Project

ERADE
Acoustic Assessment

Prepared for

Castleoak Care Developments Limited and
RST Topsham Road (Exeter) Ltd

By

Claire Starley

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Telephone +44(0)1787 247595
Website www.srltsl.com
London, Birmingham, Manchester, Sudbury

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Client	Castleoak Care Developments Limited and RST Topsham Road (Exeter) Ltd
Client Address	Bridge House 4 Borough High Street London SE1 9QR
Author	Claire Starley BEng (Hons) MIOA
Checker	Heulwen Peters BSc (Hons) MIOA
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00	28 September 2017	Issued
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Summary

SRL Technical Services Limited has been commissioned by Acorn Property Group to do a noise survey and assessment to support the planning application for a residential development on Topsham Road, Exeter.

A noise survey was done to establish the daytime and night time noise levels including at peak times (as required by the Local Authority). This report details existing noise levels affecting the site, and outlines mitigation needed to meet internal and external noise limits given in British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS 8233).

This noise level data has been used to determine the required acoustic specification for glazing and ventilators to satisfy the anticipated planning condition, as detailed in section 3 of this report.

Acceptable internal noise levels can be achieved using standard thermal glazing and ventilation provided by acoustic trickle ventilators, as summarised in this table, or with a mechanical ventilation system.

Room Type	Façade	Night/Day	Glazing	Ventilation
Living Room	Topsham Road	Day	32dB $R_w + C_{tr}$	Acoustic Ventilator 42 D_{new}
Living Room	All other facades	Day	32dB $R_w + C_{tr}$	Standard Trickle Ventilator
Bedroom	Topsham Road	Night	34dB $R_w + C_{tr}$	Acoustic Ventilator 42 D_{new}
Bedroom	All other facades	Night	32dB $R_w + C_{tr}$	Standard Trickle Ventilator

(Table 3: Glazing and Ventilation Strategy Summary, from P12)

Based on the results of the assessment, with appropriate mitigation for the glazing and ventilation solution, the proposed development complies with local and national policy and no acoustic constraints have been identified.

Claire Starley
For and on behalf of
SRL Technical Services Limited
Tel: 0161 929 5585
Email: cstarley@srltsl.com

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1.0 Introduction

Acorn Property Group are preparing a planning application for a large residential site on the site of the Exeter Royal Academy for Deaf Education (ERADE), which is situated off Topsham Road. This site is to consist of a one care home, one block of assisted living accommodation, flats and houses with a total number of 149 residential dwellings

The main noise source affecting the site is road traffic on Topsham Road to the north; a plan of the proposed development is given in Figure 1 below.

Figure 1: Proposed Development

2.0 Noise Policy and Criteria

2.1 ProPG: Planning and Noise

(Professional Practice Guidance on Planning and Noise)

Professional Practice Guidance on Planning and Noise (ProPG) was published in June 2017. It provides guidance on a recommended approach for managing noise appropriately within the planning system for new housing. It is not an official government code of practice, nor does it replace or provide an authoritative interpretation of the law or government policy, but it does help to draw together existing policies, such as the National Planning Policy Framework (NPPF) and provides additional guidance which helps fill in some of the current gaps.

This document has been jointly created by three bodies: The Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health. The key message is the drive to adopt Good Acoustic Design for every new housing scheme to protect people from the harmful effects of noise.

ProPG: Planning and Noise aims to establish a framework for assessing proposed developments by looking at the potential 'risks' from noise affecting the site, and establishing suitable noise criteria. The fundamental approach is to do an initial Risk Assessment of the site in terms of noise and unless the risk is deemed to be negligible, you are expected to do a full noise assessment. This involves establishing suitable noise criteria and developing a Good Acoustic Design to achieve them, wherever possible.

However, the foreword of ProPG also points out that

'Good acoustic design does not mean "gold plating" or significantly increasing costs. This guidance seeks to encourage and promote design outcomes that are proportionate and reasonable in the particular circumstances of each development site.'

Hence, while the aim of a noise assessment like this is to provide acceptable amenity, it is recognised that the scheme sits within an existing community already exposed to similar road traffic along the routes around the site itself.

2.2 British Standard 8233:2014 - 'Guidance on sound insulation and noise reduction for buildings'

In residential developments, external noise levels must be controlled so that acceptable internal noise levels are achieved. For this assessment, I have used the guidance in British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS 8233); these are summarised in Table 1 below.

Activity	Room Type	Time Period, hh:mm	
		07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,T}$	-
Dining	Dining room/area	40 dB $L_{Aeq,T}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,T}$	30 dB $L_{Aeq,T}$

Table 1: Summary of indoor ambient noise levels from BS 8233:2014

The latest version of BS 8233 does not include a maximum noise level criterion. Note 4 (p.29) of the standard states:

'NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax}, depending on the character and number of events per night. Sporadic noise events could require separate values.'

For regular external vehicular movements, I recommend maximum noise levels are controlled as best as practicable to less than 45dB L_{AFmax} internally, which is considered appropriate for the site location.

For outdoor areas, such as gardens, BS 8233:2014 states the following design guidance:

'it is desirable that the external noise level does not exceed 50 $L_{Aeq,T}$ dB, with an upper guideline value of 55 $L_{Aeq,T}$ dB which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

2.3 BS 4142:2014

Exeter City Council's Environmental Health Department have confirmed that their preferred criterion for plant noise is to meet a noise level (L_{Aeq}) 5dB below background (L_{A90}).

We will adopt the methodology principals given in BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'. BS 4142 provides a method to assess whether "sound of an industrial and/or commercial nature" is likely to have an adverse impact at nearby Noise Sensitive Receptors.

BS 4142's assessment methodology considers how loud the noise is and its character (e.g. whether it contains hisses, bangs or clicks). Corrections are applied dependant on the acoustic character of the noise source. The source noise with acoustic character corrections (the rating noise level) is compared with the existing background noise at the receptor to make an assessment of the likelihood of adverse comment from receptors.

BS 4142 states that where the rating level does not exceed the background noise level there is a low probability of adverse comment. Therefore, assuming an acoustic character correction of 5 dB (for a noise that is tonal and intermittent in character), by designing plant to meet a noise level L_{Aeq} of 5 dB below the background noise level, a BS 4142 will indicate that plant noise is controlled to a reasonable level at nearby receptors.

3.0 Noise Survey and Data

Attended noise measurements were made from 10:30 to 15:00 on Friday 15th September 2017 on the roads surrounding the site, using a receiver approximately 1.5m off the ground. Night measurements were made from 23:00-00:00 Thursday 14th September 2017 and from 06:00 - 07:00 Friday 15th September to capture the peak times during the night, again on all the roads surrounding the site.

A logger was set up in a playing field opposite the site, due to security, and L_{Amax} levels were measured over the whole night to determine glazing and ventilation strategy. The logger was also used to work out the background level at the quietest part of the night for setting plant limits.

Details of the survey are in Appendix A and tabulated results are detailed in Appendix B. Measurement parameter definitions in Appendix C.

The main noise source affecting the development is road traffic along Topsham Road. Road traffic was noted as regular during the day, and less frequent at night.

During the attended daytime measurements, we measured noise levels over 10-minute intervals. Attended night-time measurements were over 2 x 5-minute intervals per hour These periods were chosen to obtain a steady noise level from road traffic noise sources, and sample typical maximum noise levels from vehicular movements along the main carriageways. Figure 2 shows the measurement locations used for this assessment in relation to the existing site layout.

Figure 2: Measurement Positions

3.1 Noise Levels

We measured noise levels during a representative daytime period between 10:00 and 13:00 hours and during a representative night-time period between the hours of 23:00 till 01:00 and 06:00 till 7:00, as agreed with Exeter's Environmental Health department. Noise levels across the site are characterised by vehicular movements. Table 2 below provides a summary of the noise levels measured during the attended measurements.

Measurement Position	Description of measurement location	Measured Noise Levels, dB		
		Daytime	Night-time	
		$L_{Aeq,16hr}$* (07:00 to 23:00h)	$L_{Aeq,8hr}$* (23:00 to 01:00h)	L_{Amax}, Typical
1	Old Mill Close: Side Road: River Exeter is Main Noise Source: running water.	46	37	50
2	Weirfield Road: Side Road, River Exe is Main Noise Source	47	35	62
3	Topsham Road: Road Traffic is Main Noise Source	72	59	82
4	Trews Weir Reach: Topsham Road is Main Noise Source	53	36	58

Table 2: Measured noise levels

* Calculated from the measured LA10 using the shortened measurement procedure given in Department of Transport's 'Calculation of Road Traffic Noise' (CRTN) and the methodology in Transport Research Laboratory "Method for Converting the UK Road Traffic Noise Index LA10,18h to the EU Noise Indices for Road Noise Mapping"

4.0 Noise Assessment

4.1 Façade Specification

The external walls of the residential dwellings will be brick or blockwork, with internal plasterboard linings. The rooves are expected to be constructed with clay tiles, insulation, and plasterboard ceilings.

These types of construction will provide sufficient sound insulation against external noise and it will be the windows and ventilation openings that will be the weakest elements acoustically.

4.2 Glazing and ventilation recommendations

Glazing and ventilation specifications are given below for the various dwelling types and locations. I have summarised them in the table below. Please note these are the minimum requirements, therefore glazing with higher sound insulation performances are also acceptable.

Room Type	Façade	Night/Day	Glazing	Ventilation
Living Room	Topsham Road	Day	32dB $R_w + C_{tr}$	Acoustic Ventilator 42 D_{new}
Living Room	All other facades	Day	32dB $R_w + C_{tr}$	Standard Trickle Ventilator
Bedroom	Topsham Road	Night	34dB $R_w + C_{tr}$	Acoustic Ventilator 42 D_{new}
Bedroom	All other facades	Night	32dB $R_w + C_{tr}$	Standard Trickle Ventilator

Table 3: Glazing and Ventilation Strategy Summary

The locations of the various glazing types are shown below in section 4.2.1 and 4.2.2.

The ventilator specification given allows for one vent to each room only. Should more than one ventilator be necessary, the ventilator specifications may need to be reviewed (and increased accordingly).

This glazing specification stated must be met by the glass and frame. You must ask your suppliers to provide test data which shows that their proposed solutions meet the requirements for the glazing as shown in the

table above, as the performance of similar systems, such as the same glazing configuration, etc. can vary between manufacturers/suppliers. It also depends upon the actual frame/seal system used.

Should more than one ventilator be necessary, the ventilator specifications may need to be reviewed. I recommend that you confirm the specification and number of proposed ventilators and proposed glazing systems with SRL prior to ordering.

4.2.1 Residential

a) Living rooms

Based on the noise levels presented in Section 3.0, thermal double glazing that achieves 32dB $R_w + C_{tr}$ (for example 14mm glass, 12mm spacer, 4mm glass) and a ventilator achieving 42dB D_{new} is required to all living rooms fronting Topsham Road, as figure 3 depicts. This will allow the daytime criterion of 35dB $L_{Aeq,16hour}$ to be achieved in living rooms.

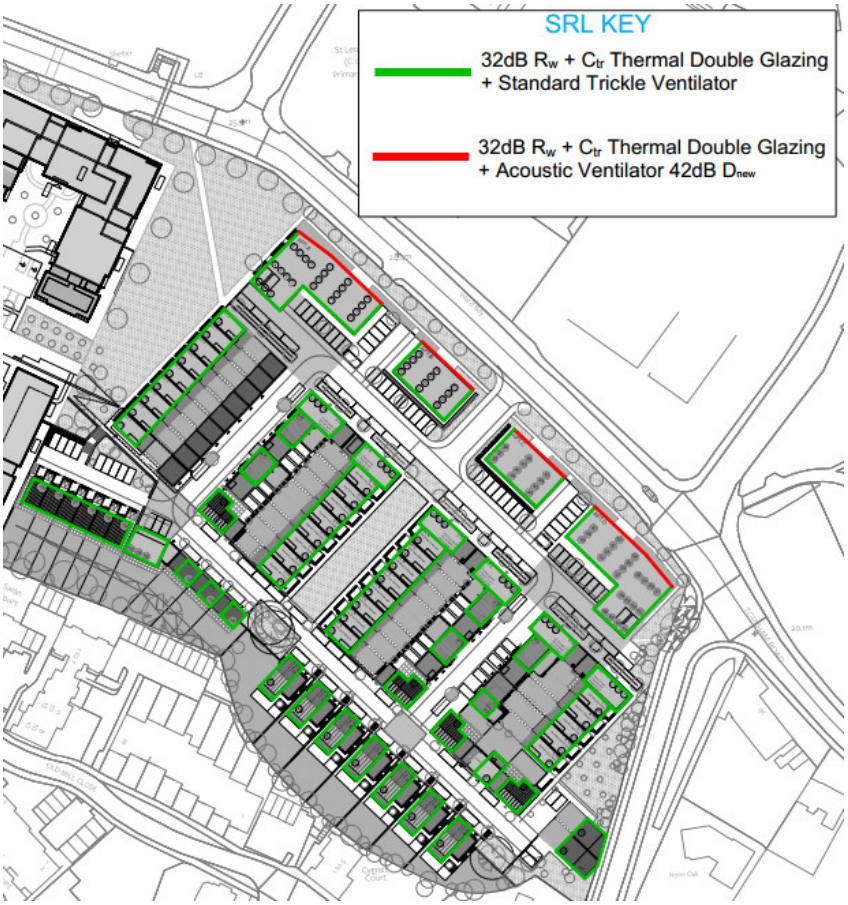


Figure 3: Glazing and ventilation strategy for Living Rooms (daytime)

b) Bedrooms

At night, the most onerous requirement is the control of maximum noise levels from vehicles on the nearby roads.

Based on the noise levels presented in Section 3.0, thermal double glazing that achieves 34dB $R_{w + Ctr}$ (for example 4mm glass, 12mm spacer, 4mm glass) and a ventilator achieving 42dB D_{new} is required to all bedrooms fronting on to Topsham Road, as figure 3 depicts. For all other bedrooms that do not directly overlook the roads, standard thermal double-glazing units and standard trickle ventilators can be used. With this provision, maximum noise levels in bedroom at night will typically be between 45 - 50dB L_{AFmax}. Average noise levels will be lower than the BS 8233 night-time criterion of 30dB $L_{Aeq,8hour}$.

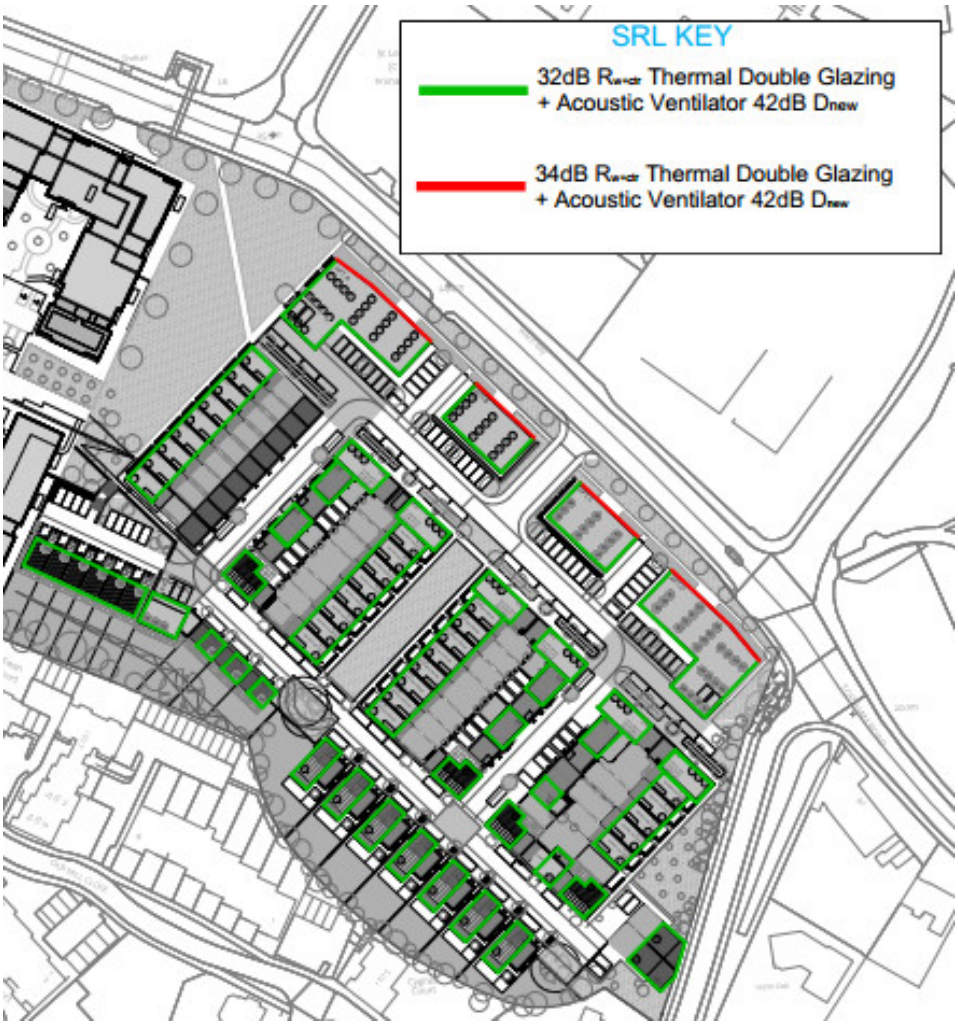


Figure 4: Glazing and ventilation strategy for Bedrooms (night-time)

4.2.2 Care home/assisted living

No internal layout was provided for the care home or assisted living builds, therefore assumptions have had to be made. It was decided that the entire build would be assessed as bedrooms, this will mean that the both the bedrooms and living room areas will meet the internal noise criteria set in BS 8233:2014.

Based on the noise levels presented in Section 3.0, thermal double glazing that achieves 32dB $R_w + C_{tr}$ (for example 4mm glass, 12mm spacer, 4mm glass) and a ventilator achieving 42dB D_{new} is required to all rooms fronting Topsham Road. This will allow the daytime criterion of 35dB $L_{Aeq,16hour}$ to be achieved in living rooms and the night time criterion of 30dB $L_{Aeq,8r}$ to be achieved in bedrooms.

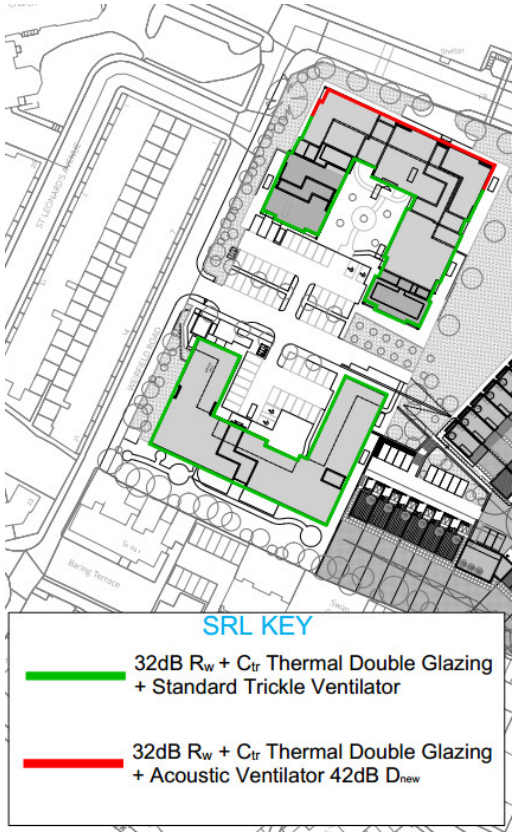


Figure 5: Glazing and ventilation strategy for Bedrooms (night-time)

Based on the results of the assessment, with appropriate mitigation for the glazing and ventilation solution as identified in section 4.0, the proposed development complies with local and national policy and no acoustic constraints have been identified.

4.2.3 External amenity areas

The development includes gardens, generally at the rear of each proposed dwelling (see Figure 1).

Our predictions indicate that the noise levels should meet the BS 8233 upper guideline level of 55dB $L_{Aeq,T}$ in the closest parts of gardens to the roads.

5.0 Plant Noise Limits

The site is surrounded by existing residential dwellings. Receptors to the rear of the site (Old Mill Close) are expected to be most affected by plant noise if not controlled adequately at source. Based on this and the criteria detailed in section 2 of this report, table 3 below details the plant noise limits for the development set by Exeter City Council of 5dB (L_{aeq}) below background noise, it is assumed that this is not a rating level and that it is a L_{Aeq} level.

Typical background noise levels (L_{A90}) dB(A)		**Plant noise levels at nearest sensitive receptors, dB(A)**	
Daytime (07:00-23:00)	Night (23:00-07:00)	Daytime (07:00-23:00)	Night (23:00-07:00)
42	35	37	30

Table 4: Plant noise limits

Appendix A - Survey Details

A1. Location of Survey

Exeter Royal Academy for Deaf Education, 50 Topsham Rd, Exeter, EX2 4NF.

A2. Date & Time of Survey

Night: Thursday 14th September 2017: 23:00 - 00:00

Friday 15th September 2017: 06:00 - 07:00

Day: Friday 15th September 2017: 10:30 - 15:30

A3. Personnel Present During Survey

Claire Starley (SRL)

A4. Weather Conditions during Survey

Day: Partial cloud, rain over night but no pooling or surface water, light wind, cool.

Night: Dry, some damp patches remain from shower earlier that day, no pooling water/surface water, little/no wind.

A5. Instrumentation

Attended measurements

Brüel & Kjær

Type 2250 Sound Level Meter (SRL 2250 Purple, SRL No: 814) (serial no. 2575775)

Type 4231 Calibrator (SRL No: 815) (serial No:2575525)

Unattended Measurements

Brüel & Kjær

Type 2250 Sound Level Meter (SRL 2270 Black, SRL No: 513) (serial no. 2623080)

Type 4231 Calibrator (SRL No: 514) (serial No: 2665089)

A6. Calibration Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of ±0.3 dB using the type 4231 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2 x 10^{-5} Pa at a frequency of 1 kHz.

A7. Survey Procedure

Ambient noise levels were monitored at various positions around the site as shown on Figure 2. The measurements are tabulated in Appendix B, and explanations of the parameters used are listed in Appendix C.

Appendix B - Noise Survey Results

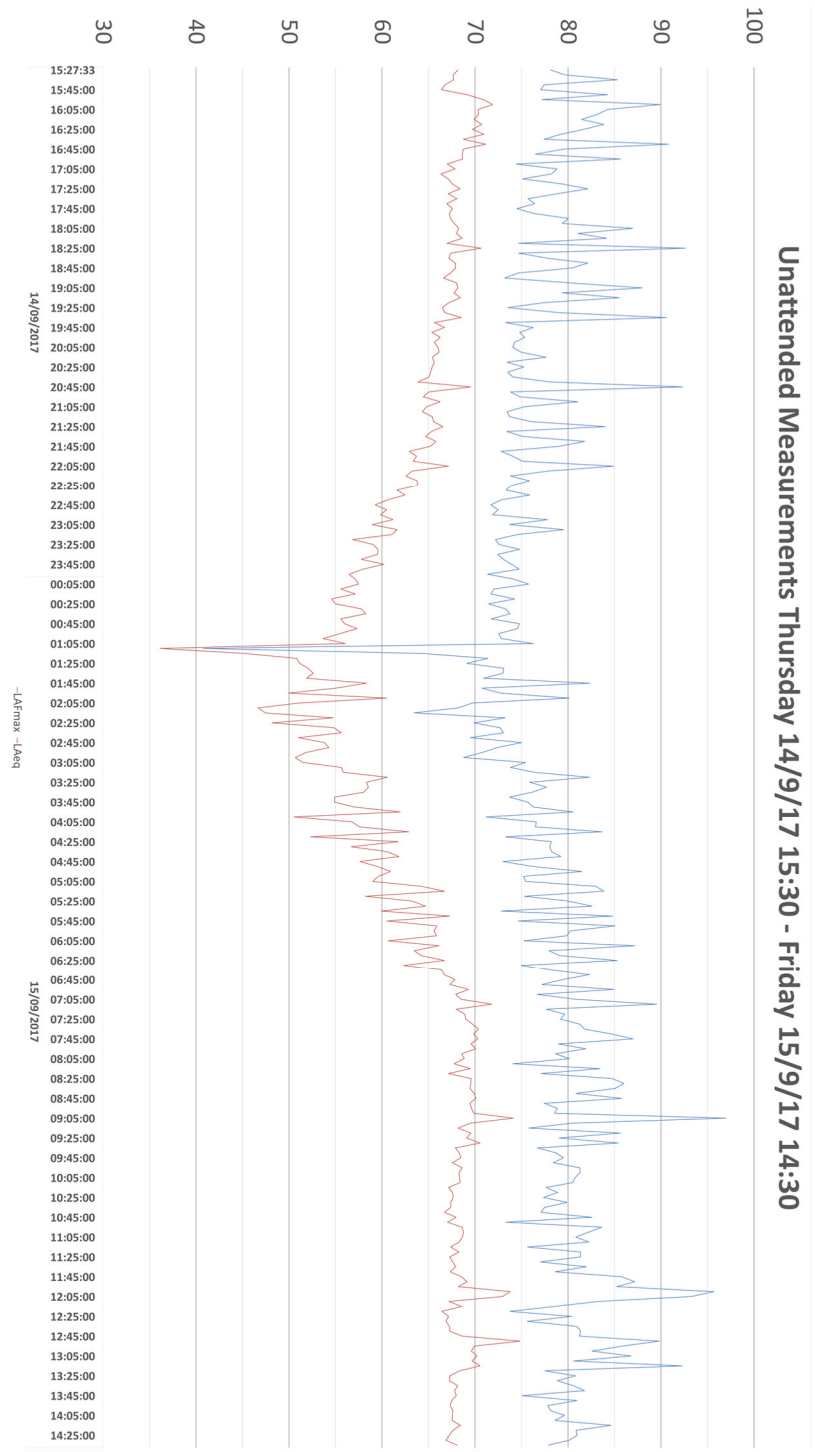
Daytime Measured Ambient Noise Levels

Position	Date	Start Time	L_{Aeq}	L_{A10}	L_{A90}
4	15/09/2017	10:38:46	56	56	46
2	15/09/2017	11:00:18	48	52	43
3	15/09/2017	11:14:56	72	75	63
1	15/09/2017	11:30:52	49	49	45
4	15/09/2017	11:45:00	56	54	46
3	15/09/2017	11:59:28	73	75	65
2	15/09/2017	12:14:24	51	50	43
4	15/09/2017	12:40:34	59	59	43
1	15/09/2017	12:58:20	47	49	42
2	15/09/2017	13:18:46	45	47	41
3	15/09/2017	13:47:16	70	74	62
1	15/09/2017	14:55:44	52	49	44

Night-time Measured Ambient Noise Levels

Position	Date	Start Time	L_{AFmax}	L_{Aeq}	L_{AF10}	L_{AF90}
3	14/09/2017	23:01:06	79	65	69	40
3	14/09/2017	23:06:26	79	64	68	38
4	14/09/2017	23:17:08	55	41	44	35
4	14/09/2017	23:19:33	58	41	43	35
4	14/09/2017	23:24:47	52	41	44	36
1	14/09/2017	23:35:11	67	48	45	41
1	14/09/2017	23:40:54	49	42	42	41
1	14/09/2017	23:47:43	50	42	43	42
2	15/09/2017	00:03:14	47	37	38	36
2	15/09/2017	00:09:02	44	38	39	37
3	15/09/2017	06:00:30	83	68	71	39
3	15/09/2017	06:06:09	83	65	67	40
4	15/09/2017	06:16:07	58	45	48	41
4	15/09/2017	06:22:33	58	45	49	41
1	15/09/2017	06:30:48	57	45	46	43
1	15/09/2017	06:36:08	52	44	45	43
2	15/09/2017	06:47:31	58	46	47	44
2	15/09/2017	06:57:00	62	45	47	43

Night-time Unattended Measurements



Appendix C : Noise Measurement Parameter Definitions

L_{A90} - The "A" weighted sound pressure level that is exceeded for 90% of the measurement period. It is commonly used as the "Background Noise Level".

L_{A10} - The "A" weighted sound pressure level that is exceeded for 10% of the measurement period. This is often used for assessing traffic noise.

L_{Aeq} - The "A" weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise, over the measurement period. It can be considered as the "average" noise level.

L_{Amax} - The maximum sound pressure level measured over a measurement period.

Sudbury Consultancy
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF
Tel: +44 (0)1787 247595

Manchester Consultancy
Lynnfield House
Church Street
Altrincham
Cheshire
WA14 4DZ
Tel: +44 (0)161 929 5585

London Consultancy
Citypoint, 12th Floor
1 Ropemaker Street
London
EC2Y 9HT
Tel: +44 (0)207 251 3585

Birmingham Consultancy
Cornwall Buildings
45 Newhall Street
Birmingham
B3 3QR
Tel: +44 (0)121 270 6680

South Africa Consultancy
Ground Floor, Liesbeek House
River Park
Gloucester Road
Mowbray
7700
South Africa
Tel: +27 (0)21 680 5305

Laboratory
Holbrook House
The Street
Sudbury
Suffolk
CO10 0TF
Tel: +44 (0)1787 247595

Website: www.srltsl.com
e-mail: srl@srltsl.com

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Registered Name and Address:
SRL Technical Services Limited
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF

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