Contents

Appendix 7.1 Definitions

Introduction

A sound wave travelling through the air is a regular disturbance in ambient atmospheric pressure. These pressure fluctuations, when of frequencies within the audible range, are detected by the human ear which passes nerve responses to the brain, producing the sensation of hearing. Noise has been defined in a variety of ways and is very much dependant on factors such as the listener's attitude to the source of the sound and their environment, but is essentially any sound that is unwanted by the recipient.

The human ear is sensitive to a wide range of sound levels; the level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitude of the numbers involved, a logarithmic scale of decibels (dB) based on a reference level of the lowest audible sound is used.

Also, the response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequency to approximate human response. This is achieved by using filters to vary the contribution of different frequencies to the measured level. The "A" weighting network is the most commonly used and has been shown to correlate closely to the non-linear and subjective response of humans to sound. The use of this weighting is denoted by a capital A in the unit abbreviation (i.e. L_{Amax}, L_{Aeq}, L_{A90} etc.) or a capital A in brackets after a dB level (i.e. 3 dB(A)).

Glossary of Terms

Sound Pressure Level: The sound pressure level (LP or SPL) is the instantaneous acoustic pressure and is measured in decibels (dB). Since the ear is sensitive to variations in pressure, rather than source power or intensity, the measurement of this parameter gives an indication of the impact on people. The SPL is defined as:

$$SPL = 20\log_{10}\left(\frac{p}{p_{ref}}\right)$$

where:

p is the route mean square (r.m.s.) pressure of the sound in question (in pascals)

p_{ref} is the reference sound pressure, defined as the limit of human audibility (2×10^{-5} Pa)

Sound Power Level: The sound power level (L_W or PWL) is a measure of the acoustic energy output of a source and is a property of the source itself. The PWL is also measured in dB and is given by:

$$PWL = 10\log_{10}\left(\frac{W}{W_0}\right)$$

where:

W is the sound power of the source (in watts)

W_0 is the reference sound power (10^{-12} watts)

L_{eq}: The L_{eq} is defined as the equivalent continuous sound level and is the most widely used parameter for assessing environmental noise. Since this descriptor is a type of average level, it must by definition have an associated time period over which the measurement is referring to. This is often included in the abbreviation in the form $L_{eq,T}$, where T is the time period (i.e. $L_{Aeq,5\ min}$). The formula for calculating the L_{eq} is:

$$L_{eq} = 10\log_{10}\left(\frac{1}{t_2 - t_1}\int_{t_1}^{t_2}\frac{p^2}{p_{ref}^2}.dt\right)$$

In practice, since most modern sound level meters are digital and hence take periodic samples of the sound pressure level, the $L_{eq,T}$ will be the logarithmic average of all the SPL samples taken in the measurement period.

L_n: The L_n is a statistical descriptor and refers to the level that is exceeded for n % of the time during a particular measurement period. The measurement period that the descriptor refers to is often included in the abbreviation in the format $L_{n,T}$. Two of the most commonly used statistical descriptors used for environmental noise assessments are the L_{90} and the L_{10}. These are described in more detail below.

L_{10}: The L_{10} refers to the level exceeded for 10 % of the measurement period and is commonly used in assessing road traffic noise as it has been found to give a good indication of the subjective human response to this type of noise.

L_{90}: The L_{90} refers to the level exceeded for 90 % of the measurement period and is widely considered to represent background noise, or the underlying noise in an area between noisy events (such as cars passing etc.).

Frequency: Frequency is defined as the number of cycles per second and is denoted on Hertz (Hz). For sound this is subjectively perceived as pitch.

Frequency Spectrum: Analysis of the relative contributions of different frequencies that make up a sound.

Free-Field: The term “free-field” refers to noise levels that have been measured or predicted in the absence of any influence of reflections from nearby surfaces. In practice, a measurement is considered to be free-field if it is taken at a distance of over 3.5 m from any reflecting surfaces, other than the ground.

Façade Level: Façade levels refer to levels taken at a distance of 1 m from the façade of a building. The difference between the façade and free-field level will depend on the distance from the reflecting surface, but is generally accepted to be approximately 3 dB higher at the façade.

Ambient Sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.

Background Sound Level: See L_{90}, above.

Specific Sound Source: Sound source being assessed.

Rating Level: Specific sound level plus any adjustment for the characteristic features of the sound.

Residual Sound: Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

Appendix 7.2 Sound Level Meter Calibration Certificates

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Equipment Details

Instrument Manufacturer	Cirrus Research plc
Instrument Type	CR:171C
Description	Sound Level Meter
Serial Number	G061732

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001,IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.
Sound Level Meters: All Calibration procedures were carried out by subsitituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibrated by [redacted]

Calibration Date 03 September 2015
Calibration Certificate Number 231584

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Equipment Details

Instrument Manufacturer	Cirrus Research plc
Instrument Type	CR:171C
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Sound Level Meters: All Calibration procedures were carried out by subsitituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

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Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibrated by	[redacted]
Calibration Date	03 September 2015
Calibration Certificate Number	231592

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
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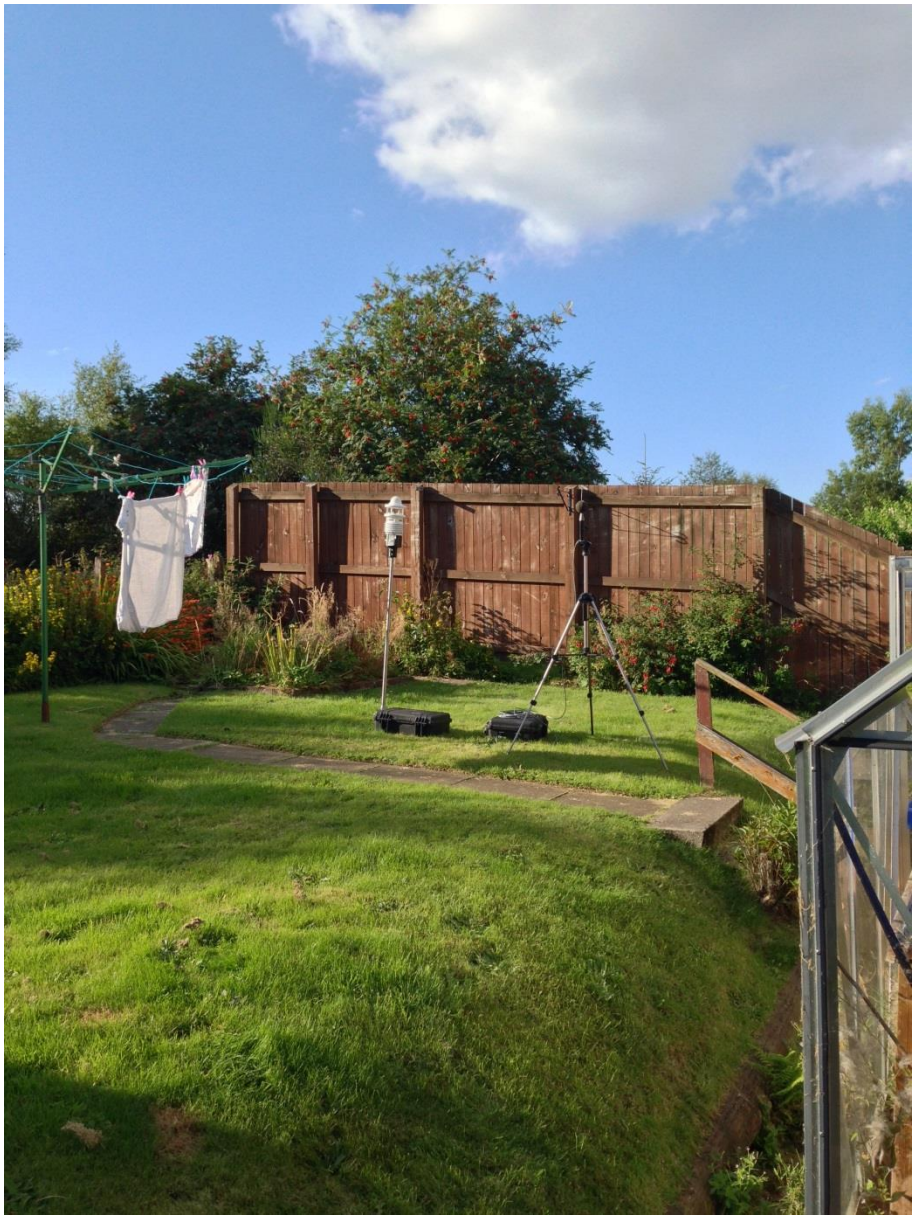
Email: sales@cirrusresearch.co.uk

Appendix 7.3 Detailed Baseline Noise Survey Results

8 Old Kyle Farm Road (Unattended)

The measurement location is shown in **Photograph 1**. A Cirrus CR:171C Class 1 sound level meter (serial number G061733) was positioned at a height of 1.5 m in free-field conditions in the middle of the garden.

Photograph 1 Unattended Noise Survey Location at 8 Old Kyle Farm Road



When the noise survey equipment was commissioned and decommissioned, the main sources of noise observed were birdsong, general human activity in the area and vehicles travelling along Old Kyle Farm Road. At the attended measurement location at the front of the property, noise from construction activities to the south-west of the dwelling was observed and therefore noise data from the unattended measurement location was also excluded during the affected period.

Generally, the weather was suitable for baseline noise measurements, though there were periods of rain on 26 September 2016, which have also been excluded from the determination of baseline noise levels. Wind speeds were below 5 metres per second (ms^{-1}) throughout the baseline noise survey.

The measured baseline noise levels are presented in **Table 1**. Noise data excluded due to rain are indicated with an "r" and noise data excluded due to construction noise or other atypical noise events are indicated with an "x".

Table 1 Baseline Noise Levels – 8 Old Kyle Farm Road (Unattended)

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
25/08/16	Thursday	17:45	15	39	40	30
25/08/16	Thursday	18:00	15	33	36	28
25/08/16	Thursday	18:15	15	39	43	30
25/08/16	Thursday	18:30	15	38	39	29
25/08/16	Thursday	18:45	15	40	41	31
25/08/16	Thursday	19:00	15	33	36	28
25/08/16	Thursday	19:15	15	34	37	25
25/08/16	Thursday	19:30	15	38	41	30
25/08/16	Thursday	19:45	15	35	37	29
25/08/16	Thursday	20:00	15	39	39	28
25/08/16	Thursday	20:15	15	33	34	24
25/08/16	Thursday	20:30	15	33	34	26
25/08/16	Thursday	20:45	15	37	37	22
25/08/16	Thursday	21:00	15	34	36	25
25/08/16	Thursday	21:15	15	31	35	21
25/08/16	Thursday	21:30	15	31	33	23
25/08/16	Thursday	21:45	15	31	33	24
25/08/16	Thursday	22:00	15	31	33	22
25/08/16	Thursday	22:15	15	39	39	22
25/08/16	Thursday	22:30	15	32	35	20
25/08/16	Thursday	22:45	15	27	31	21
25/08/16	Thursday	23:00	15	28	31	20
25/08/16	Thursday	23:15	15	25	28	20
25/08/16	Thursday	23:30	15	24	26	20
25/08/16	Thursday	23:45	15	23	26	20
26/08/16	Friday	00:00	15	24	26	20

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
26/08/16	Friday	00:15	15	24	23	20
26/08/16	Friday	00:30	15	20	20	20
26/08/16	Friday	00:45	15	43 r	48 r	20 r
26/08/16	Friday	01:00	15	44 r	49 r	33 r
26/08/16	Friday	01:15	15	36 r	40 r	25 r
26/08/16	Friday	01:30	15	25	27	22
26/08/16	Friday	01:45	15	24	25	21
26/08/16	Friday	02:00	15	21	22	20
26/08/16	Friday	02:15	15	27	29	20
26/08/16	Friday	02:30	15	28	32	20
26/08/16	Friday	02:45	15	32 r	36 r	21 r
26/08/16	Friday	03:00	15	23	23	20
26/08/16	Friday	03:15	15	20	21	20
26/08/16	Friday	03:30	15	22	22	20
26/08/16	Friday	03:45	15	33 r	36 r	20 r
26/08/16	Friday	04:00	15	46 r	48 r	37 r
26/08/16	Friday	04:15	15	48 r	49 r	44 r
26/08/16	Friday	04:30	15	41 r	43 r	32 r
26/08/16	Friday	04:45	15	34	37	26
26/08/16	Friday	05:00	15	24	26	21
26/08/16	Friday	05:15	15	35	38	24
26/08/16	Friday	05:30	15	39 r	41 r	27 r
26/08/16	Friday	05:45	15	35 r	36 r	26 r
26/08/16	Friday	06:00	15	35	35	29
26/08/16	Friday	06:15	15	38	39	31
26/08/16	Friday	06:30	15	34	36	29
26/08/16	Friday	06:45	15	36	37	31
26/08/16	Friday	07:00	15	41	41	33
26/08/16	Friday	07:15	15	37	39	32

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
26/08/16	Friday	07:30	15	42	44	36
26/08/16	Friday	07:45	15	41 [r]	44 [r]	36 [r]
26/08/16	Friday	08:00	15	39 [r]	41 [r]	35 [r]
26/08/16	Friday	08:15	15	58 [r]	62 [r]	42 [r]
26/08/16	Friday	08:30	15	62 [r]	66 [r]	44 [r]
26/08/16	Friday	08:45	15	62 [r]	66 [r]	45 [r]
26/08/16	Friday	09:00	15	65 [r]	68 [r]	48 [r]
26/08/16	Friday	09:15	15	66 [r]	70 [r]	50 [r]
26/08/16	Friday	09:30	15	66 [r]	70 [r]	41 [r]
26/08/16	Friday	09:45	15	67 [r]	70 [r]	51 [r]
26/08/16	Friday	10:00	15	44 [r]	47 [r]	38 [r]
26/08/16	Friday	10:15	15	62 [r]	63 [r]	38 [r]
26/08/16	Friday	10:30	15	45 [r]	45 [r]	38 [r]
26/08/16	Friday	10:45	15	60 [x]	64 [x]	40 [x]
26/08/16	Friday	11:00	15	59 [x]	62 [x]	40 [x]
26/08/16	Friday	11:15	15	54 [r, x]	58 [r, x]	40 [r, x]
26/08/16	Friday	11:30	15	56 [r, x]	59 [r, x]	45 [r, x]
26/08/16	Friday	11:45	15	55 [r, x]	58 [r, x]	42 [r, x]
26/08/16	Friday	12:00	15	52 [r, x]	55 [r, x]	47 [r, x]
26/08/16	Friday	12:15	15	53 [r, x]	56 [r, x]	46 [r, x]
26/08/16	Friday	12:30	15	51 [r, x]	54 [r, x]	37 [r, x]
26/08/16	Friday	12:45	15	41 [r, x]	42 [r, x]	33 [r, x]
26/08/16	Friday	13:00	15	59 [x]	62 [x]	37 [x]
26/08/16	Friday	13:15	15	62 [x]	66 [x]	51 [x]
26/08/16	Friday	13:30	15	60 [x]	64 [x]	44 [x]
26/08/16	Friday	13:45	15 [r]	60 [r, x]	64 [r, x]	38 [r, x]
26/08/16	Friday	14:00	15	41 [x]	43 [x]	36 [x]
26/08/16	Friday	14:15	15	63 [x]	66 [x]	43 [x]
26/08/16	Friday	14:30	15	61 [x]	65 [x]	51 [x]

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
26/08/16	Friday	14:45	15	63 [x]	68 [x]	46 [x]
26/08/16	Friday	15:00	15	61 [x]	65 [x]	47 [x]
26/08/16	Friday	15:15	15	60 [x]	64 [x]	51 [x]
26/08/16	Friday	15:30	15	47	47	44
26/08/16	Friday	15:45	15	59 [r]	62 [r]	46 [r]
26/08/16	Friday	16:00	15	43	44	36
26/08/16	Friday	16:15	15	47 [r]	47 [r]	42 [r]
26/08/16	Friday	16:30	15	57	60	48
26/08/16	Friday	16:45	15	51	52	38
26/08/16	Friday	17:00	15	42	42	36
26/08/16	Friday	17:15	15	39	41	35
26/08/16	Friday	17:30	15	44 [r]	40 [r]	33 [r]
26/08/16	Friday	17:45	15	40 [r]	43 [r]	34 [r]
26/08/16	Friday	18:00	15	39	41	35
26/08/16	Friday	18:15	15	39	41	35
26/08/16	Friday	18:30	15	40 [r]	41 [r]	35 [r]
26/08/16	Friday	18:45	15	39	40	34
26/08/16	Friday	19:00	15	37	39	32
26/08/16	Friday	19:15	15	36	38	31
26/08/16	Friday	19:30	15	35	36	30
26/08/16	Friday	19:45	15	35	36	30
26/08/16	Friday	20:00	15	40	40	32
26/08/16	Friday	20:15	15	36	38	31
26/08/16	Friday	20:30	15	35	36	30
26/08/16	Friday	20:45	15	34	37	30
26/08/16	Friday	21:00	15	33	36	28
26/08/16	Friday	21:15	15	35	36	27
26/08/16	Friday	21:30	15	31	32	26
26/08/16	Friday	21:45	15	31	32	24

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
26/08/16	Friday	22:00	15	33	32	26
26/08/16	Friday	22:15	15	35	34	26
26/08/16	Friday	22:30	15	33	34	28
26/08/16	Friday	22:45	15	31	33	28
26/08/16	Friday	23:00	15	29	32	24
26/08/16	Friday	23:15	15	26	29	22
26/08/16	Friday	23:30	15	31	31	22
26/08/16	Friday	23:45	15	33	29	20
27/08/16	Saturday	00:00	15	25	27	20
27/08/16	Saturday	00:15	15	23	26	20
27/08/16	Saturday	00:30	15	22	24	20
27/08/16	Saturday	00:45	15	30	28	20
27/08/16	Saturday	01:00	15	25	28	20
27/08/16	Saturday	01:15	15	24	26	20
27/08/16	Saturday	01:30	15	24	26	21
27/08/16	Saturday	01:45	15	24	27	20
27/08/16	Saturday	02:00	15	24	25	20
27/08/16	Saturday	02:15	15	23	23	20
27/08/16	Saturday	02:30	15	22	25	20
27/08/16	Saturday	02:45	15	22	24	20
27/08/16	Saturday	03:00	15	22	23	21
27/08/16	Saturday	03:15	15	26	28	22
27/08/16	Saturday	03:30	15	23	24	22
27/08/16	Saturday	03:45	15	25	28	22
27/08/16	Saturday	04:00	15	24	27	21
27/08/16	Saturday	04:15	15	23	26	21
27/08/16	Saturday	04:30	15	24	26	21
27/08/16	Saturday	04:45	15	23	25	21
27/08/16	Saturday	05:00	15	24	26	22

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
27/08/16	Saturday	05:15	15	30	27	20
27/08/16	Saturday	05:30	15	31	30	20
27/08/16	Saturday	05:45	15	27	29	21
27/08/16	Saturday	06:00	15	27	28	22
27/08/16	Saturday	06:15	15	31	31	23
27/08/16	Saturday	06:30	15	33	34	23
27/08/16	Saturday	06:45	15	38	40	25
27/08/16	Saturday	07:00	15	38	35	27
27/08/16	Saturday	07:15	15	36	35	24
27/08/16	Saturday	07:30	15	34	35	25
27/08/16	Saturday	07:45	15	32	34	25
27/08/16	Saturday	08:00	15	30	32	25
27/08/16	Saturday	08:15	15	30	31	25
27/08/16	Saturday	08:30	15	30	31	26
27/08/16	Saturday	08:45	15	36	34	27
27/08/16	Saturday	09:00	15	36	39	27
27/08/16	Saturday	09:15	15	37	38	28
27/08/16	Saturday	09:30	15	34	35	28
27/08/16	Saturday	09:45	15	35	37	28
27/08/16	Saturday	10:00	15	40	40	29
27/08/16	Saturday	10:15	15	38	39	31
27/08/16	Saturday	10:30	15	34	34	31
27/08/16	Saturday	10:45	15	36	38	31
27/08/16	Saturday	11:00	15	33	34	29
27/08/16	Saturday	11:15	15	37	37	30
27/08/16	Saturday	11:30	15	32	33	28
27/08/16	Saturday	11:45	15	35	36	28
27/08/16	Saturday	12:00	15	35	37	29
27/08/16	Saturday	12:15	15	36	37	29

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
27/08/16	Saturday	12:30	15	35	38	29
27/08/16	Saturday	12:45	15	36	38	29
27/08/16	Saturday	13:00	15	39	39	29
27/08/16	Saturday	13:15	15	36	38	31
27/08/16	Saturday	13:30	15	42	45	31
27/08/16	Saturday	13:45	15	57	60	42
27/08/16	Saturday	14:00	15	59	62	47
27/08/16	Saturday	14:15	15	55	57	39
27/08/16	Saturday	14:30	15	56	58	39
27/08/16	Saturday	14:45	15	59	63	40
27/08/16	Saturday	15:00	15	37	38	29
27/08/16	Saturday	15:15	15	39	42	31
27/08/16	Saturday	15:30	15	38	40	32
27/08/16	Saturday	15:45	15	40	41	31
27/08/16	Saturday	16:00	15	39	42	33
27/08/16	Saturday	16:15	15	37	39	31
27/08/16	Saturday	16:30	15	39	42	33
27/08/16	Saturday	16:45	15	39	43	33
27/08/16	Saturday	17:00	15	36	40	28
27/08/16	Saturday	17:15	15	36	39	29
27/08/16	Saturday	17:30	15	37	39	31
27/08/16	Saturday	17:45	15	42	45	31
27/08/16	Saturday	18:00	15	41	42	33
27/08/16	Saturday	18:15	15	47	48	38
27/08/16	Saturday	18:30	15	42	44	34
27/08/16	Saturday	18:45	15	61 [x]	43 [x]	31 [x]
27/08/16	Saturday	19:00	15	37	40	30
27/08/16	Saturday	19:15	15	36	38	30
27/08/16	Saturday	19:30	15	40	44	31

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
27/08/16	Saturday	19:45	15	35	37	27
27/08/16	Saturday	20:00	15	38	33	27
27/08/16	Saturday	20:15	15	38	37	25
27/08/16	Saturday	20:30	15	35	37	26
27/08/16	Saturday	20:45	15	32	34	22
27/08/16	Saturday	21:00	15	30	32	20
27/08/16	Saturday	21:15	15	29	32	22
27/08/16	Saturday	21:30	15	29	29	22
27/08/16	Saturday	21:45	15	29	32	21
27/08/16	Saturday	22:00	15	33	34	23
27/08/16	Saturday	22:15	15	32	35	21
27/08/16	Saturday	22:30	15	36	31	20
27/08/16	Saturday	22:45	15	28	31	20
27/08/16	Saturday	23:00	15	29	30	21
27/08/16	Saturday	23:15	15	31	31	21
27/08/16	Saturday	23:30	15	32	34	20
27/08/16	Saturday	23:45	15	27	30	20
27/08/16	Sunday	00:00	15	26	29	20
27/08/16	Sunday	00:15	15	26	29	20
28/08/16	Sunday	00:30	15	27	31	20
28/08/16	Sunday	00:45	15	24	26	20
28/08/16	Sunday	01:00	15	30	31	20
28/08/16	Sunday	01:15	15	23	25	20
28/08/16	Sunday	01:30	15	23	26	20
28/08/16	Sunday	01:45	15	23	26	20
28/08/16	Sunday	02:00	15	21	24	20
28/08/16	Sunday	02:15	15	23	24	20
28/08/16	Sunday	02:30	15	21	20	20
28/08/16	Sunday	02:45	15	25	28	20

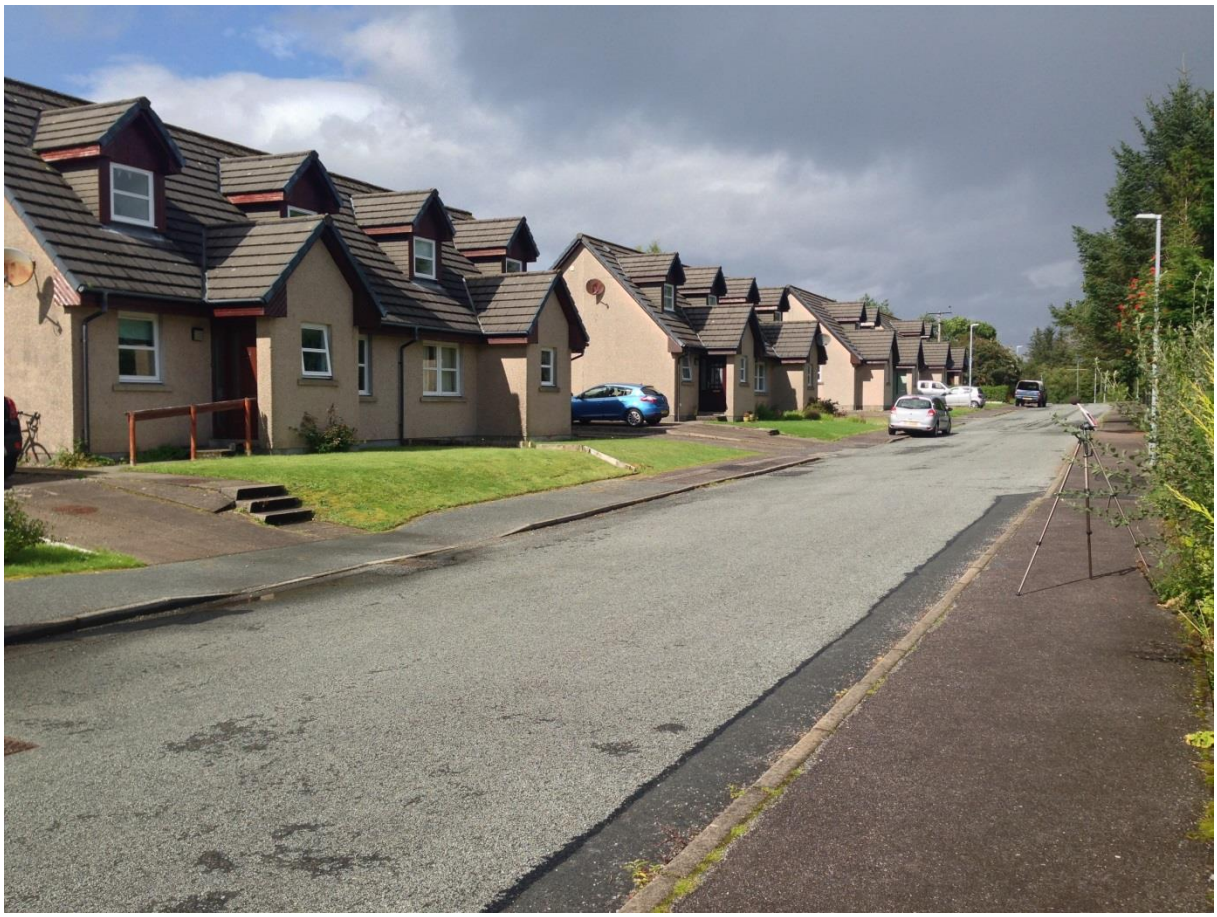
Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
28/08/16	Sunday	03:00	15	29	33	20
28/08/16	Sunday	03:15	15	31	26	20
28/08/16	Sunday	03:30	15	23	23	20
28/08/16	Sunday	03:45	15	21	21	20
28/08/16	Sunday	04:00	15	20	21	20
28/08/16	Sunday	04:15	15	27	23	20
28/08/16	Sunday	04:30	15	25	27	20
28/08/16	Sunday	04:45	15	21	20	20
28/08/16	Sunday	05:00	15	21	23	20
28/08/16	Sunday	05:15	15	26	28	21
28/08/16	Sunday	05:30	15	37	31	20
28/08/16	Sunday	05:45	15	34	32	20
28/08/16	Sunday	06:00	15	31	34	20
28/08/16	Sunday	06:15	15	35	37	20
28/08/16	Sunday	06:30	15	37	37	20
28/08/16	Sunday	06:45	15	37	38	22
28/08/16	Sunday	07:00	15	39	39	24
28/08/16	Sunday	07:15	15	38	38	22
28/08/16	Sunday	07:30	15	33	34	23
28/08/16	Sunday	07:45	15	35	37	25
28/08/16	Sunday	08:00	15	32	34	24
28/08/16	Sunday	08:15	15	43	40	24
28/08/16	Sunday	08:30	15	37	40	27
28/08/16	Sunday	08:45	15	43	44	30
28/08/16	Sunday	09:00	15	42	44	28
28/08/16	Sunday	09:15	15	37	39	29
28/08/16	Sunday	09:30	15	38	41	29
28/08/16	Sunday	09:45	15	39	39	29
28/08/16	Sunday	10:00	15	37	39	30

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)		
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
28/08/16	Sunday	10:15	15	36	39	30

8 Old Kyle Farm Road (Attended)

While setting up the unattended noise survey equipment, the dog kept at 8 Old Kyle Farm Road barked due to the noise survey team being in the garden. Therefore, to avoid attended measurements being affect by noise from dog barking, an attended measurement location across the road from the front of the house was selected. This measurement location is shown in **Photograph 2**. A Cirrus CR:171C Class 1 sound level meter (serial number G061732) was positioned at a height of 1.5 m in free-field conditions on the pavement.

Photograph 2 Attended Noise Survey Location at 8 Old Kyle Farm Road



Attended baseline noise surveys were undertaken only when weather conditions we suitable, i.e., when it was not raining and in low wind speeds.

The measured baseline noise levels are presented in **Table 2**. Noise data excluded due to nearby construction noise are indicated with an "x". As noted in **Section 7.4.3**, the noise levels measured while vehicles on Old Kyle Farm passed the microphone have been excluded (hence the measurement period is often less than 15 minutes).

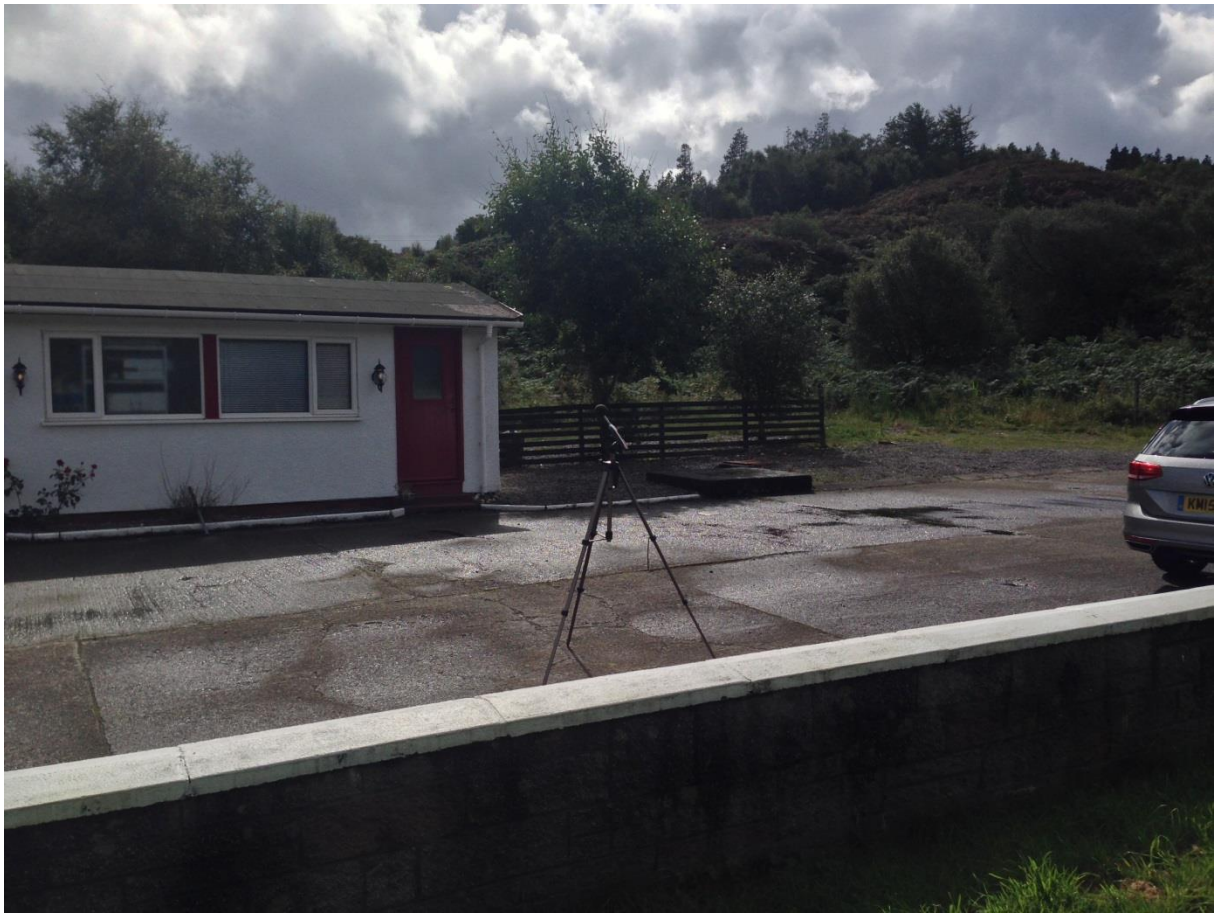
Table 2 Baseline Noise Levels – 8 Old Kyle Farm Road (Attended)

Date	Day	Time	Measurement Period (minutes: seconds)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
26/08/16	Friday	14:00	15:00	53 [x]	47 [x]	38 [x]	• Cars passing by, and a few HGVs heading to a nearby construction site to the south-west. • Construction noise. • Idling HGV at the construction site.
		14:15	15:00	57 [x]	59 [x]	41 [x]	
		19:45	13:40	35	36	30	• Cars passing by. • Children playing. • Birdsong. • Road traffic in the background on the A87.
		20:00	11:07	37	38	33	
27/08/16	Saturday	07:45	14:03	32	34	26	• Birdsong. • 1 pedestrian running. • 1 car passing by.
		08:00	14:45	32	35	25	
		18:30	11:21	41	44	33	• Tourist bus in first 2 minutes. • Cars passing by. • Road traffic in the background on the A87. • Dog barking for a few seconds. • Birdsong. • Pedestrians. • Music being played is audible in background when quiet.
		18:45	11:42	42	42	33	

Hirsel Caravan (Attended)

The measurement location is shown in **Photograph 3**. A Cirrus CR:171C Class 1 sound level meter (serial number G061732) was positioned at a height of 1.5 m in free-field conditions in front of the property.

Photograph 3 Attended Noise Survey Location at Hirsel Caravan



Attended baseline noise surveys were undertaken only when weather conditions we suitable, i.e., when it was not raining or very light rain and in low wind speeds.

The measured baseline noise levels are presented in **Table 3**. Noise data excluded to avoid the potential influence of distant construction noise are indicated with an "x".

Table 3 Baseline Noise Levels – Hirsel Caravan (Attended)

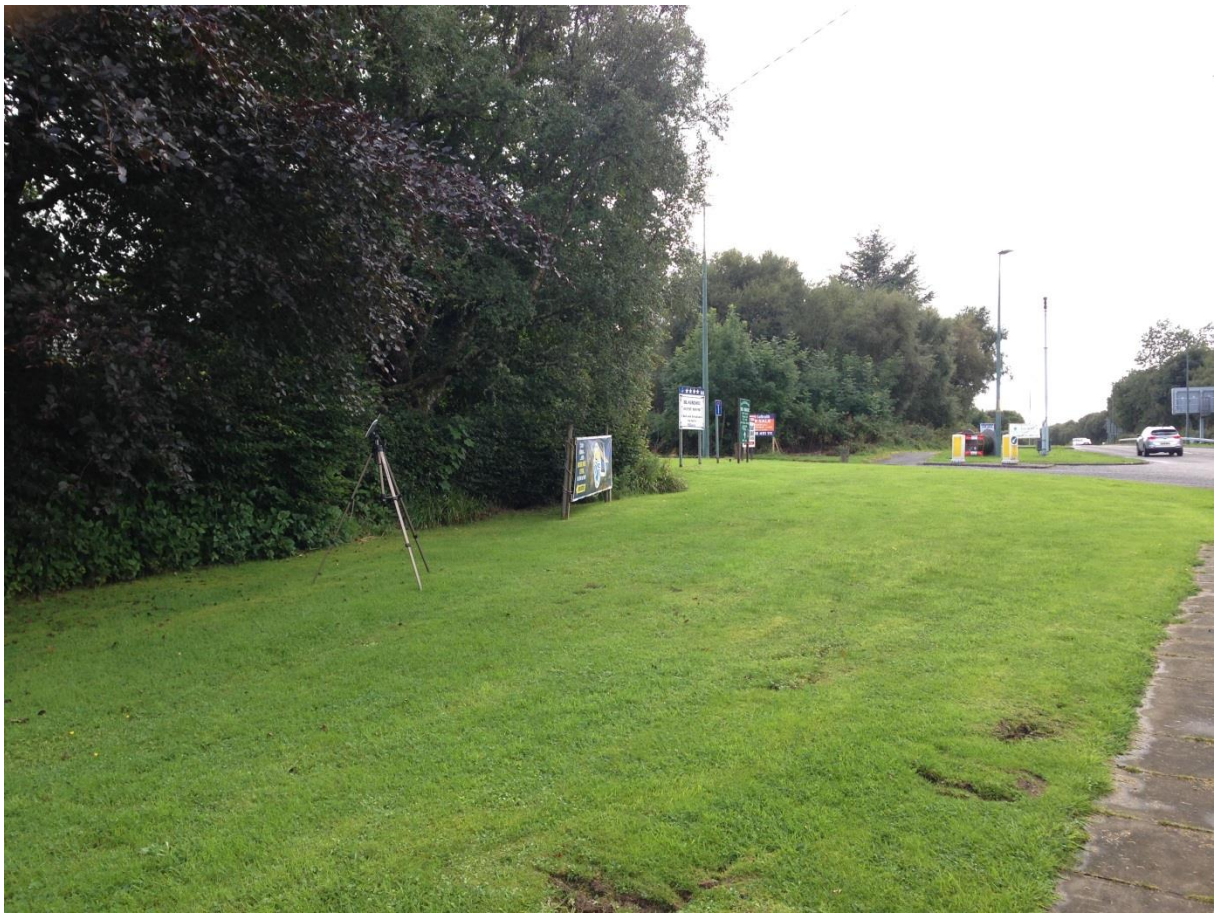
Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
26/08/16	Friday	02:00	15	26	29	22	• Vehicles passing by. • Very light rain in the first measurement.
		02:15	9.5	29	28	22	
		13:00	15	66 x	71 x	47 x	• Vehicles passing by. • Noise from rustling leaves. • Handheld drill noise is audible in the background.
		13:15	15	66 x	71 x	49 x	
		20:30	15	62	67	38	• Vehicles passing by. • Pedestrians. • Noise from rustling leaves.
		20:45	15	61	67	41	
27/08/16	Saturday	07:00	15	63	68	35	• Vehicles passing by.

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
		07:15	15	61	64	26	
		19:15	15	64	69	45	• Vehicles passing by. • Pedestrians. • Birdsong.
		19:30	15	63	69	41	

Pinewood (Attended)

The measurement location is shown in **Photograph 4**. A Cirrus CR:171C Class 1 sound level meter (serial number G061732) was positioned at a height of 1.5 m just to the north of the property boundary.

Photograph 4 Attended Noise Survey Location at Pinewood



Attended baseline noise surveys were undertaken only when weather conditions we suitable, i.e., when it was not raining and in low wind speeds.

The measured baseline noise levels are presented in **Table 4**. Noise data excluded to avoid the potential influence of distant construction noise are indicated with an "x".

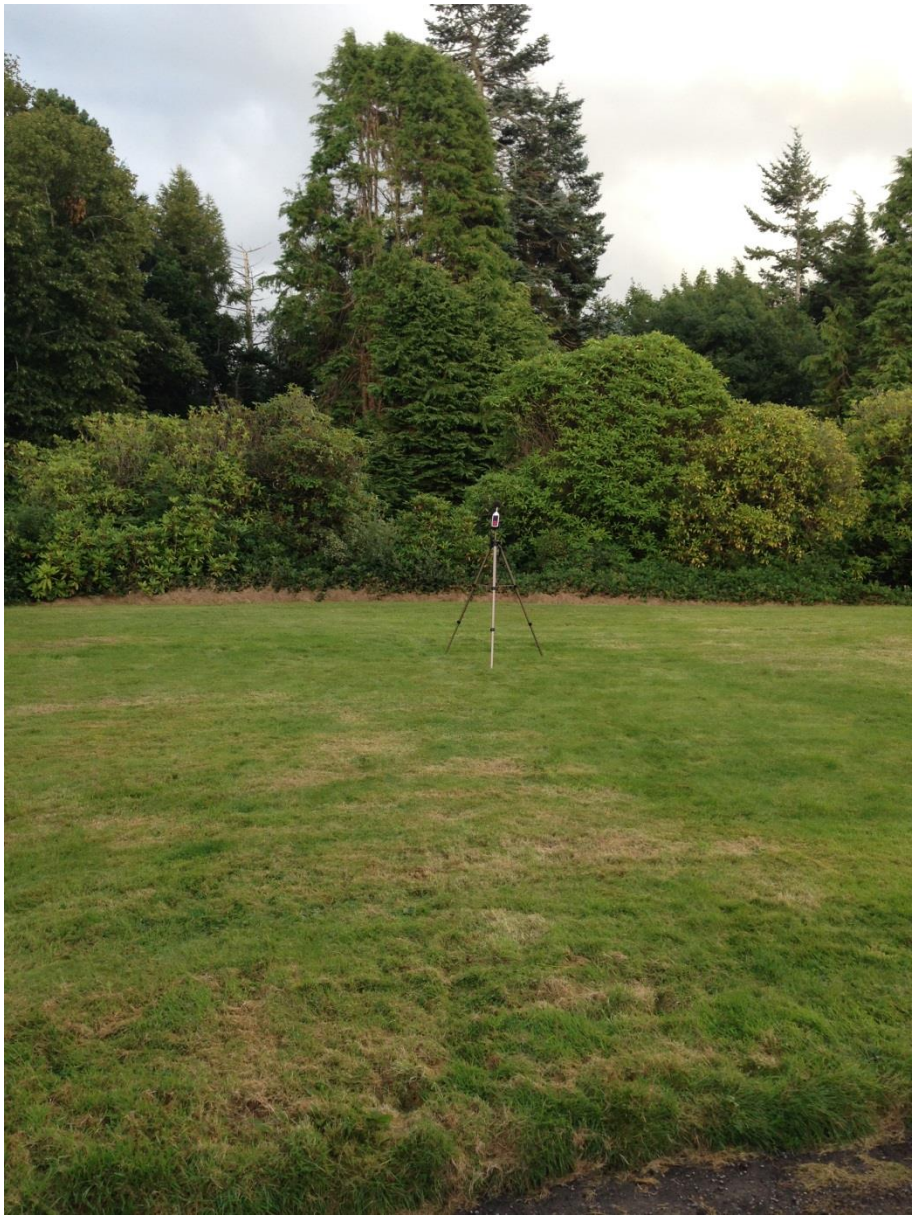
Table 4 Baseline Noise Levels – Pinewood (Attended)

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
26/08/16	Friday	14:45	15	58 [x]	61 [x]	52 [x]	• Vehicles passing by. • Noise from rustling leaves. • Birdsong. • Construction noise is audible when there is no road traffic.
		15:00	15	57 [x]	60 [x]	51 [x]	
		21:15	15	54	58	36	• Vehicles passing by. • Cars parking in the hotel car park. • Pedestrians. • Noise from rustling leaves. • Birdsong.
		21:30	15	53	57	35	
27/08/16	Saturday	06:15	15	48	53	28	• Vehicles passing by. • Birdsong. • Transformer hum from nearby display board is audible when it is very quiet.
		06:30	15	50	52	27	
		17:45	15	55	59	43	• Vehicles passing by. • 1 cyclist passed close by. • Cars parking in the hotel car park. • Pedestrians. • Bus idling in hotel car park for two minutes. • Birdsong.
		18:00	15	56	59	44	

MacKinnon Country House Hotel (Attended)

As access to Kyle House and its grounds was not possible, this location was selected as a proxy measurement location for Kyle House. The measurement location is shown in **Photograph 5**. A Cirrus CR:171C Class 1 sound level meter (serial number G061732) was positioned at a height of 1.5 m in the hotel garden, to the north-east of the hotel building.

Photograph 5 Attended Noise Survey Location at MacKinnon Country House Hotel



Attended baseline noise surveys were undertaken only when weather conditions we suitable, i.e., when it was not raining and in low wind speeds.

The measured baseline noise levels are presented in **Table 5**. Noise data excluded to avoid the potential influence of distant construction noise are indicated with an "x".

Table 5 Baseline Noise Levels – MacKinnon Country House Hotel (Attended)

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
25/08/16	Thursday	23:50	15	34	35	20	• Vehicles passing by.
26/08/16	Friday	12:30	15	49 x	53 x	42 x	• Vehicles passing by. • Distant construction noise.

Date	Day	Time	Measurement Period (minutes)	Noise Level Indices (dB)			Comments
				$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
							• Guests entering and exiting hotel. • Vehicles parking in hotel car park. • Birdsong.
		19:00	15	47	53	39	• Vehicles passing by. • Dog barking. • Guests entering and exiting the hotel. • Cars parking in hotel car park.
		19:15	15	46	50	37	
27/08/16	Saturday	05:30	15	40	45	23	• Vehicles passing by. • Birdsong.
		05:45	15	37	39	23	
		17:00	15	47	51	36	• Vehicles passing by. • Birdsong. • 1 car entered the hotel car park.
		17:15	15	46	50	38	

Appendix 7.4 Noise Source Data

Noise Source	Octave Band Sound Power Levels (dB), Hz									L_{WA} (dB)	L_{lin} (dB)
	31.5	63	125	250	500	1000	2000	4000	8000		
Construction Noise Assessment											
Junttan PM20LC – Pile Driving Rig	-	113.5	119.5	111.5	113.5	109.5	106.5	101.5	98.5	115.0	122.1
Operational Noise Assessment											
Activity in ship intake building and finished product bulk silo building	67.8	70.6	63.4	63.4	61.9	64.6	72.1	76.2	74.5	80.0	80.5
Activity in main process building	90.0	86.0	85.0	93.0	92.0	85.0	81.0	81.0	76.0	92.3	97.7
Activity in big bag building	66.0	67.0	69.0	69.0	73.5	68.8	69.0	73.3	69.6	78.1	79.7
Conveyors on pier	86.0	76.0	74.0	75.0	75.0	75.0	75.0	71.0	61.0	80.4	87.8
Conveyor from ship intake building to main process building	85.1	89.3	91.5	89.1	85.0	81.0	75.7	75.4	70.0	87.2	95.9
Transportation pipelines	86.2	85.3	82.8	82.0	77.5	75.2	78.9	86.8	87.8	91.0	93.7
Cargo to conveyors	90.8	92.1	89.7	87.7	88.5	88.7	88.2	91.2	87.8	96.2	99.2
Biobed north	109.9	112.1	115.9	114.7	111.3	110.1	94.2	88.5	82.1	113.4	120.7
Biobed south	100.4	103.1	106.4	104.8	101.5	100.3	85.0	79.2	72.6	103.6	111.1
Ship idling	105.9	113.0	107.0	97.8	92.4	87.9	82.9	76.1	67.5	96.3	114.7
Cooling fan	70.1	78.3	75.3	68.6	69.4	64.6	58.0	51.2	45.8	70.0	81.2
Cooling pump	73.1	81.3	78.3	71.6	72.4	67.6	61.0	54.2	48.8	73.0	84.2
Unloader	97.8	100.6	95.5	89.0	90.6	86.4	85.2	83.4	78.5	93.0	103.8
Loader	87.8	90.6	85.5	79.0	80.6	76.4	75.2	73.4	68.5	83.0	93.8