25 to 49 Victoria Road
Ruislip Manor,
Hillingdon,
HA4 9AA

Environmental Noise Survey and Noise Impact Assessment Report

28 June 2023

Client: URBANHOLD LIMITED

QA23038/ENS

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For Information

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Contents

1.0 INTRODUCTION

Quantum Acoustics Ltd have been appointed to prepare this Noise Assessment which accompanies an outline planning application for the proposed residential development of 25 to 49 Victoria Road, Ruislip Manor.

As part of the Noise Assessment an environmental background noise survey has been undertaken. This report presents our methodology and findings.

The data obtained may be used, in due course, as the basis for various acoustic assessment and design purposes.

2.0 SITE DESCRIPTION

The location of the proposed development in relation to the local transport infrastructure is shown below, outlined in red.

Figure 1: Site Plan (OpenStreetMap 2022, Ordnance Survey)

The site is located to the immediately south of Ruislip Manor train station and is bounded to the south by Linden avenue.

To the north, the site is bounded by railway, part of the metropolitan line and piccadilly line.

To the east, the site adjoins Linden Avenue Car Park, serving the local public library and local retail.

To the south, the site is bound by Linden Avenue.

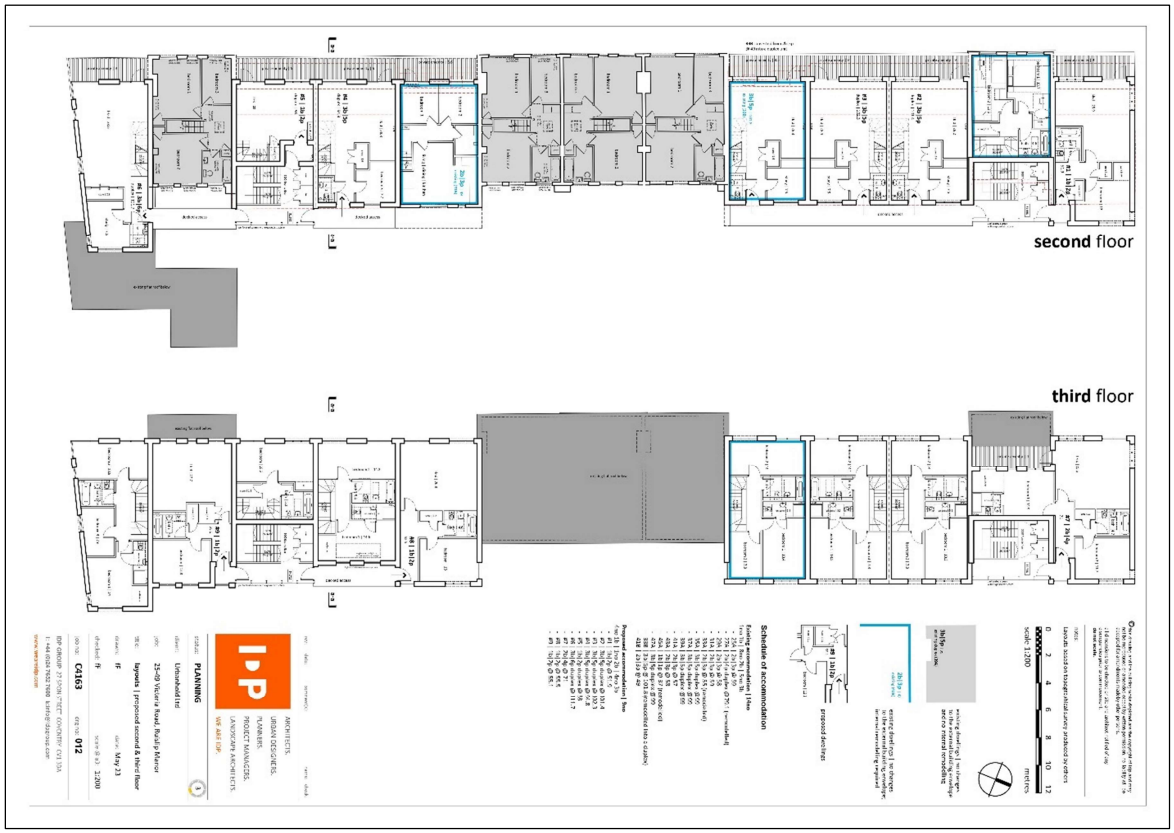
To the west, the site is bound by Victoria Road. Adjacent to Melton Road are a number of residential & commercial properties including but not limited to Supermarket, Convenience store, estate agents, bakers, chemist & coffee shop.

The wider area predominantly comprises a mixture of both residential and commercial uses.

3.0 PROPOSED DEVELOPMENT

The proposed redevelopment seeks to extend the existing roof at 2nd and 3rd floor level to create 9 additional dwellings.

The proposed general arrangement and internal arrangements of the site is shown in the figure below:



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4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Automated Noise Monitoring

An automated environmental noise survey was undertaken from approximately 12:00 hours on Tuesday 13th June 2023 to approximately 12:00 hours on Friday 16th June 2023.

Weather conditions were mainly dry and with light winds. The conditions were therefore deemed generally suitable for the measurement of environmental noise.

4.2 Measurement Procedure

Noise monitoring equipment was located at the following locations:

Position	Description
Position 1	Located towards the NW corner of the site, overlooking Victoria Road. The measurement microphone was fixed to a pole outside an existing first floor flat and suspended approximately 5m above the local ground level.
Position 2	Located on the NE corner of the site. The measurement microphone was fixed to a pole and suspended approximately 15m above the local ground level in free field conditions.
Position 3	Located on the east boundary of the site. The measurement microphone was attached to a pole extending from a raised rear terrace approximately 10m above the local ground level in free field conditions.
Position 4	Located on the SW corner of the site, overlooking Victoria Road. The measurement microphone was fixed to a store front approximately 5m above local ground level.

Noise monitoring equipment was located as shown on the following plan.

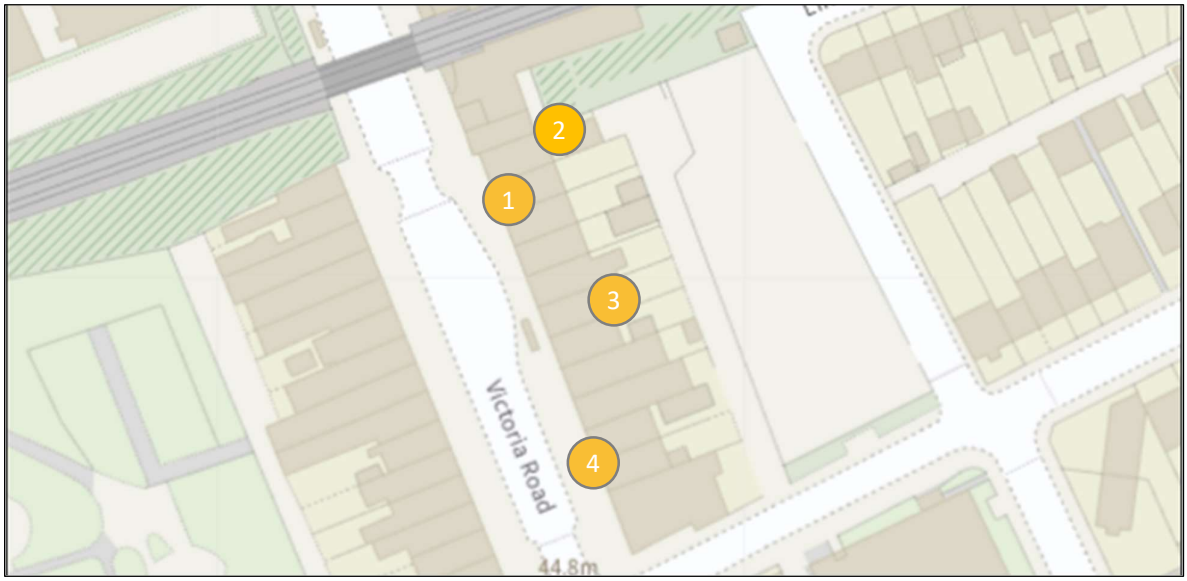


Figure 2: Site Plan (OpenStreetMap 2022, Ordnance Survey)

The monitoring equipment at Positions 1 and 3 were configured to record the L_{A90}, L_{Aeq} and $L_{Amax,\ fast}$ sound pressure level over consecutive 15-minute periods to provide a detailed time history profile showing fluctuations in noise levels. The equipment was also configured to undertake higher resolution (1 second) logging to assist with the identification and discrimination of noise events.

The sound level analyser positioned at 4 and 2, were configured to continuously log "fast" A-weighted sound pressure levels at a resolution of 1 second. The data has been post-processed using Convergence Instruments "NSTR-AutoCalc" software to determine 15-minute $L_{Aeq,\ 15min}$ and L_{Amax} noise metrics.

4.3 Automated Noise Monitoring Equipment

Details of the equipment used for the survey are summarized in the following table:

Description	Manufacturer	Type	Serial Number
Type 1 Sound Level Meter	Svantek	971A	124647
Type 1 Sound Level Meter	Svantek	971A	124674
Type 1 Sound Level Meter	Convergence Instruments	NSRT_mk4	
Type 1 Sound Level Meter	Convergence Instruments	NSRT_mk4	
Acoustic Calibrator	Svantek	SV 33B	99005

Calibration certificates for the equipment, traceable to national standards, used in this survey are available upon request.

Calibration checks were carried out prior to and on completion of the survey, with no significant calibration drift observed.

5.0 SURVEY FINDINGS

The following section uses the following acoustic terms:

A-weighted noise levels are frequency-weighted in a way that approximates the frequency response of the human ear and allows sound levels to be expressed as a single figure value. The A-weighted level is therefore a measure of the subjective loudness, rather than physical amplitude.

L_{90} is the noise levels that is exceeded for 90% of the measurement period. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is often used as a basis for setting noise emission criteria.

L_{eq} is the level of a notional continuous sound that would deliver the same sound energy as the actual fluctuating sound over the measurement period. This may be thought of as the "average" level during the measurement period.

L_{max} is the maximum noise level during the measurement period.

5.1 Noise Level Results

Detailed time history graphs showing the A-weighted L_{90}, L_{eq} and L_{max} noise levels measured during each consecutive 15-minute period of the survey are attached at Appendix A.

The measurement data has been post processed to determine the typical daytime ($L_{Aeq,16\ hour}$) and night-time ($L_{Aeq,\ 8\ hour}$) values. The results of the analysis are presented in the table below:

L_{eq} Noise Levels		
Position 1	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
13/06/2023	*65	62
14/06/2023	68	62
15/06/2023	66	62
16/06/2023	66	---
Position 2	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
13/06/2023	*66	62
14/06/2023	66	62
15/06/2023	66	62
16/06/2023	66	--

Position 3	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
13/06/2023	*51	46
14/06/2023	51	45
15/06/2023	51	41
Position 4	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
13/06/2023	*60	55
14/06/2023	59	55
15/06/2023	59	55
16/06/2023	59	--
*Data is average for available time period		

5.2 Data Analysis and Discussion

Position 1 - 4 values have been calculated for each complete day/night-time period during the automated monitoring period and averaged to provide typical daytime/night-time values and night-time LAmax, fast values.

The calculated values are summarised in the table below:

Measurement Location	Calculated Noise Level		
	Daytime Noise Level, $L_{Aeq, 16hour}$ (dB)	Night-time Noise Level, $L_{Aeq, 8\ hour}$ (dB)	Night-time $L_{Amax, fast}$ (dB)
Position 1	63*	59*	80
Position 2	65	62	80
Position 3	51	46	56
Position 4	57*	52*	71
*a 3dB correction has been applied to account for façade reflections			

Ambient noise levels at monitoring position 1 and 4 were dominated by road traffic noise from Victoria Road, activities relating to neighbouring commercial properties and localised pedestrian movements along Victoria Road.

Noise levels towards the north of the site is impacted by trains on the Metropolitan & Piccadilly lines. This particularly impacted positions 1 and 2.

At position 3, dominant noise source was localised pedestrian movements from Linden Avenue car park.

It was observed that vehicle movements along Victoria were mainly personal cars and taxis, with regular public transport busses.

During site attendances it was also noted that noise associated with business uses in the vicinity of the site was only intermittently audible and did not contribute significantly to the overall measured noise levels.

Additionally, engineering works were being undertaken on the pavement near position 1 when the sound level meter was installed. We were advised that the engineering works would extend across the following day. Whilst such noise associated with the engineering works was noted to be intermittently audible it was not considered dominant.

6.0 RELEVANT PLANNING POLICIES AND NOISE ASSESSMENT GUIDANCE

6.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the primary statement of noise policy for England and applies to all forms of noise other than occupational noise. The NPSE sets out the long term vision of Government noise policy which is 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."*
>
> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> • 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 Explanatory Note to the NPSE introduces guidance to assist in defining the adverse impacts:

> **NOEL – No Observed Effect Level**
>
> This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.
>
> **LOAEL – Lowest Observable Adverse Effect Level**
>
> This is the level above which adverse effects on health and quality of life can be detected.
>
> **SOAEL – Significant Observed Adverse Effect Level**
>
> This is the level above which significant adverse effects on health and quality of life occur.
>
> These categories are further discussed in the Planning Practice Guidance section below.

The NPSE acknowledges that it is not possible to have a single objective noise level based measure that is mandatory and applicable to all sources of noise in all situations.

5.2 Planning Practice Guidance

The government's Planning Practice Guidance is a web based resource and provide advice on various issues, including noise (https://www.gov.uk/guidance/noise--2). The advice (March 2014, latest update July 2019) states in the context of considering when noise is relevant to planning, "noise needs to be considered when new development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)."

The Planning Practice Guidance pages also include more explanation of the effect level categories noted above, providing an explanatory Noise Exposure Hierarchy Table, which explores how actions such as a requirement for noise mitigation, or prevention of a development, might be assessed with respect to whether noise levels are considered above the category thresholds.

No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

5.3 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was first published in 2012, replacing the existing Planning Policy Guidance Note 24 (PPG24) "Planning and Noise", and sets out the government's planning policies for England and how these are expected to be applied.

The latest revision of the NPPF (July 2021) states that planning system should contribute to, and enhance, the natural and local environment by (amongst others) "preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."

NPPF advises that planning policies and decisions should 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] "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" and "identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*
>
> *"…new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

The NPPF makes reference to the Noise Policy Statement for England.

5.4 Local Authority Policy/Guidance

The site lies within the jurisdiction of the London Borough of Hillingdon. The adopted Local Plan for Hillingdon Borough Council is comprised of two sections. The two sections of the Local Plan form the councils future development strategy for the borough and set out a framework of detailed policies to guide planning decisions.

The Local Plan Part 1 sets out the overall level and broad locations of growth up to 2026. IT comprises a spatial vision and strategy, strategic objectives, core policies and a monitoring and implementation framework with clear objectives for achieving delivery.

Polices relevant to the proposed development with regards to noise are set out below:

Policy EM8 – Land, Water, Air and Noise

> *"…*
>
> *Noise*
>
> *The council will investigate Hillingdon's target areas identified in the Defra Noise Action Plant, promote the maximum possible reduction in noise levels and will minimise the number of people potentially affected.*

The Council will seek to ensure that noise sensitive development and noise generating development are only permitted if noise impacts can be adequately controlled and mitigated.

…"

Hillingdon Borough Council set out a number of Strategic Objectives which align with specific planning policies, relevant to Policy EM8 and noise is SO10 as set out below:

"SO10: Improve and protect air and water quality, reduce adverse impacts from noise including the safeguarding of quiet areas and reduce the impacts of contaminated land."

The Local Plan Part 2 'Development Management Policies and Site Allocations and Designations' were adopted as part of the borough's development plant in January 2020. Policies relevant to this proposal are set out below:

*"**Policy DMT 1: Managing Transport Impacts***

A) Development proposals will be required to meet the transport needs of the development and address its transport impacts in a sustainable manner. In order for developments to be acceptable they are required to:

…

v) have no significant adverse transport or associated air quality and noise impacts on the local and wider environment, particularly on the strategic road network.".

*"**Policy DMT 2: Highways Impacts***

Development proposals must ensure that:

…

iii) they do not contribute to the deterioration of air quality, noise or local amenity or safety of all road users and residents.

…"

5.5 The World Health Organisation (WHO) Guidelines 1999

The Guidelines for Community Noise (World Health Organisation, 1999) included values for community noise in specific environments.

It is important to note that the WHO Guidelines are aspirational, as illustrated by the National Noise Incidence Study (NNIS, 2000), which indicates that 55% of the population of England and Wales are exposed to external noise levels above 55 dB $L_{Aeq,\ 16hour}$, day. A National Physical Laboratory (NPL) report (with reference CMAM 16, dated September 1998) reviewing the original 1980 WHO Guidelines and the 1995 draft version of the current Guidelines stated:

"Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached."

"As such, it would be unwise to use the WHO guidelines as targets for any form of strategic assessment, since, given the prevalence of existing noise exposure at higher noise levels, there might be little opportunity for and little real need for any across the board major improvements. On the other hand, the most constructive use for the WHO guidelines will be to set thresholds above which greater attention should be paid to the various possibilities for noise control action when planning new developments. It is important to make clear at this point that exceedances do not necessarily imply an over-riding need for noise control, merely that the relative advantages and disadvantages of noise control action should be weighed in the balance."

To prevent moderate annoyance in outdoor living areas, such as gardens and balconies of dwellings, the WHO guideline value is 50 dB $L_{Aeq, 16h}$. This can be described as an upper limit for the average noise level across the daytime and evening period (07:00h to 23:00h). The corresponding guideline value to prevent serious annoyance is stated as 55 dB $L_{Aeq, 16h}$.

However, it is again noted that these levels are aspirational in nature, as described above.

In terms of the internal noise environment, in order to achieve maximum speech intelligibility and to avoid moderate annoyance, the guideline value for noise levels within dwellings is stated as 35 dB $L_{Aeq, 16h}$ (covering the day and evening 07:00h to 23:00h). The corresponding value for the night period (23:00h to 07:00h) to avoid sleep disturbance is 30 dB $L_{Aeq, 8h}$.

Additionally in terms of sleep disturbance, a guideline value of 45 dB L_{Amax} is given. In relation to this value, the Guidelines state:

"When the background noise is low, noise exceeding 45 dB LAmax should be limited, if possible…"

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10–15 times per night…"

5.6 WHO Environmental Noise Guidelines 2018

An updated version of the Guidelines was published in October 2018. It constitutes a significant revision of the 1999 Guidelines, rather than comprising minor amendments. In relation to road traffic and railway noise, the guidance states the following:

Road Traffic Noise

For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below **53 decibels (dB)** L_{den}, as road traffic noise above this level is associated with adverse health effects.

For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night time below **45 dB** L_{night}, as night-time road traffic noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.

Railway Noise

For average noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic below **54 dB** L_{den}, as railway noise above this level is associated with adverse health effects.

For night noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic during night time below **44 dB** L_{night}, as night-time railway noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from railways in the population exposed to levels above the guideline values for average and night noise exposure. There is, however, insufficient evidence to recommend one type of intervention over another.

The L_{den} is an equivalent sound level that represents the situation over the full 24-hour day, taking account of the Lday (0700-1900h), with a penalty of 5dB(A) for evening noise Levening (1900-2300h) and a penalty of 10dB(A) for night time noise Lnight (2300-0700). The Lnight index is equivalent to the $L_{Aeq, 8h}$ index as used in other standards such as BS 8233 (but not necessarily with the same numerical guidelines).

The guidance no longer specifies LAmax criteria but states in section 2.2.2:

> *"In many situations, average noise levels like the Lden or Lnight indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (LA,max) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by LA,max. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."*

As with the 1999 WHO document, the guideline values in the 2018 document represent aspirational targets to be achieved in the long term, rather than values that should immediately be adopted into relevant policy.

This is reflected in the following excerpt from the government's Aviation 2050 consultation document (which relates to aircraft noise, but the principle of the statement is relevant to other noise sources):

> *"The government is considering the recent new environmental noise guidelines for the European region published by the World Health Organisation (WHO). It agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these effects, including the total cost of action and recent UK specific evidence which the WHO report did not assess."*

Therefore, other current standards and guidance, such as BS 8233, still represent the most relevant and appropriate basis for assessment.

5.7 British Standard BS 8233:2014

Guideline values for dwellings with respect to internal and external noise levels are included in BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BSi).

The standard states 50 dB $L_{Aeq,\,T}$ as being desirable as a steady state noise level not to be exceeded in gardens. It also states 55 dB $L_{Aeq,\,T}$ as an upper guideline value. The time period T is usually taken to be the 16-hour day (07:00h to 23:00h).

Paragraph 7.7.3.2 of the standard goes on to say the following:

> *"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 LAeq,T, with an upper guideline value of 55 dB LAeq,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.*
>
> *Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB LAeq,T or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."*

It can be seen that external noise levels, especially on small balconies to apartment blocks, are not proposed to be a controlling index by which suitability of a residential site is defined.

Therefore, when designing noise sensitive developments that incorporate gardens or other external amenity areas, the intent shall be to provide an area for each property in which the noise levels are consistent with these standards. Where these standards cannot be achieved, then reasonable measures shall be employed to provide screening or other forms of mitigation so as to minimise the noise levels in the external amenity areas.

An important principle here is that sustainable development sites will often be exposed to relatively high levels of environmental noise, and while means are available to insulate internal spaces, they are not always available to protect external spaces. Strict adherence to the enforcement of such external noise criteria would preclude development in the majority of areas considered for development in semi-urban or urban environments or in areas in the vicinity of transportation noise sources. This is why the external standards shall be viewed as targets or triggers of mitigation measures rather than thresholds not to be exceeded in all circumstances.

Buildings can be designed to achieve specific levels of insulation against external noise. It is reasonable, therefore, to set specific internal noise standards as the test of whether a development satisfies the requirements of the NPPF and the aims of the NPSE. In essence, these require a high-quality design that achieves a good standard of amenity.

Guidance in respect of indoor ambient noise levels is contained in Table 4 of BS 8233:2014 and tabulated below.

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35 dB $L_{Aeq,\ 16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,\ 16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16h}$	30 dB $L_{Aeq,\ 8h}$

Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

The previous edition of BS 8233 included quantitative guidance with respect to night-time L_{Amax} noise levels in bedrooms. BS 8233:2014 does not provide such guidance, however in paragraph 7.7.5.1.1 it is noted that the recommendations for ambient noise in hotel bedrooms are similar to those for living accommodation and Table H.3 in Annex H.3 gives example night-time L_{Amax} limits in hotel bedrooms of 45-55 dB.

The WHO study informing the 1999 Guidelines derived the L_{Amax} night time noise standard on the basis of 10 to 15 occurrences per night.

5.8 ProPG: Planning and Noise (2017)

ProPG is a guidance document prepared by a working group consisting of representatives of the Association of Noise Consultant (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH). It provides professional practice guidance on Planning and Noise with regard to new residential development that will be exposed to airborne noise from transport sources. It

is also noted that good professional guidance should have regard to any reasonably foreseeable changes to existing, and/or new sources, as well as sources currently effecting the site.

ProPG provides two stages of assessment, the first being an initial site risk assessment and the second being a full assessment. The second is only necessary when the initial risk assessment and circumstances dictate.

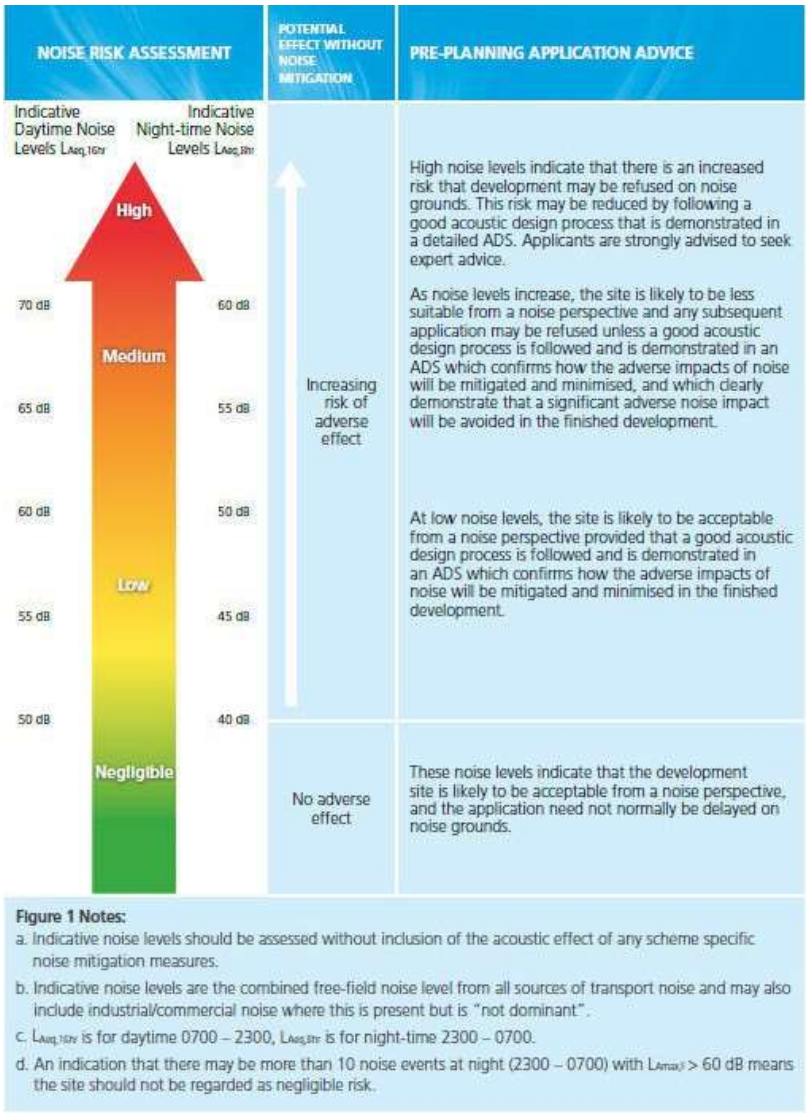
Stage 1: Initial Site Noise Risk Assessment

ProPG suggests that a Stage 1 initial site risk assessment should be undertaken on all sites at the earliest possible opportunity in order to gauge the potential effect of noise on future residential premises, without the benefit of any noise mitigation measures.

It is important to note that the initial 'Stage 1' assessment at a proposed residential development is not the basis for the eventual recommendation to the decision maker. It is intended to highlight the importance of good acoustic design within a scheme. For example, a site with a high risk of adverse effect without noise mitigation may not necessarily be unsuitable for development; however, the importance of good acoustic design provided by experts would be critical at such a site, with a detailed acoustic design statement provided.

ProPG states that a site which displays a low risk of adverse effect without noise mitigation is more likely to be acceptable from a noise perspective, provided that a good acoustic design process is followed, and sites with no risk of adverse effect need not normally be delayed on noise grounds.

The criteria provided for Stage 1 assessment of the L_{Aeq} noise levels for day and night within the initial site risk assessment are provided below:



The initial noise risk assessment also considers the effect of L_{AMax} maximum noise levels at night (2300-0700h), where the guidance states:

> *"An indication that there may be more than 10 noise events at night (2300 – 0700) with LAmax,F > 60 dB means the site should not be regarded as a negligible risk."*

Stage 2: Overview

Stage 2 of the ProPG guidance provides a systematic consideration of key elements of acoustic design. The guidance advocates a proportional, risk based approach to the Stage 2 assessment. The Stage 1 risk assessment should inform whether careful consideration is required, with the detailed input of specialist acoustic consultants essential at higher risk sites, or straightforward accelerated decision making potentially possible in relation to lower risk sites.

Stage 2: Element 1 – Good Acoustic Design Process

ProPG states that a good acoustic design process is an implicit part of achieving the requirements of government noise policy, as set out in the NPSE and NPPF, and outlined in Supplementary Document 1 of the ProPG.

However, it is also stated that good acoustic design does not simply constitute compliance with recommended internal and external criteria, if the solution adversely affects living conditions within the spaces, and hence the quality of life of the inhabitants. The following example is provided:

> *"Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided; occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for the approach, is not regarded as good acoustic design."*

Applicants must therefore consider all possibilities for mitigation including but not limited to:

- Checking the feasibility of relocating, or reducing noise levels from relevant sources;
- Considering options for planning the site or building layout;
- Considering the orientation of proposed building(s);
- Selecting construction types and methods for meeting building performance requirements;
- Assessing the viability of alternative solutions;
- Assessing external amenity area noise;
- Examining the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.

Stage 2: Element 2 – Internal Noise Level Guidelines

ProPG considers the guidance provided within BS 8233:2014 to be suitable for the assessment of internal noise levels. However, the ProPG provides additional commentary. The following table reproduces the internal ambient criteria provided within Figure 2 of ProPG. The guidance from BS 8233:2014 is displayed in black, with additional comments and criteria from ProPG in blue:

Activity	Location	0700h to 2300h	2300h to 0700h
Resting	Living room	35 dB $L_{Aeq, 16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16h}$	30 dB $L_{Aeq, 8h}$ 45 dB $L_{Amax,F}$ (Note 4)

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g., bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A [which advocates reference to available dose-response relationships appropriate for the types of noise source being considered]).

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal LAeq target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal LAeq levels start to exceed the internal LAeq target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal LAeq levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D [which states that if certain criteria are fulfilled the noise practitioner should recommend refusal on noise grounds alone, regardless of any case for the development]).

It should be noted that the guidance above includes criteria for L_{Amax} noise levels, along with further guidance relating to the assessment of maximum levels in Note 4.

Stage 2: Element 3 – External Amenity Area Noise Assessment

With regard to external amenity spaces, ProPG references the guidance provided within

BS 8322:3014, section 6. ProPG presents a statement summarising BS 8233:2014 section 6 which states:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq, 16h}$"*

The standard continues:

> *"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."*

ProPG also references guidance within the PPG on noise, which states:

> *"If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended".*

It is highlighted within ProPG that both BS 8233:2014 and the PPG on noise require a decision to be made as to whether or not external amenity areas are intrinsically important to the required design. However, it is noted that the PPG also states that noise impacts may be partially offset if the residents of affected dwellings are provided, through the design of the development or the planning process, with access to alternative spaces as set out in paragraph A3.6 of this appendix.

ProPG section 2.51 states that Local Planning Authorities (LPAs) will be best placed to provide guidance in relation to what is 'relatively quiet', as the concept will inherently vary between scenarios.

The advice in section 2.52 of ProPG highlights the increased importance of LPAs protecting publicly accessible external amenity spaces in areas that typically exhibit heightened existing noise climates, such as cities, where development is necessary but private external amenity areas below 55 dB $L_{Aeq,16hour\ are}$ not practicable. Publicly accessible spaces such as parks and squares in these areas may be providing respite for nearby residents and, therefore, should be protected.

Stage 2: Element 4 – Assessment of Other Relevant Issues

This section of the guidance relates to all other relevant issues and seeks to build upon relevant national and local planning and noise policies. Examples are provided including, but not limited to, the following:

- Compliance with relevant national and local policy
- Magnitude and extent of compliance with ProPG
- Likely occupants of the development
- Acoustic design v unintended adverse consequences
- Acoustic design v wider planning objectives

Other issues specific to the site may be added by the LPA, where relevant.

5.9 Acoustics, Ventilation and Overheating Guide, AVO 2020

In addition to considering internal noise levels under background ventilation conditions, it is appropriate to consider the interaction between internal noise levels and means of controlling overheating. Increased ventilation flow is commonly provided as a means to control thermal comfort, but this is not controlled under Building Regulations.

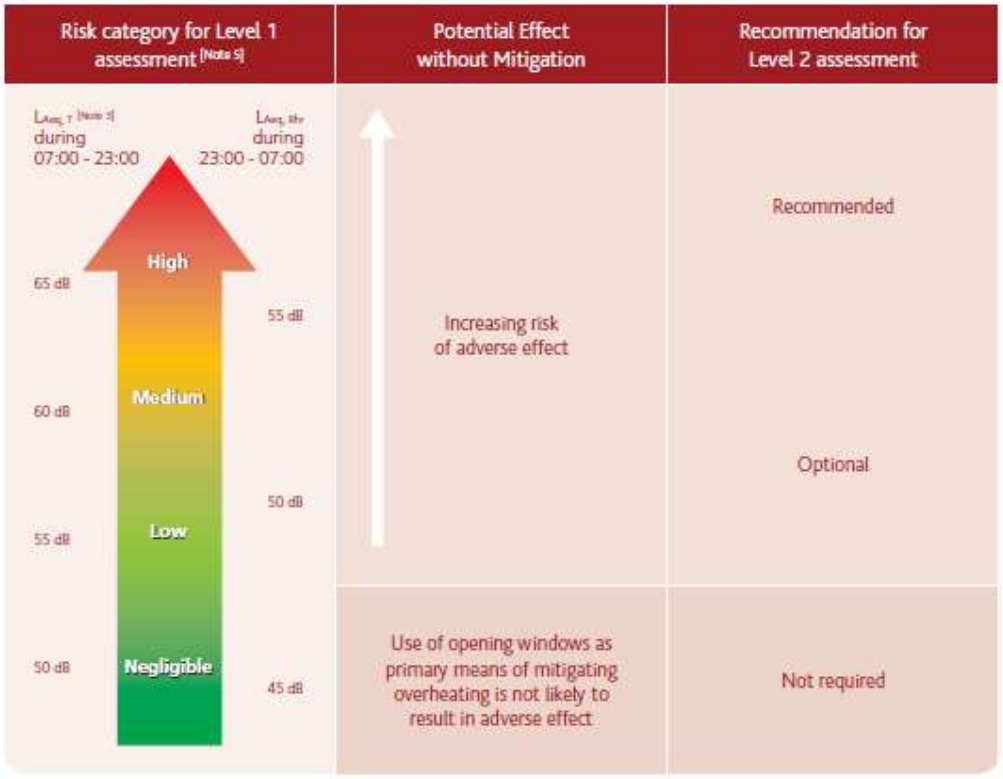
The Association of Noise Consultants document Acoustics, Ventilation and Overheating Guide (AVO) provides guidance for internal noise criteria when additional ventilation is required for thermal comfort. The three main methods for providing additional ventilation by the guidance are:

- Passive Ventilative Cooling: Introducing external air to a space to provide a cooling effect without the use of fans. The most common method is to use open windows, but other façade openings can also be used. Note that trickle vents do not enable sufficient airflow to have a significant cooling effect.
- Mechanical Ventilative Cooling: Using fans to introduce external air to a space to provide a cooling effect. Due to the airflow required, this type of system often involves significant plant and duct size requirements.
- Comfort Cooling: Using a mechanical system to cool the air within a space to achieve a user-defined setpoint. This type of system will require some form of mechanical device to cool the air, such as a fan coil unit (FCU).

Where windows are opened in order to provide passive ventilative cooling to a residential building, the AVO guidance states that it is reasonable for the internal ambient noise levels to be higher than those set out in BS 8233:2014 for background ventilation:

> *'It is suggested here that the desirable internal noise standard within Table 4 of BS 8233:2014 should be achieved when providing adequate ventilation as defined by ADF whole dwelling ventilation. However, it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.'*

The guidance suggests an initial 'Level 1' assessment which utilises a risk-based approach, using a number of risk categories ranging from 'negligible' to 'high' that correlate to external noise levels. Where the 'Level 1' assessment shows that it is a high-risk site, it recommends that a 'Level 2' assessment is conducted where the internal noise levels during the overheating condition are predicted. Where the site is a Low or Medium risk the 'Level 2' assessment is optional. Table 3-2 of the standard, showing the risk categories for Level 1 assessment, along with the notes are reproduced below:



AVO Guide Table 3-2: Guidance for Level 1 site risk assessment of noise from transport noise sources relating to overheating condition.

- Note 1: The noise levels suggested assuming a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.
- Note 2: The values presented in this table should not be regarded as fixed thresholds and reference can also be made to the relevant dose-response relationships [15, 17].
- Note 3: A decision must be made regarding the appropriate averaging period to use. The average period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines.
- Note 4: Refer also to references [1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB L_{AFmax} is normally exceeded during the night time period (2300-0700), a Level 2 assessment is recommended.
- Note 5: The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3

- Note 6: To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

The following information is required for a Level 2 assessment:

- Statement of the overheating criteria being applied;
- Description of the provision for meeting the stated overheating criteria. This should include, where relevant, the area of façade opening;
- Details of the likely internal ambient noise levels whilst using provisions for mitigating overheating, and the method used to predict these;
- Estimation of how frequently and for what duration such provisions are required to mitigate overheating;
- Consideration of the effect of individual noise events;
- Assessment of adverse effect on occupants.

The noise levels within habitable rooms, with the cooling strategy in place, is then calculated and compared to the thresholds provided within Table 3-3 “Guidance for Level 2 assessment of noise from transport noise sources relating to overheating condition”. This table is reproduced below:

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

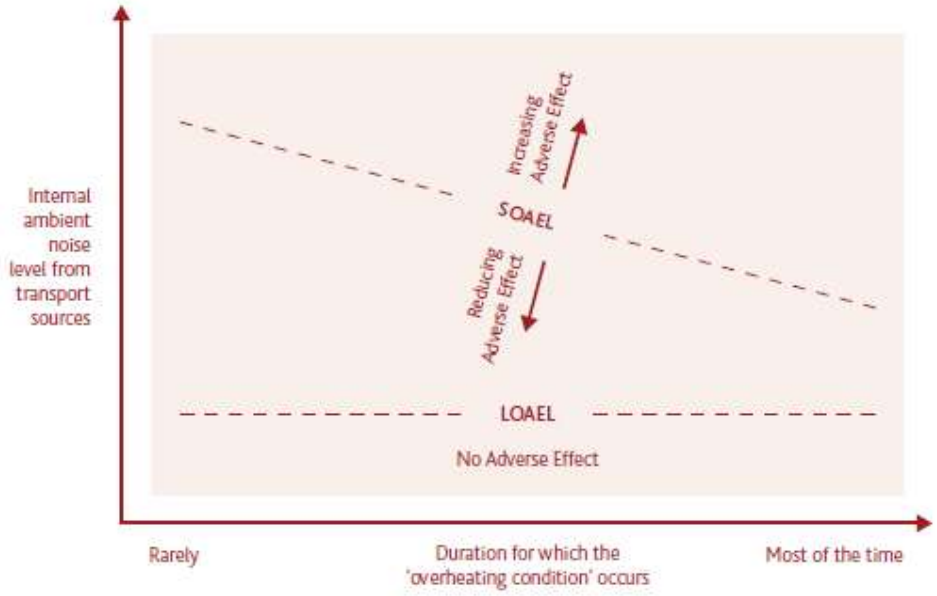
AVO Guide Table 3-3: Guidance for Level 2 assessment of noise from transport noise sources [note 1] relating to overheating condition.

- Note 1: The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise.
- source but may be adapted for other types of transport.
- Note 2: The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships such as those

described in a DEFRA 2014 study [15, 21, 22]. With the exception of individual noise events, the references [15,21]

- are based on evidence drawn from external noise levels. There is currently very little robust evidence linking internal averaged noise levels with health outcomes and occupant behaviour. Internal ambient noise levels would normally be considered for living rooms and bedrooms during the daytime. At night, the levels would normally only be applicable to bedrooms.
-
- Note 3: A decision must be made regarding the appropriate averaging period to use. The average period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines.
-
- Note 4: Refer to references [1, 17, 18, 22] for further guidance regarding individual noise events. The $L_{AF,max}$ indicator associated with the upper category is intended for road traffic; it may be more appropriate to use the "one additional noise-induced awakening" method for noise from rail traffic or aircraft.
-
- Note 5: The potential for adverse effects will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.
-
- Note 6: The daytime levels presented in this table may not be appropriate for residential care homes or other situations where conditions for daytime resting are known to be of particular importance.
-
- Note 7: When evaluating the potential for adverse effect, all three aspects of noise exposure (i.e., daytime, night-time and individual noise events) should be evaluated.
-
- Note 8: BS 8233 states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.
-
- Note 9: It is known that physiological responses do occur at lower levels of L_{AFmax} than 45 dB.

As detailed in Note 5 above, the level of assessed impact varies depending on the duration for which the 'overheating condition' occurs. Figure 3-2 provides qualitative guidance on combined effect of internal ambient noise level and duration for the overheating situation and is reproduced below:



AVO Guide Figure 3-2: Qualitative guidance on combined effect of internal ambient noise level and duration for the overheating situation.

5.10 Approved Document O

The Building Regulation 2010 provides guidance to ensure an overheating strategy is usable.

Section 3 advises the following:

> *"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
>
> *Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).*
>
> *b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).*
>
> *Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.*

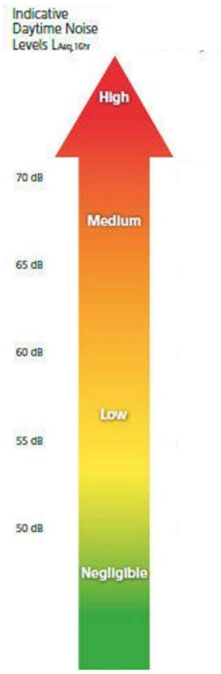
NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)."

7.0 SITE SUITABILITY – PROPG STAGE 1 ASSESSMENT

Based on the data collected form the site noise survey (results presented in section 5.0 above), the following ProPG Stage 1 assessment can be made.

For presentation purposes the measured noise levels at all positions have been plotted against the site and addressed in accordance with the ProPG "stage 1 Initial Site Noise Risk Assessment" guidance.

The figure below presents an initial risk assessment of daytime noise levels:



The initial daytime noise risk assessment indicates a *Low" to "medium" risk.

The figure below presents an initial risk assessment of night-time noise levels:

As seen from above, the initial night time noise risk assessment indicated a “low” to “high” risk across the site.

The above figures clearly show the significance of road traffic noise characterising the western side of the site having the greatest noise risk, with the western side of the site characterising as having a low noise risk. This Is inherent from the current acoustic screening provided by the mass of the existing building.

For “low” sites, the Pr30oPG states:

> *“At low noise levels, the site it 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 on noise will be mitigated and minimised in the finished development.”*

For “medium” risk sites, ProPG states:

> *“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 ADFS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impacts will be avoided in the finished development.”*

ProPG also advises:

> *"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. The above initial risk assessment concludes that, subject to adherence to a "good acoustic design process", the site should be suitable for residential development." and "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.*

Is therefore clear that careful consideration will need to be given to noise mitigation of the site. A more detailed consideration of noise impacts for the site and potential mitigation strategies, in line with a ProPG *'Stage 2'* assessment (which constitutes an *'Acoustic Design Statement'*) is required.

8.0 PROPG ELEMENT ONE – GOOD ACOUSTIC DESIGN (MITIGATION)

The ProPG references a preferred hierarchy of strategies that represent a "good acoustic design process". These include the following:

- Reducing noise "at source" and or relocating the noise source;
- Providing "buffer" zones to maximise the spatial separation between noise source and receiver locations;
- Reducing noise propagation across the site by way of introducing acoustic screening (e.g. barriers, earth bunds etc)
- Optimise the acoustic screening provided by the proposed development by creating "barrier" blocks to reduce the noise propagation across the site and in particular, protect external amenity areas;
- Optimise the orientation and internal layout of buildings to reduce the noise exposure on noise sensitive rooms (positioning non-habitable rooms on the greater noise risk side of the building with sensitive rooms located on the acoustically screened facades); and
- Using the building envelope to mitigate noise to acceptable levels by way of ensuring the corrects specification of external fabric constructions are used.

As noted previously, the dominant noise source affecting the site is taken to be road traffic noise from Victoria Road to the west and trains along the metropolitan and piccadilly lines to the north. Clearly, such a noise source cannot be "removed" or "relocated", any scope to provide "at source" mitigation (through the use of "low noise" road surface or enforcing a reduction of speed limit on both roads and railways) would therefore fall beyond the gift of the developer. As such, the dominant noise source cannot be reduced or relocated.

Sound energy naturally decreases with increasing distance from the source. Therefore, the creation of "buffer zones", or the avoidance of construction in areas that are most heavily by noise is an effective strategy to mitigate against the potential adverse effects of noise.

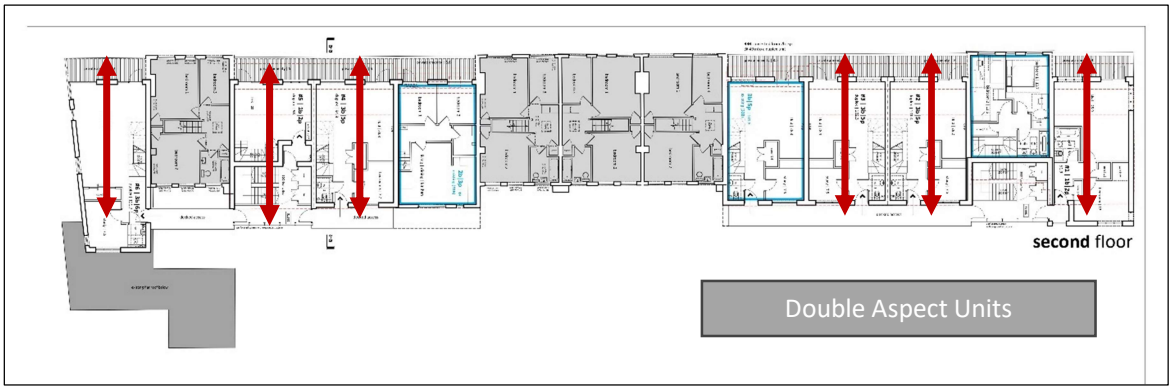
Notwithstanding the above, and considering how noise propagates, relying entirely on distance to reduce noise levels can result in an unproductive use of land. This is because noise typically decreases 3dB per doubling of distance from the source (I.e., if the development was set back 50m form the noise source, an additional 50m of land would be needed in order to achieve a 3dB reduction). It is for this reason that buffer zones should implemented alongside other design requirements, such as the need to promote the efficient use of the site.

The proposed development proposals are to extend the existing building by creating additional 2nd and 3rd story floors. The ability to incorporate a 'buffer zone' into the development proposal is therefore unfeasible.

Buildings can also be strategically spaced and positioned to operate as "barrier blocks" to provide some degree of acoustic screening. As previously stated, the development proposal only seeks to create two additional floors to an existing building. As such, incorporating 'barrier blocks' withing the design scheme is unfeasible.

In addition to the above, it is generally desirable for buildings to 'overlook' noise sources and be arranged with the "front" of the property looking towards the sound source (with any amenity space on the "rear" of the building). This enables the external amenity spaces to benefit from the inherent acoustic screening that can be provided by the massing of the building. It also enables residents to have access to a relatively quiet façade and optimise potential options for natural ventilation. The above design provisions can help offset noise effects, as per governmental Planning Practice Guidance.

The proposed development follows this guidance by creating dual aspect units for dwellings most exposed to noise as shown in the figure below:



As such, it is concluded that the proposed development has been developed following a good acoustic design process which helps minimise noise impacts.

9.0 PROPG ELEMENT 2 – INTERNAL NOISE LEVELS

As referenced in Section 5 of this report, BS8233: 2014 and the ProPG set out recommended values for internal daytime ($L_{Aeq,\ 16hour)}$ and night-time ($L_{Aeq,\ 8hour}$) noise levels. The noise levels presented are considered to represent a LOAEL in line with national planning policy guidance.

During night-time periods, the WHO/ProPG guidelines suggest a LOAEL would occur when an event should level of 45dB $L_{Amax,\ fast}$ is not exceeded more than 10-15 times per night.

It should be noted that the level of sound insulation required to achieve the aforementioned design goals will be determined by a number of factors, including:

- Noise levels incident on a particular façade. More significant levels of sound insulation will be expected for facades looking "towards" adjoining roads, as opposed to units looking "away" from such sources.
- The acoustic conditions of the receiving room;
- The sound insulation capabilities of the individual building elements;
- The relative proportion of building elements; and
- The acoustic conditions of the receiving room.

9.1 Incident Noise Levels

The results of the noise monitoring undertaken suggest that the "worst case" noise levels on the western façade of the development site (overlooking Victoria Road) are in the order of 63dB $L_{Aeq,\ 16hour}$ (daytime) and 59dB $L_{Aeq,\ 8hour}$ (night-time) these noise levels were measured at Position 1 (closest to the railway line). Noise levels were lower at measurement position 4, this is likely due to the distance between the railway and receiver location. It is taken that these measured noise levels are representative of the future noise levels experienced at the western fronting facades of the proposed flats.

Due to the inherent acoustic screening provided by the existing building on site, the worst-case noise levels on the western façade of the development site (overlooking the service road to the rear of the building) are in the order of 51dB $L_{Aeq,\ 16hour}$ (daytime) and 46dB $L_{Aeq,\ 8hour}$ (night-time). It is taken that these measured noise levels are representative of the future noise levels experienced along the eastern facades of the proposed flats.

Noise levels measured at Position 2 on the north-eastern side of the site (closest to the railway line) are likely to be representative of the future incident noise levels experienced along the eastern façades of the proposed dwelling at 2nd a 3rd floor level closest to the north eastern boundary.

9.2 External Walls

The sound insulation capabilities of a particular building façade is determined by the sound insulation capabilities of the individual construction components. The acoustic performance of the windows will typically determine noise intrusion in masonry exterior walls with windows.

It should be noted that the relative proportion of the building elements will also influence the sound insulation capabilities of any particular façade. As an external area increases, so does the need for sound

insulation. When the proportional area of weaker performing elements is increased, such as windows, the amount of sound insulation required will also increase.

9.3 Glazing and Ventilator Performance Requirements

Based on the predicted incident noise levels, it follows that the worst case noise levels can be adequately controlled through the correct glazing specification.

Design specifications for windows will need to be finalised during the detailed design phase and based on the finalised construction proposals and design drawings. It is suggested that the finalised values are included within the tender documentation and prospective suppliers should be asked to provide the necessary documentation to prove their adherence to the published acoustic performance specifications.

9.4 Purge Ventilation

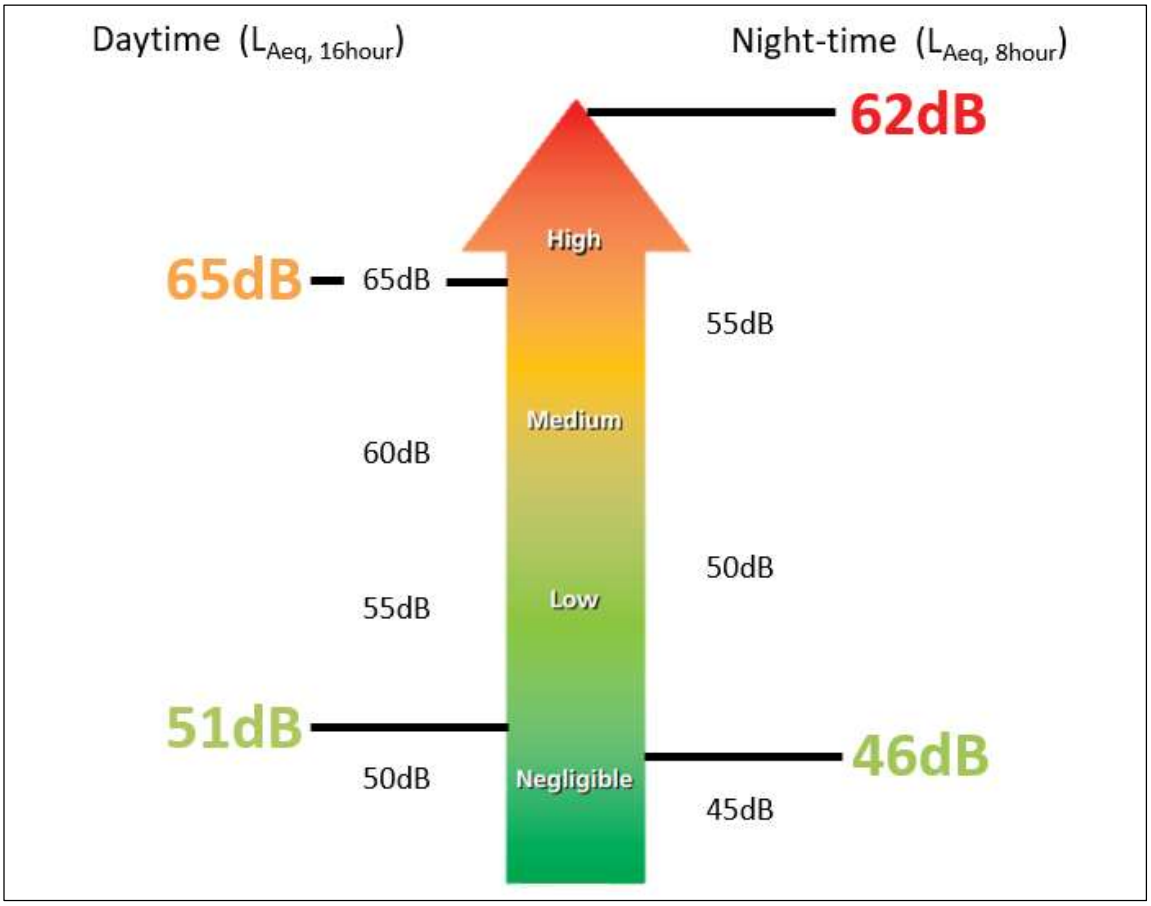
Document F requires that adequate provision is made for purge ventilation. The need for purge ventilation is by its definition “occasional”, this is normally achieved by giving residents the ability to open their windows. Whilst noise intrusion will increase as a result of windows being open, the occasional and temporary occurrence of such a situation can be readily accepted, particularly since occupants are “in control” of both the timing and duration of purge ventilation being required.

It is therefore recommended that all dwellings should be fitted with windows that can be opened to provide purge ventilation. This strategy is in line with the advice offered in BS 8233: 2014 and the ProPG.

9.5 Thermal Comfort

Based on the measured noise levels an initial Stage 1 risk assessment has been undertaken in line with the AVOG. Such guidance is aimed to help identify when external noise levels might indicate a “significant” risk of adverse health and quality of life, if reliance is placed on the use of openable windows to minimise the risk of overheating.

The figure below shows noise levels are categorised as having a “low” to “high” daytime and night time risk of overheating risk when assessed in line with the AVOG Stage 1 assessment.



Following the guidance provided by Acoustics, Ventilation and Overheating Guide 2020 and Approved Document O the lower measured noise levels taken at measurement position 3 & 4 are suitably low to ensure using opening windows as the primary means of mitigating overheating is not likely to result in adverse effect. However the higher measured noise levels at position 1 & 2 present as having a high risk and therefore an alternative means of ventilation should be sought.

Based on the above, it should be feasible for flats towards the southern extent of the proposed extension to rely on the use of openable windows to provide ventilative cooling. However, for flats located further north (closer to the railway line) a more detailed assessment of nose and overheating is required. This should be completed during the detailed design stage of the development along with an overheating assessment completed by a suitably qualified engineer.

10.0 PROPG ELEMENT 3 – EXTERNAL AMENITY AREAS

As set out in Section 5 of this report a noise level of 50 dB $L_{Aeq,16hr}$ is a desirable target for noise in external amenity areas. 55 dB $L_{Aeq,16hr}$ is suggested as an upper target in BS 8233:2014, although the standard also highlights that these are aspirational targets and not criteria intended for strict application in order to judge the suitability of a site for residential development.

The measurement data presented earlier in the report suggests that amenity spaces provided on the eastern side of the development site should fully comply with the aforementioned noise targets. Budlings located on the north eastern extent of the site are exposed to higher levels of traffic noise.

It should be noted that design comprises a strong massing parallel to the Victoria Road protecting the amenity area located on the opposite façade. As such, noise levels in private amenity areas will be minimised as far as practicable through the implementation of 'acoustic screening'.

It is therefore concluded that external amenity areas are provided for all dwelling in the form of a private balcony. All future residents will also have access to a quiet façade

11.0 AGENT OF CHANGE OBLIGATIONS

It should be noted that Paragraph 187 of the NPPF draws specific attention to the need to ensure that new development is compatible with existing businesses and community facilities and introduces and "agent of change" principle.

As noted earlier in this report, neighbouring land uses in the vicinity of the site are predominantly residential or commercial. As such it is material to note that both the automated and attended survey work presented earlier in this report presents measurement which include contributions from all sources. This will, in addition to general environmental noise, include any noise associated with the existing neighbouring commercial/industrial uses in the locality of the site.

During site attendance, noise associated with these uses was not constant nor readily discernible in the context of the otherwise prevailing noise environment. Thus, any noise associated with local commercial units was does not have a dominant influence on the existing noise environment.

It is also material to note that there are existing residential properties in closer proximity to such existing commercial uses which appear to be satisfactorily co-located with these existing uses. As such the principle of residential development within the surrounding location of the proposed development site is already well established.

It can there be concluded that there is no acoustic conflict between the proposed development and continued use of any existing neighbouring commercial uses.

12.0 CONSTRUCTION NOISE AND VIBRATION

12.1 Construction Noise

Construction activities have the potential to cause noise and vibration disturbance to both residential and commercial uses in the vicinity of the site.

Potential noise and vibration impact during the construction phase of the development would include

- Directs noise impacts due to noise from construction plant, machinery and processes;

- Direct vibration impacts due to vibration from construction plant, machinery and processes; and,
- Indirect noise and vibration impact due to construction traffic on neighbouring roads.

At this early stage, detailed information relating to the construction programme, plant et. Is not available. As such, a detailed quantitative assessment of construction noise and vibration has not been undertaken.

Notwithstanding this, it is clear that there are existing residential receptors directly below the site and adjoining the site to the east, south and west. Given the proximity of the surrounding noise sensitive receptors, construction noise has the potential to have a significant adverse impact.

It is therefore recommended that noise and vibration effects during the construction phase of the works are mitigated through the use of appropriate operative and management controls, implemented throughout the use of a Construction Environmental Management Plant (CEMP).

12.2 Construction Vibration

Two potential effects of construction vibration need to be considered – (A) the potential effect of vibration on the structure of neighbouring buildings and (b) the potential effects of vibration on occupants within those buildings.

With regard to buildings, vibration can potentially cause cosmetic damage and in the extreme, structural damage. Criteria for a significant vibration effect have therefore been aligned with guidance for cosmetic damage ser out in BS 5228-2. Such criteria should safeguard buildings form structural damage, whilst vibration below the threshold can be considered to be negligible since there would be no effect. Recommended values are presented in the table below:

Type of Building	Peak Particle Velocity (PPV) in Frequency Range of 4 Hz to 15 Hz	Peak Particle Velocity (PPV in Frequency Range 15 Hz and Above)
Reinforced or framed structures	50 mm/s 4 Hz and above	
Industrial and heavy commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz.	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

The potential effect of vibration on occupants within buildings can be assessed based on the guidance of Annex B of BS 5228-2.

Peak Particle Velocity (PPV)	Impact	Magnitude of Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibrations frequencies associated with construction. At	Negligible

	lower frequencies, people are less sensitive to vibration.	
0.3 mm/s	Vibration might be just perceptible in residential environments	Minor
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residence.	Medium
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Major

The guidance presented within BS 5228 suggests that vibration effects will not normally be significant beyond a distance of around 20m form the construction works. Noise sensitive receptors within this 20m distance (i.e. adjoining residential properties) may be at risk.

It is therefore recommended that construction vibration is also mitigated through the use of appropriate operative and management controls, implements through the use of a CEMP.

13.0 CONCLUSIONS

Quantum Acoustics have undertaken a fully automated environmental noise survey to establish the existing noise levels. The noise survey concluded that the site is dominated by road traffic noise associated with the A3.

The potential risk of the site has been assessed in with national and local planning policies and guidance and a ProPG stage one and stage two assessment has been undertaken.

It has been concluded that the scheme has been developed to minimise noise impacts and therefor follows a good acoustic design process.

Internal noise criteria have been proposed with reference to internal noise levels contained in BS8233:2014.

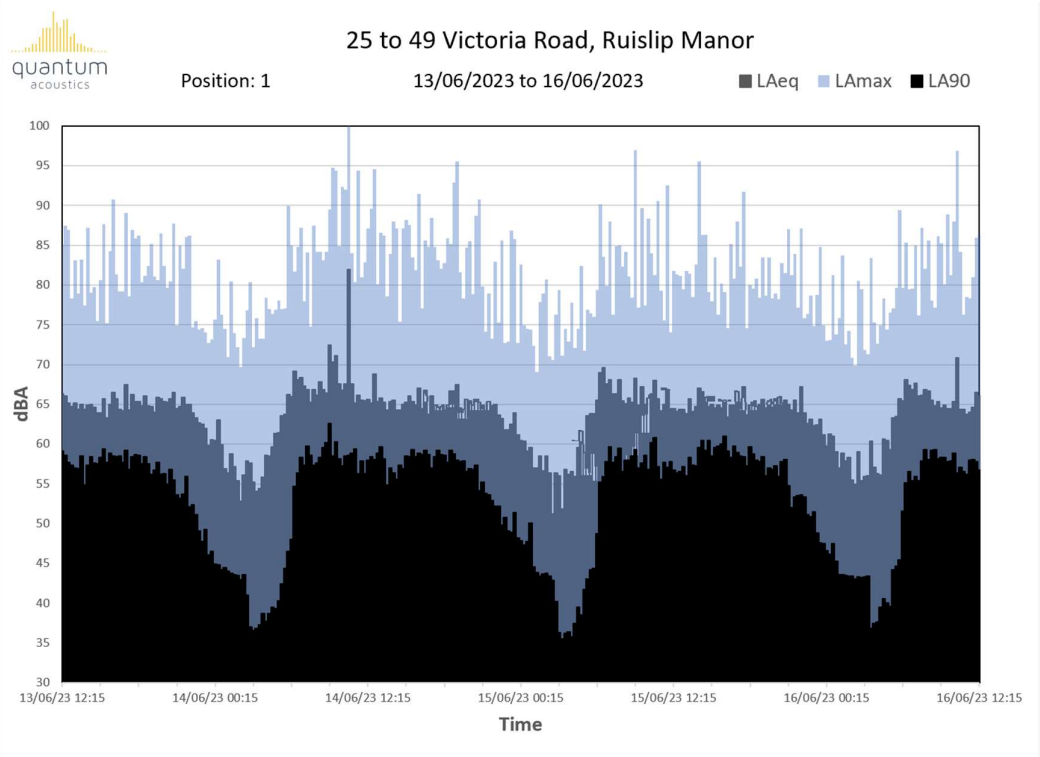
The proposed development does not raise any agent of change concerns in relation to existing neighbouring business or community use facilities.

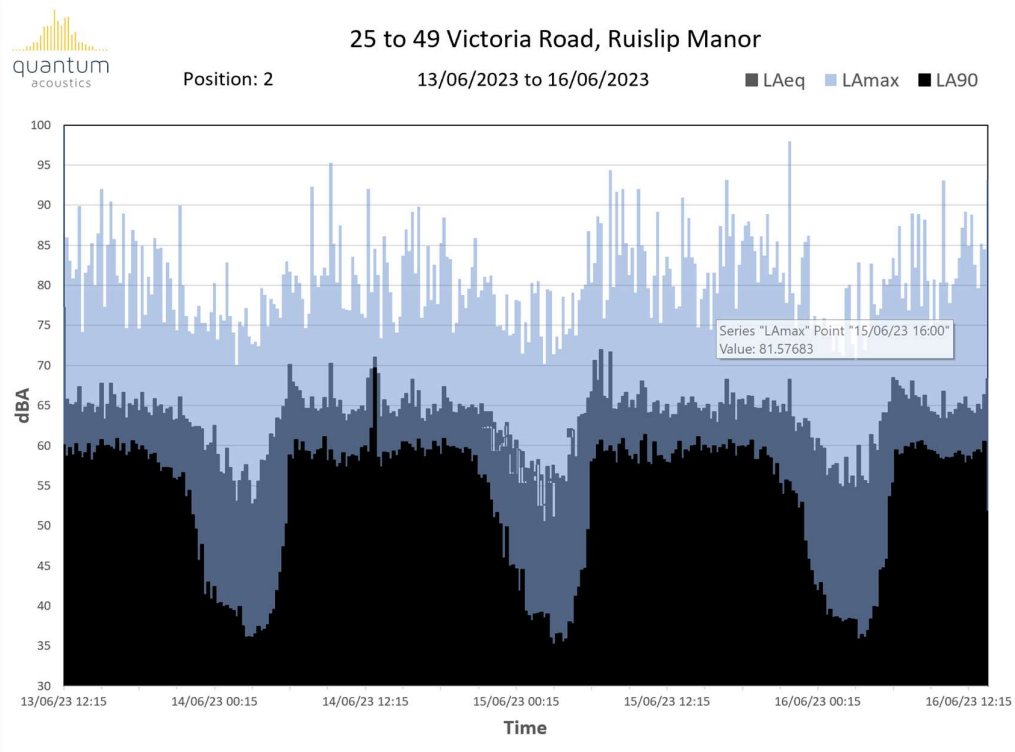
It is recommended that the potential impact constriction phase noise and vibration is controlled through appropriate operative and management controlled implement through a Construction Environmental Management Plan.

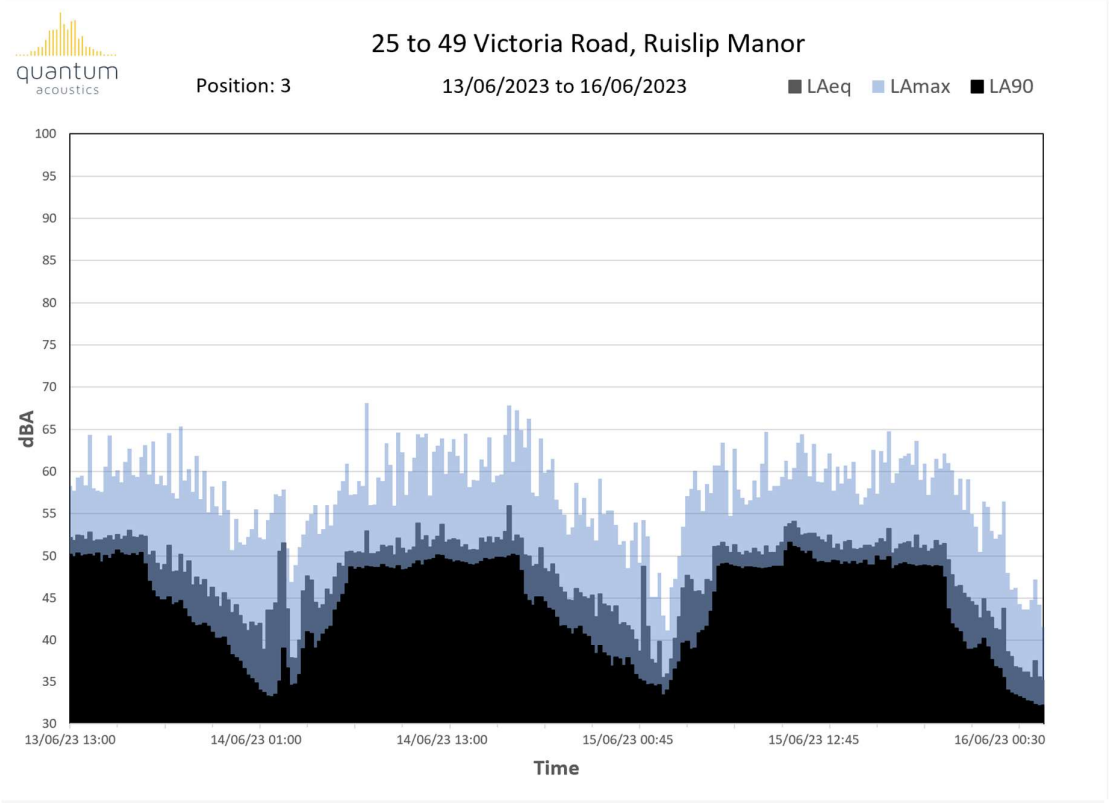
It is concluded that the proposed development should not raise any residual significant or other adverse impacts on the health and/or quality of life for existing neighbour dwellings in the vicinity of the site, or dwellings to be created by the development.

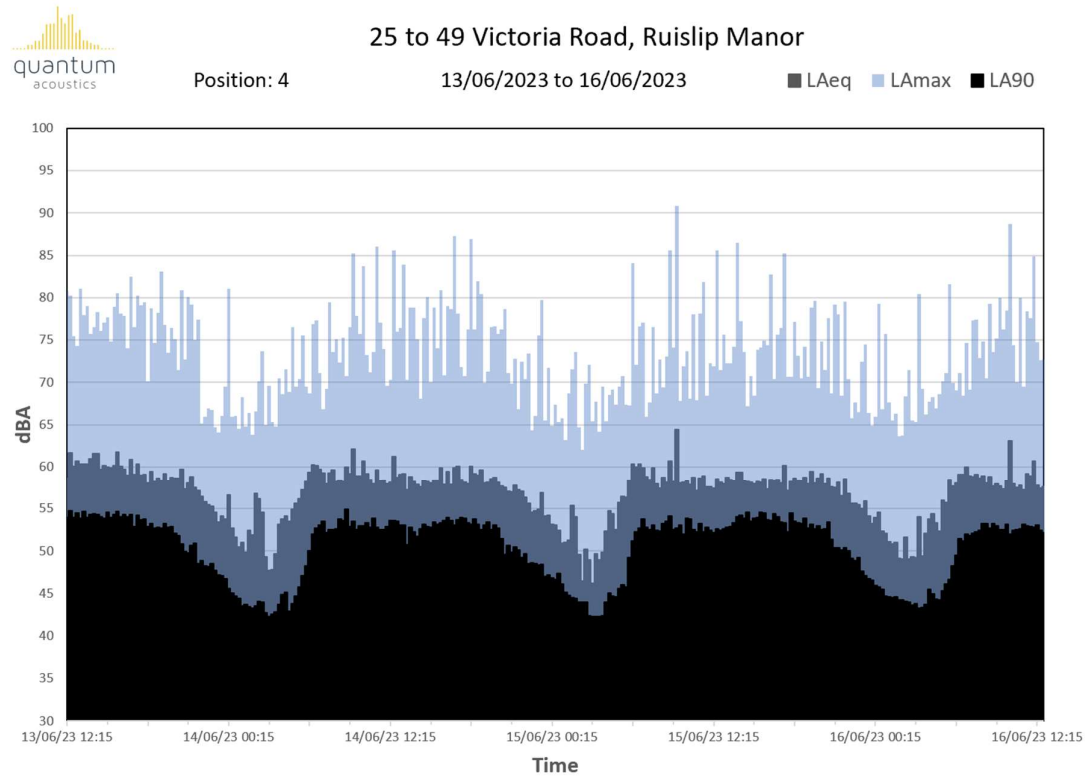
The proposed development therefore fully complies with noise related national and local planning policies.

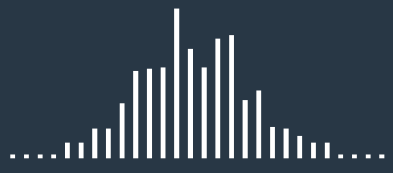
Appendix A: Time History Graphs






25 to 49 Victoria Road, Ruislip Manor
Position: 3
13/06/2023 to 16/06/2023
LAeq
LAmax
LA90
dBA
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
13/06/23 13:00
14/06/23 01:00
14/06/23 13:00
15/06/23 00:45
15/06/23 12:45
16/06/23 00:30
Time


25 to 49 Victoria Road, Ruislip Manor
Position: 4
13/06/2023 to 16/06/2023
LAeq
LAmax
LA90
dBA
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
13/06/23 12:15
14/06/23 00:15
14/06/23 12:15
15/06/23 00:15
15/06/23 12:15
16/06/23 00:15
16/06/23 12:15
Time



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