

35 King Street Manchester



Preliminary Planning Compliance Report Report 27580.PCR.01

**FHP ESS
17 Bevis Marks
London
EC3A 7LN**

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27580.TH1	Environmental Noise Time History
27580.Daytime L90.TH1	Statistical analysis for representative daytime L_{A90}
27580.Night-time L90.TH1	Statistical analysis for representative night-time L_{A90}
Appendix A	Glossary of Acoustics Terminology

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by FHP ESS, 17 Bevis Marks, London, EC3A 7LN, to undertake a noise impact assessment of a proposed plant unit installation serving the building at 35 King Street, Manchester M2 7AT.

A 24-hour environmental noise survey has been undertaken on site in order to prepare a noise impact assessment in accordance with the planning requirements of Manchester City Council (MCC).

This report presents the methodology and results from the environmental survey and outlines the plant noise emissions criteria.

2.0 SITE SURVEYS

2.1 Site Description

As shown in Figure 2.1, the site is bounded by St Ann's Place to the north, King Street to the south and commercial buildings on all other sides.



Figure 2.1 Site Location Plan (Image Source: Google Maps)

Initial inspection of the site revealed that the background noise profile at the monitoring location was typical of an urban cityscape environment, with the dominant source being road traffic noise from the surrounding roads.

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 11:00 on 20/11/2023 and 11:00 on 22/11/2023.

The environmental noise measurement position, proposed plant installation locations, and the closest noise sensitive receivers relative to the plant installations are described within Table 2.1 and shown within Figure 2.2.

Icon	Descriptor	Location Description
①	Noise Measurement Position 1	The microphone was installed on the roof terrace of 35 King Street, as shown in Figure 2.2. The microphone was positioned in free-field conditions at least 3 metres from the nearest surface.
	Receptor 1	3 rd floor windows of 37 King Street, office receptor.
	Receptor 2	Upper floor windows of commercial properties opposite proposed development (50-56 King Street)
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement position and description

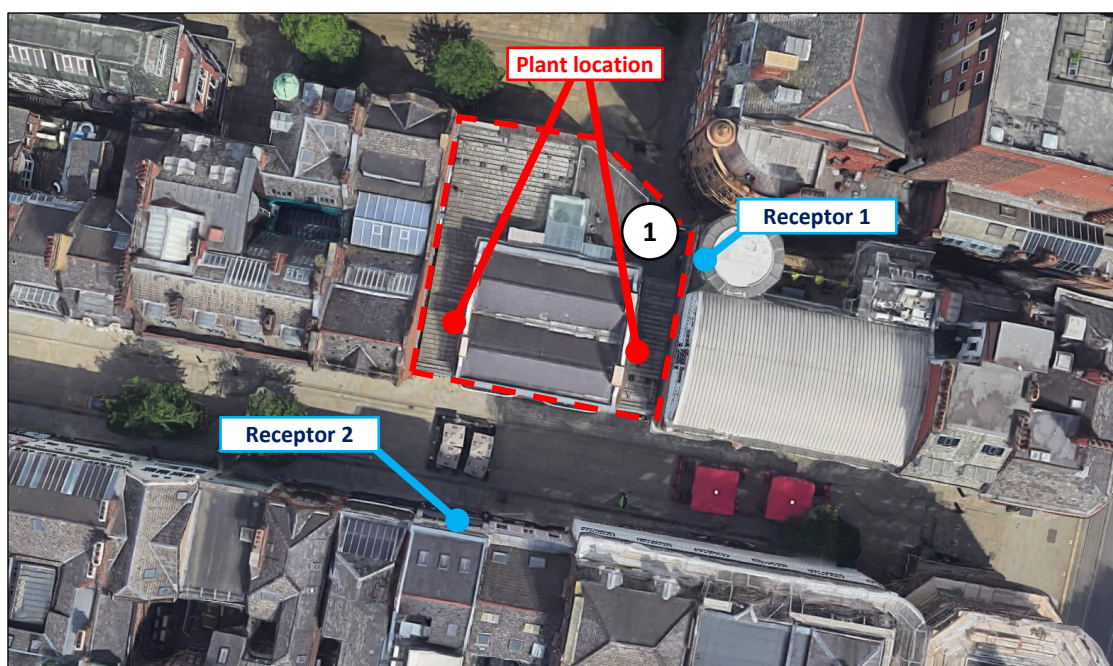


Figure 2.1 Site measurement positions (Image Source: Google Maps)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and the proposed plant installation.

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 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 34	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21069-E0	04/08/22	UK-22-077
	Free-field microphone NTI Acoustics MC230A	A23544		
	Preamp NTI Acoustics MA220	11020		
	NTI Audio External Weatherproof Shroud	-	-	-
Larson Davis CAL200 Class 1 Calibrator		8932	19/07/23	UCRT23/1949

Table 2.2 Measurement instrumentation

3.0 RESULTS

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 a time history in Figure 27580.TH1.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5 \text{ min}}$ levels measured during the environmental noise survey undertaken on site, as shown in 27580.DaytimeL90.TH1 and 27580.Night-timeL90.TH1.

Time Period	Representative background noise level L_{A90} dB(A)
Daytime (07:00-23:00)	53
Night-time (23:00-07:00)	43

Table 3.1 Representative background noise levels

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Local Authority Guidance

The guidance provided by Manchester City Council for noise emissions of new plant in this instance is as follows:

“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location”

4.2 BS4142: 2014 ‘Methods for rating and assessing industrial and commercial sound’

British Standard BS4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an L_{A90} when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq, Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – ‘For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible’
- **Impulsivity** – ‘A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for

impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible'

- **Intermittency** – *'If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*
- **Other sound characteristics** – *'Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the proposed plant installation is comprised of the following units:

- 1 No. Condenser (model not yet selected)
- 1 No. Extraction Fan (model not yet selected)

The proposed installation location for the proposed plant will be at 3rd floor level on either side of 35 King Street, as shown in Figure 2.2 above. At this stage it is understood the

condenser will be located on the western side of the building, and the extract fan will be located on the eastern side.

5.2 Plant Noise Emission Limit

With consideration for the requirements of Manchester City Council and based upon the representative background sound level measured at the site, the following plant noise emission limit would apply at the nearest noise sensitive receptors.

Period	Representative Background Sound Level	Plant Noise Emission Limit at the Nearest Receptor
Daytime (07:00-23:00)	53 dB L _{A90,5min}	48 dB L _{A,r,1h}

Table 5.1 Predicted noise level and criterion at nearest noise sensitive location

NB: As the nearest noise sensitive receptors are commercial, with no residential receptors within line of sight of the proposed plant, only daytime limits have been considered.

5.3 Limiting Sound Power Levels (Indicative)

The overriding design criteria is for all plant to comply with the plant noise emission limit in Table 5.1, at the nearest receptor. To assist with the selection of individual plant items, indicative limiting sound power levels for individual plant items are provided below for reference only:

- Condenser – 78 dBA L_w
- Extract Fan – 74 dBA L_w radiating sound power level (including directivity)

The above shall be subject to detailed review once the location and selection of all plant items has been finalised.

6.0 NOISE CONTROL MEASURES

The overriding design criteria is for all plant to comply with the cumulative plant noise emission limit in Table 5.1, at the nearest receptor. Provided this limit is achieved cumulatively by all plant, any noise control scheme would be considered acceptable.

To assist with the selection of individual plant items, initial guidance is provided on indicative limiting sound power levels for individual plant items below.

6.1 Kitchen Extraction System

In order to comply with the noise emission limit at the nearest receptor, it is likely that the radiating sound power level from the extract system duct termination point (including corrections for directivity) would need to be limited to around **74 dBA (L_w)**.

The above limit should not be significantly restrictive and should be readily achievable with typical fan selections and attenuation measures.

The above would be subject to the final location of any duct termination point and should be used for guidance only.

6.2 Condenser Unit

In order to comply with the noise emission limit at the nearest receptor, it is likely that the sound power level from the single (1No) proposed condenser would need to be limited to around **78 dBA (L_w)**.

The above limit should be readily achievable by most smaller condenser units, but larger condenser units may need additional attenuation packages to achieve the above.

Should more than one condenser be proposed, the limiting sound power level for each individual unit should be reduced accordingly:

- 2No units – Reduce by 3 dB (75 dBA L_w)
- 3No units – Reduce by 5 dB (73 dBA L_w)
- 4No units – Reduce by 6 dB (72 dBA L_w)

The above would be subject to the final location of the plant and should be used for guidance only.

6.3 Anti-Vibration Mounting Strategy

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Guidance on suitable measures can be provided once plant selections have been made.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 35 King Street, Manchester M2 7AT, by KP Acoustics Ltd between 11:00 on 20/11/2023 and 11:00 on 22/11/2023. The results of the survey have enabled criteria to be set for noise emissions.

Indicative limits have been set for individual plant items to enable selections to be made. These limits are for guidance only and would be subject to review once selected.

It has been concluded that the noise emissions limit from the proposed plant should be readily achievable provided the plant is appropriately designed and selected.

35 King Street, Manchester - Position 1
Environmental Time History
20/11/2023 to 22/11/2023

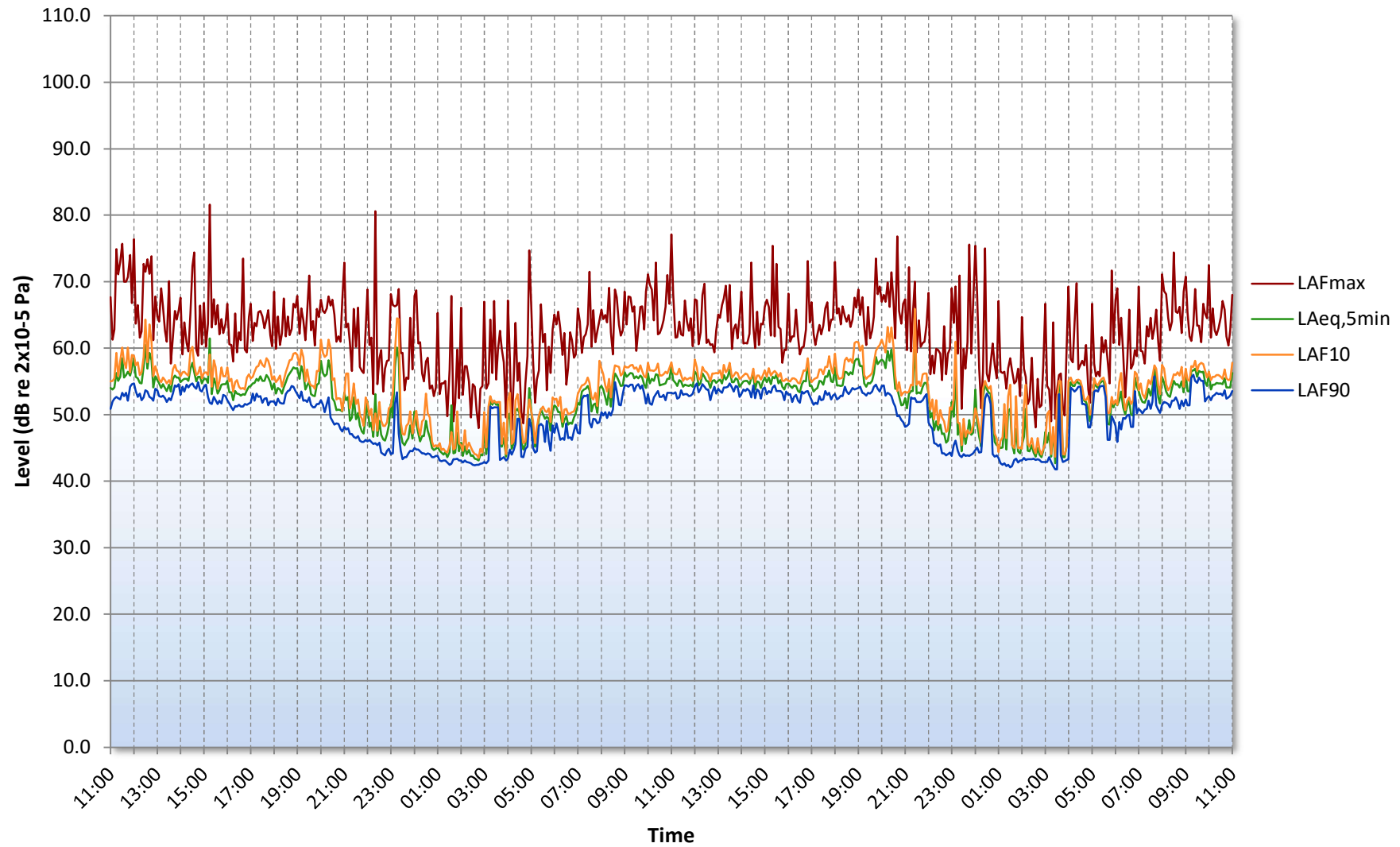


Figure 27580.TH1

35 King Street, Manchester - Position 1
Representative Daytime Background Noise Level
20/11/2023 to 22/11/2023

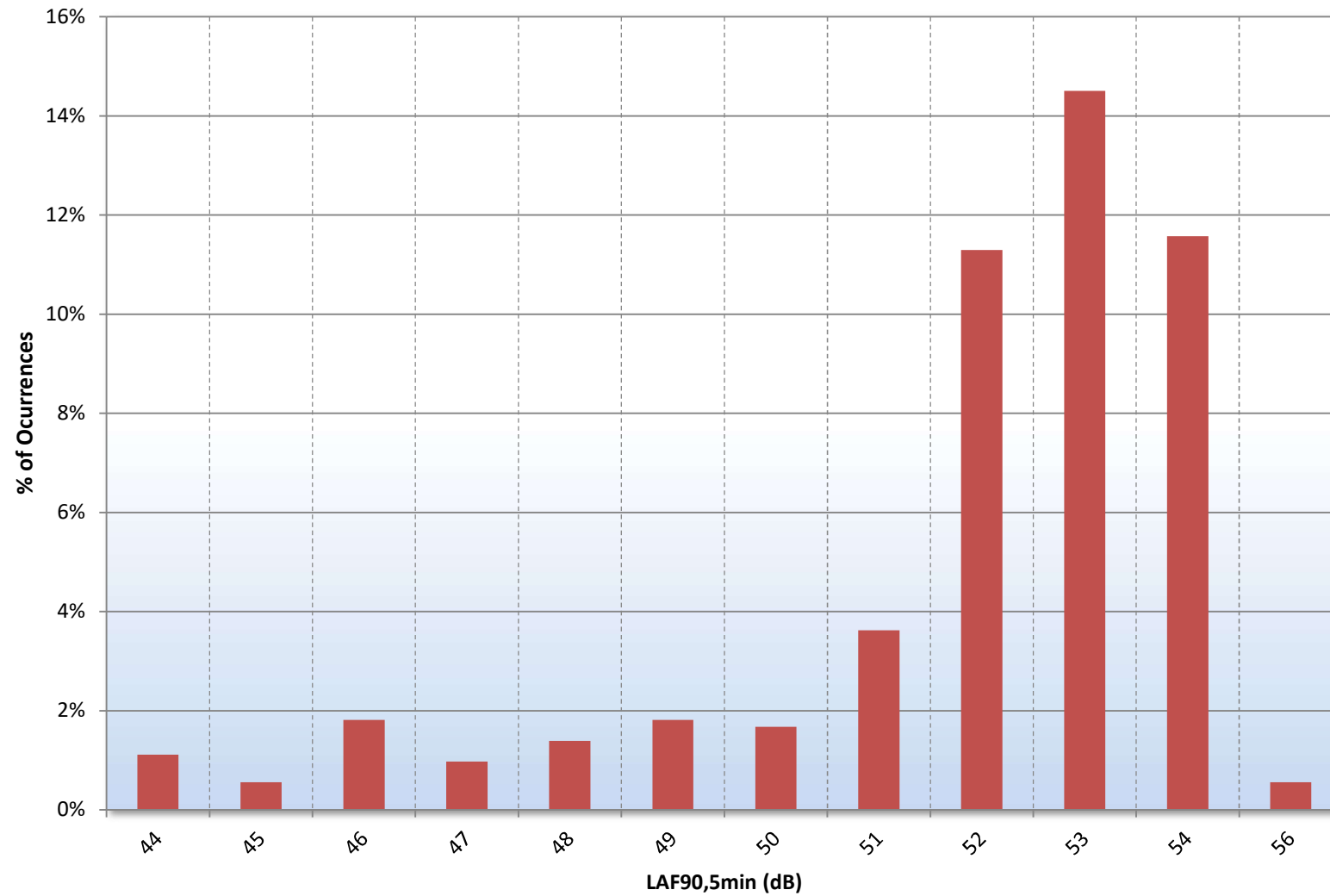


Figure 27580.Daytime L90.TH1

35 King Street, Manchester - Position 1
Representative Night-time Background Noise Level
20/11/2023 to 22/11/2023

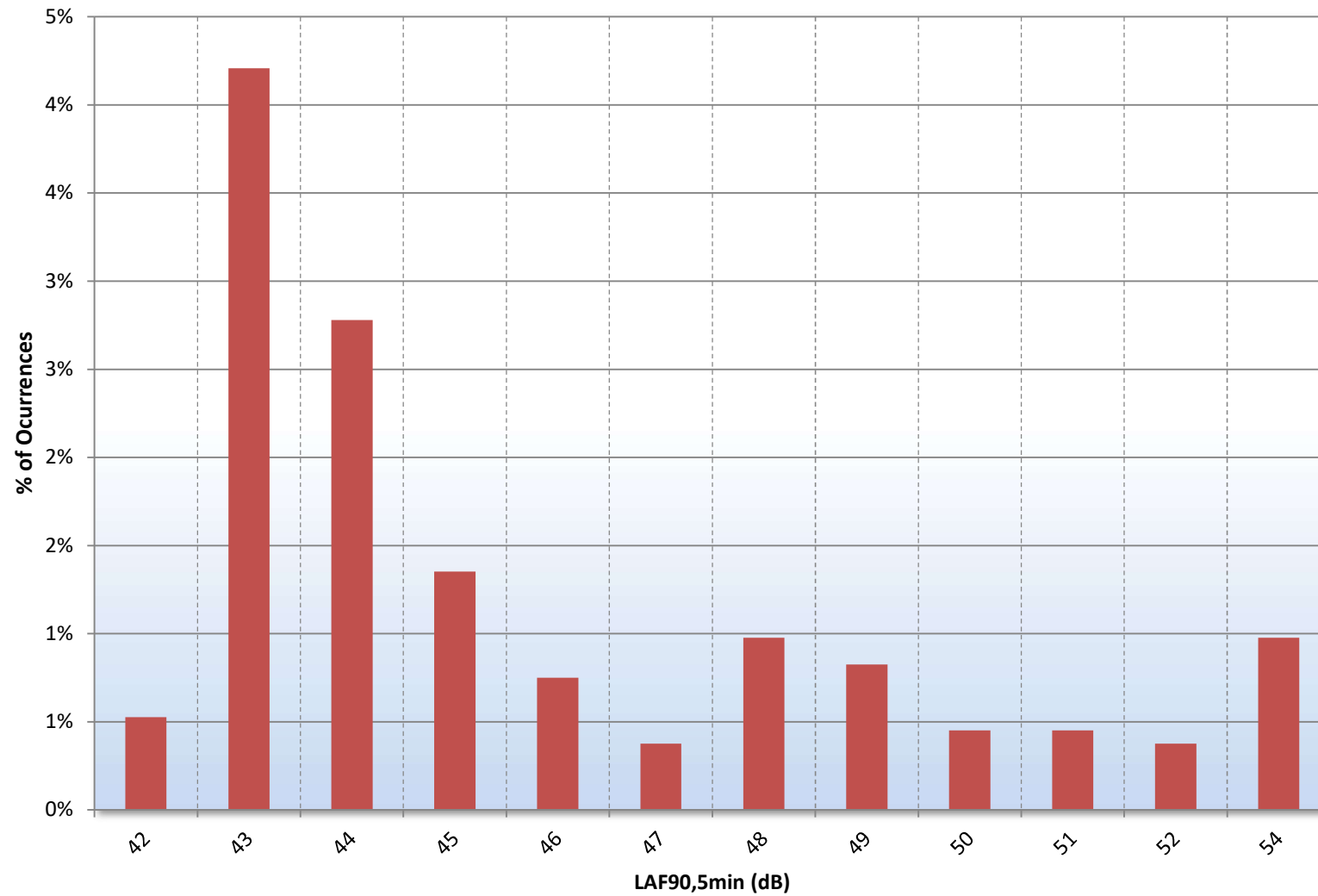


Figure 27580.Night-time L90.TH1

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.