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9 John Street
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Noise Impact Assessment Report
Report 27845.NIA.01 – Rev. C

GFZ Limited

<table>
<tr><th colspan="4">Report 27845.NIA.01
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Appendix A Glossary of Acoustics Terminology

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by GFZ Limited, to assess the suitability of the site at 9 John Street, Camden, London, WC1N 2ES for a residential development in accordance with the provisions of the National Planning Policy Framework and the Noise Policy Statement for England (NPSE).

This report presents the results of internal noise surveys undertaken in order to measure the current internal noise climate for compliance with current guidance, and presents the results of the external environmental surveys undertaken in order to measure the prevailing background noise levels and outlines any necessary mitigation measures.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by Northington Street, commercial and residential properties to the north, John Street, commercial and residential properties to the west, residential properties to the south, and residential properties and gardens to the east. Entrance to the site is located at John Street. At the time of the survey, the background noise climate was dominated by road traffic noise from surrounding roads.

The site location plan is shown in in Figure 2.1 below.

Figure 2.1 Site location plan (Image Source: Google Maps)

2.2 Internal Noise Survey Procedure

Noise surveys were undertaken within internal areas of the building in order to assess worst-case levels with the current external building fabric configuration.

Continuous automated monitoring was undertaken for the duration of the survey between 12:30 on 19/01/2023 and 21:00 on 22/01/2023.

Microphones installed internally were positioned within the diffuse field of the room, ensuring the microphone was at least 1.5m from any reflective surface. Noise measurement positions are detailed in Table 2.1 and shown in Figure 2.1.

2.3 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.

Continuous automated monitoring was undertaken for the duration of the survey between 12:30 on 19/01/2023 and 21:00 on 22/01/2023.

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*'.

Measurement positions are as described within Table 2.1 and shown within Figures 2.2 and 2.3.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a window on the 2nd floor of the west façade, as shown in Figure 2.2. The microphone was positioned within 1.5 metres from the nearest surface, and therefore a correction of 3dB has been considered.
2	Noise Measurement Position 2	The microphone was installed on a window on the 1st floor of the south façade, as shown in Figure 2.2. The microphone was positioned within 1.5 metres from the nearest surface, and therefore a correction of 3dB has been considered.
A	Internal Noise Measurement Position A	Located on the 1st floor of the building within a room on the west façade. The microphone was installed on a tripod at a distance of 1.5m from the window on the external façade and 1.5m above ground floor.

Icon	Descriptor	Location Description
B	Internal Noise Measurement Position B	Located on the 1st floor of the building within a room on the east facade. The microphone was installed on a tripod at a distance of 1.5m from the window on the external façade and 1.5m above ground floor.

Table 2.1 Measurement positions and descriptions

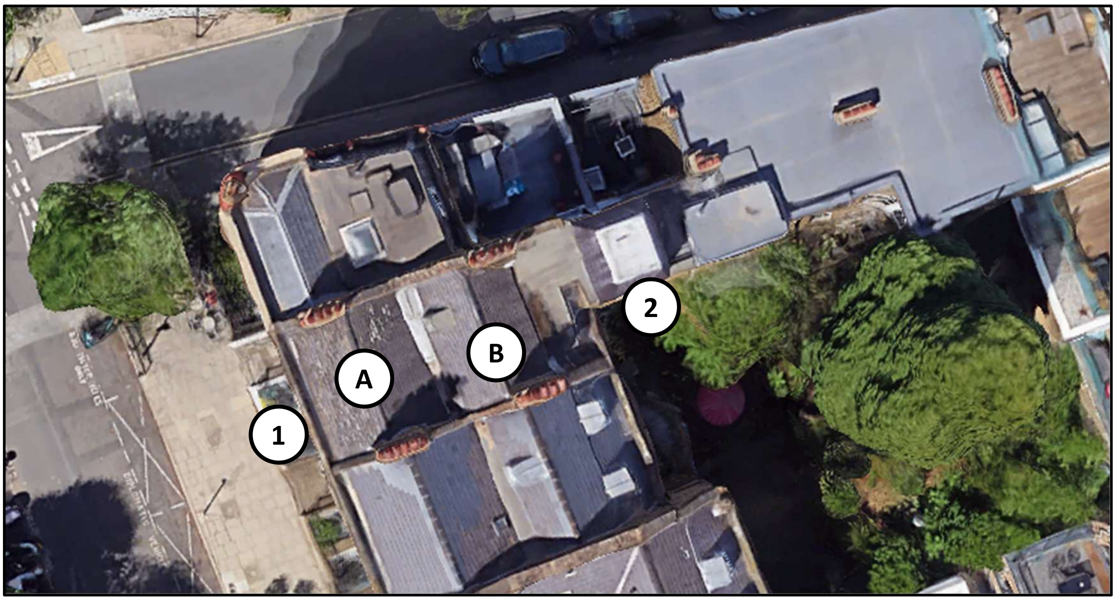

Figure 2.2 Site measurement positions (Image Source: Google Maps)

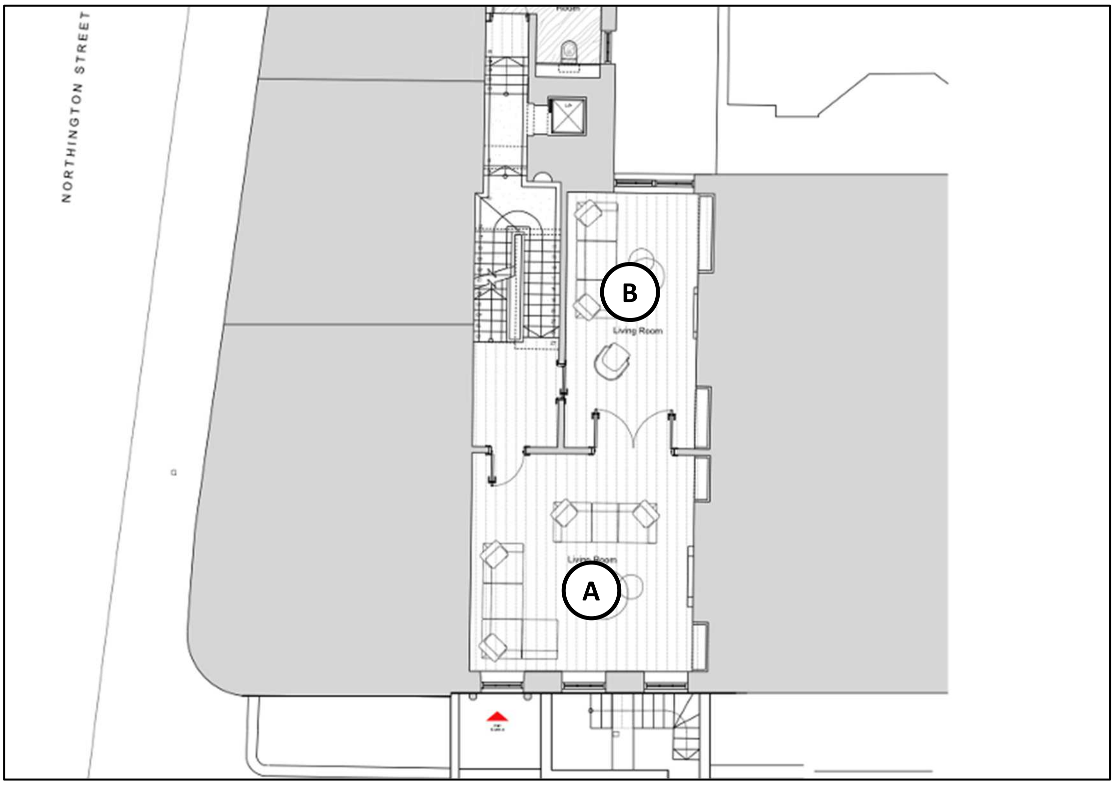

Figure 2.3 Internal measurement positions relative to the proposed plan (Image Source: Studio Three Architects)

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.

<table>
<tr><th colspan="2">Measurement instrumentation</th><th>Serial no.</th><th>Date</th><th>Cert no.</th></tr>
<tr><td rowspan="4">Noise Kit 21</td><td>NTI Audio XL2 Class 1 Sound Level Meter</td><td>A2A-21099-E0</td><td rowspan="3">21/07/2022</td><td rowspan="3">UK-22-064</td></tr>
<tr><td>Free-field microphone NTI Acoustics MC230A</td><td>A23571</td></tr>
<tr><td>Preamp NTI Acoustics MA220</td><td>10996</td></tr>
<tr><td>NTI Audio External Weatherproof Shroud</td><td>-</td><td>-</td><td>-</td></tr>
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<tr><td>Free-field microphone NTI Acoustics MC230A</td><td>A25833</td></tr>
<tr><td>Preamp NTI Acoustics MA220</td><td>13818</td></tr>
<tr><td>NTI Audio External Weatherproof Shroud</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">B&K Type 4231 Class 1 Calibrator</td><td>2147411</td><td>05/06/2023</td><td>UCRT23/1739</td></tr>
</table>

Table 2.2 Measurement instrumentation

3.0 RESULTS

3.1 Internal Noise Surveys

The $L_{Aeq:\ 5min}$ and $L_{Amax:\ 5min}$ acoustic parameters were measured throughout the duration of the internal noise surveys. Measured levels are shown as time histories in Figures 27846.TH1-2 for internal monitoring positions A and B respectively.

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

Time Period	Internal Noise Measurement Position A (Measured Noise level – dBA)	Internal Noise Measurement Position B (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	37	33
Night-time $L_{Aeq,8hour}$	33	26

Table 3.1 Current internal average noise levels for daytime and night time

3.2 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 27846.TH3-4.

Measured noise levels are representative of noise exposure levels expected to be experienced by the all facades of the proposed development, and are shown in Table 3.2.

Time Period	External Noise Measurement Position 1 (Measured Noise level – dBA)	External Noise Measurement Position 2 (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	58	50
Night-time $L_{Aeq,8hour}$	54	48

Table 3.2 Site average noise levels for daytime and night time

Please note that external measurement positions were 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 Noise Policy Statement for England 2024

The National Planning Policy Framework (NPPF) has superseded and replaces Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England. Paragraph 180 of NPPF 2024 states that planning policies and decisions should aim to:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

In addition, Paragraph 191 of the NPPF states that '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should':*

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the aim to 'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

Noise Policy Statement England (NPSE) noise policy aims are as follows:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- NOEL – No Observed Effect Level
    - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level
    - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
    - This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

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

It should be noted that the recommended internal noise levels outlined above are not applicable under "purge ventilation" conditions as defined by Approved Document F of the Building Regulations, as this should only occur occasionally (e.g. to remove odour from painting or burnt food). However, the levels above should be achieved whilst providing sufficient background ventilation, either via passive or mechanical methods.

4.3 WHO Guidelines for Community Noise (1999)

WHO Guidelines for Community Noise (1999) recommends that internal noise levels for individual events should not exceed 45dB L_{Amax} more than 10-15 times per night.

It should be noted that this impact is increasingly being regarded as 'LOAEL' for this number of exceedances, as described in Section 4.1.

The external building fabric would need to be carefully designed to ensure that the above guidance is achieved.

5.0 DISCUSSION

As shown in Table 3.1, noise levels measured internally of the rear façade of the property are fully commensurate with the design criteria, as per the guidance of BS8233:2014. If the surrounding area were to remain unchanged, the existing external building fabric towards the rear elevation would be sufficient in controlling external noise intrusion from surrounding commercial sources and would provide a suitable residential environment.

As shown in Table 3.1, noise levels measured internally in rooms at the front façade of the property exceed the design criteria, and the maximum noise levels recommended within BS8233:2014. Therefore, in order to ensure that the development is suitable for residential use, the existing glazed external building fabric should be upgraded as outlined within Section 6.0.

6.0 GLAZED EXTERNAL BUILDING FABRIC SPECIFICATION

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.

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	
Front Elevation	27	26	33	39	39	47	36 (-1;3)

Table 6.1 Required glazing performance

As changes to the external building fabric cannot be made at the John Street elevation, the existing windows would need to be 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 a secondary glazing system is installed at John Street elevation, 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)

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.

7.0 VENTILATION AND OVERHEATING

7.1 Ventilation Strategy

Based on the noise levels measured on site, appropriate ventilation systems are outlined in Table 7.1 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 36dB $D_{,n,e,w}$ at John Street elevation	Intermittent extract fans
ADF System 3	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 36dB $D_{,n,e,w}$ at John Street elevation	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 7.1 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 7.2.

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

Table 7.2 CIBSE Guide A 2015 guidance levels for mechanical building services

In all cases, purge ventilation would be provided by openable windows. As outlined in Section 4.2, the internal noise level requirement would not be applicable during purge conditions as this would only occur occasionally.

8.0 CONCLUSION

Internal noise surveys and external environmental noise surveys have been undertaken at 9 John Street, Camden, London, allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Noise levels measured internally along the rear elevation demonstrate that the existing external building fabric would be sufficient in providing internal noise levels commensurate to the design criteria of BS8233:2014. Therefore, no further mitigation measures will be required at the rear elevation. However, noise levels measured internally along John Street elevation demonstrate that the existing external building fabric would be insufficient in providing internal noise levels commensurate to the design criteria of BS8233:2014. Therefore, 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.

No further mitigation measures should be required in order to protect the proposed habitable spaces from external noise intrusion.

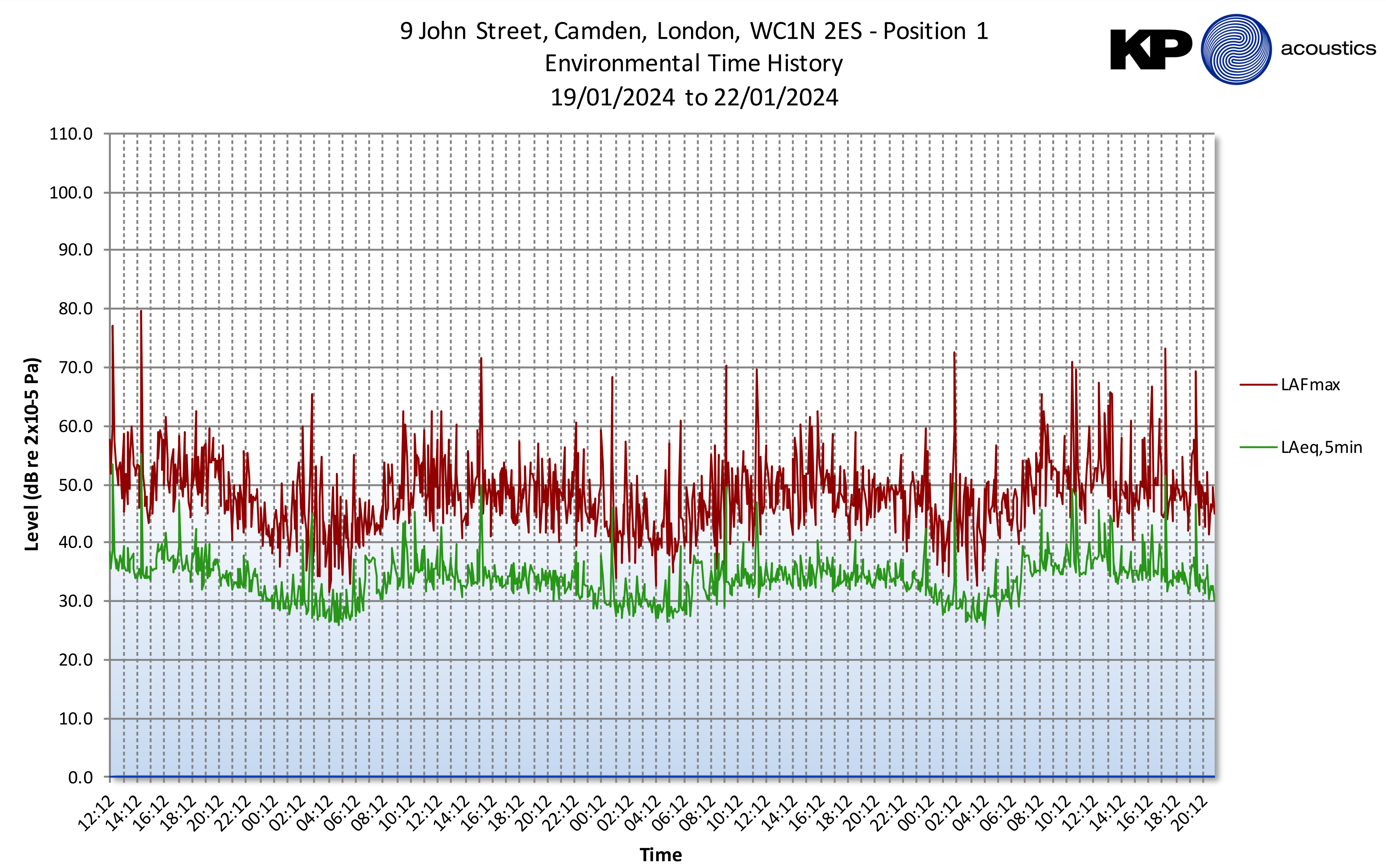

Figure 27845.TH1

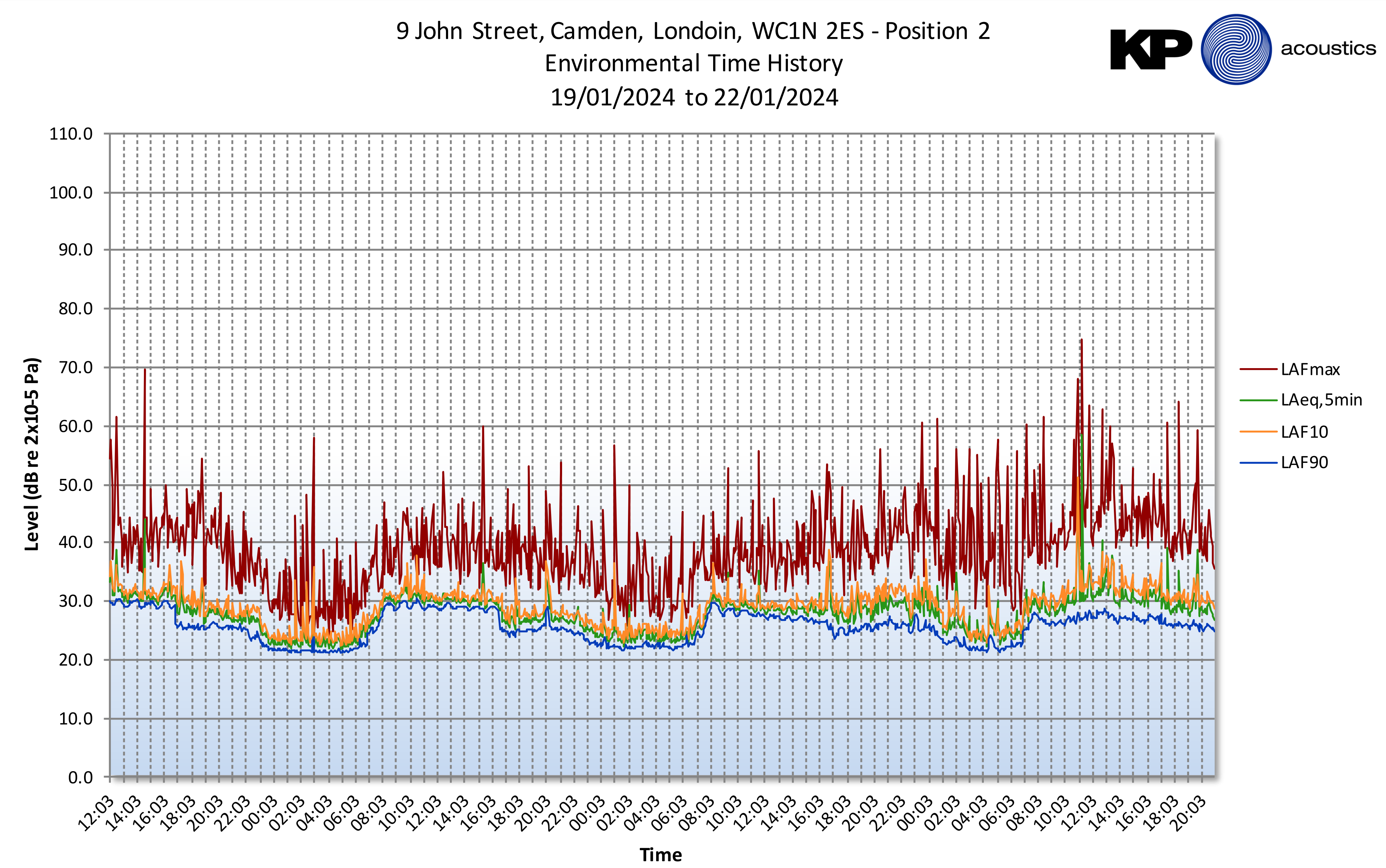

Figure 27846.TH2

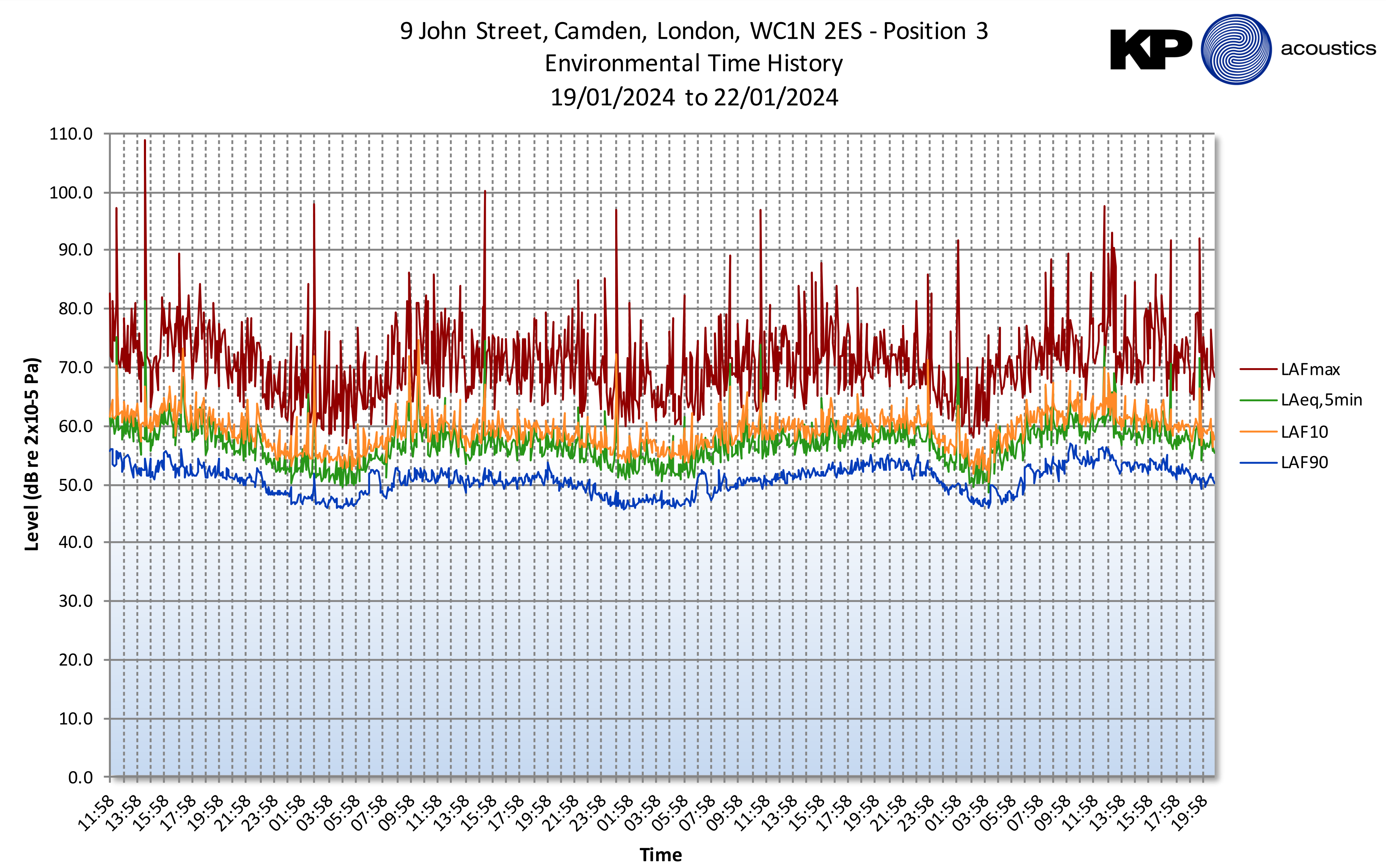

Figure 27845.TH3

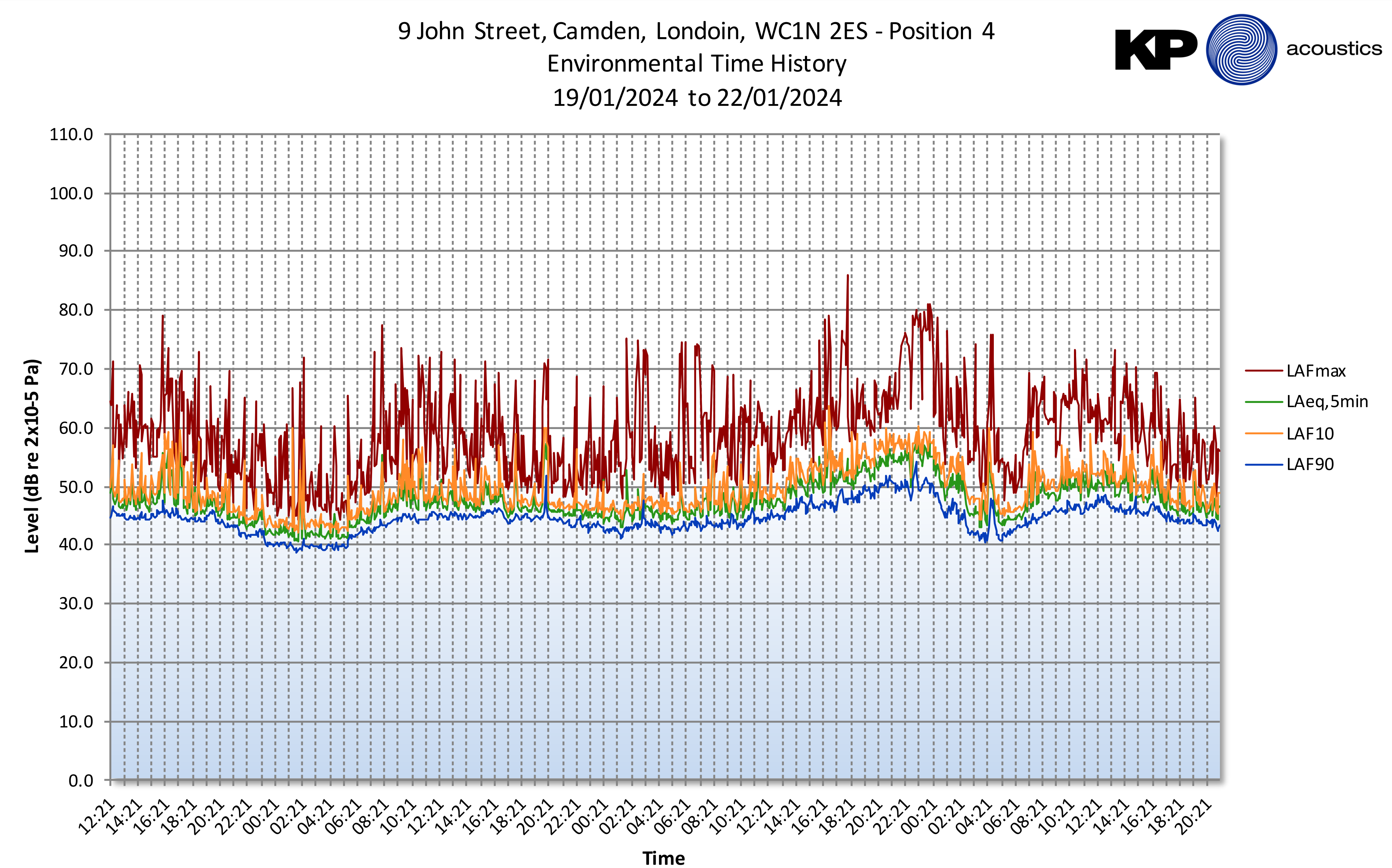

Figure 27846.TH4

APPENDIX A

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*.

APPENDIX A

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.