DONALDSON AND ABEL COAL MINES

Quarterly Noise Monitoring
Quarter Ending December 2019

Prepared for:

Donaldson Coal Pty Ltd
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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

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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	$L_{A10(15minute)}$ 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	
		$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{A1(1minute)}$
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:
            - 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 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 (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

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

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)
		LAmax	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)
		LAmax	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)
		LAmax	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 (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
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)
		LAmax	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 $L_{Aeq(15minute)}$ 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 $L_{A1(1minute)}$ Contribution dBA	Consent Conditions $L_{A1(1minute)}$ 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)			
		L_{A1}	L_{A10}	L_{A90}	L_{Aeq}
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 L_{A90} noise levels collected from each monitoring location are presented graphically in Figure 1, Figure 2 and Figure 3 for the daytime, evening and night-time periods respectively.

Figure 1 Long term Daytime L_{A90} Noise Levels

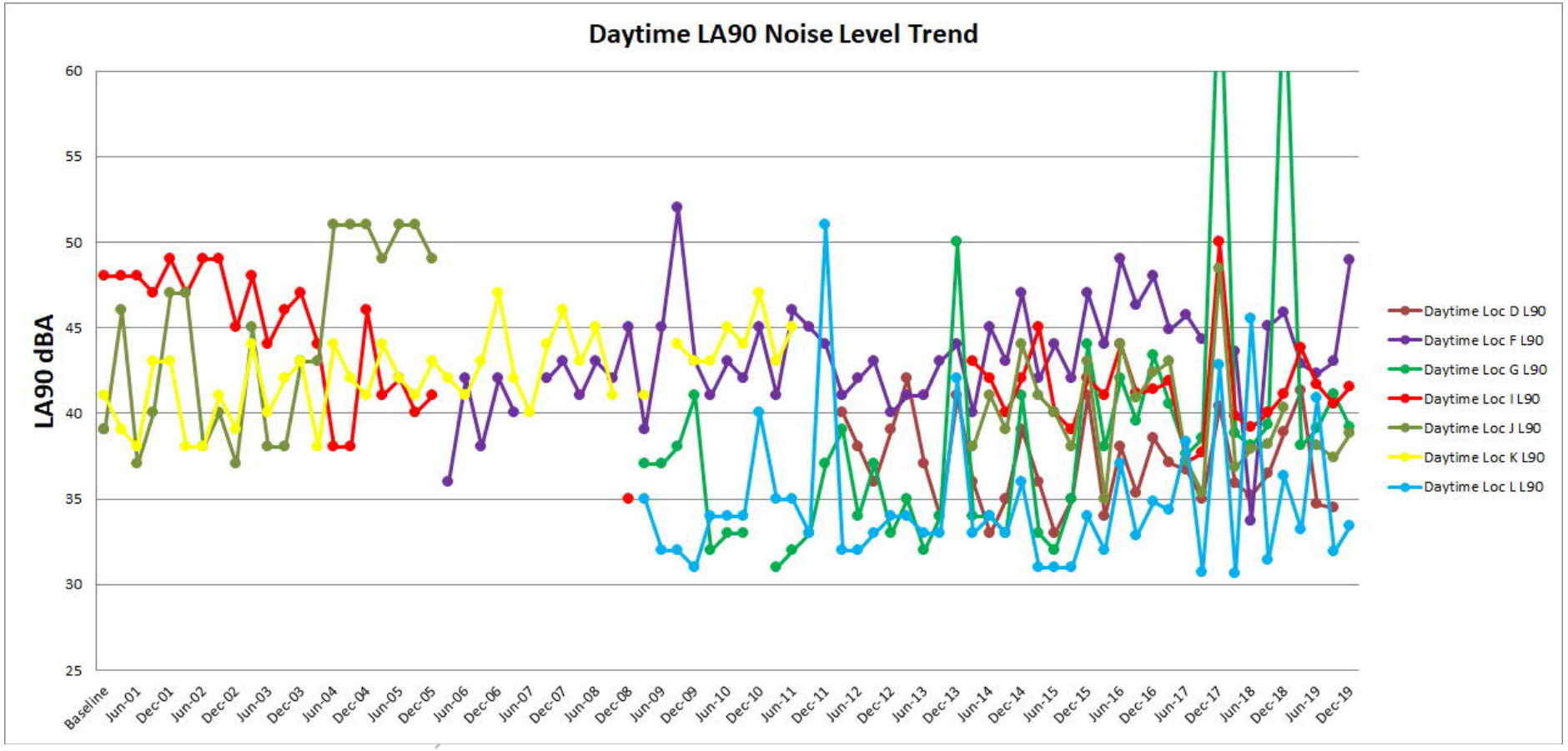


Figure 2 Long term Evening L_{A90} Noise Levels

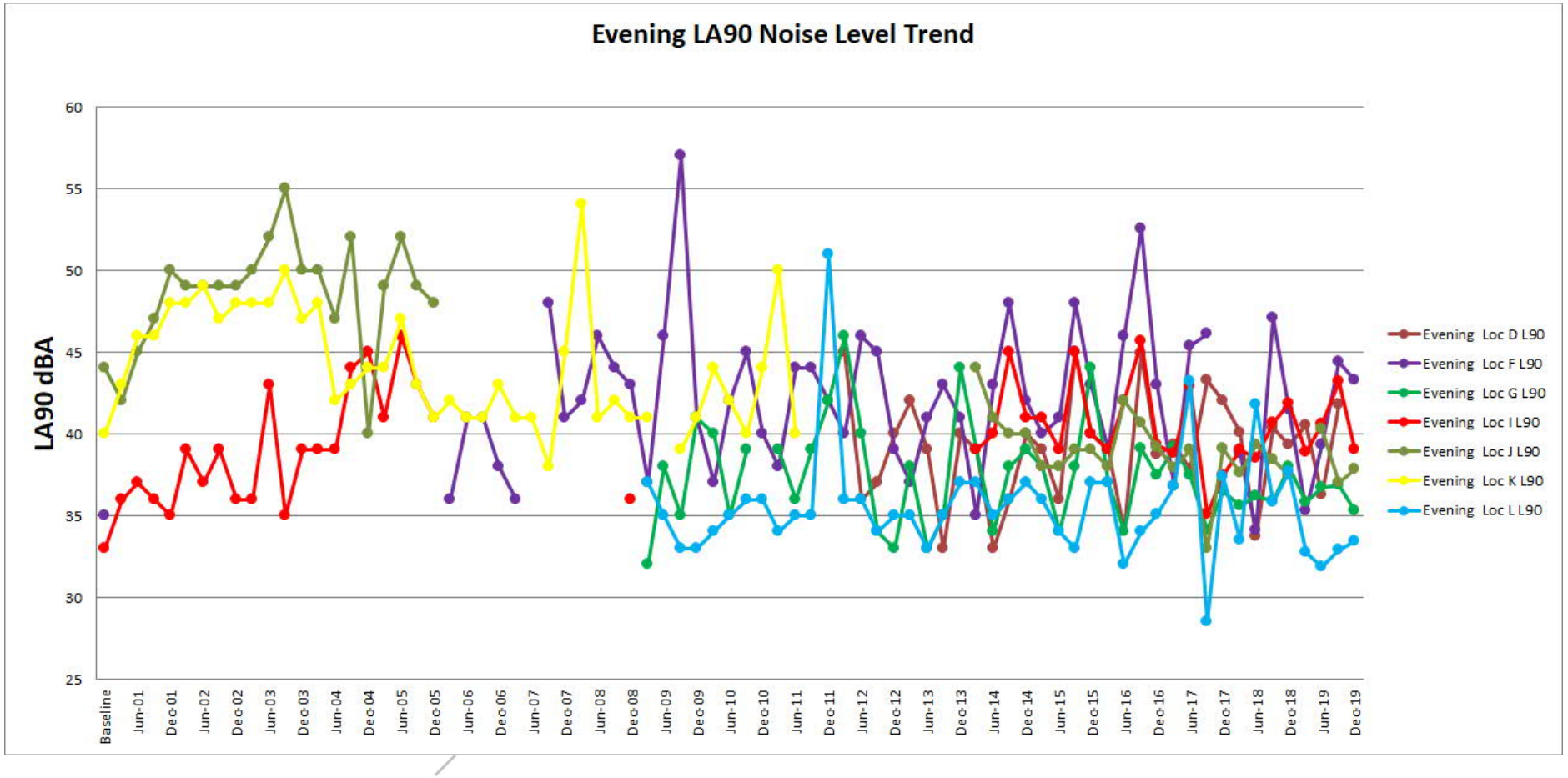
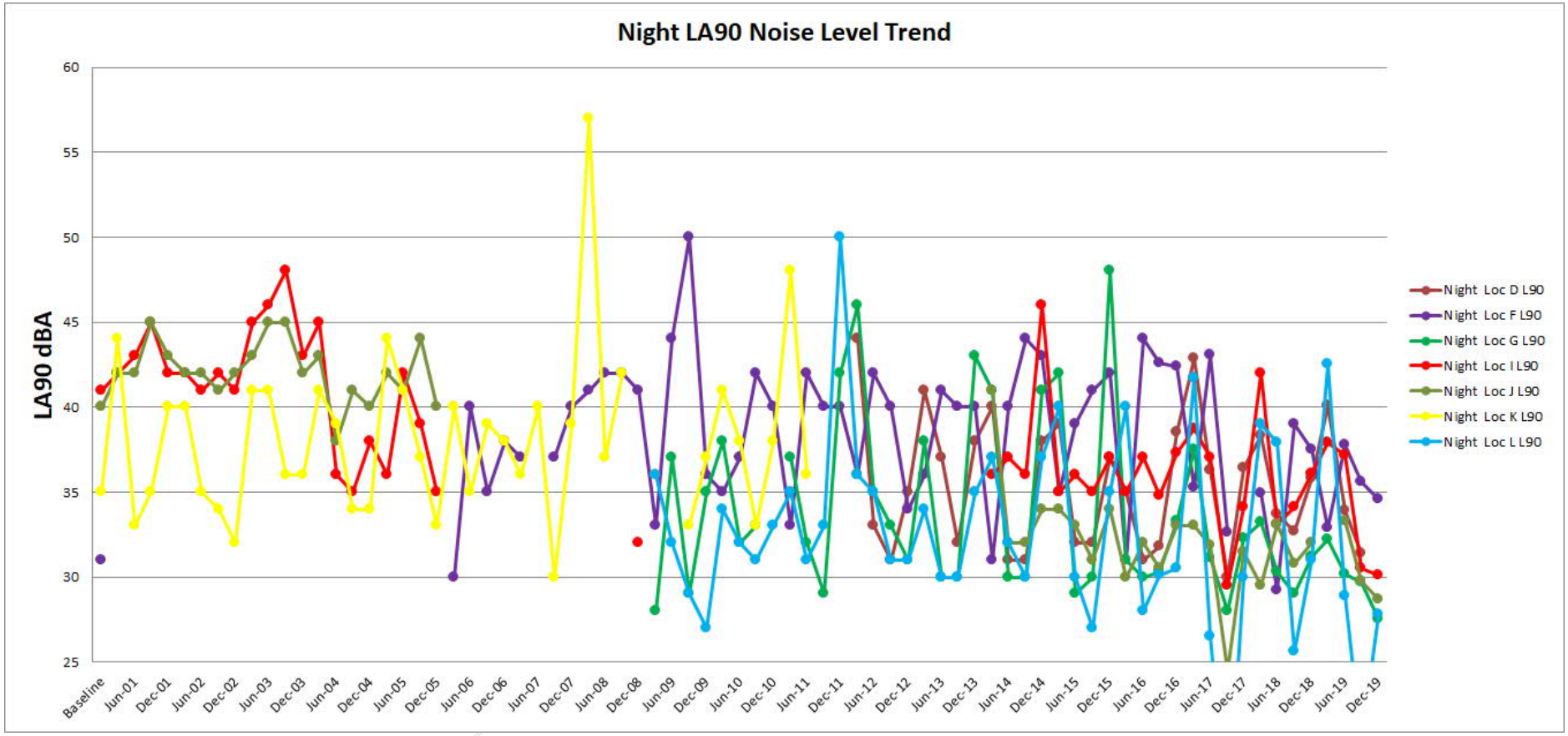


Figure 3 Long term Night-time L_{A90} Noise Levels



5.2.1.1 Baseline

The summary of results in Table 12 shows the ambient L_{A90} 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 L_{A90} Results Comparison – Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A90} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm 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 L_{A90} noise levels recorded for the current monitoring period compared to those measured in the previous monitoring period.

Table 13 L_{A90} Results Comparison – Previous Quarter

Monitoring Location	Period[1]	Long term Night-time L_{A90} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm 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 L_{A90} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 L_{A90} Results Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A90} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient L_{A10} Noise Comparison

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

Figure 4 Long term Daytime L_{A10} Noise Levels

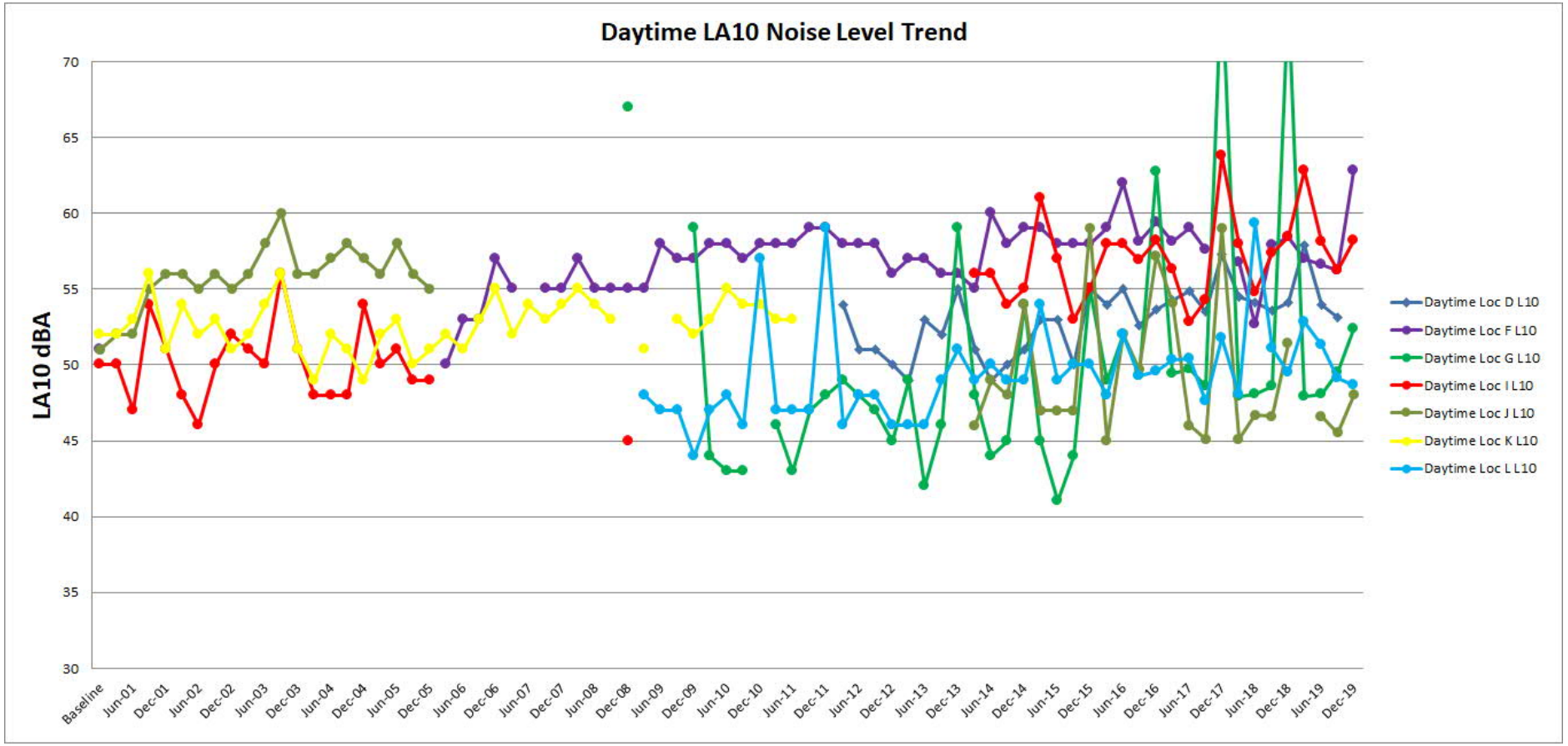


Figure 5 Long term Evening L_{A10} Noise Levels

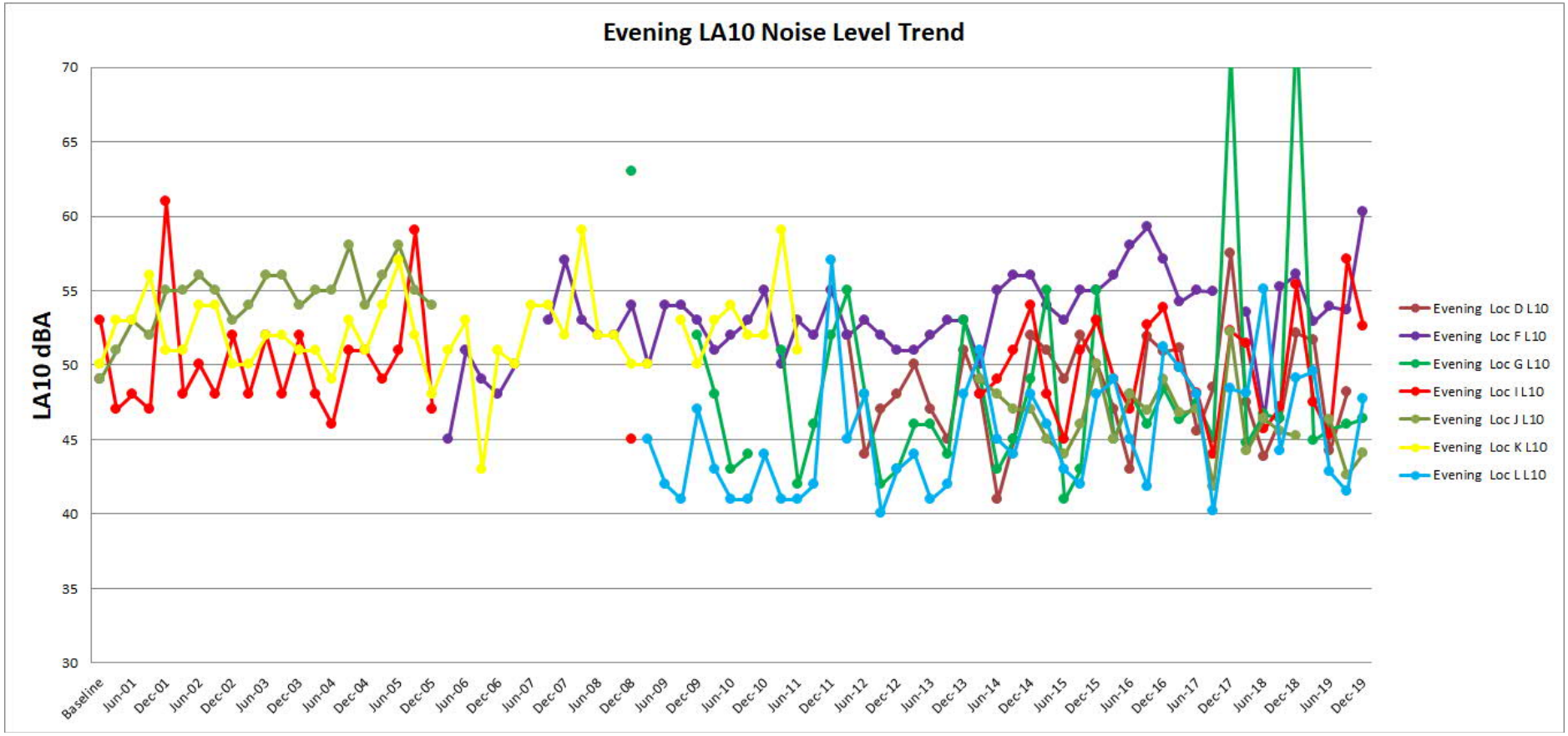
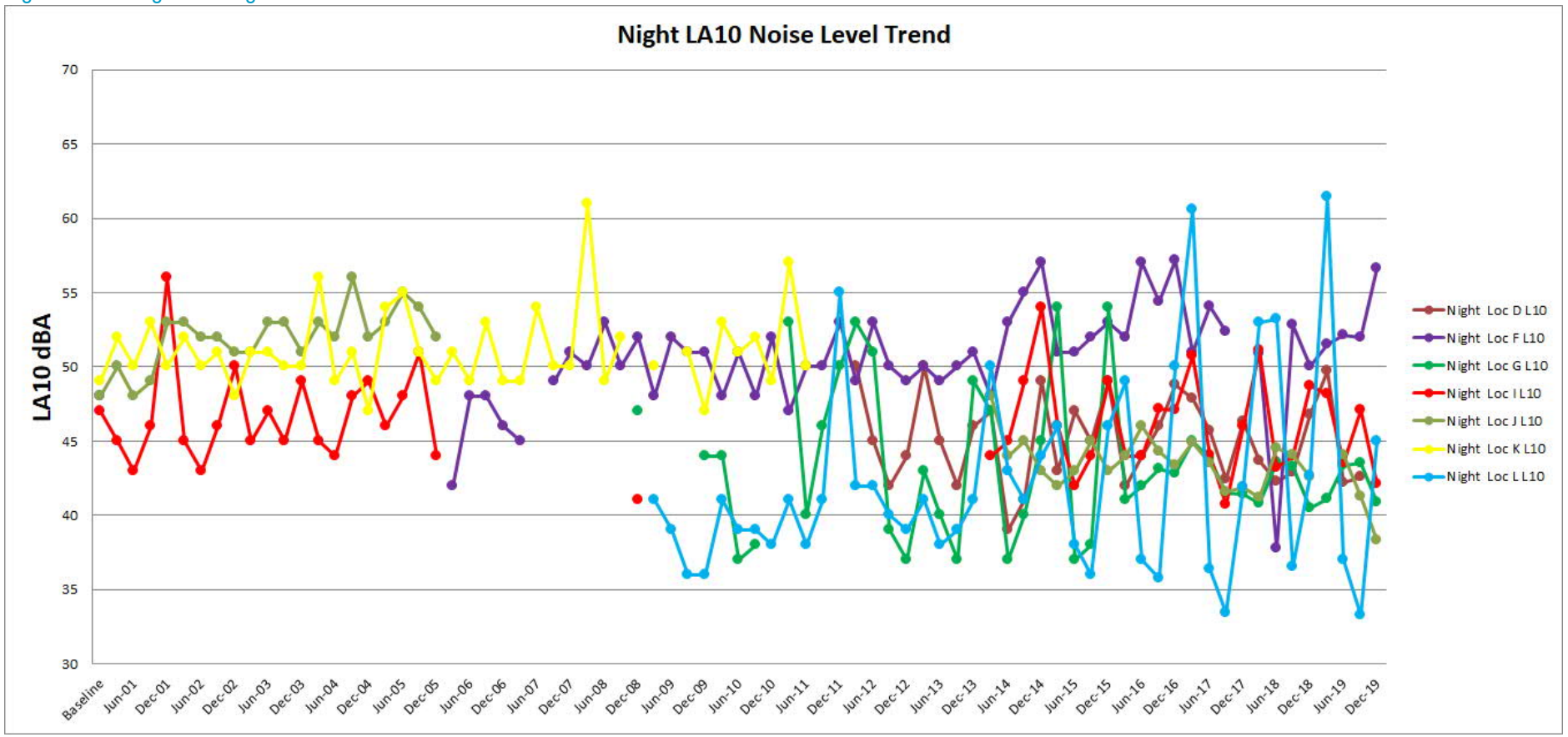


Figure 6 Long term Night L_{A10} Noise Levels



Baseline

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

Table 15 L_{A10} Results Comparison – Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A10} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm 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 L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 L_{A10} Results Comparison – Previous Quarter

Monitoring Location	Period[1]	Long term Night-time L_{A10} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm 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 L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 L_{A10} Result Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A10} 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 10.00 pm; Night - 10.00 pm to 7.00 am pm 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 L_{A10} and L_{A90} 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 x 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

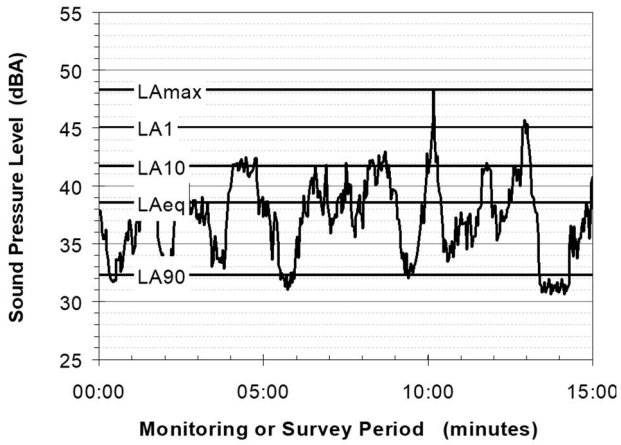
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

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

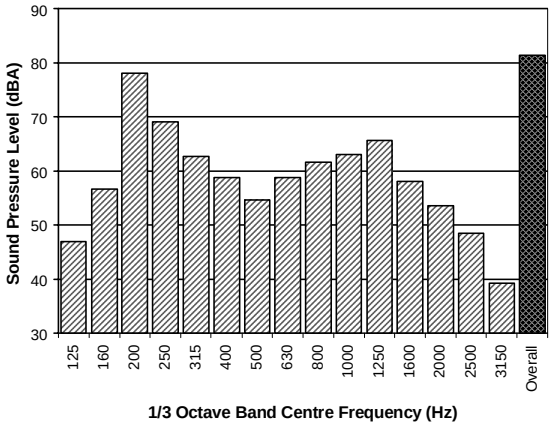
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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/Vo), where Vo 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

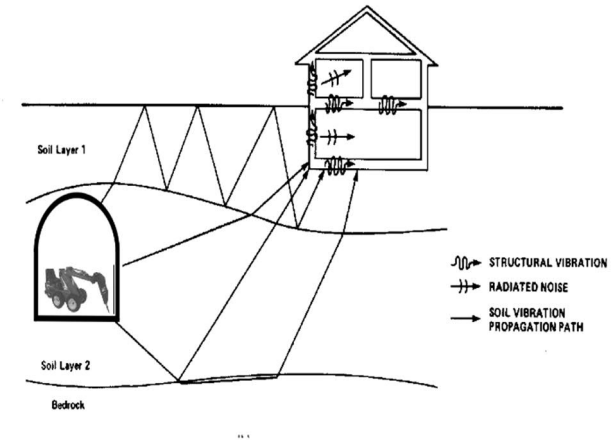
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience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

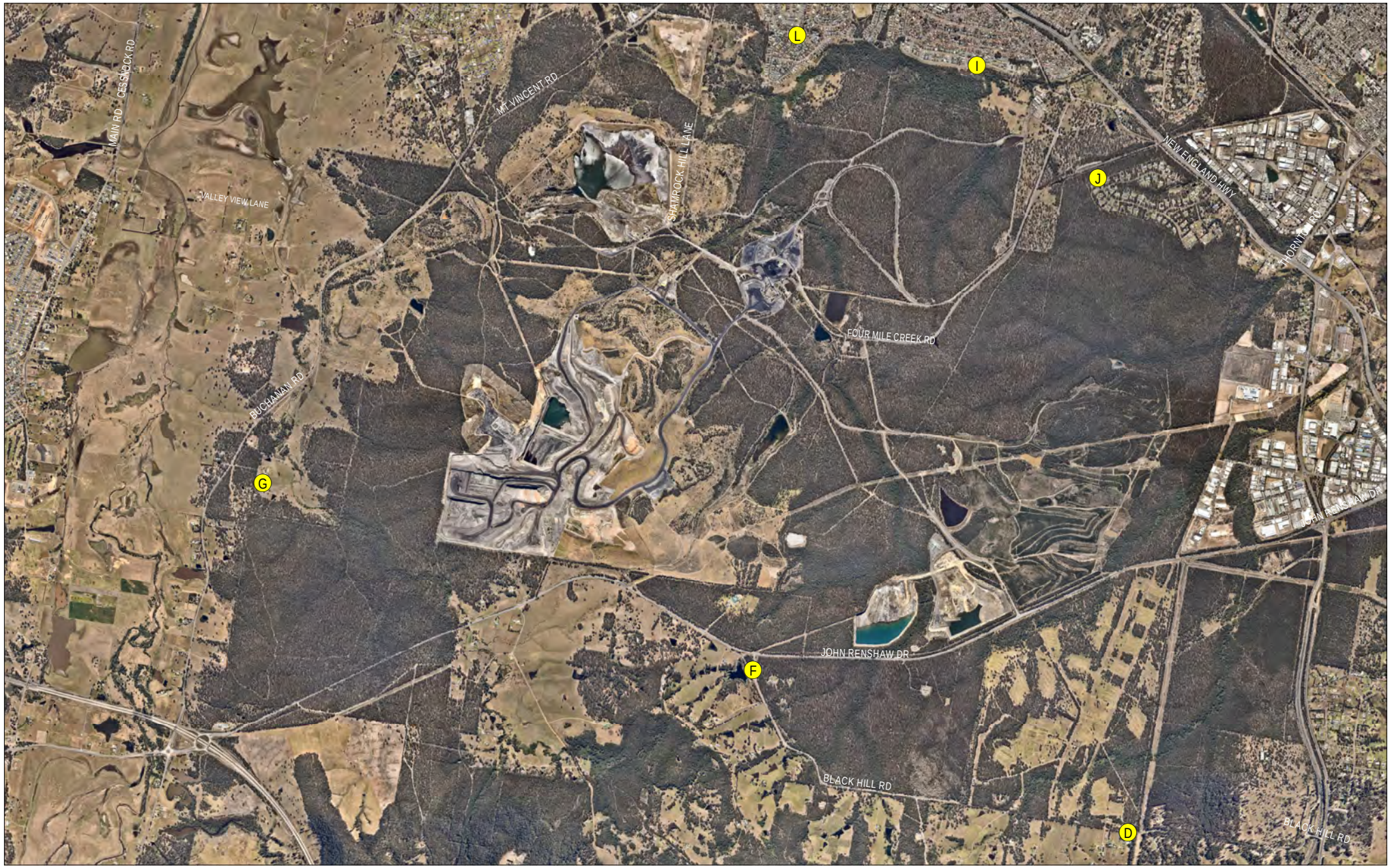
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



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\SLR630010530 1200_AB_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

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

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W
E
S

0 500 1,000 1,500 2,000 m

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 ±2° C	**Relative Humidity:**	26% ±5%
Date of Calibration:	09/09/2019	**Issue Date:**	09/09/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: IKB **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.

NATA
WORLD RECOGNISED ACCREDITATION

ACU-VIB
ELECTRONICS
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

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

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*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	NA
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	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: 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.

NATA
WORLD RECOGNISED ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB ELECTRONICS
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

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 ±2° C

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

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

CHECKED BY: NKB . **AUTHORISED SIGNATURE:** .....
Jack Kelt

Accredited for compliance with ISO/IEC 17025 - Calibration
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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 ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.01dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.08dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.15dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.14dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.21dB	± 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 % ±5%

Temperature: 23 °C ±2° C

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

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

CHECKED BY: JKB **AUTHORISED SIGNATURE:** .....
Jack Rielt

Accredited for compliance with ISO/IEC 17025 - Calibration
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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 ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.11dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.18dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.25dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.24dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.31dB	± 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 ±2° C	**Relative Humidity:**	53 % ±5%
Date of Calibration:	27/06/2019	**Issue Date:**	27/06/2019

Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: ..MB.. **AUTHORISED SIGNATURE:** .....

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration

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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: ±0.13dB (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 ±2° C	**Relative Humidity:**	53 % ±5%
Date of Calibration:	27/06/2019	**Issue Date:**	27/06/2019

Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration

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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: ±0.13dB (at 95% c.l.) k=2

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

Checked by: .....

Accredited for compliance with ISO/IEC 17025 - Calibration
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Level 7 Building 2 423 Pennant Hills Rd
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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

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 -

		Environmental Conditions	
Acoustic Tests		*Temperature*	*±0.05°C*
31.5 Hz to 8kHz	*±0.16dB*	*Relative Humidity*	*±0.46%*
12.5kHz	*±0.2dB*	*Barometric Pressure*	*±0.017Pa*
16kHz	*±0.29dB*		
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.

NATA WORLD RECOGNISED ACCREDITATION

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		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.

NATA WORLD RECOGNISED ACCREDITATION

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www.acousticresearch.com.au

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.

NATA WORLD RECOGNISED ACCREDITATION

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

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Accredited for compliance with ISO/IEC 17025 - calibration.

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ENVIRONMENTAL CONDITIONS

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

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	127	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1376	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith 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.

2. 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.

3. 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 8305 No 1435233.

4. 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.

5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubeł ..... Test date: 2018-10-26

SVANTEK

ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 977A 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_{sin}=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_{sin}= 31.5 Hz

Nominal result LEQ [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_{sin}= 1000 Hz

Nominal result LEQ [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_{sin}= 8000 Hz

Nominal result LEQ [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_{sin}= 31.5 Hz

Nominal result LEQ [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_{sin}= 1000 Hz

Nominal result LEQ [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_{sin}= 8000 Hz

Nominal result LEQ [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_{sin}= 4000 Hz; Burst duration: 2 s

Range: Low; Steady level nominal result = 117dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
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
		Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	Indication [dB]	115.0	113.0	109.6	106.8	103.9	100.0	97.0	94.0	90.0	-	-	-
		Error [dB]	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	90.0	87.0	83.9	80.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-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	-0.0	-0.1	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	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	Indication [dB]	132.0	130.0	126.6	123.8	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

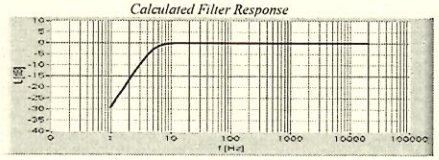
Range: **High**; Steady level nominal result = 46dB

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 - frequency, L - level)

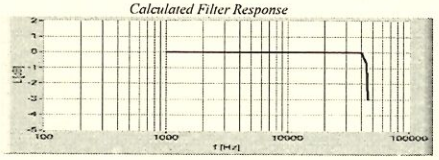
f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
1	-29.5	4	-5.9	16	0.0	250	0.0	16000	-0.0
1.25	-25.5	5	-3.2	20	0.0	500	0.0	20000	-0.0
1.6	-21.3	6.3	-1.4	25	0.0	1000	0.0		
2	-17.3	8	-0.5	31.5	0.0	2000	0.0		
2.5	-13.3	10	-0.2	63	0.0	4000	0.0		
3.15	-9.4	12.5	-0.0	125	0.0	8000	-0.0		

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 - frequency, L - level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
1000	0.0	16000	-0.0	40000	-0.2
2000	0.0	20000	-0.0	43856*	-0.4
4000	-0.0	25000	-0.1	45255*	-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

	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	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;

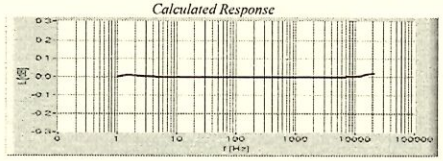
Characteristic	Reference frequency [Hz]	Correct value [dB]	Indication [dB]	Error [dB]
HP1	79.58	140.0	140.2	0.2

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]
1	0.0
1000	0.0
20000	-0.0

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

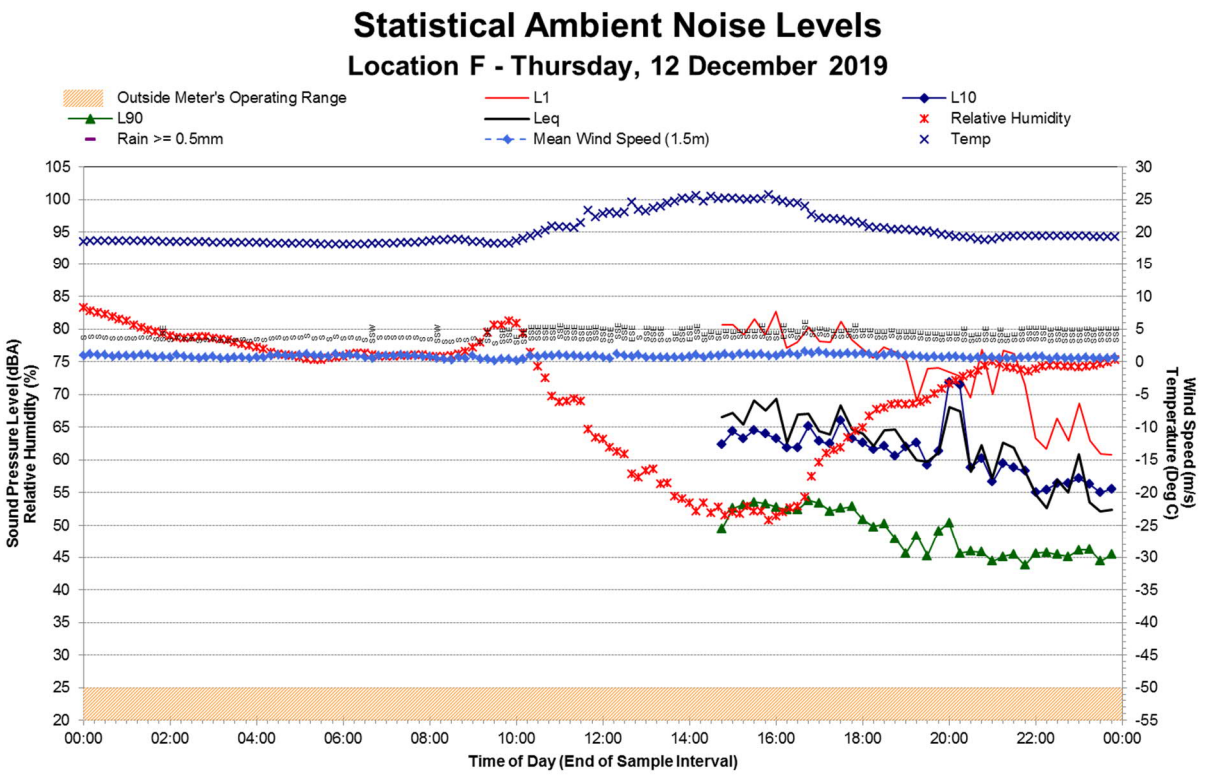
4. INTERNAL NOISE LEVEL (electrical)

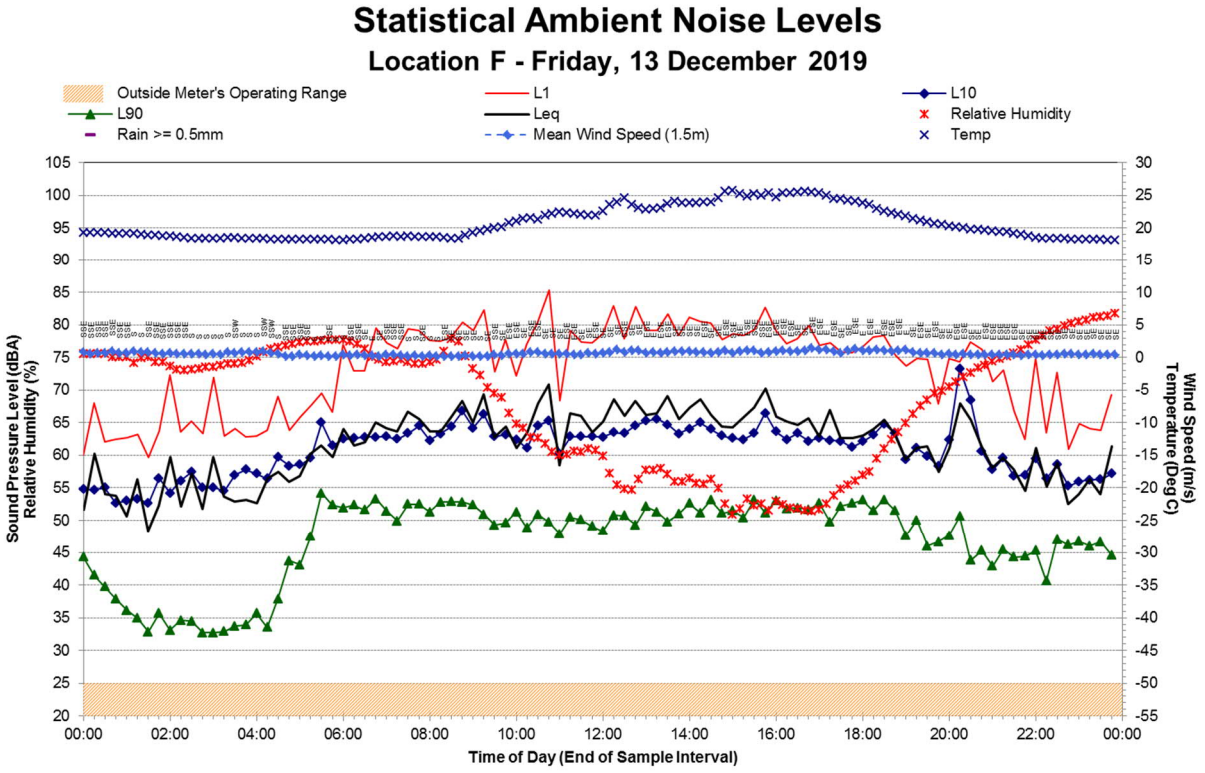
LEVEL METER function; Range: Low;

Characteristic	HP1
Indication [dB]	36.5

APPENDIX D

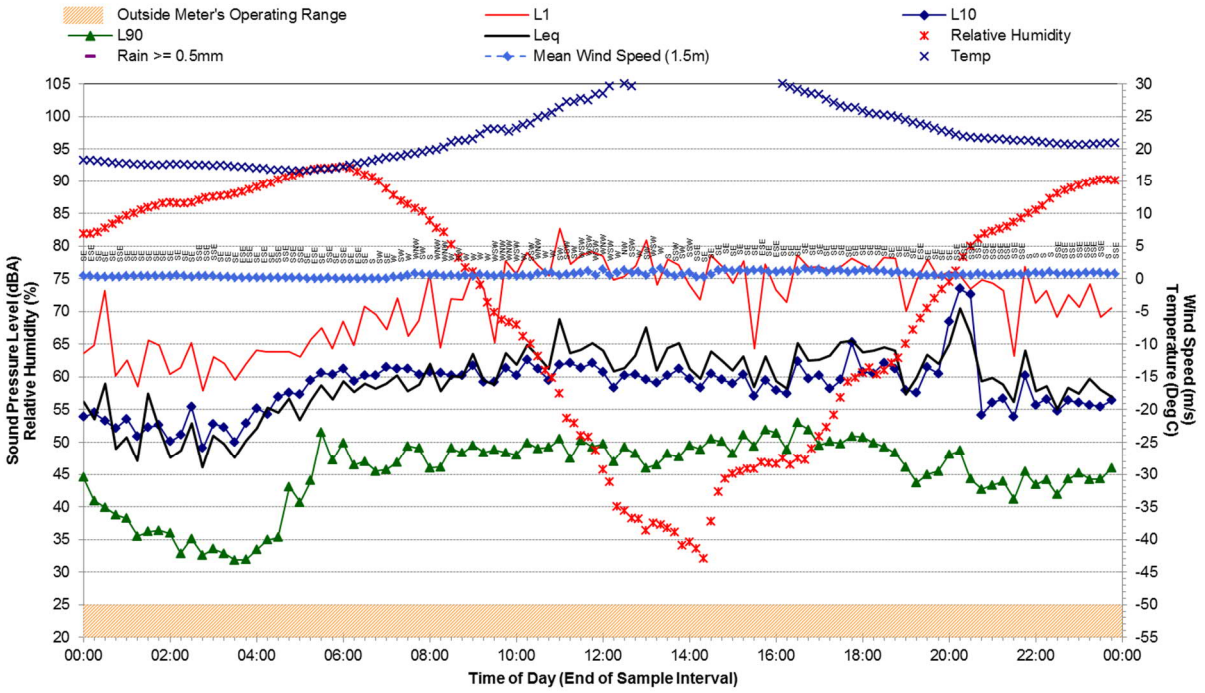
Statistical Ambient Noise Levels


Statistical Ambient Noise Levels
Location F - Thursday, 12 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location F - Friday, 13 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

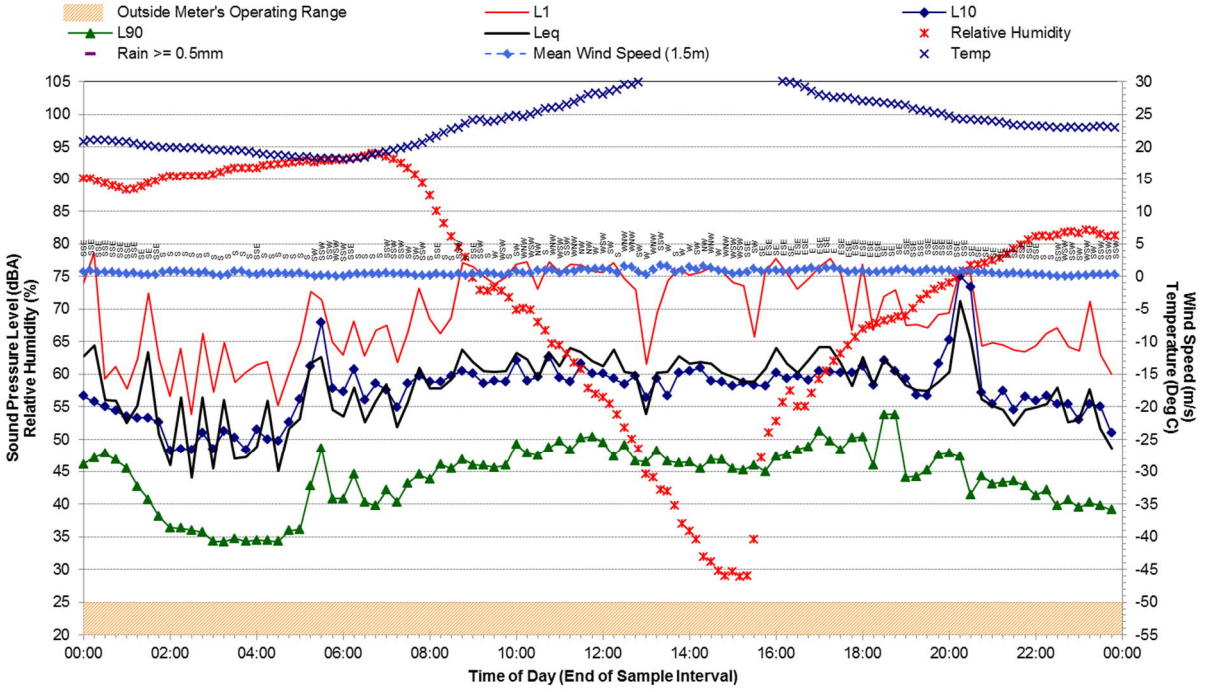
Statistical Ambient Noise Levels

Location F - Saturday, 14 December 2019



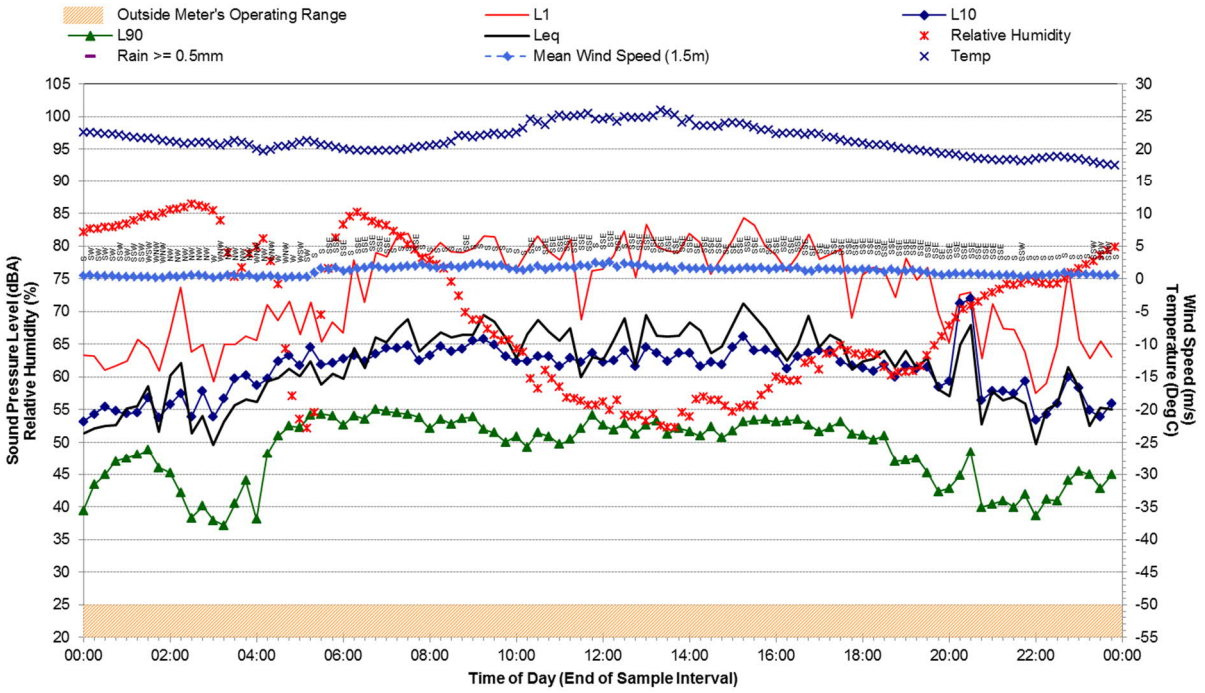
Statistical Ambient Noise Levels

Location F - Sunday, 15 December 2019



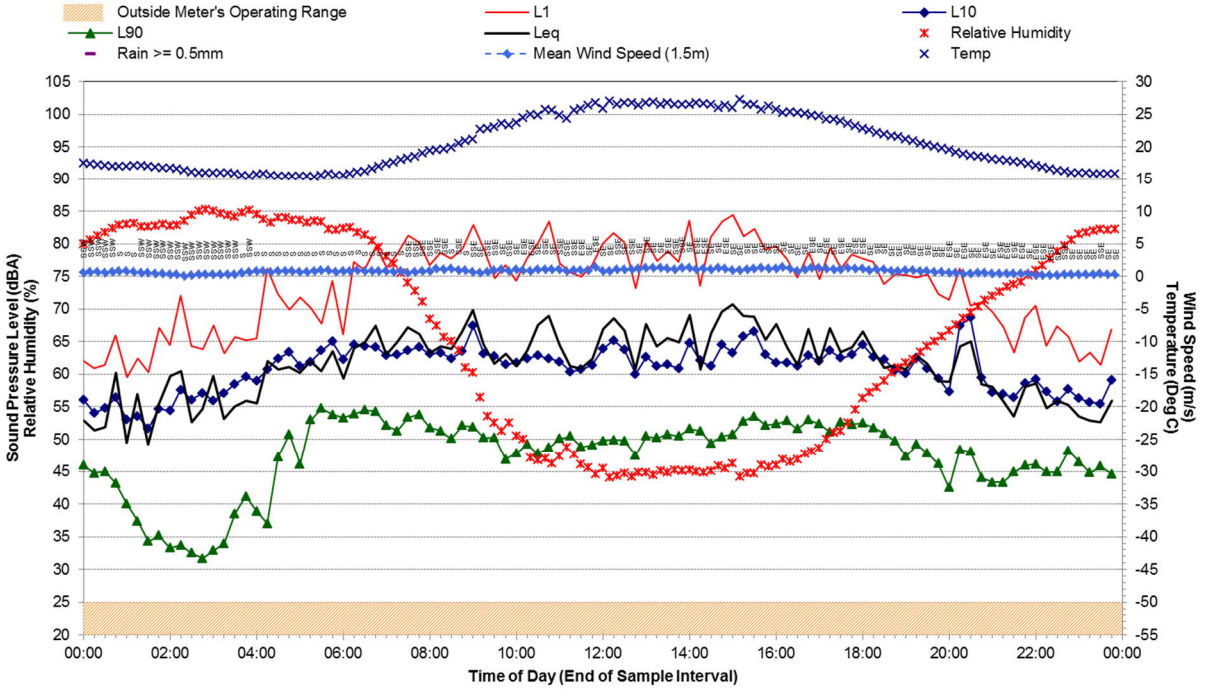
Statistical Ambient Noise Levels

Location F - Monday, 16 December 2019



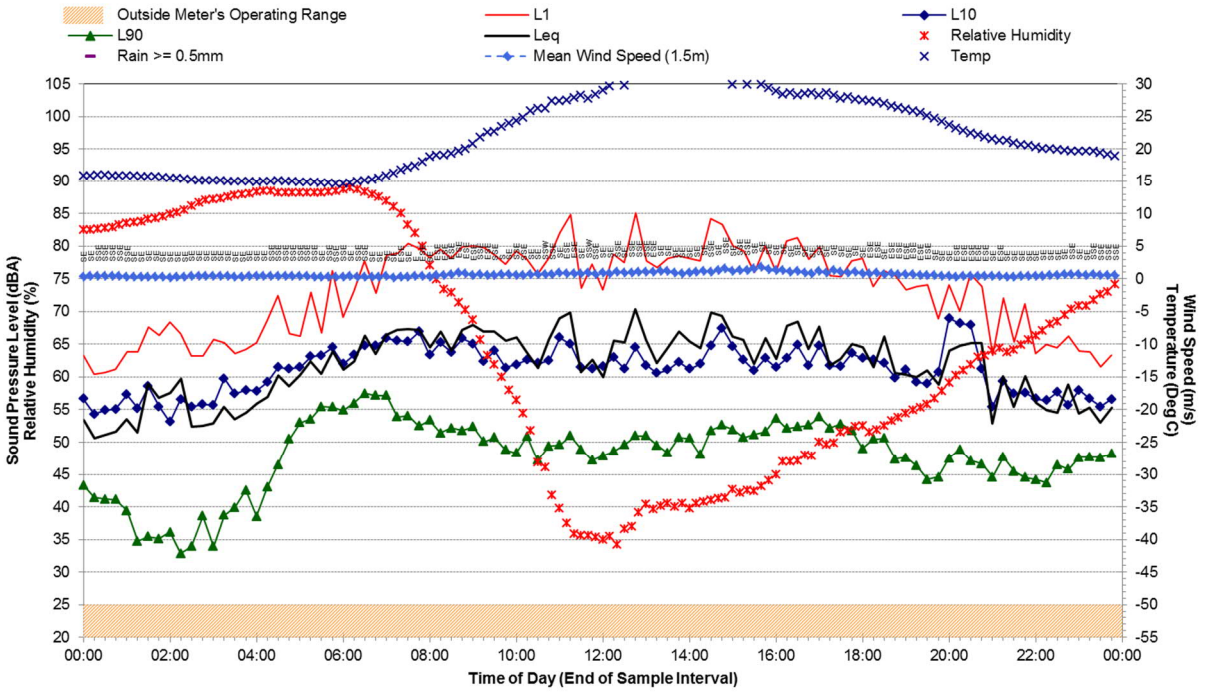
Statistical Ambient Noise Levels

Location F - Tuesday, 17 December 2019



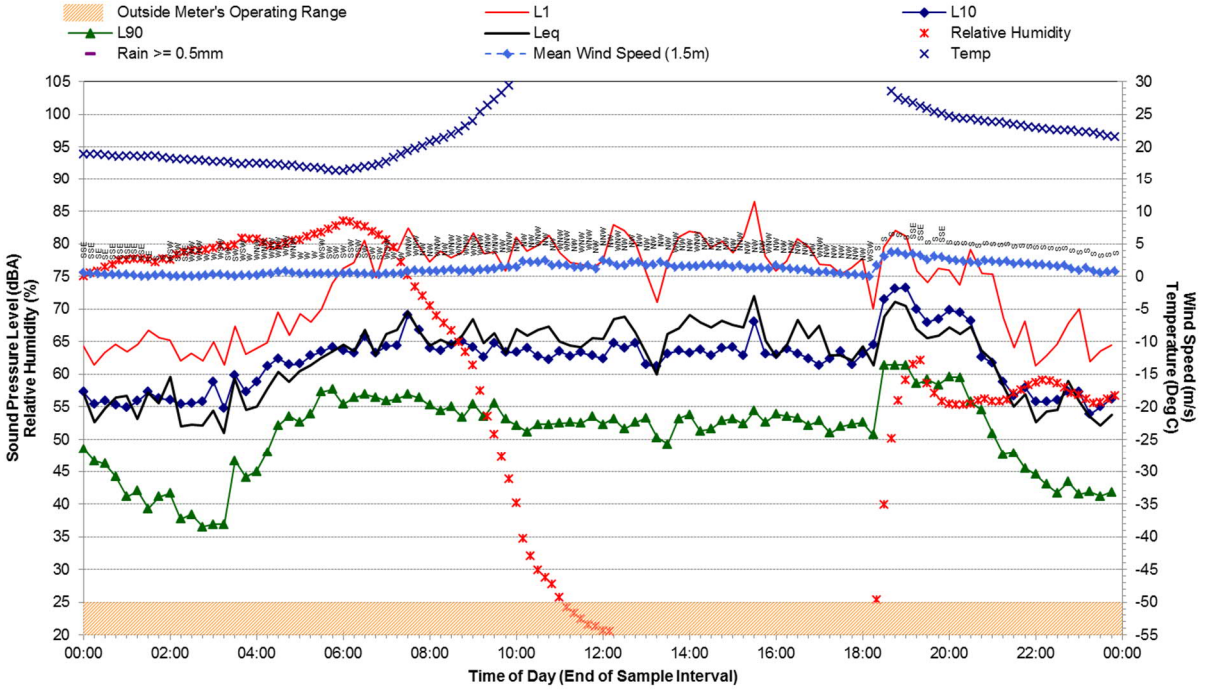
Statistical Ambient Noise Levels

Location F - Wednesday, 18 December 2019



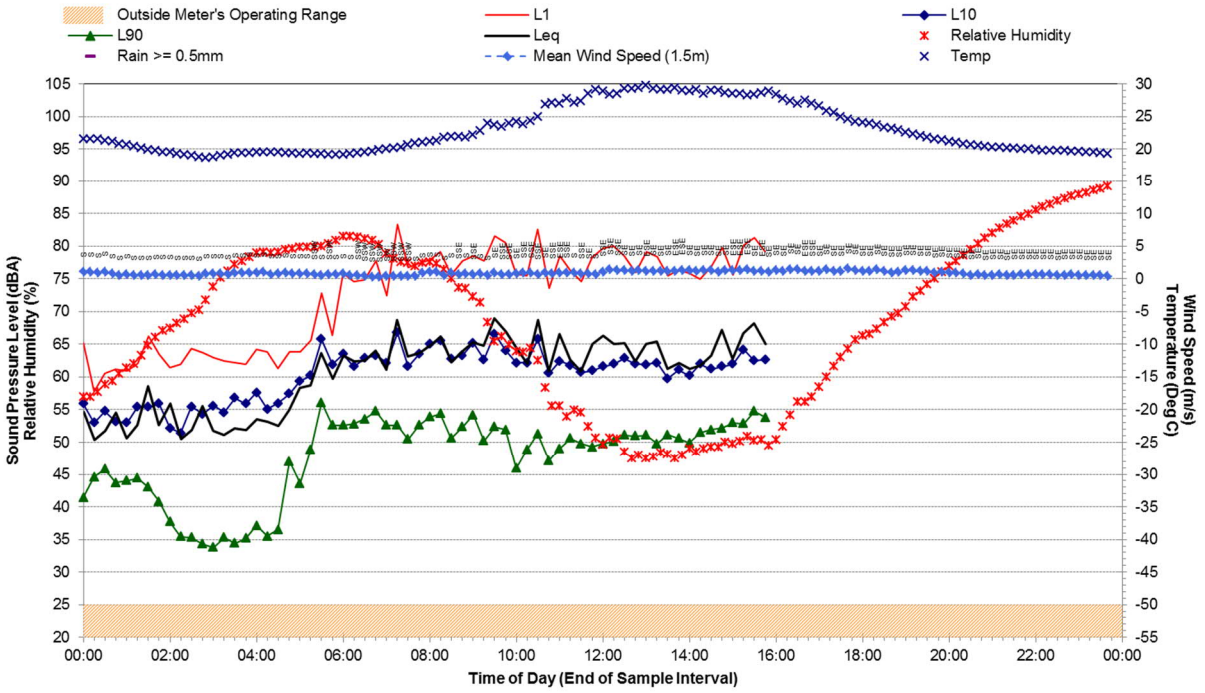
Statistical Ambient Noise Levels

Location F - Thursday, 19 December 2019



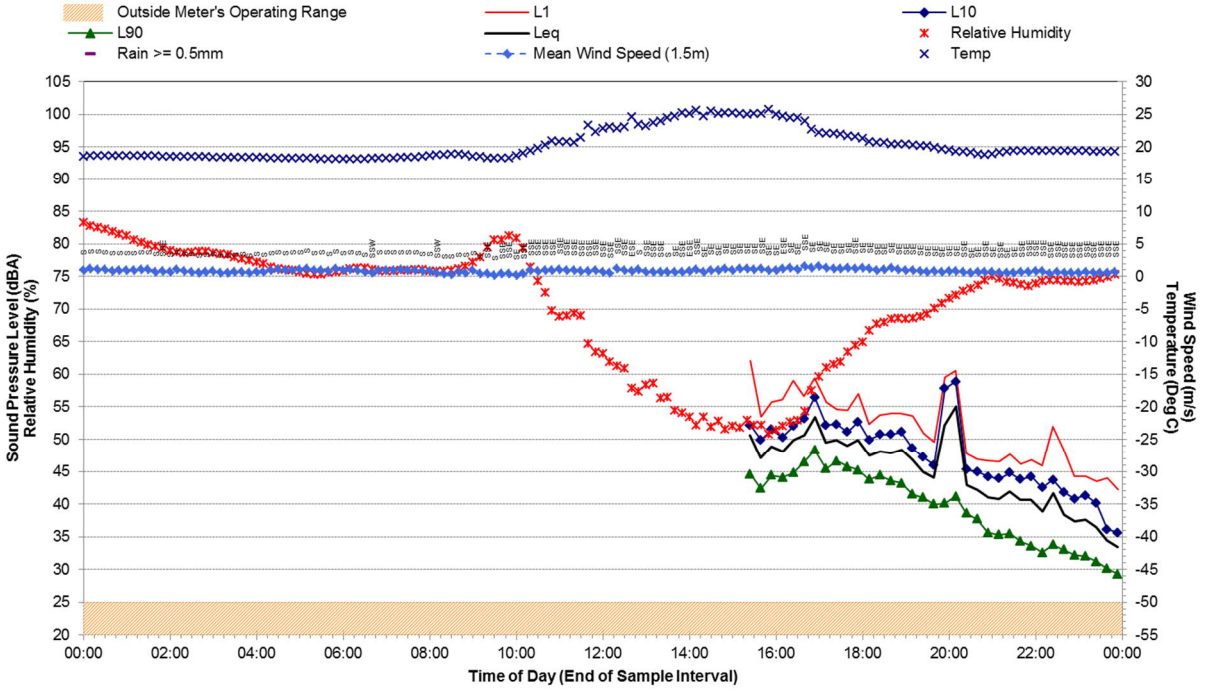
Statistical Ambient Noise Levels

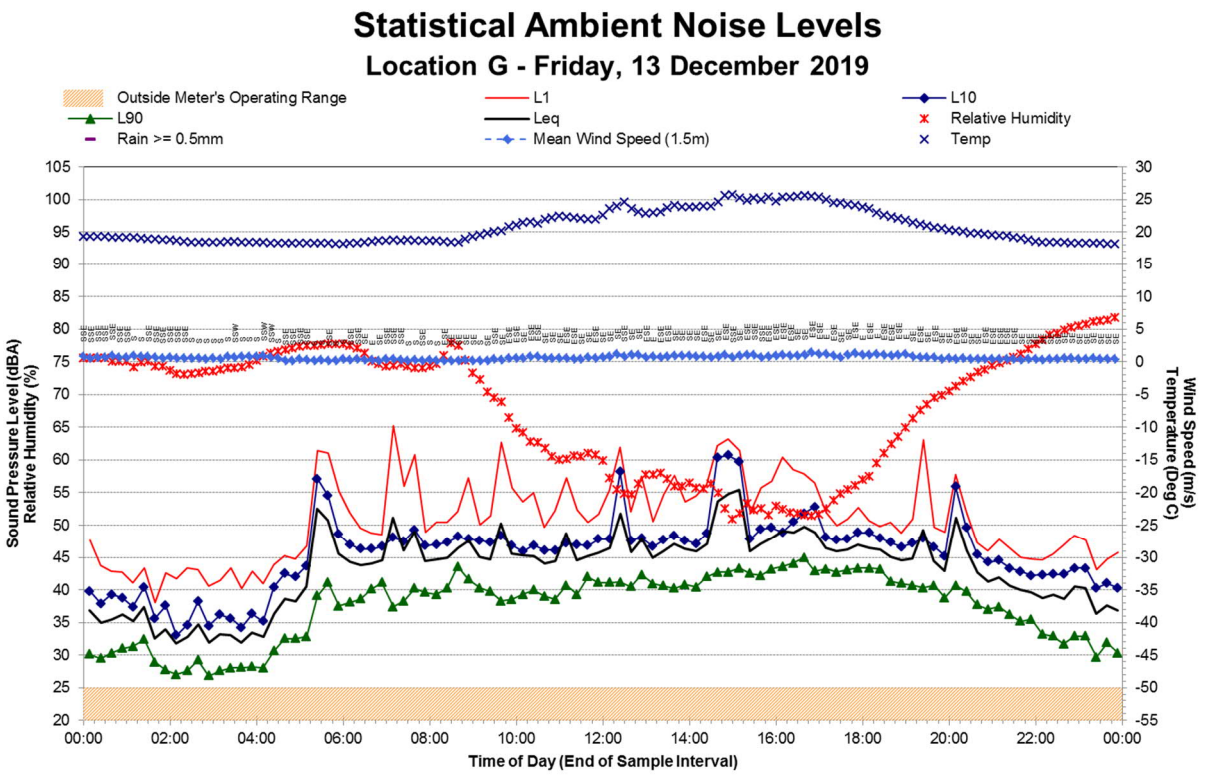
Location F - Friday, 20 December 2019

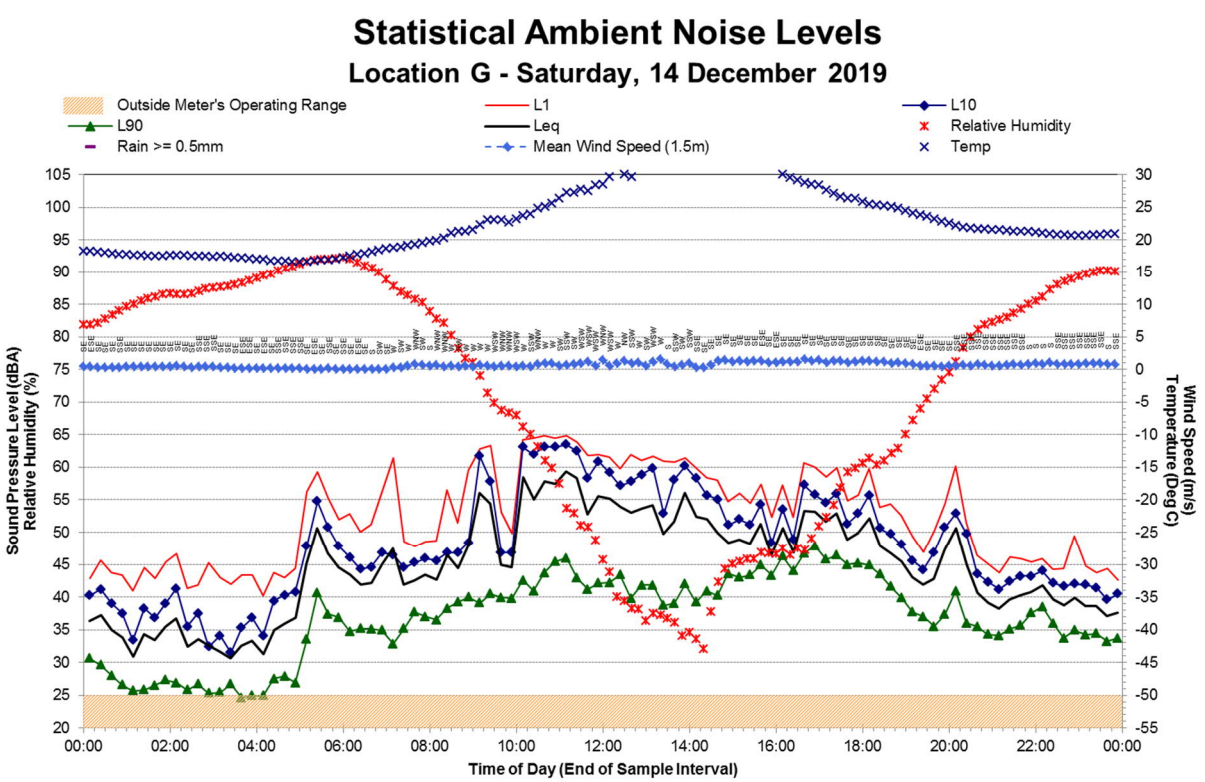


Statistical Ambient Noise Levels

Location G - Thursday, 12 December 2019

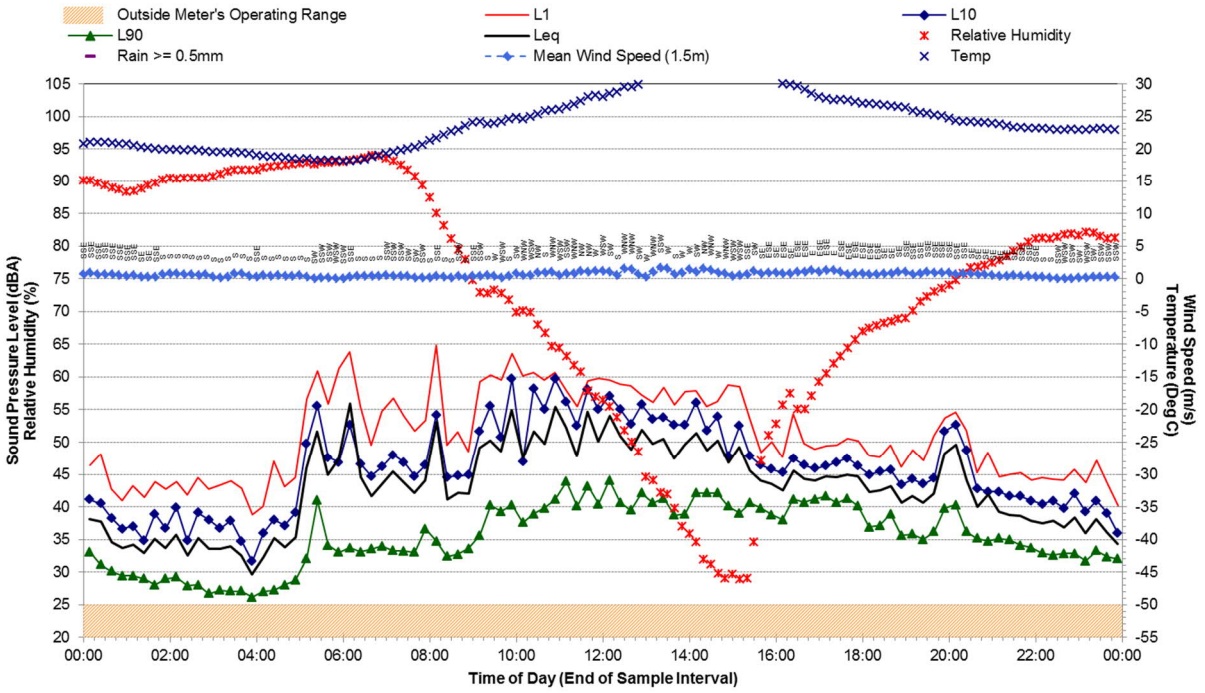



Statistical Ambient Noise Levels
Location G - Friday, 13 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location G - Saturday, 14 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

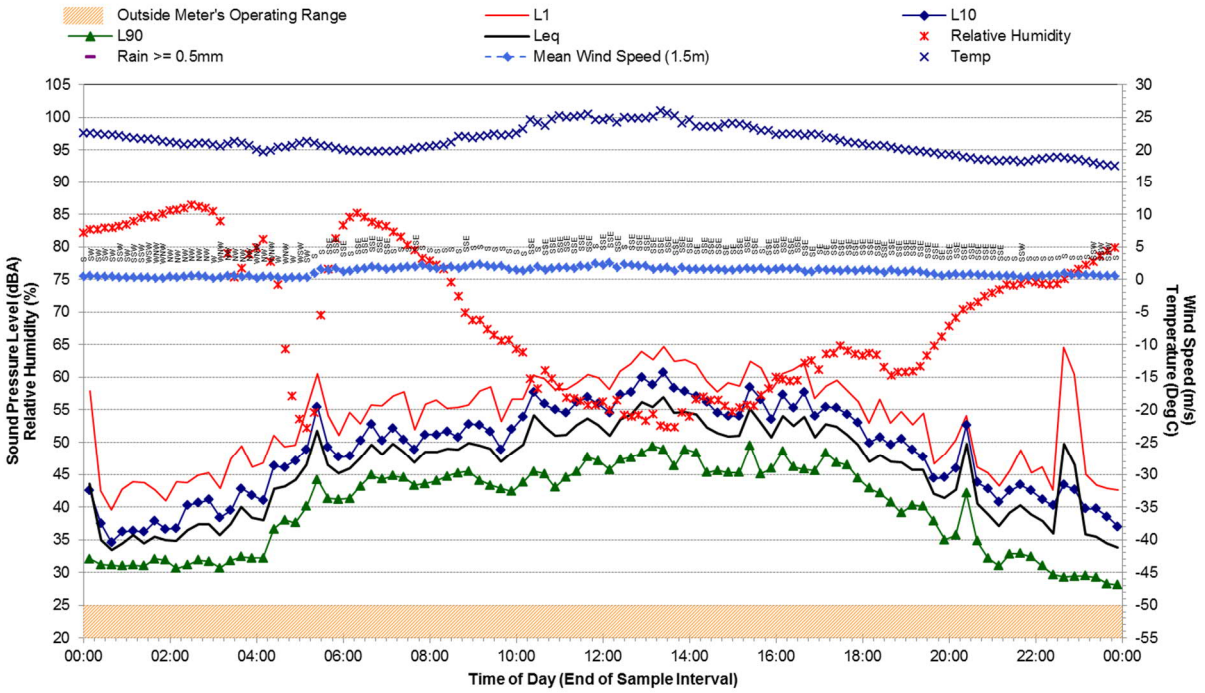
Statistical Ambient Noise Levels

Location G - Sunday, 15 December 2019



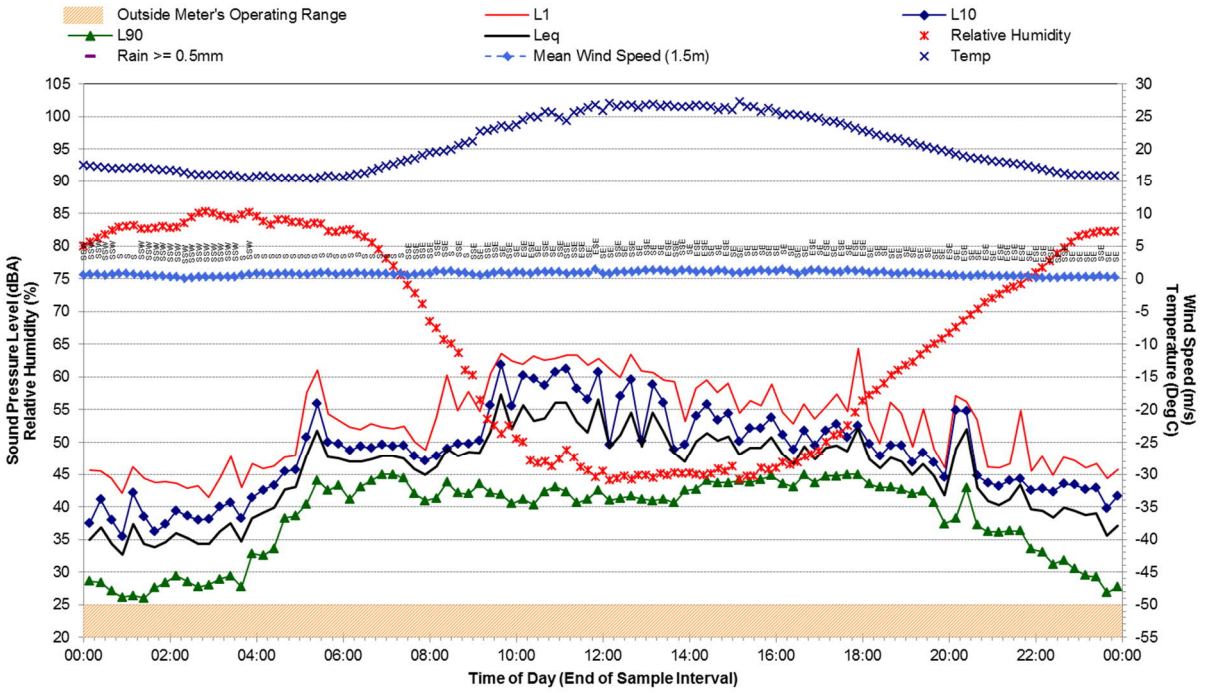
Statistical Ambient Noise Levels

Location G - Monday, 16 December 2019



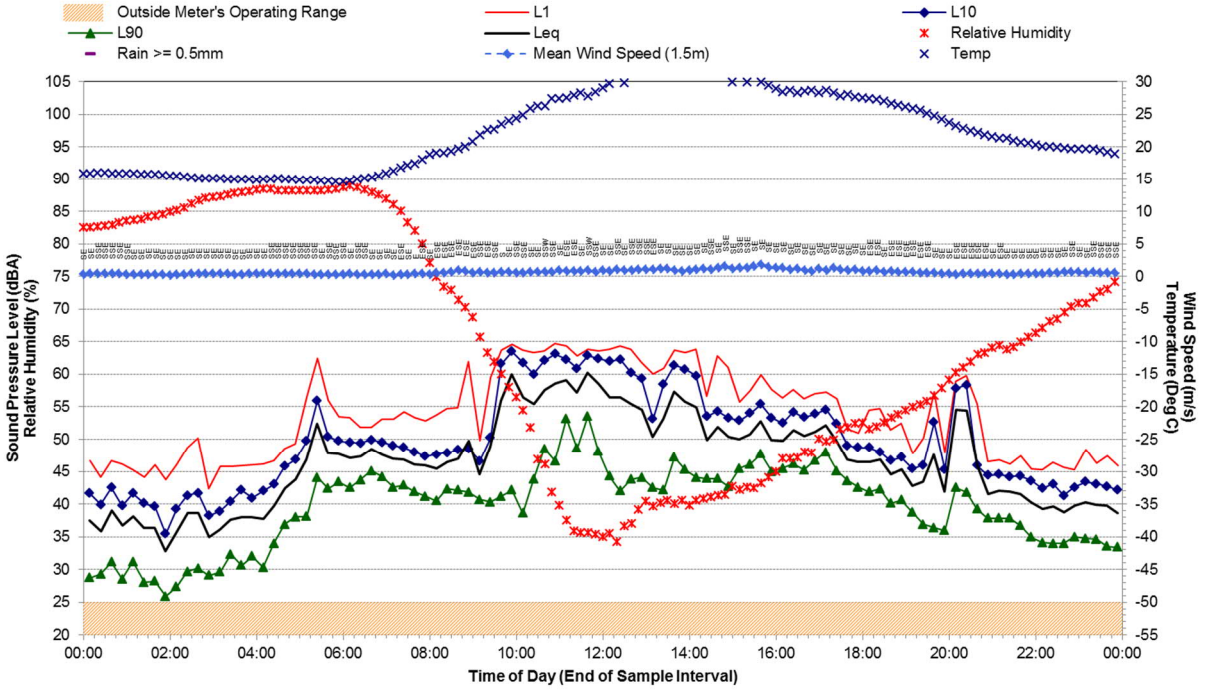
Statistical Ambient Noise Levels

Location G - Tuesday, 17 December 2019



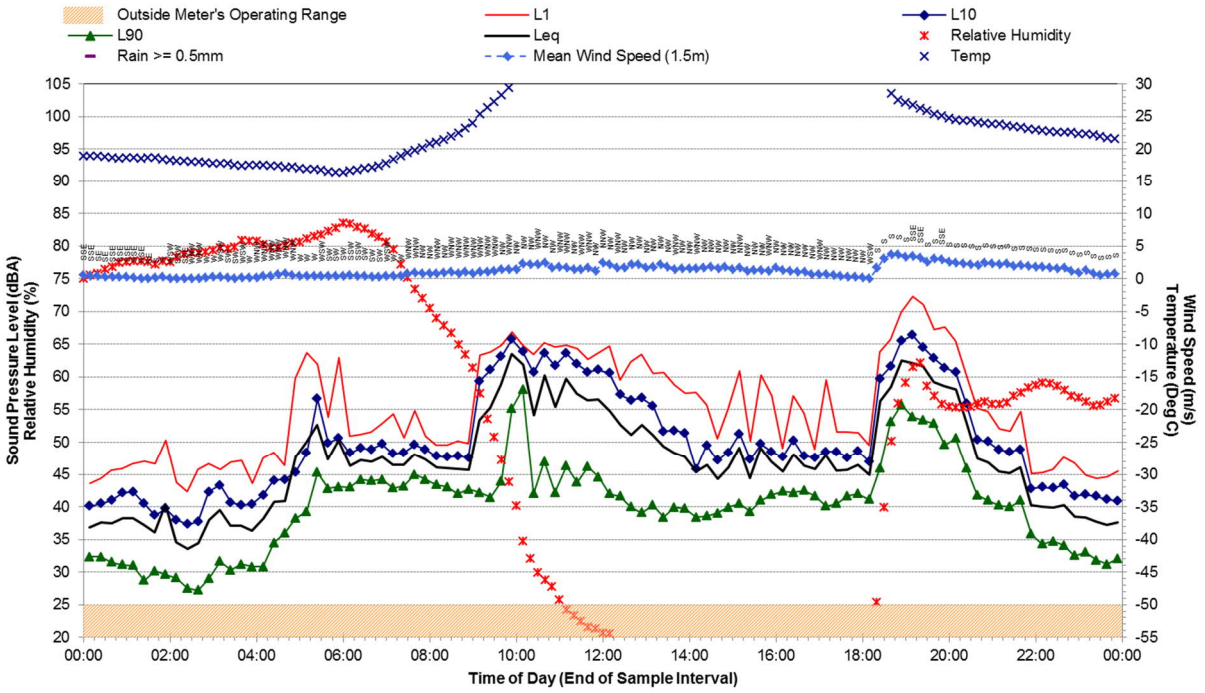
Statistical Ambient Noise Levels

Location G - Wednesday, 18 December 2019



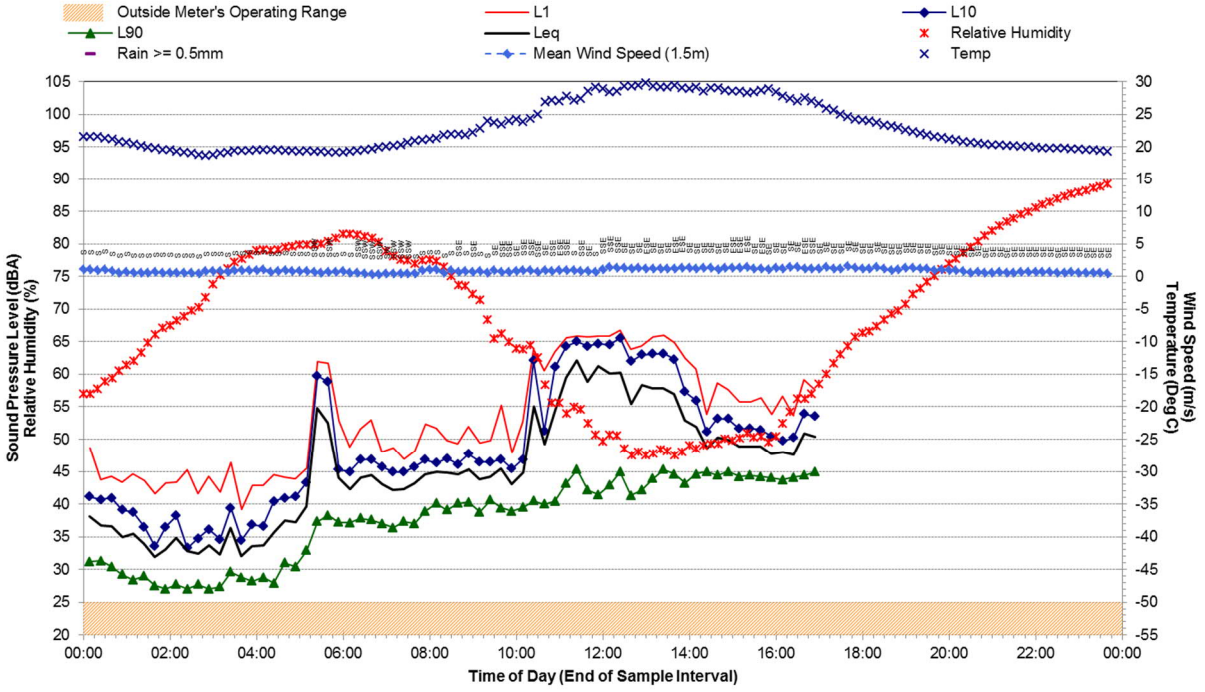
Statistical Ambient Noise Levels

Location G - Thursday, 19 December 2019



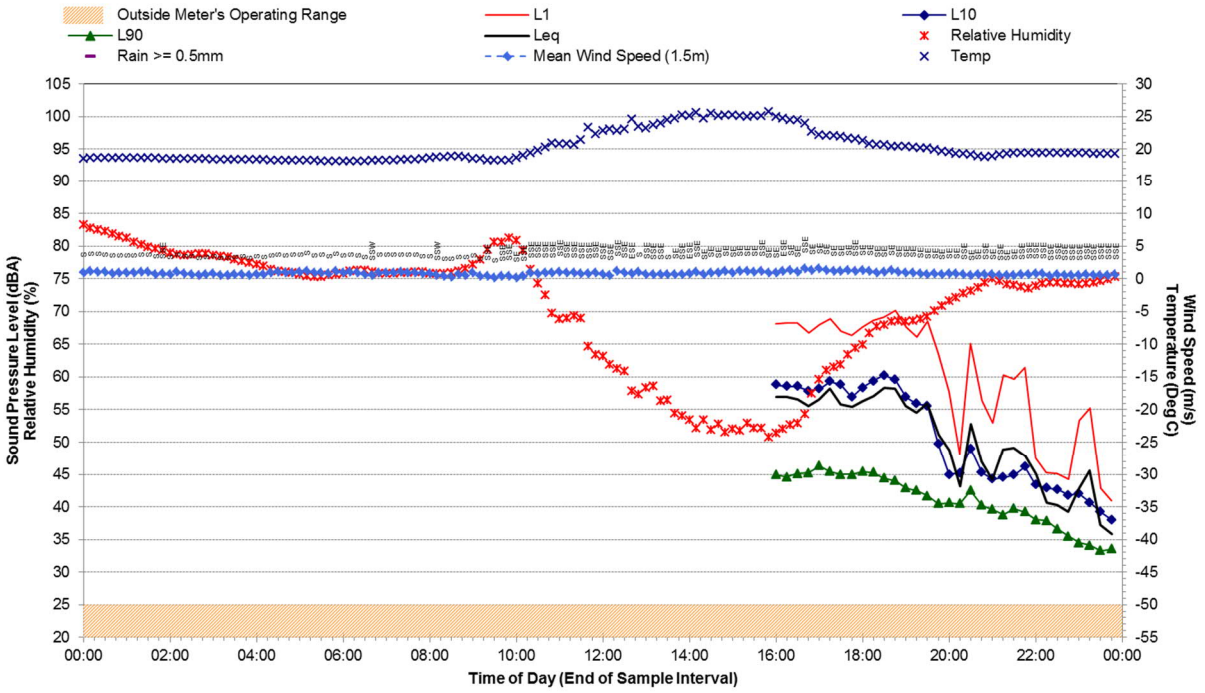
Statistical Ambient Noise Levels

Location G - Friday, 20 December 2019



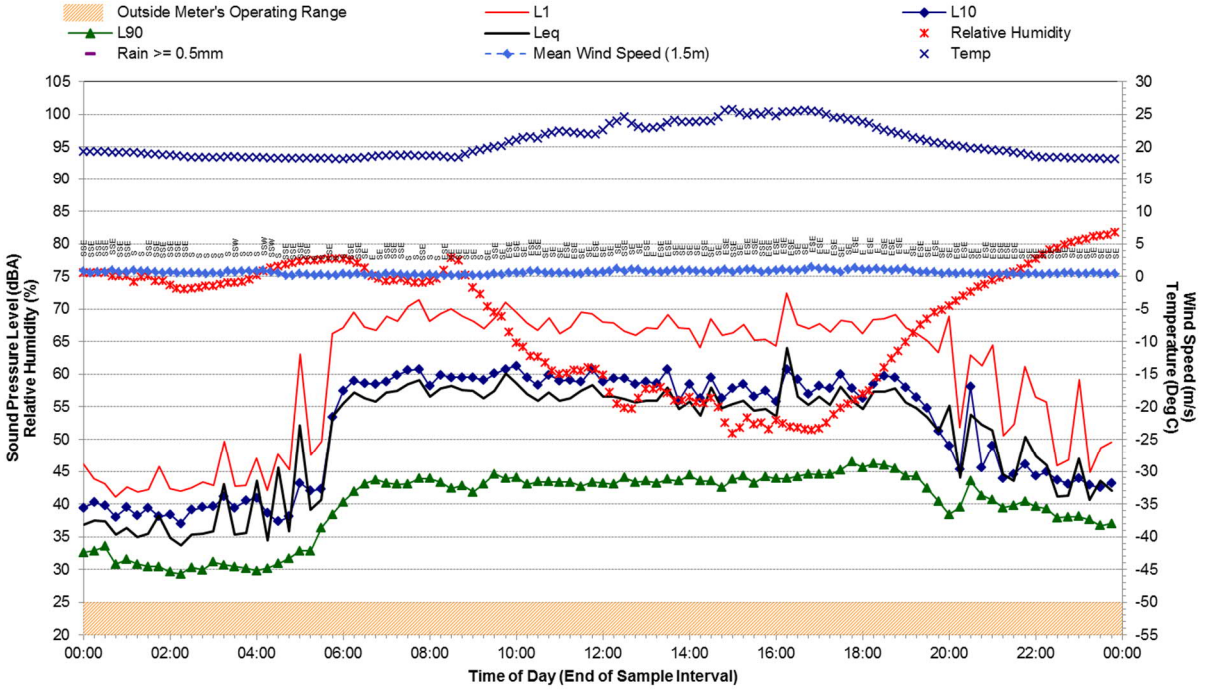
Statistical Ambient Noise Levels

Location I - Thursday, 12 December 2019



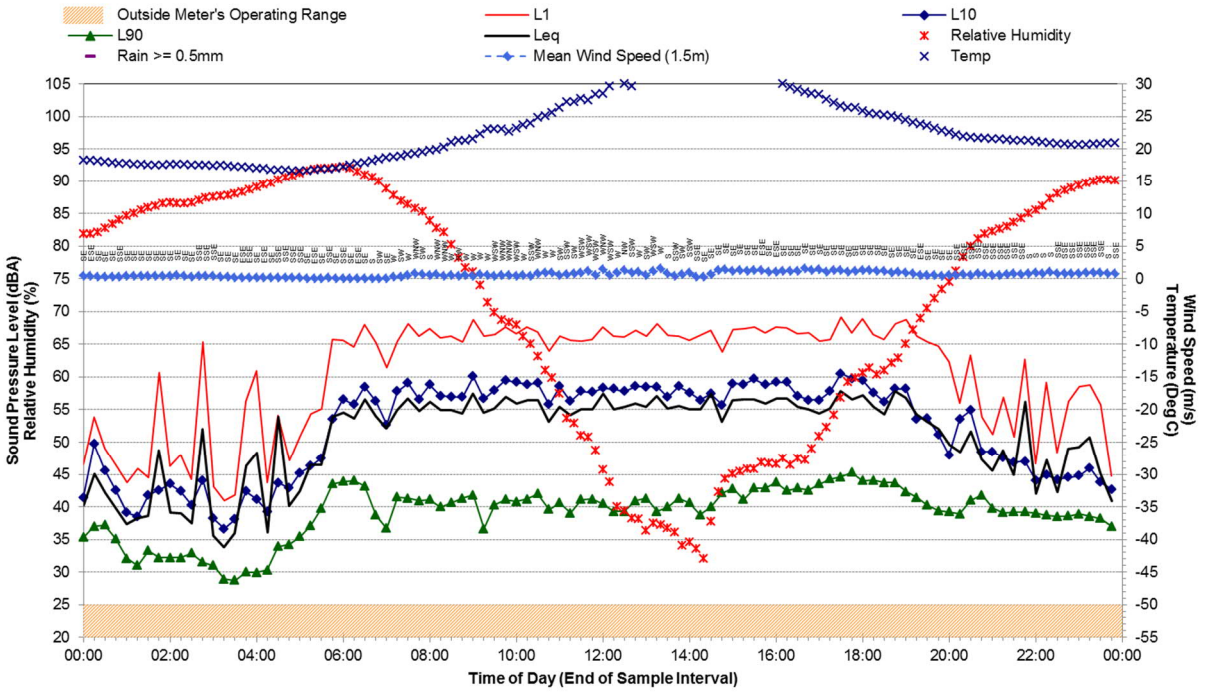
Statistical Ambient Noise Levels

Location I - Friday, 13 December 2019



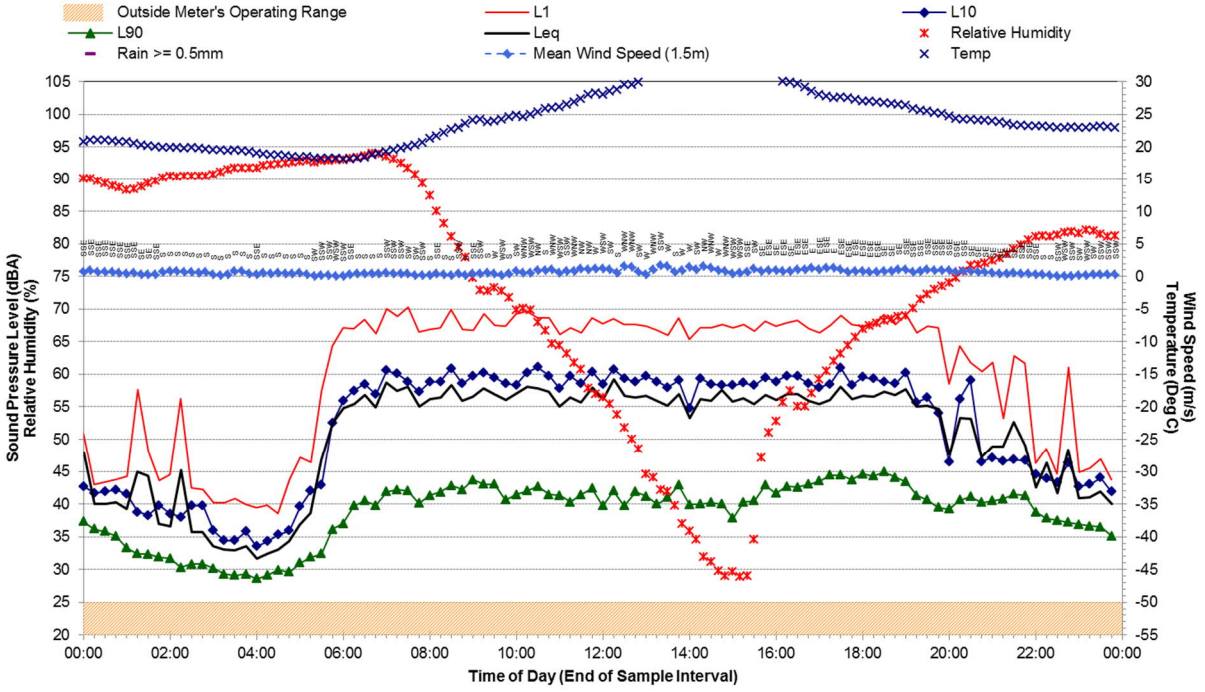
Statistical Ambient Noise Levels

Location I - Saturday, 14 December 2019



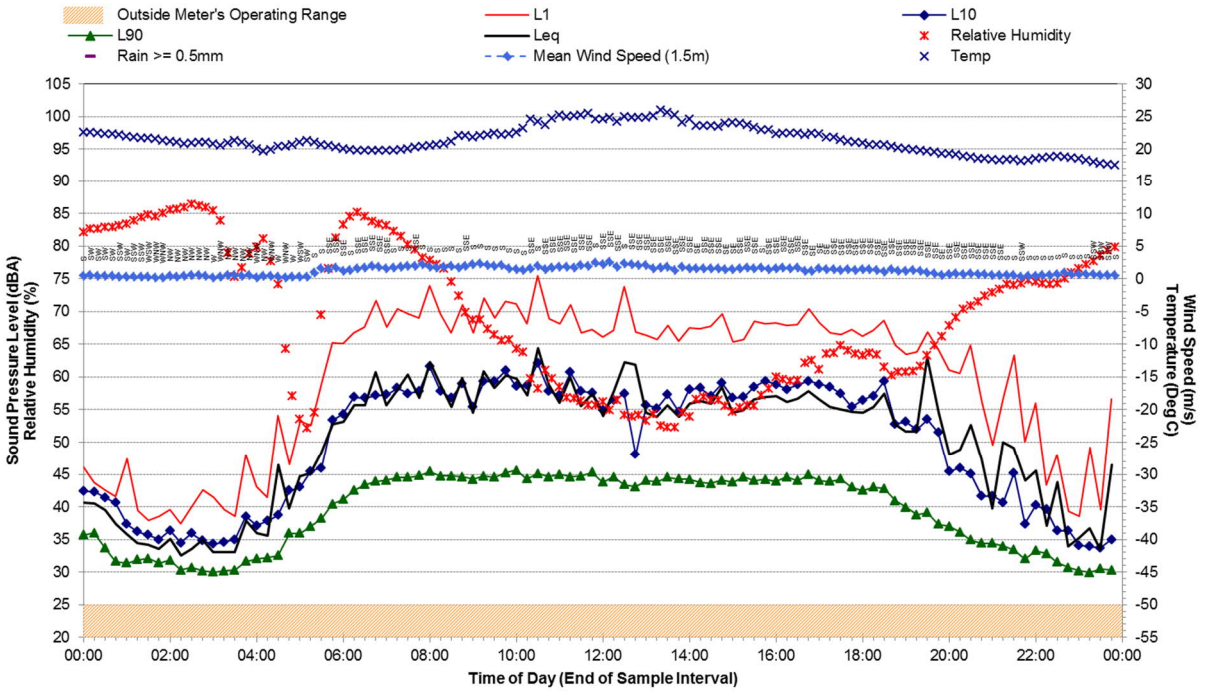
Statistical Ambient Noise Levels

Location I - Sunday, 15 December 2019



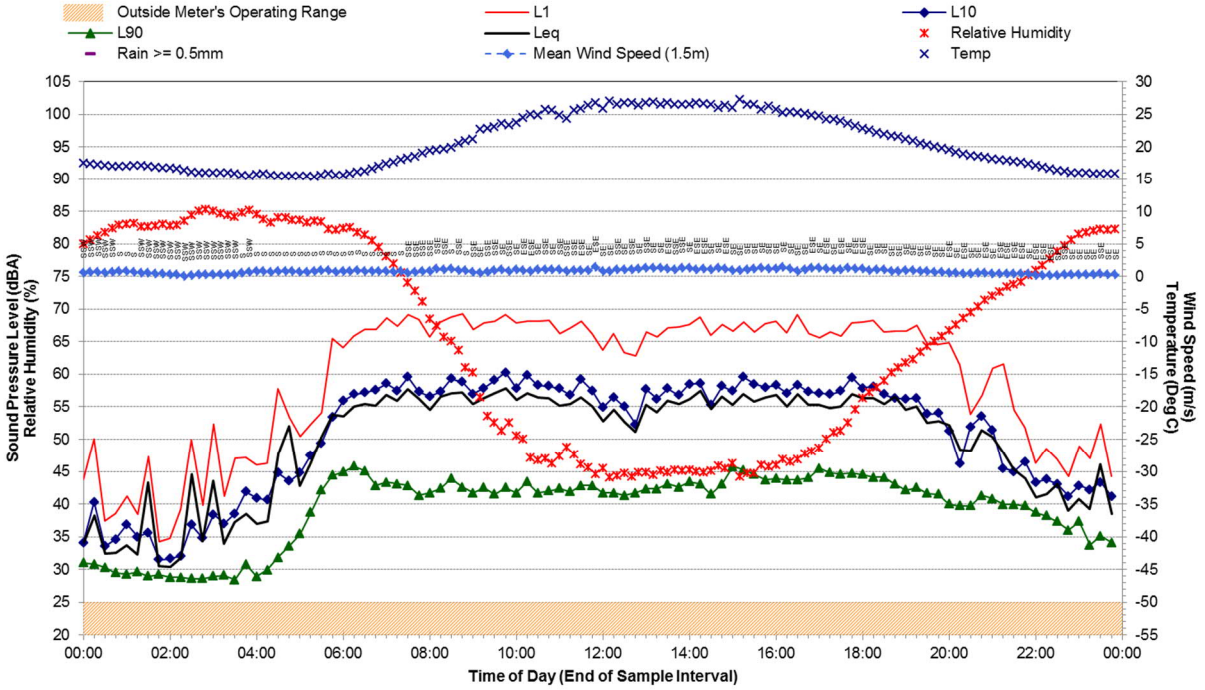
Statistical Ambient Noise Levels

Location I - Monday, 16 December 2019



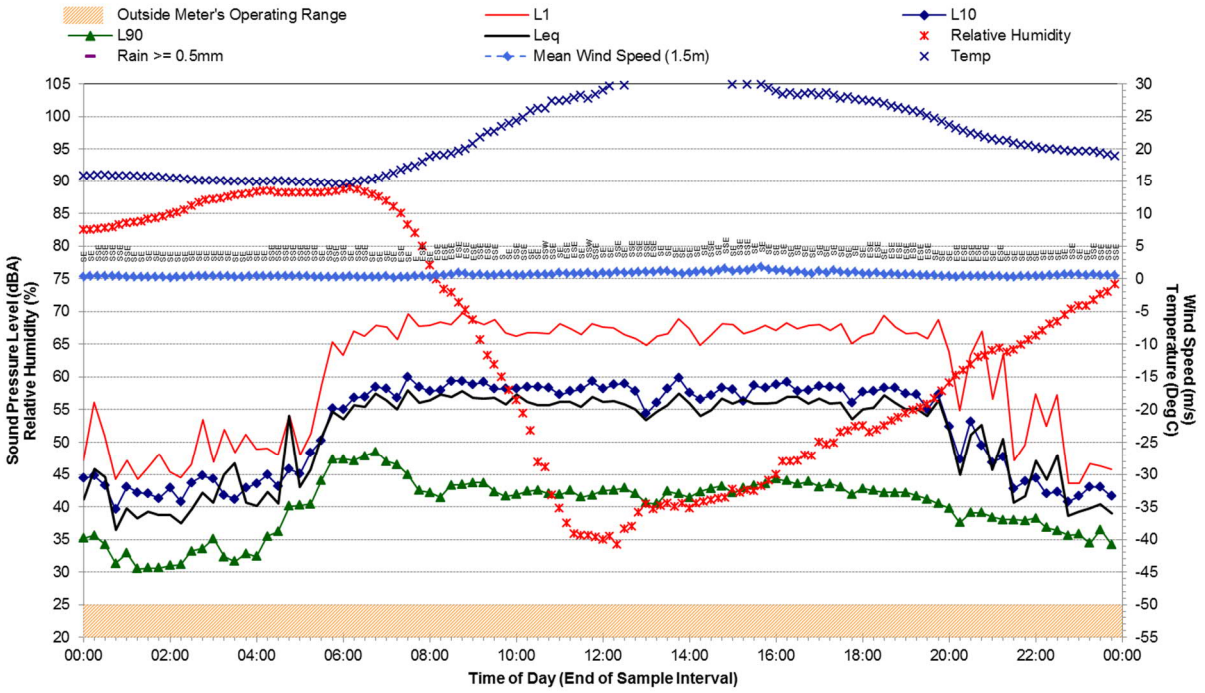
Statistical Ambient Noise Levels

Location I - Tuesday, 17 December 2019



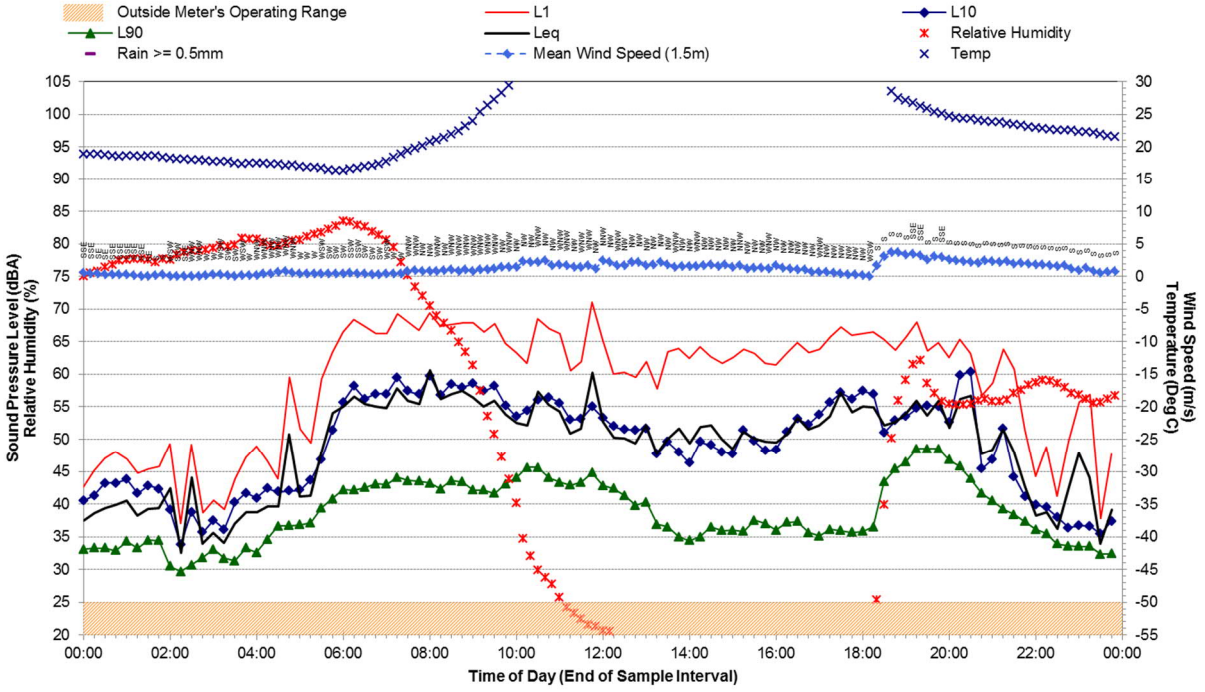
Statistical Ambient Noise Levels

Location I - Wednesday, 18 December 2019



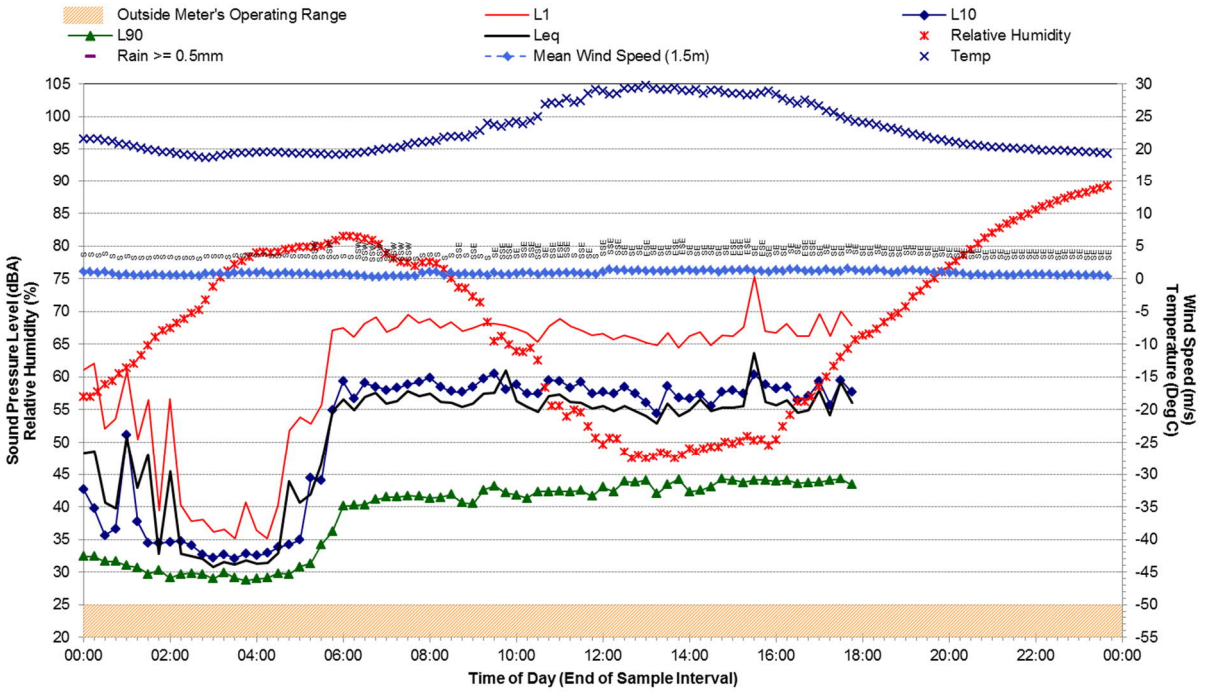
Statistical Ambient Noise Levels

Location I - Thursday, 19 December 2019



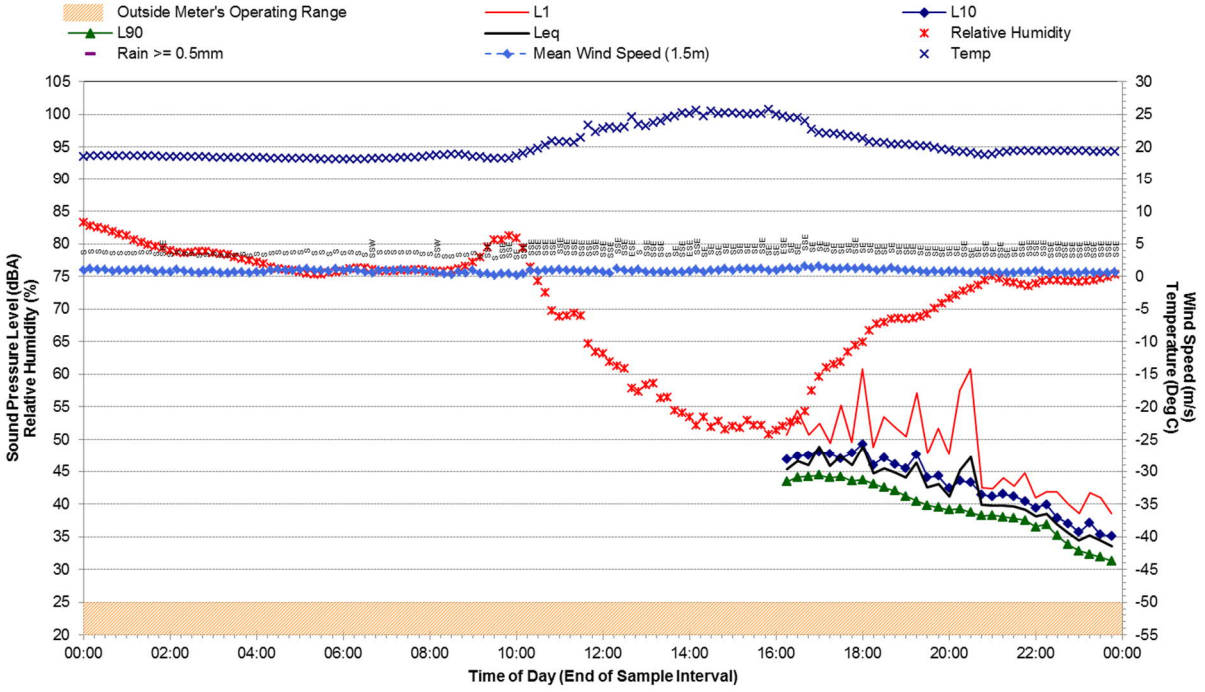
Statistical Ambient Noise Levels

Location I - Friday, 20 December 2019



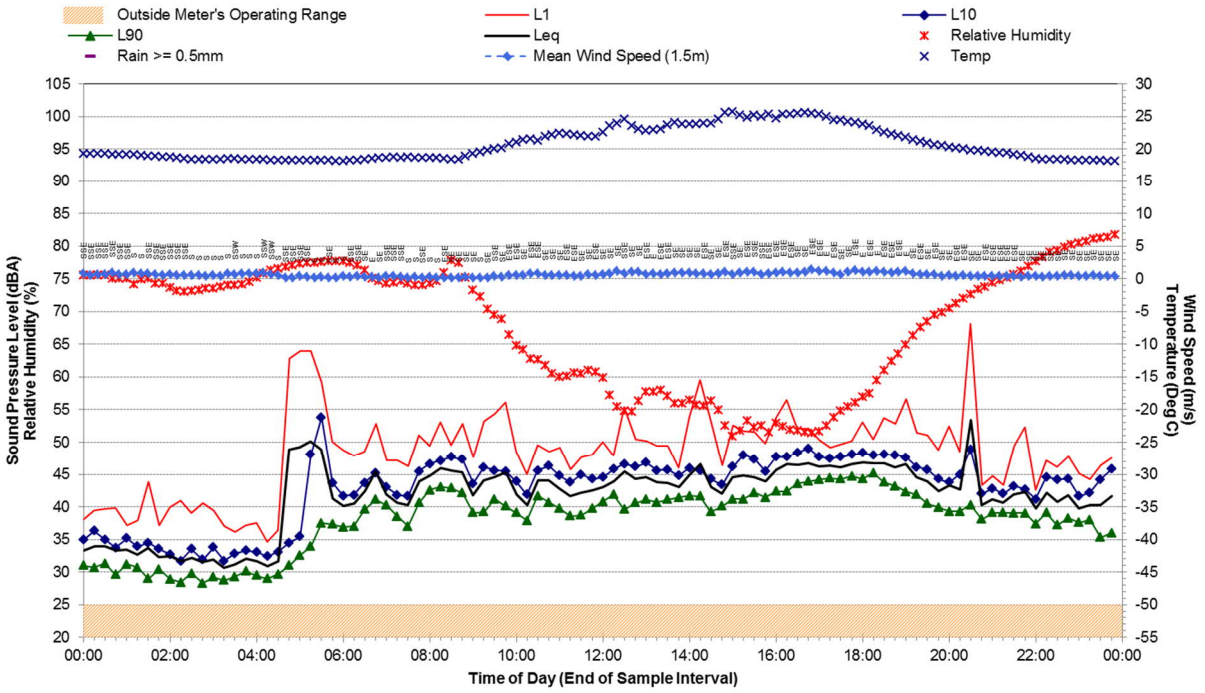
Statistical Ambient Noise Levels

Location J - Thursday, 12 December 2019



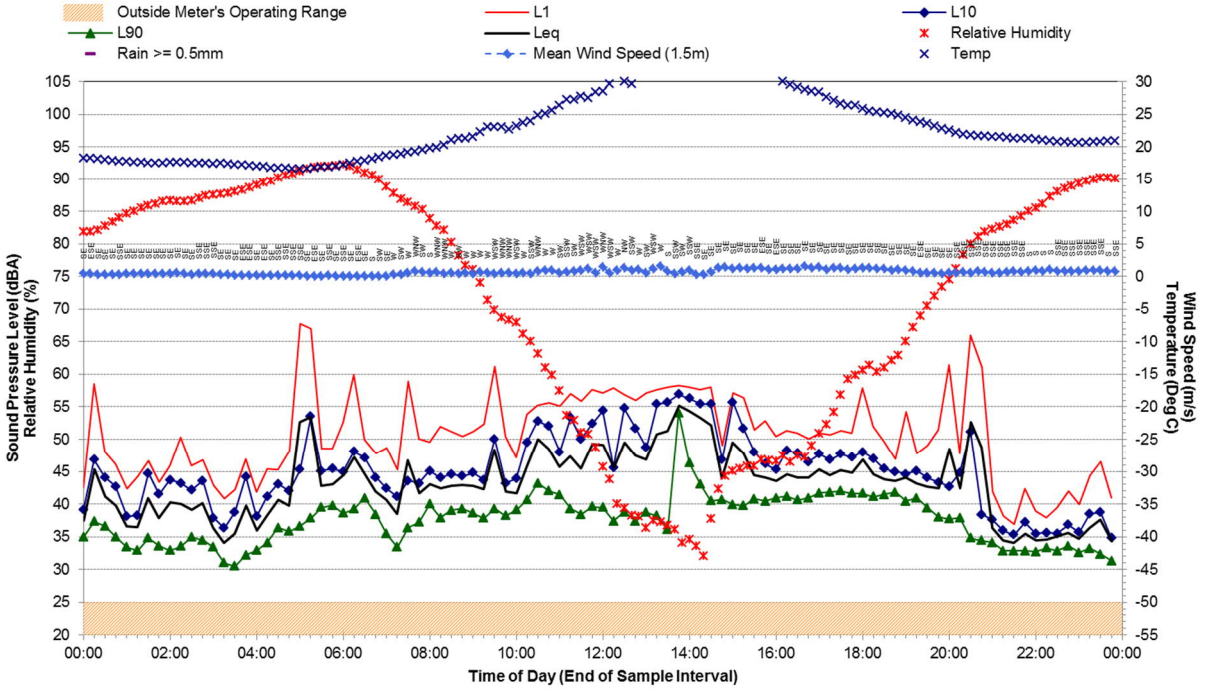
Statistical Ambient Noise Levels

Location J - Friday, 13 December 2019



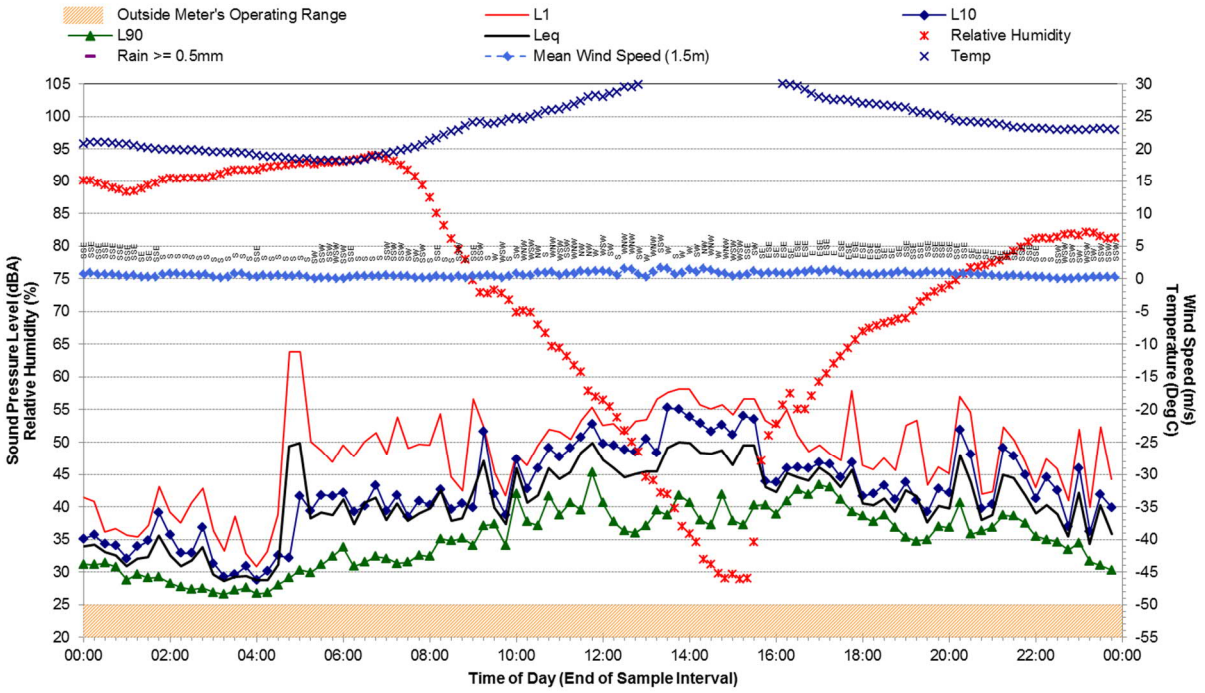
Statistical Ambient Noise Levels

Location J - Saturday, 14 December 2019



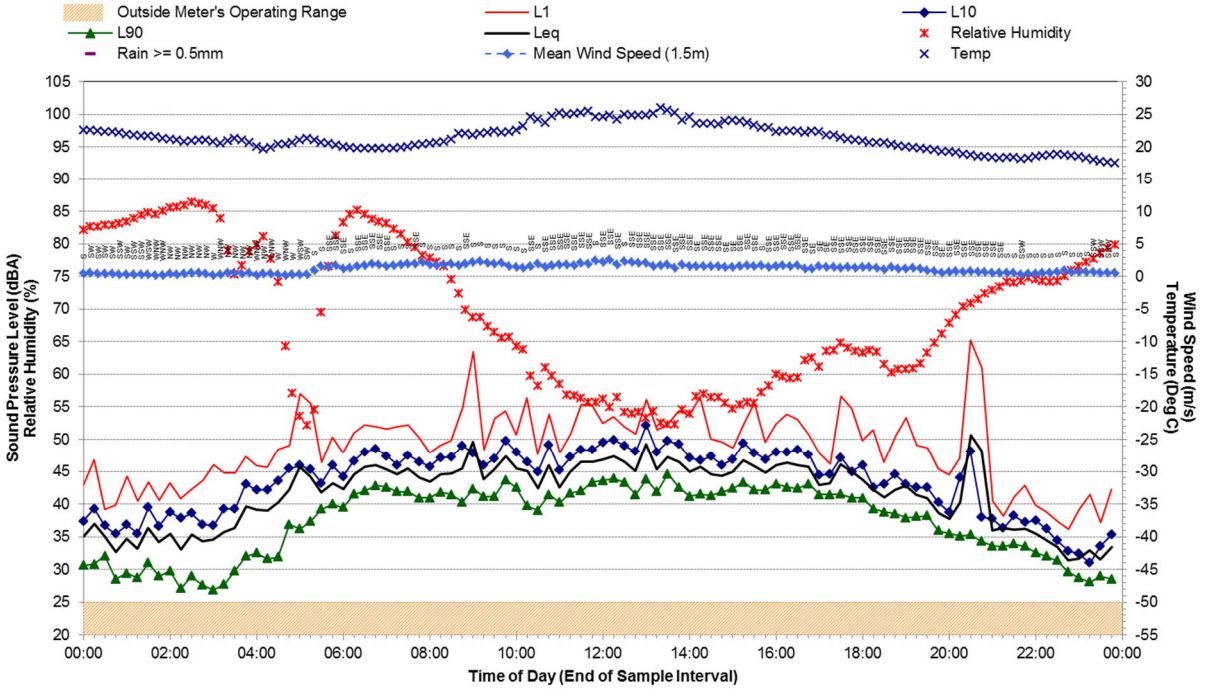
Statistical Ambient Noise Levels

Location J - Sunday, 15 December 2019



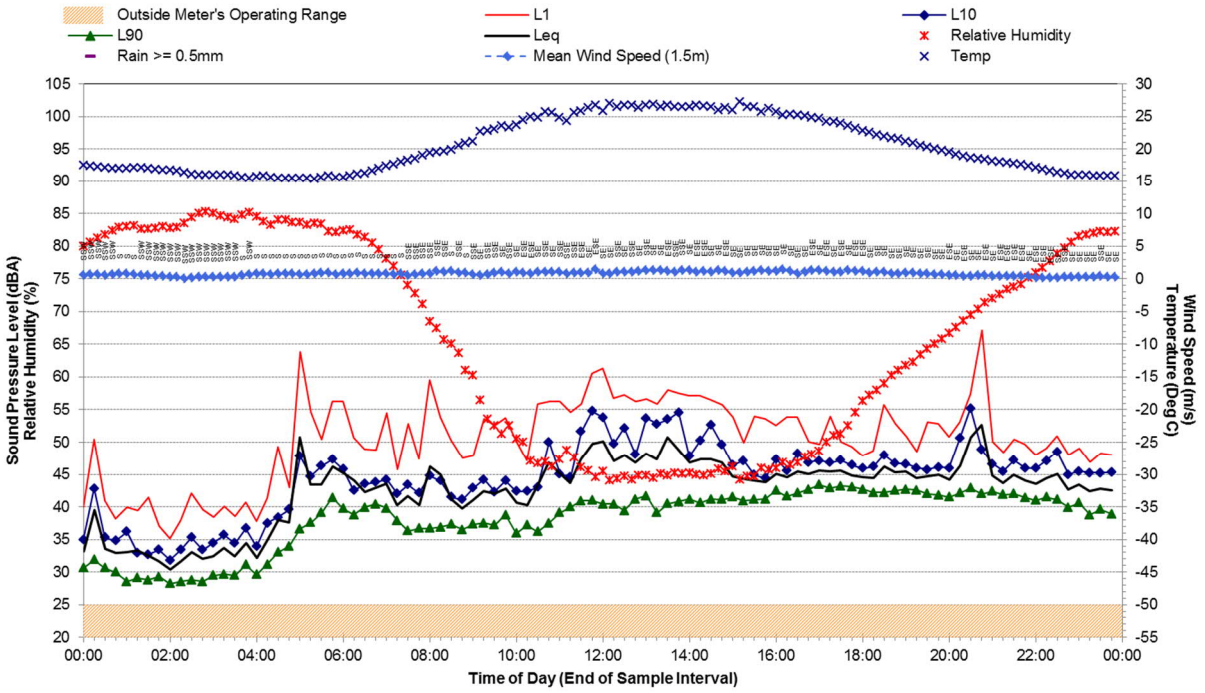
Statistical Ambient Noise Levels

Location J - Monday, 16 December 2019



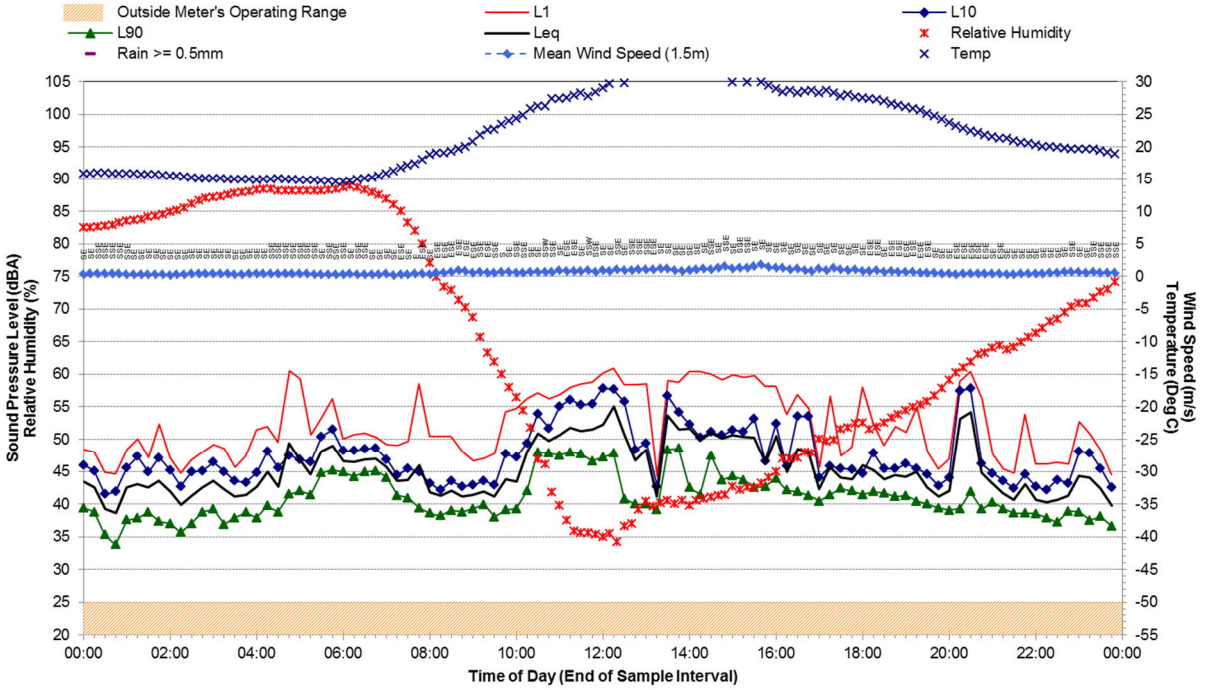
Statistical Ambient Noise Levels

Location J - Tuesday, 17 December 2019



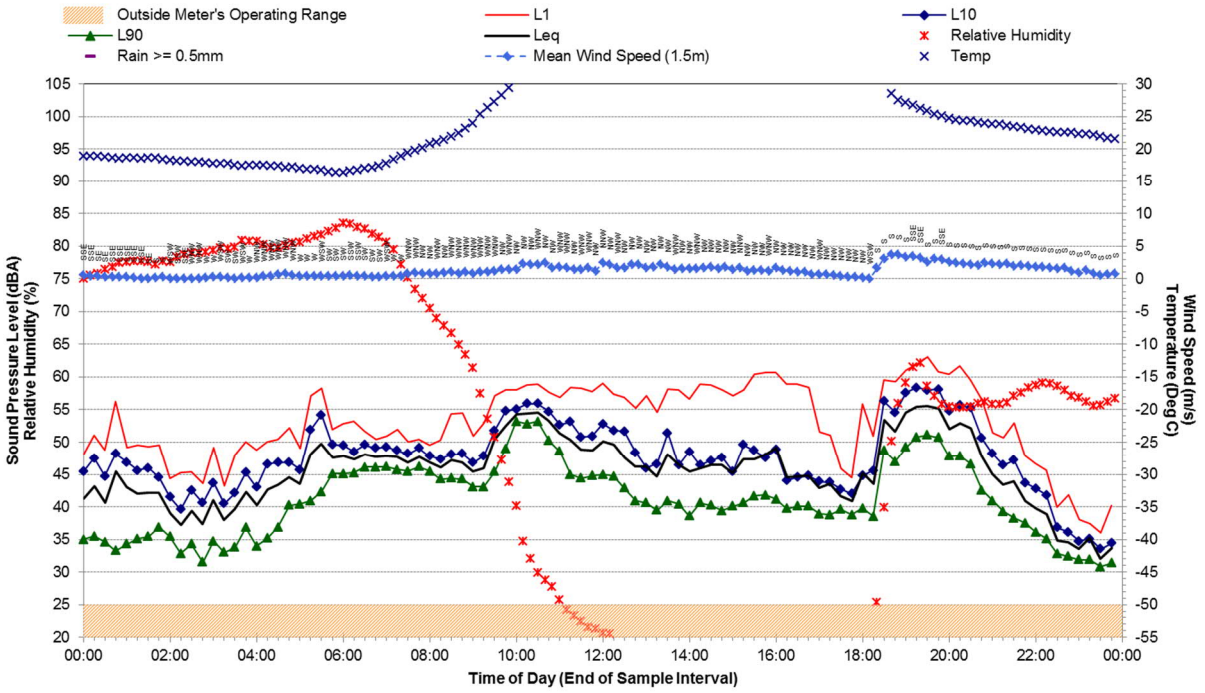
Statistical Ambient Noise Levels

Location J - Wednesday, 18 December 2019



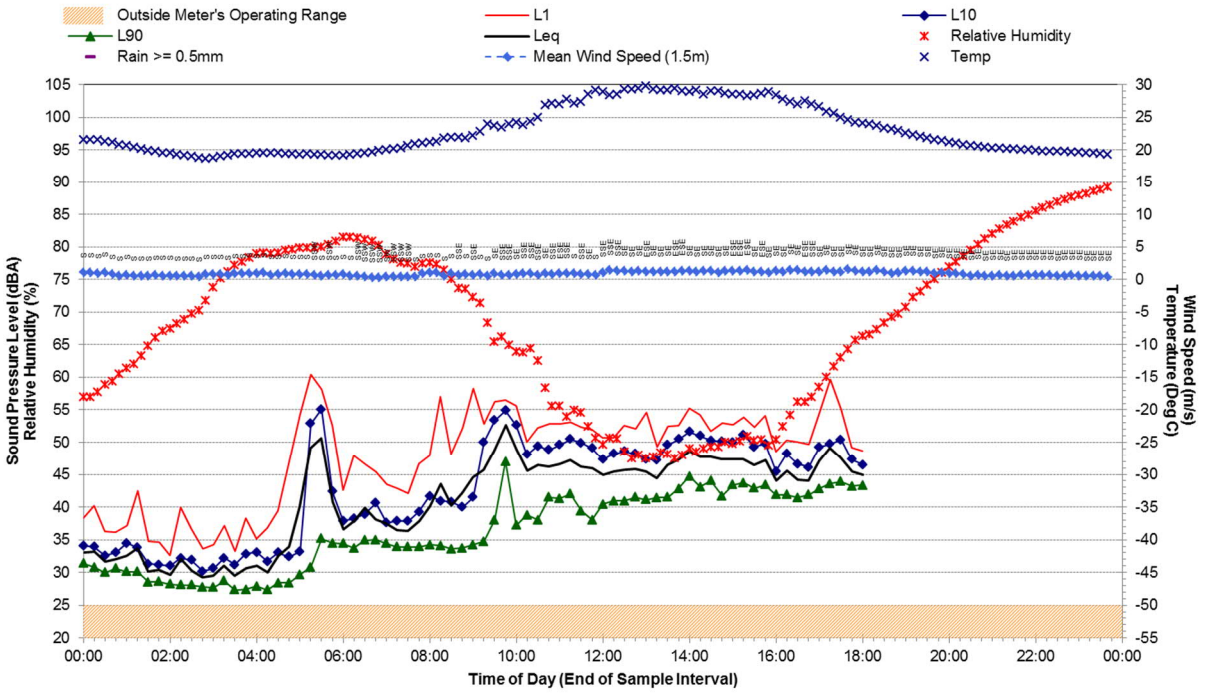
Statistical Ambient Noise Levels

Location J - Thursday, 19 December 2019



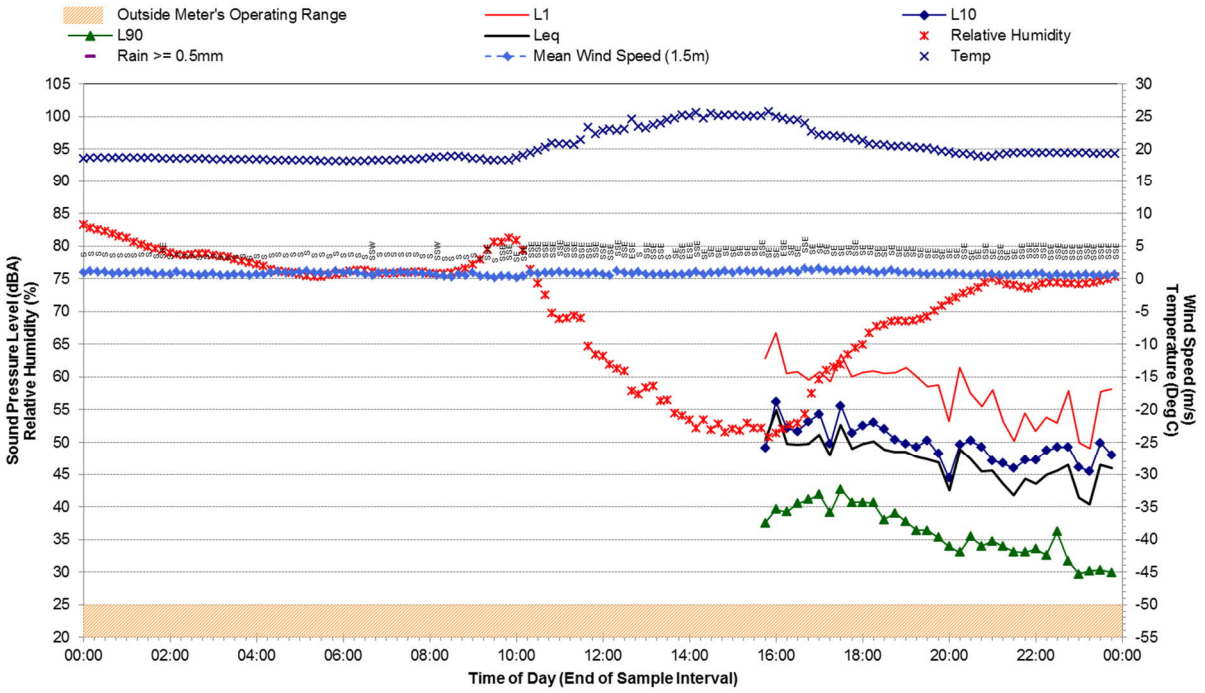
Statistical Ambient Noise Levels

Location J - Friday, 20 December 2019



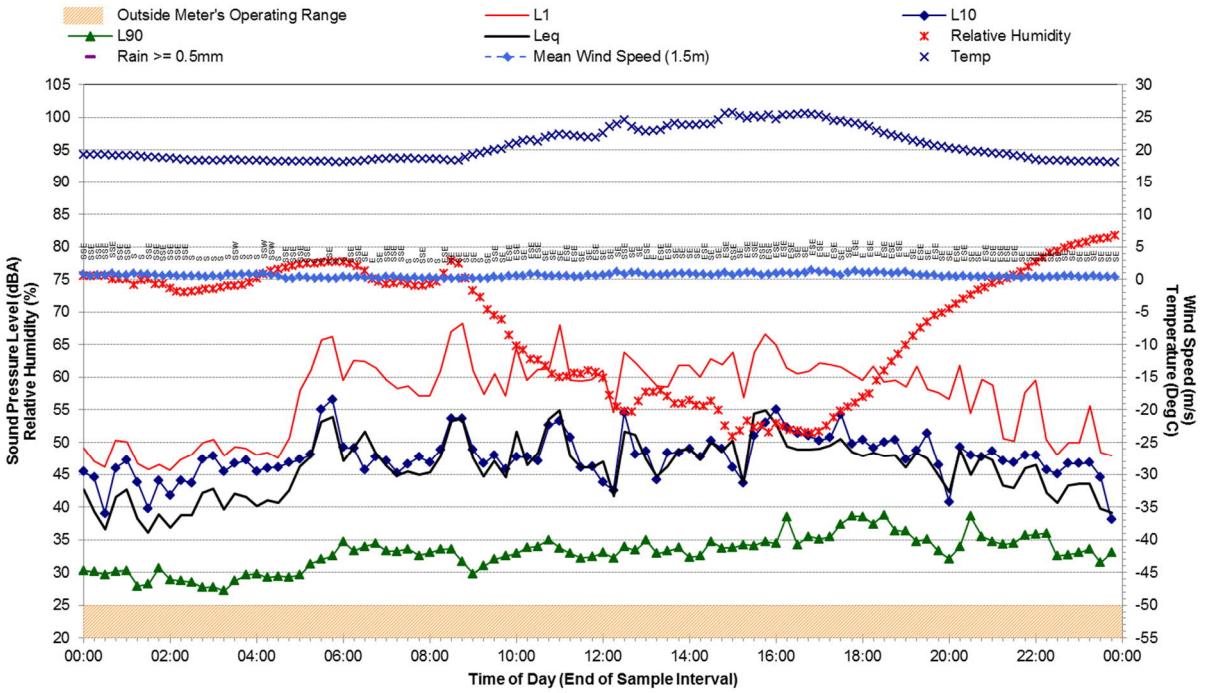
Statistical Ambient Noise Levels

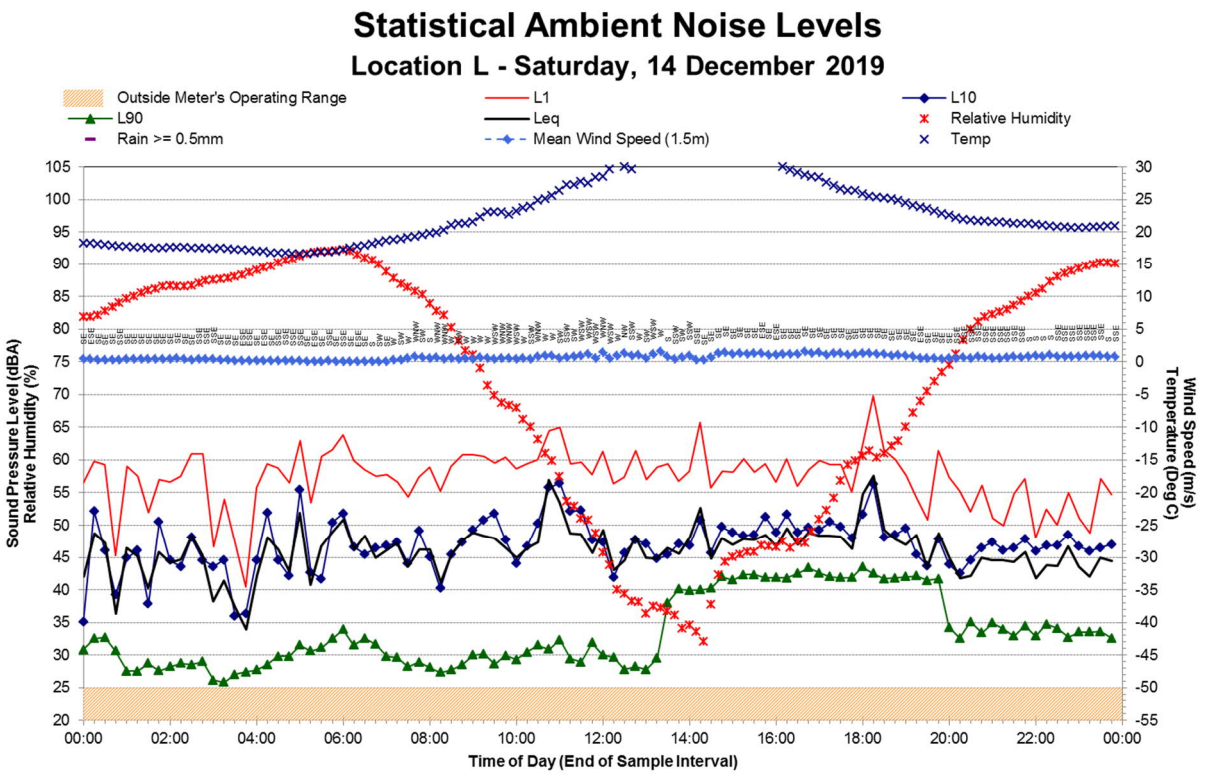
Location L - Thursday, 12 December 2019

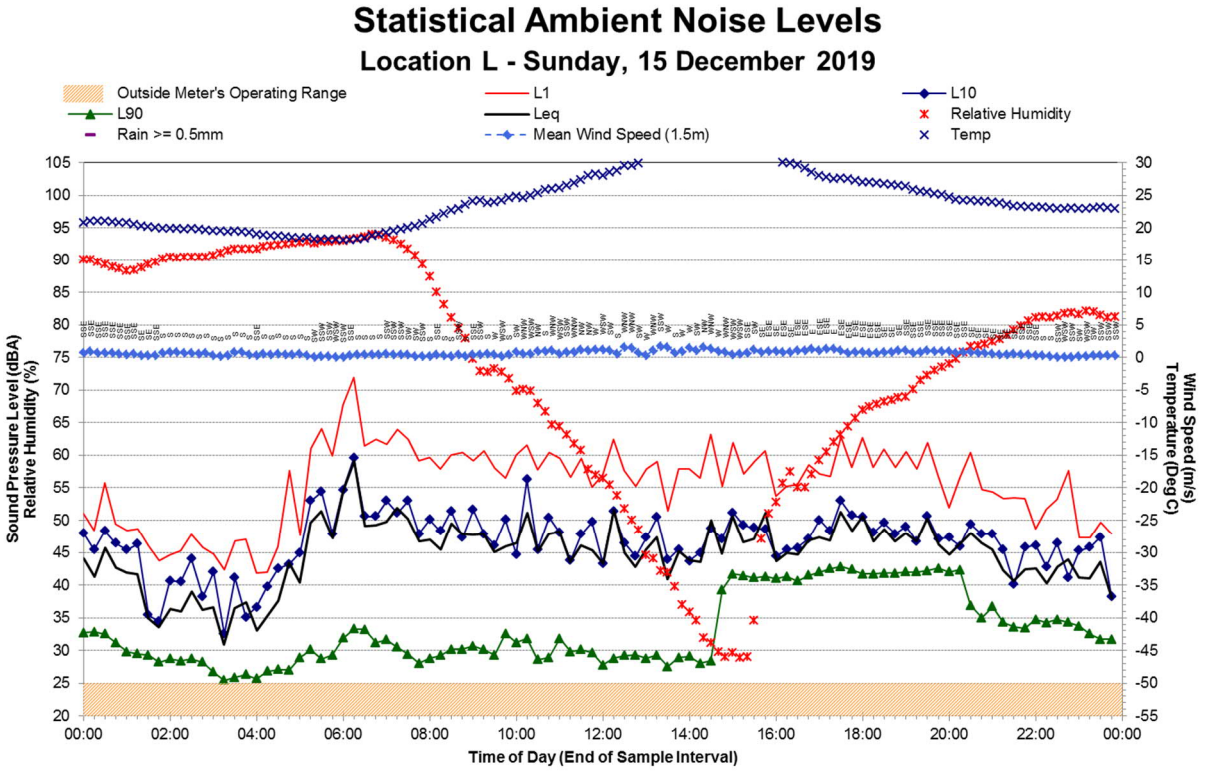


Statistical Ambient Noise Levels

Location L - Friday, 13 December 2019

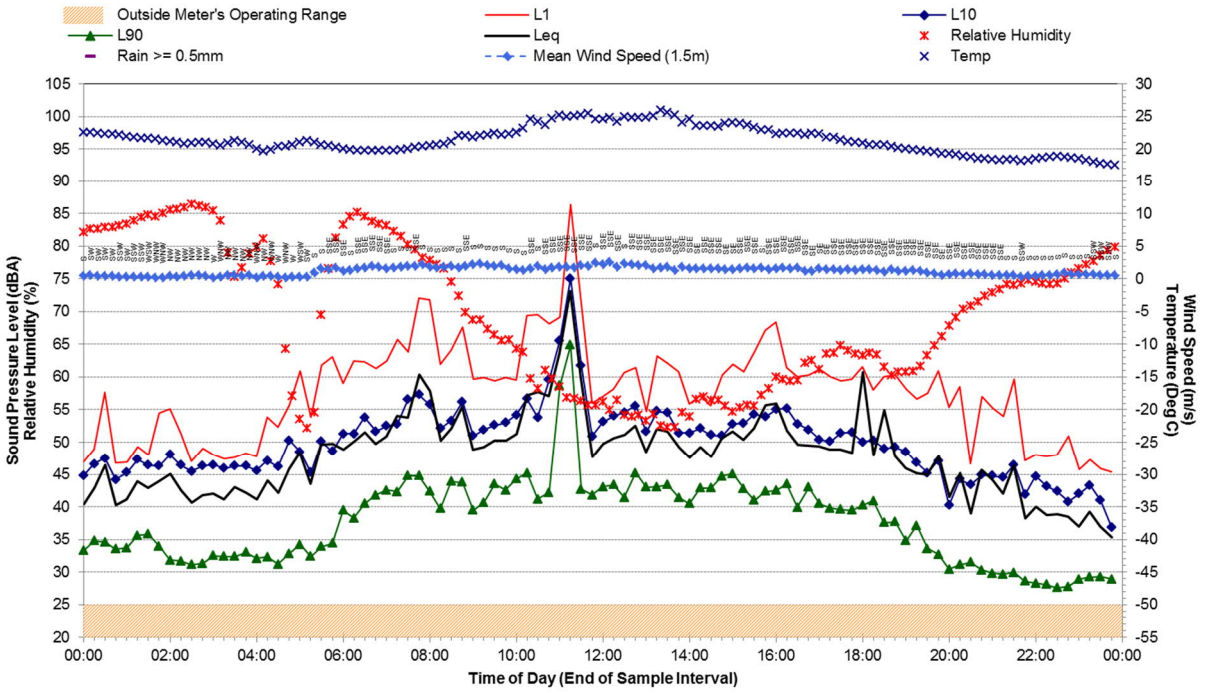



Statistical Ambient Noise Levels
Location L - Saturday, 14 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location L - Sunday, 15 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

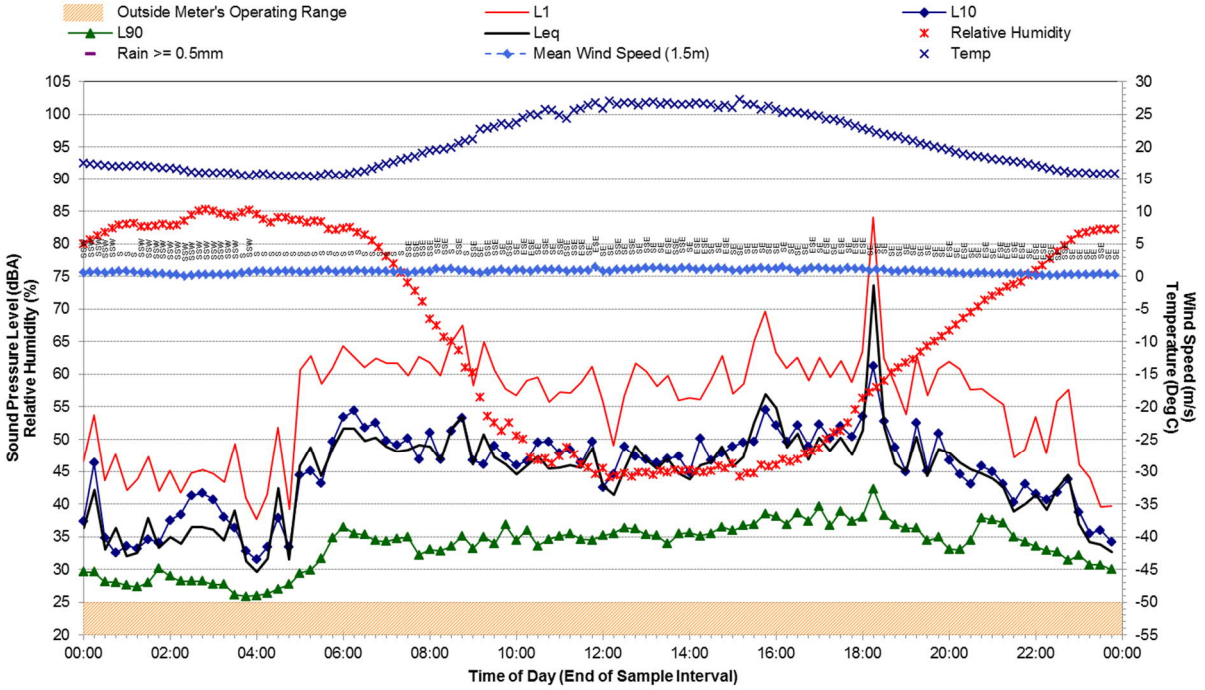
Statistical Ambient Noise Levels

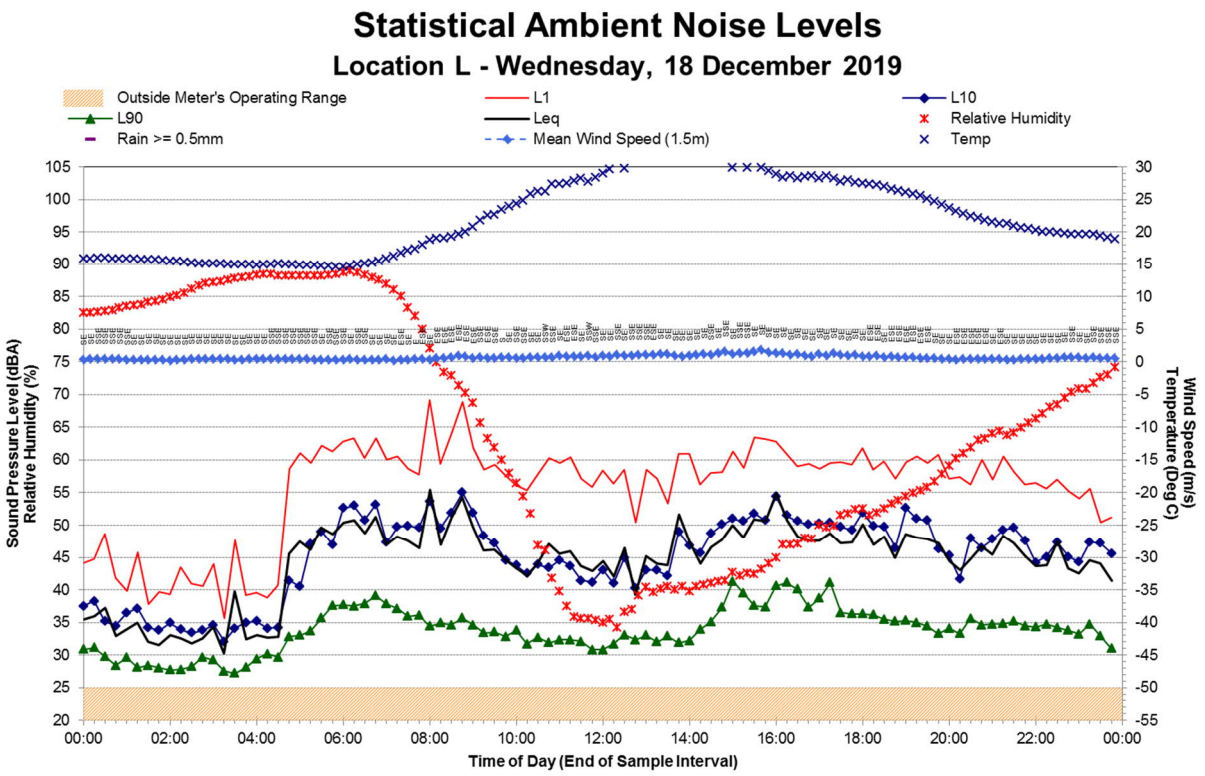
Location L - Monday, 16 December 2019

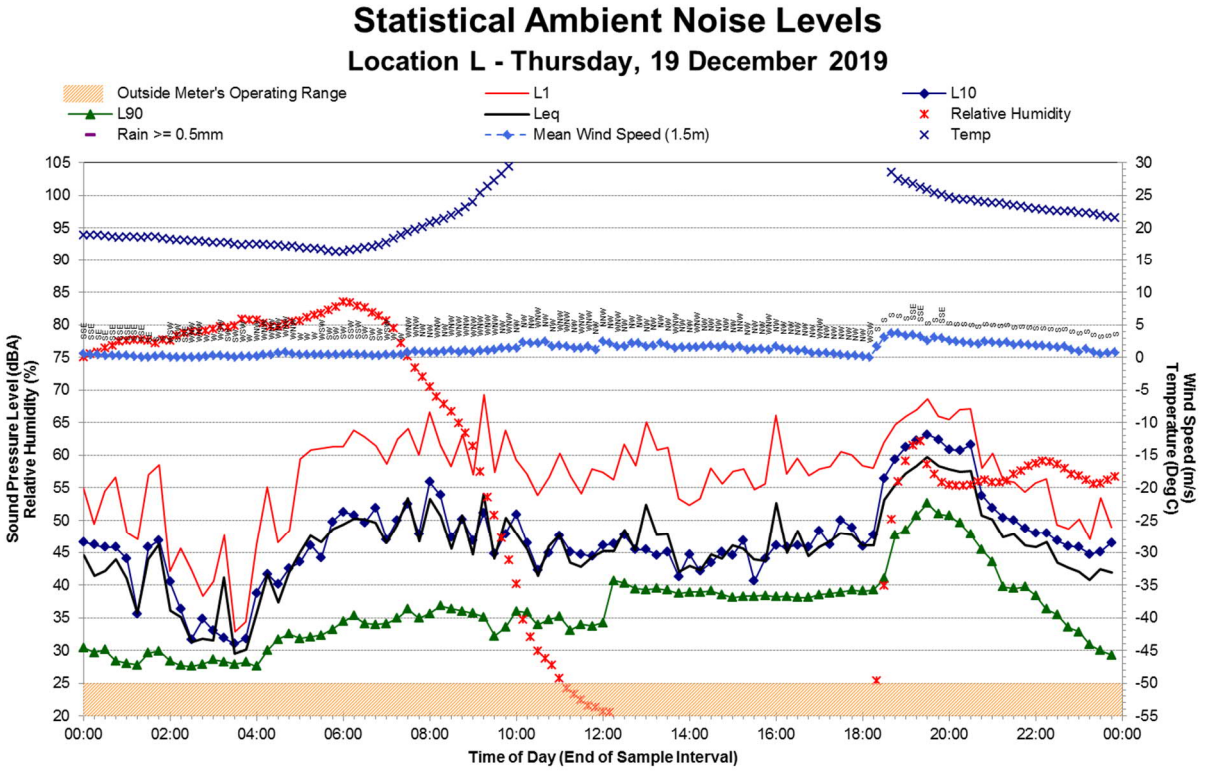


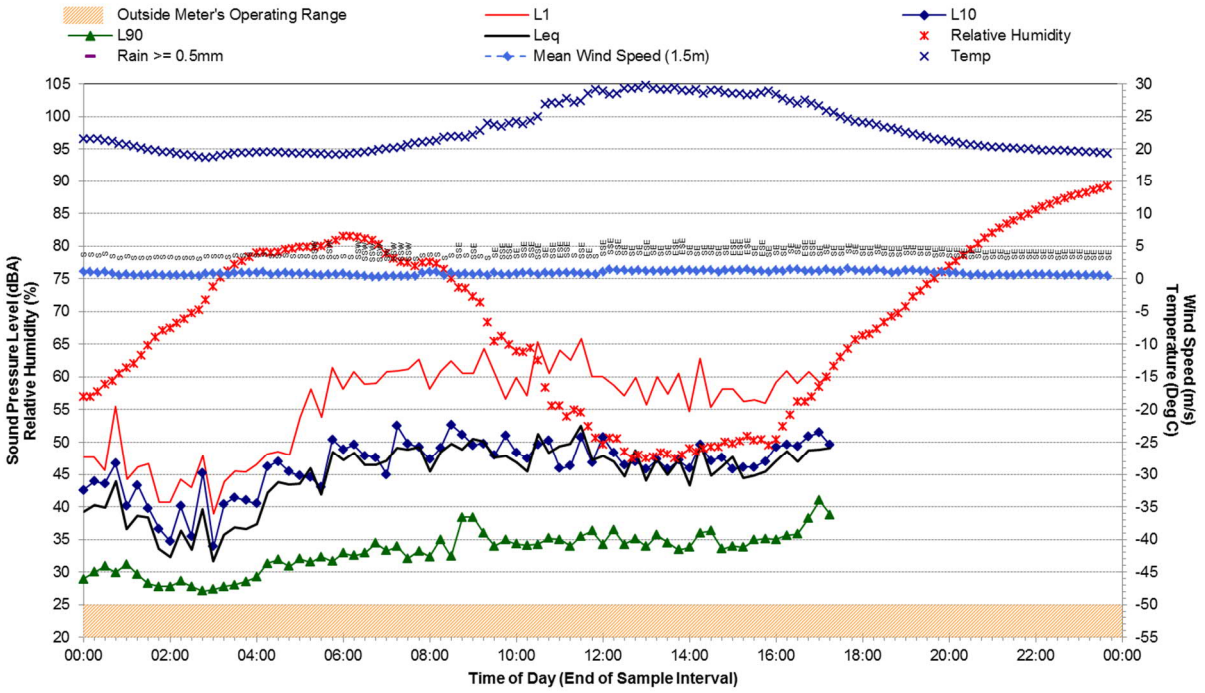
Statistical Ambient Noise Levels

Location L - Tuesday, 17 December 2019




Statistical Ambient Noise Levels
Location L - Wednesday, 18 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location L - Thursday, 19 December 2019
Outside Meter's Operating Range
L90
Rain >= 0.5mm
L1
Leq
Mean Wind Speed (1.5m)
L10
Relative Humidity
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location L - Friday, 20 December 2019
Outside Meter's Operating Range
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00

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