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125 Finchley Road
London

Noise Impact Assessment Report
Report 25361.NIA.01 – Rev B

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A	**09/12/2022** Updated details of the proposed roof terrace. *Revised by Saoirse Butterfield.*	D	
B	**21/03/2023** Updated site address in the introduction section, the roof terrace operating hours, and included the building name for the closest noise sensitive receivers. *Revised by Saoirse Butterfield*	E	
C		F	

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SUMMARY

KP Acoustics Ltd has been commissioned to assess the suitability of the site at 125 Finchley Road, London, for an office development in accordance with the provisions of the National Planning Policy Framework and the Noise Policy Statement for England (NPSE).

An environmental noise survey has been undertaken on site in order to establish the current ambient noise levels, as shown in Table 3.1.

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to meet the requirements of BS8233:2014, taking into consideration the non-glazed external building fabric elements. The results of these calculations and the sound reduction performance requirements for the glazed elements are shown in Table 5.2.

Current proposals include the development of a first-floor roof terrace to the rear of the existing building.

A plant noise impact assessment has been undertaken to assess proposed mechanical plant that is to be installed externally from the building.

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

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Countryroad Investments Ltd c/o Cresthall Property Management Ltd., to assess the suitability of the site at 125 Finchley Road, London 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 the environmental survey undertaken in order to measure prevailing background noise levels and outlines any necessary mitigation measures.

Current proposals include the development of a first-floor roof terrace to the rear of the existing building.

A plant noise impact assessment has been undertaken to assess proposed mechanical plant that is to be installed externally from the building.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by commercial properties to the south, residential properties to the west, and north, and Finchley Road to the east. Entrance to the site is located to the east via Finchley Road. At the time of the survey, the background noise climate was dominated by road traffic noise from the surrounding roads, in addition to existing noise emissions from the surrounding rooftops and neighbouring mechanical plant installations.

2.2 Environmental Noise Survey Procedure

A 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 12:30 on 04/11/2022 and 14:00 on 07/11/2022.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 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 the east elevation of the building at first floor level overlooking Finchley Road in free field conditions, as shown in Figure 2.1.
	Noise Measurement Position 2	The microphone was installed on the west elevation of the building on the first-floor roof in free field conditions, as shown in Figure 2.1.
	Noise Measurement Position 3	The microphone was installed on the west elevation of the building on the first-floor roof in free field conditions, as shown in Figure 2.1.

Table 2.1 Measurement positions and descriptions

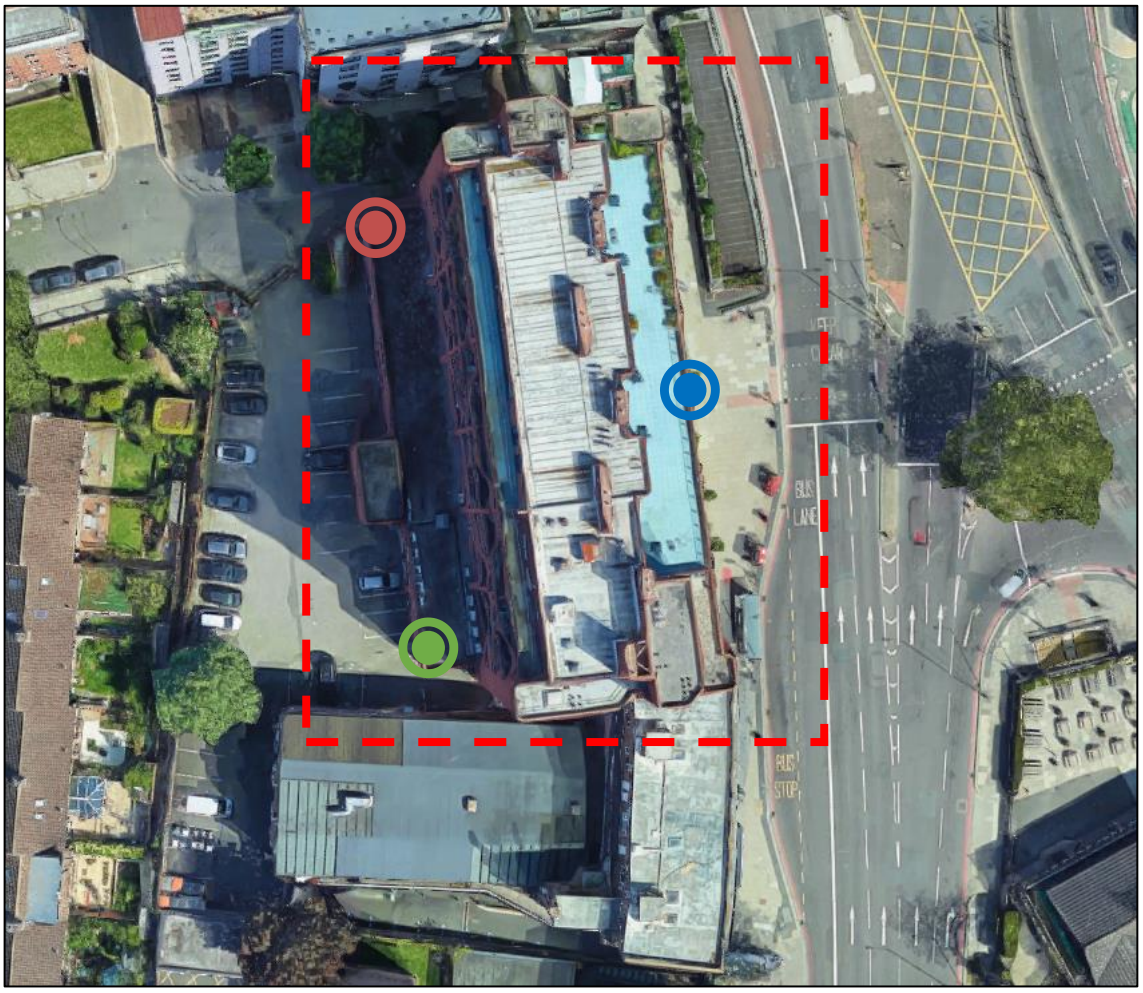

Figure 2.1 Site measurement positions (Image Source: Google Maps)

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.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 31	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21119-E0	04/08/2022	UK-22-081
	Free-field microphone NTI Acoustics MC230A	A23402		
	Preamp NTI Acoustics MA220	10915		
	NTI Audio External Weatherproof Shroud	-	-	-
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	-	-	-
Noise Kit 33	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21020-E0	05/08/2022	UK-22-082
	Free-field microphone NTI Acoustics MC230A	A23569		
	Preamp NTI Acoustics MA220	10994		
	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 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 time histories in Figures 25361.TH1-3.

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 3.1.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey undertaken on site.

	Noise Measurement Position 1		Noise Measurement Position 2		Noise Measurement Position 3	
Time Period	**Average background noise level L_{Aeq}**	**Minimum background noise level L_{A90}**	**Average background noise level L_{Aeq}**	**Minimum background noise level L_{A90}**	**Average background noise level L_{Aeq}**	**Minimum background noise level L_{A90}**
Daytime $L_{Aeq,16hour}$	58	44	59	46	71	54
Night-time $L_{Aeq,8hour}$	51	41	53	43	68	48

Table 3.1 Site average noise levels for daytime and night time

4.0 NOISE ASSESSMENT GUIDANCE

4.1 BS8233:2014

BS8233:2014 *'Sound insulation and noise reduction for buildings'* describes recommended internal noise levels for office spaces. These levels are shown in Table 4.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Typical noise levels for acoustic privacy in shared spaces	Open plan office	45-50 dB(A)	-
Study and work requiring concentration	Executive Office	35-40 dB(A)	-

Table 4.1 BS8233 recommended internal background noise levels

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

5.0 EXTERNAL BUILDING FABRIC SPECIFICATION

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed and non-glazed elements in order to achieve the recommended internal noise levels shown in Table 4.1, taking into account average noise levels monitored during the environmental noise survey.

Typical sized rooms with a high ratio of glazed to non-glazed fabric have been used for all calculations in order to specify glazing.

Please note that the glazed and non-glazed element calculations would need to be finalised once all design proposals are finalised.

5.1 Non-Glazed Elements

It is currently understood that the non-glazed building façade is comprised of the elements as shown within Table 5.1 based on the site inspection. The anticipated sound reduction index has been calculated and would be expected to provide the minimum figures shown in Table 5.1 when tested in accordance with BS EN ISO, 140-3:1995.

Element	Octave band centre frequency SRI, dB					
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Brickwork Cavity Wall	41	43	48	50	55	55

Table 5.1 Assumed sound reduction performance for non-glazed elements

5.2 Glazed Elements

Minimum octave band sound reduction index (SRI) values required for all glazed elements to be installed are shown in Table 5.2.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.

Glazing performance calculations have been based on average measured daytime noise levels. The most robust results of these calculations are shown in Table 5.2.

Elevation	Octave band centre frequency SRI, dB						$R_w (C;C_{tr})$, dB
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
East Elevations	29	27	35	37	36	45	36 (-1;-3)
West, North & South Elevations	24	20	25	34	37	35	31 (-2;-4)

Table 5.2 Required glazing performance

The nominated glazing supplier should verify that their proposed window system meets the attenuation figures shown at each centre frequency band as shown in Table 5.2.

All major building elements should be tested in accordance with BS EN ISO 140-3:1995.

Independent testing at a UKAS accredited laboratory will be required in order to confirm the performance of the chosen system for an 'actual' configuration.

6.0 VENTILATION

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 6.1.

Room type	Noise rating (NR)
All meeting rooms	30
Cellular offices	35
Open-plan offices	38
Ancillary spaces	40
Toilets, lift lobbies	40-45

Table 6.1 Acoustic design criteria for building services noise

7.0 PLANT NOISE IMPACT ASSESSMENT

An environmental noise survey has also been undertaken on site for the purpose of a plant noise assessment. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for all proposed plant units in agreement with the planning requirements of the London Borough of Camden.

7.1 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.

7.2 Local Authority Guidance

The guidance provided by The London Borough of Camden for noise emissions of new plant in this instance is as follows:

The noise criteria, as per the Local Plan 2017 of London Borough of Camden, British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' should be considered as the main reference document for the assessment. The resultant 'Rating Level' would be considered as follows:

Period	**Assessment Location**	**Rating Level Acceptability Range**		
		Green: noise is considered to be at an acceptable level	**Amber:** noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development	**Red:** noise is observed to have a significant adverse effect.
Daytime (7:00-23:00)	Garden used for main amenity (free field) and Outside living or dining or Bedroom window (façade)	10dB below background	9 dB below and 5dB above background	5dB above background
Night-time (23:00-7:00)	Outside bedroom window (façade)	10dB below background and no events exceeding 57dB L_{Amax}	9db below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	5dB above background and/or events exceeding 88dB L_{Amax}

Table 4.1 Camden noise criteria for plant and machinery

Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level ($L_{90,\ 15\ min}$). During standby periods, emergency equipment will be required to meet the usual

criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application.

7.3 Plant Noise Emissions Criteria

The criterion has been set as shown in Table 7.1 in order to comply with the above requirements.

Time Period	Noise Criterion at North, West and South Facades	Noise Criterion at East Facades
Daytime (07:00 to 23:00)	34dB	44dB

Table 7.1 Proposed plant noise emissions criteria

7.4 Proposed Plant Installations

Current design proposals do not outline a detailed M&E specification. It is understood that plant is to be installed at up to three locations, on the west facing elevation of the building. A full plant noise assessment will be undertaken at a later project design stage.

7.5 Closest Noise Sensitive Receivers

The closest noise sensitive receivers to the proposed installation locations have been identified as being residential windows located to the north and west of the building, approximately 14 metres from the north of the building and 35m from west of the building as shown in Figure 7.1.

Additionally residential noise sensitive receivers may be located above the proposed plant installation location areas from the 3rd floor and above of Cresta House.

Figure 7.1 Identified noise sensitive receivers (Image Source: Google Maps)

8.0 ROOF TERRACE ASSESSMENT

Current design proposals allow for the development of a terrace above the first-floor roof of the west facing elevation. The terrace would be used as breakout space. The proposed operating hours of the terrace would be between 08:00 and 20:00 hours.

For the purposes of this assessment in relation to the closest noise sensitive receivers, measurement data from position 1 has been utilised within the assessment, as the noise profile at the measurement position is the lowest in terms of ambient noise levels measured on site.

The measured minimum background noise levels are shown in Table 8.1 for the proposed roof terrace opening hours. The minimum background noise level LA90dB(A) has been derived from ambient noise levels measured during 09:03 on 05/11/2022 and 21:03 on 05/11/2022.

	Position 1 (Road facing) Minimum background noise level L_{A90} dB(A)
Daytime (09:00-21:00)	48

Table 8.1 Minimum background noise levels

As opposed to mechanical plant noise emissions criteria, which often requires effective inaudibility, it would be reasonable to apply a criterion to noise from human speech which is more lenient, due to the variable and inconsistent nature of speech.

As such, a criterion of 5dB above minimum L_{A90} is proposed for this instance. According to the survey data gathered, this maintains a level below the average ambient L_{Aeq} (59dB) and would therefore be deemed sufficient to protect residential amenity.

We therefore propose to set the noise criteria as shown in Table 3 in order to comply with the above requirement.

	Noise criterion at nearest receiver (5dB above minimum LA90)
Daytime (09:00-21:00)	53

Table 8.2 Proposed Noise Emissions Criteria

In order to determine the impact of terrace use, and define the maximum number of occupants while maintaining compliance with the recommended criteria above, calculations have been undertaken as shown in Appendix B1.

In order to provide representative calculations, noise emissions are based on those for typical human speech, as shown in Table 4 below.

	Octave Band Sound Pressure Level (dB) at 1m								**Overall dB(A)**
Typical unamplified speech	48	51	57	60	54	49	44	39	60

Table 8.3 Source Noise Levels

As shown in Appendix B1, noise levels would be compliant with the proposed criteria with up to 20 occupants.

For reference, and if required to achieve a lower threshold, halving the number of occupants to 10 for the terrace area would have the effect of reducing the received noise level by only 3dB. It would therefore not be expected that a reduction in the number of terrace occupants would have a significant impact on the received noise in comparison to background noise levels.

The values predicted would be expected to be audible in relation to background noise levels in the area, but not sufficiently high as to become intrusive.

Having more than 20 occupants within the roof terrace area at one given time would require the installation of a mitigation strategy such as permanent building construction in the form of a roof and perimeter walls.

9.0 CONCLUSION

An environmental noise survey has been undertaken at 125 Finchley Road, London allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Measured noise levels allowed a robust glazing specification to be proposed which would provide internal noise levels for all commercial and office environments of the development commensurate to the design range of BS8233.

Additionally, a maximum noise emissions criterion for mechanical plant has been set based on the requirements of the London Borough of Camden's requirements.

An assessment of the proposed roof terrace has been undertaken and concluded a maximum permissible number of 20 occupants at one given time.

125 Finchley Road, London - Position 1
Environmental Time History
04/11/2022 to 07/11/2022

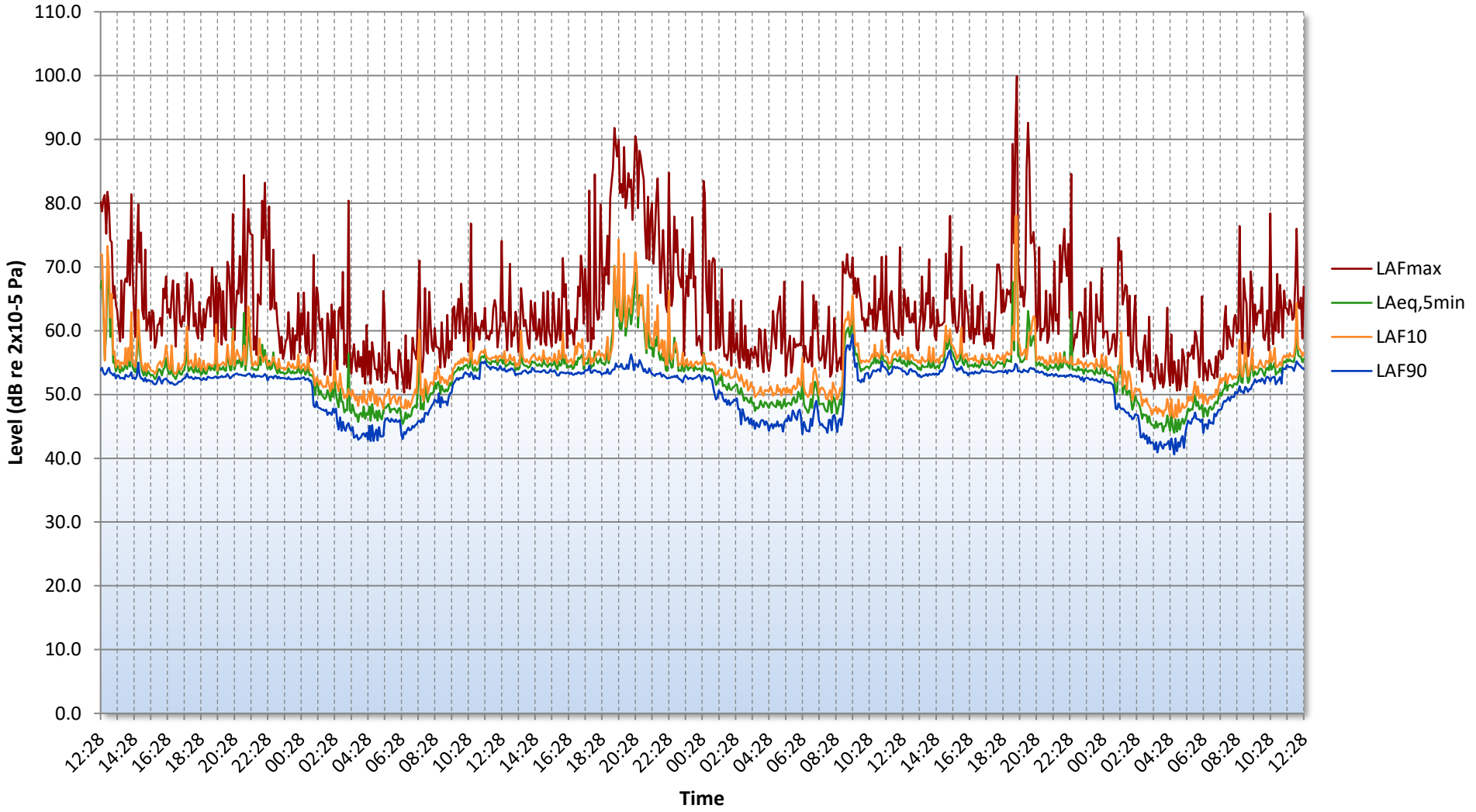

Figure 25361.TH1

125 Finchley Road, London - Position 2
Environmental Time History
04/11/2022 to 07/11/2022

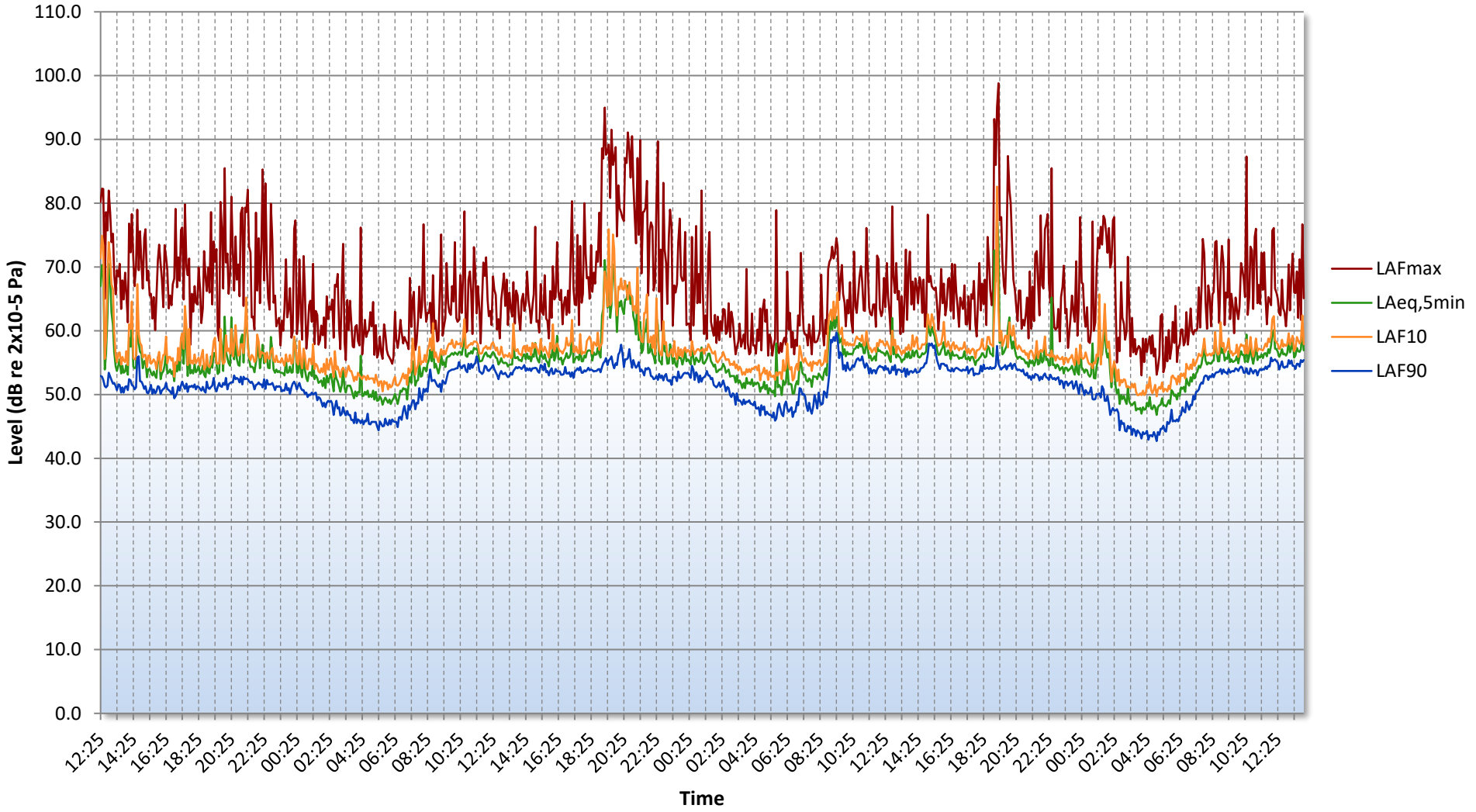

Figure 25361.TH2

125 Finchley Road, London - Position 3
Environmental Time History
04/11/2022 to 07/11/2022

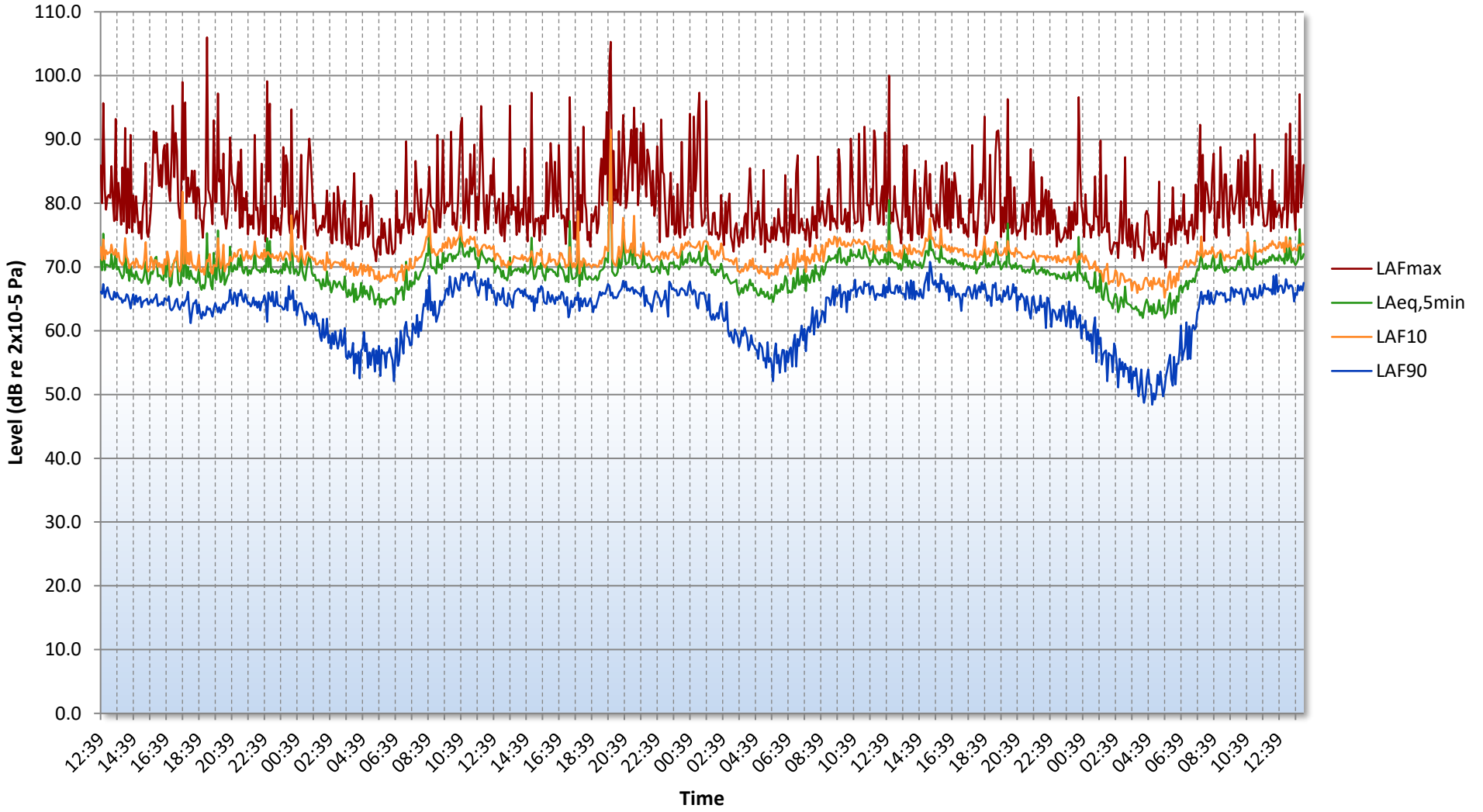

Figure 25361.TH3

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.

APPENDIX B1

125 Finchley Road, London

Terrace Attendee Emissions Calculations

Source: Terrace Attendees Receiver: Residential units (2nd floor and above - 125 Finchley Road)	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Typical unamplified speech sound pressure level at 1m	48	51	57	60	54	49	44	39	60
Correction for number of terrace attendees (20)	13	13	13	13	13	13	13	13	
Minimum attenuation provided by distance (10m), dB	-20	-20	-20	-20	-20	-20	-20	-20	
Sound Pressure Level 1m from Noise Sensitive Window	41	44	50	53	47	42	37	32	53
Sound pressure level 1m from front sensitive receiver									**53**

Minimum background (Daytime)	**48**
Design criterion (Daytime)	**53**

Source: Terrace Attendees Receiver: Residential units (Dobson Close)	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Typical unamplified speech sound pressure level at 1m	48	51	57	60	54	49	44	39	60
Correction for number of terrace attendees (20)	13	13	13	13	13	13	13	13	
Minimum attenuation provided by distance (34m), dB	-31	-31	-31	-31	-31	-31	-31	-31	
Sound Pressure Level 1m from Noise Sensitive Window	30	33	39	42	36	31	26	21	42
Sound pressure level 1m from front sensitive receiver									**42**

Minimum background (Daytime)	**48**
Design criterion (Daytime)	**53**

Source: Terrace Attendees Receiver: Residential units (Center Heights)	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Typical unamplified speech sound pressure level at 1m	48	51	57	60	54	49	44	39	60
Correction for number of terrace attendees (20)	13	13	13	13	13	13	13	13	
Minimum attenuation provided by distance (14m), dB	-23	-23	-23	-23	-23	-23	-23	-23	
Sound Pressure Level 1m from Noise Sensitive Window	38	41	47	50	44	39	34	29	50
Sound pressure level 1m from front sensitive receiver									**50**

Minimum background (Daytime)	**48**
Design criterion (Daytime)	**53**