

Abbey Gardens Reading



Noise Impact Assessment Report
Report 28800.NIA.01 RevD

McGrath Group
36 Mount Street Upper
Dublin 2
D02 Y982

Report 28800.NIA.01			
Revision History			
First Issue Date: 20/12/2024			
A	06/03/2025 Discussion section now includes details of the noise from adjacent office space.	D	17/04/2025 Amendments to the proposed floor and wall build ups.
B	07/04/2025 Report updated as per revised scheme and to include assessment of breakthrough from office to residential through party walls and floors.	E	
C	08/04/2025 Minor typo in Para 2.2	F	
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1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by McGrath Group, 36 Mount Street Upper, Dublin 2, D02 Y982, to assess the suitability of the site at Abbey Gardens, Abbey Street, Reading RG1 3BA for a residential development in accordance with Permitted Development (PD) 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 internal and external noise surveys undertaken to measure the existing noise environment. The results of the survey have informed an assessment of commercial noise against PD requirements. A assessment of party walls between residential and commercial spaces has also been undertaken to protect the amenity of proposed residential spaces as per the requirements of Permitted Development.

2.0 SITE SURVEYS

2.1 Site Description

The site is bordered by a commercial office block to the north, Abbey Street to the west, Kings Road to the south, and River Kennet to the east. During set up and collection of the equipment, the background noise climate was dominated by road traffic noise from Kings Road.

During set up and collection of the equipment it was noted that all surrounding nearby buildings were offices, which were not deemed to be notable noise emitting premises. As such no commercial noise was audible from any surrounding premises.

The proposed development includes the retention of some office space within the building at all floors of the scheme.

2.2 Internal Noise Survey Procedure

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

Continuous automated monitoring was undertaken for the duration of the survey between 15:28 on 10/12/2024 and 11:07 on 12/12/2024.

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.

During set up and collection of the internal meters, the ambient noise environment was dominated by road traffic noise and building services noise from within the room in which the

meter was located. No internal noise was audible from office premises adjacent to the meter location. The noise emitting building services on the roofs of the north and central blocks will become redundant as part of the residential conversion. The plant in the south block will be retained to serve the commercial use but this is not considered to have an impact on the proposed residential use.

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 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 11:07 on 10/12/2024 and 15:28 on 12/12/2024.

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*'.

During set up and collection of the internal meters the ambient noise climate was dominated by road traffic.

2.4 Measurement Positions

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

Icon	Descriptor	Location Description
	Noise Measurement Position 1	The microphone was installed on a pole extending from the window on the 2 nd floor as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
	Noise Measurement Position 2	The microphone was installed on a pole extending from the window on the 4 th floor as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
	Internal Noise Measurement Position A	Located on the 1 st floor of the building within a room overlooking Kings Road. The microphone was installed on a tripod at a distance of 1.5m from the window on the external façade and positioned at 1.5m above ground floor

Icon	Descriptor	Location Description
	Internal Noise Measurement Position B	Located on the 3 rd floor of the building within a room overlooking Abbey Street. The microphone was installed on a tripod at a distance of 1.5m from the window on the external façade and positioned at 1.5m above ground floor

Table 2.1 Measurement positions and descriptions

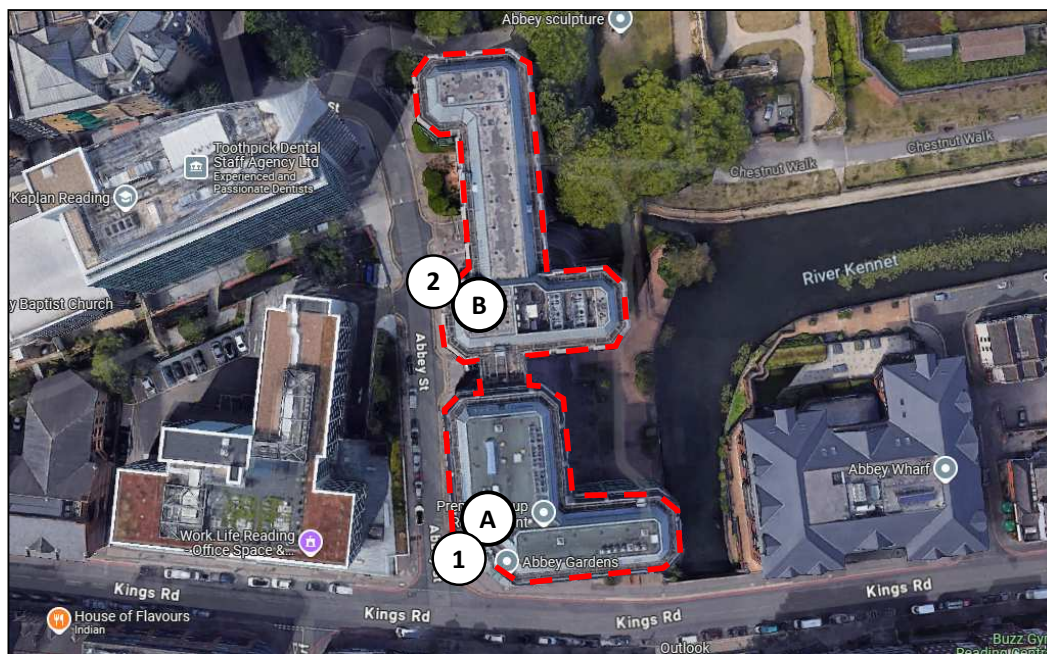


Figure 2.1 Site measurement positions (Image Source: Google Maps)

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 28	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21140-E0	23/05/2023	UK-23-063
	Free-field microphone NTI Acoustics MC230A	A23592		
	Preamp NTI Acoustics MA220	10981		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 29	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21175-E0	22/07/2024	TCRT24/1568
	Free-field microphone NTI Acoustics MC230A	A23073		
	Preamp NTI Acoustics MA220	11033		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 40	NTI Audio XL2 Class 1 Sound Level Meter	A2A-24279-E1	27/01/2024	UK-24-007
	Free-field microphone NTI Acoustics MC230A	A26879		
	Preamp NTI Acoustics MA220	14180		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 41	NTI Audio XL2 Class 1 Sound Level Meter	A2A-24074-E1	15/08/2024	TCRT24/1644
	Free-field microphone NTI Acoustics MC230A	A27960		
	Preamp NTI Acoustics MA220	14367		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	14/06/2024	UKAS24/06438

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 28800.THA-B for internal monitoring positions A and B respectively.

Measured noise levels are representative of noise exposure levels expected to be experienced in the facades most exposed to external ambient noise, and are shown in Table 3.1 and 3.2.

Time Period	Internal Noise Measurement Position A (Measured Noise level – dBA)	Internal Noise Measurement Position B (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	35	39
Night-time $L_{Aeq,8hour}$	31	33

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

Time Period	Internal Noise Measurement Position A (Measured Noise level – dBA)	Internal Noise Measurement Position B (Measured Noise level – dBA)
15 th Highest Night-time L_{Amax}	45	49

Table 3.2 Current internal 15th highest L_{max} noise levels for night time

The time history at internal position A shows a continuous L_{90} during the daytime period that sharply drops during the evening which is typical of building services noise within the internal spaces. This is assumed to be due to mechanical plant serving Abbey Gardens within the location the meter was installed, as there were no other obvious sources of services noise observed during set up and collection of the noise monitoring equipment. The noise emitting building services within residential spaces will be replaced/removed as part of the proposed development, and therefore are not be considered in the assessment of noise from commercial spaces in this report.

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 28800.TH1-2.

Measured noise levels are representative of noise exposure levels expected to be experienced by the facades most exposed to external ambient noise 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 $L_{Aeq,16\text{hour}}$	56	58
Night-time $L_{Aeq,8\text{hour}}$	51	53

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 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.

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

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 – EXTERNAL BUILDING FABRIC

The existing glazing is proposed to be retained. During the survey, no evidence was found of significant noise generated by nearby commercial sources that would affect the site's conversion to residential use under Permitted Development Rights, therefore no specific noise mitigation measures for the external building fabric related to commercial activity are required or should be enforced under permitted development rights.

The noise climate is largely dominated by transport sources such as road traffic. Assessments made on site concluded that noise produced from adjacent office spaces was insignificant.

Outcome: No specific external building fabric noise mitigation measures related to commercial activity are required or should be enforced under the requirements of Class MA under Permitted Development Rights.

Notwithstanding the above, with the existing glazing, noise levels measured from transport as shown in Table 3. are in exceedance of the limits recommended in BS8233:2014 for residential environments. While mitigation is not strictly required, we would recommend controlling the impact of road noise for future occupants by upgrading the existing glazing to provide appropriate sound insulation. A specification is outlined as an optional upgrade in Section 6.0.

6.0 GLAZED EXTERNAL BUILDING FABRIC SPECIFICATION – OPTIONAL

Since commercial noise sources were not found to impact our assessment in Section 5.0, no glazing upgrades are required under permitted development rights. However, we would recommend controlling noise from environmental sources by upgrading the glazing as outlined in this section.

Sound reduction performance calculations have been undertaken to specify the required performance from glazed elements 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	
All elevations	26	27	34	40	38	46	37(-1;-4)

Table 6.1 Required glazing performance

As changes to the external building fabric cannot be made under permitted development rights, typically 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, which would achieve the project requirements.

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 INTERNAL BUILDING FABRIC SPECIFICATION – COMMERCIAL-RESIDENTIAL

7.1 Overview

As part of the redevelopment, new residential spaces are proposed vertically and horizontally adjacent to office spaces. To protect the amenity of the new proposed residential spaces, an uplift of 10dB is proposed above The Building Regulations for all party walls and floors that separate residential habitable spaces and office/commercial space.

In order to satisfy the proposed 10dB uplift above the Building Regulations, the minimum sound insulation performance criteria as shown in Table 7.1 must be adhered to.

Element	Design Criteria – Dwelling-houses and Flats	
	Airborne	Impact
Commercial-Residential Wall	$D_{nT,w} + C_{tr} \geq 55 \text{ dB}$	N/A
Commercial-Residential Floor	$D_{nT,w} + C_{tr} \geq 55 \text{ dB}$	$L'_{nT,w} \leq 54 \text{ dB}$ (only required where commercial is above residential)

Table 7.1 Building regulations requirements for new-build party elements

7.2 Party Walls (Commercial to Residential)

It is understood that the proposed separating party walls will be “New, Double Studded Separating Walls as per Typical Robust Details”. So that they meet the proposed target, the following wall detail is recommended:

- 3No. layers 15mm dense plasterboard (Soundbloc or equivalent)
- Double stud forming minimum 300mm cavity between linings with 200mm mineral wool (min 45kg density)
- 3No. layers 15mm dense plasterboard (Soundbloc or equivalent)

The above wall is predicted to achieve the proposed target with good workmanship and details.

7.3 Party Floors (Commercial to Residential)

It is understood that the existing separating floors are 200mm RC (Retained) and 100mm Raised Service Floor. So that they meet the proposed target, the following floor detail is recommended:

- 200mm Reinforced Concrete Slab
- MF Ceiling forming 250mm minimum cavity with 200mm mineral wool
- 2No. layer 15mm dense plasterboard (Soundbloc or equivalent)

The above floor is predicted to achieve the proposed target with good workmanship and details.

Where offices are proposed above residential developments, a resilient layer is required such that an onsite performance of $L_{nT,w} \leq 54\text{dB}$ is achieved with the surface finish installed.

8.0 CONCLUSION

Internal noise surveys and environmental noise surveys have been undertaken at Abbey Gardens, Abbey Street, Reading RG1 3BA allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

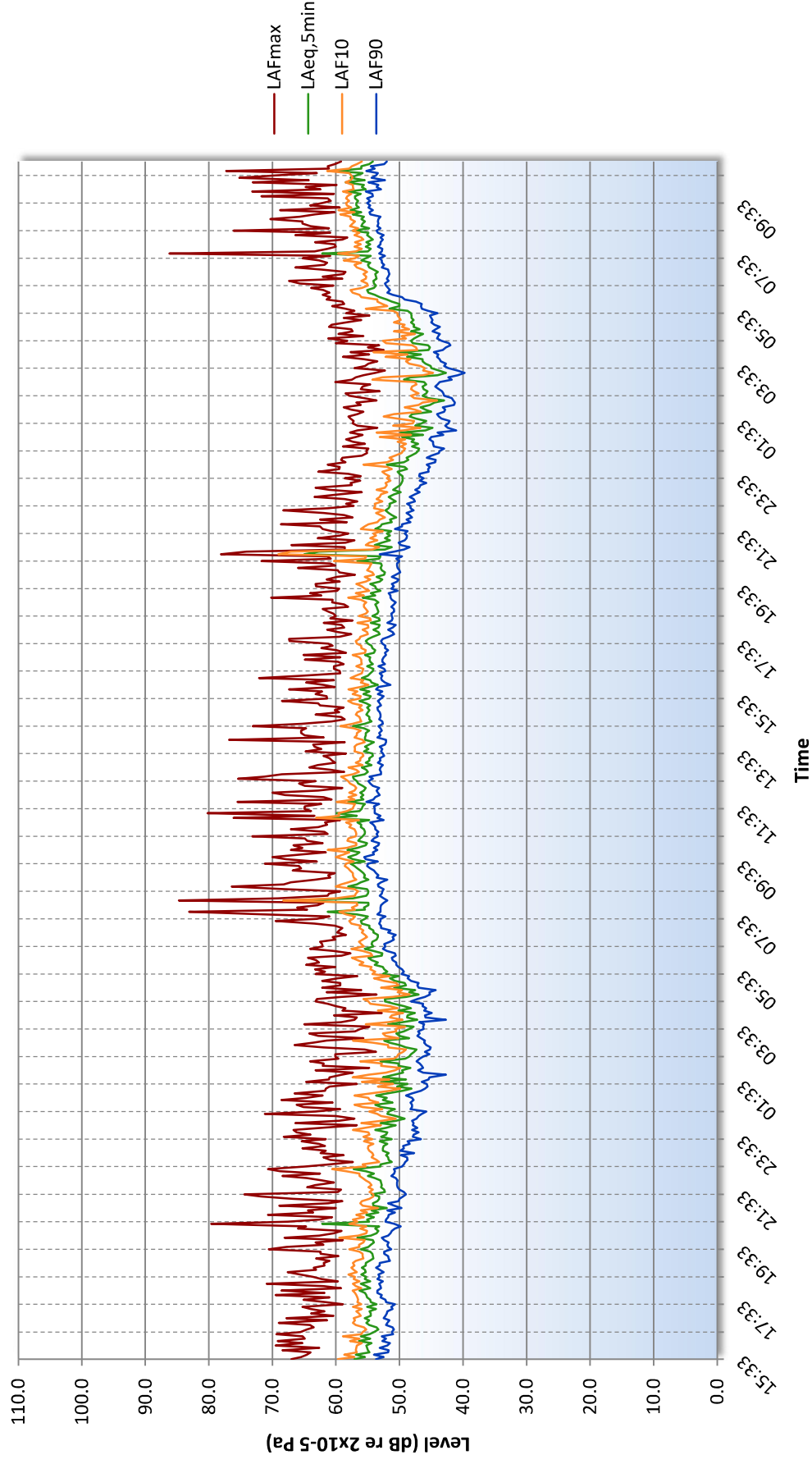
The noise assessment has demonstrated that there should be no unacceptable impacts from noise generated by nearby commercial uses on the intended occupiers of the residential development, satisfying the requirements of Class MA under Permitted Development Rights without the need for external building fabric mitigation measures.

Measured noise levels allowed a robust glazing specification to be proposed, which could be installed at discretion of the client, which would provide internal noise levels for all residential environments of the development commensurate to the design range of BS8233:2014.

While mitigation measures have been recommended to protect the proposed habitable spaces from external noise intrusion, it is important to note that these measures are not strictly required under permitted development (PD) rights. However, implementing the suggested upgrades would improve the overall living environment and ensure compliance with the recommended internal noise levels for residential use.

Mitigation measures have been proposed for the internal building fabric which, should they be installed, would suitably protect the amenity of proposed habitable spaces from adjacent commercial/office space.

Abbey Gardens, Reading - Position 1
Environmental Time History
10/12/2024 to 12/12/2024



Abbey Gardens, Reading - Position 2
Environmental Time History
10/12/2024 to 12/12/2024

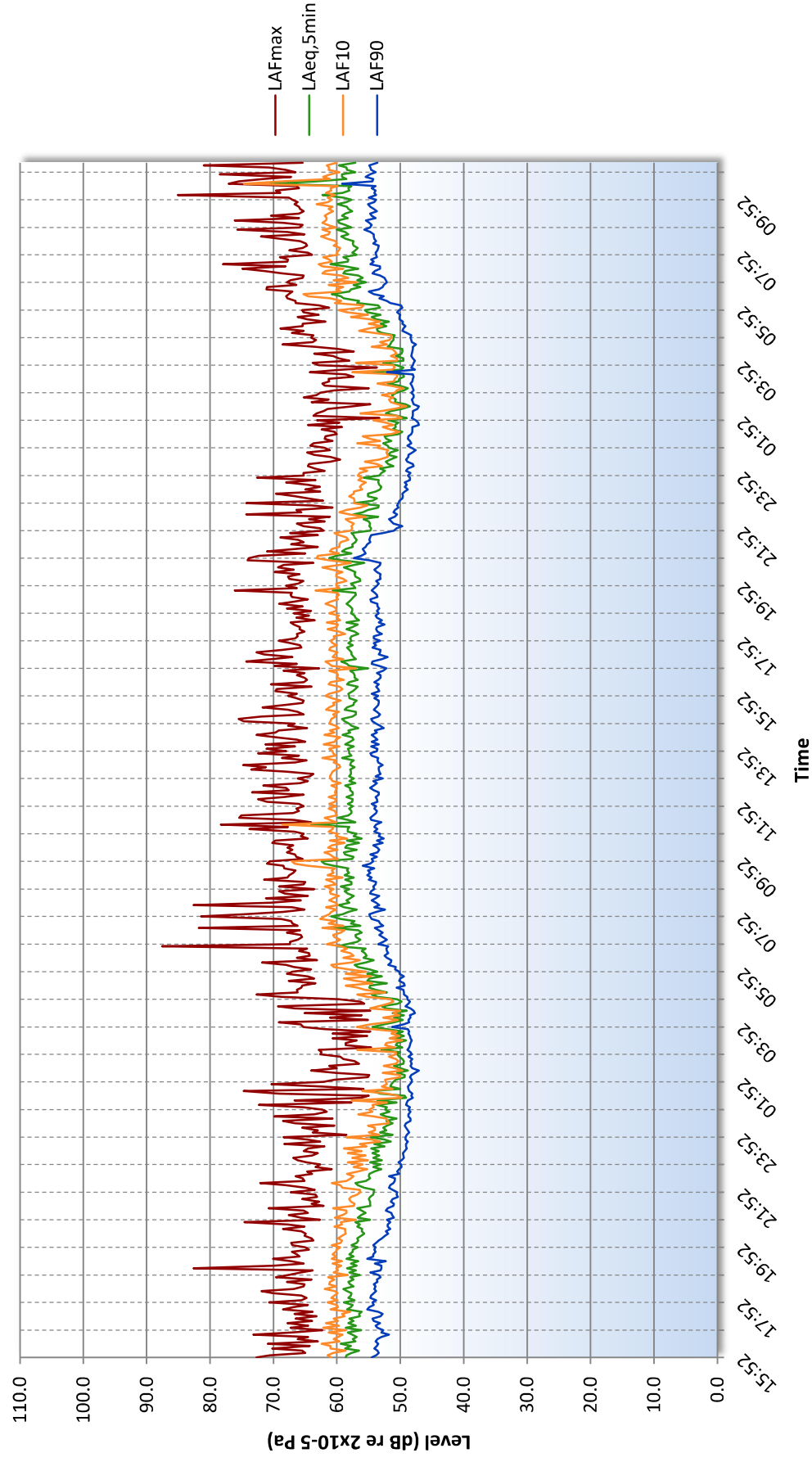


Figure 28800.TH2

Abbey Gardens, Reading - Position A
Environmental Time History
10/12/2024 to 12/12/2024

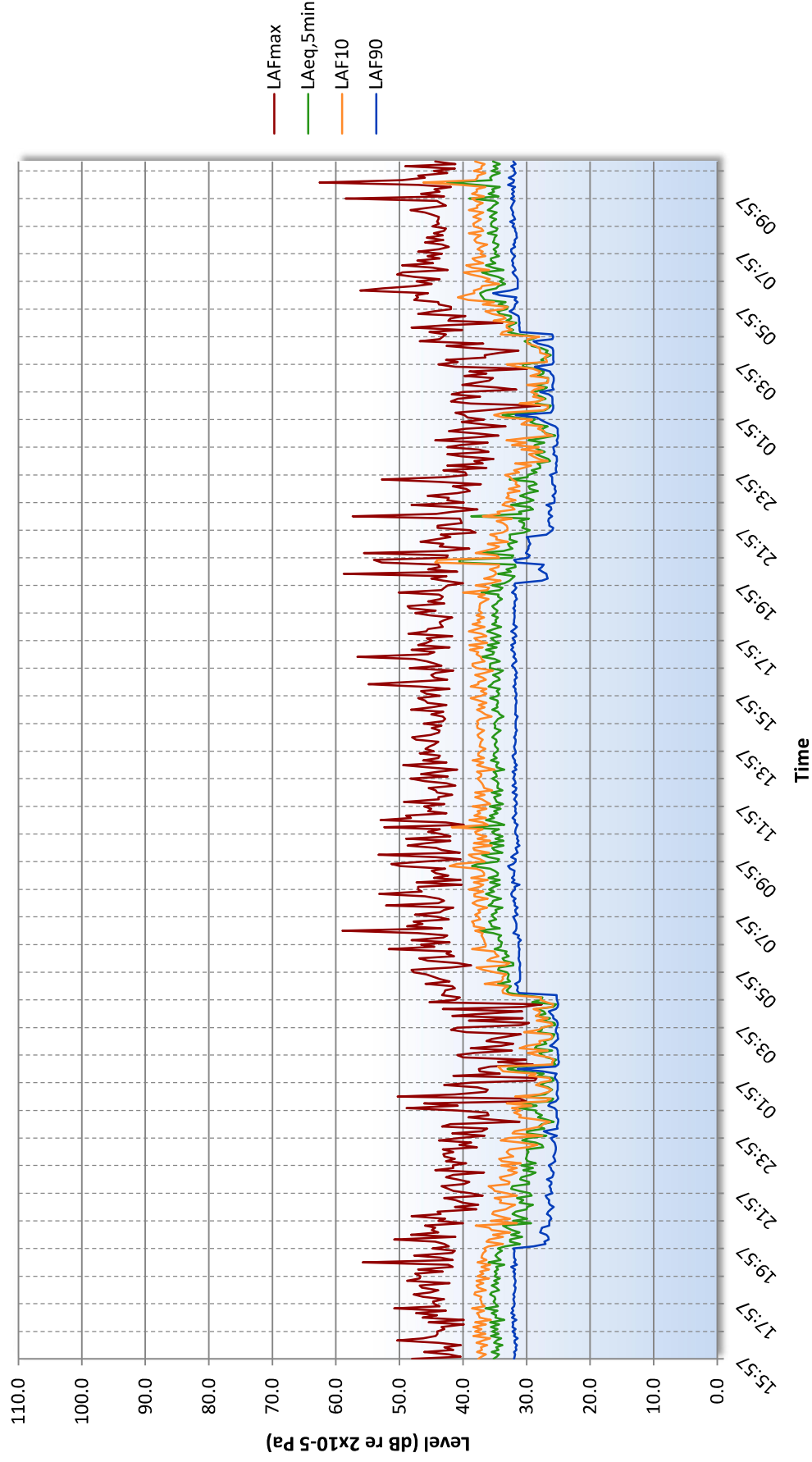


Figure 28800.THA

Abbey Gardens, Reading - Position B
Environmental Time History
10/12/2024 to 12/12/2024

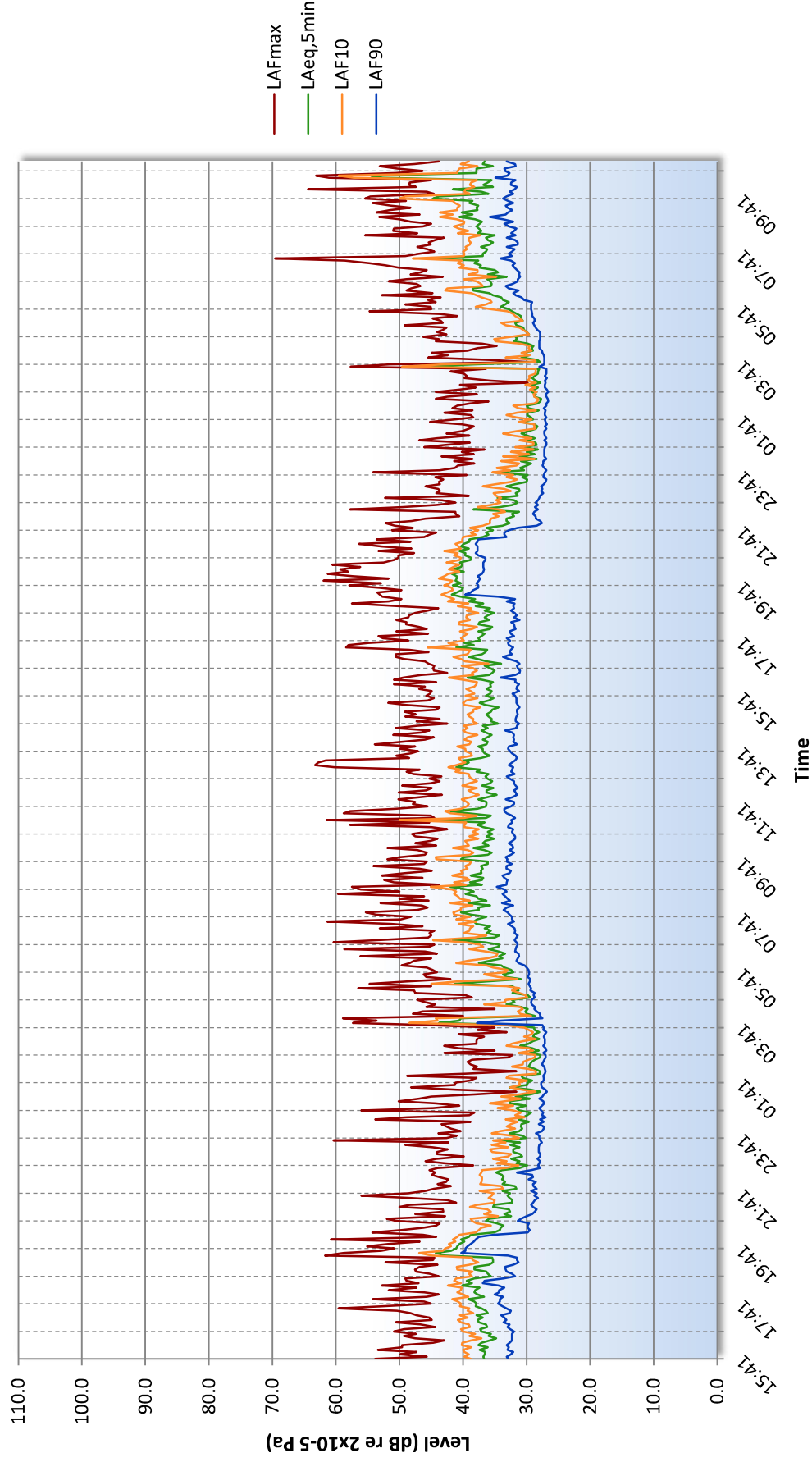


Figure 28800.THB

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.