Report VA4985.231108.NIA

815-823 High Road, London

Noise Impact Assessment

04 December 2023

Finchley Estates Ltd

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Report Version	Author	Approved	Changes	Date
NIA1	Steven Liddell	Ben Alexander	-	08/11/2023

1. Introduction

It is proposed to reconfigure the residential use at the upper levels of 815-823 High Road, London, including the introduction of a roof extension and a rear extension to provide additional residential use.

Venta Acoustics has been commissioned by Finchley Estates Ltd to undertake an assessment of the current environmental noise impact on the site and provide recommendations of acoustic mitigation, where required, in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the noise levels incident on the site. These levels are then used to undertake an assessment of the likely impact in accordance with the National Planning Policy Framework with reference to relevant standards, guidance and the planning requirements of The Local Authority.

Outline mitigation measures are considered and an appraisal of the requirements of external building fabric elements is provided.

2. Guidance and Legislation

2.1 The National Planning Policy Framework (2023)

The revised *National Planning Policy Framework* (NPPF), published in September 2023, sets out the Government's planning polices for England, superseding all previous planning policy statements and guidance.

In respect of noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence, Paragraph 185 states that *planning policies and decisions should also ensure 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:*

a) 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
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

In regards to the term adverse impact, reference is made to the Noise Policy for England:

2.2 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This vision is supported by the following aims:

- *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 terms “significant adverse” and “adverse” are related to the following concepts:

- No Observed Effect Level (NOEL) - the level below which no effect on health and quality of life can be detected.
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The guidance acknowledges that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations, but will be different for different noise sources, receptors and times.

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

2.3 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.1.

Criterion	Environment	Design range $L_{Aeq,T}$ dB
Maintain speech intelligibility and avoid moderate annoyance, daytime and evening	Living Room	35 dB
Prevent sleep disturbance, night time	Bedrooms	30 dB

Table 2.1 – Excerpt from WHO **[dB ref. 20µPa]**

This guidance also states:

> *For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991).*

2.4 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to desirable internal ambient noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$

Table 2.2 – Excerpt from BS8233:2014 - Indoor ambient noise levels for dwellings [dB ref. 20µPa]

3. Site Description

As illustrated on attached site plan VA4985/SP1, the site consists of a three-storey building in a mixed-use area on the corner of High Road and Lodge Lane, with retail uses at ground floor level and residential use above. There is parking to the rear with the residential elements accessed via a first-floor walkway that is open to the car park.

The proposal is to add a rear extension and a roof extension as well as a subdivision of the existing 5 flats to provide 8 additional residential units. On the High Road façade, changes are limited to 9 new dormer windows at roof level. The scheme will not include any external amenity areas.

The dominant noise source expected to affect the site is traffic on High Road.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Monday 30th October and Wednesday 1st November 2023 at first floor level at the locations shown in site plan VA4985/SP1. These locations were chosen to be representative of the noise levels incident on the building.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at each of the measurement locations.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-15993-E0	1504971-2	28/3/23
NTi Class 1 Integrating SLM	XL2	A2A-15892-E0	150497-1	28/3/23
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23

Table 4.1 – Equipment used for the survey

The calibration of the sound level meters was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4985/TH1-2 for position 1, (at the front of the building) and VA4985/TH3-4 for position 2, (at the rear of the building). The displayed time history plots have not been corrected for façade reflections.

The site is primarily affected by traffic on High Road.

The average noise levels for the Daytime and Night-time periods, as measured at the automated monitoring position were as follows. The Position 1 figures have had a façade correction of 3dB deduction applied, as the monitoring location was within 1m of a reflective surface, namely a window.

Monitoring Period	$L_{Aeq,T}$	
	Position 1	Position 2
07:00 – 23:00 hours	67 dB*	54 dB
23:00 – 07:00 hours	64 dB*	48 dB

Table 4.2 – Average ambient noise levels at measurement locations **[dB ref. 20µPa]**
* Façade correction applied

The typical night time L_{Amax} events, generated by vehicle passbys on High Road, were recorded to be in the order of 77dB $L_{Amax,fast}$ (façade corrected).

5. Internal Noise Assessment

The measured values are considered representative of the average noise levels incident on the building façade.

BS8233 suggests that a loss of 10 - 15dB can be expected from a partially open window. The guidance also suggests that a 5dB relaxation of the stipulated internal noise levels can be accommodated and reasonable internal sound levels still achieved where residential use is desirable. It is offered that the beneficial aspect of an open window, under occupant preference, is a desirable option and when residents choose to open their windows, this 5dB relaxation would be entirely acceptable.

On this basis, reasonable internal noise levels can be achieved at the rear of the building with windows open and the desirable internal sound levels stipulated in BS8233:2014 would be comfortably achieved with windows closed.

For the rooms facing High Road and Lodge Lane, appropriately specified glazing would be required to provide the required internal sound levels. Allowance should be made for alternative means of background ventilation such as trickle vents, such that windows may remain closed if preferred. This does not preclude the opening of windows for personal preference or purge ventilation.

5.1 External Building Fabric

The likely sound insulation performance specifications required for glazing and background ventilators have been considered in outline, targeting the internal noise levels stated in BS8233 and the WHO Guidelines.

The UPP drawings for the scheme have been reviewed. The review considers daytime noise levels in living rooms and daytime/night-time noise levels in bedrooms, including internal night-time maxima.

5.1.1 Sound Reduction Performances of Building Elements

It has been assumed that all the non-glazed elements, i.e. walls and roof systems, will be capable of providing the following minimum sound insulation performance, when tested in accordance with BS EN ISO 10140-2:2021 *Acoustics - Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*.

Building Element	Single figure weighted sound reduction index, dB
Roof	R_w 45
Masonry	R_w 51

Table 5.1 – Assumed sound reductions performances of non-glazed elements

5.1.2 Sound Reduction Performance of Windowsets and Vents

The monitoring data along with the architectural drawings have been used to calculate the required sound insulation performance for the windowsets (glazing and frame combination) and open ventilators for the building. These are summarised in Table 5.2 below.

Glazing Location	Required Glazing SRI, dB	Ventilator Performance, dB
Front Façade – All	R_w 34	$D_{n,e,w}$ 41
Rear Facade - All	Standard thermal double-glazing + standard background vents	

Table 5.2 – Required minimum sound reduction indices for glazing and ventilators

The specifications apply to habitable rooms (bedrooms, living rooms and dining rooms only. In order that windows may remain closed to maintain the internal noise levels, it is expected that attenuated means of background ventilation will be required. If trickle vents are used the performance shown in Table 5.2 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the performance requirement shown in Table 5.2 will increase by a value equal to +10log(*N*), with N being the total number of vents serving the room. It should be noted that there is no reason why windows could not be opened as a matter of personal preference or for purge ventilation.

5.1.3 Windowset Performances

It is important that the performance shown in Table 5.2 are achieved by the entire windowset including frames, ventilators, seals, etc. Glass performance alone would not be likely to show compliance with the specification as the other elements typically provide the weakest noise transmission path.

The ventilator performances provided would need to be achieved with the vents open. Should this performance not be achievable, a mechanical ventilation solution may be required.

Passive ventilators alone may not provide sufficient air flow for summer overheating, which should be evaluated by a suitably qualified thermal engineer.

5.2 Assessment Outcome

With the above recommendations implemented, the noise levels within the proposed dwellings would be expected to be in line with recommendations given in the WHO 1999 and BS8233:2014 guidance. Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

6. Sound Insulation to Commercial Uses

Inspections of the existing building suggest that the building has a concrete slab between ground and first floor. There is no ceiling currently in place at ground floor level.

The sound insulation of the existing floor between a ground floor unit and first floor apartment was measured during a site visit on 30 October 2023.

Tests were undertaken in general accordance with the procedures defined in BS EN ISO 16283-1:2014 *Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation* using a pair of uncorrelated pink noise sources.

The tests results are shown in Table 1.1 and are weighted as per the methodology described in BS EN ISO 717-1: 2013 *Acoustics – Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation* to provide a single figure performance value.

The following equipment was used during the testing:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-15993-E0	1504971-2	28/3/23
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23
Electro Voice	ZLX-12P-EX	095208361761760076	-	-
Electro Voice	ZLX-12P-EX	095208361761760087	-	-
2 No. Unbranded WAV player	-	-	-	-

Table 1.1 – Equipment used for the tests

The spectral test results are presented in VA4985/AB1, attached.

Source	Receive	Sound Insulation, D_w
Ground Floor Unit	First Floor Residential Unit	50 dB

Table 1.1 – Airborne sound insulation test result

The test result is indicative of a good level of sound insulation.

It is recommended that a ceiling is suspended below the soffit, forming a cavity of at least 250mm and consisting of 2 layers of 15mm dense plasterboard such as SoundBloc or similar (minimum mass 11kg/m^2 per board), joints staggered and skimmed. This is expected to provide a 5-10dB improvement at mid to high frequencies and a good level of protection to the residents above.

The stores below are expected to be standard Class E retail uses with moderate internal noise. With the example of a lively restaurant or coffee shop, internal levels are expected to reach L_{Aeq} 75dB. This would result in a noise level of approximately L_{Aeq} 20dB in the space above (with the above mitigation measures in place). This is not expected to cause an adverse impact and the sound insulation would be expected to be sufficient for the residential/commercial adjacency.

These assumed noise levels are the upper limit of what would reasonably be expected in a retaul store. Should a store with higher noise levels occupy one of the commercial units in the future, it would generally be expected that the tenant would take appropriate steps during the fit-out of the space to control the noise impact.

It should be noted that these adjacencies (residential above commercial use) already exist at this site with the current floor buildup, supporting this conclusion.

7. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of 815-823 High Road, London in support of a planning application for the proposed development of new residential dwellings.

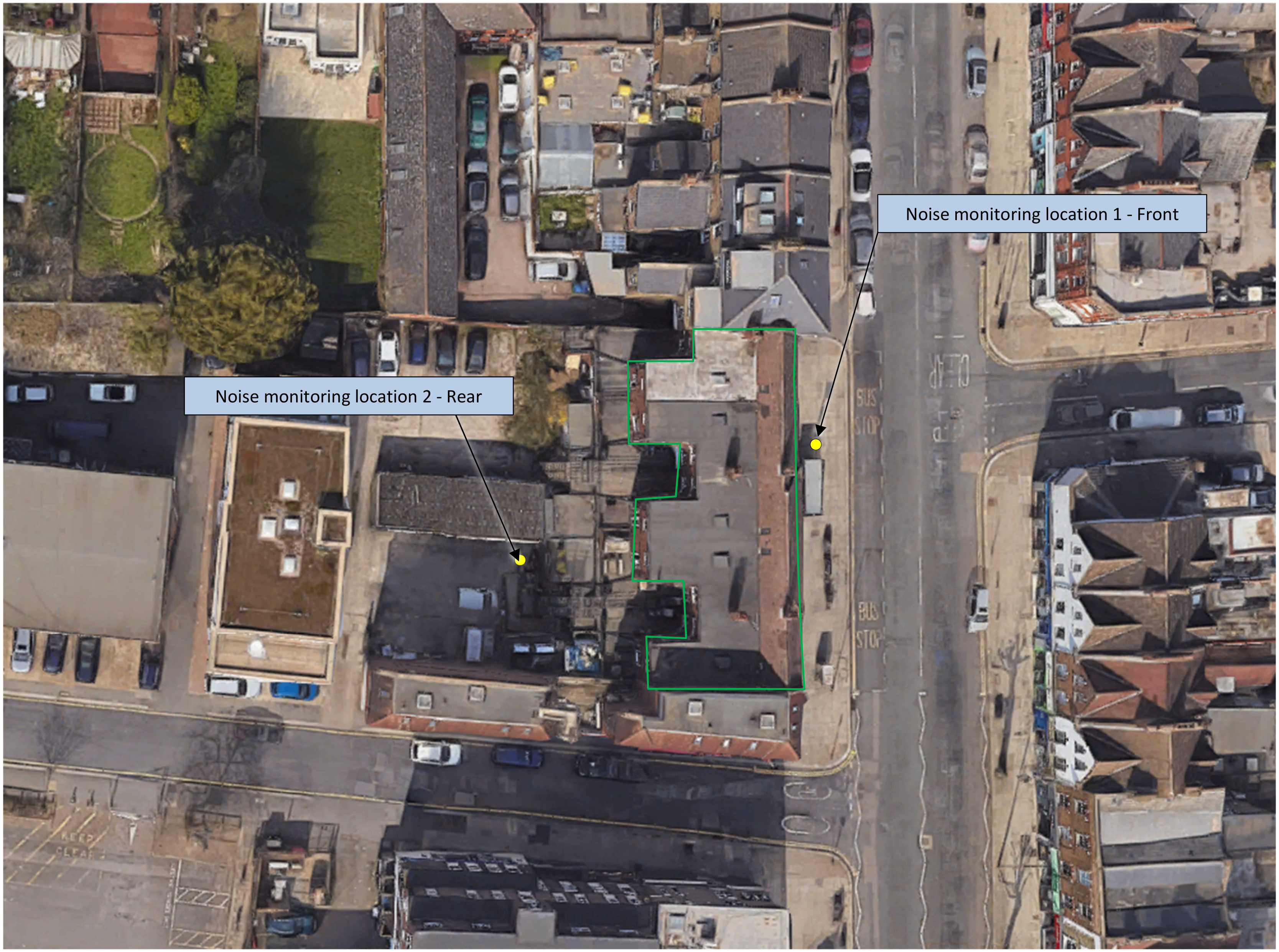
The measured levels have been assessed against the National Planning Policy Framework and currently available standards and guidance documents including World Health Organisation *Guidelines for Community Noise* (1999) and BS8233:2014 *Guidance on sound Insulation and noise*.

Appropriate external and internal noise criteria have been considered to minimise adverse impacts on health and quality of life as a result of the new development. Appropriate mitigation measures have been outlined which should be developed during detailed design, including proprietary thermal double-glazing and trickle vents.

The sound insulation between the ground and first-floor areas has been measured and, while already providing a good level of acoustic separation, recommendations to enhance the performance have been provided. The upper limits of noise expected from reasonable retail use at ground floor level have been shown to have a low impact with these measures in place.

The proposed scheme is not expected to experience a significant adverse noise impact and the site is considered acceptable for the proposed residential use.

Steven Liddell MIOA


Noise monitoring location 1 - Front
Noise monitoring location 2 - Rear

815-823 High Road, London

Environmental Noise Time History: 1

Front

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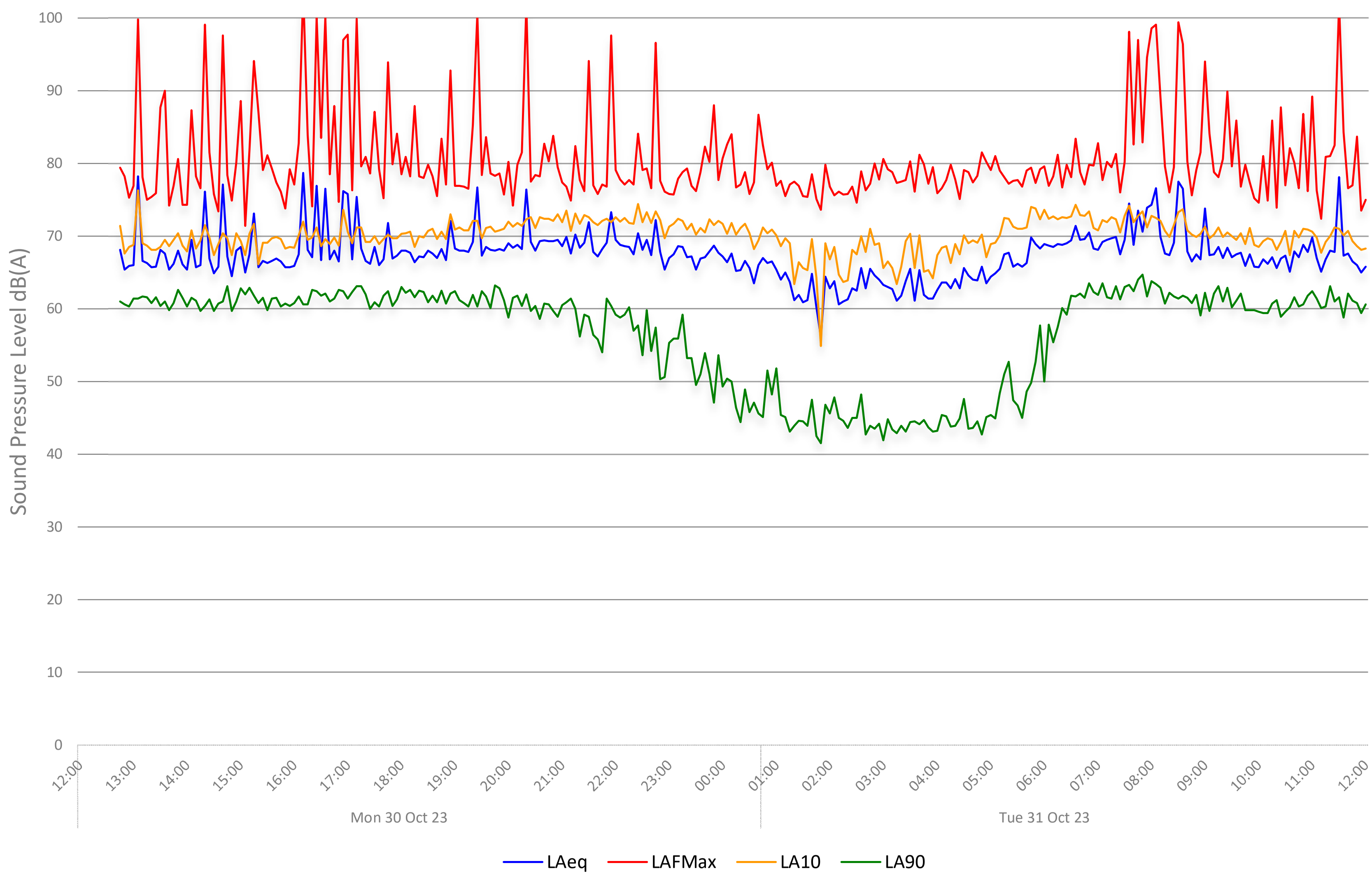
Figure VA4985/TH1



815-823 High Road, London

Environmental Noise Time History: 2

Front

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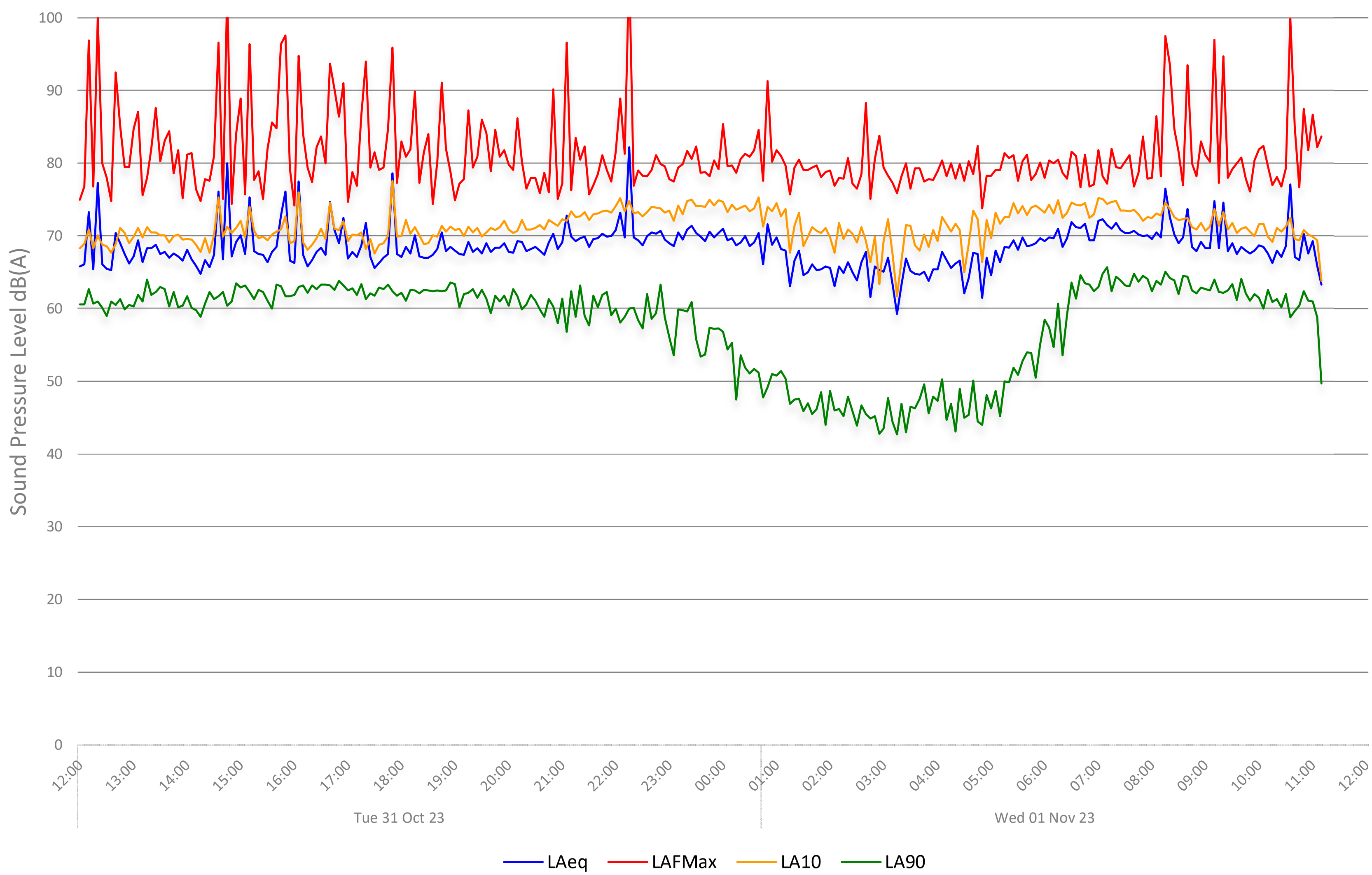
Figure VA4985/TH2

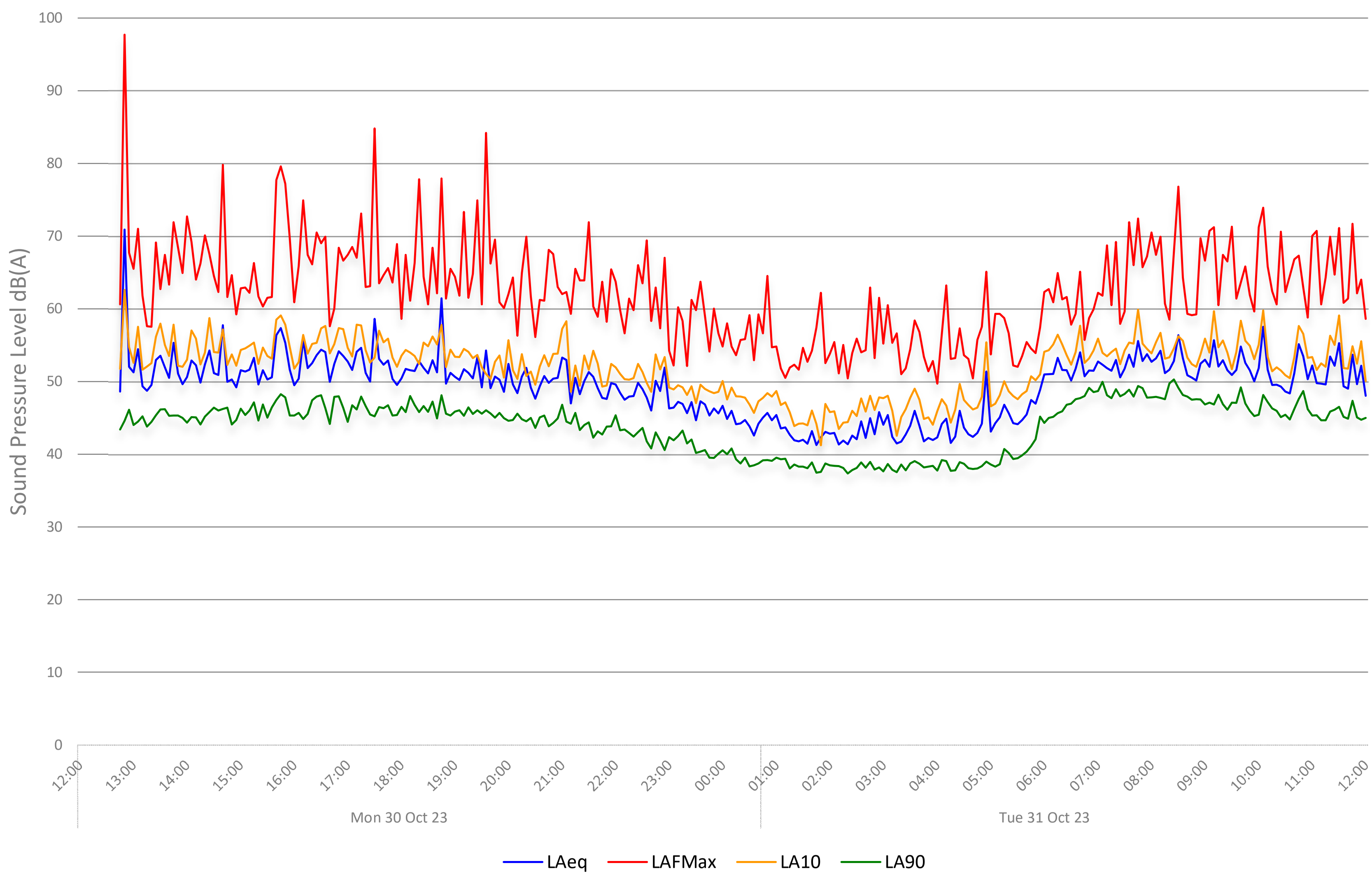


815-823 High Road, London

Environmental Noise Time History: 3

Rear

Figure VA4985/TH3



815-823 High Road, London

Environmental Noise Time History: 4

Rear

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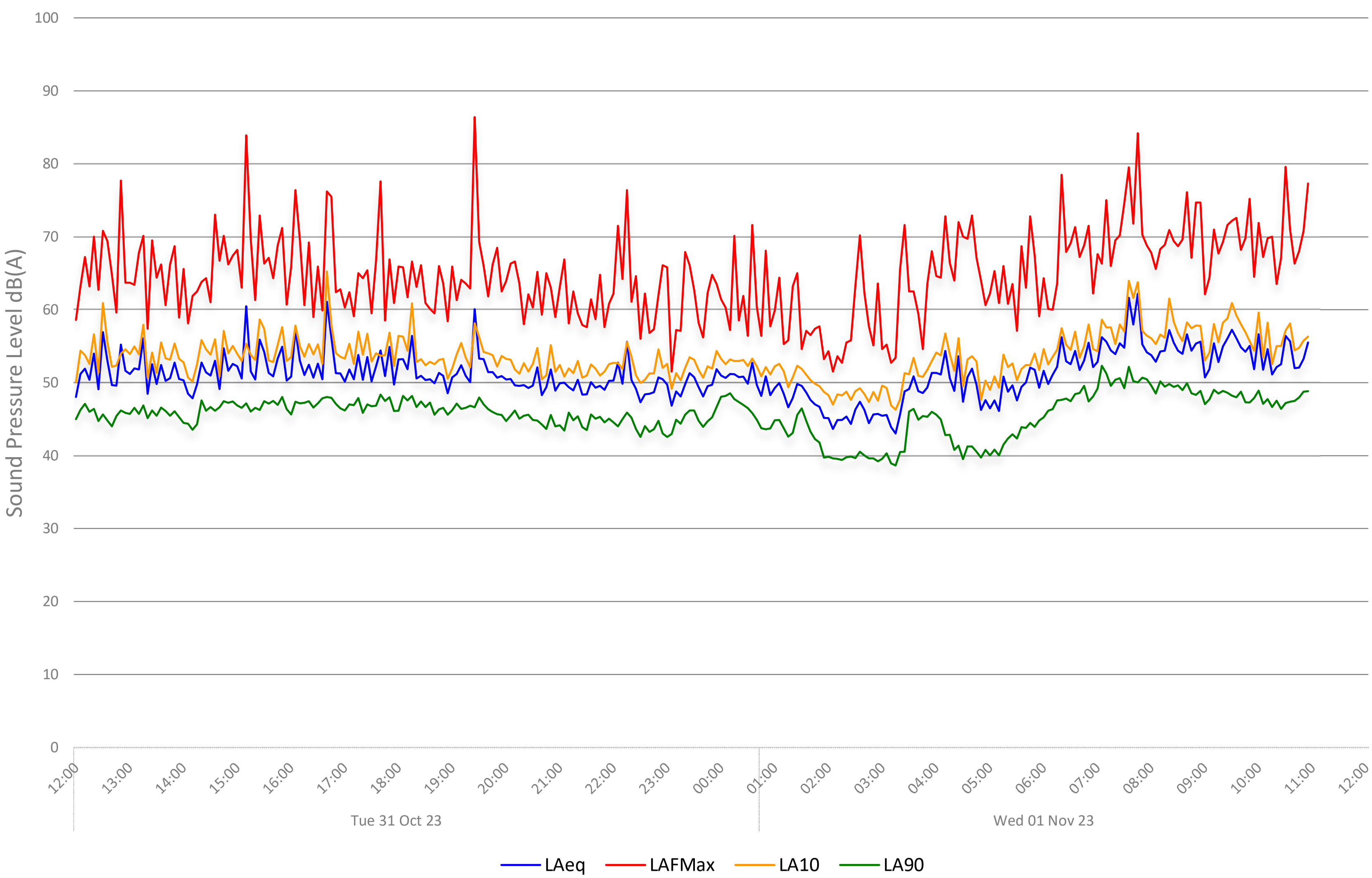
Figure VA4985/TH4



Airborne Sound Insulation Test

Figure : **VA4985/AB1**

Level difference

Field measurements of airborne sound insulation between rooms

(NB Higher D_w figures denote better sound insulation performance)

Construction Tested:

Type

Rooms Tested From : ***Ground Floor***

To : ***First Floor***

Frequency Hz	*D* dB
100	28.1
125	35.7
160	36.6
200	36.9
250	40.4
315	41.0
400	45.6
500	47.5
630	49.7
800	54.6
1k	56.5
1.25k	56.1
1.6k	54.1
2k	53.0
2.5k	55.1
3.15k	55.3

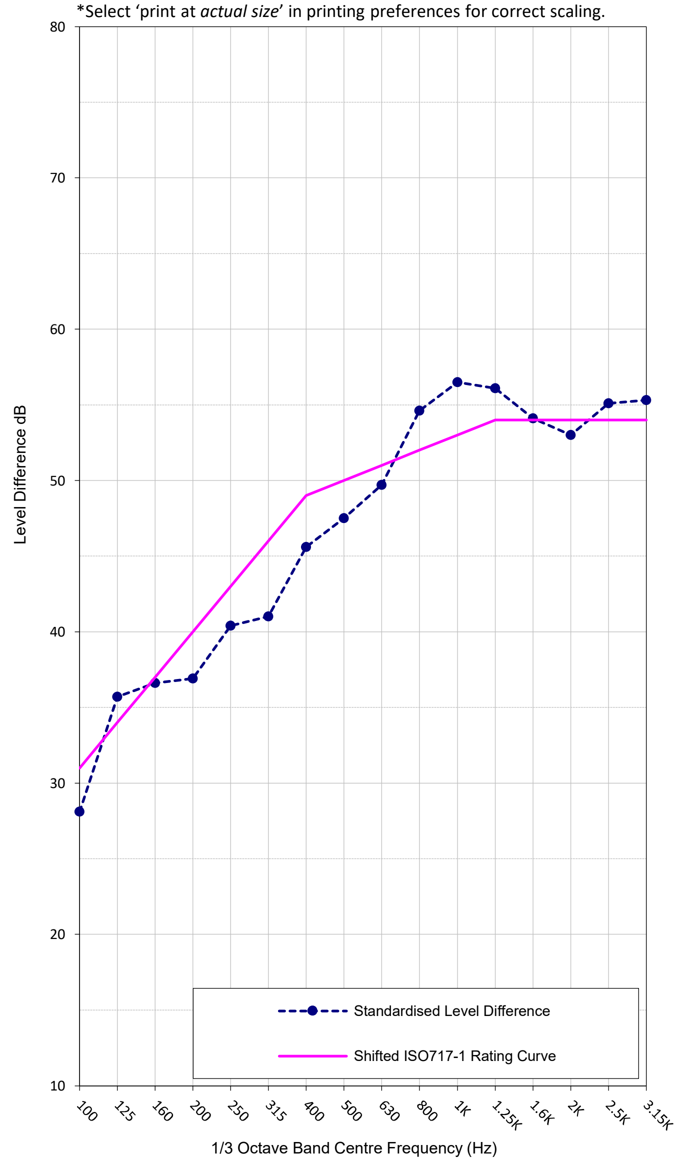
Shift Curve By:	-2 dB
Sum of Adverse Deviations =	22.2 dB

-6

D_w = 50 dB

Evaluation based on field measurement results obtained in one-third octave bands by an engineering method.

*Select 'print at *actual size*' in printing preferences for correct scaling.



Test Date: *30/10/2023*

VA Project Number: *VA4985*

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Client: *Hillbourne*

Site: *815-823 High Road, London*

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.