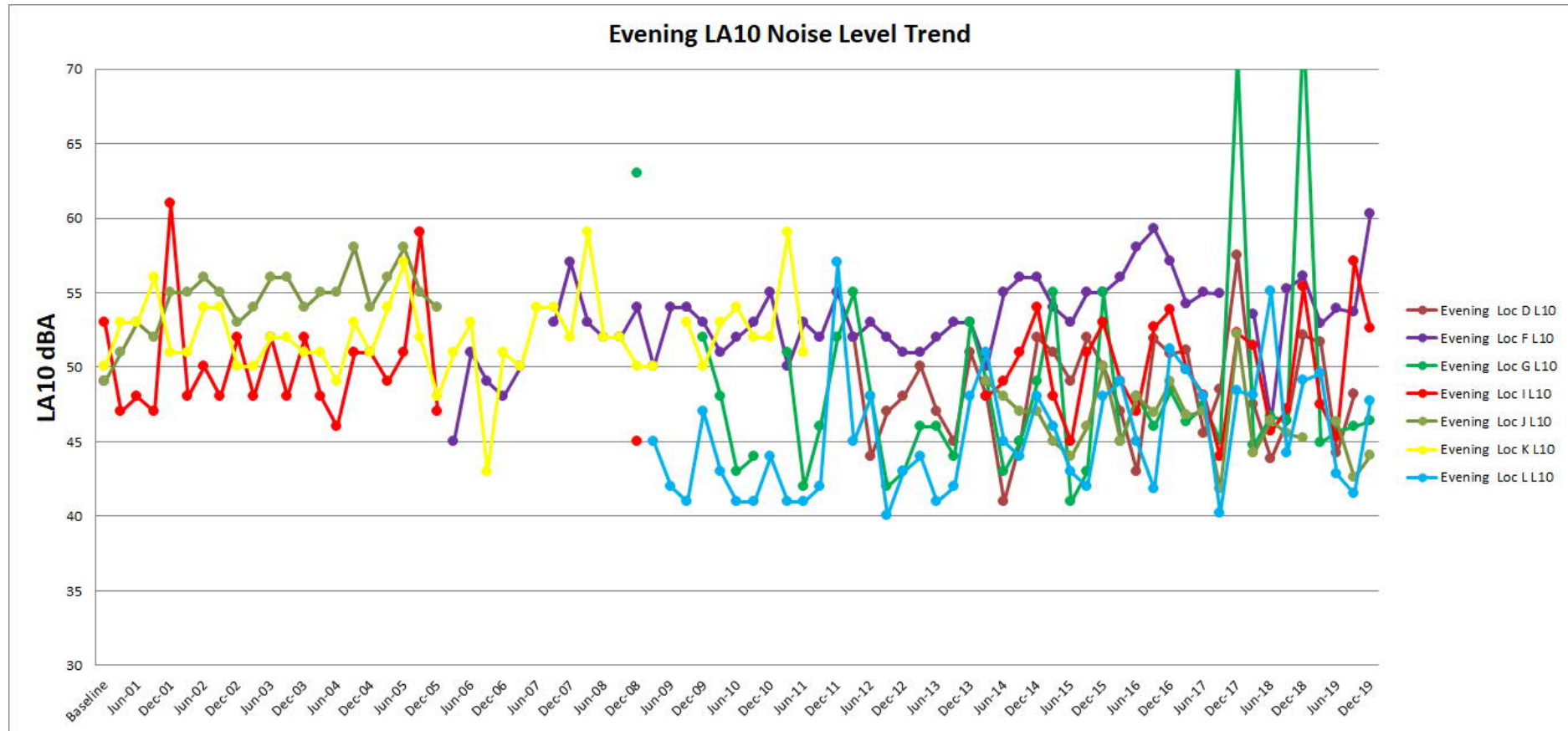
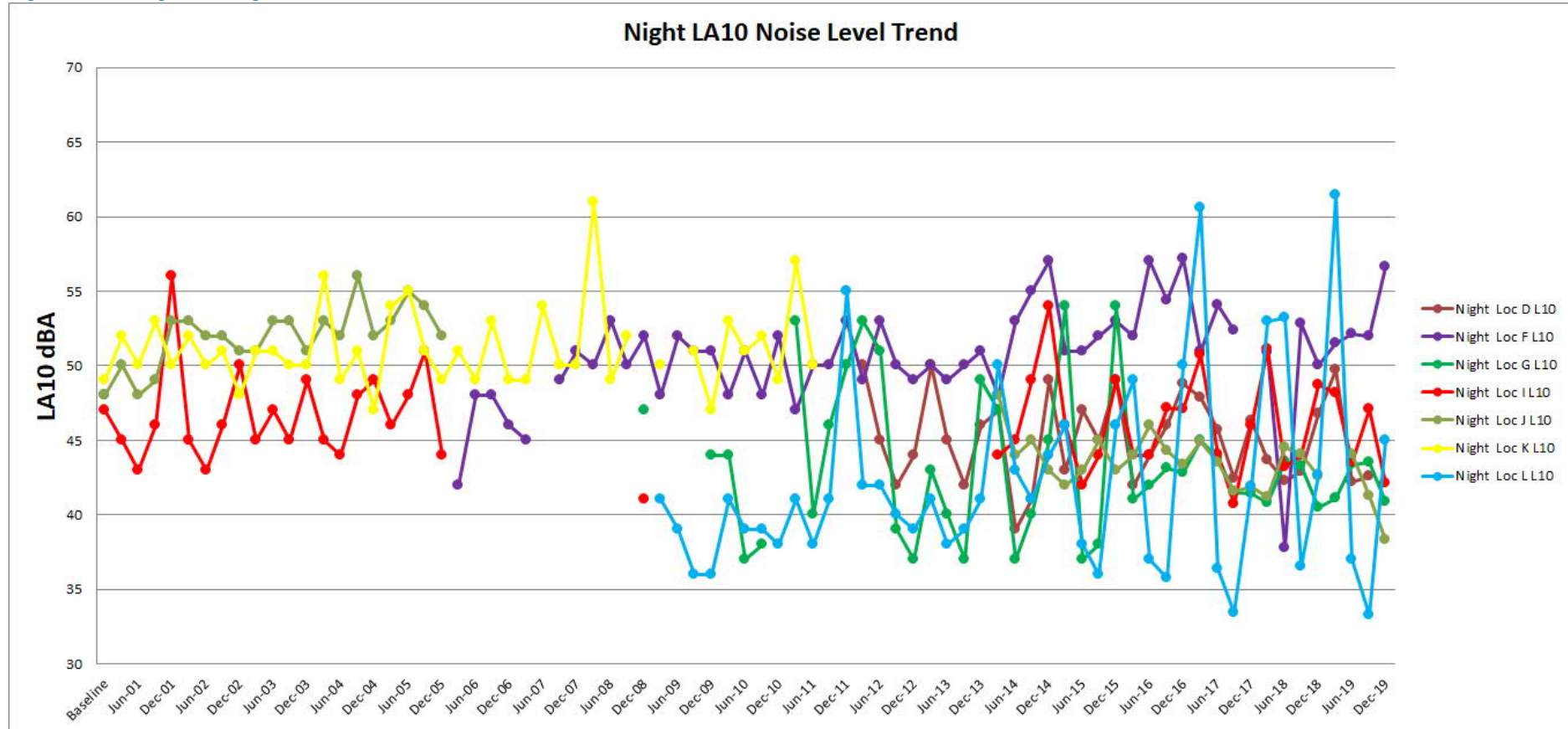


Figure 6 Long term Night LA₁₀ Noise Levels



Baseline

Table 15 presents the ambient LA₁₀ noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 LA10 Results Comparison – Baseline

Monitoring Location	Period ¹	Long term Night-time LA10 Noise Levels		Difference dB ³
		Baseline	December 2019	
D Black Hill School, Black Hill	Day	N/A ²	No result	N/A
	Evening	N/A ²	No result	N/A
	Night	N/A ²	No result	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	63	12
	Evening	49	60	11
	Night	48	57	9
G 156 Buchanan Road, Buchanan	Day	N/A ²	52	N/A
	Evening	N/A ²	46	N/A
	Night	N/A ²	41	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	58	8
	Evening	53	53	0
	Night	47	42	-5
L 65 Tipperary Drive, Ashtonfield	Day	N/A ²	49	N/A
	Evening	N/A ²	48	N/A
	Night	N/A ²	45	N/A
J 220 Parish Drive, Thornton	Day	51	48	-3
	Evening	49	44	-5
	Night	48	38	-10

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Quarter

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

Monitoring Location	Period ¹	Long term Night-time LA ₁₀ Noise Levels		Difference dB ²
		September 2019	December 2019	
D Black Hill School, Black Hill	Day	53	No result	-
	Evening	48	No result	-
	Night	43	No result	-
F Lot 684 Black Hill Road, Black Hill	Day	56	63	7
	Evening	54	60	7
	Night	52	57	5
G 156 Buchanan Road, Buchanan	Day	50	52	3
	Evening	46	46	0
	Night	44	41	-3
I 49 Magnetic Drive, Ashtonfield	Day	56	58	2
	Evening	57	53	-5
	Night	47	42	-5
L 65 Tipperary Drive, Ashtonfield	Day	49	49	0
	Evening	42	48	6
	Night	33	45	12
J 220 Parish Drive, Thornton	Day	46	48	3
	Evening	43	44	2
	Night	41	38	-3

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

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 Result Comparison – Coinciding Period Last Year

Monitoring Location	Period ¹	Long term Night-time LA ₁₀ Noise Levels		Difference dB ²
		December 2018	December 2019	
D Black Hill School, Black Hill	Day	54	No result	-
	Evening	52	No result	-
	Night	47	No result	-
F Lot 684 Black Hill Road, Black Hill	Day	58	63	4
	Evening	56	60	4
	Night	50	57	7
G 156 Buchanan Road, Buchanan	Day	74	52	-22
	Evening	73	46	-27
	Night	41	41	0
I 49 Magnetic Drive, Ashtonfield	Day	58	58	0
	Evening	55	53	-3
	Night	49	42	-7
L 65 Tipperary Dr, Ashtonfield	Day	50	49	-1
	Evening	49	48	-1
	Night	43	45	2
J 220 Parish Drive, Thornton	Day	51	48	-3
	Evening	45	44	-1
	Night	43	38	-4

Note 1: 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 to 10.00 pm; Night - 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.3 Rail Noise Monitoring

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J, however no train movements occurred during the monitoring period.

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 NMP, dated 3 June 2019.

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.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the December 2019 quarter at six focus locations surrounding the mine.

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

A comparison of ambient LA10 and LA90 noise levels recorded during the current monitoring period (December 2019), the baseline monitoring period, the last monitoring period (September 2019), and the coinciding monitoring period from last year (December 2018) has been conducted.

No rail movements occurred on the Bloomfield Rail Spur during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being 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 LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-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 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB 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	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	
90	Construction site with pneumatic hammering	Very noisy
80	Kerbside of busy street	
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	
30	Inside bedroom	Quiet to very quiet
20	Recording studio	

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

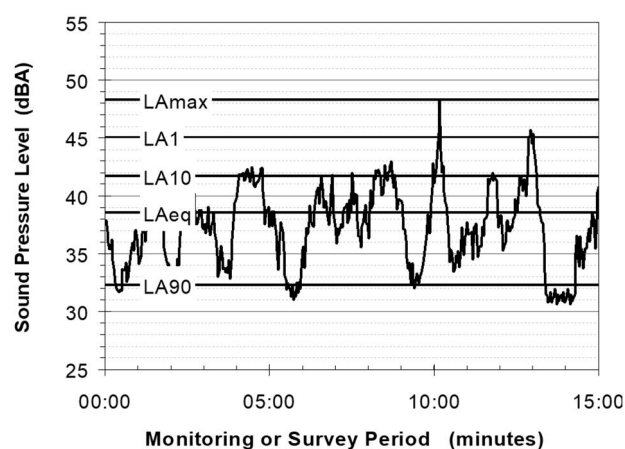
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of 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 LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 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:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 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.

LAeq 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.

5. Frequency Analysis

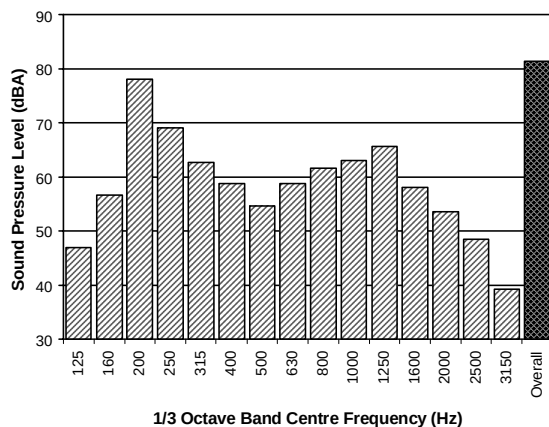
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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 (three 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.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. 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 (ie vertical, longitudinal 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 $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

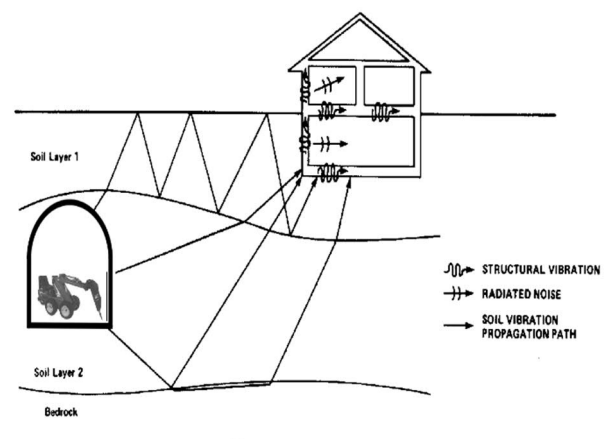
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience 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.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This 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 ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.

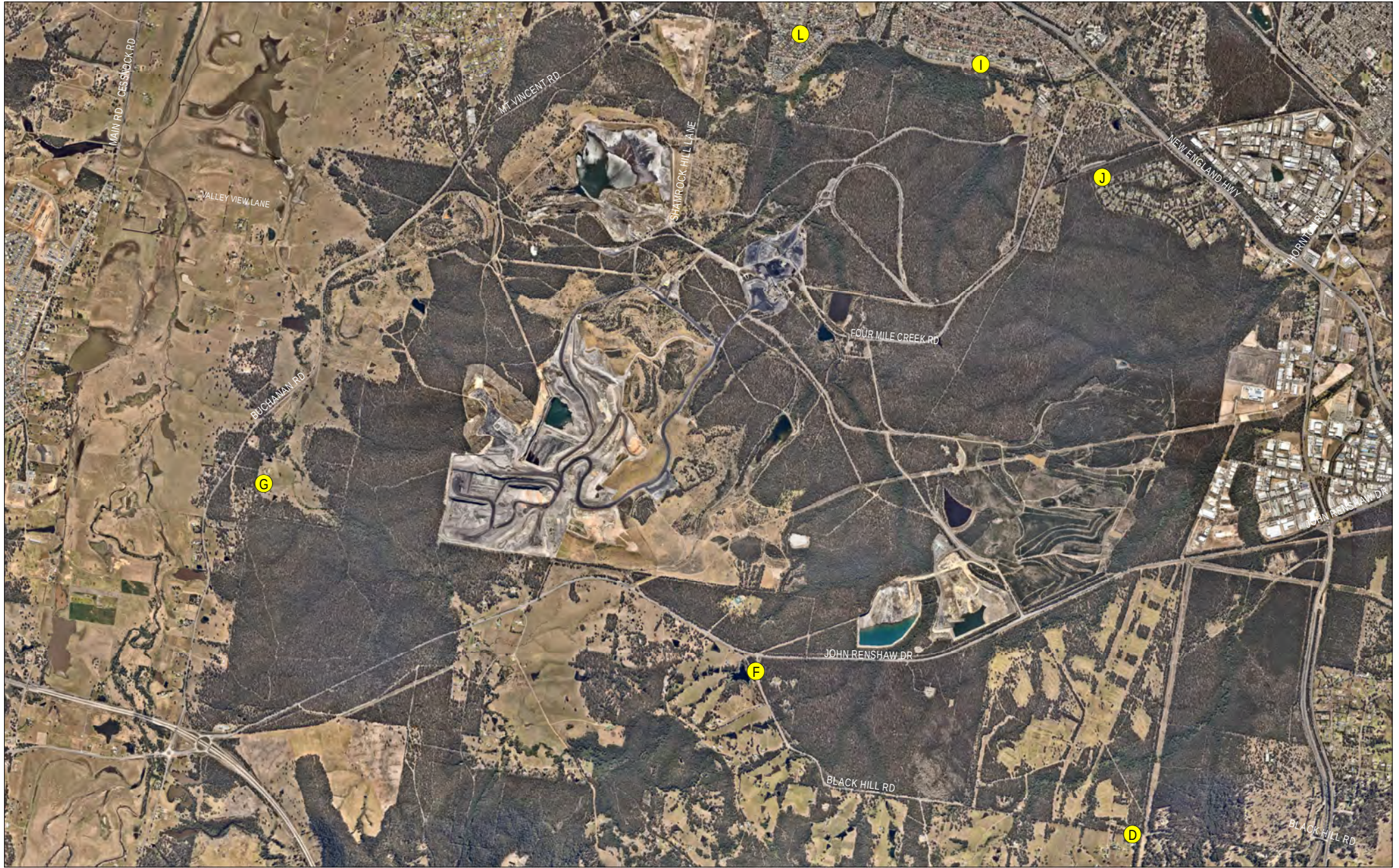


The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Locations

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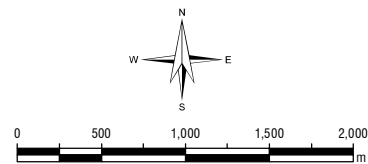
10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

The content contained within this document may be based on third party data.
SLR Consulting Australia Pty Ltd does not guarantee the accuracy of such information.

Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

 Noise Monitoring Locations



Donaldson Coal

Noise Monitoring

Noise Monitoring Locations

APPENDIX B

APPENDIX C

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 25532 & FILT 5408**

Equipment Description: Sound Level Meter

Manufacturer: B & K

Model No: 2270 **Serial No:** 2679354

Microphone Type: 4189 **Serial No:** 2695417

Preamplifier Type: ZC0032 **Serial No:** 12254

Filter Type: 1/3 Octave **Serial No:** 2679354

Comments: All tests passed for class 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 998 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 26% $\pm 5\%$

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

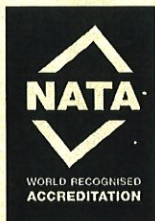
Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: *AKB*

AUTHORISED SIGNATURE:

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.



ACU-VIB
ELECTRONICS

HEAD OFFICE

Unit 14, 22 Hudson Ave. Castle Hill NSW 2154

Tel: (02) 96808133 Fax: (02) 96808233

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web site: www.acu-vib.com.au

Accredited Lab. No. 9262
Acoustic and Vibration
Measurements

Page 1 of 2
AVCERT10 Rev. 1.3 15.05.18

CERTIFICATE NO.: SLM 25532 & FILT 5408

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	Clause	Result
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

Checked by: *KB*

Accredited for compliance with ISO/IEC 17025 - Calibration
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web site: www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE No: **25534**

EQUIPMENT TESTED: 1/2" Microphone

Manufacturer: B & K

Type No: 4197

Serial No: 3077697 (Part 2)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Tests Performed: Acoustic Microphone Frequency
Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure: 997 hPa ± 1.5 hPa **Relative Humidity:** 24 % ± 5 %

Temperature: 23 °C $\pm 2^\circ$ C

Date of Calibration: 09/09/2019

Issue Date 09/09/2019

Acu-Vib Test Procedure: AVP05 (Microphone Acoustic Frequency
Response)

CHECKED BY: *IKB* **AUTHORISED SIGNATURE:** *Jack Keelt*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the
Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of
approximately 95%.



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Mobile: 0413 809806
Web site: www.acu-vib.com.au

Acoustic Tests, Microphone response

Job No: 13678

Test No: 255334

Microphone type: B&K 4197

Serial No.: 3077697 (Part 2)

Preamplifier type: 2683

Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE

Serial No: 4396

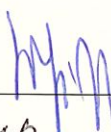
Ambient Temperature: 23C $\pm$ 2° C, Relative Humidity: 997 RH $\pm$ 5% RH,Ambient Pressure: 24 hPa $\pm$ 1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	$\pm$ 3.0 dB	$\pm$ 1.5 dB dB	0.12	P
63 Hz	-0.01dB	$\pm$ 2.0 dB	$\pm$ 1.5 dB dB	0.10	P
125 Hz	-0.08dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
250 Hz	-0.15dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
500 Hz	-0.14dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
2 kHz	0.05dB	$\pm$ 2.0 dB	$\pm$ 1.0 dB dB	0.07	P
4 kHz	-0.25dB	$\pm$ 3.0 dB	$\pm$ 1.0 dB dB	0.13	P
8 kHz	-0.21dB	$\pm$ 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.10dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.61dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer)




Date:09/09/2019

Checked by:

Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE No: 25533

EQUIPMENT TESTED: 1/2" Microphone

Manufacturer: B & K

Type No: 4197

Serial No: 3077697 (Part 1)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Tests Performed: Acoustic Microphone Frequency
Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure: 997 hPa ± 1.5 hPa **Relative Humidity:** 24% $\pm 5\%$

Temperature: 23 $^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Date of Calibration: 09/09/2019

Issue Date 09/09/2019

Acu-Vib Test Procedure: AVP05 (Microphone Acoustic Frequency
Response)

CHECKED BY: *RKB*

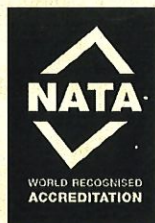
AUTHORISED SIGNATURE:

Jack Rielt

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



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Mobile: 0413 809806
Web site: www.acu-vib.com.au

Acoustic Tests, Microphone response

Job No: 13678

Test No: 25533

Microphone type: B&K 4197

Serial No.: 3077697 (Part 1)

Preamplifier type: 2683

Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE

Serial No: 4396

Ambient Temperature: 23C $\pm$ 2° C, Relative Humidity: 99% RH $\pm$ 5% RH,Ambient Pressure: 24 hPa $\pm$ 1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	$\pm$ 3.0 dB	$\pm$ 1.5 dB dB	0.12	P
63 Hz	-0.11dB	$\pm$ 2.0 dB	$\pm$ 1.5 dB dB	0.10	P
125 Hz	-0.18dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
250 Hz	-0.25dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
500 Hz	-0.24dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	$\pm$ 1.5 dB	$\pm$ 1.0 dB dB	0.09	P
2 kHz	0.05dB	$\pm$ 2.0 dB	$\pm$ 1.0 dB dB	0.07	P
4 kHz	-0.25dB	$\pm$ 3.0 dB	$\pm$ 1.0 dB dB	0.13	P
8 kHz	-0.31dB	$\pm$ 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.20dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.51dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer)



Date:09/09/2019

Checked by:



Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 42109**

Equipment Description: Noise Logger

Manufacturer: ARL

Model No: EL-316 **Serial No:** 16-207-050

Microphone Type: UC-53A **Serial No:** 318219

Preamplifier Type: NA **Serial No:** NA

Comments: All tests passed for type 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1019 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 53 % $\pm 5\%$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

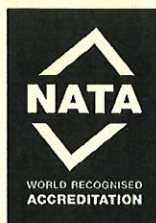
Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: *MB* **AUTHORISED SIGNATURE:** *Jack Kieft*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02) 96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

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AVCERT05b Rev. 1.3 15.05.18

CERTIFICATE No.: SLM 42109

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3 NA
4. Time Weighting P	clause 10.4.4 NA
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 95.8 dB and adjusted to 94.0 dB

Uncertainty: $\pm 0.13\text{dB}$ (at 95% c.l.) $k=2$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

Checked by: *VKB*

Accredited for compliance with ISO/IEC 17025 - Calibration

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CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 42108**

Equipment Description: Noise Logger

Manufacturer: ARL

Model No: EL-316 **Serial No:** 16-207-044

Microphone Type: UC-53A **Serial No:** 321979

Preamplifier Type: NA **Serial No:** NA

Comments: All tests passed for type 1.
(See over for details)

Owner: SLR Consulting Australia Pty Ltd
Level 2, 2 Lincoln Street
Lane Cove, NSW 2066

Ambient Pressure: 1019 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 53 % $\pm 5\%$

Date of Calibration: 27/06/2019 **Issue Date:** 27/06/2019

Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: *NKB* **AUTHORISED SIGNATURE:** *Jack Kielt*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



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Page 1 of 2
AVCERT05b Rev. 1.3 15.05.18

CERTIFICATE NO.: SLM 42108

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3 NA
4. Time Weighting P	clause 10.4.4 NA
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 88.1 dB and adjusted to 94.0 dB

Uncertainty: $\pm 0.13\text{dB}$ (at 95% c.l.) $k=2$

Date of Calibration: 27/06/2019

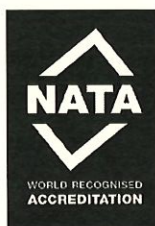
Issue Date: 27/06/2019

Checked by: *JKB*

Accredited for compliance with ISO/IEC 17025 - Calibration

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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C17217**

Client Details SLR Consulting Australia Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-525
Microphone Serial Number : 322080
Pre-amplifier Serial Number : 27089

Atmospheric Conditions

Ambient Temperature : 24.9°C
Relative Humidity : 46.4%
Barometric Pressure : 100.27kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 09/06/2017

Secondary Check: Riley Cooper
Report Issue Date : 13/06/2017

Approved Signatory :

PP

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests

31.5 Hz to 8kHz ±0.16dB
12.5kHz ±0.2dB
16kHz ±0.29dB

Electrical Tests

31.5 Hz to 20 kHz ±0.12dB

Environmental Conditions

Temperature ±0.05°C
Relative Humidity ±0.46%
Barometric Pressure ±0.017Pa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18314**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-203-508
Microphone Serial Number : 319092
Pre-amplifier Serial Number : 27474

Atmospheric Conditions

Ambient Temperature : 21.7°C
Relative Humidity : 43.3%
Barometric Pressure : 99.36kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz $\pm 0.15dB$
12.5kHz $\pm 0.21dB$
16kHz $\pm 0.29dB$
Electrical Tests
31.5 Hz to 20 kHz $\pm 0.12dB$

Environmental Conditions
Temperature $\pm 0.3^{\circ}C$
Relative Humidity $\pm 2.5\%$
Barometric Pressure $\pm 0.017Pa$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

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Sound Level Meter AS 1259.1:1990 - AS 1259.2:1990 Calibration Certificate

Calibration Number **C18311**

Client Details SLR Consulting
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-103-494
Microphone Serial Number : 317150
Pre-amplifier Serial Number : 28022

Atmospheric Conditions

Ambient Temperature : 22.5°C
Relative Humidity : 42.4%
Barometric Pressure : 99.31kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2018

Secondary Check: Lewis Boorman
Report Issue Date : 14 Jun 2018

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.15dB	Temperature	±0.3°C
12.5kHz	±0.21dB	Relative Humidity	±2.5%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
23 °C	34%	994 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTER	SVAN 401	127	Signal generator
2.	SVANTER	SVAN 912A	4369	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTER	SV33	48878	Acoustic calibrator
5.	SVANTER	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DTTRAN	3253A	1376	Reference accelerometer

CONFORMITY & TEST DECLARATION

- Hereby SVANTEK company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
- The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
- The vibrational calibration was performed using the Back-to-Back Comparison method and is traceable to the GUM (Central Office of Measures) reference standard - accelerometer type 8505 No 1455233.
- The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This calibration sheet shall not be reproduced except in full, without written permission of the SVANTER Ltd.

Calibration specialist: Krzysztof Kubel



Test date: 2018-10-26



SVANTEK

ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 9774 No. 69756

with preamplifier SVANTEK type SV12L No. 77821 and microphone ACO PACIFIC type 7052E No. 72478

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function: Characteristic: A; $f_{ref}=1$ kHz; Input signal = 110.9 dB.

Range	Low (120dB)	High (137dB)
Indication (dB)	114.0	114.0
Error (dB)	0.0	0.0

2. CALIBRATION* (acoustical)

LEVEL METER function: Range: High; Reference frequency: 1000 Hz; Sound Pressure Level: 113.97 dB.

Characteristic	Correct value (dB)	Indication (dB)	Error (dB)
Z	113.97	113.98	0.01
A	113.97	113.98	0.01
C	113.97	113.98	0.01

Calibration measured with the microphone ACO PACIFIC type 7052E No. 72478. Calibration factor: 0.26 dB.

3. LINEARITY TEST* (electrical)

LEVEL METER function: Range: Low; Characteristic: A; $f_{ref}=31.5$ Hz

Nominal result L EQ (dB)	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0
Error (dB)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Range: Low; Characteristic: A; $f_{ref}=1000$ Hz

Nominal result L EQ (dB)	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	120.0
Error (dB)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Range: Low; Characteristic: A; $f_{ref}=8000$ Hz

Nominal result L EQ (dB)	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	119.0
Error (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Range: High; Characteristic: A; $f_{ref}=31.5$ Hz

Nominal result L EQ (dB)	35.0	36.0	37.0	38.0	40.0	60.0	80.0	97.0
Error (dB)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Range: High; Characteristic: A; $f_{ref}=1000$ Hz

Nominal result L EQ (dB)	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error (dB)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Range: High; Characteristic: A; $f_{ref}=8000$ Hz

Nominal result L EQ (dB)	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error (dB)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

4. TONE BURST RESPONSE*

LEVEL METER function: Characteristic: A; $f_{ref}=4000$ Hz; Burst duration: 2 s

Range: Low; Steady level nominal result = 117 dB														
Result	Detector	Duration (ms)												
		1000	500	200	100	50	20	10	5	2	1	0.5	0.25	0.1
MAX	Fast	Indication (dB)	117.0	117.0	116.1	114.4	112.2	108.7	105.9	103.0	99.0	96.0	93.0	89.9
	Fast	Error (dB)	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
SEL	Slow	Indication (dB)	115.0	115.0	109.6	106.8	103.9	100.0	97.0	94.0	90.9	-	-	-
	Slow	Error (dB)	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
SEL	-	Indication (dB)	117.0	114.0	110.0	107.0	104.0	100.0	97.0	94.0	90.9	87.0	83.9	80.9
	-	Error (dB)	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1

Range: Low: Steady level nominal result = 57dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1
MAX	Fast	Indication [dB]	57.0	56.9	56.0	54.4	52.2	48.7	45.9	42.9	39.0	35.9
		Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1
	Slow	Indication [dB]	55.0	53.0	49.6	46.8	43.9	40.0	37.0	34.0	30.0	-
		Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-
SEL	-	Indication [dB]	57.0	54.0	50.0	47.0	44.0	40.0	37.0	34.0	30.0	27.0
		Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0

Range: Low: Steady level nominal result = 35dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	Indication [dB]	35.0	34.9	34.0
		Error [dB]	0.0	0.0	0.0
	Slow	Indication [dB]	33.0	31.0	27.6
		Error [dB]	0.0	0.1	-0.0
SEL	-	Indication [dB]	35.0	32.0	28.1
		Error [dB]	0.0	0.0	0.1

Range: High: Steady level nominal result = 134dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	134.0	133.9	133.1	131.4	129.2	125.7	122.9	119.9	116.0	113.0	109.9	106.9
		Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	Indication [dB]	132.0	130.0	126.6	125.8	120.9	117.0	114.0	111.0	107.0	-	-	-
		Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	Indication [dB]	134.0	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: High: Steady level nominal result = 54dB

Result	Detector	Duration [ms]	1000	500	200	100	50
MAX	Fast	Indication [dB]	54.0	54.0	53.0	51.4	49.2
		Error [dB]	0.0	0.0	-0.0	-0.0	-0.0
	Slow	Indication [dB]	52.0	50.0	46.6	43.8	40.9
		Error [dB]	0.0	0.1	-0.0	-0.1	-0.0
SEL	-	Indication [dB]	54.0	51.0	47.0	44.0	41.1
		Error [dB]	0.0	0.0	0.0	0.0	0.0

Range: High: Steady level nominal result = 46dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	Indication [dB]	46.1	45.9	45.0
		Error [dB]	0.0	0.0	0.0
	Slow	Indication [dB]	44.0	42.0	38.6
		Error [dB]	0.0	0.1	-0.0
SEL	-	Indication [dB]	46.0	43.0	39.1
		Error [dB]	0.0	0.0	0.1

5. FREQUENCY RESPONSE – BAND AUDIO* (electrical)

LEVEL METER function: Characteristic: Z; Range: High: Input signal = 135 dB;

Calculated Filter Response



Measured Filter Response with Preamplifier SV12L

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
1	-39.5	10	-39.5	100	-39.5	1000	-39.5	10000	-39.5
1.25	-39.5	12.5	-39.5	125	-39.5	1250	-39.5	12500	-39.5
1.6	-39.5	16	-39.5	160	-39.5	1600	-39.5	16000	-39.5
2	-39.5	20	-39.5	200	-39.5	2000	-39.5	20000	-39.5
2.5	-39.5	25	-39.5	250	-39.5	2500	-39.5	25000	-39.5
3.15	-39.5	31.5	-39.5	315	-39.5	3150	-39.5	31500	-39.5
4	-39.5	40	-39.5	400	-39.5	4000	-39.5	40000	-39.5
5	-39.5	50	-39.5	500	-39.5	5000	-39.5	50000	-39.5
6.3	-39.5	63	-39.5	630	-39.5	6300	-39.5	63000	-39.5
8	-39.5	80	-39.5	800	-39.5	8000	-39.5	80000	-39.5
10	-39.5	100	-39.5	1000	-39.5	10000	-39.5	100000	-39.5

All frequencies are nominal center values for the 1/3 octave bands

6. FREQUENCY RESPONSE – BAND ULTRA* (electrical)

LEVEL METER function: Characteristic: HPE; Range: High: Input signal = 135 dB;

Calculated Filter Response



Measured Filter Response with Preamplifier SV12L

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
1000	0.0	16000	-0.0	40000	-0.2	100000	-0.2
2000	0.0	25000	-0.0	43855*	-0.4		
4000	-0.0	25000	-0.1	45555*	-2.7		
8000	-0.0	32000	-0.1				

All frequencies not marked by * are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical – compensated)

LEVEL METER function: Calibration factor: 0 dB

Range	Characteristic	Z	A	C
Range Low	Level [dB]	≤20	≤11	≤10
Range High	Level [dB]	≤40	≤23	≤22

* measured with preamplifier SVANTEK type SV12L No. 77821.

8. INTERNAL NOISE LEVEL (acoustical – compensated)

LEVEL METER function: Characteristic: A; (Backlight – off)

Range	Indication [dB]	Low	High
Indication [dB]		11.5	20.1

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function: Characteristic: HP10; f=79.58 Hz; Input signal = 140 dB;

Range	Low	High
Indication [dB]	140.0	140.0
Error [dB]	0.0	0.0

2. CALIBRATION (vibrational)

LEVEL METER function: Range: High; Input signal: 140dB;

Characteristic	Reference frequency [Hz]	Correct value [dB]	Indication [dB]	Error [dB]
HP1	79.58	140.0	140.2	0.2

Calibration measured with the accelerometer SVANTEK type SV80 No. H0413. Calibration factor: -0.56dB

3. FREQUENCY RESPONSE (electrical)

LEVEL METER function: Characteristic: HP; Range: High: Input=175 dB;

Calculated Response



Measured Response (f: frequency, L: level)

f [Hz]	L [dB]	f [Hz]	L [dB]
1	0.0	1000	0.0
20000	-0.0		

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

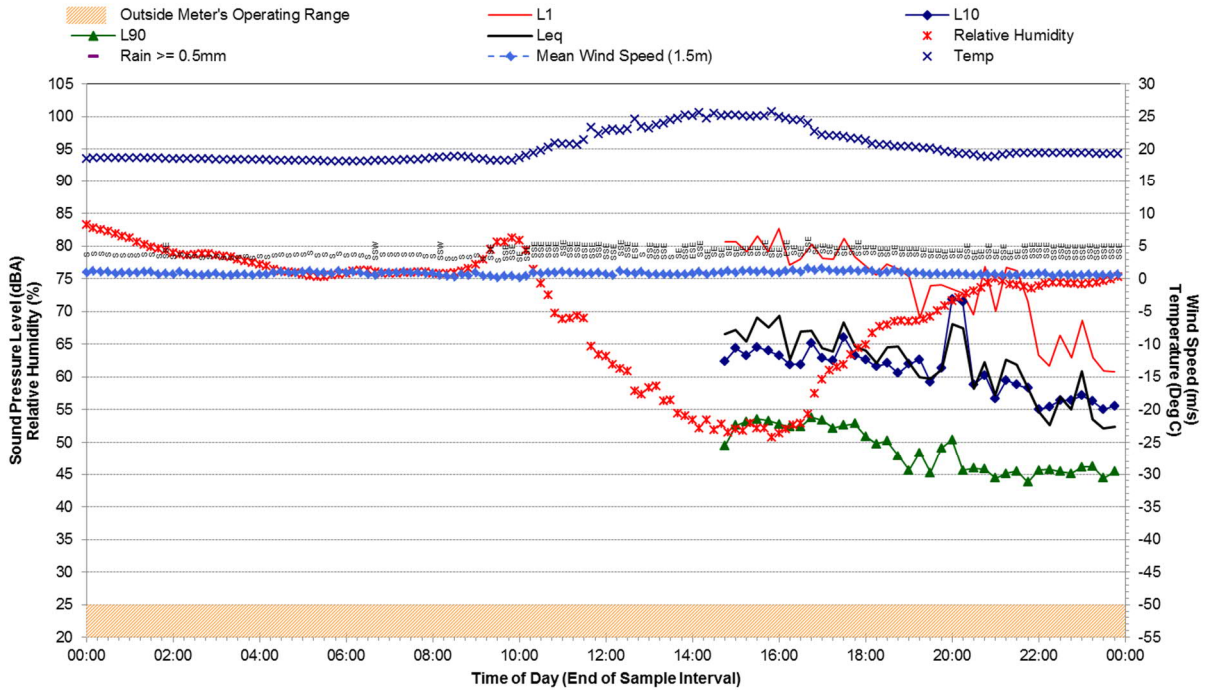
LEVEL METER function: Range: Low;

Characteristic	HP1
Indication [dB]	36.5

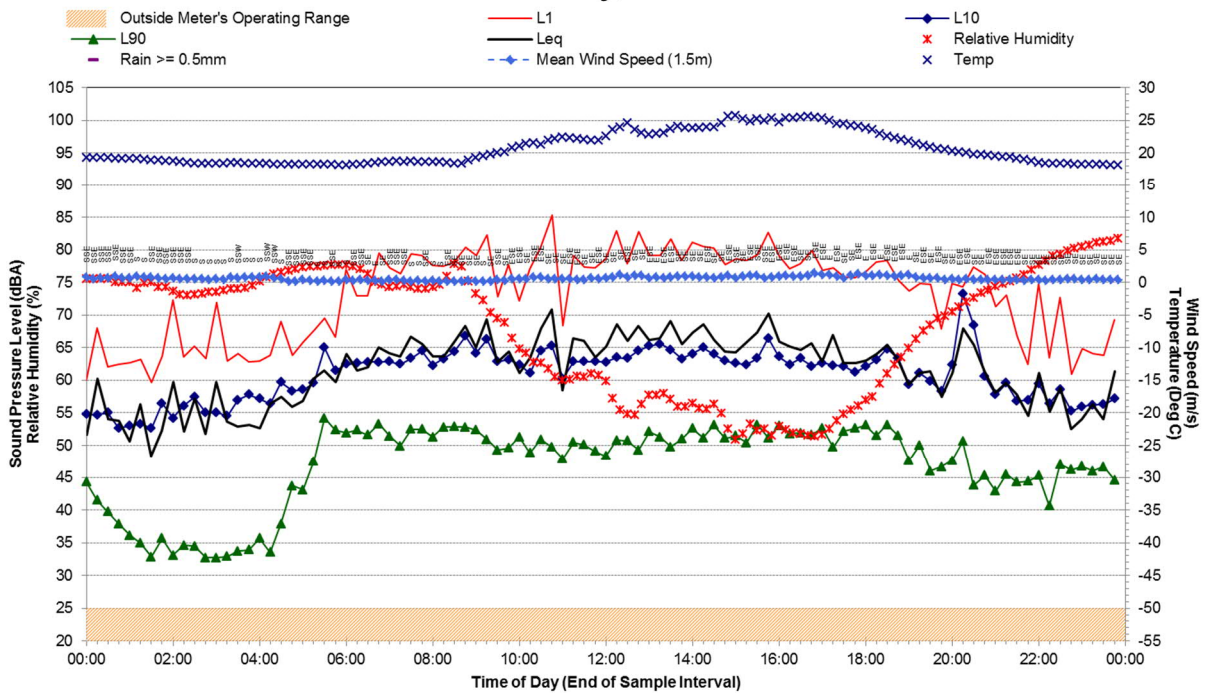
APPENDIX D

Statistical Ambient Noise Levels

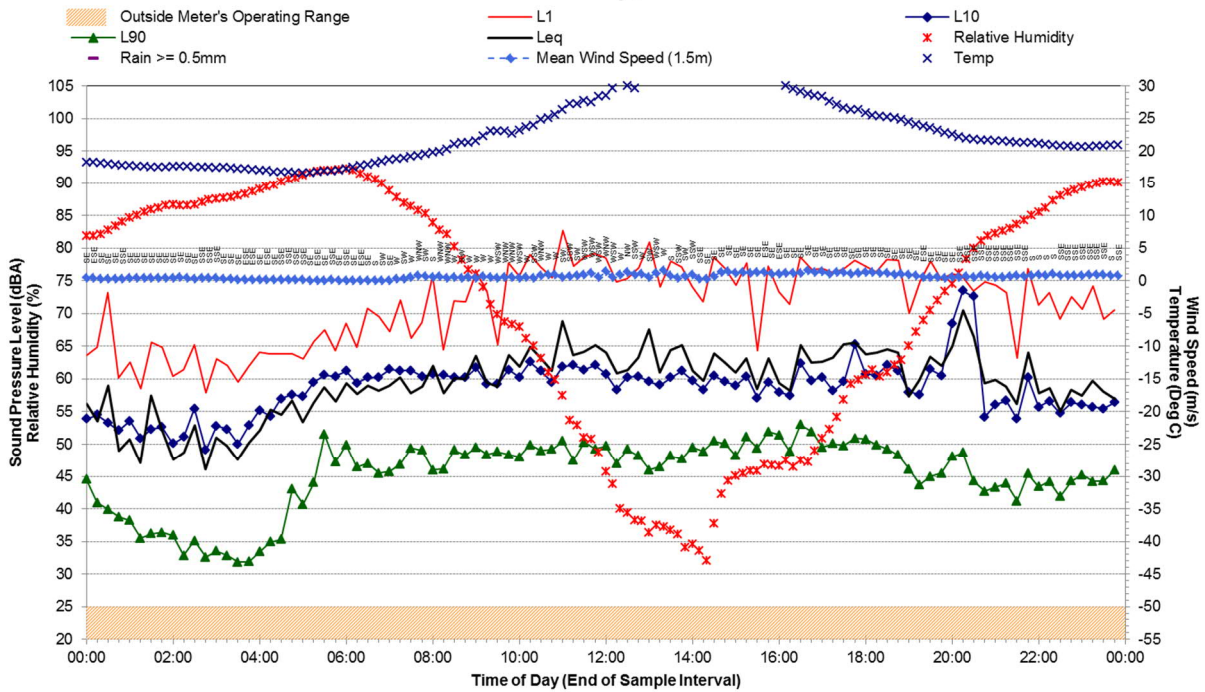
Statistical Ambient Noise Levels Location F - Thursday, 12 December 2019



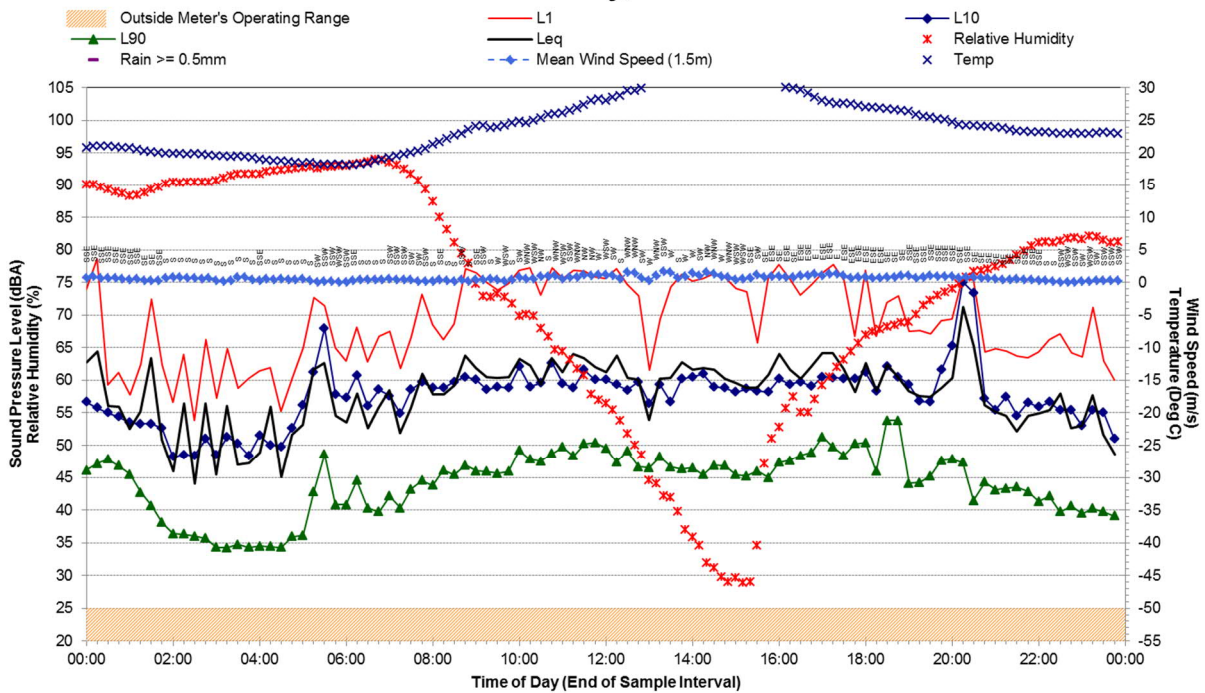
Statistical Ambient Noise Levels Location F - Friday, 13 December 2019



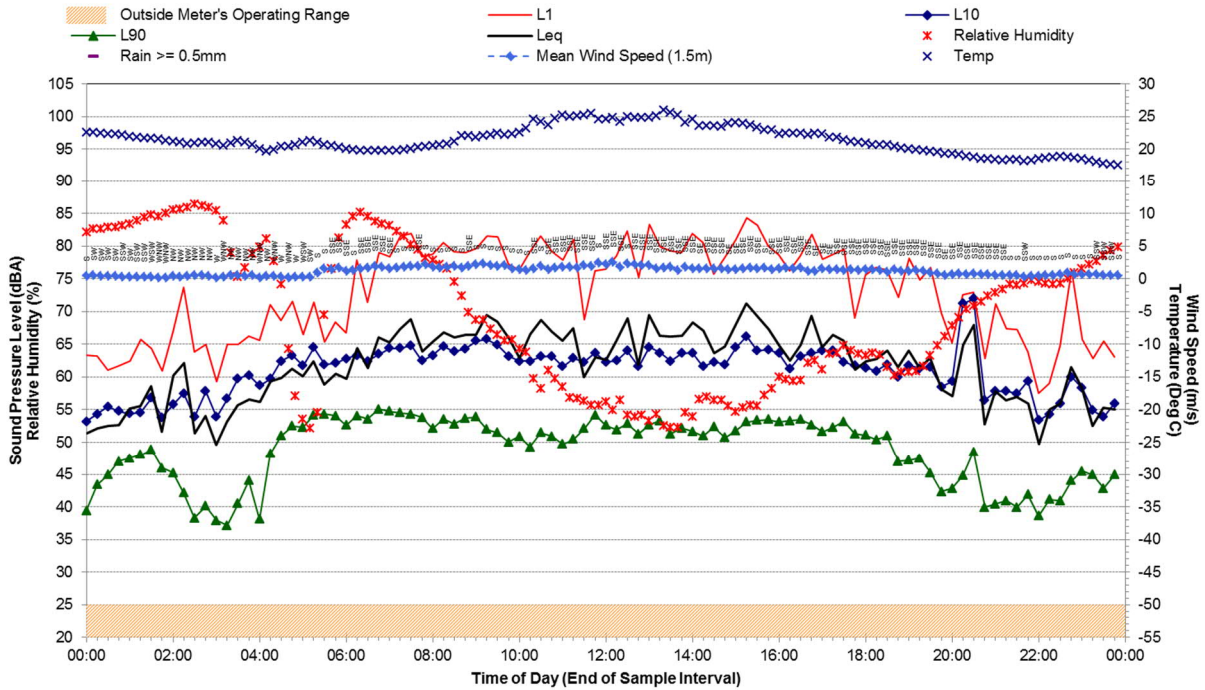
Statistical Ambient Noise Levels Location F - Saturday, 14 December 2019



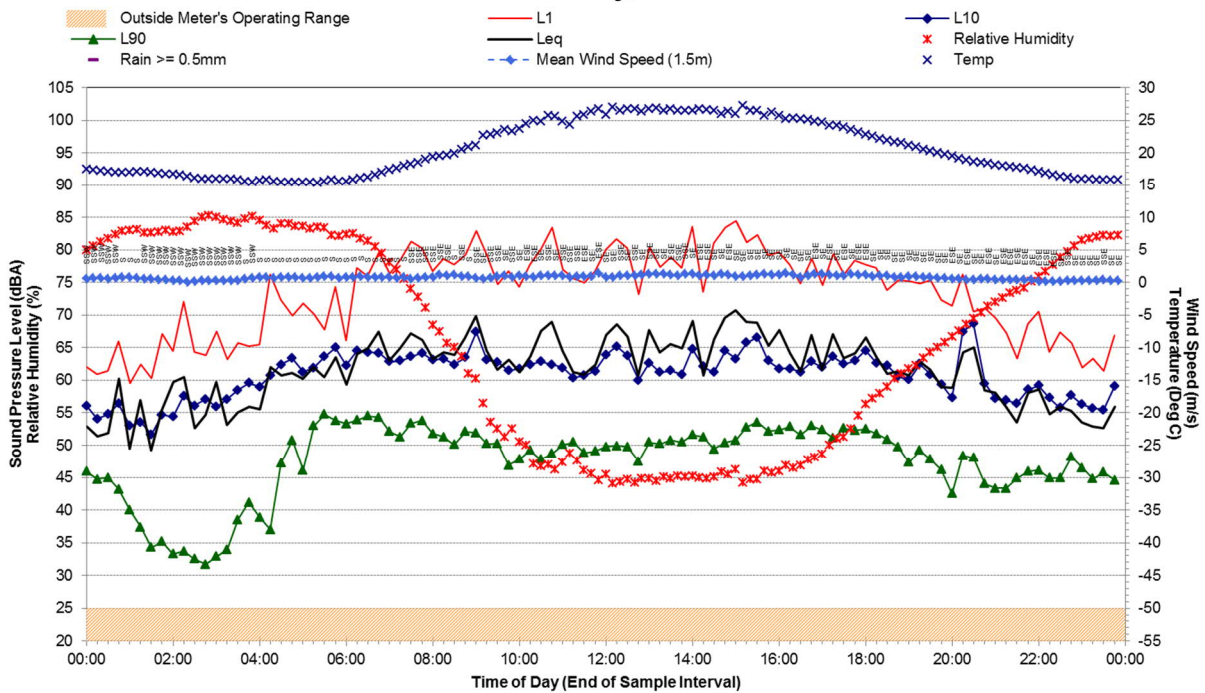
Statistical Ambient Noise Levels Location F - Sunday, 15 December 2019



Statistical Ambient Noise Levels Location F - Monday, 16 December 2019

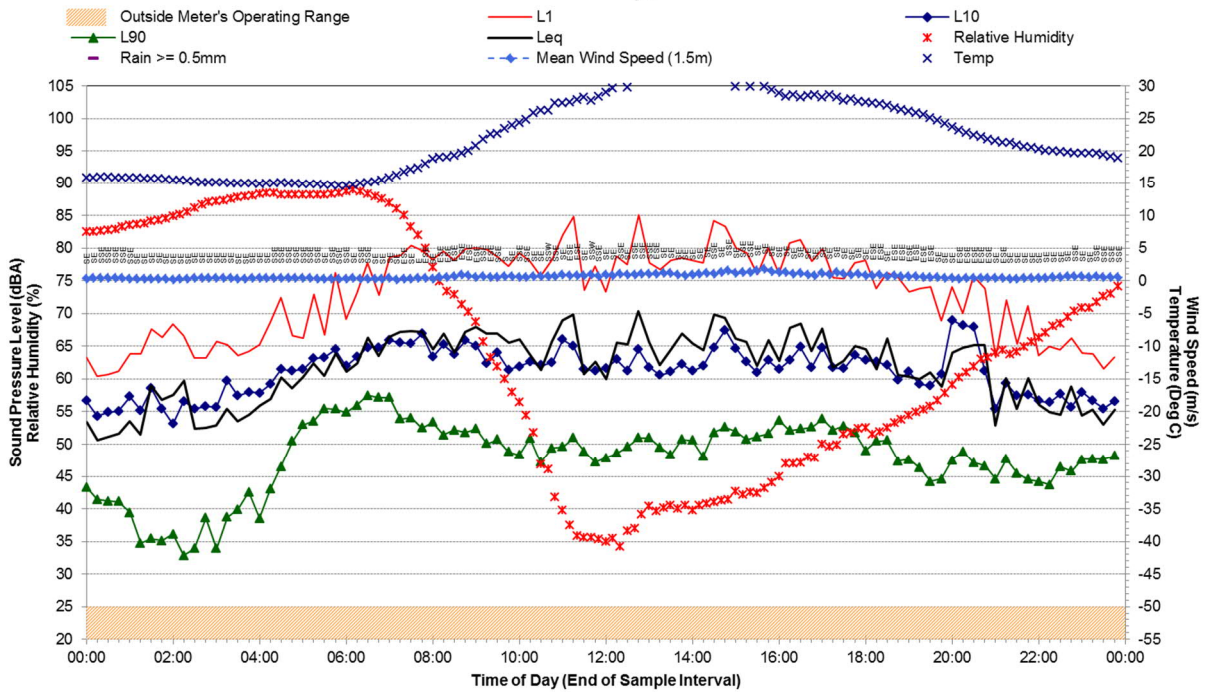


Statistical Ambient Noise Levels Location F - Tuesday, 17 December 2019



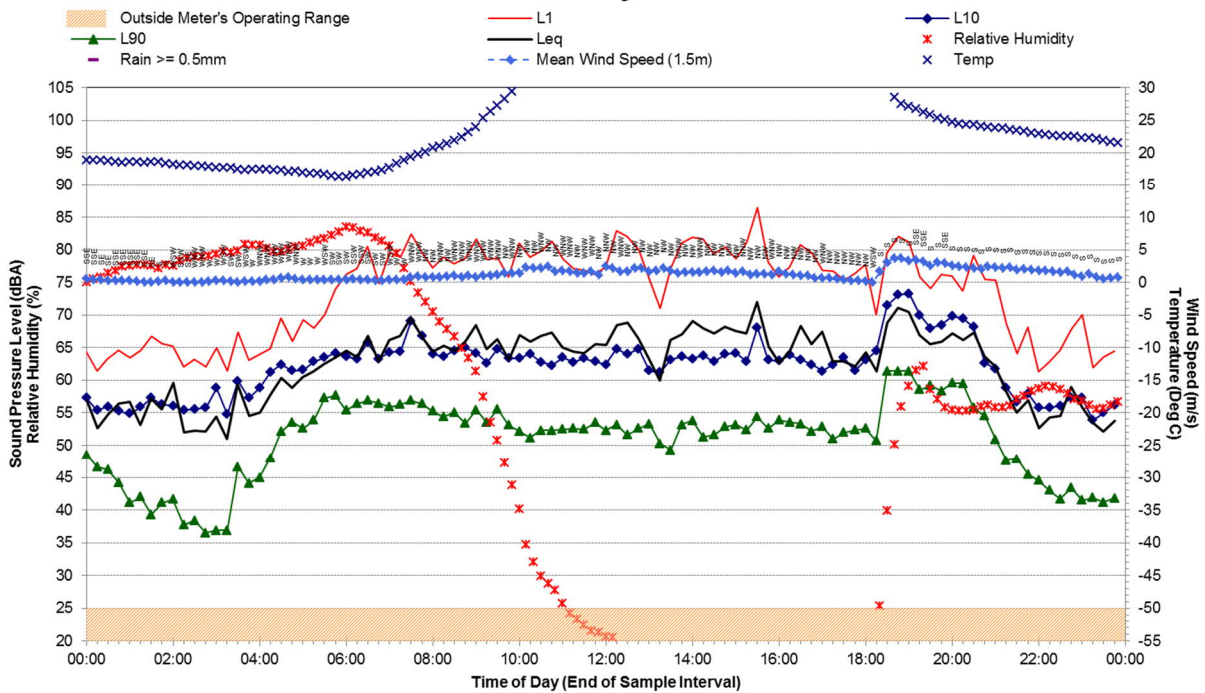
Statistical Ambient Noise Levels

Location F - Wednesday, 18 December 2019

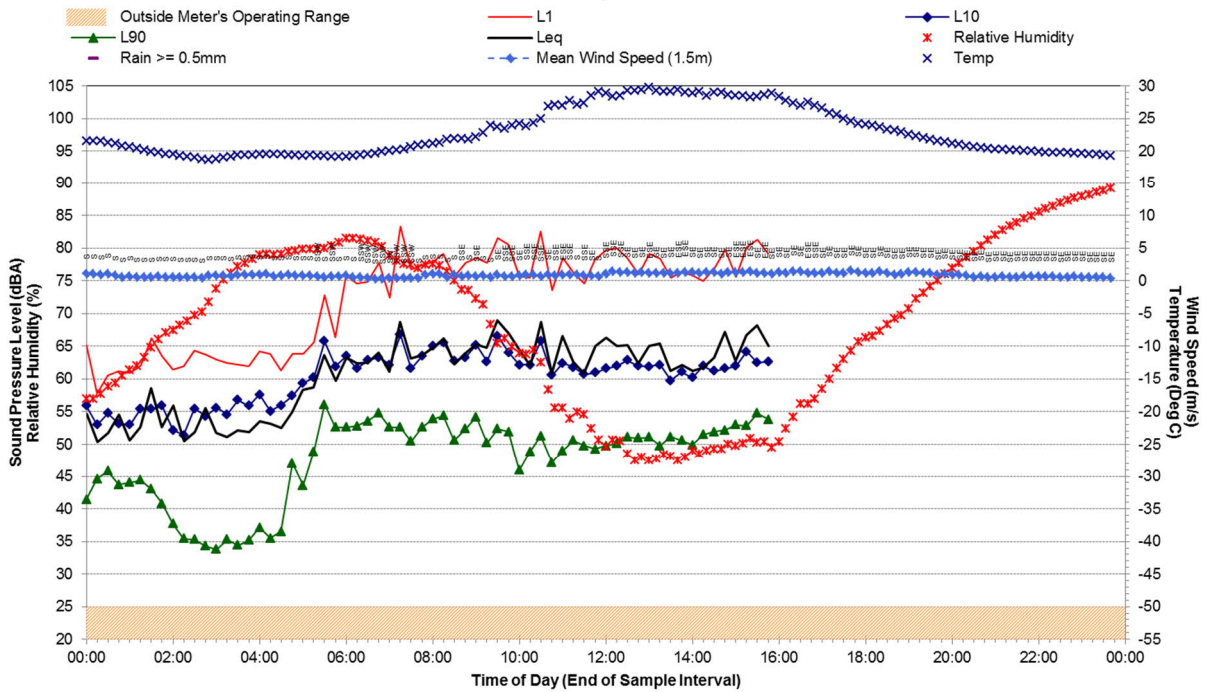


Statistical Ambient Noise Levels

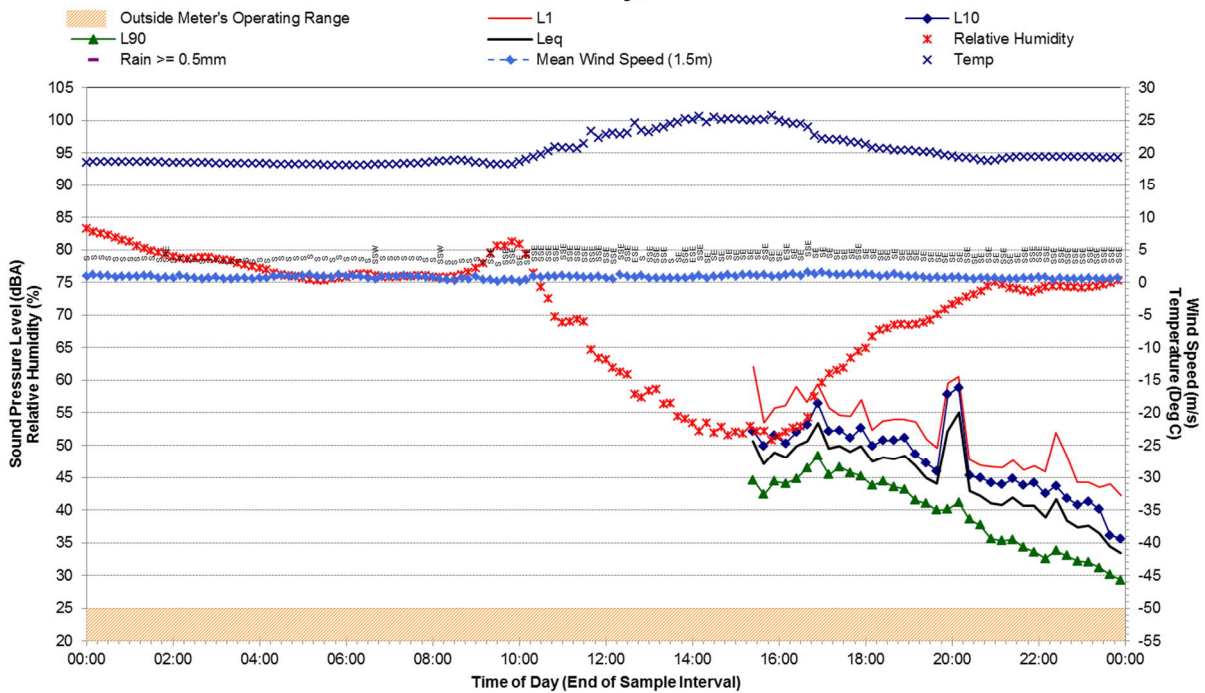
Location F - Thursday, 19 December 2019



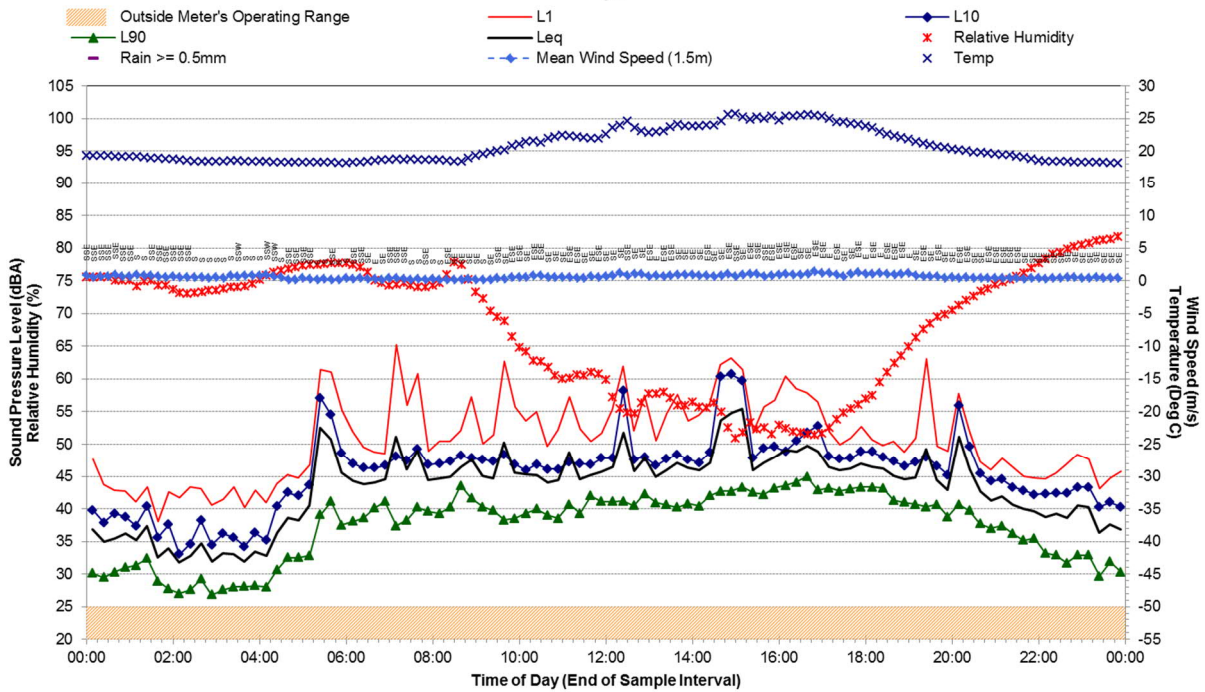
Statistical Ambient Noise Levels Location F - Friday, 20 December 2019



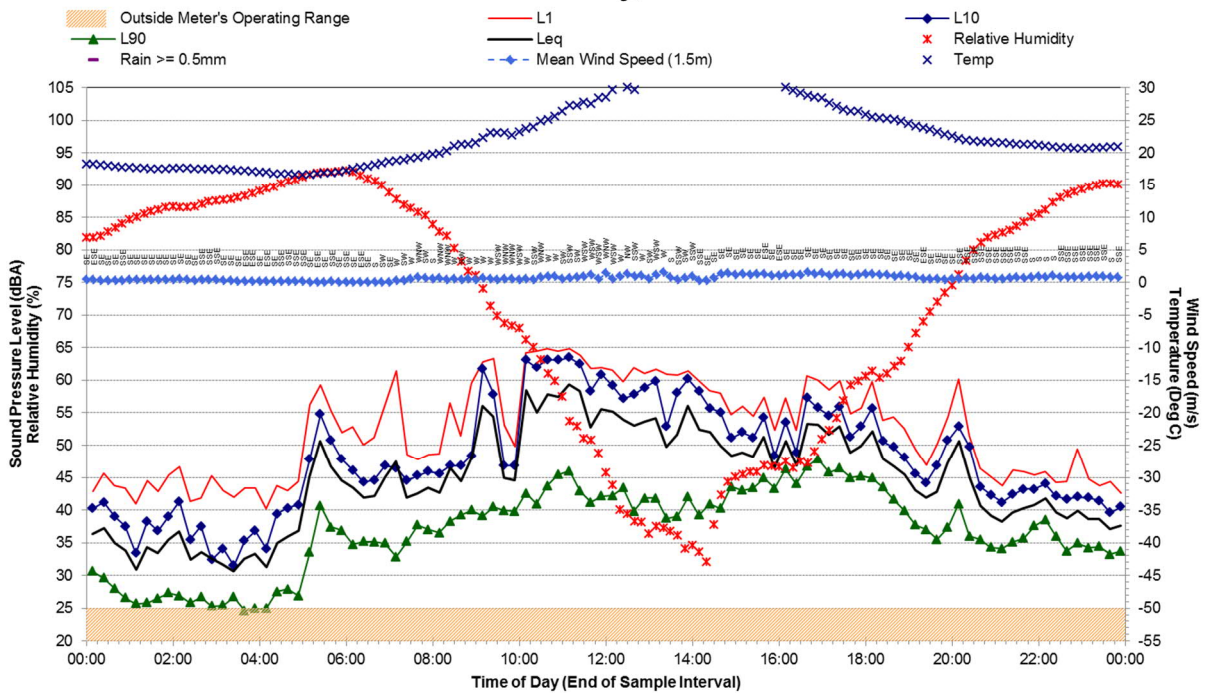
Statistical Ambient Noise Levels Location G - Thursday, 12 December 2019



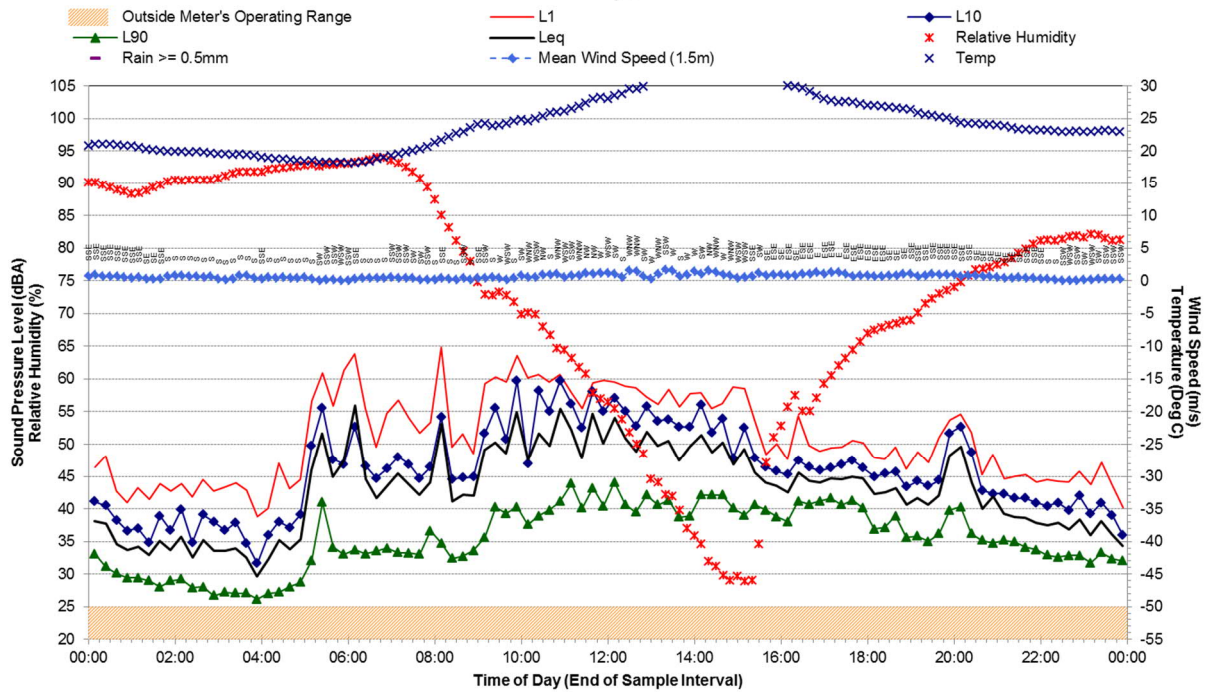
Statistical Ambient Noise Levels Location G - Friday, 13 December 2019



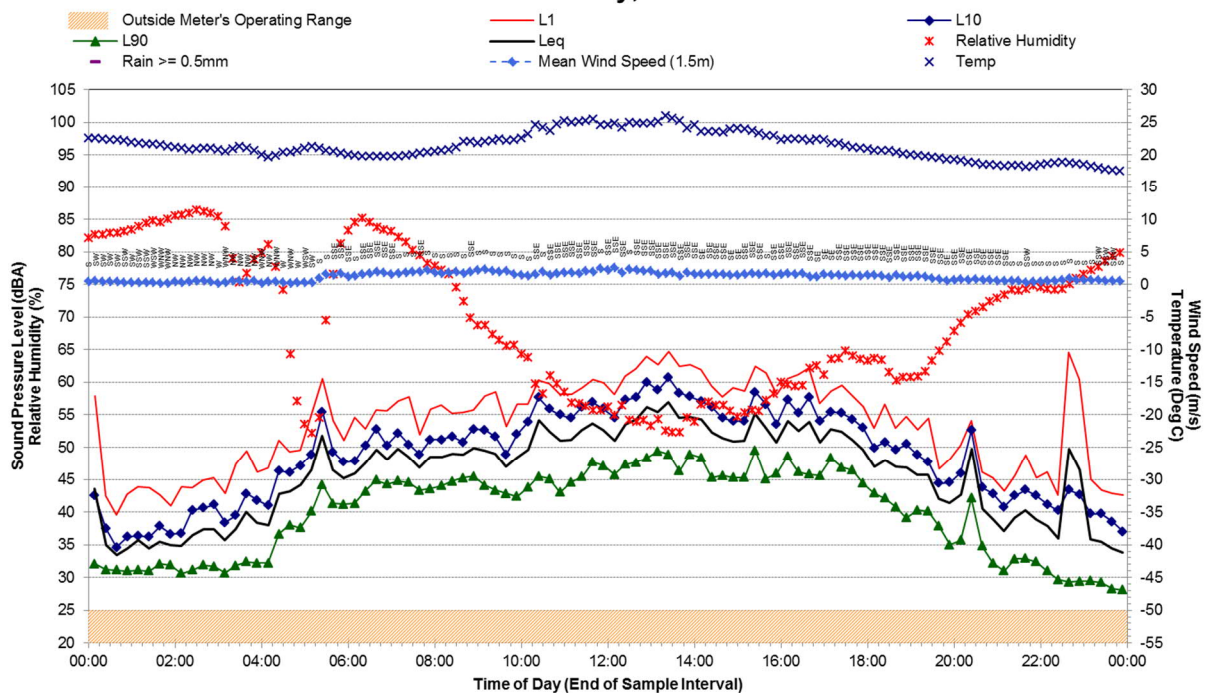
Statistical Ambient Noise Levels Location G - Saturday, 14 December 2019



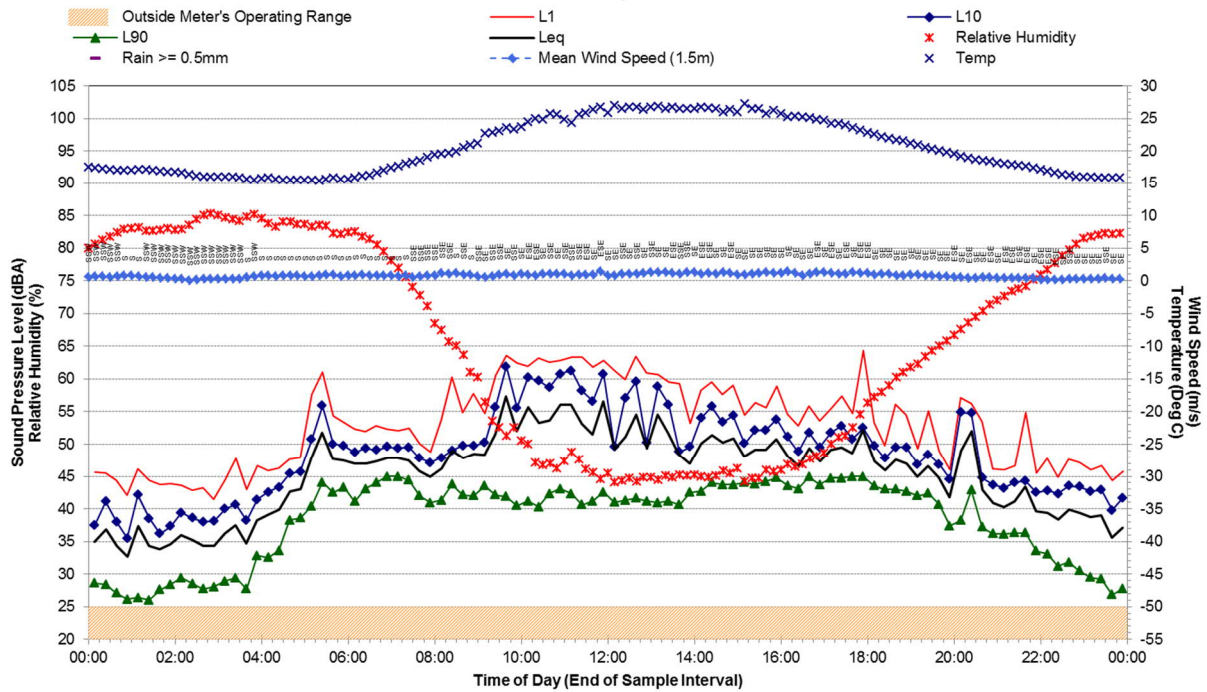
Statistical Ambient Noise Levels Location G - Sunday, 15 December 2019



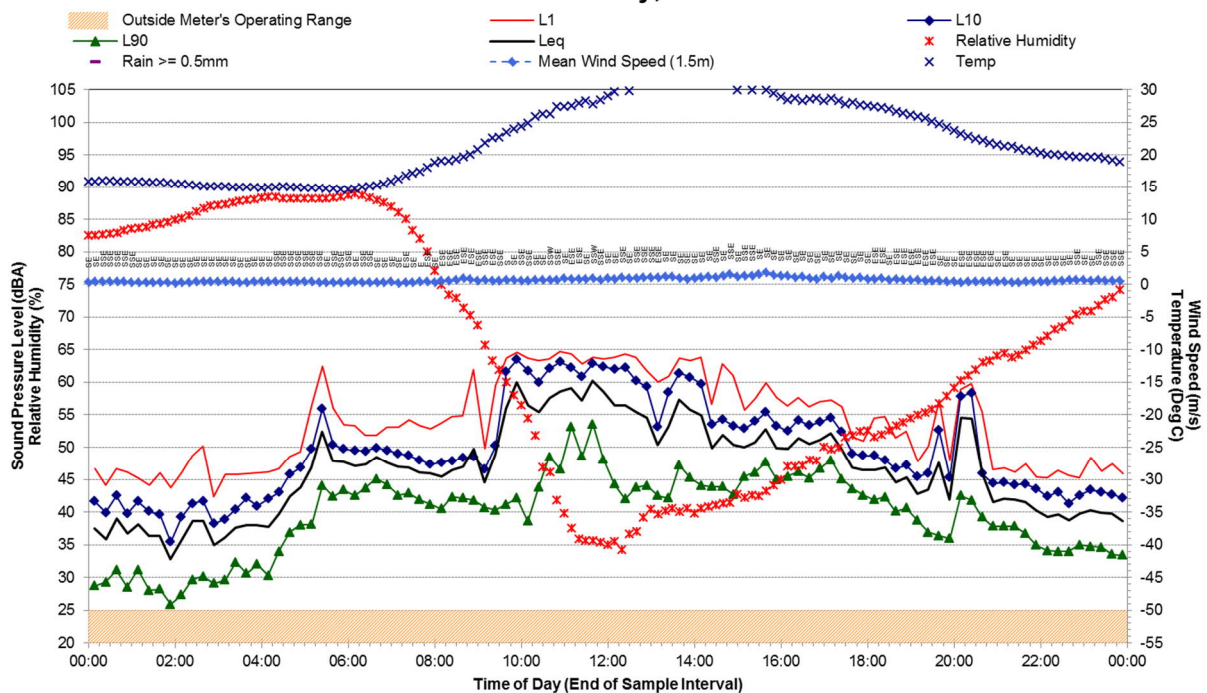
Statistical Ambient Noise Levels Location G - Monday, 16 December 2019



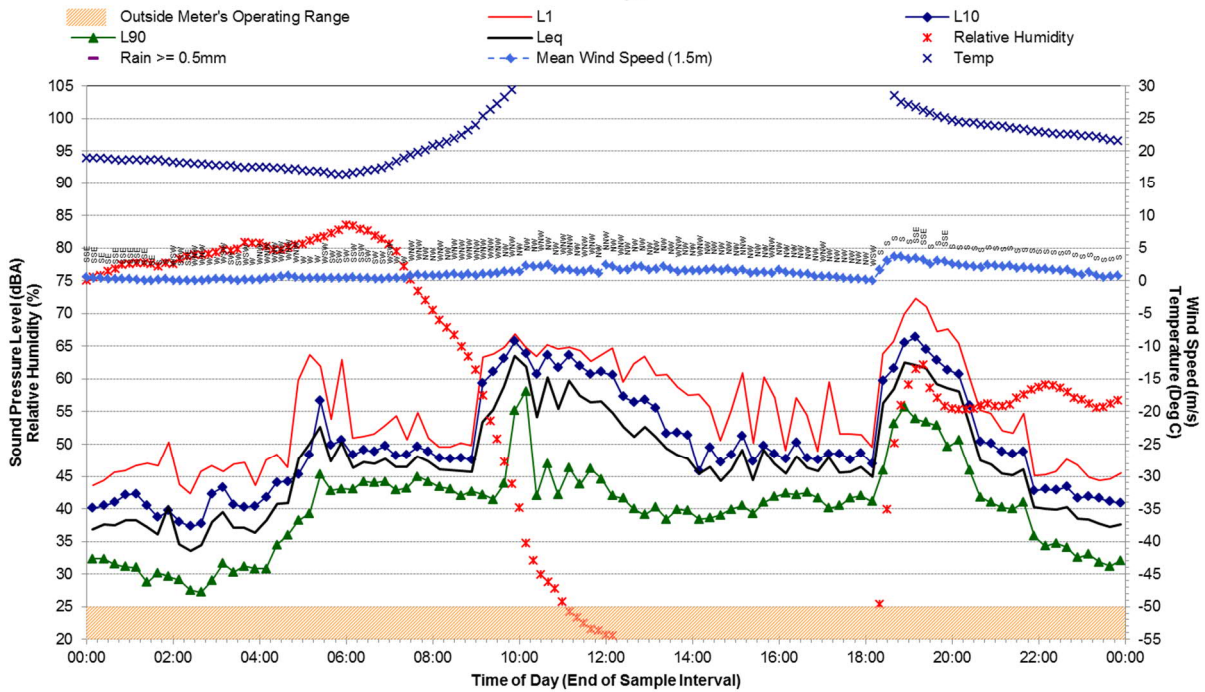
Statistical Ambient Noise Levels Location G - Tuesday, 17 December 2019



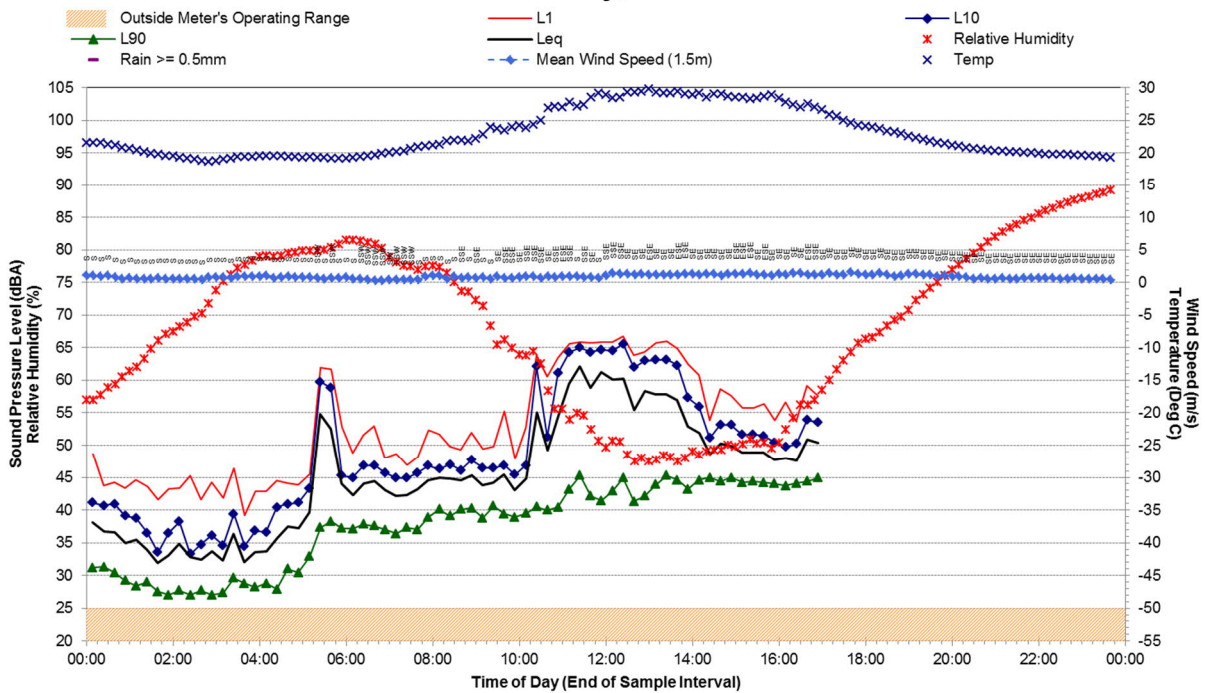
Statistical Ambient Noise Levels Location G - Wednesday, 18 December 2019



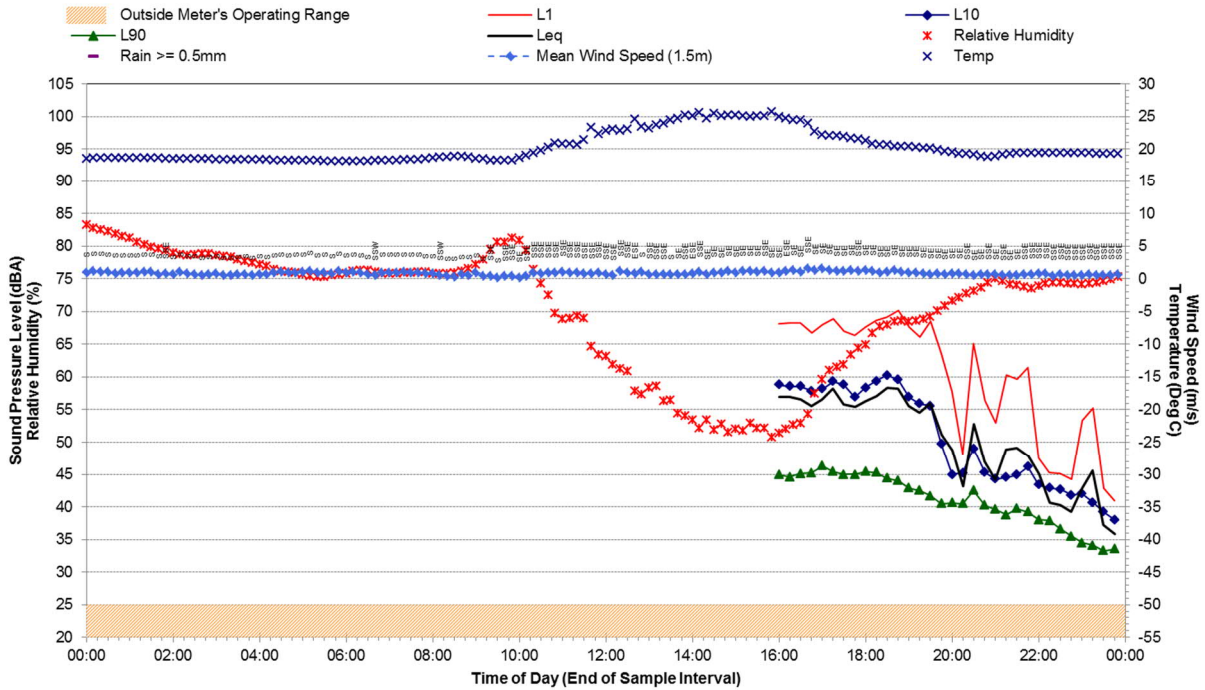
Statistical Ambient Noise Levels Location G - Thursday, 19 December 2019



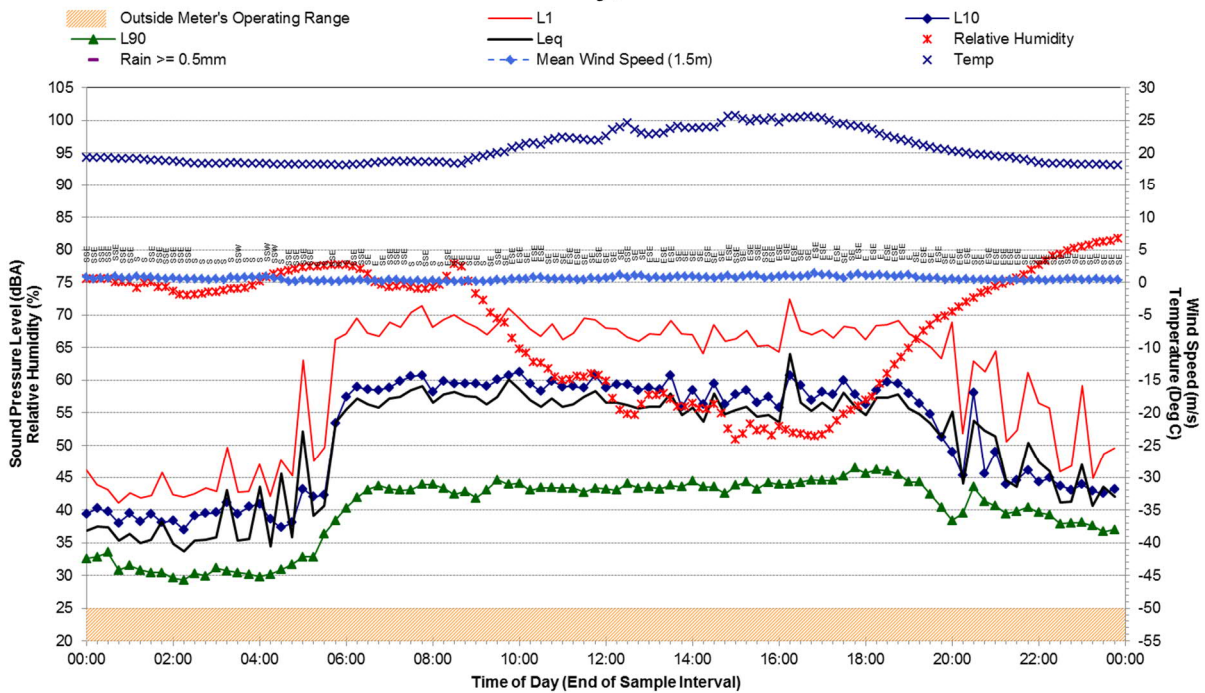
Statistical Ambient Noise Levels Location G - Friday, 20 December 2019



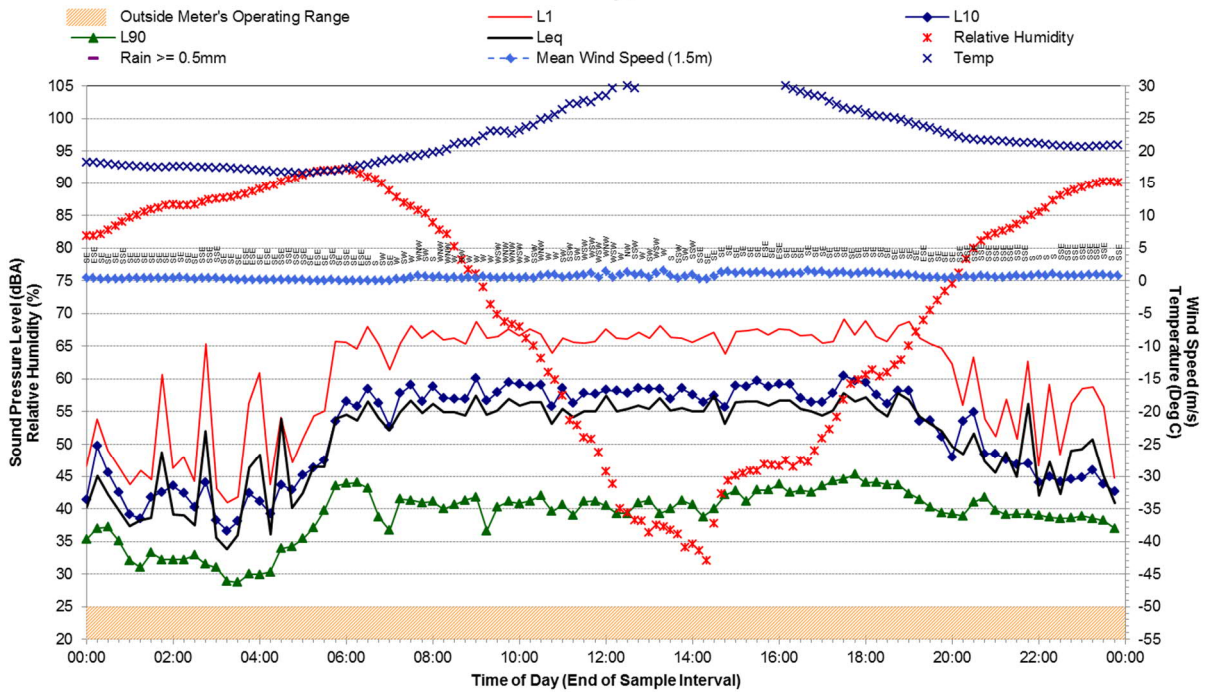
Statistical Ambient Noise Levels Location I - Thursday, 12 December 2019



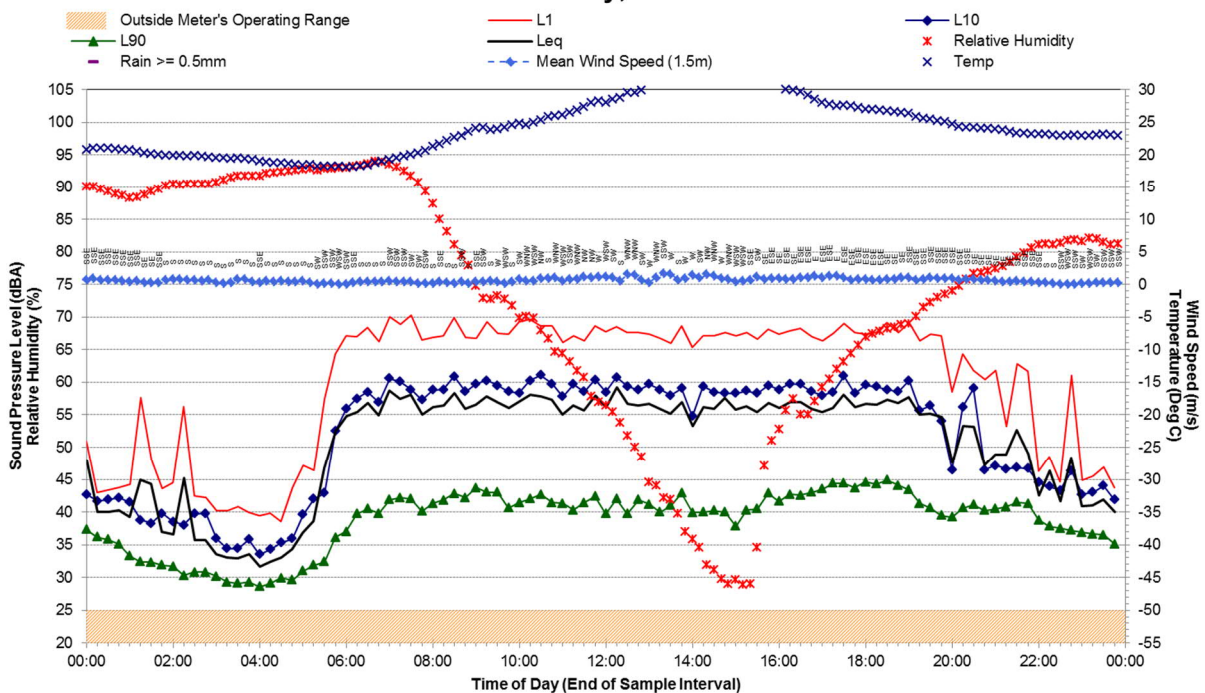
Statistical Ambient Noise Levels Location I - Friday, 13 December 2019



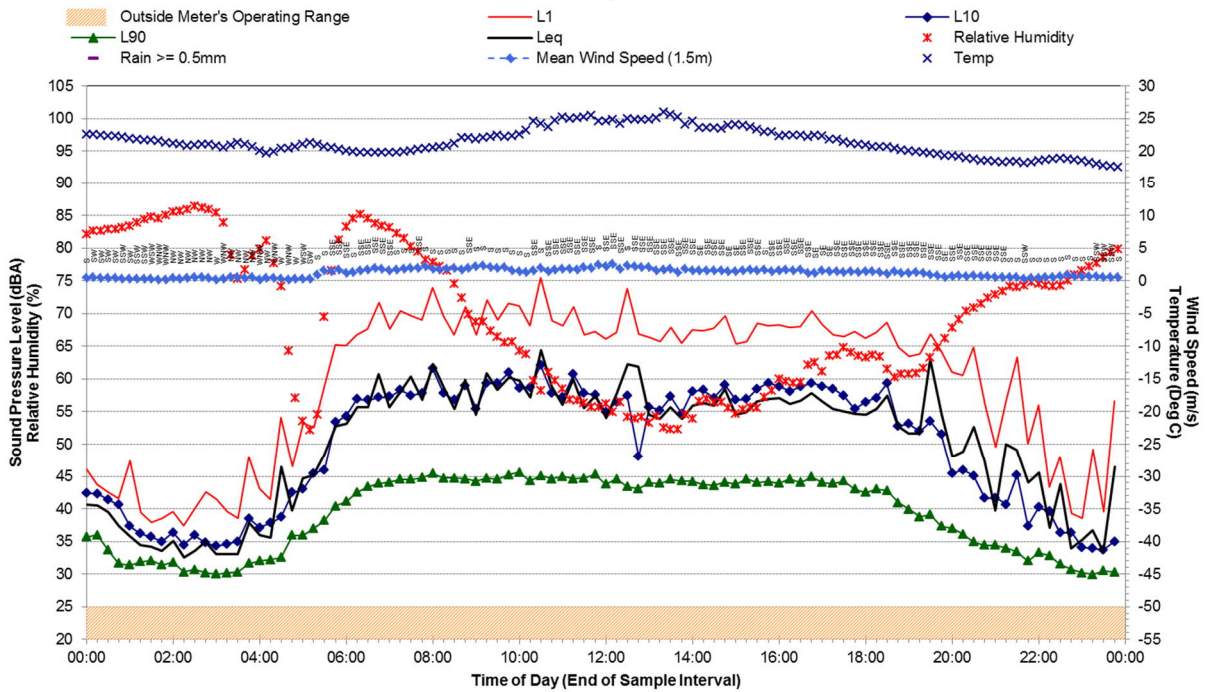
Statistical Ambient Noise Levels Location I - Saturday, 14 December 2019



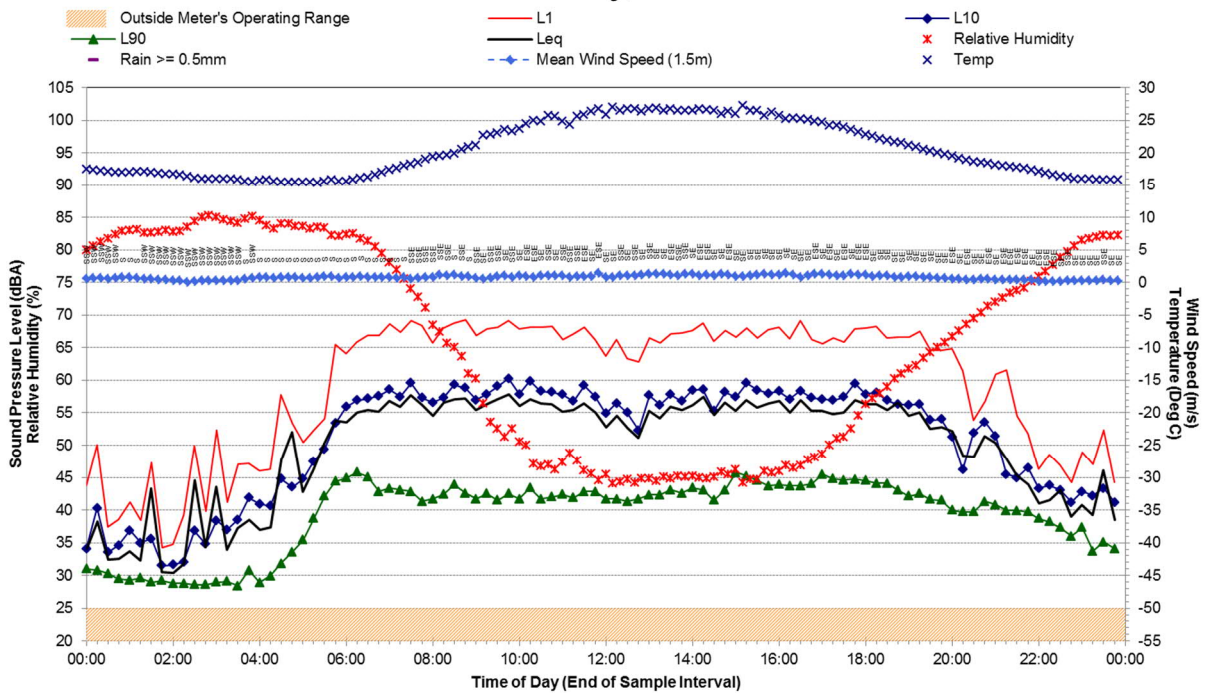
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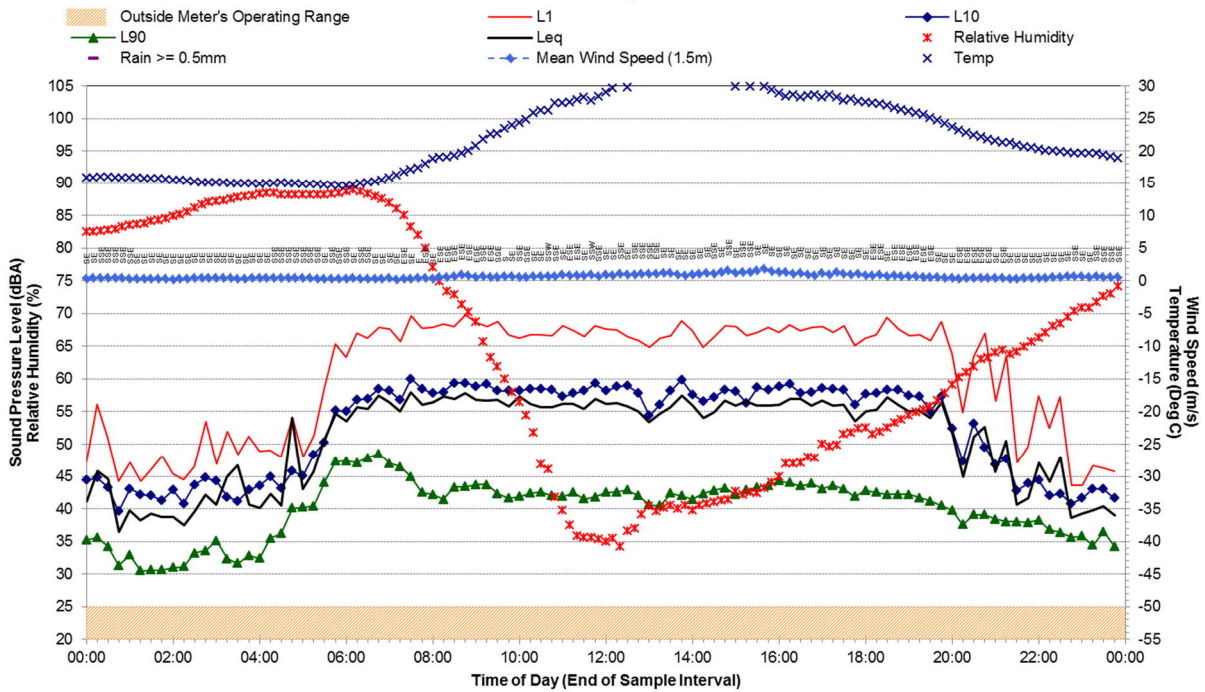
Statistical Ambient Noise Levels Location I - Monday, 16 December 2019



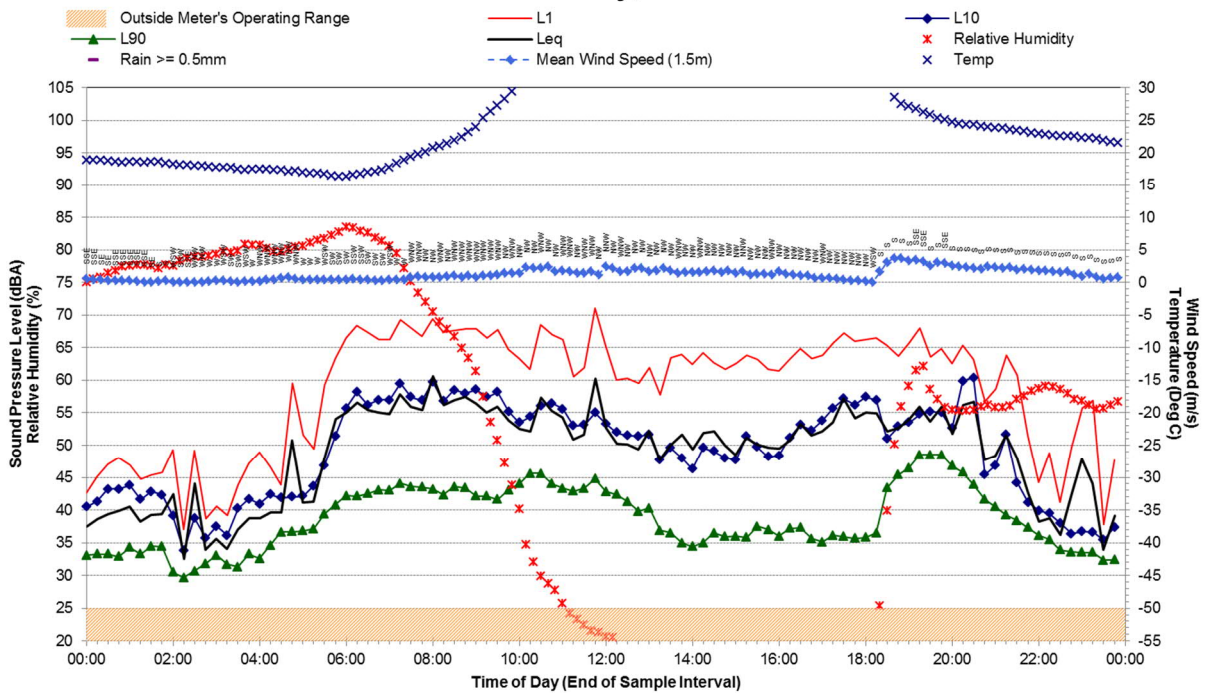
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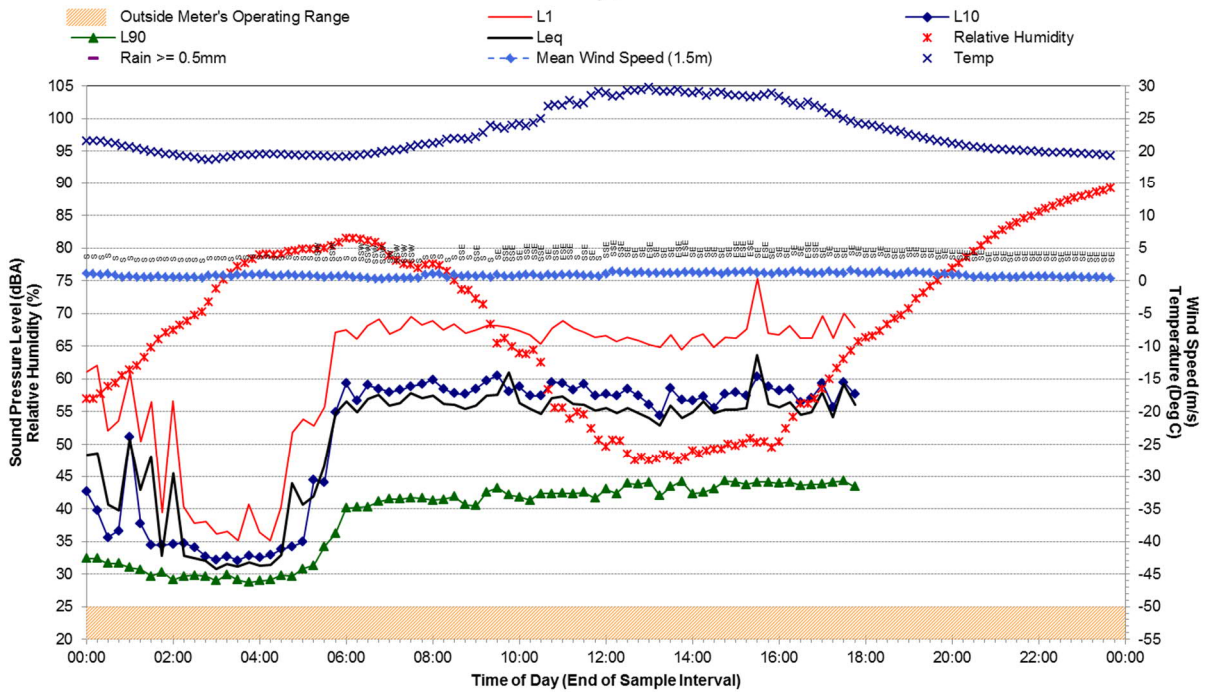
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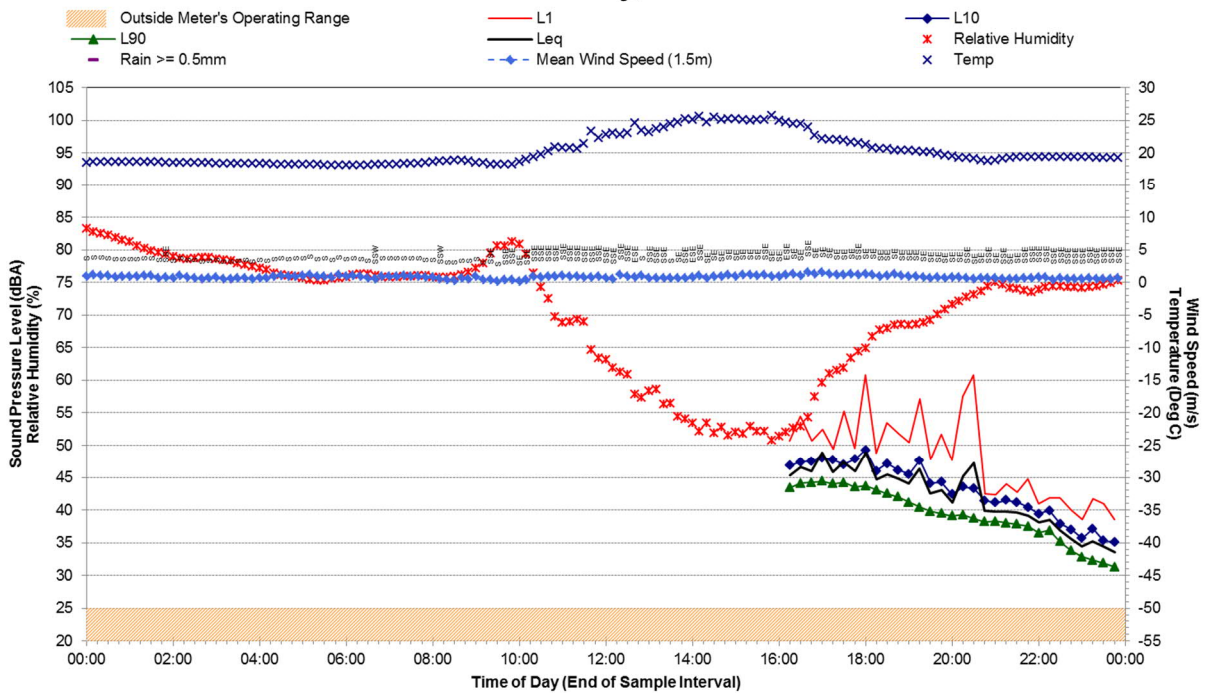
Statistical Ambient Noise Levels Location I - Thursday, 19 December 2019



Statistical Ambient Noise Levels Location I - Friday, 20 December 2019

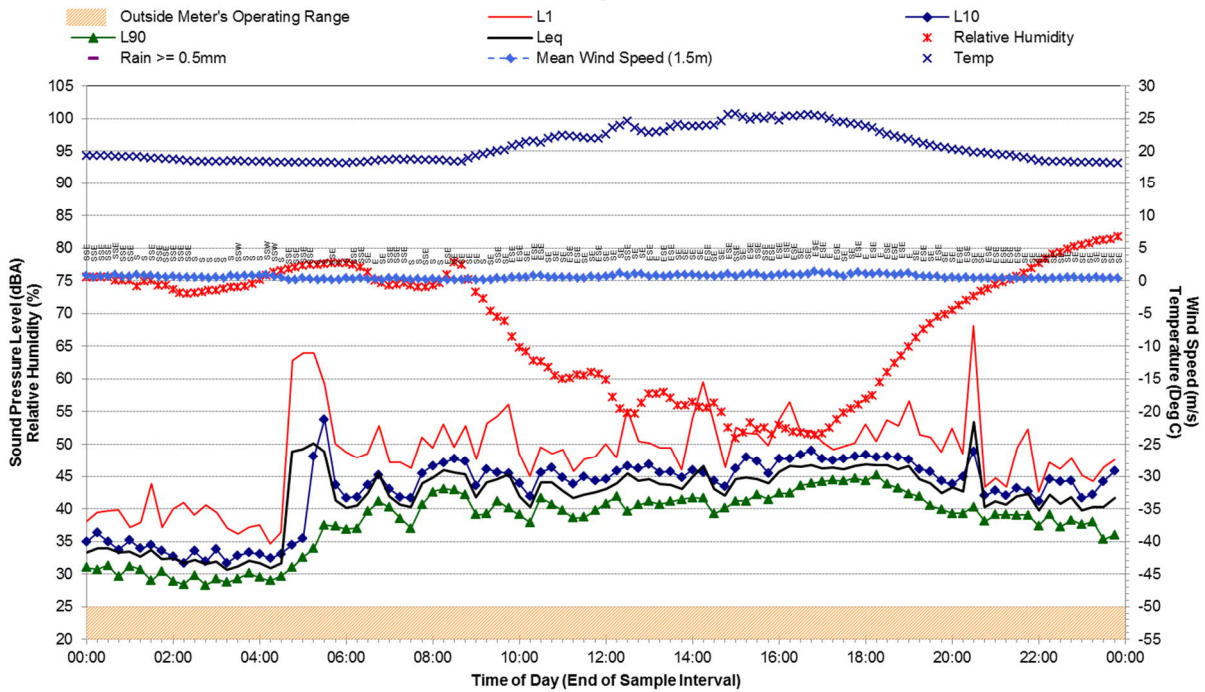


Statistical Ambient Noise Levels Location J - Thursday, 12 December 2019



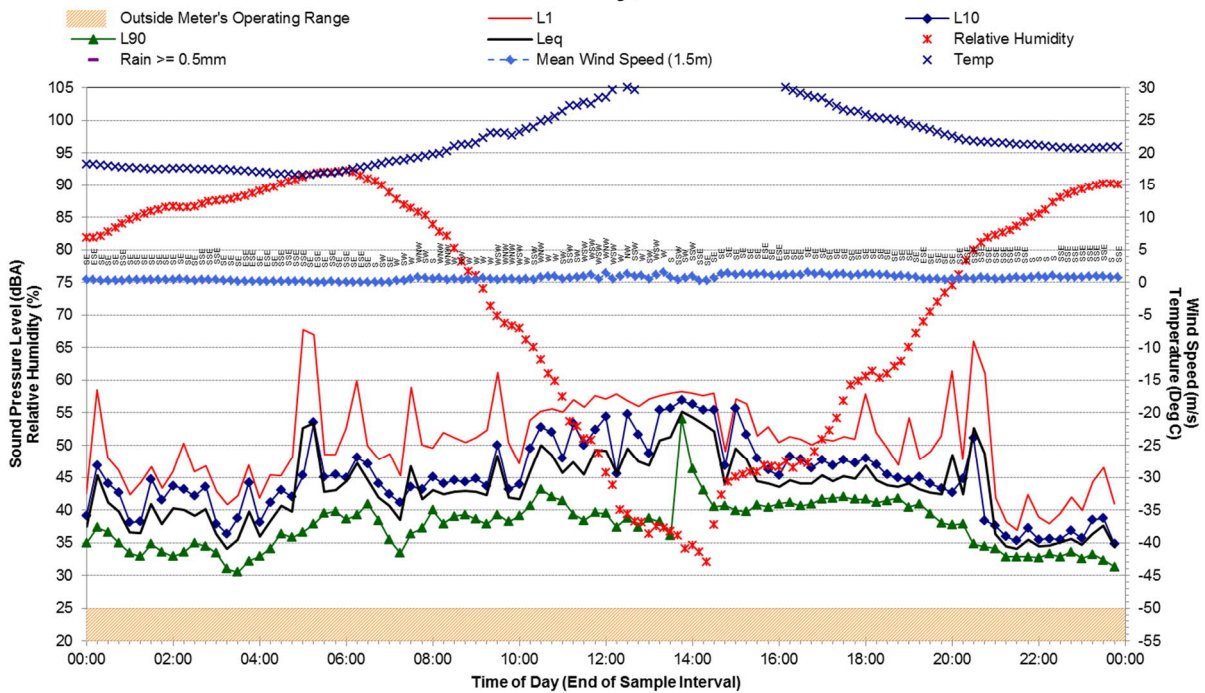
Statistical Ambient Noise Levels

Location J - Friday, 13 December 2019

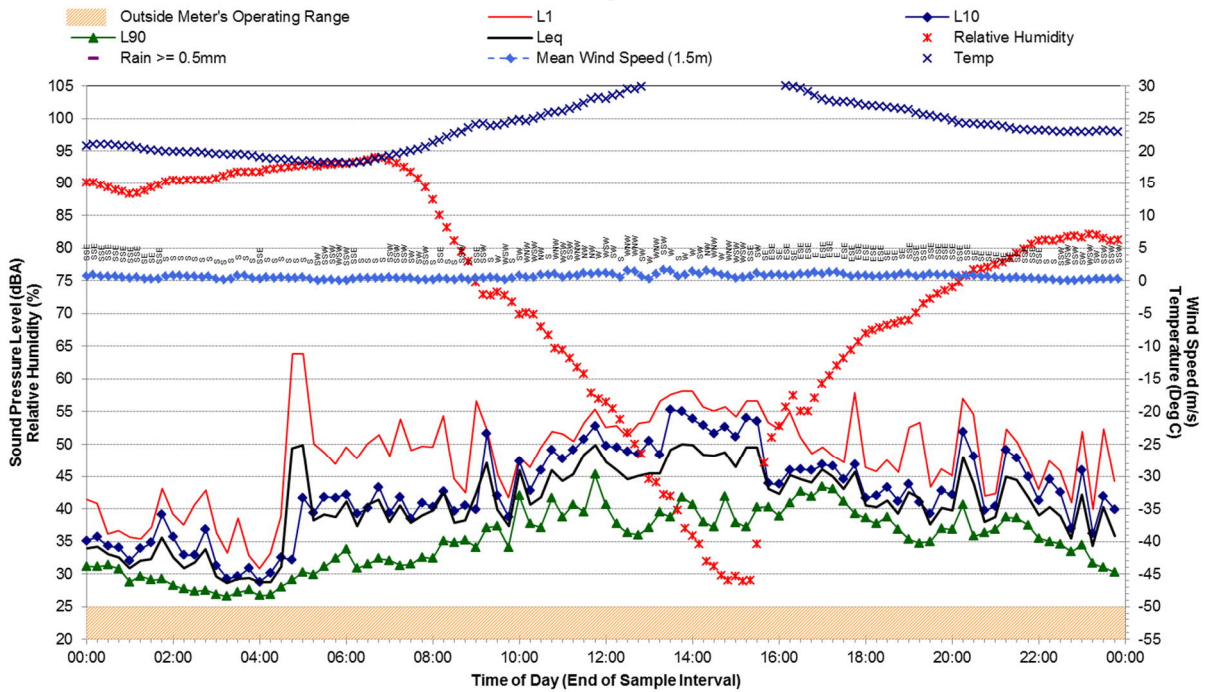


Statistical Ambient Noise Levels

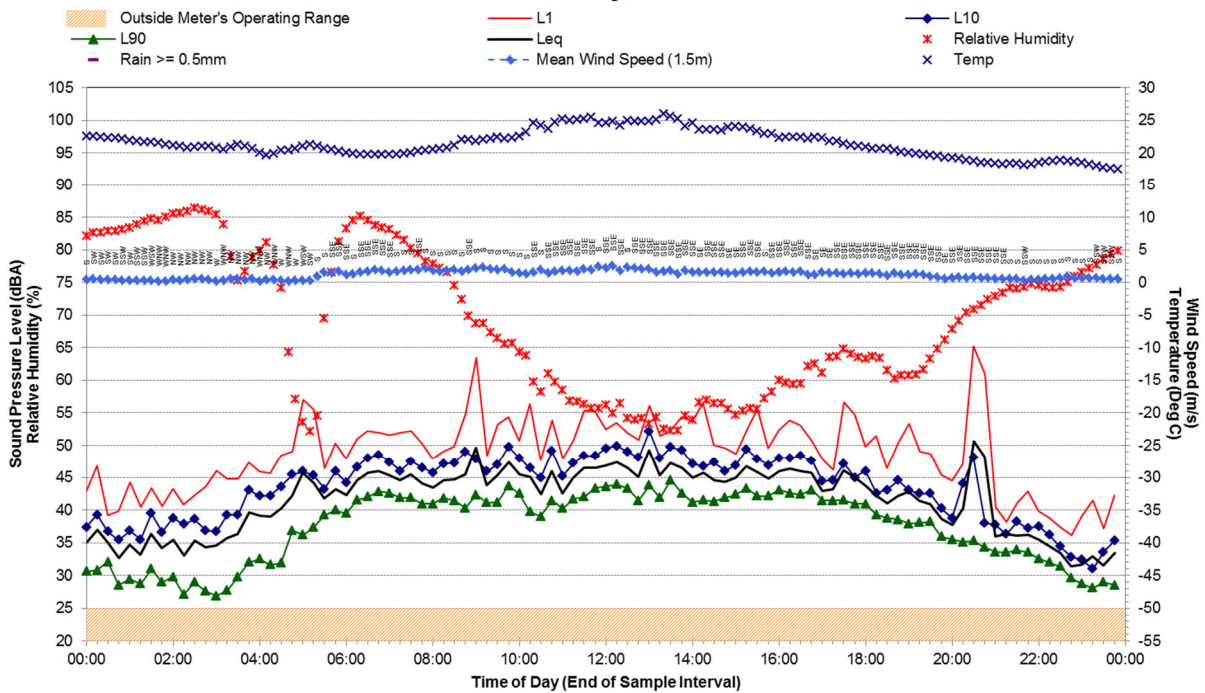
Location J - Saturday, 14 December 2019



Statistical Ambient Noise Levels Location J - Sunday, 15 December 2019

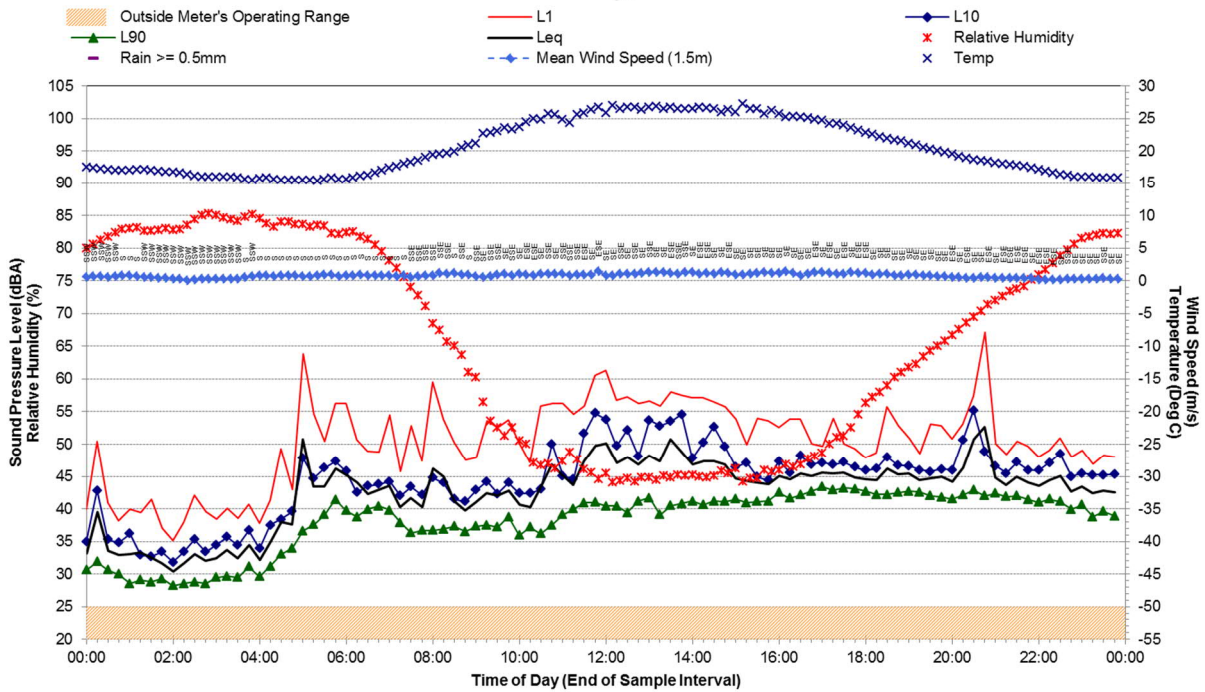


Statistical Ambient Noise Levels Location J - Monday, 16 December 2019



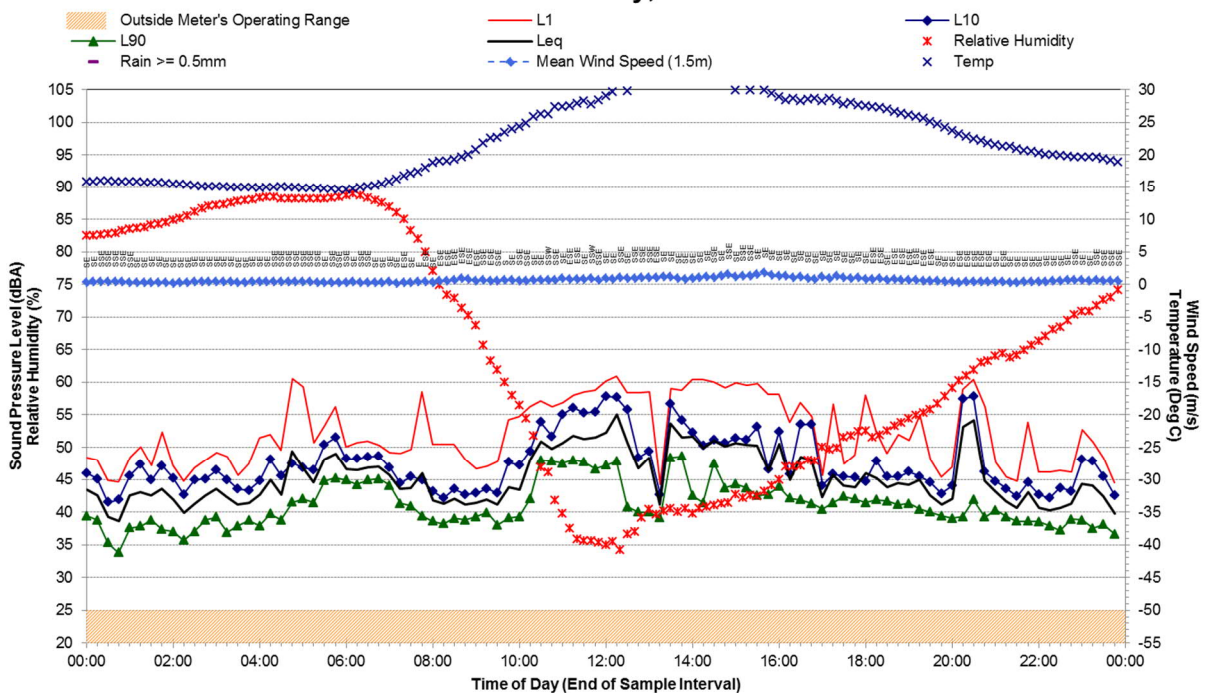
Statistical Ambient Noise Levels

Location J - Tuesday, 17 December 2019

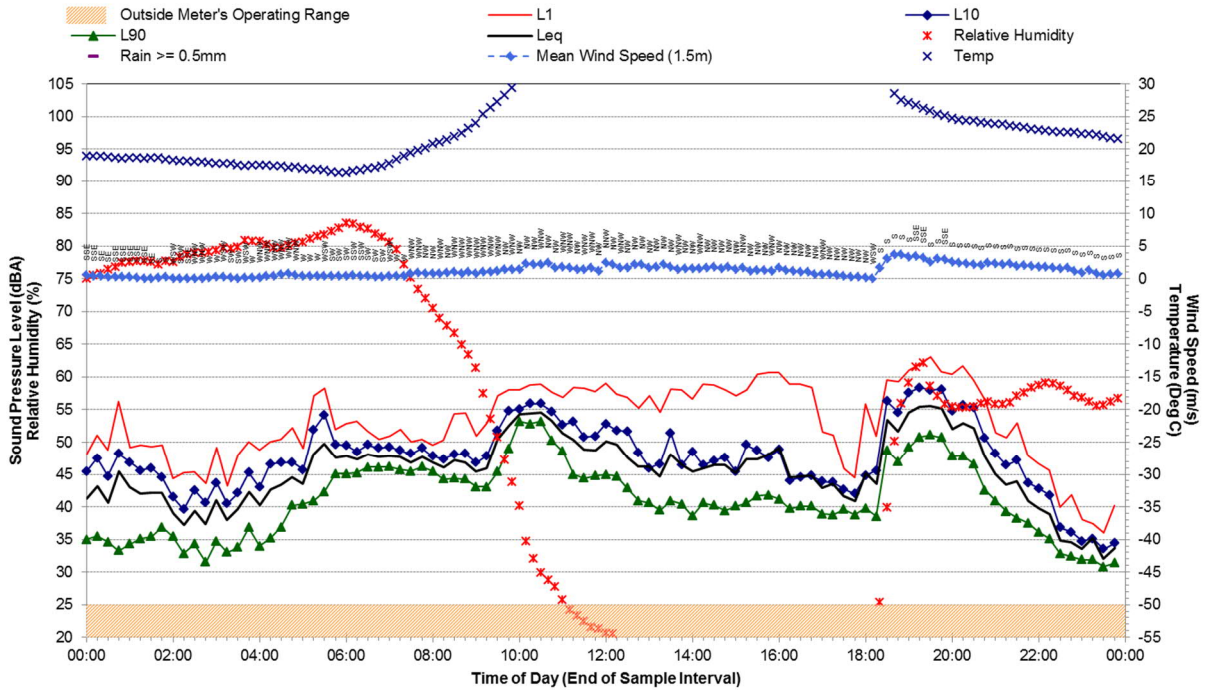


Statistical Ambient Noise Levels

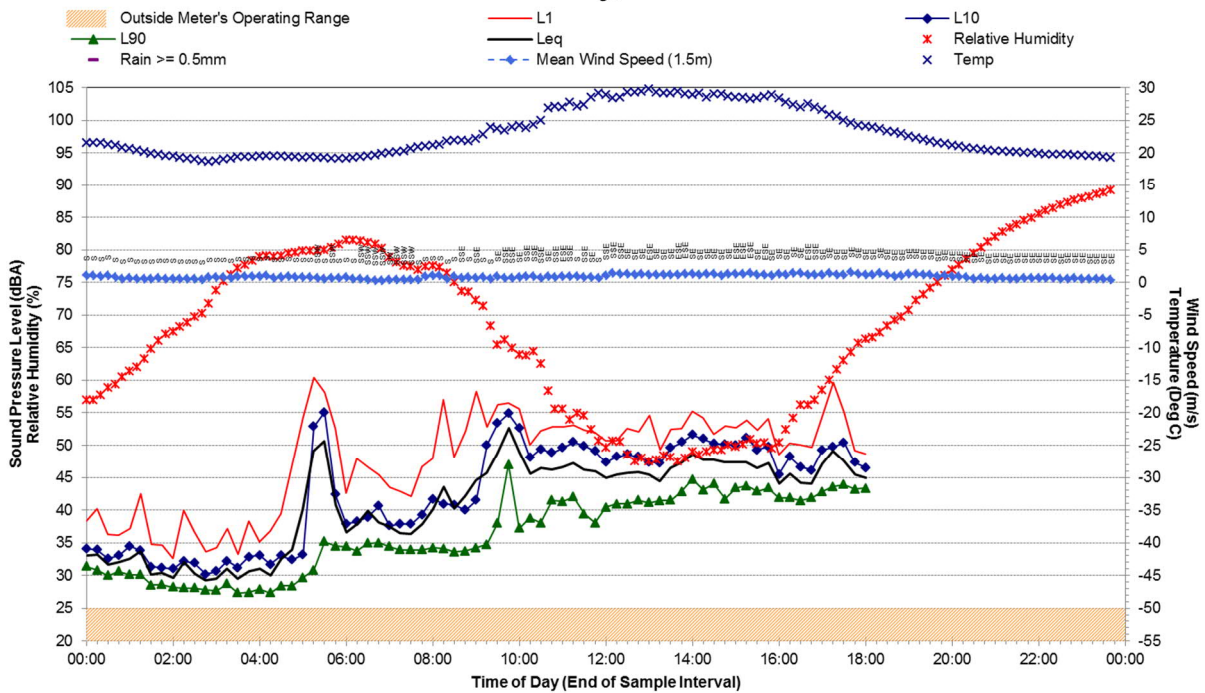
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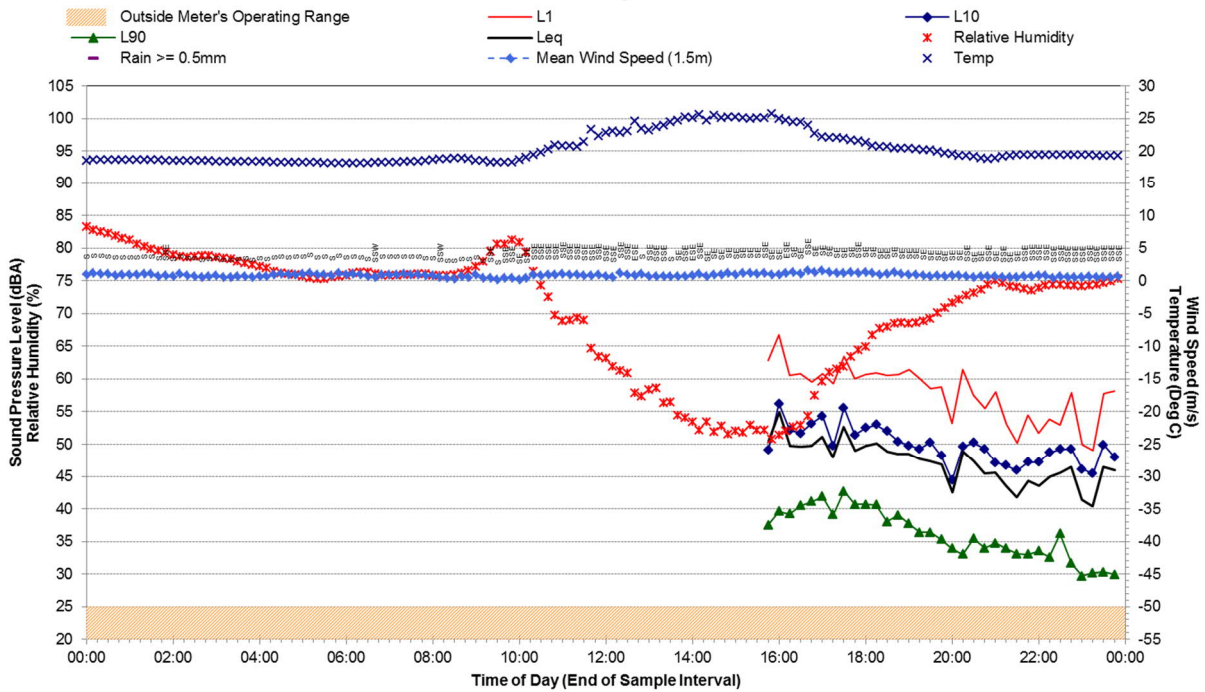
Statistical Ambient Noise Levels Location J - Thursday, 19 December 2019



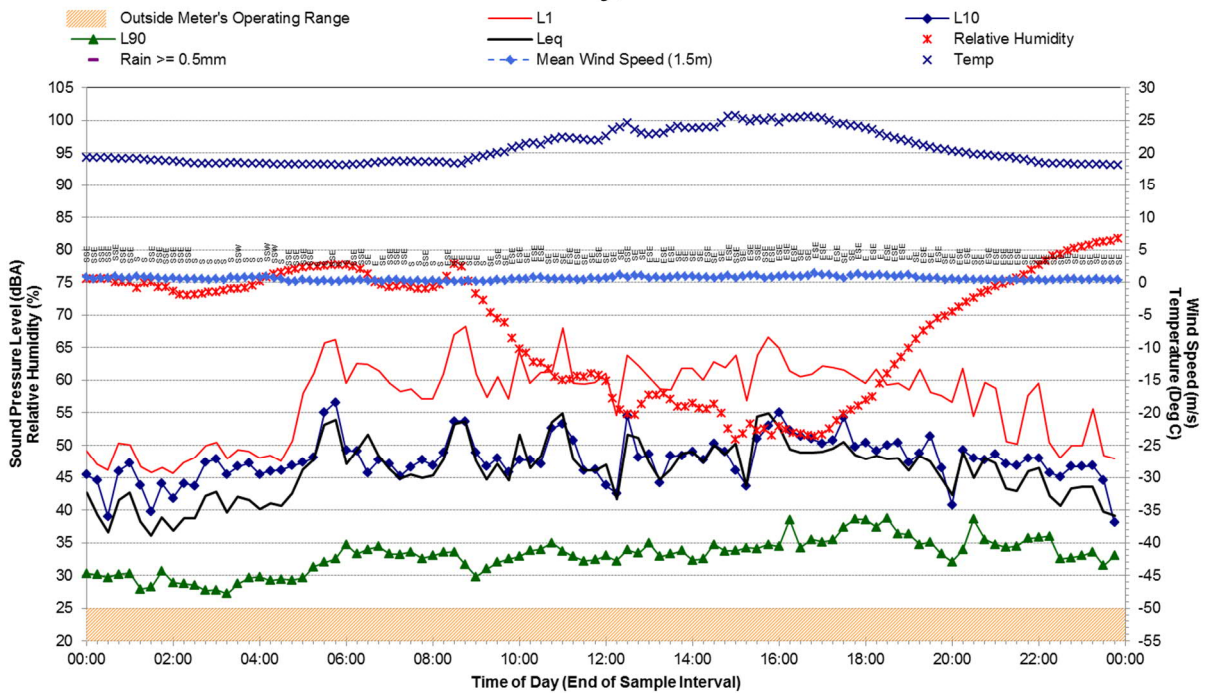
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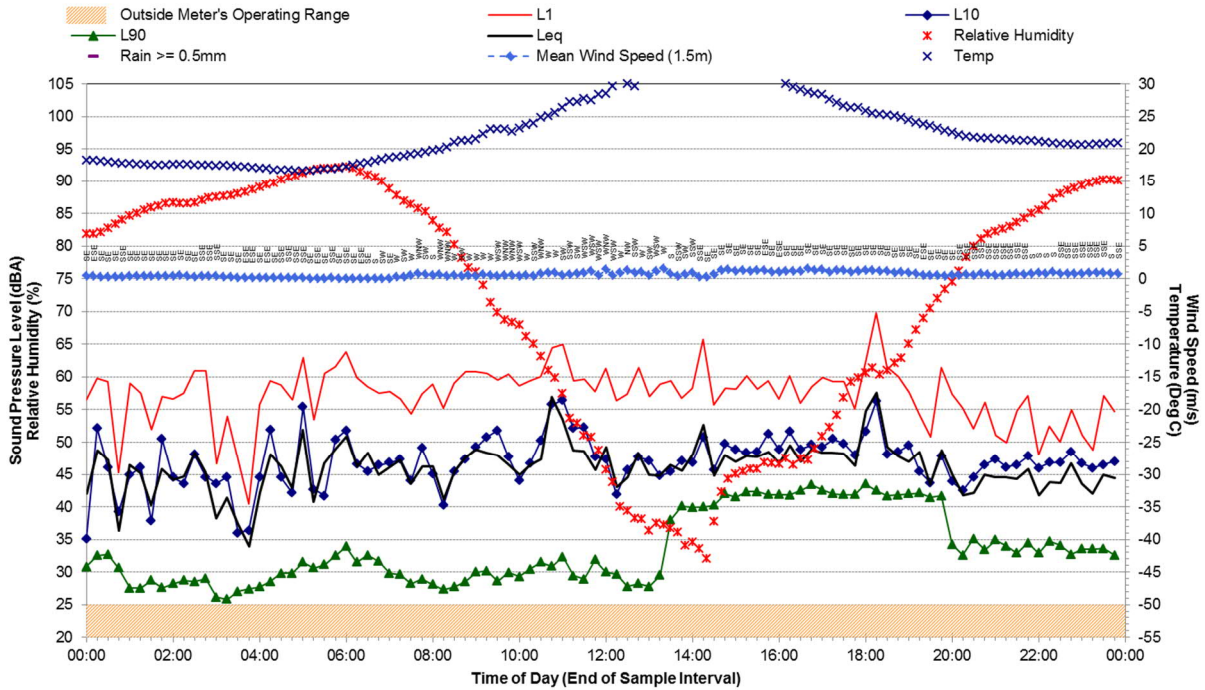
Statistical Ambient Noise Levels Location L - Thursday, 12 December 2019



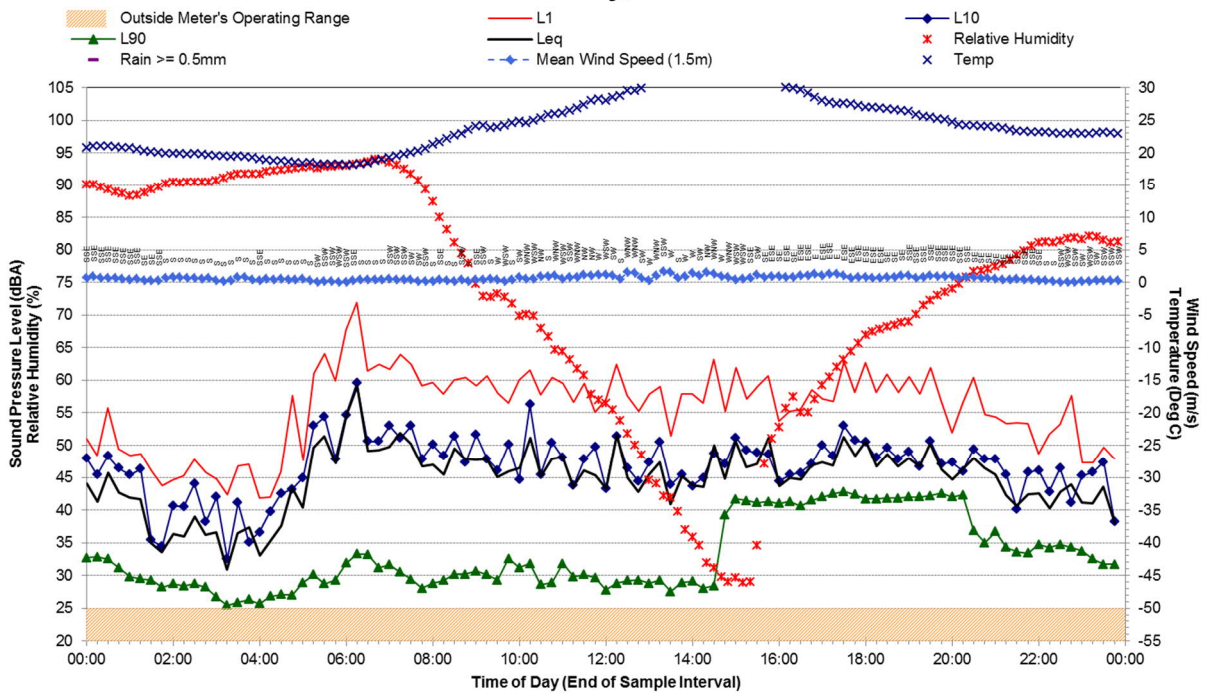
Statistical Ambient Noise Levels Location L - Friday, 13 December 2019



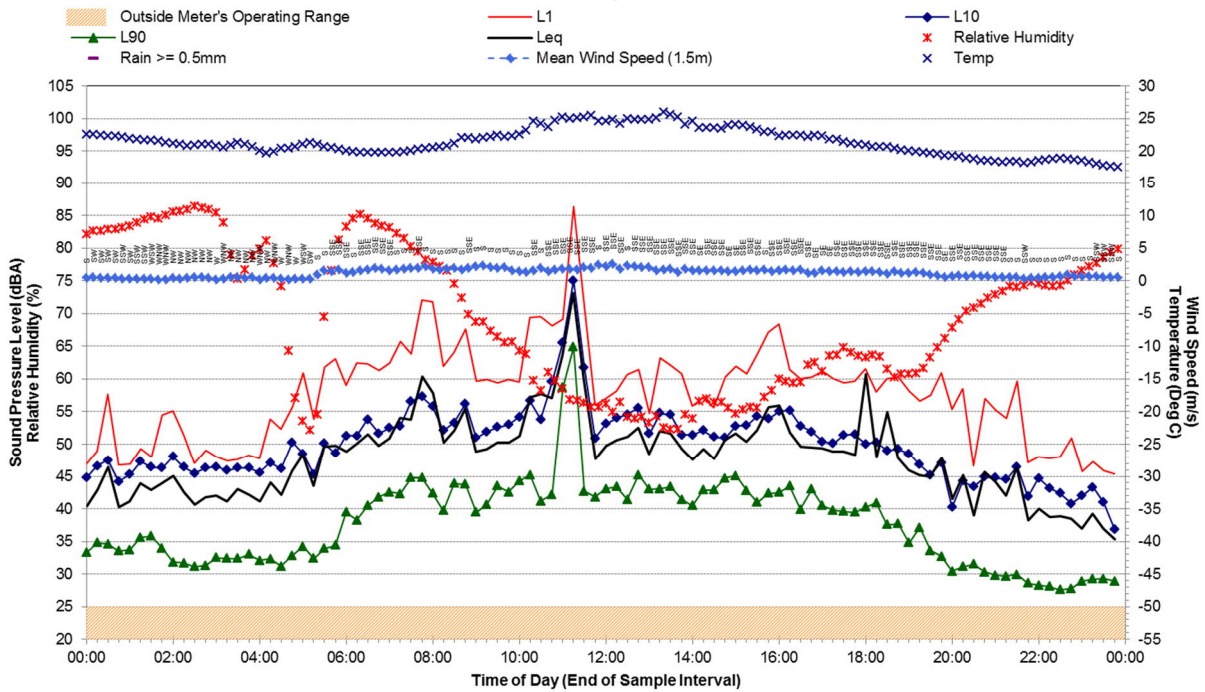
Statistical Ambient Noise Levels Location L - Saturday, 14 December 2019



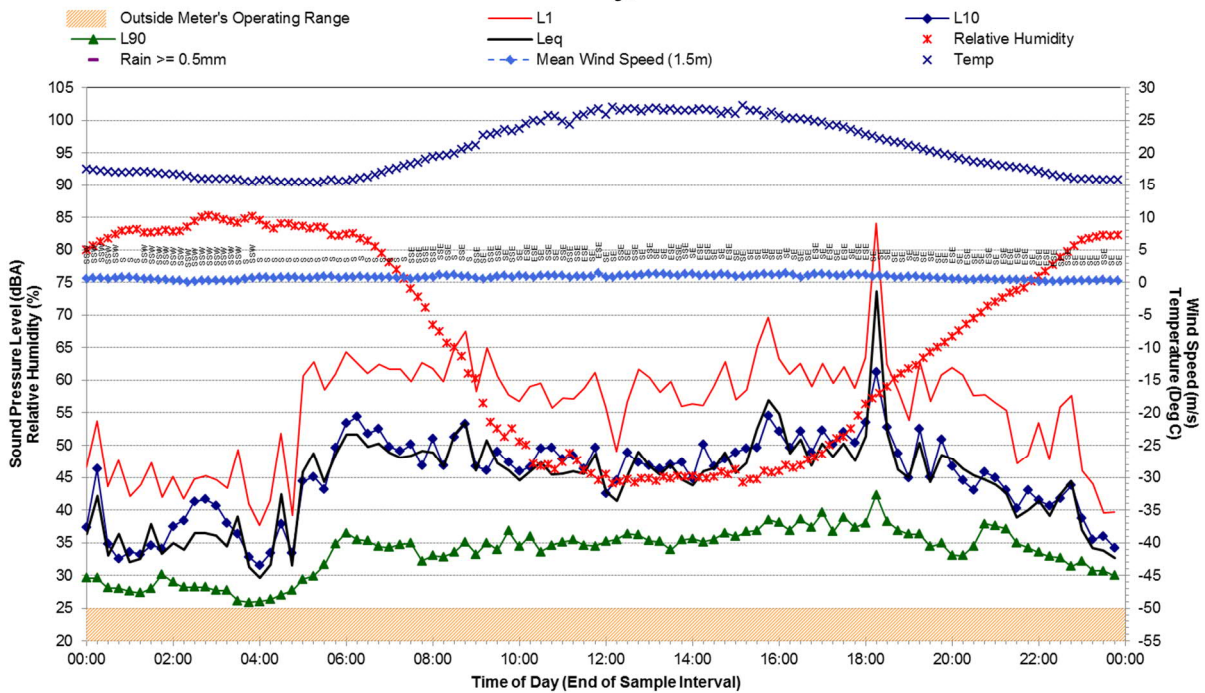
Statistical Ambient Noise Levels Location L - Sunday, 15 December 2019



Statistical Ambient Noise Levels Location L - Monday, 16 December 2019

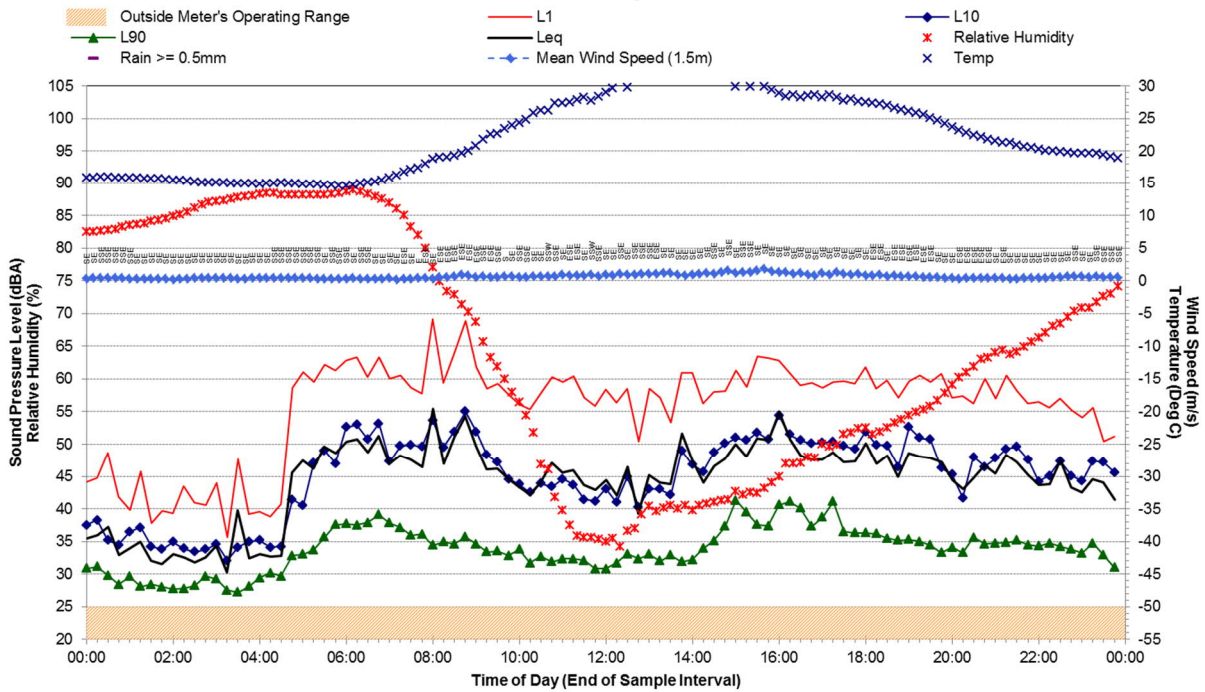


Statistical Ambient Noise Levels Location L - Tuesday, 17 December 2019



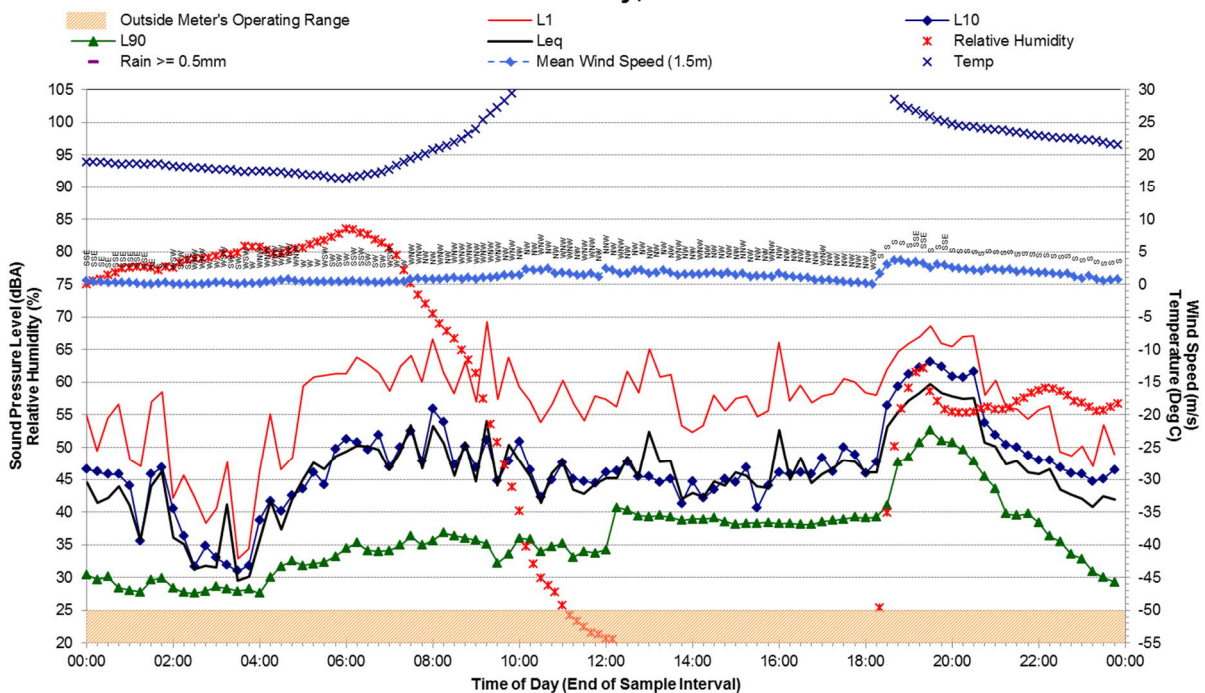
Statistical Ambient Noise Levels

Location L - Wednesday, 18 December 2019



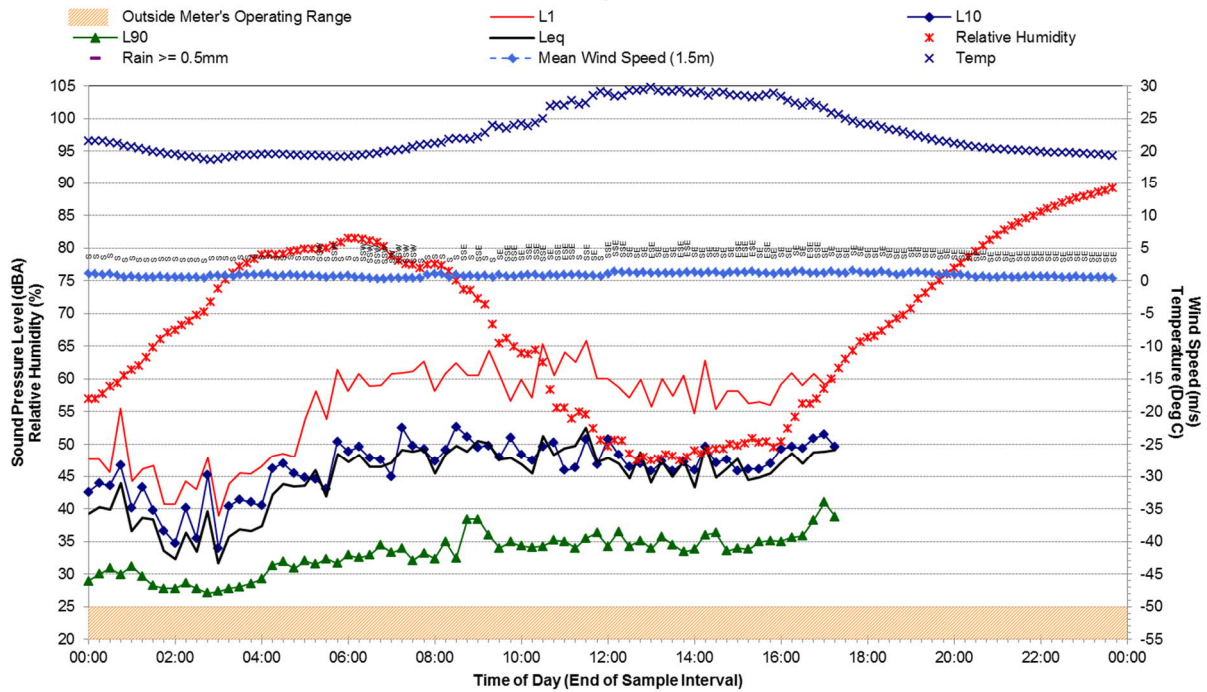
Statistical Ambient Noise Levels

Location L - Thursday, 19 December 2019



Statistical Ambient Noise Levels

Location L - Friday, 20 December 2019



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