16 March 2016

610.06323 Noise Investigation 20160316

Multiquip Group of Companies
260 Tenth Avenue
AUSTRAL NSW 2179

Attention: Mr Jason Mikosic

Dear Jason

Ardmore Park Quarry
Investigation of Noise Complaint

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) was engaged by the Multiquip Group of Companies to conduct noise monitoring in relation to a complaint received from the residence located at 5094 Oallen Road, Bungonia (Residence 6 as referred to in the Project Approval) regarding noise emissions from the Ardmore Park Quarry. This report presents the noise monitoring results for 25 September 2015 and the period 23 October to 17 November 2015.

2 Monitoring Locations

Noise monitoring was conducted at Residence 6 during quarrying operations in order to quantify site noise emissions. The monitoring location is shown in **Figure 1**.

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Figure 1 Noise Monitoring Location

3 Noise Assessment Criteria

Operational noise criteria are nominated in the Project Approval (PA 07_0155 dated 20 September 2009), and are extracted in **Table 1** for the residence considered this assessment.

Table 1 Operational Noise Criteria

Noise Assessment Location	$L_{Aeq\ (15minute)}$ Noise Criteria
Residence 6	36 dBA

4 Methodology

Operator-attended noise measurements were conducted at Residence 6 in order to quantify both the ambient noise environment and quarry noise emissions. The noise measurements were undertaken using a Brüel & Kjær type 2260 Sound Level Meter (SN 2414605).

An audio recorder capable of recording wave files (Rion DA20) was deployed at Residence 6. The resident was instructed to trigger the recording device whenever the noise level from the quarry was considered (by them) to be intrusive. The ambient noise was then automatically recorded for the period each time the resident pushed the recording button. Samples of the noise occurring over the period of recording have then been post-processed and the sources of ambient noise identified and quantified.

In addition, an unattended statistical noise logger (Svantek 957 SN: 20675) was deployed at Residence 6, which continuously logged ambient noise levels in 15 minute intervals.

5 Noise Monitoring Results

Table 2 presents the results of the operator-attended noise survey conducted on 25 September 2015 including a breakdown of the ambient noise sources and quarry noise contributions.

Table 3 present a summary of all recording events triggered by the resident during the monitoring period 23 October to 17 November 2015, including the overall 15 minute statistical noise levels together with a breakdown of the ambient noise source contributions.

Table 2 Operator Attended Noise Monitoring Results

Date/ Start time	Location	Weather			Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Levels L_{Amax} (dBA)
		Rain	Temp (˚C)	Wind (km/h)	L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
25/09/2015 09:16	Residence 6	No	10	18 (S)	59	48	43	33	40	Birds: 33-51 dBA Wind: 41-53 dBA Dog: 30 dBA Warning Siren: 25-30 dBA Plant Noise: 29-33 dBA Quarry L_{Aeq} Contribution: 27 dBA

Table 3 Triggered Noise Events

Date/ Start time	Duration	Weather			Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Levels L_{Amax} (dBA)
		Rain	Temp (˚C)	Wind (km/h)	L_{Amax}	L_{A5}	L_{A10}	L_{A90}	L_{Aeq}	
23/10/2015 11:09	0:36:31	No	12.6	8-17 (SW)	65	46	44	24	42	Birds: 54-65 dBA Wind: 51-57 dBA Quarry Noise: • 36 dBA for 12s • 42 dBA for 20s • 44 dBA for 20s • 41 dBA for 6s Quarry L_{Aeq} Contribution: 35 dBA

Date/ Start time	Duration	Weather			Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Levels LAmax (dBA)
		Rain	Temp (˚C)	Wind (km/h)	LAmax	LA5	LA10	LA90	LAeq	
28/10/2015 11:04	1:00:00	No	13.5	8-15 (SW)	66	44	42	28	39	Birds: 53-60 dBA Dog: 52-66 dBA Quarry Noise: • 37 dBA for 12s • 34 dBA for 5s • 41 dBA for 7s Quarry LAeq Contribution: 33 dBA
28/10/2015 12:04	0:39:44	No	15	8-20 (WSW)	77	38	34	25	36	Birds:48-70 dBA Dog: 54-77 dBA Quarry Noise: not discernible Quarry LAeq Contribution: <15 dBA
28/10/2015 13:18	0:32:24	No	17.3	8-14 (SSW)	69	44	42	26	39	Birds: 51-69 dBA Quarry Noise: • 42 dBA for 30s • 40 dBA for 26s • 39 dBA for 30s • 44 dBA for 3s Quarry LAeq Contribution: 33 dBA
28/10/2015 13:51	0:48:03	No	18.1	4-12 (SW)	86	39	37	28	48	Birds: 55-64 dBA Dog: 73-86 dBA Quarry Noise: barely audible • 32 dBA for 5s Quarry LAeq Contribution: <22 dBA

6 Findings

A review of the operator attended and resident triggered noise events has found that the $L_{Aeq(15minute)}$ noise emissions from the quarry ranged from less than 15 dBA, when the quarry was not discernible above the ambient noise environment, to 35 dBA, when the quarry was continually discernible. Accordingly, the noise emissions from the quarry are found to comply with the 36 dBA $L_{Aeq(15minute)}$ Project Approval Noise Limit at Residence 6.

It is also noted that the prevailing wind conditions at the time of the noise trigger events were, on occasion, outside the weather conditions under which the Project Approval Noise Limits apply (ie greater than 10.8 km/hr). Conservatively, the findings above have included all measured data, irrespective of the prevailing wind condition.

Notwithstanding the above findings, the quarry was clearly discernible on occasions, with short duration noise events reaching maximum noise levels from 36 dBA to 44 dBA. Further, although the maximum noise levels from other sources (eg birds and dogs) were significantly louder than the quarry, ranging between 48 dBA and 86 dBA, the noise emissions from the quarry were clearly discernible during the lulls in the ambient noise environment, which was as low as 24 dBA to 28 dBA on occasion. Consequently, the resident perceives the noise emissions from the quarry during these occurrences as being intrusive, even though the quarry is in compliance with the Project Approval Noise Limit.

7 Recommendations

Notwithstanding that the quarry achieving the Project Approval Noise Limit at Residence 6, it is recommended that as the quarry is developed over the coming years that the quarry implement and incorporate into the quarry operating plan the following potential noise controls in order to improve the acoustic amenity to the neighbouring residences:

1. The existing acoustic bund to the west of the processing area could be increased in height to be at least 1 m higher than the highest noise source operating in the processing area (eg 1 m higher than the exhaust height of the haul trucks and excavators).
2. The mobile processing plant could be relocated in order to maximise the natural topographic shielding offered by the hill between Residence 6 and the processing area.
3. The mobile processing plant could also be repositioned at the bottom of a box cut or highwall cut in order to provide both additional shielding from the processing plant and to reduce the working height of excavator loading the feeder, plus potentially reducing the height of the product area and associated mobile plant.

8 Conclusion

SLR Consulting Australia Pty Ltd was engaged by the Multiquip Group of Companies to conduct unattended noise monitoring in relation to a complaint received from Residence 6 (5094 Oallen Road, Bungonia) regarding noise emissions from the Ardmore Park Quarry. The noise survey found the $L_{Aeq(15minute)}$ noise emissions from the quarry ranged from less than 15 dBA to 35 dBA at Residence 6 and is found to comply with the 36 dBA $L_{Aeq(15minute)}$ Project Approval Noise Limit.

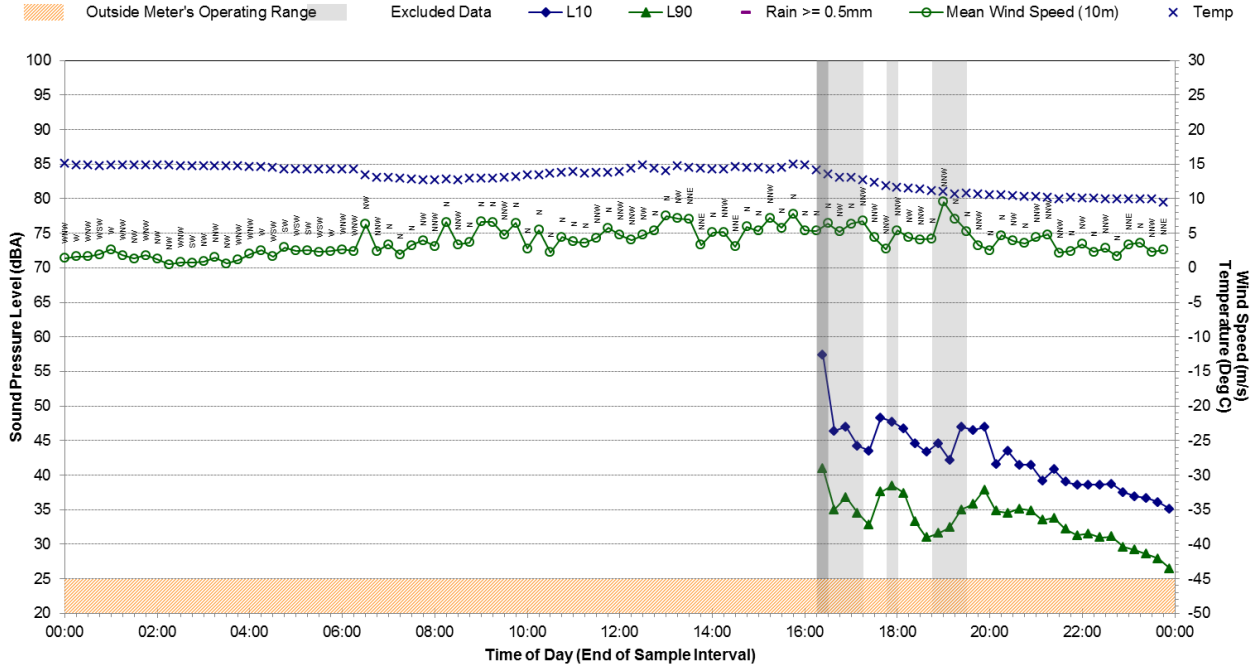
I trust that the above report meets your current requirements. Should you have any questions or require any additional information, please contact me on 02 9427 8100.

Yours sincerely

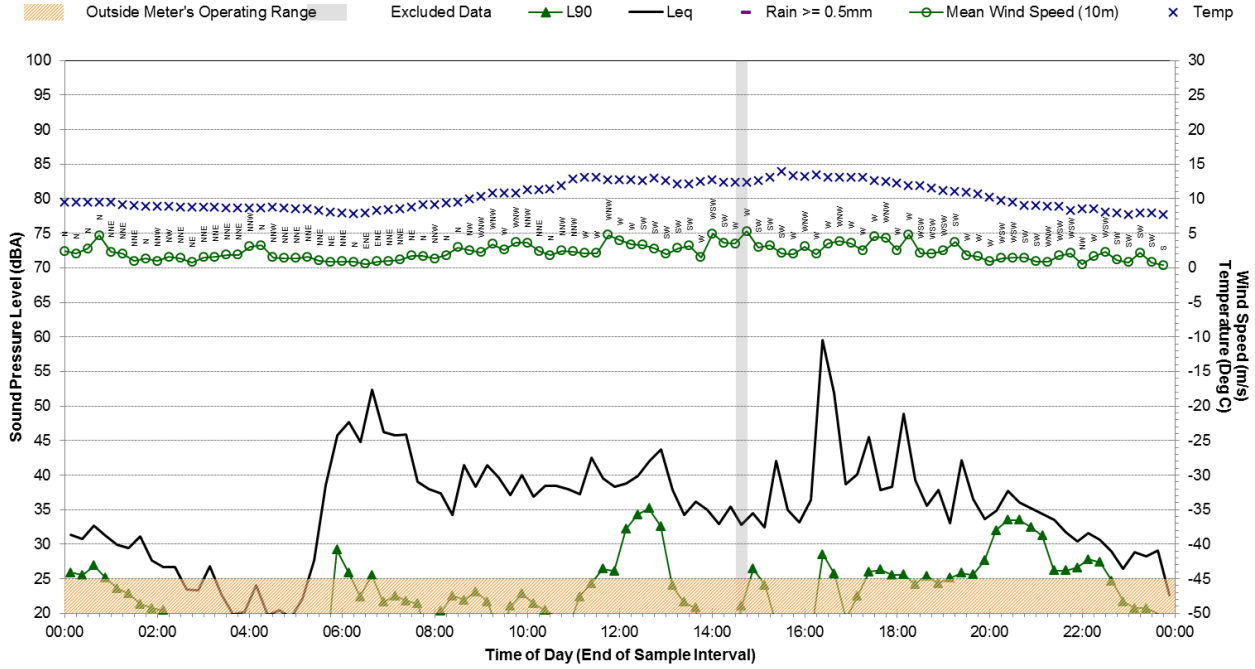
MARK BLAKE
Principal - Acoustics and Vibration

Checked/
Authorised by: RW

Statistical Ambient Noise Levels
Residence 6 - Thursday, 22 October 2015

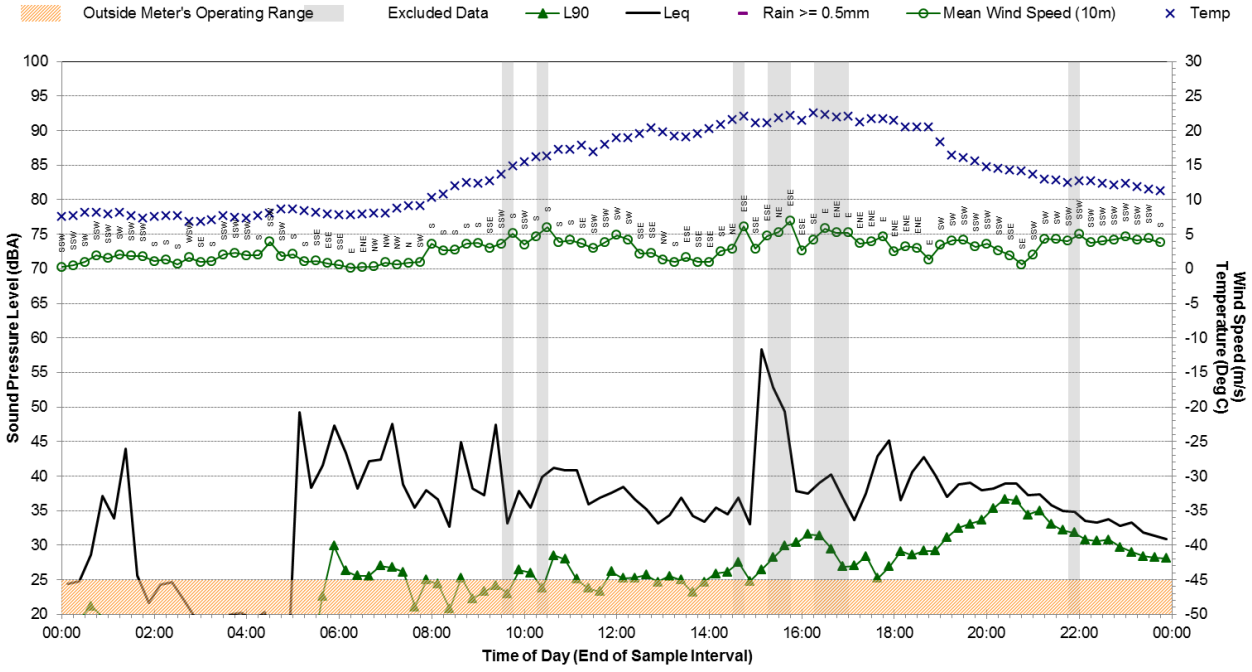


Statistical Ambient Noise Levels
Residence 6 - Friday, 23 October 2015

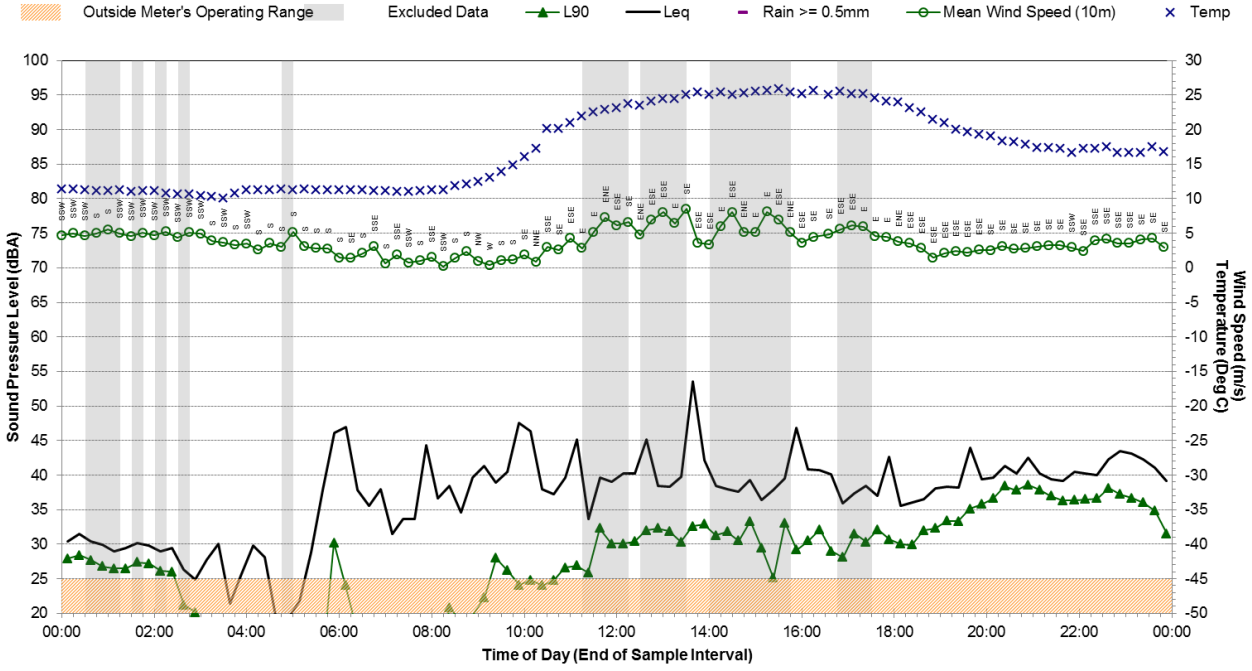


Statistical Ambient Noise Levels

Statistical Ambient Noise Levels
Residence 6 - Saturday, 24 October 2015

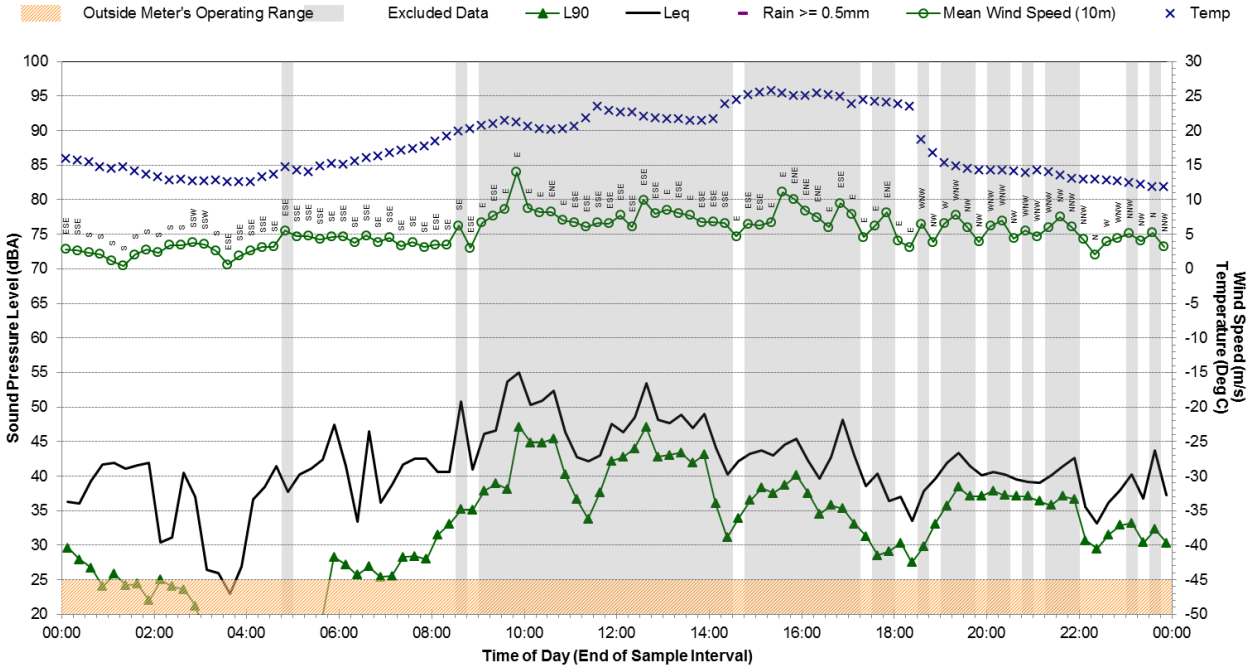


Statistical Ambient Noise Levels
Residence 6 - Sunday, 25 October 2015

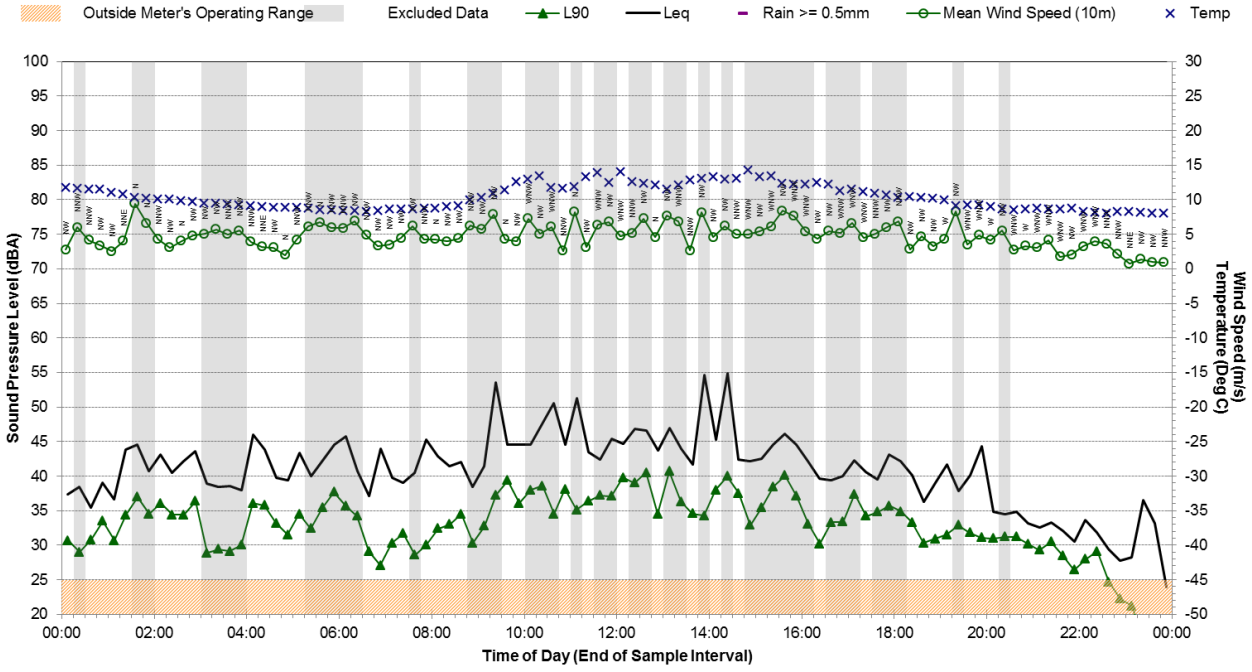


Statistical Ambient Noise Levels

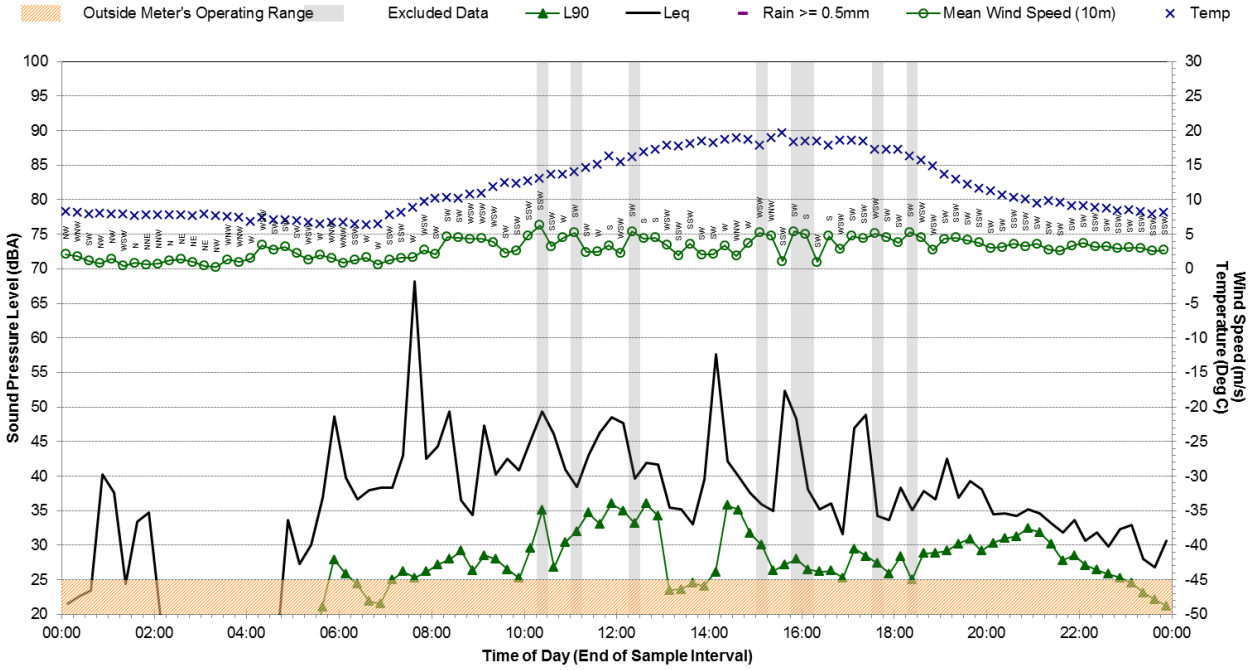
Statistical Ambient Noise Levels
Residence 6 - Monday, 26 October 2015



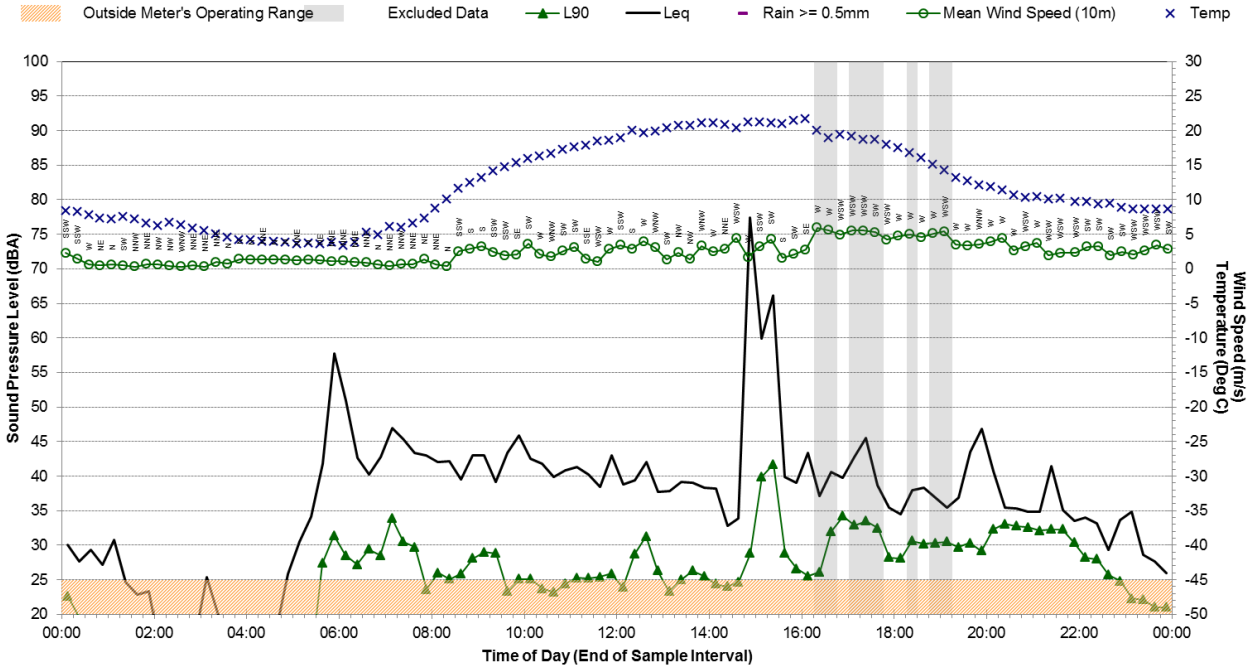
Statistical Ambient Noise Levels
Residence 6 - Tuesday, 27 October 2015



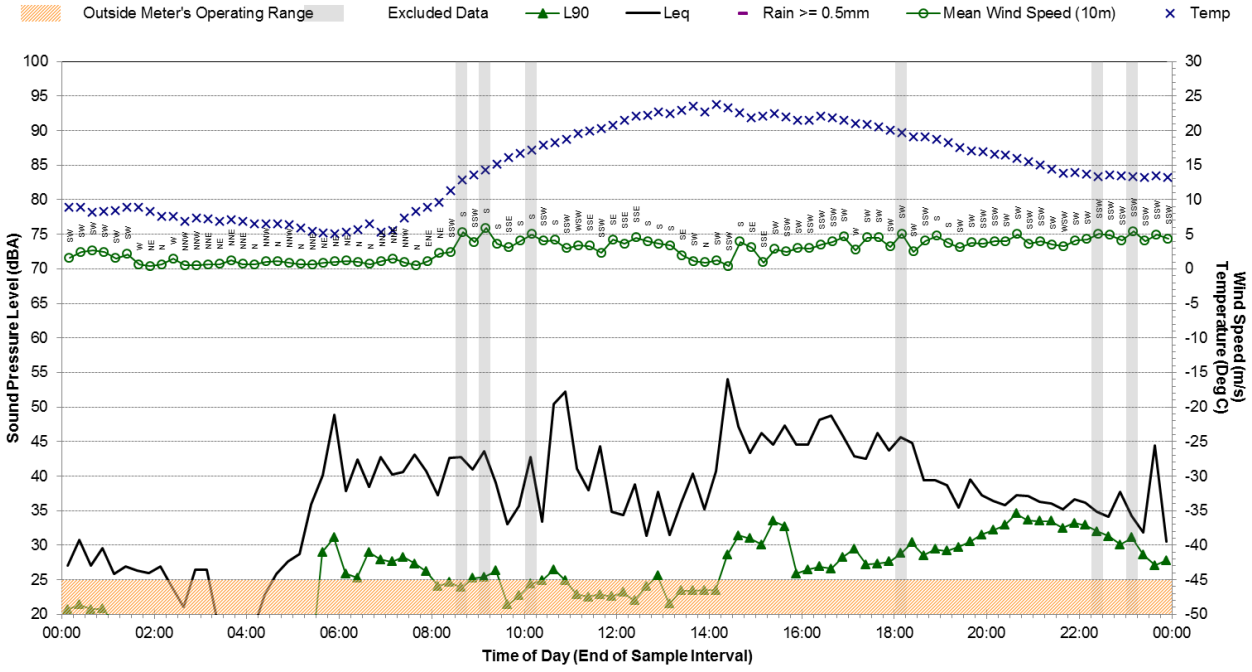
Statistical Ambient Noise Levels
Residence 6 - Wednesday, 28 October 2015



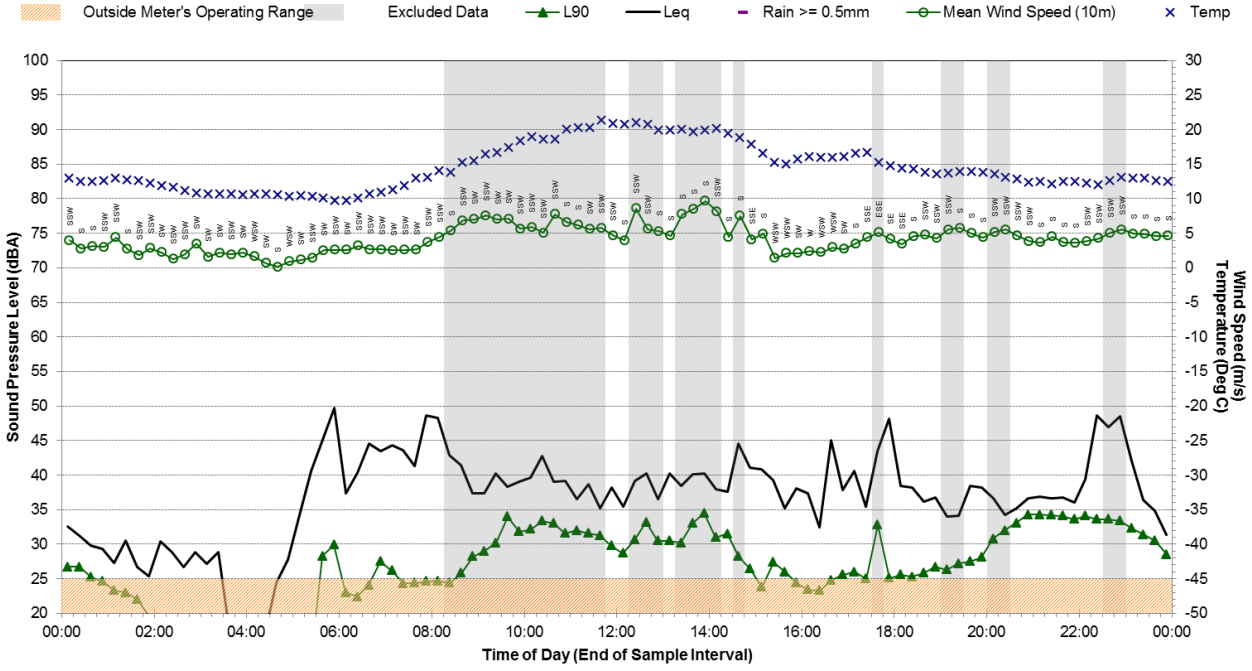
Statistical Ambient Noise Levels
Residence 6 - Thursday, 29 October 2015



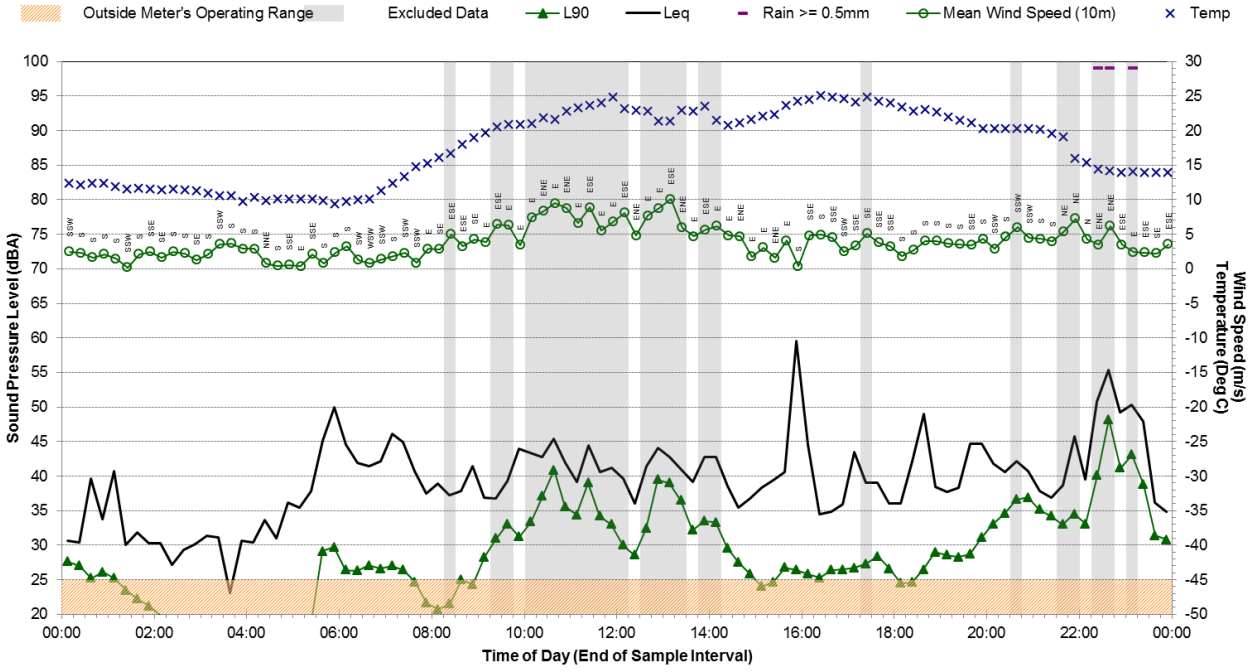
Statistical Ambient Noise Levels
Residence 6 - Friday, 30 October 2015



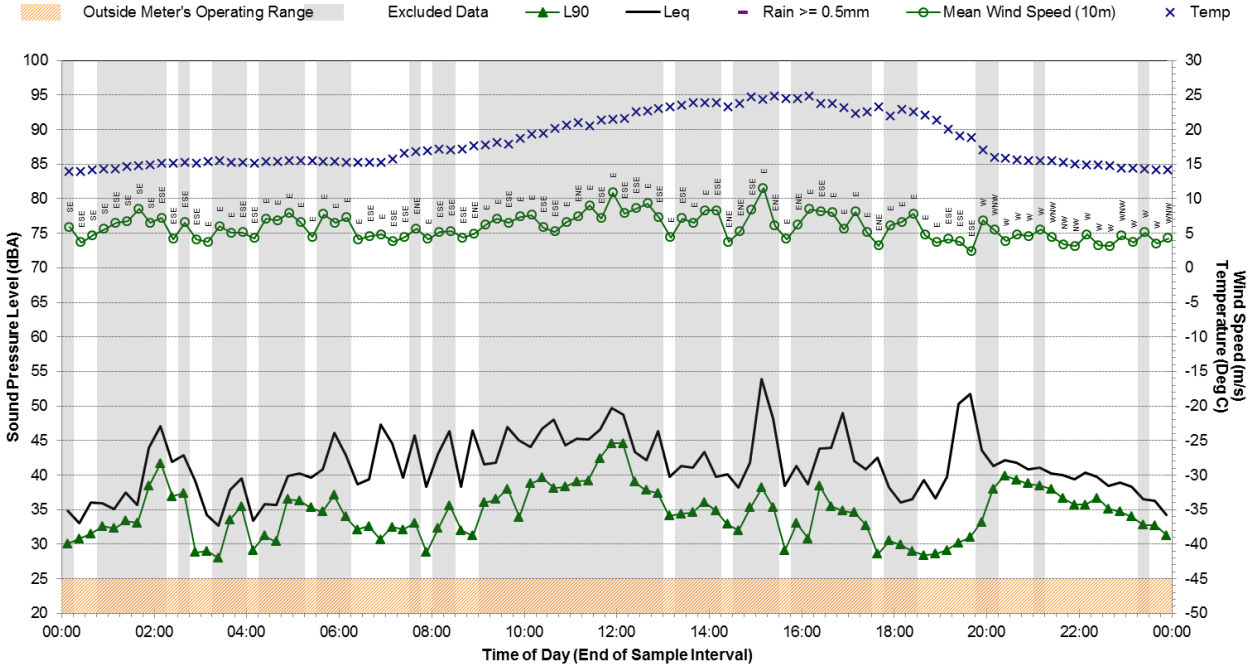
Statistical Ambient Noise Levels
Residence 6 - Saturday, 31 October 2015



Statistical Ambient Noise Levels
Residence 6 - Sunday, 1 November 2015

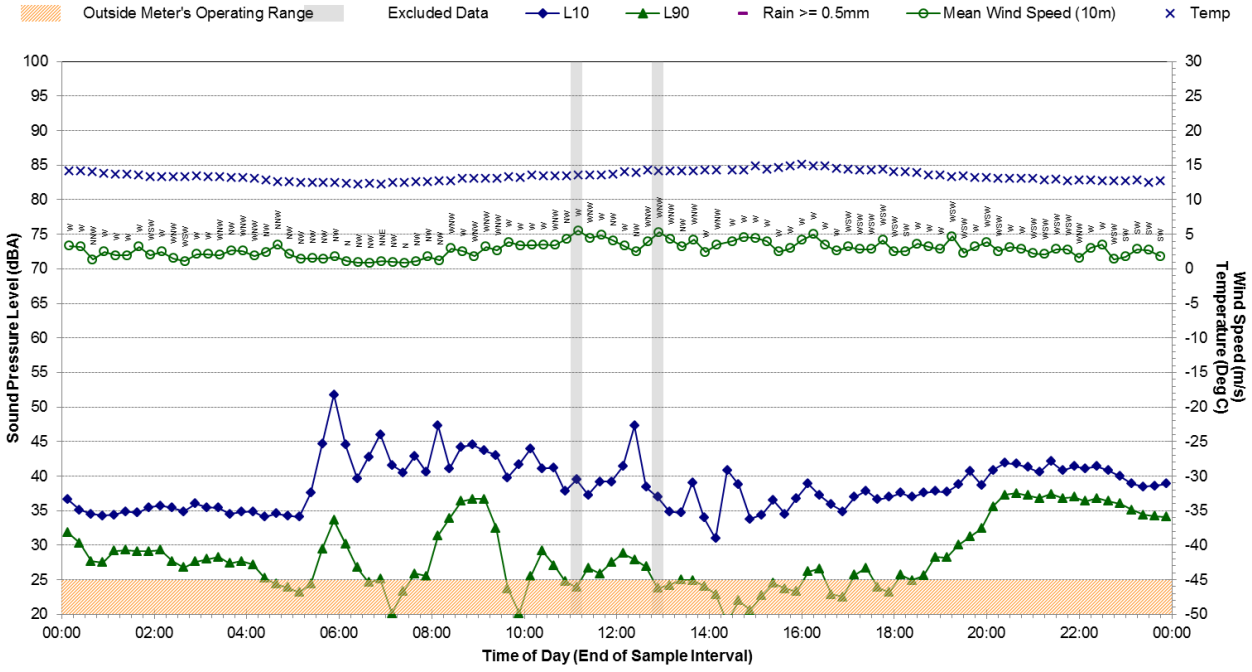


Statistical Ambient Noise Levels
Residence 6 - Monday, 2 November 2015

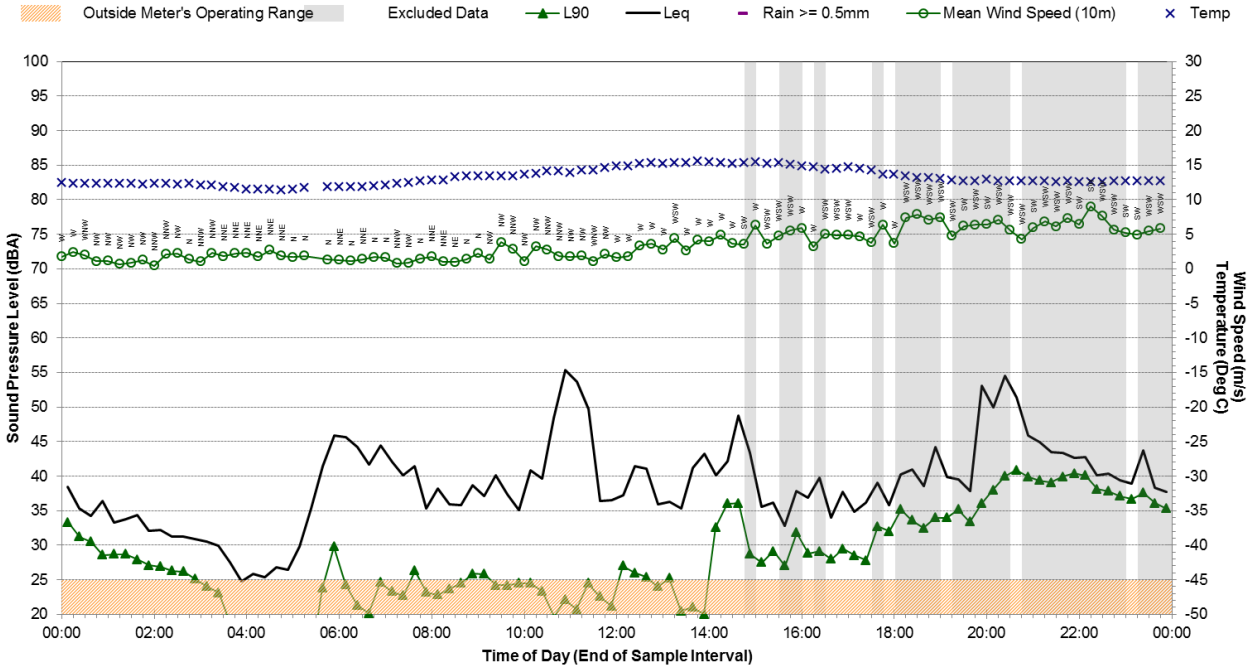


Statistical Ambient Noise Levels

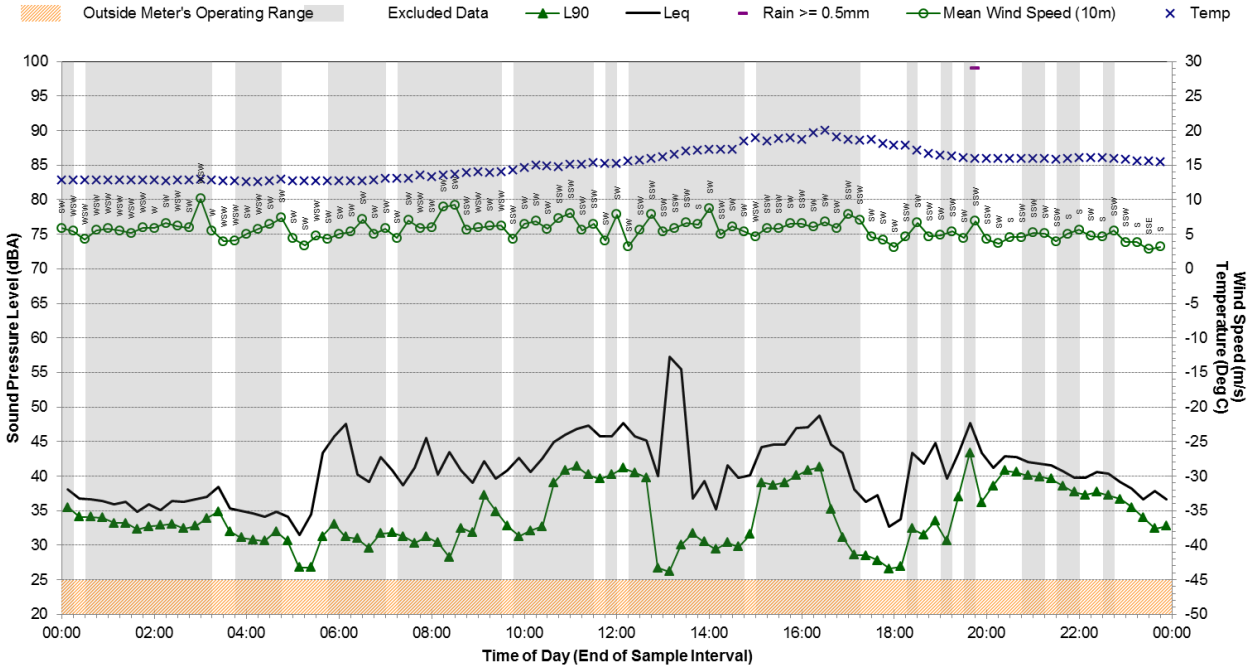
Statistical Ambient Noise Levels
Residence 6 - Tuesday, 3 November 2015



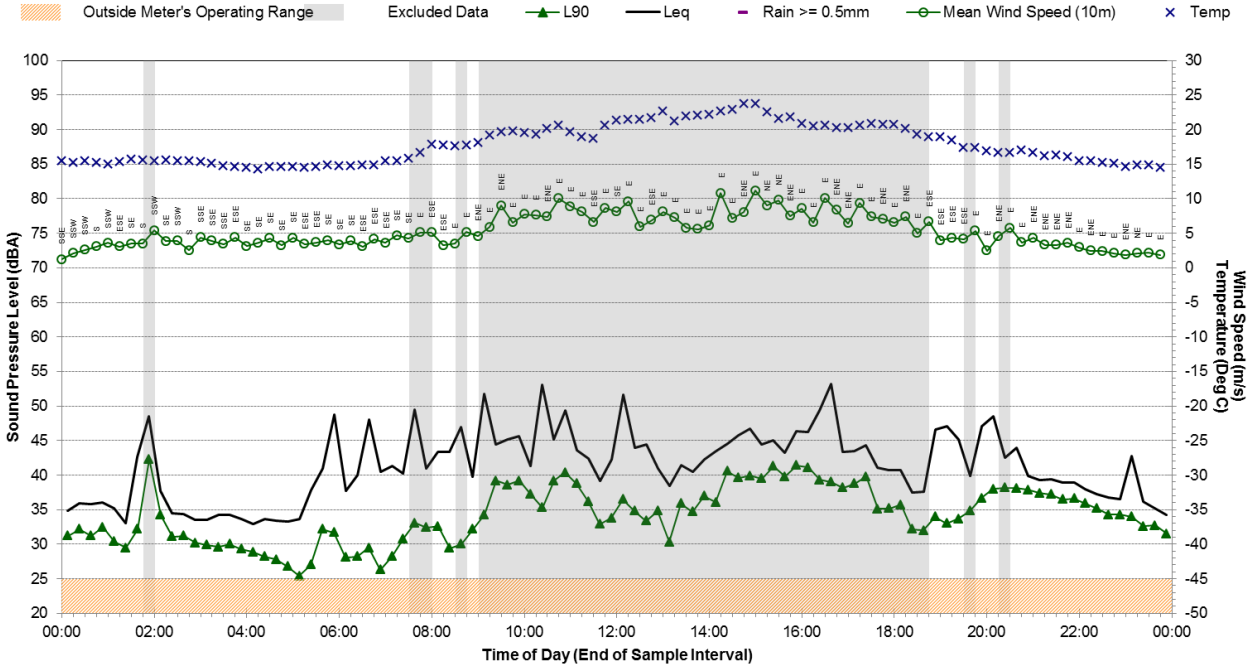
Statistical Ambient Noise Levels
Residence 6 - Wednesday, 4 November 2015



Statistical Ambient Noise Levels
Residence 6 - Thursday, 5 November 2015

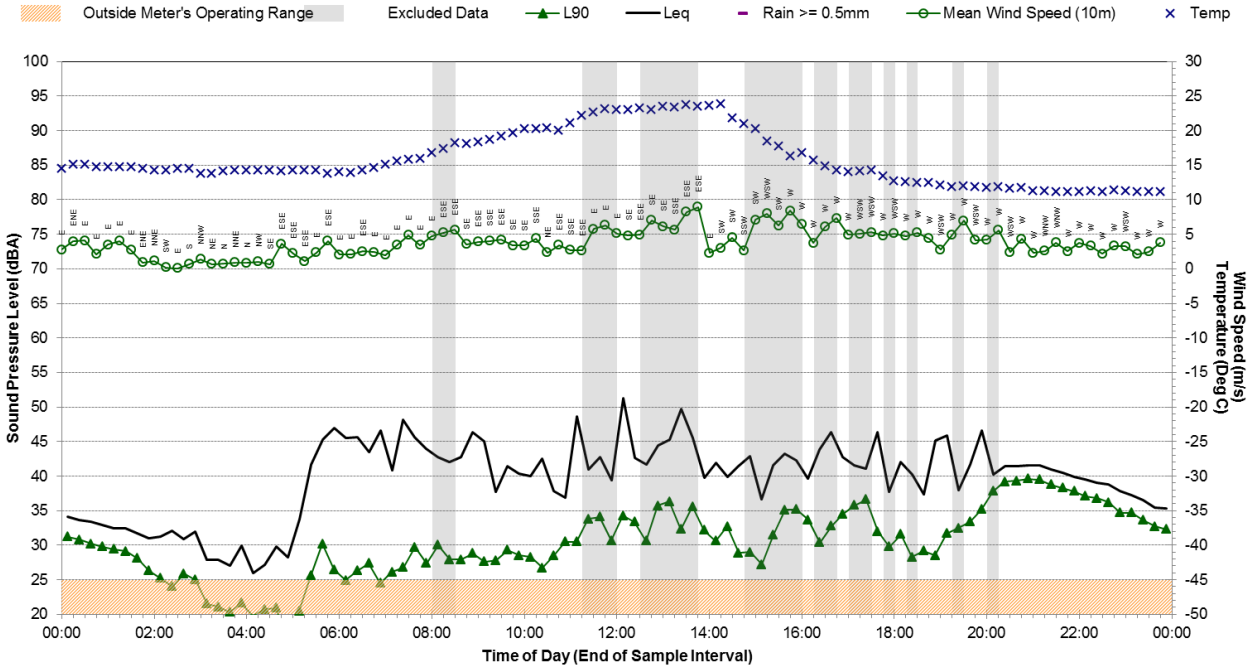


Statistical Ambient Noise Levels
Residence 6 - Friday, 6 November 2015

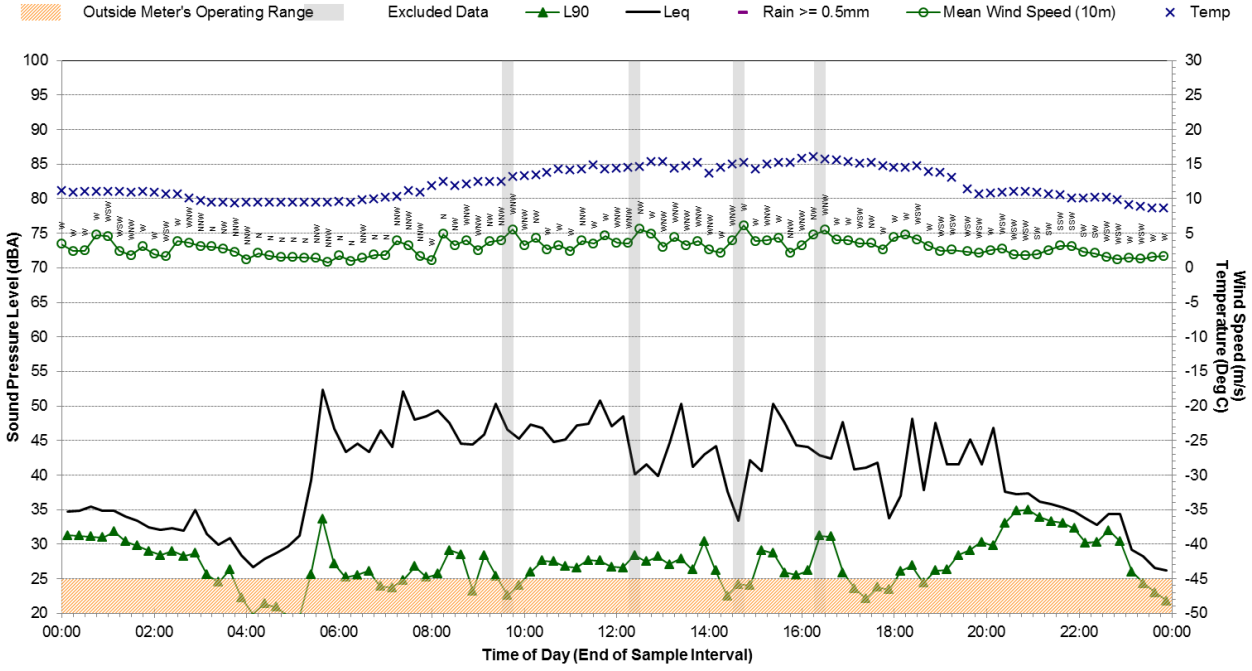


Statistical Ambient Noise Levels

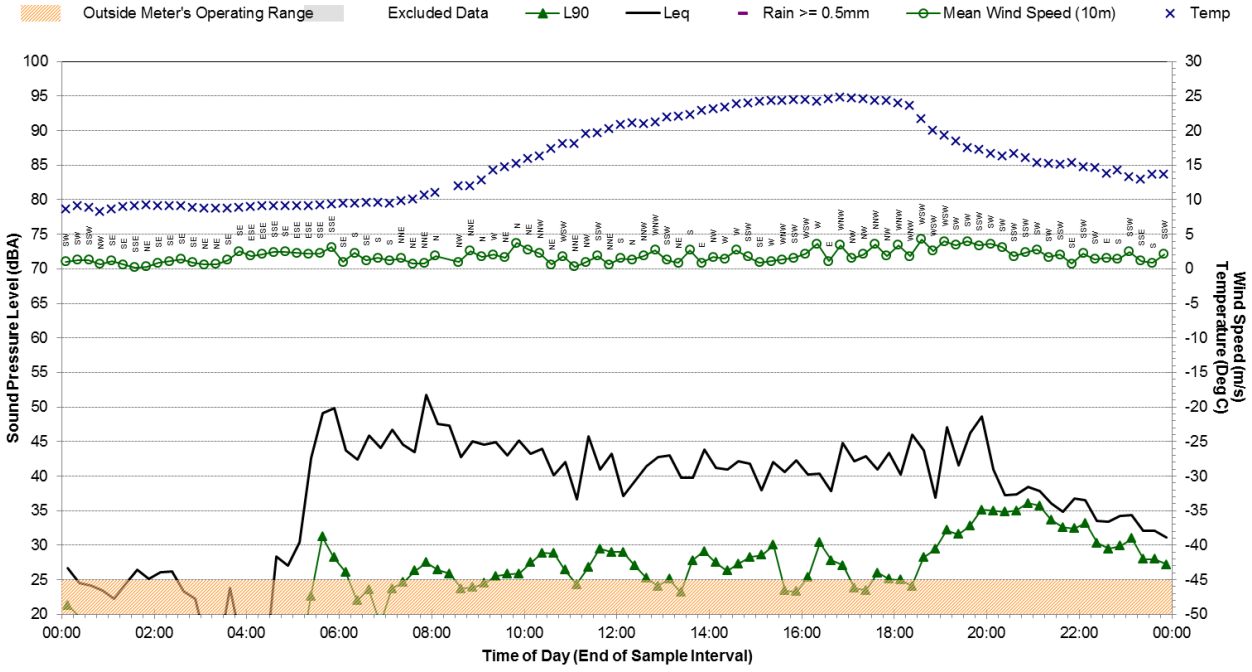
Statistical Ambient Noise Levels
Residence 6 - Saturday, 7 November 2015



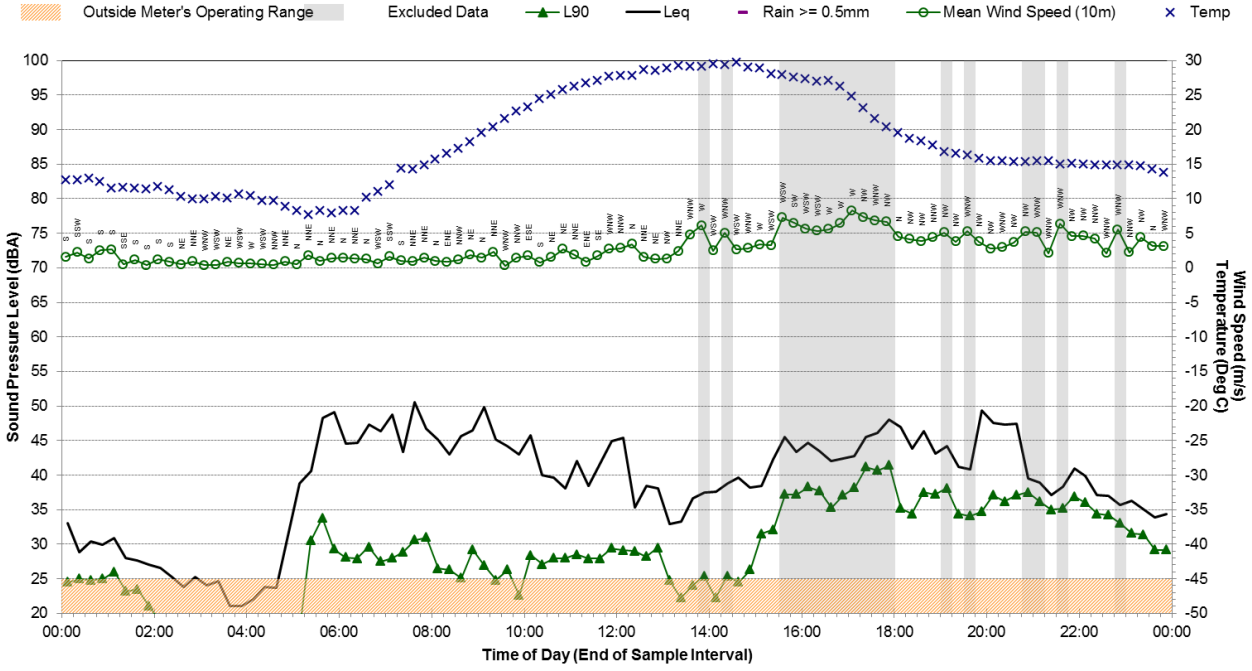
Statistical Ambient Noise Levels
Residence 6 - Sunday, 8 November 2015



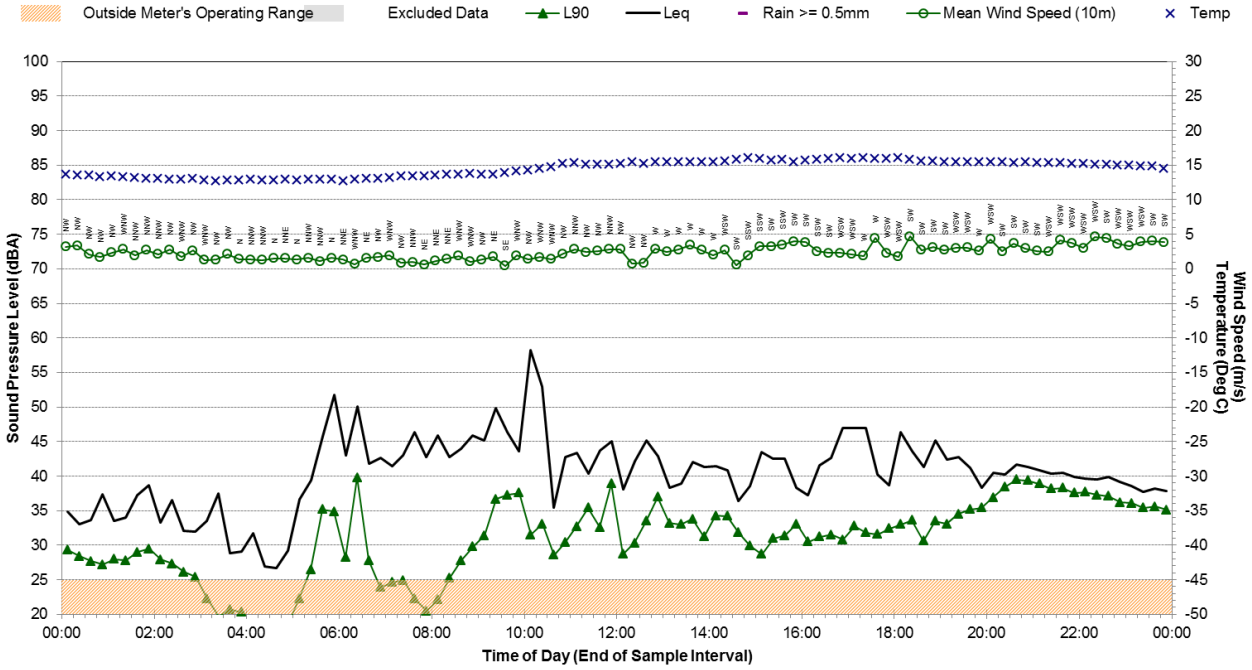
Statistical Ambient Noise Levels
Residence 6 - Monday, 9 November 2015



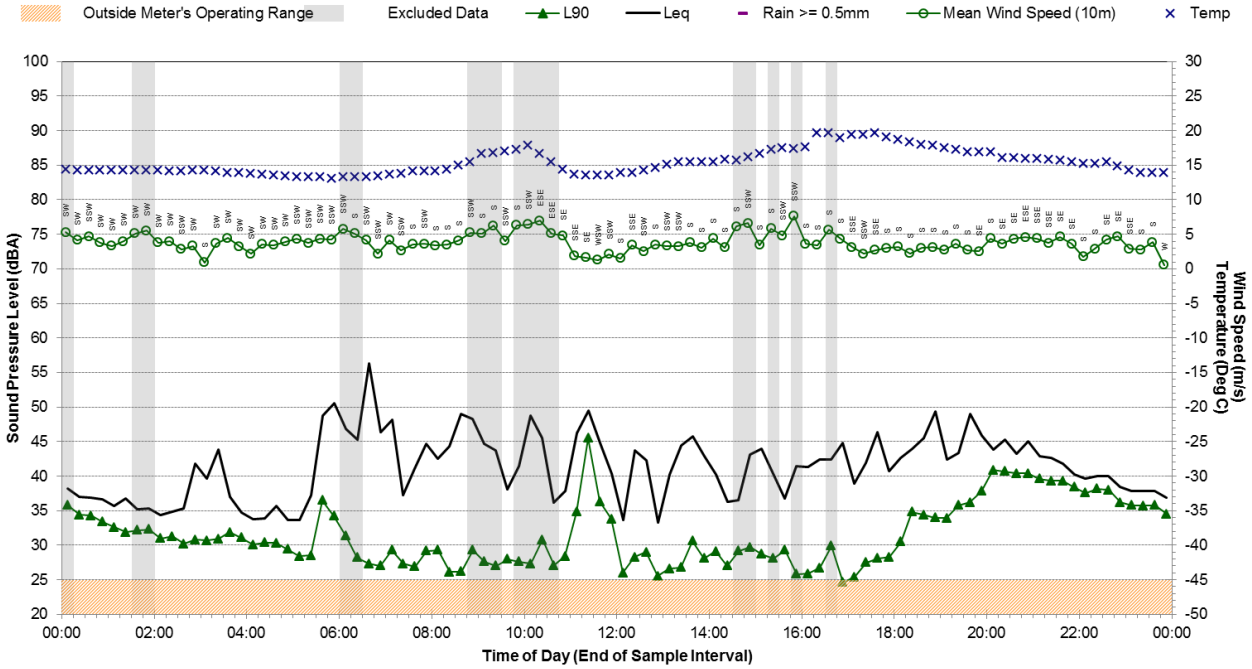
Statistical Ambient Noise Levels
Residence 6 - Tuesday, 10 November 2015



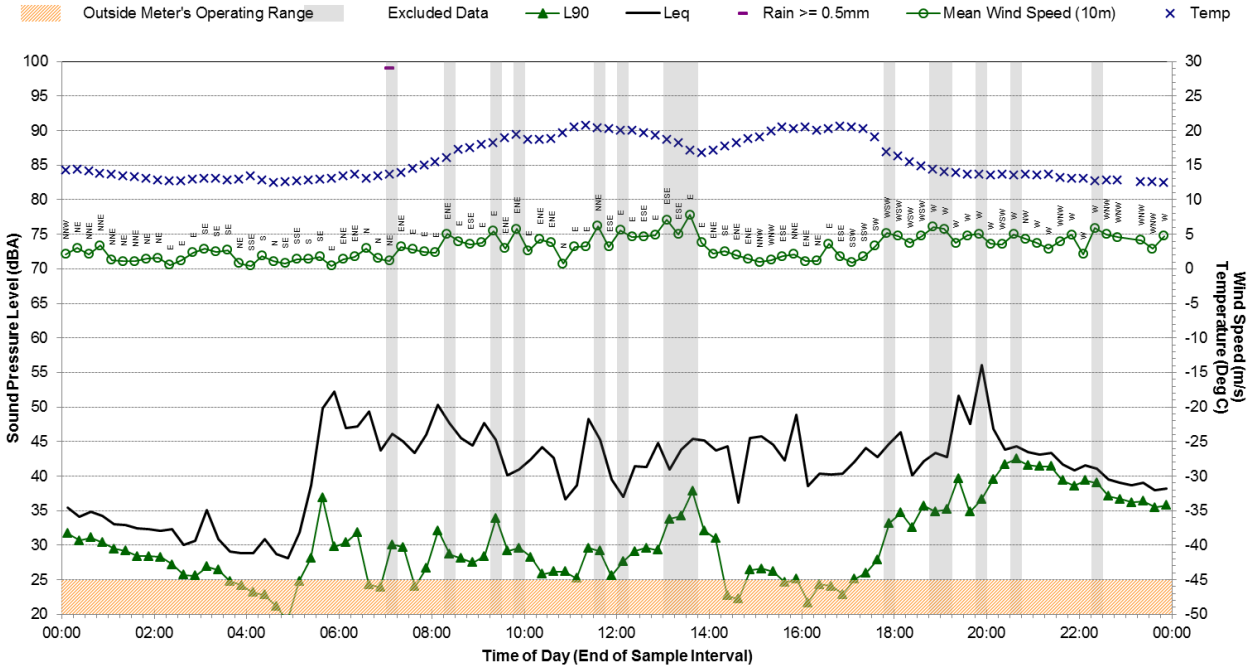
Statistical Ambient Noise Levels
Residence 6 - Wednesday, 11 November 2015



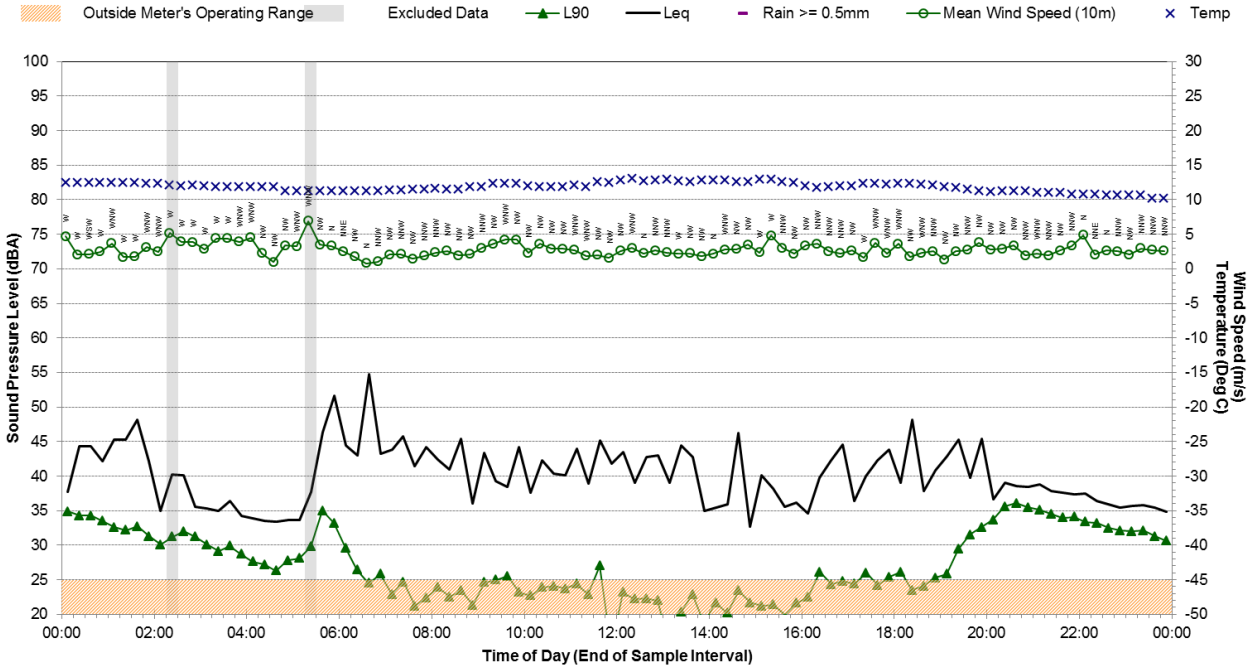
Statistical Ambient Noise Levels
Residence 6 - Thursday, 12 November 2015



Statistical Ambient Noise Levels
Residence 6 - Friday, 13 November 2015

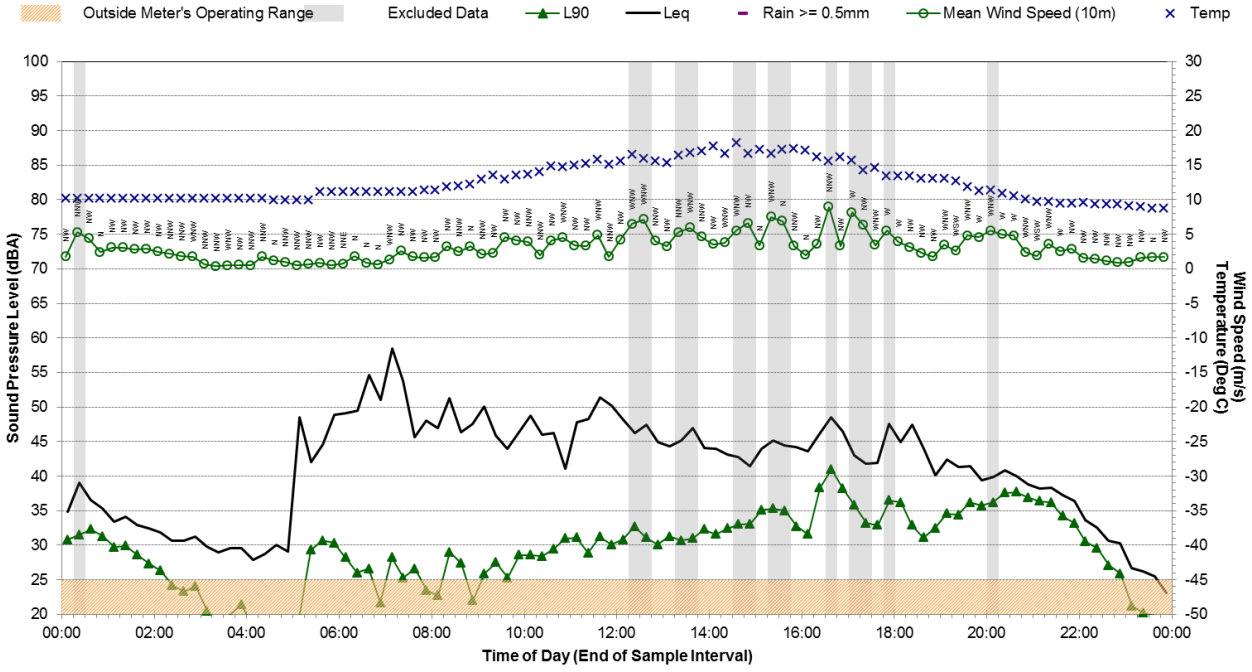


Statistical Ambient Noise Levels
Residence 6 - Saturday, 14 November 2015

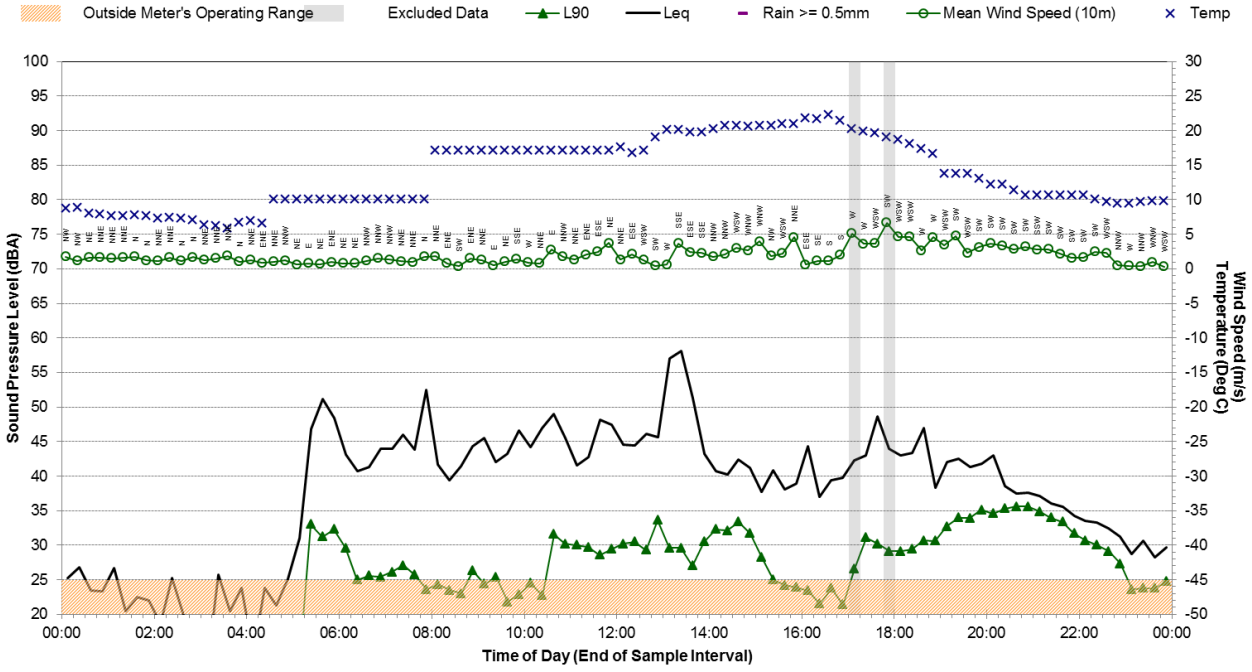


Statistical Ambient Noise Levels

Statistical Ambient Noise Levels
Residence 6 - Sunday, 15 November 2015



Statistical Ambient Noise Levels
Residence 6 - Monday, 16 November 2015



Statistical Ambient Noise Levels

Residence 6 - Tuesday, 17 November 2015