

The Exchange, Queen Street Hitchin

Noise Impact Assessment Report
Report 28535.NIA.01

First Building Services Ltd
118 Pall Mall
London
SW1Y 5EA

Report 28535.NIA.01					
Revision History					
First Issue Date: 03/06/2024					
A		D			
B		E			
C		F			
Written by:		Checked by:		Approved by:	
John Cane MSc MIOA Senior Acoustic Consultant		Daniel Stuart MIOA Senior Acoustic Consultant		Gonçalo Lemos MEnvSc MIOA Principal Acoustic Consultant	
Disclaimer KP Acoustics Ltd. has used reasonable skill and care to complete this technical document, within the terms of its brief and contract with the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the stated scope. This report is confidential to the client and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. KP Acoustics Ltd. accepts no responsibility for data provided by other bodies and no legal liability arising from the use by other persons of data or opinions contained in this report. KP Acoustics Ltd. 2024					

Contents

1.0	INTRODUCTION	1
2.0	SITE SURVEYS	1
2.1	Site Description	1
2.2	Environmental Noise Survey Procedure	1
2.3	Measurement Positions	2
2.4	Equipment.....	2
3.0	RESULTS	3
3.1	External Noise Surveys.....	3
4.0	NOISE ASSESSMENT GUIDANCE	4
4.1	Permitted Development Rights.....	4
4.2	BS8233:2014	4
5.0	DISCUSSION.....	5
6.0	EXTERNAL BUILDING FABRIC SPECIFICATION	5
6.1	Glazed Elements.....	5
6.2	Ventilation Strategy	6
7.0	CONCLUSION.....	8

List of Attachments

28535.TH1-2	External Environmental Noise Time Histories
Appendix A	Glossary of Acoustics Terminology

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by First Building Services Ltd, 118 Pall Mall, London, SW1Y 5EA, to assess the suitability of the site at The Exchange, Queen Street, Hitchin for a residential development in accordance with Permitted Development rights as outlined in Class MA (offices to dwelling/houses) of The Town and Country Planning (General Permitted Development) (England) Order 2021.

This report presents the results of external environmental surveys undertaken in order to measure the prevailing background noise levels.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by Hollow Lane to the north, B656 to the west, with businesses and residential units to other sides. The building already contains a number of residential apartments. At the time of the survey, the background noise climate was dominated by road traffic noise from B656 at most times, and at sometimes was dominated by noise from The Bricklayer's Arms pub.

To the south of the site is The Bricklayer's Arms pub, which has a small outdoor garden to the rear. There is currently a gym in the ground floor of the building on site, but this is proposed to be removed before occupation of the proposed new residential units. There are also small businesses further to the south and west, and St Marys Car Park and a large outdoor market to the west across B656. All of the above were in operation during the survey.

2.2 Environmental Noise Survey Procedure

External noise surveys were undertaken on the proposed site as shown in Figure 2.1. The location was chosen in order to collect data representative of the worst-case levels expected on the site due to all nearby sources, including those from nearby commercial premises. The time of the survey was chosen to represent the busiest times for the nearby pub, market and car park, and so is a worst-case scenario for typical noise from local businesses.

Continuous automated monitoring was undertaken for the duration of the survey between 17/05/2024 at 14:28 and 20/05/2024 at 15:27.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Measurement Positions

Measurement positions are as described within Table 2.1 and shown within Figure 2.1. The site is highlighted in red line, and nearby businesses are highlighted in green line.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a window on the 2 nd floor of the front, B656 façade, as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
2	Noise Measurement Position 2	The microphone was installed on a tripod on the 2 nd floor roof of the rear façade, as shown in Figure 2.2. The microphone was positioned within free-field conditions at least approx. 1.5 metres from the nearest surface.

Table 2.1 Measurement positions and descriptions

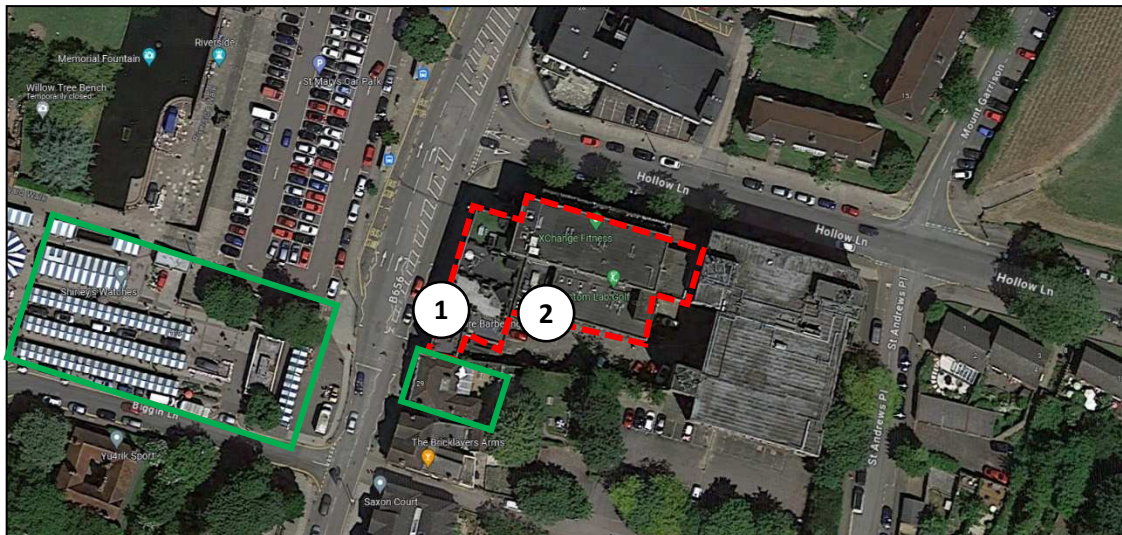


Figure 2.1 Site measurement positions and nearby commercial noise sources (Image Source: Google Maps)

2.4 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 26	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21130-E0	21/07/2022	UK-22-067
	Free-field microphone NTI Acoustics MC230A	A23541		
	Preamp NTI Acoustics MA220	11023		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 27	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21174-E0	21/07/2022	UK-22-070
	Free-field microphone NTI Acoustics MC230A	A23539		
	Preamp NTI Acoustics MA220	11025		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	05/06/2023	UCRT23/1739

Table 2.2 Measurement instrumentation

3.0 RESULTS

3.1 External Noise Surveys

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as time histories in Figures 28535.TH1-2.

Measured noise levels are representative of noise exposure levels expected to be experienced by all façades of the proposed development, and are shown in Table 3.1.

Time Period	External Noise Measurement Position 1 (Measured Noise level – dBA)	External Noise Measurement Position 2 (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	69	49
Night-time $L_{Aeq,8hour}$	63	46

Table 3.2 Site average noise levels for daytime and night time

Please note that the microphone at Noise Measurement Position 1 was located at a distance less than 1.5 metres from the nearest reflective surface and therefore a 3dB correction has

been applied to the results in Table 3.2 to obtain a free-field measurement as per ISO1996 Part 2.

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Permitted Development Rights

It is understood that the office development would be converted into residential units under the Permitted Development Rights. Therefore, this assessment would be targeted to demonstrate the noise requirement as per Citation *“Amendments in relation to change of use of offices to dwelling houses”* of The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2021:

“(2) Before beginning development under Class MA, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to –

(a) transport impacts of the development, particularly to ensure safe site access;

(b) contamination risks in relation to the building;

(c) flooding risks in relation to the building;

(d) impacts of noise from commercial premises on the intended occupiers of the development;”

The measurements undertaken on site would not only encompass noise generated by any nearby commercial units, but it would also encompass the full spectrum of noise sources in the area affecting the premises.

In order to demonstrate if the current external building fabric of the site would be sufficient to protect the future residents, the measured internal noise levels would be assessed against the recommendations of the British Standard BS8233:2014 *“Sound insulation and noise reduction for buildings”*.

4.2 BS8233:2014

BS8233:2014 *‘Sound insulation and noise reduction for buildings’* describes recommended internal noise levels for residential spaces. These levels are shown in Table 4.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 4.1 BS8233 recommended internal background noise levels

5.0 DISCUSSION

In the context of this site, BS8233:2014 targets shown above are considered suitable for the assessment of noise from the nearby pub, because the principal source of noise is talking in the pub garden. There is understood to be no loud amplified music played at the pub, and therefore no significant low frequency emphasis on the noise to mitigate for at the receiving windows.

To ensure that the development is suitable for residential use, the existing building fabric should be upgraded as outlined within Section 6.0. Please note that the glazed and non-glazed element calculations would need to be finalised once all design proposals are finalised.

6.0 EXTERNAL BUILDING FABRIC SPECIFICATION

6.1 Glazed Elements

Sound reduction performance calculations have been undertaken in order to specify the required performance from glazed elements in order to achieve the recommended internal noise levels shown in Table 4.1, taking into account average and maximum noise levels monitored during the environmental noise survey as well as the non-glazed external building fabric construction.

Along the façade highlighted in blue in figure 6.1 below, the windows open onto a corridor, after which there are front doors to apartments. In this arrangement, we do not recommend that any upgrade to glazing is necessary, except to ensure all seals around external windows are made good.

Other facades facing the pub (shown highlighted green below) and front facades in view of the B656 and surrounding businesses (highlighted in yellow), should meet the specifications in Table 6.1.

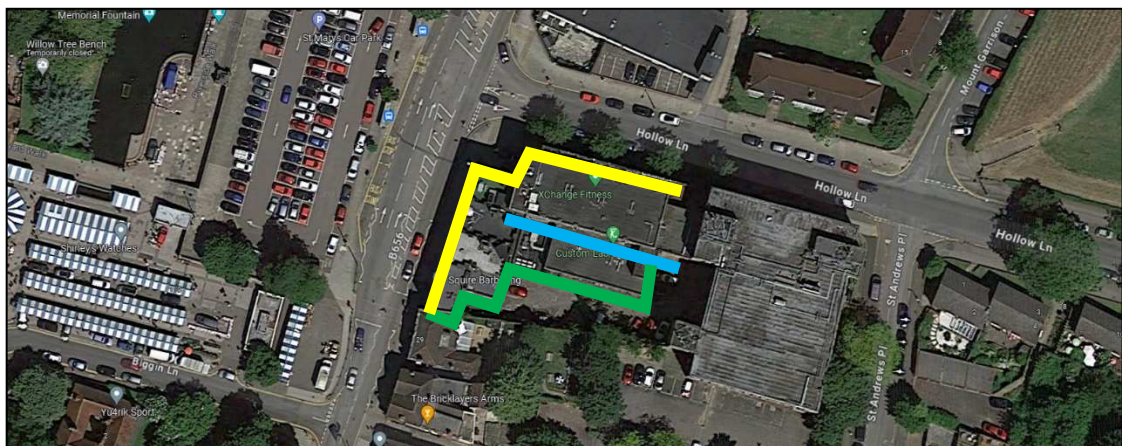


Figure 6.1 Site facades (Image Source: Google Maps)

Minimum octave band sound reduction index (SRI) values required for all glazed elements to be installed are shown in Table 6.1. The performance is specified for the whole window unit, including the frame, seals, etc. as appropriate. Sole glass performance data would not demonstrate compliance with this specification.

Elevation	Octave band centre frequency SRI, dB						$R_w (C; C_{tr})$, dB
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
All elevations	27	26	33	39	39	47	36(-1;-3)

Table 6.1 Required glazing performance

The existing windows would need to be upgraded either by replacement with windows matching or exceeding the above specifications or upgraded internally to meet the recommended internal noise levels stipulated in BS8233:2014 and meet the minimum octave band sound reduction values outlined in Table 6.1.

We would therefore recommend that, if retaining the windows, a secondary glazing system is installed, such as those provided by SelectaGlaze, who provide several systems which would achieve the project requirements:

- S20 Vertical Sliding System, comprised of 50mm cavity from the existing window system, with 4-6.4mm standard glass (Provides 39dB R_w with primary window)
- HS10 Horizontal Sliding System, comprised of 50mm cavity from the existing window system, 4-6.4mm standard glass (Provides 39dB R_w with primary window)
- HC45 Hinged Casement System, comprised of 50mm cavity from the existing window system, 4-6.4mm standard glass (Provides 41dB R_w with primary window)

It should be noted that if the windows are replaced at a later stage under a full planning application, the minimum octave band sound reduction values outlined in Table 6.1 should be met for all new window systems.

6.2 Ventilation Strategy

Based on the noise levels measured on site, appropriate ventilation systems are outlined in Table 6.2 below in order to ensure the internal noise environment is not compromised.

Ventilation System	Whole Dwelling Ventilation	Extract Ventilation
ADF System 1	Trickle vents providing a minimum performance of 39dB $D_{n,e,w}$	Intermittent extract fans
ADF System 3	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 39dB $D_{n,e,w}$	Continuous mechanical extract (high rate) with trickle vents providing inlet air
ADF System 4	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)

Table 6.2 Ventilation systems

Where trickle vents are proposed, a typical number has been assumed based on the room size and number of windows. As trickle vents introduce a weak point in the building façade, it should be noted that increasing the number of trickle vents will reduce the composite performance of the facade. If more trickle vents are required, the required insulation should be increased by '+10*LOG(N)' where N is the number of vents proposed. If trickle vents are proposed, the total number of trickle vents for each sensitive space should be confirmed so that calculations can be accurately revised.

In the case of mechanical ventilation, systems should be designed to meet the internal noise levels as defined in CIBSE Guide A (2015), as shown in Table 6.2.

Room Type	L_{Aeq} , dB	NR
Bedrooms	30	25
Living Rooms	35	30
Kitchen	45-50	40-45

Table 6.2 CIBSE Guide A 2015 guidance levels for mechanical building services

In all cases, purge ventilation would be provided by openable windows. The internal noise level requirement would not be applicable during purge conditions as this would only occur occasionally.

7.0 CONCLUSION

Environmental noise surveys have been undertaken at The Exchange, Queen Street, Hitchin allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Mitigation measures have been provided to meet the recommended internal noise levels provided in BS8233 and to protect the proposed habitable spaces from external noise intrusion.

The Exchange, Queen Street, Hitchin - Position 1
Environmental Time History
17/05/2024 to 20/05/2024

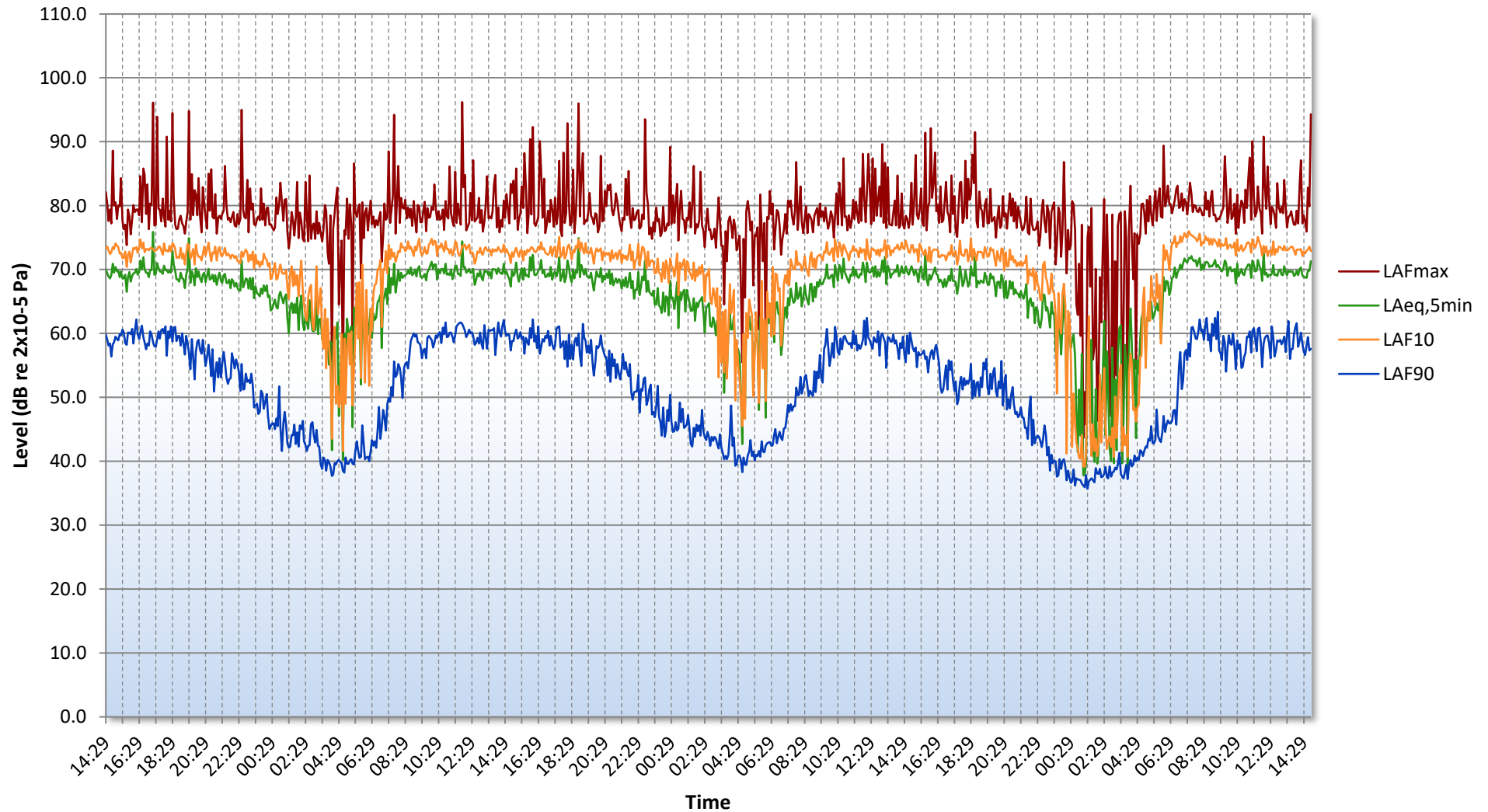


Figure 28535.TH1

The Exchange, Queen Street, Hitchin - Position 2
Environmental Time History
17/05/2024 to 20/05/2024

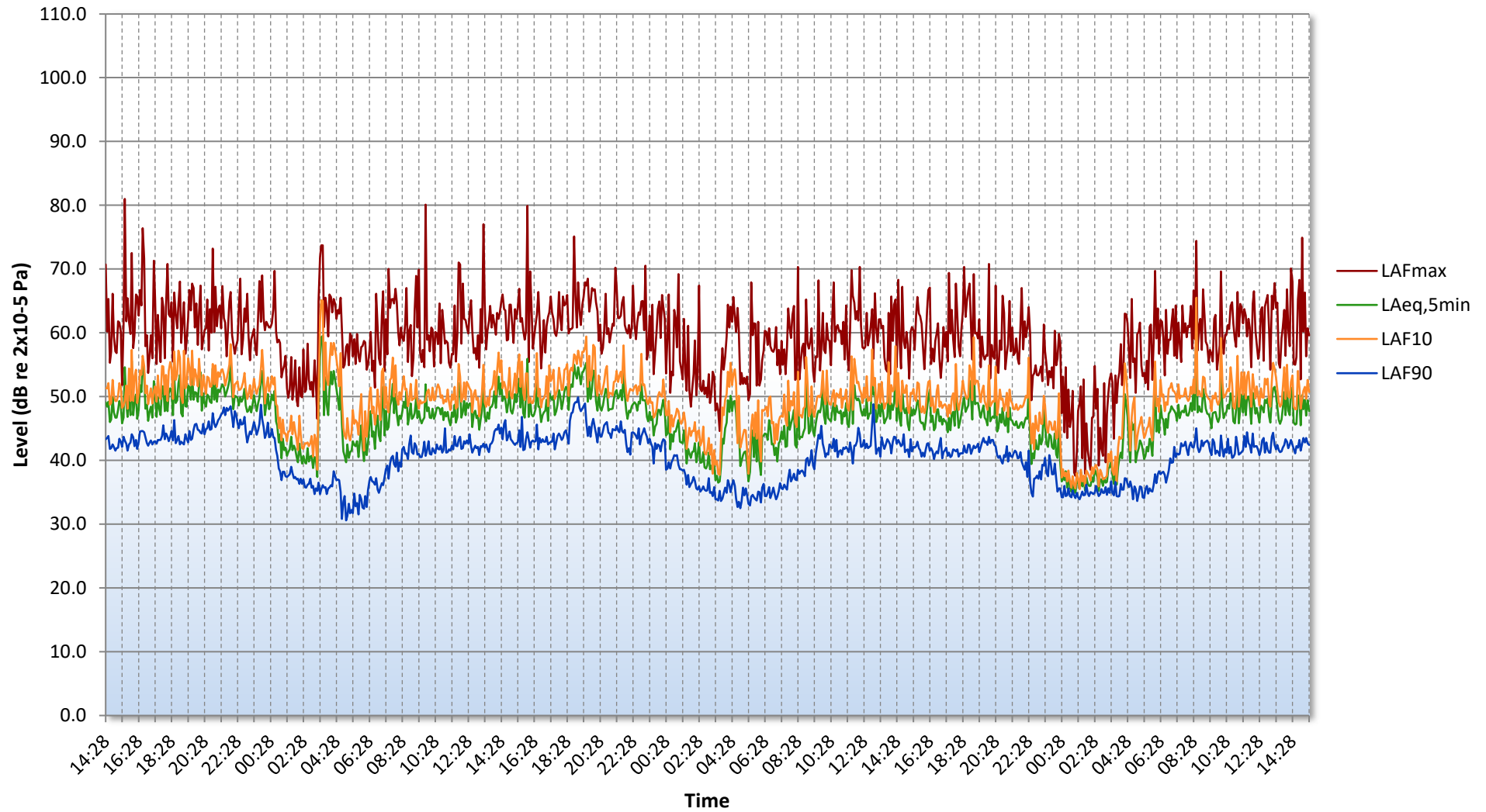


Figure 28535.TH2

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.