clement acoustics
www.clementacoustics.co.uk

London office
1B(c) Yukon Road
London
SW12 9PZ
Tel: 0203 475 2280

Manchester office
105 Manchester Road
Bury
BL9 0TD
Tel: 0161 850 2280

4 WALDRAM PARK ROAD, LONDON

NOISE EXPOSURE ASSESSMENT

Report **17355-NEA-01**

Prepared on 17 March 2022

Issued For

Electro Trading Ltd

9 Broadfields Ave

Edgware

HA8 8PF

Institute of Acoustics sponsoring organisation
committed to CSCS Platinum award
CQMS Safety Scheme
ISO 17025 Quality Assurance
CHAS Contractors Health & Safety Assessment Scheme Accredited Contractor
Constructionline
UKAS Testing 7688

Executive Summary

This noise exposure assessment has been undertaken so external building fabric elements can be specified in order to meet appropriate internal noise criteria at 4 Waldram Park Road, London SE23 2PN.

The assessment adheres to the Local Authority requirements, the principles provided by the *National Planning Policy Framework*: 2021 (NPPF) and internal noise criteria stated within BS 8233: 2014 *'Guidance on sound insulation and noise reduction for buildings'.*

The Institute of Acoustics' *Professional Guidance on Planning & Noise*: 2017 (ProPG) recommended approach for determining site risk due to environmental noise has also been adopted.

The site currently comprises an unused building. Proposals include the redevelopment to create 5 No. residential units.

A noise survey has been undertaken as detailed in the report, in order to establish the prevailing environmental noise levels at the site.

A subsequent detailed analysis has been carried out of road traffic noise intrusion through the external building fabric. Sound insulation performance specifications have been proposed for glazing systems and trickle ventilators.

The assessment has demonstrated that appropriate internal noise levels should be achievable at the front with the installation of high performing glazing systems acoustic trickle ventilators, and at the rear with nominal / standard units.

It is essential that certificated performances should be sought from the manufacturer(s) of the proposed systems and trickle ventilators.

This report is designed to be suitable to discharge typical noise planning conditions, as per our original scope of work. The report should not be relied upon for further reasons, such as the detailed design of mitigation measures.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment. This report contains confidential information and should not be disclosed to third parties.

Contents

List of Attachments

17355-SP1 & SP2	Indicative Site Plans
17355-TH1 & TH2	Environmental Noise Time Histories
Appendix A	Glossary of Acoustic Terminology
Appendix B	ProPG Initial Site Risk Assessment Guidance

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	17/03/2022	First Issue	Matt Markwick MIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Electro Trading Ltd to assess the suitability of the site at 4 Waldram Park Road, London for residential development.

Proposals are to redevelop a currently unused building to comprise 5 residential units.

This report presents the results of environmental noise surveys undertaken in order to measure prevailing background levels and details the proposed internal noise level criteria.

Full details of necessary mitigation measures in order to meet the proposed criteria are also provided.

2.0 SITE DESCRIPTION

The proposed development site is a currently disused building with garden to rear, with plans to redevelop it to create 5 residential flats.

The site is in a mixed residential and commercial area facing on to Waldram Park Road, a street largely populated by residential properties, with a commercial office opposite to the north and some small retail / food businesses nearby to the west. The site is bound by Westbourne Drive to the west and other residential properties to the south and east.

At the time of the survey, the background noise climate was dominated by road traffic from Waldram Park Road.

3.0 ARCHITECTURAL ASSUMPTIONS

3.1 Drawings

The following drawings have been used in our assessment:

- DC_21_121259-SITE___BLOCK_PLAN-985529
- DC_21_121259-PROPOSED_ELEVATIONS-997672
- DC_21_121259-PROPOSED_GROUND_AND_FIRST_FLOOR_PLANS-1018913
- DC_21_121259-PROPOSED_SECOND_FLOOR_AND_ROOF_PLAN-997671

3.2 Room Volume and Window Dimensions

Based on the above drawings we have based our calculations on the following worst case living room and bedroom and window dimensions.

- Living Room
  - Room Volume: 55 m^3
  - Window Area: 6 m^2
- Bedroom
  - Room Volume: 12 m^3
  - Window Area: 3 m^2

3.3 Room Finishes

Our assessment assumes that bedrooms and living rooms will contain typical amounts of soft furnishings, including sofas, chairs, beds and curtains.

4.0 CRITERIA

4.1 London Plan 2021

The assessment and recommendations in this report have been undertaken in accordance with Policy D14 of the adopted plan, which contains the following relevant sections:

"*D14. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

5) separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation

6) where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles".

4.2 Local Authority Requirements

It is understood that the following planning condition has been imposed by London Borough of Lewisham.

> *3. (a) The building shall be designed so as to provide sound insulation against external noise and vibration, to achieve levels not exceeding 30dB LAeq (night) and 45dB LAmax (measured with F time weighting) for bedrooms, 35dB LAeq (day) for other habitable rooms, with window shut and other means of ventilation provided.*

4.3 National Planning Policy Framework: 2021 (NPPF)

The NPPF, which was first published in 2012 with the latest revision in 2021, outlines the Government's environmental, economic and social policies for England. The NPPF aims to enable local authorities to produce their own distinctive local and neighbourhood plans, which should be applied in order to meet the needs and priorities of their communities.

Paragraph 185 of The *Ground Conditions and Pollution* section of the NPPF relates specifically to noise stating that:

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

> *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…'*

4.4 BS 8233: 2014 Internal Noise Criteria

BS 8233: 2014: '*Guidance on sound insulation and noise reduction for buildings*' describes recommended acceptable internal noise levels for residential spaces during daytime and night-time hours. These levels are shown in Table 4.1.

Activity	Location	Design range $L_{eq,T}$ Daytime (07:00-23:00)	Night-time (23:00-07:00)
Resting	Living Room	35 dB(A)	-
Dining	Dining Room/Area	40 dB(A)	-
Sleeping	Bedroom	35 dB(A)	30 dB(A)

Table 4.1: BS 8233: 2014 recommended internal background noise levels

4.5 World Health Organisation Guidelines

The World Health Organisation (WHO) document on *'Guidelines for Community Noise'* 1999 states the internal noise level guidelines as summarised in Table 4.2.

Specific Environment	Critical Health Effects	$L_{eq,T}$	$L_{max,\ F}$
Dwelling, Indoors	Speech Intelligibility and moderate annoyance, daytime and evening	35 dB(A)	-
Inside Bedrooms	Sleep disturbance, night-time	30 dB(A)	45 dB(A)

Table 4.2: WHO Internal noise level guidelines

The document also states *'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dBA LAmax more than 10-15 times per night, (Vallet & Varnet 1991).'*

4.6 External Noise Criteria

The guidance of BS 8233: 2014, with regards to external amenity spaces, is as follows:

"*For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*"

The site is in an area that would be considered mixed use / urban. We would therefore recommend the guidance upper guideline value of $L_{Aeq,T}$ 55 dB(A) would be an appropriate target although exceedance of this may also be acceptable where unavoidable.

4.7 Proposed Noise Level Criteria

On the basis of Sections 4.1 to 4.7 above, Table 4.3 presents our proposed minimum design targets to be achieved in the worst affected dwellings.

Location	Period	Design Target	
		$L_{eq,T}$	$L_{max,F}$
Living Rooms	Daytime (07:00-23:00 hours)	35 dB(A)	-
Bedrooms	Night-time (23:00-07:00 hours)	30 dB(A)	45 dB(A)*
External Amenity	24 Hours	55 dB(A)	-

Table 4.3: Proposed noise level criteria

***Please note that this is not an absolute limit, however, $L_{max,F}$ 45 dB(A) should not be regularly exceeded.**

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

4.8 Professional Guidance on Planning & Noise (ProPG)

The Institute of Acoustics' *Planning & Noise: Professional Practice Guidance on Planning and Noise: New Residential Development*: 2017 (the ProPG) provides a recommended approach for dealing with noise within the planning process, specifically in relation to new residential developments.

The ProPG follows 2-stage risk assessment approach. The two stages are as follows:

- Stage 1 - an initial assessment where external noise is rated against the risk of adverse effect; and
- Stage 2 – consideration of key elements to determine the suitability of the site for a residential dwelling.

The results of the initial Site noise risk assessment will determine the appropriate risk of developing the site and therefore how appropriate it is from a noise perspective.

Appendix B presents the Initial Site Risk assessment as presented in ProPG.

Stage 2 attempts to determine that good acoustic design principals have been incorporated into the design so that suitable internal noise levels can be achieved in habitable rooms and that suitable external noise levels can be achieved in outdoor amenity space.

4.9 Guidance on Ventilation

Guidance on ventilation and associated acoustic considerations is given in Acoustic Ventilation and Overheating – Residential Design Guide [AVO] issued jointly by the Association of Noise Consultants and the Institute of Acoustics.

In this guide, the need for ventilation (as falls under the requirements of Approved Document F [ADF] are covered in three main requirements as follows:

- Whole Dwelling Ventilation
    - General ventilation – continuous ventilation of rooms or spaces at a relatively low rate
- Extract Ventilation
    - Removal of air from a space or spaces (typically stale air from bathrooms or kitchens) to outside
- Purge Ventilation
    - Manually controlled removal of air at a high rate to eliminate fumes and odours, e.g. during painting and decorating or from burnt food. May be provided by natural or mechanical means.

Four main template systems for providing each of the above ADF ventilation requirements are summarised in the AVO guide as shown in Table 4.4.

Ventilation System	Method of Whole Dwelling Ventilation	Method of Extract Ventilation	Method of Purge Ventilation
System 1 [*Background ventilators and intermittent extract fans*]	Background ventilators (trickle vents)	Intermittent extract fans	Typically provided by opening windows
System 2 [*Passive Stack*]	Background ventilators (trickle vents) & passive stack	Continuous via passive stack	Typically provided by opening windows
System 3 [*Continuous Mechanical Extract (MEV)*]	Continuous mechanical extract (low rate), trickle vents provide fresh air	Continuous mechanical extract (high rate), trickle vents provide fresh air	Typically provided by opening windows
System 4 [*Continuously mechanical supply and extract with heat recovery (MVHR)*]	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)	Typically provided by opening windows

Table 4.4: Summary of template systems for ADF ventilation requirements

Where possible, natural forms of ventilation are typically preferred. However, in high noise areas, it may be necessary to recommend System 4, in order to minimise penetrations through the external building façade, which weaken the overall sound reduction performance.

Ventilation requirements will be assessed with consideration to the above systems.

5.0 ENVIRONMENTAL NOISE SURVEY

5.1 Unattended Noise Survey Procedure

Measurements were undertaken at two positions as shown on indicative site drawing 17355-SP1. The choice of these positions was based both on accessibility and on collecting representative noise data in relation to the identified significant noise sources.

The surroundings and position used for each monitoring location are described in Table 5.1.

Position No.	Description
1	The microphone was mounted on the site hoarding at the at the front of the building. The microphone was positioned 1 m above the fence. [1]
2	The microphone was mounted on the handrail to the terrace at the rear of the building. The microphone was positioned 1.5 m above the terrace deck. [1]

Table 5.1: Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 8233: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 14:20 on 21 February 2022 and 14:20 on 23 February 2022

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

5.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were light rain (on installation) and dry with light winds (on collection). It is understood that the weather conditions during the unattended survey were generally dry with light winds.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

5.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 2 No. Svantek Type 958 Class 1 Sound Level Meter
- Svantek Type SV33B Class 1 Calibrator

6.0 RESULTS

6.1 Environmental 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 Figures 17355-TH1 and 17355-TH2. A summary of the measured noise levels is presented in Table 6.1.

Period	Ambient Noise Level $L_{eq,T}$	Typical Maximum Noise Level $L_{Fmax,\ 5min}$
POSITION 1		
Daytime [07:00 - 23:00]	72 dB(A)	-
Night-time [23:00 - 07:00]	69 dB(A)	84 dB(A)
POSITION 2		
Daytime [07:00 - 23:00]	55 dB(A)	-
Night-time [23:00 - 07:00]	49 dB(A)	67 dB(A)

Table 6.1: Site noise levels for daytime and night time

The levels presented in Table 6.1 are as expected considering the site location in a mixed use / urban area. Provided adequate mitigation measures are put in place during the design and construction phase of the development, recommended internal noise levels can be achieved. Outline mitigation measures are described in Section 8.0 of this report.

Maximum noise levels shown in Table 6.1 are deemed to be 'not regularly exceeded' as required for maximum internal noise level specification purposes.

7.0 PROPG INITIAL SITE RISK ASSESSMENT

The environmental noise survey has determined the onsite noise levels. Table 6.1 shows the calculated day and Night-time noise levels to be used in the noise assessment.

With reference to the ProPG risk assessment guidance presented in Appendix B, Table 7.1 shows the identified risk level of this site.

Period	Measured Noise Level $L_{eq,T}$	ProPG Noise Risk	ProPG Action Guidelines
POSITION 1			
Daytime [07:00 - 23:00**]**	72 dB(A)	High	See Note [1]
Night-time [23:00 - 07:00**]**	69 dB(A)	High	
POSITION 2			
Daytime [07:00 - 23:00**]**	55 dB(A)	Low	See Note [2]
Night-time [23:00 - 07:00**]**	49 dB(A)	Low	

Table 7.1: ProPG initial site risk assessment

Note [1]: High – '*High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.'*

Note [2]: Low – *'At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an Acoustic Design Statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.'*

In consideration of the above, we would therefore recommend that assessing the site according to the guidance of British Standard 8233: 2014 will demonstrate that the impacts of noise can be suitably mitigated to avoid an adverse impact.

Provided adequate mitigation measures are put in place during the design and construction phase of the development, recommended internal noise levels can be achieved. Outline mitigation measures are described in Section 8.0 of this report.

It should be noted that good acoustic design is inherent to the development in that all bedrooms are to the rear, while the noisier front façade is exclusively made up of living rooms.

8.0 NOISE EXPOSURE ASSESSMENT

8.1 External Building Fabric - Non Glazed Elements

It is currently assumed that the non-glazed external building fabric elements of the proposed development would be comprised of existing masonry. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality window configuration, as shown in Section 8.2.

All non-glazed elements of the building facades should be designed to provide a sound reduction performance of at least the figures shown in Table 8.1 when tested in accordance with BS EN ISO 140-3: 1995.

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
Non glazed element SRI	41	43	48	50	55	55

Table 8.1: Minimum required sound reduction performance from non-glazed elements

8.2 External Building Fabric - Specification of Glazed Units

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to achieve recommended internal noise levels shown in Table 4.3. This specification therefore presents the most robust assessment, for BS 8233: 2014 criteria for internal noise levels in a bedroom at all affected facades.

The minimum sound reduction index (SRI) value required for all glazed elements to be installed is shown in Table 8.2. **The performance is specified for the whole window unit, including the frame and other design features.**

Type	Façade	Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)					
		125	250	500	1k	2k	4k
A	Front	30	32	38	36	40	49
B	Rear	24	20	25	34	37	35

Table 8.2: Required glazing performance

Where non-vision spandrel panels are proposed, they should provide sound reduction performance at least equal to that required of the glazing in order to maintain the acoustic integrity of the external building fabric.

The attached site plan indicates 17355-SP2 indicates the location of the proposed glazing types.

It is essential that prospective glazing system suppliers can demonstrate compliance with the acoustic performance detailed in our specification rather than simply offering a generic glazing configuration. The complete glazing system should achieve the performance requirements stated in Table 8.2 when tested in accordance with BS EN 10140-2: 2010.

It is essential that the performance presented in Table 8.2 is met. However, the following typical configurations would be expected to meet the required levels of sound insulation.

- Type A: 10 mm Glass - 12 mm Airgap - 10 mm Glass: R_w 39 dB
- Type B: 4 mm Glass - 16 mm Airgap - 4 mm Glass: R_w 31 dB

N.B. Type B is a nominal glazing configurations; however, Type A is a high performance glazing system.

Please note that the above guidance only considers acoustic performance. Other disciplines, which consider thermal, safety, durability etc. should be consulted to ensure suitability.

8.3 External Building Fabric - Specification of Trickle Ventilators

It is understood the proposal on this site it to use System 1 ventilation as summarised in Table 4.4.

In order to comply with Building Regulations (Part F), fresh air ventilation to habitable rooms is required via trickle ventilators.

The trickle ventilators should comply with the minimum octave band normalised weighted level differences stated in Table 8.3.

Type	Façade	Minimum $D_{n,e,}$ Values (dB) at Octave Band Centre Frequency (Hz)					
		125	250	500	1k	2k	4k
A	Front	32	33	42	45	52	56
B	Rear	31	30	30	34	28	30

Table 8.3: Required trickle ventilator performance

N.B. Type B should be achievable with standard units; however, Type A performance may call for an acoustic trickle ventilator.

8.4 Flanking Transmission

It is understood that the external building fabric for this development does not include curtain walling or any other lightweight cladding. Therefore, a flanking performance specification should not be required.

Junctions where party walls and floors interface with the external building fabric should however be carefully detailed. Suitable flexible cavity stops should be introduced into cavities at party floor/wall lines.

9.0 ASSESSMENT OF EXTERNAL AMENITY SPACE

As shown in Section 4.5, the proposed design target for external amenity space is to ensure noise levels do not exceed L_{Aeq} 55 dB(A).

Comparing the measured daytime ambient noise levels at Position 2 (the rear) with this upper design range indicates that the garden to the rear of the property would be expected to experience ambient noise levels that comply with this requirement.

Compliance with the design target is therefore expected without the need for mitigation, with external amenity areas currently proposed to be located at the rear of the development.

10.0 CONCLUSION

An environmental noise survey has been undertaken at 4 Waldram Park Road, London in order to measure ambient noise levels in the area.

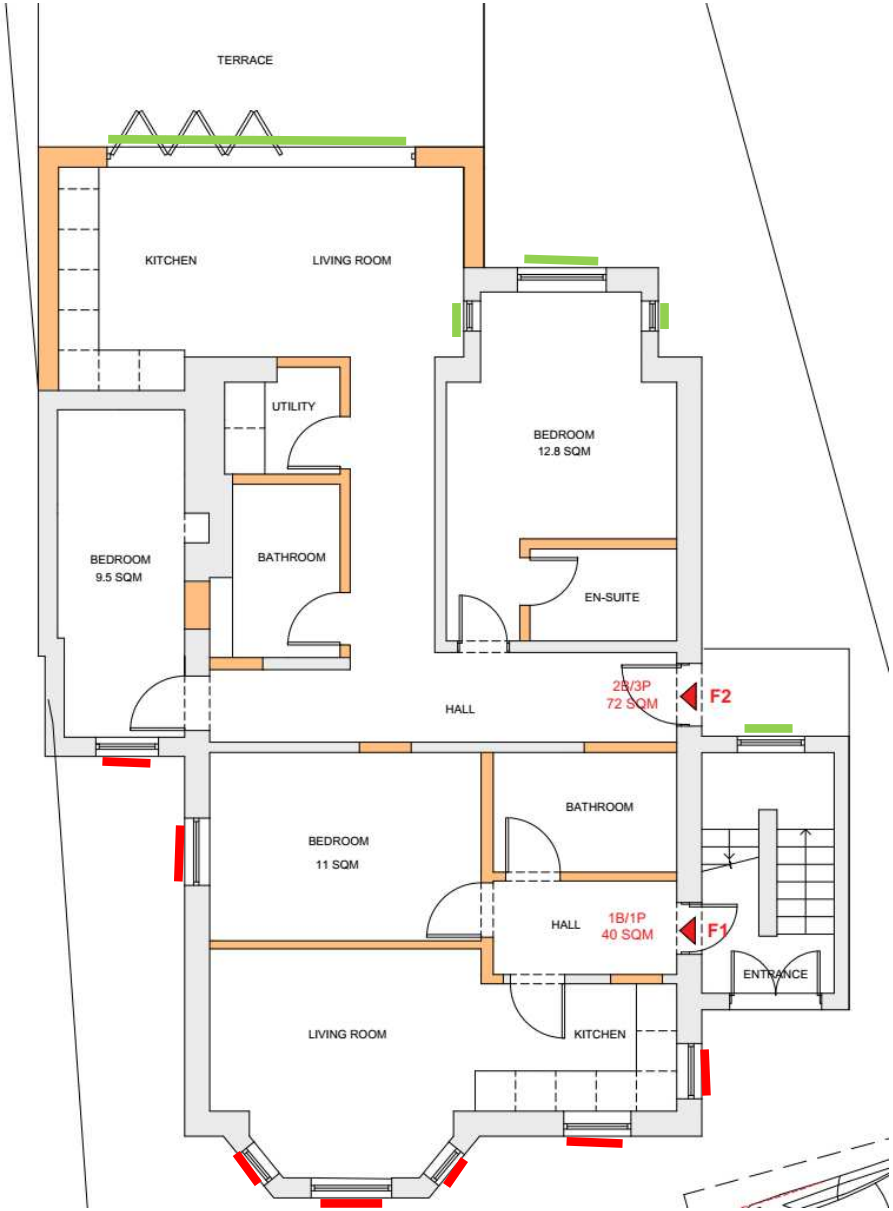
Measured noise levels have allowed an assessment of the level of exposure to noise of the proposed development site to be made.

Outline mitigation measures, including a glazing specification and the use of appropriate ventilation have been recommended and should be sufficient to achieve recommended internal noise levels for the proposed development according to BS 8233: 2014, WHO and the requirements of the Local Authority.

Author	**Matthew Markwick** Principal Consultant BSc (Hons) MSc MIOA		17 March 2022
Approved	**Duncan Martin** Director BSc (Hons) MIOA		17 March 2022

17355-SP1 Indicative site plan indicating noise monitoring position and site surroundings **Date:** 17 March 2022

Applies to all floors, including equivalent facades where the layout varies.



Glazing Type A

Glazing Type B

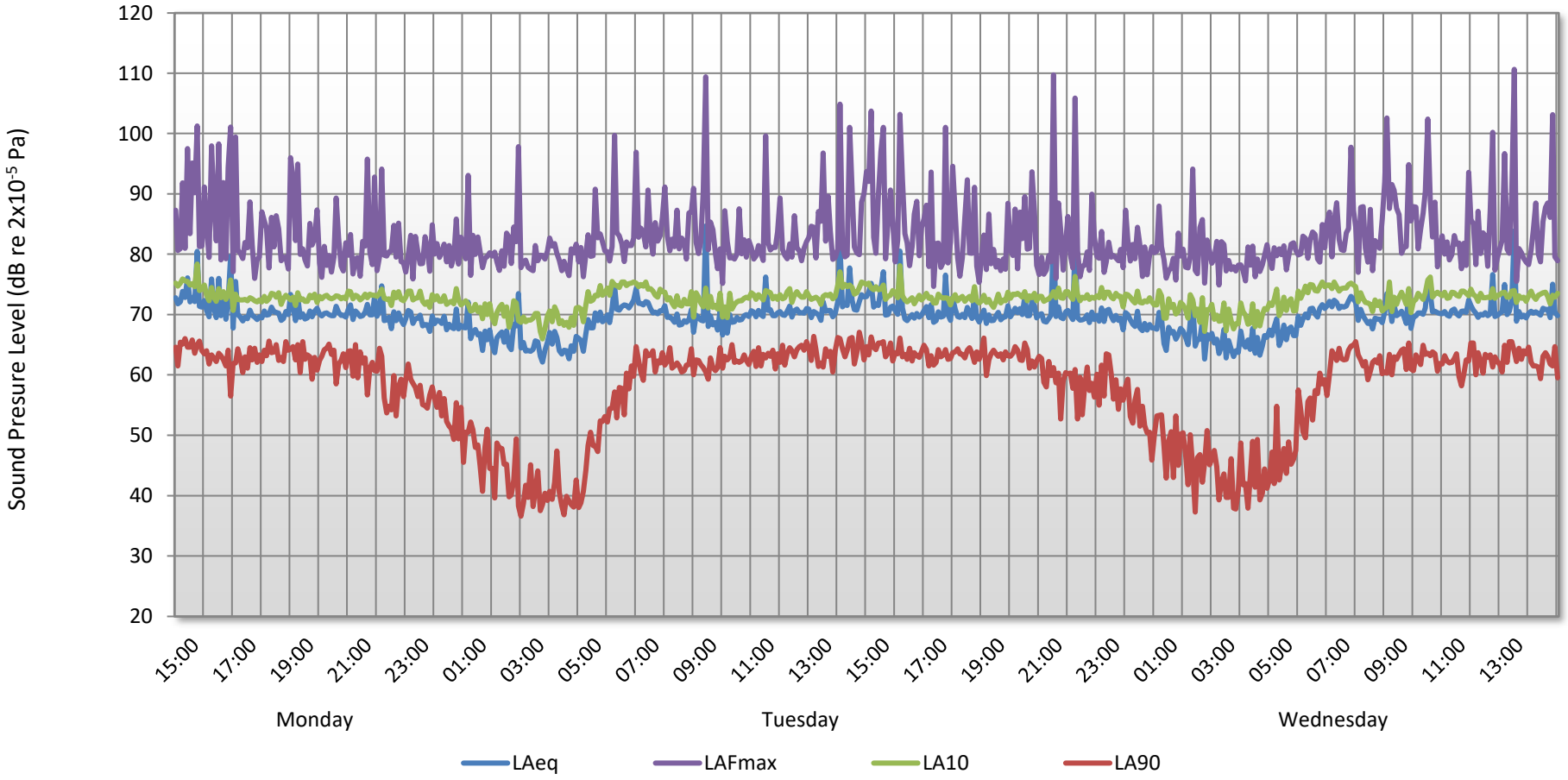
17355-SP1 Indicative site plan indicating noise monitoring position and site surroundings

Date: 17 March 2022

4 Waldram Park Road, London

Position 1

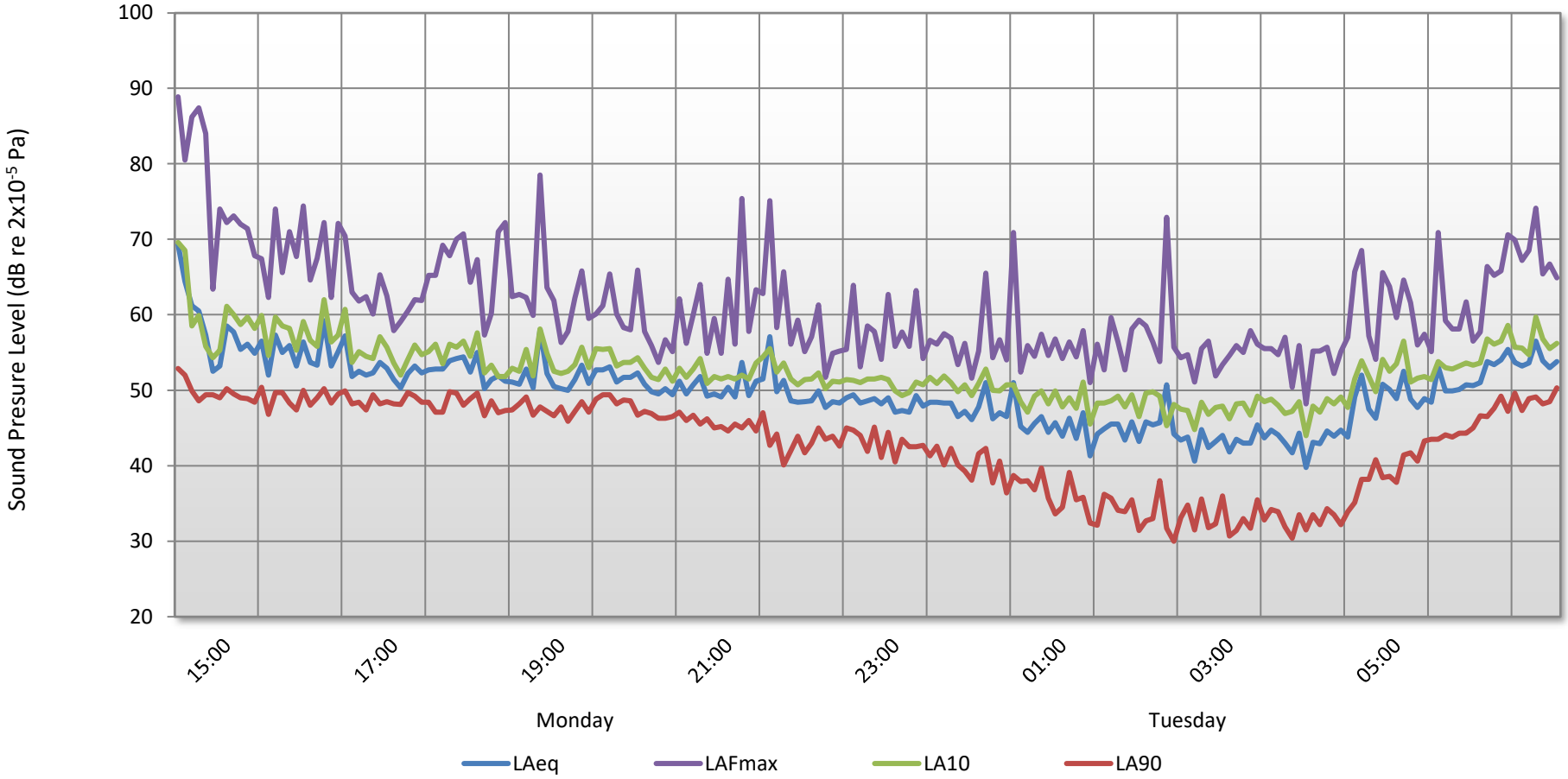
Environmental Noise Time History
21 February 2022 to 23 February 2022



4 Waldram Park Road, London

Position 2

Environmental Noise Time History
21 February 2022 to 22 February 2022



17355-TH2

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and 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 not 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 not 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 10 such octave bands whose centre frequencies are defined in accordance with international standards.

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 one alone and 10 sources produce a 10 dB 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 3 dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception 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 reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

ProPG Initial Site Risk Assessment Guidance

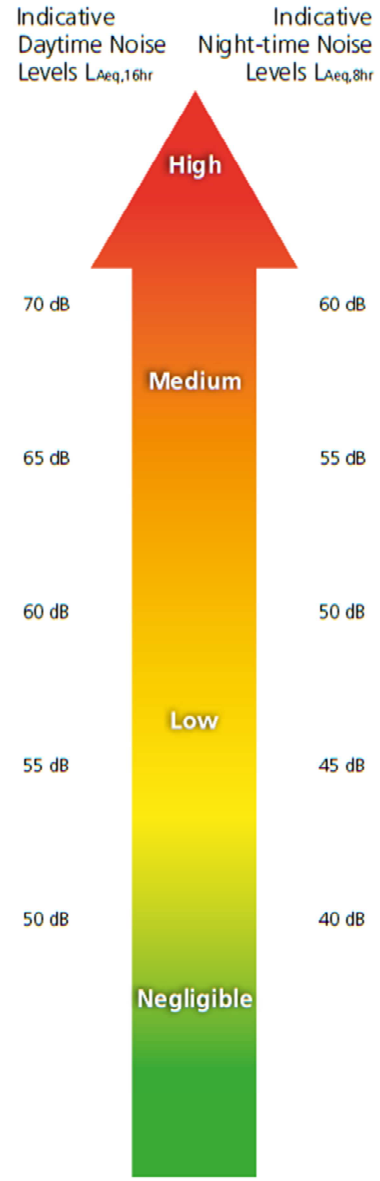
NOISE RISK ASSESSMENT	POTENTIAL EFFECT WITHOUT NOISE MITIGATION	PRE-PLANNING APPLICATION ADVICE
	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment