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Haydon House
296 Joel Street, Pinner

Noise Impact Assessment Report
Report 24451.NIA.01 Rev A

Hyde Park Construction Ltd
1st Floor
4 Longwalk
Stockley Park UB11 1FE

Report 24451.NIA.01 Revision History			
First Issue Date: 29/04/2022			
A	22/09/2022 – Revisions made to the report further to comments received by the Local Planning Authority. Assessment of internal noise levels undertaken, further to an additional internal noise survey.	D	
B		E	
C		F	

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1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Hyde Park Construction Ltd, 1st Floor, 4 Longwalk, Stockley Park, UB11 1FE to assess the suitability of the site at Haydon House, 296 Joel Street, HA5 2PY 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 the environmental survey undertaken in order to measure prevailing background noise levels and outlines any necessary mitigation measures.

An additional internal noise survey has been undertaken to verify existing noise levels for comparison against current guidance, as the building has now been vacated by the previous tenants.

A visual inspection was undertaken on site to confirm whether or not there are any existing neighbouring commercial noise sources.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by Joel Street to the east, Deerings Drive to the south and residential properties to all other cardinal directions. At the time of the survey, the background noise climate was dominated by road traffic noise from Joel Street.

A visual inspection of the surrounding area was undertaken by walking around the building as well as on Google Street view to locate any nearby commercial premises. None were identified. The surrounding area is entirely residential with exception of Eastcote Cricket Club.

2.2 Internal Noise Survey Procedure

An internal noise survey was undertaken within the ground floor area 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 16/09/2022 and 00:00 on 18/09/2022.

The microphone installed internally was positioned within the diffuse field of the room, ensuring the microphone was at least 1.5m from any reflective surface. The noise measurement position is detailed in Table 2.1 and shown in Figure 2.1.

2.3 Environmental Noise Survey Procedure

An external noise survey was 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.

Continuous automated monitoring was undertaken for the duration of the survey between 12:00 on 27/04/2022 and 14:25 on 28/04/2022.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.4 Measurement Positions

Measurement positions are as described within Table 2.1 and shown within Figure 2.1.

Icon	Descriptor	Location Description
	External Noise Measurement Position 1	The external measurement microphone was installed on a tripod at least 2m away from any reflective surface. The measurement position was located overlooking Joel Street on the east elevation of the site.
	Internal Noise Measurement Position 1	Internal measurement position 1 was on the ground floor of the building within a room on the east elevation overlooking Joel Street. The microphone was installed on a tripod at a distance of 1.5m from the window of the external façade and positioned at 1.5m above ground floor.

Table 2.1 Measurement positions and description

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

2.5 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 3	Svantek Type 977 Class 1 Sound Level Meter	34104	23/03/2022	1502092-1
	Free-field microphone ACO 7052E	66830		
	Preamp Svantek SV12L	17293		
	Svantek External windshield	-	-	-
Noise Kit 32	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21098-E0	04/08/2022	UK-22-078
	Free-field microphone NTI Acoustics MC230A	A23535		
	Preamp NTI Acoustics MA220	11029		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	24/05/2022	UCRT22/1581

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 a time history in Figure 24451.TH1.

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

Time Period	Internal Noise Measurement Position 1 (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	40
Night-time $L_{Aeq,8hour}$	34

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

3.2 External Noise Survey

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 24451.TH2

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

Time Period	External Noise Measurement Position 1 (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	63
Night-time $L_{Aeq,8hour}$	58

Table 3.2 Site average noise levels for daytime and night time

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 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

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.

The external building fabric would need to be carefully designed to achieve these recommended internal levels.

5.0 DISCUSSION

As shown in Table 3.1, internally measured noise levels exceed the recommended noise levels outlined within BS8233:2014.

Therefore, in order to ensure that the development is suitable for residential use, the existing 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 and other design features such as the inclusion of trickle vents. 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	22	20	26	36	39	31	31 (-1, -4)

Table 6.1 Required glazing performance

As changes to the external building fabric cannot be made under permitted development rights, 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, 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.

7.0 CONCLUSION

An Internal noise survey and an environmental noise survey have been undertaken at Haydon House, 296 Joel Street, HA5 2PY allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Noise levels measured internally demonstrate that the existing external building fabric would be insufficient in providing internal noise levels commensurate to the design criteria of BS8233:2014.

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.

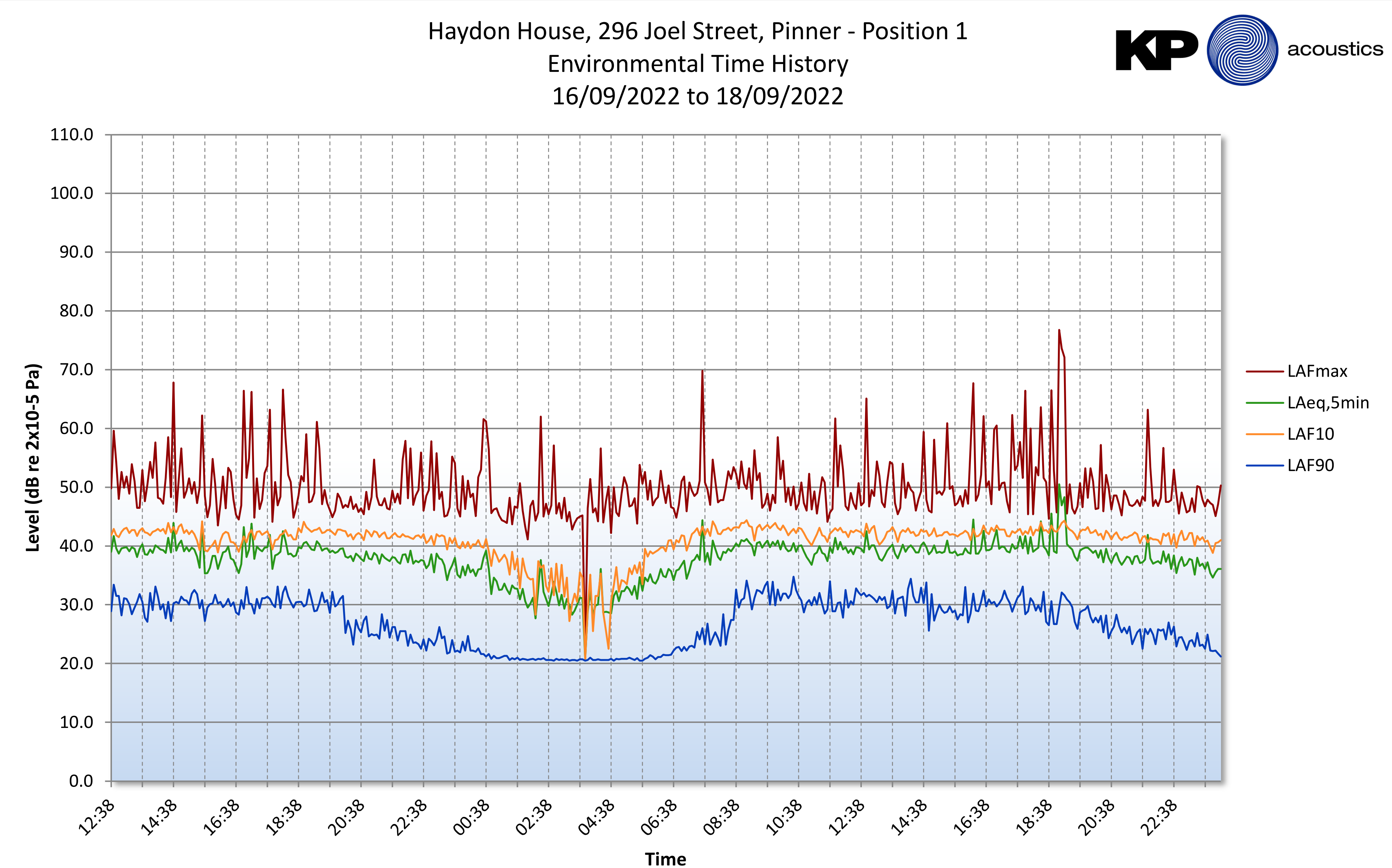

Figure 24451.TH1

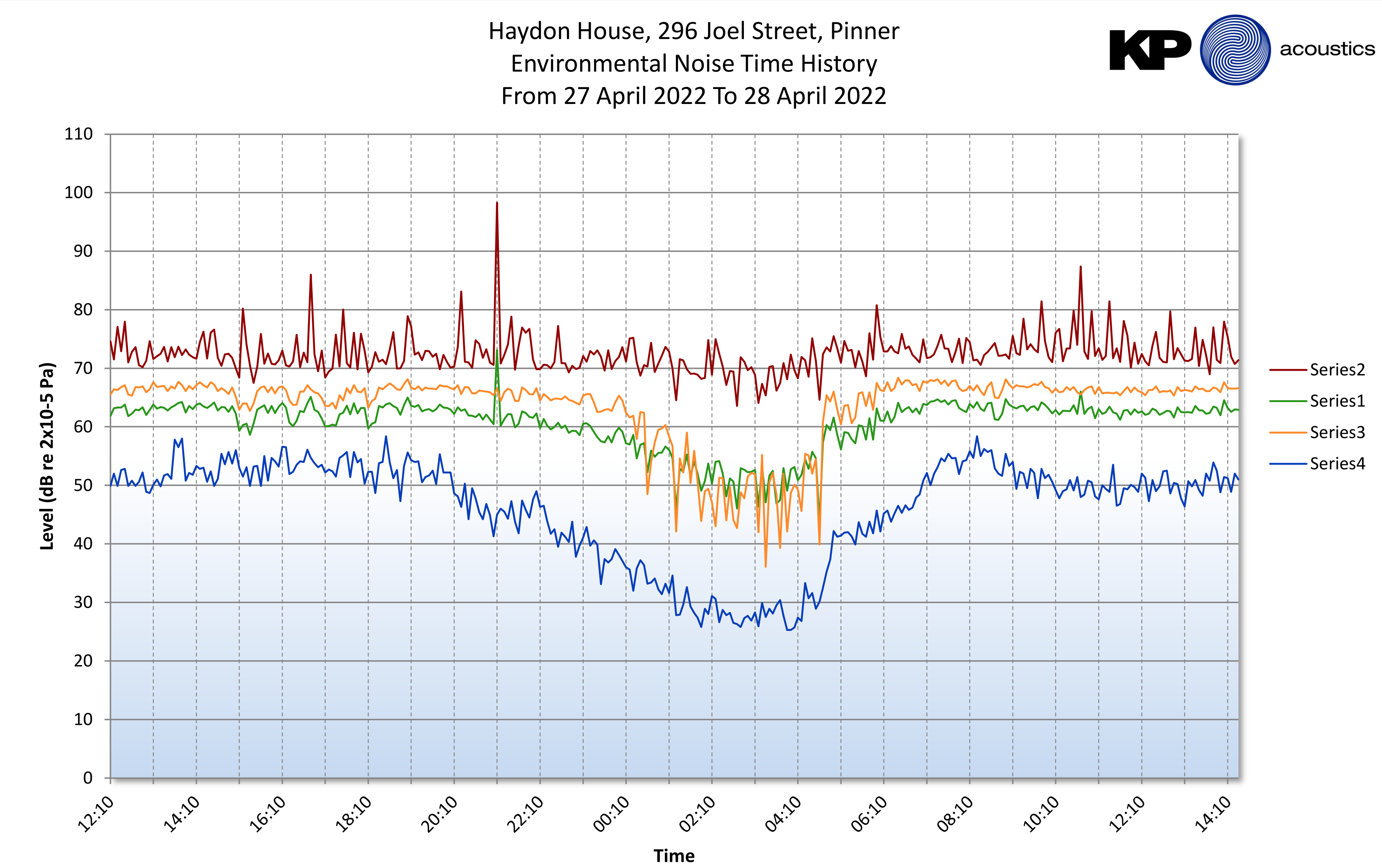

Figure 24451.TH2

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.