

Eunomia Research & Consulting Ltd
Building 37, Queen Square, Bristol, BS1 4QS
Noise Survey Report

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A handwritten signature in black ink, appearing to read 'A. Best', with a long horizontal stroke extending to the right.

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1 INTRODUCTION

MLM Acoustics have been commissioned by Eunomia Research & Consulting Ltd to undertake a scheme of noise monitoring at noise-sensitive properties surrounding the Building 41 located in Pembroke Dock. This report sets out the procedure adopted, observations made and results obtained.

While every effort has been made to ensure that this report is easily understood, it is technical in nature; a glossary of terms is included in Appendix A to assist the reader.

It should be noted that this report details the background noise assessment only, and does not include an assessment of the construction and operational phase of the development, in accordance with BS4142:1997.

There are no activities associated with Building 41 that are currently operational, as such, background noise measurements are representative of the noise climate in the area. The specific intended use/processes of Building 41 are not known to the author of this report.

2 BASELINE SURVEY

Methodology

Logged Measurements

The baseline survey was undertaken to determine the existing background noise levels at nearest noise sensitive receptors. The background noise level measurements, on land associated with the parcel boundary of Building 41 (close to Fort Road), were made over 7 days from Thursday 3rd April 2014 to Thursday 10th April 2014. The background noise level measurements, on land associated with the South Pembrokeshire Hospital (Fort Road), were made over 7 days from Thursday 3rd April 2014 to Thursday 10th April 2014. The background noise level measurements, on land associated with Whites Farm Way, were made over 7 days from Thursday 3rd April 2014 to Thursday 10th April 2014.

It should be noted that no attended noise measurements were made whilst on site. A description of the noise climate at each noise measurement position has been detailed in the following text.

Equipment and Procedure

The noise measurement exercise was undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445¹ and following the guidance given in the Institute of Acoustics' *Good Practice Guide*.

The acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672². A full inventory of this equipment is shown in Table 1 below.

TABLE 1: INVENTORY OF NOISE MEASUREMENT EQUIPMENT			
Make, Model & Description	Serial Number	Calibration Certificate Number	Calibration Due Date
1 – SLM – Rion NL-31	00583267	1401008	06/01/16
1 – Preamplifier – Rion NH-21	27497	1401008	06/01/16
1 – Microphone – Rion UC-53A	312273	1401008	06/01/16
2 – SLM – Rion NL-52	00620957	CONF101211	10/10/14
2 – Preamplifier – Rion NH-25	20998	CONF101211	10/10/14
2 – Microphone – Rion UC-59	03875	CONF101211	10/10/14
3 – SLM – Rion NL-31	00773028	1401010	06/01/16
3 – Preamplifier – Rion NH-21	25039	1401010	06/01/16
3 – Microphone – Rion UC-53A	316034	1401010	06/01/16
Rion NC-74 Calibrator	34662223	1401011	08/01/15

¹ British Standard 7445: 2003: *Description and measurement of environmental noise*. BSI

² British Standard 61672: 2003: *Electroacoustics. Sound level meters. Part 1 Specifications*. BSI.

The noise measurement equipment used during the survey was calibrated at the start and end of the measurement period. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements. No drift in calibration was found to have occurred.

The microphones were fitted with protective windshields for the duration of the measurements.

The sound level meters (SLMs) were configured during the survey to collect A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise level data (as a minimum) with a 'fast' time response, integrated over 5 minute periods. The microphone was mounted at a height of 1.6 metres above local ground level. All microphones were fitted with protective windshields and all measurements were undertaken in free-field conditions.

Three measurement positions were selected to represent the groups of dwellings that are closest to the works. These are shown in Figure 1 and described below.



FIGURE 1: BASELINE NOISE SURVEY MEASUREMENT POSITIONS

Measurement Position 1 – Boundary of Building 41

The measurements were carried out on land associated with the boundary of the Building 41 (close to Fort Road), as shown below in Figure 2.



FIGURE 2: BUILDING 41 MEASUREMENT POSITION

Whilst on site, it was noted that road traffic noise from Fort Road was a constitute part of the noise climate. Furthermore, there was no industrial noise associated with other plots in the Pembroke Dock complex. In addition to this, wind-induced vegetation noise and birdsong was also noted.

The equipment was located approximately 2 m from the nearest boundary wall, which is constituted primarily of wire fence, and can be seen below in Figure 3.



FIGURE 3: MEASUREMENT POSITION 1 BOUNDARY FENCE

Given that the boundary fence is 'acoustically invisible' (i.e. it does not offer significant reflection of sound), no further adjustment of the measured sound pressure levels have been made.

Measurement Position 2 – South Pembrokeshire Hospital

The measurements were carried out on land associated with South Pembrokeshire Hospital (back garden), as shown below in Figure 4.



FIGURE 4: SOUTH PEMBROKESHIRE HOSPITAL MEASUREMENT POSITION

Whilst on site, it was noted that road traffic noise from Fort Road was present; however, local traffic movements in the car park associated with the hospital were the dominant feature in the noise climate. Furthermore, there was no industrial noise associated with other plots in the Pembroke Dock complex. In addition to this, wind-induced vegetation noise and birdsong was also noted.

Measurement Position 3 – Whites Farm Way

The measurements were carried out on land associated with Whites Farm Way, as shown below in Figure 5.



FIGURE 5: ST. CLEMENT VETERINARY CLINIC MEASUREMENT POSITION

Whilst on site, it was noted that road traffic noise from the Whites Farm Way and Fort Road was the dominant source in the noise climate.

3 MEASUREMENTS

Averages of the equivalent levels of different daytime periods (Monday to Friday, and Saturday) from 07:30 and 19:30, as well as the equivalent level for Sunday from 09:00 and 16:00 are presented in Table 2 below. It should be noted that the results have been corrected for periods when rainfall occurred.

TABLE 2: AVERAGE NOISE MEASUREMENT SURVEY RESULTS					
Location	Time, T	Noise Level, dB			
		L _{Aeq,T}	L _{A90,T}	L _{A10,T}	L _{Amax,T}
1	Monday to Friday 07:30-19:30	48	41	48	75
	Saturday 07:30-19:30	44	40	46	75
	Sunday and Bank Holidays 09:00-16:00	43	40	45	55
2	Monday to Friday 07:30-19:30	51	45	58	82
	Saturday 07:30-19:30	49	45	57	71
	Sunday and Bank Holidays 09:00-16:00	48	45	58	68
3	Monday to Friday 07:30-19:30	50	43	52	78
	Saturday 07:30-19:30	49	41	50	76
	Sunday and Bank Holidays 09:00-16:00	47	41	49	64

Graphical representations and hourly tabulated levels of the measurement results for the whole survey period are presented in Appendix B.

Appendices

Appendix A – Glossary of Acoustic Terminology

Appendix B – Full Measurement Results

Appendix A

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT	
Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source.

A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10} , the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq} .

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

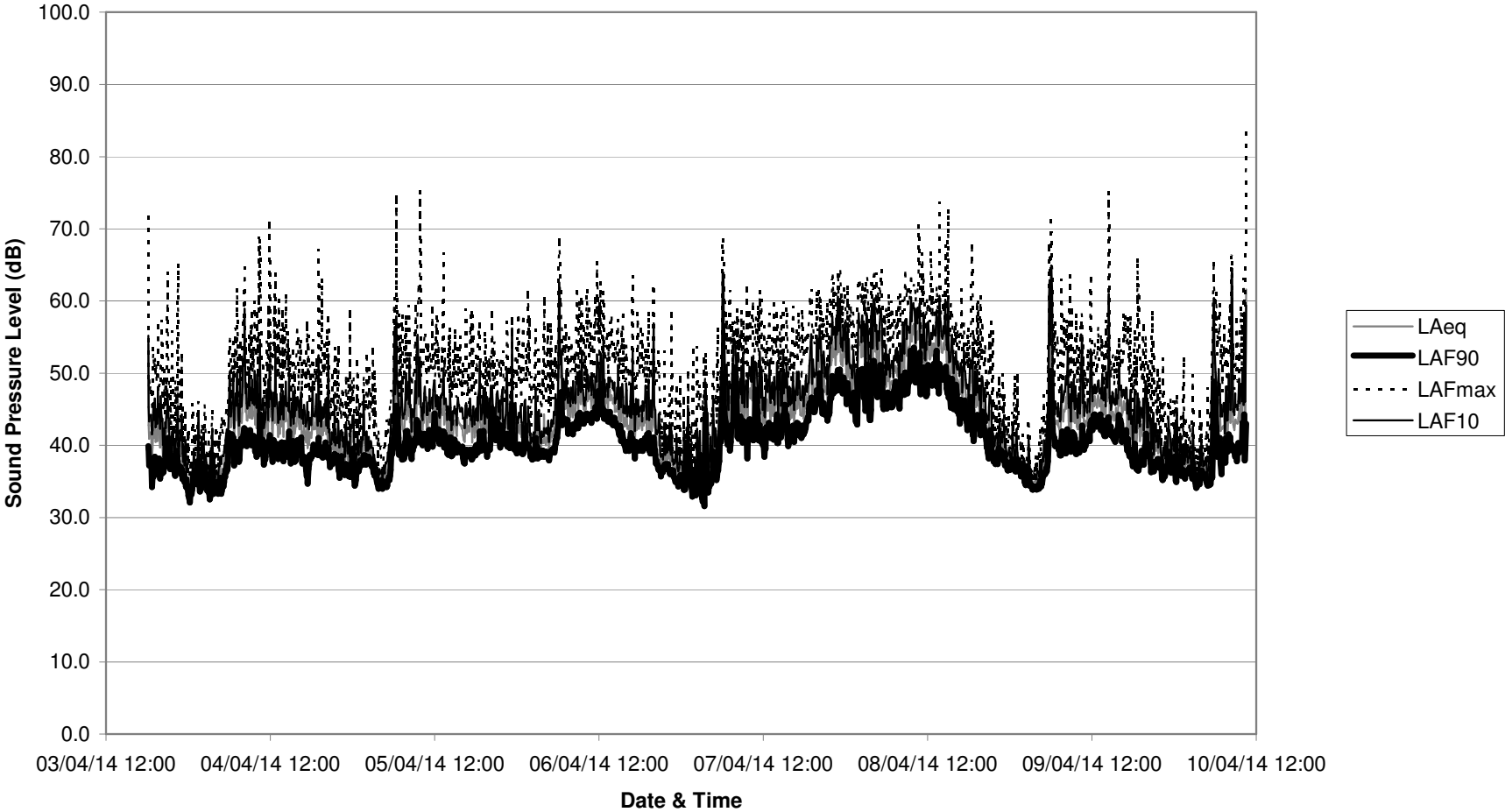
To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1\text{hour}}$ dB and $L_{A90,5\text{mins}}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

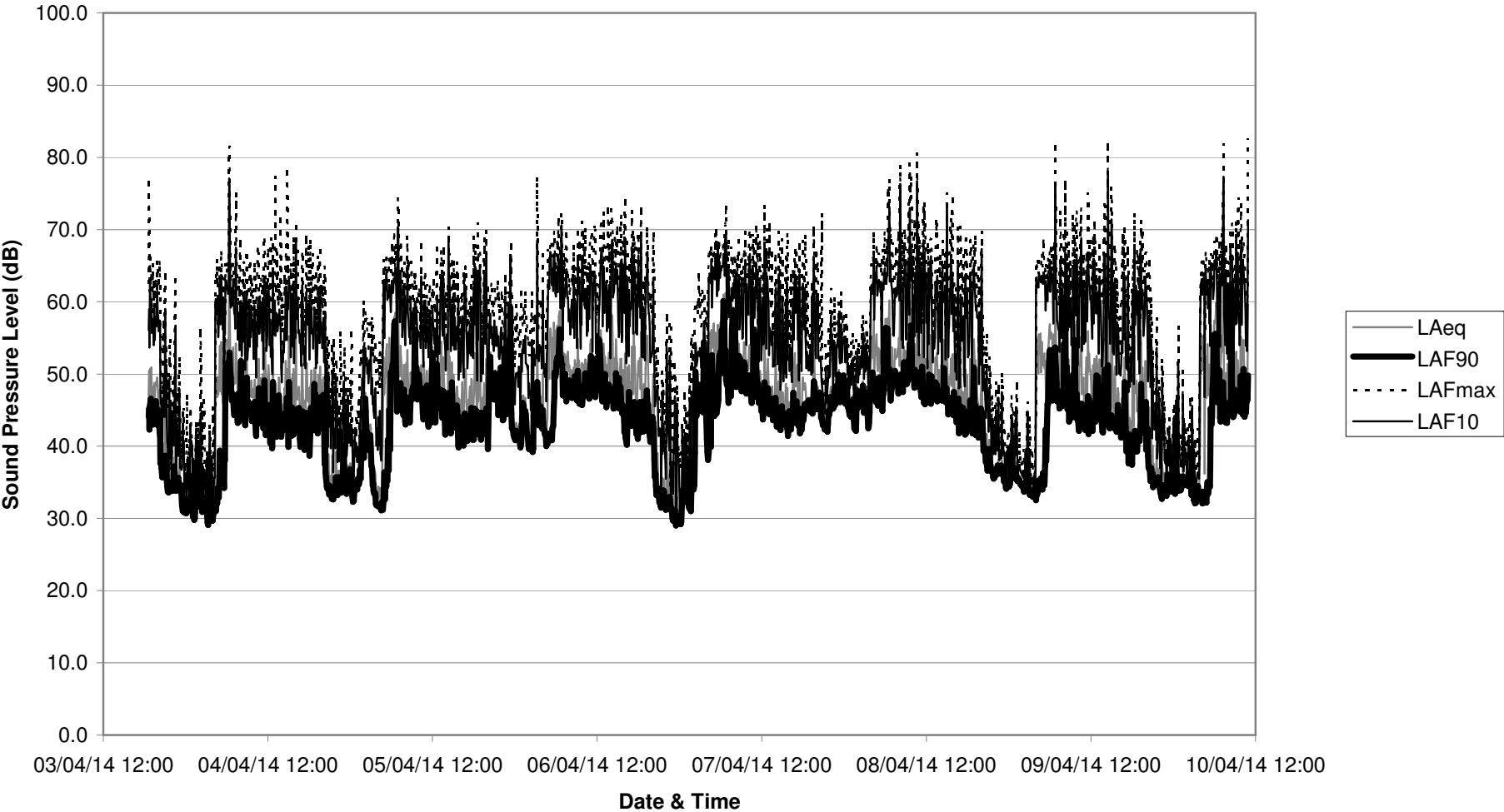
Appendix B

APPENDIX B – FULL MEASUREMENT RESULTS

MP1 - Building 41 - Noise Survey Results



MP2 - South Pembrokeshire Hospital - Noise Survey Results



MP3 - Whites Farm Way - Noise Survey Results

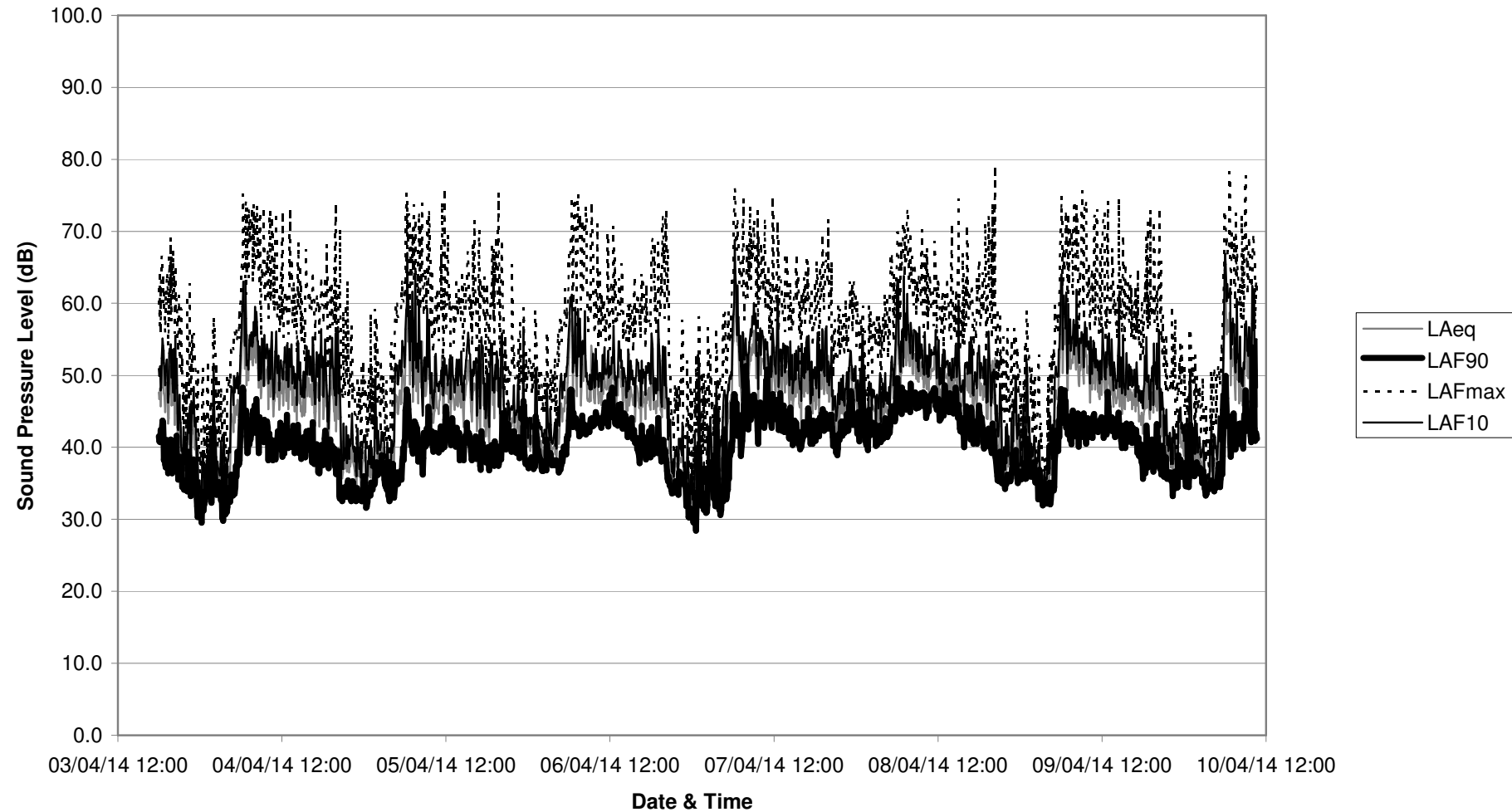


TABLE B1 – POSITION 1				
Start time	L_{Aeq,1-hour}	L_{A90,1-hour}	L_{A10,1-hour}	L_{AFmax}
03/04/14 19:00	42.0	36.9	44.4	57.3
03/04/14 20:00	41.0	37.6	42.9	57.4
03/04/14 21:00	41.9	38.7	41.8	64.1
03/04/14 22:00	40.8	37.2	40.7	65.2
03/04/14 23:00	37.5	35.3	38.6	52.9
04/04/14 00:00	35.3	33.8	35.8	45.9
04/04/14 01:00	36.9	35.2	37.7	46.1
04/04/14 02:00	37.2	35.4	38.1	45.7
04/04/14 03:00	36.1	34.1	36.6	45.0
04/04/14 04:00	35.8	34.3	36.9	44.0
04/04/14 05:00	38.9	36.1	40.4	47.5
04/04/14 06:00	44.2	40.3	46.1	56.3
04/04/14 07:00	43.9	39.6	46.1	61.8
04/04/14 08:00	47.8	41.4	49.6	64.7
04/04/14 09:00	44.9	40.7	47.3	60.0
04/04/14 10:00	46.2	40.0	46.7	68.9
04/04/14 11:00	45.6	39.3	45.6	71.4
04/04/14 12:00	44.7	39.7	46.8	63.9
04/04/14 13:00	43.1	39.1	45.1	60.3
04/04/14 14:00	44.1	39.6	46.2	61.1
04/04/14 15:00	42.8	38.6	45.1	56.7
04/04/14 16:00	43.1	39.2	45.4	55.0
04/04/14 17:00	41.5	37.3	43.7	57.4
04/04/14 18:00	42.8	39.3	44.8	54.7
04/04/14 19:00	43.9	39.2	45.2	67.2
04/04/14 20:00	42.8	38.7	43.6	58.3
04/04/14 21:00	40.3	38.0	41.6	54.0
04/04/14 22:00	38.9	36.6	40.6	49.0
04/04/14 23:00	39.8	36.6	41.0	59.0
05/04/14 00:00	39.1	36.6	40.1	52.2
05/04/14 01:00	40.3	37.8	41.5	49.7
05/04/14 02:00	39.1	37.8	40.1	53.0
05/04/14 03:00	36.8	35.4	37.4	53.9
05/04/14 04:00	35.6	34.5	36.5	42.5

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05/04/14 05:00	39.5	36.5	40.9	47.7
05/04/14 06:00	48.8	42.0	48.7	74.9
05/04/14 07:00	44.0	39.4	45.8	58.2
05/04/14 08:00	44.0	39.8	45.9	59.4
05/04/14 09:00	47.7	41.2	48.9	75.3
05/04/14 10:00	43.7	40.7	45.5	55.4
05/04/14 11:00	44.3	41.2	46.2	59.6
05/04/14 12:00	44.4	41.5	45.9	58.0
05/04/14 13:00	44.9	40.7	46.6	66.7
05/04/14 14:00	42.7	39.6	44.5	56.4
05/04/14 15:00	42.8	39.5	44.9	56.3
05/04/14 16:00	42.4	38.7	44.4	58.9
05/04/14 17:00	42.6	38.7	44.4	58.9
05/04/14 18:00	43.9	39.7	45.8	57.5
05/04/14 19:00	43.2	39.8	45.4	55.8
05/04/14 20:00	44.2	41.7	45.5	59.0
05/04/14 21:00	44.4	41.8	46.1	52.0
05/04/14 22:00	43.6	40.6	44.9	57.3
05/04/14 23:00	44.9	40.5	45.1	58.1
06/04/14 00:00	41.9	39.4	43.3	58.4
06/04/14 01:00	42.6	40.0	43.6	61.7
06/04/14 02:00	41.2	38.8	42.2	56.2
06/04/14 03:00	40.9	38.9	42.1	53.4
06/04/14 04:00	41.1	38.6	42.0	60.8
06/04/14 05:00	42.7	39.8	44.4	57.1
06/04/14 06:00	51.1	44.2	51.4	69.0
06/04/14 07:00	45.5	42.8	47.2	56.8
06/04/14 08:00	45.7	42.8	47.6	62.0
06/04/14 09:00	46.6	43.5	48.1	60.8
06/04/14 10:00	46.6	43.8	48.1	61.8
06/04/14 11:00	48.0	44.7	49.2	65.5
06/04/14 12:00	48.6	45.2	49.9	62.7
06/04/14 13:00	46.5	43.8	48.5	58.2
06/04/14 14:00	45.5	42.8	47.3	57.5
06/04/14 15:00	44.1	40.9	46.1	58.8
06/04/14 16:00	44.4	40.4	46.4	63.5
06/04/14 17:00	43.0	39.7	45.0	58.5

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06/04/14 18:00	43.5	40.0	45.5	56.8
06/04/14 19:00	44.0	39.9	45.8	60.4
06/04/14 20:00	44.1	38.0	44.2	62.4
06/04/14 21:00	38.3	36.7	39.3	53.1
06/04/14 22:00	38.9	36.5	39.8	58.9
06/04/14 23:00	36.9	35.2	38.0	50.0
07/04/14 00:00	36.7	35.0	37.9	47.0
07/04/14 01:00	38.2	35.6	38.4	53.9
07/04/14 02:00	37.6	35.2	38.4	53.7
07/04/14 03:00	41.0	36.0	40.6	52.9
07/04/14 04:00	39.4	35.9	40.2	50.7
07/04/14 05:00	41.7	38.2	43.0	56.4
07/04/14 06:00	53.4	43.7	52.5	68.8
07/04/14 07:00	49.4	44.4	50.4	61.5
07/04/14 08:00	47.1	43.2	48.9	59.0
07/04/14 09:00	45.9	41.1	48.1	62.4
07/04/14 10:00	47.4	43.1	49.6	60.1
07/04/14 11:00	47.0	42.4	48.7	61.5
07/04/14 12:00	45.5	41.2	47.5	58.4
07/04/14 13:00	45.2	41.9	47.3	60.4
07/04/14 14:00	46.4	42.1	48.4	59.9
07/04/14 15:00	45.9	42.4	47.9	59.3
07/04/14 16:00	45.4	41.7	47.5	59.3
07/04/14 17:00	45.4	41.9	47.5	59.0
07/04/14 18:00	47.3	43.8	49.3	60.8
07/04/14 19:00	49.4	45.6	51.5	61.6
07/04/14 20:00	50.7	46.3	53.1	62.0
07/04/14 21:00	48.9	44.9	51.1	60.7
07/04/14 22:00	53.5	48.4	56.3	64.1
07/04/14 23:00	53.4	48.5	55.9	64.6
08/04/14 00:00	50.6	47.0	52.5	62.3
08/04/14 01:00	49.7	45.7	50.6	62.3
08/04/14 02:00	53.4	48.9	55.7	63.2
08/04/14 03:00	52.7	46.6	54.0	63.5
08/04/14 04:00	53.7	48.5	56.2	64.4
08/04/14 05:00	52.5	47.6	53.5	64.4
08/04/14 06:00	49.0	46.0	51.1	61.0

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08/04/14 07:00	49.8	47.1	51.5	60.6
08/04/14 08:00	52.6	48.3	54.7	64.5
08/04/14 09:00	54.8	50.1	57.4	63.8
08/04/14 10:00	55.5	50.4	58.0	70.6
08/04/14 11:00	52.4	48.3	54.5	66.7
08/04/14 12:00	53.3	49.7	55.4	66.9
08/04/14 13:00	54.6	49.9	56.5	73.7
08/04/14 14:00	53.6	49.6	55.7	67.8
08/04/14 15:00	52.1	47.0	53.3	72.8
08/04/14 16:00	49.0	45.6	51.1	57.4
08/04/14 17:00	47.6	44.1	49.6	61.7
08/04/14 18:00	47.9	43.6	49.4	68.2
08/04/14 19:00	46.0	42.8	47.7	60.8
08/04/14 20:00	44.3	41.3	45.8	57.3
08/04/14 21:00	41.7	38.9	42.7	57.2
08/04/14 22:00	40.1	38.7	41.1	49.8
08/04/14 23:00	39.1	37.6	40.1	50.0
09/04/14 00:00	38.4	36.8	39.3	49.7
09/04/14 01:00	37.8	36.6	38.4	50.1
09/04/14 02:00	36.6	35.4	37.4	43.7
09/04/14 03:00	35.0	34.2	35.6	38.6
09/04/14 04:00	35.9	34.7	36.9	43.9
09/04/14 05:00	50.2	38.7	45.8	68.2
09/04/14 06:00	53.4	42.2	50.0	71.9
09/04/14 07:00	44.1	40.0	45.5	63.1
09/04/14 08:00	45.6	40.3	47.7	63.6
09/04/14 09:00	44.5	40.2	46.5	59.4
09/04/14 10:00	46.6	40.2	48.0	58.3
09/04/14 11:00	45.6	41.3	47.0	63.8
09/04/14 12:00	45.9	43.3	47.8	56.5
09/04/14 13:00	45.5	42.6	47.4	55.2
09/04/14 14:00	51.2	42.4	48.8	75.2
09/04/14 15:00	44.6	41.7	46.8	53.3
09/04/14 16:00	45.7	41.9	47.7	58.2
09/04/14 17:00	43.3	39.4	45.4	58.1
09/04/14 18:00	43.1	37.5	44.2	66.1
09/04/14 19:00	43.0	38.6	45.1	57.2

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09/04/14 20:00	41.8	38.4	43.0	58.8
09/04/14 21:00	39.9	37.4	41.4	54.9
09/04/14 22:00	37.9	36.4	38.8	52.2
09/04/14 23:00	39.5	37.5	40.6	46.5
10/04/14 00:00	39.0	36.6	39.9	47.2
10/04/14 01:00	37.7	36.1	39.1	52.4
10/04/14 02:00	37.8	36.4	38.8	49.8
10/04/14 03:00	36.0	34.9	36.6	45.2
10/04/14 04:00	37.0	35.6	37.9	48.0
10/04/14 05:00	49.0	38.4	44.7	65.7
10/04/14 06:00	45.7	40.4	47.6	61.3
10/04/14 07:00	42.8	38.9	44.7	56.6
10/04/14 08:00	52.5	39.7	49.1	66.5
10/04/14 09:00	44.1	39.5	46.5	59.4
DENOTES RAIN AFFECTED PERIOD REMOVED FROM CALCULATIONS				

TABLE B2 – POSITION 2				
Start time	L_{Aeq,1-hour}	L_{A90,1-hour}	L_{A10,1-hour}	L_{AFmax}
03/04/14 19:00	48.4	44.6	57.6	65.7
03/04/14 20:00	43.3	39.2	49.4	65.8
03/04/14 21:00	38.8	35.4	44.5	64.3
03/04/14 22:00	37.3	34.8	42.7	63.8
03/04/14 23:00	34.1	32.8	38.5	52.5
04/04/14 00:00	32.8	31.9	37.2	47.2
04/04/14 01:00	33.5	32.2	36.0	43.5
04/04/14 02:00	33.8	33.1	36.6	56.5
04/04/14 03:00	32.2	31.0	34.7	43.1
04/04/14 04:00	46.6	32.3	50.7	66.0
04/04/14 05:00	51.3	39.5	58.5	67.2
04/04/14 06:00	56.8	49.6	63.8	81.6
04/04/14 07:00	50.0	45.3	58.6	75.1
04/04/14 08:00	50.0	46.8	57.4	67.1
04/04/14 09:00	47.5	45.1	55.6	65.9
04/04/14 10:00	48.2	44.4	57.1	68.0
04/04/14 11:00	49.2	44.5	57.4	69.1
04/04/14 12:00	48.2	43.5	56.2	68.9
04/04/14 13:00	47.3	42.7	57.0	77.4
04/04/14 14:00	47.7	43.6	55.7	78.7
04/04/14 15:00	49.4	43.1	58.6	69.0
04/04/14 16:00	48.9	42.8	57.6	71.2
04/04/14 17:00	47.9	42.9	56.6	69.5
04/04/14 18:00	48.3	44.2	56.8	68.8
04/04/14 19:00	47.4	44.0	55.4	67.8
04/04/14 20:00	43.6	37.7	50.2	65.0
04/04/14 21:00	35.9	33.9	42.8	55.1
04/04/14 22:00	35.6	34.5	41.2	55.9
04/04/14 23:00	37.4	35.5	42.7	53.9
05/04/14 00:00	35.3	34.3	39.9	56.3
05/04/14 01:00	39.3	37.3	43.8	60.2
05/04/14 02:00	43.7	41.8	50.7	58.8
05/04/14 03:00	37.5	34.4	46.2	57.9
05/04/14 04:00	43.4	31.9	46.0	65.9
05/04/14 05:00	51.4	38.8	61.0	66.8

Noise Survey Report

05/04/14 06:00	56.2	51.5	62.5	74.4
05/04/14 07:00	52.5	46.6	60.2	73.2
05/04/14 08:00	49.1	45.1	57.7	69.2
05/04/14 09:00	51.6	49.3	57.6	64.4
05/04/14 10:00	49.2	46.6	56.6	68.5
05/04/14 11:00	48.3	45.9	55.3	62.6
05/04/14 12:00	49.9	48.1	55.5	68.2
05/04/14 13:00	49.8	45.3	57.4	67.9
05/04/14 14:00	50.3	44.4	57.9	70.4
05/04/14 15:00	46.9	43.4	55.5	65.7
05/04/14 16:00	47.2	42.5	55.6	65.0
05/04/14 17:00	46.4	42.6	54.5	63.7
05/04/14 18:00	50.2	43.2	60.0	71.0
05/04/14 19:00	47.0	42.9	55.8	69.9
05/04/14 20:00	49.7	47.6	54.6	62.8
05/04/14 21:00	48.8	47.6	54.6	63.1
05/04/14 22:00	49.0	46.9	53.9	64.1
05/04/14 23:00	50.9	45.3	54.1	68.5
06/04/14 00:00	42.4	41.1	49.2	62.0
06/04/14 01:00	45.3	43.7	52.4	61.5
06/04/14 02:00	43.7	41.2	49.1	61.4
06/04/14 03:00	48.1	45.0	54.1	77.4
06/04/14 04:00	47.9	41.8	53.9	67.3
06/04/14 05:00	54.5	43.7	64.3	69.9
06/04/14 06:00	56.4	52.1	64.1	72.4
06/04/14 07:00	51.8	48.4	60.4	70.0
06/04/14 08:00	50.3	48.0	58.4	67.9
06/04/14 09:00	50.8	47.2	60.1	71.2
06/04/14 10:00	50.6	47.9	59.7	70.3
06/04/14 11:00	52.2	49.4	60.7	70.5
06/04/14 12:00	53.2	49.9	60.8	72.5
06/04/14 13:00	51.2	47.4	60.0	73.5
06/04/14 14:00	53.1	47.1	63.6	72.9
06/04/14 15:00	49.9	46.2	60.2	72.1
06/04/14 16:00	48.8	43.4	58.6	74.6
06/04/14 17:00	51.0	43.4	61.2	72.7
06/04/14 18:00	50.2	43.7	59.0	73.4

Noise Survey Report

06/04/14 19:00	50.2	43.4	58.1	70.5
06/04/14 20:00	43.4	37.6	49.9	69.8
06/04/14 21:00	34.0	32.5	40.7	50.4
06/04/14 22:00	35.4	31.8	42.6	58.6
06/04/14 23:00	32.3	29.9	38.7	52.0
07/04/14 00:00	33.1	32.1	35.9	47.8
07/04/14 01:00	35.8	33.8	40.1	55.3
07/04/14 02:00	46.5	43.5	50.1	64.2
07/04/14 03:00	49.5	47.8	53.2	61.6
07/04/14 04:00	53.5	44.3	59.5	67.9
07/04/14 05:00	54.7	47.0	63.9	70.5
07/04/14 06:00	58.2	53.5	65.4	73.6
07/04/14 07:00	54.8	51.5	60.8	68.8
07/04/14 08:00	53.7	51.5	60.1	69.2
07/04/14 09:00	51.6	49.1	59.8	69.8
07/04/14 10:00	52.3	49.1	59.8	70.1
07/04/14 11:00	51.8	48.7	59.6	70.9
07/04/14 12:00	50.3	46.1	59.0	73.5
07/04/14 13:00	47.0	45.1	54.2	71.2
07/04/14 14:00	48.2	43.9	55.2	69.8
07/04/14 15:00	46.2	43.3	55.0	69.6
07/04/14 16:00	48.2	43.9	55.5	67.2
07/04/14 17:00	48.1	43.8	56.5	68.5
07/04/14 18:00	47.6	45.2	55.5	69.4
07/04/14 19:00	49.3	46.2	55.5	70.6
07/04/14 20:00	46.7	45.3	52.8	72.3
07/04/14 21:00	43.8	43.2	47.7	56.9
07/04/14 22:00	47.3	46.3	52.8	61.9
07/04/14 23:00	48.9	48.0	54.1	61.4
08/04/14 00:00	47.3	46.4	51.5	58.2
08/04/14 01:00	45.6	44.7	49.8	55.8
08/04/14 02:00	46.9	46.3	51.2	58.4
08/04/14 03:00	47.1	45.3	52.2	65.0
08/04/14 04:00	54.0	47.7	62.4	69.7
08/04/14 05:00	53.0	48.3	61.7	69.9
08/04/14 06:00	56.3	50.7	65.1	77.0
08/04/14 07:00	52.3	49.2	60.4	68.9

Noise Survey Report

08/04/14 08:00	56.1	48.9	62.2	79.0
08/04/14 09:00	55.4	51.3	62.7	79.2
08/04/14 10:00	55.2	49.4	61.0	80.7
08/04/14 11:00	52.4	47.8	61.7	73.7
08/04/14 12:00	51.0	47.5	59.1	68.8
08/04/14 13:00	50.0	47.4	57.6	71.4
08/04/14 14:00	51.3	47.6	59.2	68.5
08/04/14 15:00	52.3	45.8	60.8	75.1
08/04/14 16:00	48.3	44.7	54.4	70.4
08/04/14 17:00	47.8	43.5	57.3	70.5
08/04/14 18:00	49.4	44.6	58.2	68.7
08/04/14 19:00	48.6	43.3	57.6	69.4
08/04/14 20:00	44.6	40.3	50.3	69.9
08/04/14 21:00	37.8	36.9	42.8	52.4
08/04/14 22:00	37.0	36.7	40.2	49.0
08/04/14 23:00	36.0	35.5	39.3	50.3
09/04/14 00:00	36.6	36.0	39.3	47.1
09/04/14 01:00	35.7	35.4	38.3	49.2
09/04/14 02:00	35.5	34.9	37.5	46.2
09/04/14 03:00	33.4	33.3	35.2	44.1
09/04/14 04:00	53.4	34.2	63.0	66.7
09/04/14 05:00	52.2	41.2	62.1	68.9
09/04/14 06:00	56.5	50.2	63.9	82.2
09/04/14 07:00	50.2	46.6	58.7	72.6
09/04/14 08:00	53.4	48.6	59.5	77.0
09/04/14 09:00	52.9	47.6	60.4	72.7
09/04/14 10:00	50.9	44.8	59.7	73.1
09/04/14 11:00	50.9	44.2	60.6	75.1
09/04/14 12:00	49.9	45.3	60.6	71.4
09/04/14 13:00	49.6	45.2	57.0	73.6
09/04/14 14:00	55.4	45.7	60.5	82.3
09/04/14 15:00	51.6	43.5	58.1	75.9
09/04/14 16:00	47.2	43.9	54.5	70.7
09/04/14 17:00	44.7	40.6	52.5	68.0
09/04/14 18:00	48.7	40.5	58.6	72.4
09/04/14 19:00	50.5	43.6	59.3	71.3
09/04/14 20:00	44.6	38.6	54.1	66.9

Noise Survey Report

09/04/14 21:00	37.1	35.1	44.5	57.8
09/04/14 22:00	34.9	33.7	40.8	52.2
09/04/14 23:00	34.8	34.4	38.0	44.0
10/04/14 00:00	36.8	35.2	41.7	56.7
10/04/14 01:00	35.3	34.8	38.6	50.5
10/04/14 02:00	36.2	35.4	39.3	46.9
10/04/14 03:00	34.5	32.8	37.3	61.5
10/04/14 04:00	52.7	33.0	61.1	67.1
10/04/14 05:00	52.7	41.1	61.1	66.7
10/04/14 06:00	55.5	49.6	62.3	69.5
10/04/14 07:00	54.9	45.4	62.3	81.9
10/04/14 08:00	54.1	46.4	60.4	70.9
10/04/14 09:00	51.5	46.2	60.9	74.4
DENOTES RAIN AFFECTED PERIOD REMOVED FROM CALCULATIONS				

TABLE B3 – POSITION 3				
Start time	L_{Aeq,1-hour}	L_{A90,1-hour}	L_{A10,1-hour}	L_{AFmax}
03/04/14 18:00	48.8	41.0	51.2	66.6
03/04/14 19:00	48.6	38.6	51.2	69.2
03/04/14 20:00	46.5	37.7	48.3	67.3
03/04/14 21:00	39.8	36.1	40.9	59.4
03/04/14 22:00	40.8	35.8	42.0	62.8
03/04/14 23:00	39.6	33.8	40.5	55.8
04/04/14 00:00	34.6	32.0	35.7	51.0
04/04/14 01:00	37.9	34.9	39.4	52.1
04/04/14 02:00	40.5	35.7	39.6	58.2
04/04/14 03:00	35.7	32.1	36.8	48.4
04/04/14 04:00	41.2	33.8	43.1	54.0
04/04/14 05:00	45.8	37.2	49.3	60.0
04/04/14 06:00	55.8	44.2	57.4	75.2
04/04/14 07:00	53.0	42.2	54.5	73.8
04/04/14 08:00	53.3	43.5	54.4	73.6
04/04/14 09:00	50.8	42.6	53.1	73.4
04/04/14 10:00	50.0	39.7	50.9	72.9
04/04/14 11:00	48.9	41.0	51.6	72.7
04/04/14 12:00	48.7	40.6	51.4	72.8
04/04/14 13:00	48.7	41.0	51.0	73.2
04/04/14 14:00	47.9	40.6	49.8	68.5
04/04/14 15:00	47.9	40.7	50.6	67.6
04/04/14 16:00	47.8	39.5	50.7	64.5
04/04/14 17:00	48.2	38.7	52.0	63.7
04/04/14 18:00	46.5	39.2	48.5	68.2
04/04/14 19:00	48.6	38.9	50.6	73.9
04/04/14 20:00	46.4	35.4	46.6	70.3
04/04/14 21:00	38.7	34.1	40.1	63.1
04/04/14 22:00	37.8	33.6	39.9	56.9
04/04/14 23:00	37.1	33.4	39.3	52.0
05/04/14 00:00	37.0	33.8	38.5	51.6
05/04/14 01:00	40.5	35.4	41.1	59.2
05/04/14 02:00	39.4	37.1	40.9	52.2
05/04/14 03:00	36.7	34.2	38.1	53.4
05/04/14 04:00	43.9	34.7	45.4	60.1

Noise Survey Report

05/04/14 05:00	48.1	37.2	51.8	63.3
05/04/14 06:00	55.7	44.2	57.5	76.0
05/04/14 07:00	53.8	41.3	54.8	73.7
05/04/14 08:00	52.0	39.8	52.5	74.0
05/04/14 09:00	51.1	41.9	51.7	73.0
05/04/14 10:00	46.1	40.6	48.6	62.2
05/04/14 11:00	49.1	41.4	49.6	76.0
05/04/14 12:00	47.9	42.4	50.2	69.5
05/04/14 13:00	47.3	41.6	50.2	63.6
05/04/14 14:00	47.0	40.1	49.9	64.6
05/04/14 15:00	48.9	40.8	51.7	67.2
05/04/14 16:00	48.1	39.9	50.0	71.6
05/04/14 17:00	47.3	39.3	49.5	63.7
05/04/14 18:00	47.6	38.9	49.6	68.0
05/04/14 19:00	48.1	38.7	49.4	75.3
05/04/14 20:00	46.9	41.3	47.8	68.9
05/04/14 21:00	43.9	41.2	45.6	65.4
05/04/14 22:00	43.3	40.0	45.3	57.4
05/04/14 23:00	45.0	39.4	45.1	59.4
06/04/14 00:00	40.5	37.6	42.5	53.7
06/04/14 01:00	43.6	39.5	45.0	59.0
06/04/14 02:00	41.3	37.7	42.9	56.1
06/04/14 03:00	40.5	38.2	42.0	52.5
06/04/14 04:00	42.7	37.6	44.8	57.8
06/04/14 05:00	47.2	39.8	50.0	62.6
06/04/14 06:00	55.1	45.1	56.6	74.8
06/04/14 07:00	53.2	43.0	53.5	75.2
06/04/14 08:00	50.9	42.6	52.0	73.6
06/04/14 09:00	50.1	43.4	49.8	74.0
06/04/14 10:00	47.9	43.6	50.1	71.1
06/04/14 11:00	49.2	45.1	51.2	69.8
06/04/14 12:00	49.5	45.0	51.3	70.7
06/04/14 13:00	49.2	44.4	51.5	65.5
06/04/14 14:00	47.3	43.2	49.8	60.3
06/04/14 15:00	47.0	41.8	49.8	63.8
06/04/14 16:00	47.0	40.0	50.2	64.0
06/04/14 17:00	46.8	39.8	50.3	62.6

Noise Survey Report

06/04/14 18:00	48.7	40.2	50.4	69.2
06/04/14 19:00	50.1	40.2	51.2	72.2
06/04/14 20:00	45.9	36.5	45.5	73.2
06/04/14 21:00	36.6	34.2	37.9	48.7
06/04/14 22:00	38.4	35.8	39.7	57.7
06/04/14 23:00	34.9	32.2	36.0	52.1
07/04/14 00:00	34.8	30.9	36.0	53.1
07/04/14 01:00	40.8	33.9	39.2	58.2
07/04/14 02:00	38.2	34.4	39.2	56.7
07/04/14 03:00	40.7	35.9	40.0	56.7
07/04/14 04:00	41.7	34.0	43.6	58.8
07/04/14 05:00	46.1	37.1	48.4	63.9
07/04/14 06:00	57.8	44.9	60.1	76.0
07/04/14 07:00	51.5	44.5	52.8	74.5
07/04/14 08:00	52.3	45.4	54.5	73.5
07/04/14 09:00	53.2	44.8	55.2	72.9
07/04/14 10:00	52.1	45.3	54.5	71.8
07/04/14 11:00	50.8	45.5	52.4	74.8
07/04/14 12:00	51.2	44.6	53.3	71.4
07/04/14 13:00	49.8	44.1	52.7	67.1
07/04/14 14:00	48.3	42.8	50.9	62.9
07/04/14 15:00	48.2	41.8	51.1	66.9
07/04/14 16:00	49.0	41.9	51.9	66.6
07/04/14 17:00	48.1	42.4	50.2	65.3
07/04/14 18:00	48.9	42.8	51.5	65.9
07/04/14 19:00	51.0	43.8	53.1	71.7
07/04/14 20:00	47.1	42.4	48.8	68.5
07/04/14 21:00	44.6	41.1	46.7	59.7
07/04/14 22:00	46.0	42.7	48.0	60.6
07/04/14 23:00	48.9	45.2	51.0	63.0
08/04/14 00:00	47.1	43.3	47.9	61.2
08/04/14 01:00	46.4	42.6	46.8	59.7
08/04/14 02:00	45.1	42.3	46.9	59.0
08/04/14 03:00	44.8	41.5	46.7	58.7
08/04/14 04:00	45.3	42.0	47.0	61.3
08/04/14 05:00	50.0	44.8	51.8	67.0
08/04/14 06:00	54.6	46.8	56.0	71.0

Noise Survey Report

08/04/14 07:00	55.0	46.5	57.1	73.2
08/04/14 08:00	52.2	46.7	55.0	66.5
08/04/14 09:00	50.6	46.6	52.6	70.3
08/04/14 10:00	49.9	46.0	51.7	67.6
08/04/14 11:00	51.0	47.0	53.1	68.7
08/04/14 12:00	49.0	45.2	51.0	63.2
08/04/14 13:00	49.5	46.7	51.3	63.6
08/04/14 14:00	49.5	45.8	51.5	71.1
08/04/14 15:00	50.1	42.8	49.7	74.6
08/04/14 16:00	49.4	43.8	52.1	70.8
08/04/14 17:00	47.7	42.5	50.1	64.2
08/04/14 18:00	48.7	42.7	51.2	71.2
08/04/14 19:00	48.4	40.9	49.5	72.3
08/04/14 20:00	46.6	38.5	45.8	79.1
08/04/14 21:00	40.6	36.0	41.5	58.2
08/04/14 22:00	38.7	36.0	40.1	56.5
08/04/14 23:00	42.5	37.4	44.5	56.5
09/04/14 00:00	41.0	36.3	41.2	57.2
09/04/14 01:00	42.0	37.8	42.7	59.0
09/04/14 02:00	37.7	35.7	39.0	52.9
09/04/14 03:00	34.6	33.2	35.6	43.4
09/04/14 04:00	38.2	34.0	40.2	53.9
09/04/14 05:00	50.0	41.0	51.5	70.9
09/04/14 06:00	56.4	45.4	59.0	74.9
09/04/14 07:00	53.6	42.7	55.4	73.7
09/04/14 08:00	53.3	42.7	55.4	74.3
09/04/14 09:00	52.9	42.8	54.9	75.7
09/04/14 10:00	50.4	42.8	53.0	72.3
09/04/14 11:00	48.9	43.2	51.0	73.1
09/04/14 12:00	51.5	43.4	52.7	74.2
09/04/14 13:00	48.9	43.0	51.5	67.6
09/04/14 14:00	50.0	42.4	51.2	74.6
09/04/14 15:00	48.0	41.5	50.1	69.5
09/04/14 16:00	46.9	41.7	49.5	63.9
09/04/14 17:00	45.7	39.7	47.9	64.8
09/04/14 18:00	47.8	38.8	49.5	71.3
09/04/14 19:00	47.2	38.8	49.4	73.0

Noise Survey Report

09/04/14 20:00	47.5	39.2	48.6	73.2
09/04/14 21:00	40.2	36.7	42.0	55.8
09/04/14 22:00	38.2	34.9	39.7	59.7
09/04/14 23:00	40.8	36.7	42.7	54.8
10/04/14 00:00	41.0	36.4	41.4	56.5
10/04/14 01:00	40.4	37.2	42.2	55.3
10/04/14 02:00	38.3	36.4	39.7	49.7
10/04/14 03:00	35.5	34.2	36.5	45.7
10/04/14 04:00	38.0	34.8	39.9	51.2
10/04/14 05:00	50.7	38.5	47.5	72.6
10/04/14 06:00	57.9	43.9	61.1	78.3
10/04/14 07:00	52.3	42.3	54.9	72.6
10/04/14 08:00	50.1	42.3	51.3	72.6
10/04/14 09:00	52.5	43.4	54.8	77.8
DENOTES RAIN AFFECTED PERIOD REMOVED FROM CALCULATIONS				