AF Acoustics Ltd
13 Bernard Ave
West Ealing
London
W13 9TG
[redacted]

PROMA BETA LTD

402 FINCHLEY ROAD, LONDON NW2

ACOUSTIC DESIGN STATEMENT

8 MARCH 2024

2058-AF-00001-01

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ACOUSTIC DESIGN STATEMENT

DOCUMENT REFERENCE: 2058-AF-00001-01

REVIEW AND AUTHORISATION			
Authored by Daniel Flood	**Position** Senior Consultant	[redacted]	**Date** 08/03/2024
Approved by Adrian Finn	**Position** Director		**Date** 08/03/2024

AMENDMENT HISTORY			
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1. INTRODUCTION

1.1.1 AF Acoustics have been appointed by Proma Beta Ltd to provide an acoustic design statement for the site at 402 Finchley Road, London NW2 2HR.

1.1.2 The development proposals include the demolition of the existing building on site and the construction of a 5 storey building, to provide commercial space on the ground floor and 8No. self-contained apartments.

1.1.3 AF Acoustics has undertaken an assessment in relation to the noise levels likely to be incident on the proposed building facades and to provide acoustic performan specifications such that acceptable internal noise criteria can be achieved, in accordance with the guidance provided by WHO and BS8233. Furthermore, an external amenity assessment has also been undertaken.

1.1.4 In addition, a vibration assessment informed by the results of the vibration measurements has been undertaken.

1.1.5 The purpose is to demonstrate compliance with planning conditions issued by Barnet London Borough Council, in Application Number: 19/4221/FUL.

2. SITE DESCRIPTION

2.1.1 The development site is located within the administrative district of Barnet London Borough Council.

2.1.2 The existing site consists of a 1 storey building. The development proposals include the demolition of the existing building on site and the construction of a 5 storey building, to provide commercial space on the ground floor and 8No. self-contained apartments.

2.1.3 The front elevation of the site overlooks the well trafficked Finchley Road. The neighbouring properties on Finchley Road are predominantly commercial on the ground floor level, with residential units located above. The adjacent roads leading from Finchley Road are residential in character.

2.1.4 The wider area is predominantly urban, with a mixture of business premises and residential properties.

2.1.5 The ambient noise environment at the front of the site was dominated by noise from Finchley Road.

2.1.6 The ambient noise environment at the rear of the site was quiet, due to being screened from Finchley Road, and was determined by noise from the surrounding road network.

2.1.7 The location of the site is shown in Figure 2.1, with the site boundary shown in red.

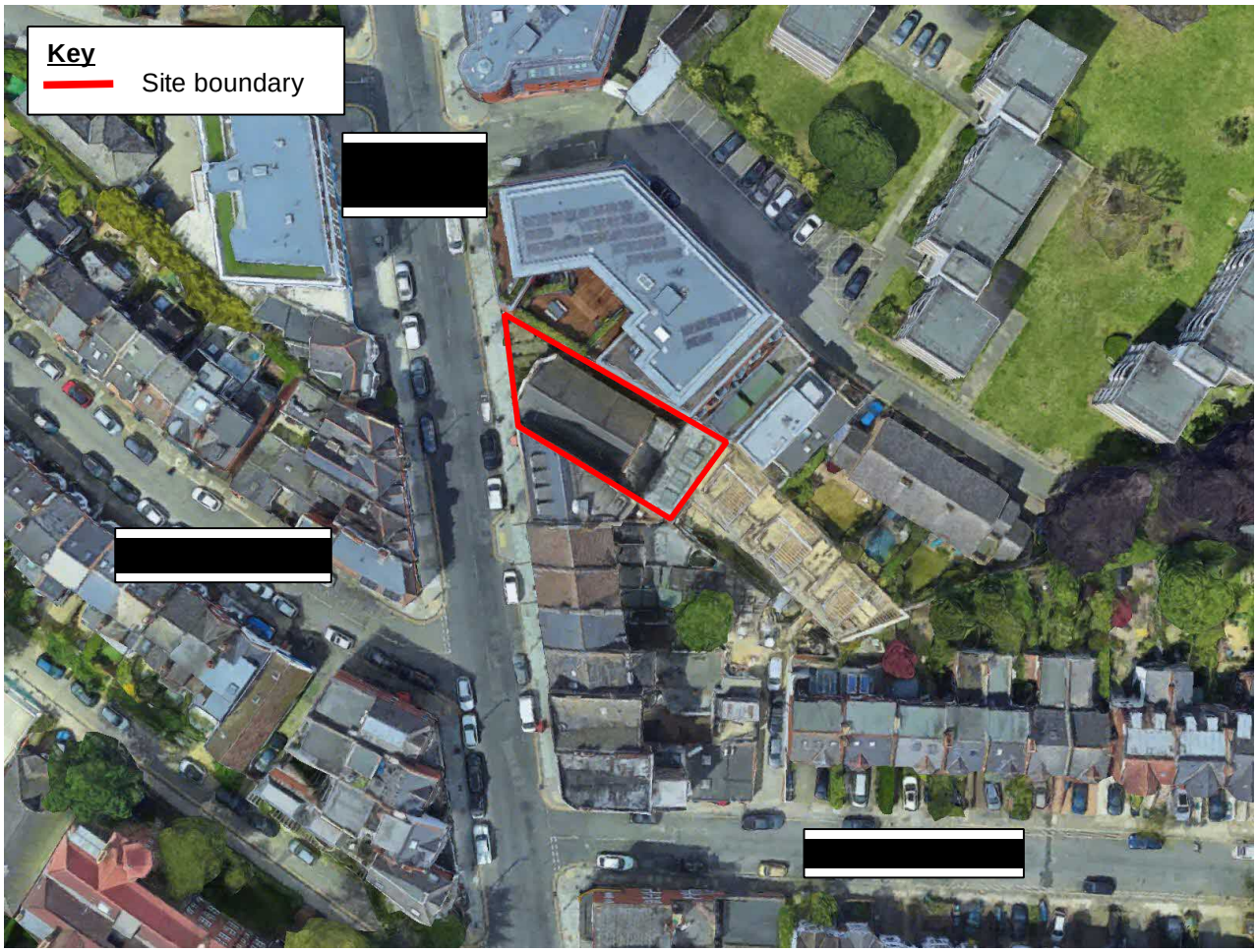


FIGURE 2.1: SITE LOCATION MAP

3. GUIDANCE

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. It does not present specific noise criteria to be applied but does provide the following statements regarding noise impacts:

180. Planning policies and decisions should contribute to and enhance the natural and local environment by: (bullet point points reduced to those regarding noise only).

> Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.
> Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

191. Planning policies and decisions should 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:

> 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 quality of life; and
> Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

187. Planning policies and decisions should ensure that 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.

194. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

3.2 Planning Practice Guidance Note - Noise

3.2.1 Planning Practice Guidance (PPG) on noise was issued in March 2014. This web-based guidance advises local planning authorities to consider the acoustic environment, and in doing so consider the following:

> Whether or not a significant adverse effect is occurring or likely to occur;
> Whether or not an adverse effect is occurring or likely to occur; and
> Whether or not a good standard of amenity can be achieved.

3.2.2 The PPG includes examples of how to recognise when noise could be a concern and provides example outcomes to which the Observed Effect Levels can apply. The PPG noise exposure hierarchy is presented in Table 1, based on the likely average response, along with example outcomes.

3.2.3 The hierarchy table provides information regarding how the concept of Significant Observed Adverse Effects and Lowest Observed Adverse Effect Levels, introduced through the Noise Policy Statement for England could be applied and does allow for subjective observations to be considered in the context of potential effect levels.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a 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, attitude or other physiological response, 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. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	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, attitude or other physiological response, 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, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

TABLE 3.1: THE PPG NOISE EXPOSURE HIERARCHY

3.2.4 The PPG gives guidance on the type of measures that can be used to mitigate the effects of noise:

> engineering: reducing the noise generated at source and/or containing the noise generated;
> layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;
> using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;
> mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.
> It also provides specific additional advice in relation to residential developments and states that noise impacts may be partially offset if residents have access to one or more of:
> a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;
> a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;
> a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
> a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance).

3.2.5 It is also worth noting that the practice guidance also makes reference to the ProPG.

3.3 Noise Policy Statement for England (NPSE)

3.3.1 The Noise Policy Statement for England (March 2010), sets out the long-term vision of Government noise policy.

3.3.2 The vision of the NPSE is to 'Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development.' This vision is supported by three key aims:

> avoid significant adverse impacts on health and quality of life;
> mitigate and reduce to a minimum other adverse impacts on health and quality of life; and
> where possible, contribute to the improvement of health and quality of life.

3.3.3 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace (occupational noise).

3.4 World Health Organisation Noise Guidelines

3.4.1 Although the Community Noise Guidelines (1999) have been superseded by th Environmental Noise Guidelines for the European Region (2018), the 1999 guidelines are still the most relevant guidelines to planning and internal guideline noise values.

3.4.2 Guideline values for community noise in specific environments are presented in the WHO Guidelines for Community Noise document. The guideline values pertinent to this noise assessment are presented in Table 3.2.

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB L_{AFMAX}
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

TABLE 3.2: WHO COMMUNITY NOISE GUIDELINE VALUES

3.4.3 It should be noted that the above values generally apply to 'anonymous' or everyday levels of environmental noise from road traffic, trains and aircraft. Human reaction to tonal and low frequency noise may be underestimated by the dB(A) noise level and hence lower limits may apply.

3.5 BS 8233:2014

3.5.1 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' contains a number of design criteria and guideline levels for the protection of new or planned development against external noise. The guidelines are designed to achieve desirable resting/ sleeping conditions in bedrooms and good listening conditions in other rooms. Those criteria which are most relevant to residential environment are reproduced in Table 3.3.

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

TABLE 3.3: DESIGN TARGETS FOR INDOOR AMBIENT NOISE LEVELS

3.5.2 It should also be noted that BS 8233:2014 states that "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 $L_{Amax,F}$ depending on the character and number of events per night." However, no numerical values for internal $L_{Amax,F}$ levels in dwellings are stated within BS 8233.

3.5.3 With regards to external amenity areas, BS 8233 recommends that "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." The Standard also states that these guideline values are not always achievable in all circumstances and therefore a compromise between elevated noise levels and 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.

3.5.4 In addition, BS 8233 states that “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 $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

3.6 ProPG: Planning and Noise

Introduction

3.6.1 The Professional Practice Guidance on Planning and Noise (ProPG) was published in May 2017 and produced jointly by the Association of Noise Consultants, the Institute of Acoustics, and the Chartered Institute of Environmental Health. The primary goal of the ProPG is to assist in the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. It seeks to do that by encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.

3.6.2 The guidance adopts a 2-stage approach to assessing potential residential developments that will be exposed predominately to airborne noise from transport sources, see Table 3.1.

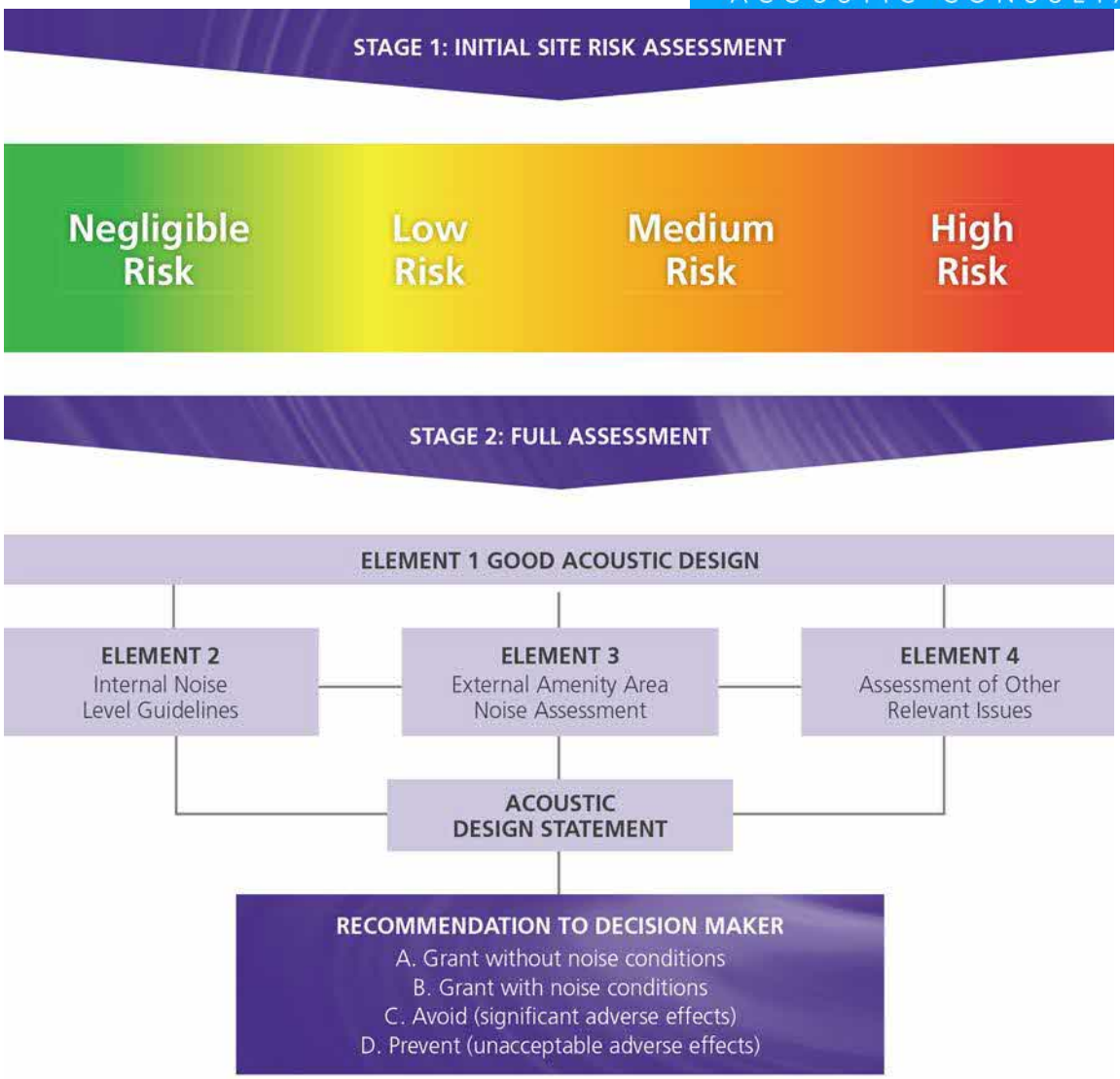


FIGURE 3.1: SUMMARY OF APPROACH REPRODUCED FROM PROPG

3.6.3 Stage 1 is an initial noise risk assessment of the proposed development site. This should indicate whether the site poses a negligible, low, medium, or high noise risk based on noise levels measured during the day and night-time. The aim is to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future.

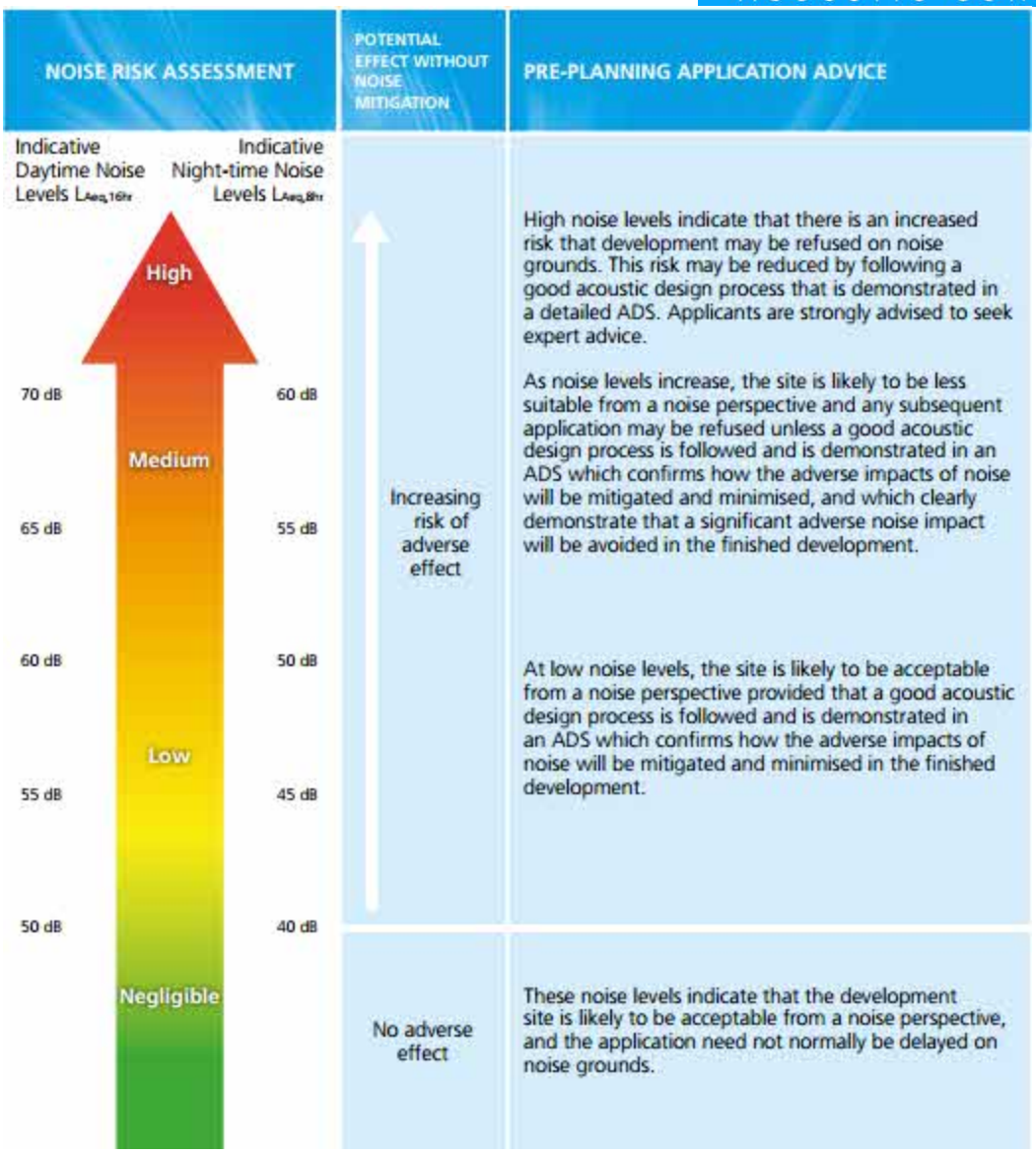


FIGURE 3.2: STAGE 1 – INITIAL SITE NOISE RISK ASSESSMENT (REPRODUCED FROM PROPG)

3.6.4 Stage 2 is a full assessment of four key elements to be undertaken in parallel. These are:

1. Good acoustic design
2. Internal noise level guidelines
3. External amenity area noise assessment
4. Assessment of other relevant issues

3.6.5 The approach is underpinned by the preparation and delivery of an “Acoustic Design Statement” (ADS). Having followed a good acoustic design process to its end, it is envisaged that noise practitioners will then have a choice of one of four possibl recommendations to present to the decision maker. In simple terms the choice of recommendation is as follows: grant without conditions, grant with conditions, “avoid” or “prevent”

3.6.6 Good acoustic design should avoid “unreasonable” acoustic conditions and prevent “unacceptable” acoustic conditions. Good acoustic design does not mean overdesign or

gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site.

3.6.7 The guidance states that good acoustic design is not just compliance with recommended internal and external noise exposure standards. Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements.

3.6.8 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 this approach, is not regarded as good acoustic design. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents.

3.6.9 Planning applications for new residential development should include evidence that the following aspects of good acoustic design have been properly considered:

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

3.6.10 The internal target noise levels shown in Table 3.4 are based upon the levels contained in BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ and are supported by the WHO ‘Community noise guidelines’ 2000. In contrast to the noise levels in the Stage 1 initial risk assessment, these levels are annual averages and would normally represent typical conditions.[1]

[1] It is normal to exclude occasional events, such as fireworks night or New Year’s Eve but where there is significant variability in the noise exposure across the year and where annual average noise levels are not considered representative, then it may be more appropriate to average over a shorter time period. This situation may arise, for example, in the vicinity of airports that are likely to be busier in the summer months.

Activity	Location	07:00 – 23:00 Hrs	23:00 – 07:00 Hrs
Resting	Living room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$ 45 dB $L_{AF, Max}$*
Where development is considered necessary or desirable, the internal $L_{Aeq,T}$ target levels can be relaxed by up to 5dB and reasonable internal conditions still achieved.			
For external amenity areas that are an intrinsic part of the overall design, noise levels should ideally not be above the range of 50 – 55dB $L_{Aeq,16hr}$.			
* This criterion has been added by ProPG as an extension to BS8233.			

TABLE 3.4: TARGET NOISE LEVELS FOR STAGE 2 (REPRODUCED FROM PROPG)

3.6.11 ProPG also provides criteria from BS8233 for external amenity areas and quotes from BS8233:

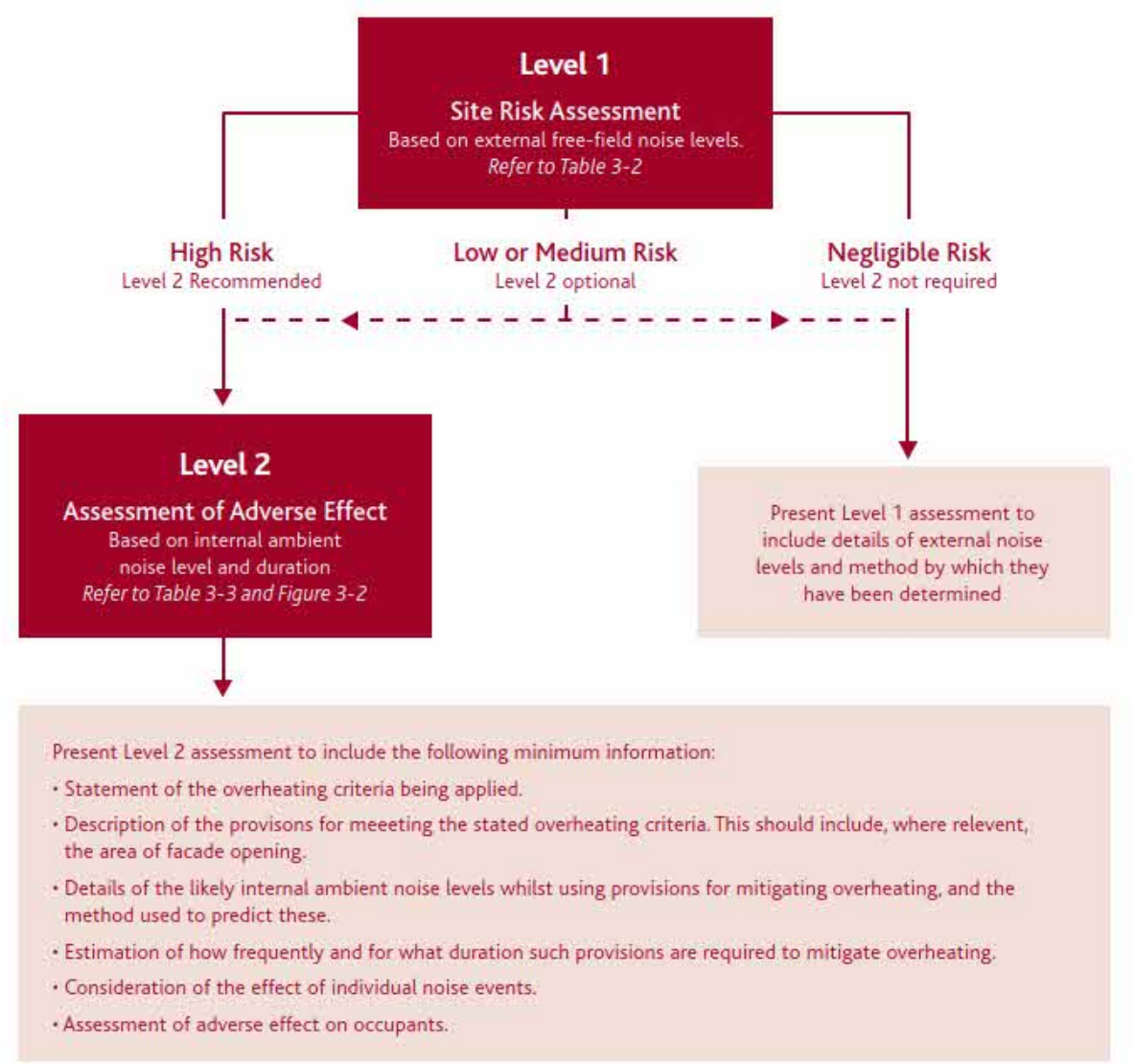
" … the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$
…. These guideline values may not be achievable in all circumstances where development might 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."

3.7 Acoustics Ventilation and Overheating Residential Design Guide (2020)

3.7.1 The Acoustics Ventilation and overheating Residential Design Guide (AVOG) is intended to supplement the ProPG on Planning and Noise for new residential development and provides detailed guidance on the acoustic effects of noise during the overheating condition. It also gives detailed recommendations on building services noise from mechanical plant and equipment located inside dwellings.

3.7.2 In the case of environmental noise ingress, a two-level assessment procedure is described for the overheating condition. The first level is a site risk assessment based on external noise levels and the assumption that opening windows is the primary means of mitigating overheating. The second level assessment considers the potential for adverse effect on occupants based on internal ambient noise level.

3.7.3 Many buildings require closed windows to provide good internal conditions, however, opening a window is the normal way to keep a building cool during the warmer summer months. These opposing requirements have become a major issue in the design of buildings, in particular for housing, given the general desire to avoid the widespread use of mechanical cooling.



3.7.4 The Acoustics and Ventilation & Overheating (AVO) guide by the Association of Noise Consultants (ANC) attempts to address this increasingly urgent need for an integrated approach to consider noise, ventilation, and overheating. The guide involves a two-level approach to addressing issues of overheating with respect to noise:

AVO – AVO Level 1 Assessment

3.7.5 To assess the acoustic implications of using opening windows to overcome overheating within the new residential areas, it is necessary to predict internal ambient noise levels and compare these with the criteria set by BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' as detailed in Section 3.4. In line with the guidance of BS 8233:2014 , it is appropriate to increase these values by 5dB to account for the natural increase in internal ambient noise levels from opening a window.

3.7.6 Additionally, for an AVO Level 1 Assessment, it is reasonable to assume that a partially open window provides a reduction in sound of approximately 13 dBA. Therefore, to achieve internal noise levels in line with BS 8233:2014 external noise levels incident on the façade should fall within the level presented in Table 5.4

Activity	Room	07:00 – 23:00 ($L_{Aeq, 16hour}$)	23:00 – 07:00 ($L_{Aeq, 8hour}$)
Resting	Living Rooms	53 dB	-
Sleeping (daytime resting)	Bedrooms	53 dB	48 dB

TABLE 3.5: MAXIMUM EXTERNAL NOISE LEVELS TO ALLOW OPENABLE WINDOWS

3.7.7 Based on the external levels detailed above the AVO guide seeks to determine the level of risk associated with overheating within a new development, based on the developments surrounding noise climate. The AVO risk categories and their associated noise levels are detailed below:

Daytime Noise Levels ($L_{Aeq,16hours}$)	Night-time Noise Levels ($L_{Aeq,8hours}$)	Risk Category	Mitigation
≤ 53 dB	≤ 48 dB	Negligible Risk	None required – openable windows suitable for ventilation
54 – 62 dB	49 – 54 dB	Low/Medium Risk	Level 2 assessment optional to give more confidence regarding the suitability of internal noise conditions
≥ 63 dB	≥ 55 dB	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy

TABLE 3.6: AVO LEVEL 1 RISK ASSESSMENT GUIDE

3.8 Local Authority Requirements – Barnet London Borough Council

3.8.1 Barnet London Borough Council have imposed the following conditions, in Application No.: 19/4221/Ful:

12) The level of noise emitted from any plant hereby approved shall be at least 5dB(A) below the background level, as measured from any point 1 metre outside the window of any room of a neighbouring residential property.

If the noise emitted has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or distinct impulse (bangs, clicks, clatters, thumps), then it shall be at least 10dB(A) below the background level, as measured from any point 1metre outside the window of any room of a neighbouring residential property.

Reason: To ensure that the proposed development does not prejudice the amenities of occupiers of neighbouring properties in accordance with Policies DM04 of the Development Management Policies DPD (adopted September 2012) and 7.15 of the London Plan 2015.

14 a) No development other than demolition works shall commence on site in connection with the development hereby approved until a report has been carried out by a competent acoustic consultant that assesses the likely noise impacts from the development of the ventilation/extraction plant, and mitigation measures for the development to reduce these noise impacts to acceptable levels, and has been submitted to and approved in writing by the Local Planning Authority

The report shall include all calculations and baseline data, and be set out so that the Local Planning Authority can fully audit the report and critically analyse the content and recommendations.

b) The measures approved under this condition shall be implemented in their entirety prior to the commencement of the use/first occupation of the development and retained as such thereafter.

Reason: To ensure that the proposed development does not prejudice the amenities of occupiers of neighbouring properties in accordance with Policy DM04 of the Development Management Policies DPD (adopted September 2012), the Sustainable Design and Construction SPD (adopted April 2013) and Policy 7.15 of the London Plan 2015.

15 a) No development shall take place until details of mitigation measures to show how the development will be constructed/adapted so as to provide sufficient airborne and structure borne sound insulation against internally/externally generated noise and vibration has been submitted to and approved in writing by the Local Planning Authority.

This sound insulation shall ensure that the levels of noise generated from the development; as measured within habitable rooms of the development shall be no higher than 35dB(A) from 7am to 11pm and 30dB(A) in bedrooms from 11pm to 7am.

The report shall include all calculations and baseline data, and be set out so that the Local Planning Authority can fully audit the report and critically analyse the content and recommendations.

b) The mitigation measures as approved under this condition shall be implemented in their entirety prior to the commencement of the use or first occupation of the development and retained as such thereafter.

Reason: To ensure that the proposed development does not prejudice the amenities of occupiers of the residential properties in accordance with Policies DM04 of the Development Management Policies DPD (adopted September 2012), the Sustainable Design and Construction SPD, and 7.15 of the London Plan 2015.

18 a) No development shall take place until a scheme of proposed noise mitigation measures against externally generated traffic/mixed use noise has been submitted to and approved in writing by the Local Planning Authority.

b) The mitigation measures as approved under this condition shall be implemented in their entirety prior to the commencement of the use or the first occupation of the development and retained as such thereafter.

Reason: To ensure the amenities of occupiers are not prejudiced by traffic/mixed use noise in the immediate surroundings, in accordance with Policies DM04 of the Development Management Policies DPD (adopted September 2012), the Sustainable Design and Construction SPD (adopted April 2013), and 7.15 of The London Plan 2015.

4. NOISE SURVEY AND MEASUREMENTS

4.1 Unattended Noise Survey

4.1.1 An unattended noise and vibration survey was undertaken by Daniel Flood of AF Acoustics at 402 Finchley Road, London NW2, in two positions.

4.1.2 The duration of the noise survey was between 13:45 hours on Wednesday 14 February and 11:30 hours on Friday 16 February 2024.

4.1.3 The duration of the vibration survey was between 14:00 hours on Wednesday 14 February and 14:30 hours on Thursday 15 February 2024

4.1.4 Noise Position 1 - Measurements were undertaken along the front elevation of the site. The microphone was attached to a pole and mounted at a height of 3m, so it protruded above the site hoarding. The ambient noise environment in this position was dominated by road traffic noise from Finchley Road.

4.1.5 Noise Position 2 - Measurements were undertaken at the rear of the site on a flat first-floor flat roof area. The microphone was mounted on a tripod at a height of 1.5m above roof level. This position was screened from Finchley Road. The noise environment was determined by road traffic on the surrounding road network.

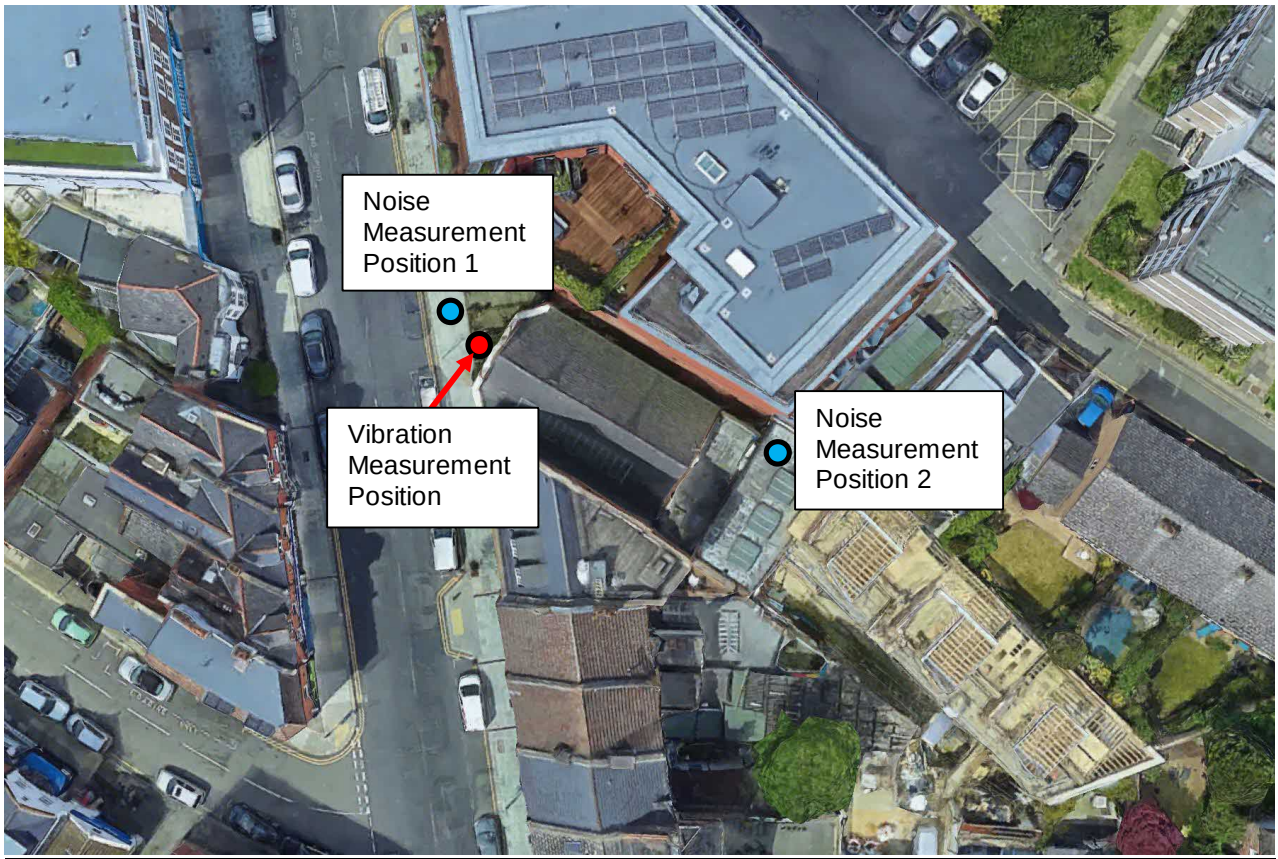


FIGURE 4.1: NOISE MONITORING LOCATION

4.1.6 The measured noise levels in all positions are considered free-field.

4.1.7 Measurements were carried out in accordance with the requirements of BS 7445-2:1991 and ISO 1996-2:1987.

4.1.8 The sound level meter was calibrated both prior to and on completion of the survey with no significant drift observed. The microphone was fitted with a windshield.

4.2 Measurement Weather Conditions

4.2.1 The weather during the measurements was mostly dry and clear. The temperature ranged from 11 to 18 °C. Average wind speeds remained below 3 ms^{-1}.

4.2.2 Spells of precipitation occurred during the following night-time periods, which have been removed from the subsequent analysis:

February 14/15 – 23:30 – 01:30 hours
February 16 – 03:30 – 05:30 hours

4.2.3 The weather is deemed to have caused no significant effect during the measurement period.

4.2.4 The equipment used for the noise survey is shown in Table 4.1.

Location	Name	Serial Number	Last Laboratory Calibrated
Position 1	NTI Audio XL2-TA Class 1 Sound Level Meter	A2A-18530-E0	January 2023
	NTI Audio MA220 Pre-amplifier	9566	January 2023
	NTI Audio MC230A Microphone	A19842	January 2023
Position 2	Norsonic 118 Class 1 Sound Level Meter	31382	March 2022
	Norsonic 1206 Pre-amplifier	30416	March 2022
	Gras 40AF Microphone	150690	March 2022
Calibrator	Larson Davis	18295	January 2024

TABLE 4.1: MEASUREMENT EQUIPMENT

4.3 Results – Unattended

4.3.1 A summary of the time-averaged ambient noise levels and background noise level, along with typical maximum noise levels are presented in Table 4.2 below. The typical L_{A90} background noise level has been derived considering the most commonly occurring 15 minute period. The $L_{Amax,F}$ noise level is the 90th percentile of the measured 5min maximum noise levels.

Location	Time period	Measured Noise Levels (dB re 2.0 x 10^{-5} Pa)		
		$L_{Amax,F}$	$L_{Aeq,T}$	Typical $L_{A90,T}$
Position 1 – Front of site	Day (07:00 – 23:00)	92	68	54
	Night-time (23:00 – 07:00)	84	66	44
Position 2 – Rear of site	Day (07:00 – 23:00)	68	49	42
	Night-time (23:00 – 07:00)	59	49	34

TABLE 4.2: SUMMARY OF UNATTENDED NOISE MEASUREMENTS

5. PROPG ASSESSMENT

5.1.1 With reference to Section 3.6, noise levels at the measurement positions fall within the following Noise Risk Categories as defined in ProPG for both daytime and night-time periods.

Measurement Position	Noise Exposure Category	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Front of site	Medium	High
Position 2 – Rear of site	Negligible/Low	Negligible/Low

TABLE 5.1: PROPG ASSESSMENT

5.1.2 The ProPG risk assessment categories for the front elevation fall into the "Medium" classification for the daytime period and "High" for the night-time period.

5.1.3 The ProPG risk assessment categories for the rear elevation fall into the "Negligible/Low" category for both the day and night-time periods.

5.1.4 ProPG recommends the following:

> High Risk – '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.'
>
> Medium risk – '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.'
>
> Low risk – '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.'

5.1.5 As recommended in PropG for 'High' noise exposure categories, good acoustic design has been implemented by the location of all but one of the bedrooms to the rear of the site. In addition, this front fourth-floor bedroom is set back from the road, further reducing the noise impact.

6. ACOUSTIC DESIGN STATEMENT

6.1 Overview of the process

6.1.1 ProPG sets out four elements which form Stage 2 of the approach:

Element 1 – Good Acoustic Design Process

Element 2 – Internal Noise Level Guidelines

Element 3 – External Amenity Area Noise Assessment

Element 4 – Assessment of other relevant issues

6.1.2 These four elements are considered in turn in the following sections.

6.2 Element 1 - Good Acoustic Design Process

6.2.1 The site layout generally responds appropriately to the overall shape of the site and is sensible from an acoustic perspective. With the exception of the fourth floor, all bedrooms are located at the rear of the building, where noise levels are significantly lower than the front.

6.3 Element 2 – Internal noise level guidelines

6.3.1 The second element of the ADS is to consider whether/how the ProPG internal noise criteria can be met.

External Building Fabric Assessment

6.3.2 Analysis of the external building fabric has been undertaken in order to ascertain the required acoustic performance of the glazing and other external fabric elements to achieve the project criteria.

6.3.3 The measured noise levels, presented in Section 4.3, have formed the basis of the subsequent assessment.

6.3.4 Given the distance between the measurement location at the front of the site and the proposed facades, distance corrections have been applied to L_{Aeq} and $L_{Amax,F}$ noise levels.

6.3.5 The glazing assessment has been based on the highest measured daytime and night-time noise levels and is based on the proposed layout, shown in Figures A1 and A2 of Appendix A.

6.3.6 The external wall build-up will comprise the following construction:

1No. layer 102.5mm brickwork
1No. layer 125mm Rainscreen Duo-Slab insulation
Breathable membrane
100mm SFS framing with 100mm Rockwool within the cavity
2No. layers 12.5mm plasterboard (10.6Kg/m^3)

6.3.7 As such, our analysis is based upon an R_w of 52dB for all non-glazed areas of the façade, comprising the above construction.

6.3.8 When assessing the sound insulation performance of an external building fabric system, it is generally regarded that the glazing element is the weakest path for external noise intrusion into internal areas.

6.3.9 It is assumed that the non-glazed areas of any façade systems may incorporate sufficient acoustic treatment behind such that the glazing remains the weakest path for external noise intrusion. As such, the acoustic performance of the glazing will be the most critical element in determining the overall sound insulation performance of the external façade.

Specification

6.3.10 Table 6.1 and Table 6.2 present the sound insulation performance specifications recommended for the glazed elements and ventilators of the external building fabric, along with typical constructions capable of achieving the internal ambient noise criteria set out in BS8233:2014, reproduced in Table 3.3.

Type	Example Constructions	Sound Insulation Performance, dB R_W
G1	Standard thermal double glazing e.g. 4mm glass/ 6mm cavity/ 4mm glass	31
G2	Medium specification thermal double glazing e.g. 4mm glass/ 12mm cavity/ 6mm glass	34
G3	High-specification thermal double glazing e.g. 6mm glass/ 12mm cavity/ 8mm glass	35

TABLE 6.1: SOUND INSULATION PERFORMANCE AND INDICATIVE CONSTRUCTIONS FOR THE GLAZING ELEMENTS

Note: The acoustic specifications for the windows and ventilators are given in Appendix C.

Type	Example Constructions	Sound Insulation Performance, dB $D_{n,e,w}$
V1	Standard through-the-frame trickle ventilator	32
V2	Standard through-the-frame trickle ventilator	33
V3	Medium Specification through-the-frame trickle ventilator	35

TABLE 6.2: SOUND INSULATION PERFORMANCE AND INDICATIVE CONSTRUCTIONS FOR THE VENTILATOR ELEMENTS

6.3.11 Typical glazing and ventilator configurations are quoted for guidance only and alternatives may be utilised, in any case, the acoustic performance of the system proposed must be demonstrated to the satisfaction of the acoustic consultant. The sound reduction performance quoted above must be achieved by the glazing system taken as a whole in its installed condition. The specification, therefore, applies to the glazing, the frames and all seals on any openable parts of the systems and any required ventilation or condensation control mechanisms. This list is not exhaustive: no part of the glazing system shall cause the above figures not to be achieved.

Glazing Zoning Plan

6.3.12 Given the varying noise climate across the site, we have split the facades into three separate zones for which differing glazing treatments and ventilation options will be applicable. Table 6.3 outlines the glazing requirements of each façade zone. Please see the attached Façade Zoning Plan in Figures A1 and A2 of Appendix A.

Type	Example Constructions	Glazing Type	Glazing performance dB R_w	Ventilator Type	Ventilator Performance $D_{n,e,w}$
Zone 1	Bedrooms and Living Rooms	G1	31	V1	32
Zone 2	Living Rooms and Commercial	G2	34	V2	33
Zone 3	Bedrooms	G3	35	V3	35

TABLE 6.3 GLAZING AND VENTILATION ZONING PLAN

Ventilation Strategy

6.3.13 It should be noted that the trickle ventilators provide background trickle ventilation only and that windows are to generally be openable to provide rapid/purge ventilation. During those periods where windows are opened for rapid/purge ventilation, noise levels will naturally be increased internally.

6.4 Acoustic Ventilation and Overheating (AVO)

6.4.1 As part of our acoustic assessment AF Acoustics have been commissioned to undertake an assessment regarding the risk of overheating. Table 6.4 presents the required assessment.

Location	Time period	Measured Noise Levels $L_{Aeq,T}$ (dB)	Risk Category	Mitigation
Front of Site	Day (07:00 – 23:00)	68	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy
	Night-time (23:00 – 07:00)	61*	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy
Rear of Site	Day (07:00 – 23:00)	49	Negligible Risk	None required – openable windows suitable for ventilation
	Night-time (23:00 – 07:00)	49	Negligible Risk	None required – openable windows suitable for ventilation

TABLE 6.4: AVO LEVEL 1 RISK ASSESSMENT
**5dB Distance correction applied*

6.4.2 On the basis of measured noise levels detailed in Section 4.3, the AVO risk category for day and night-time periods for the front elevation would be classified as “high risk”. For these areas, an AVO Level 2 assessment is recommended.

6.4.3 Meanwhile, the AVO risk category for the rear elevation, based on measured noise levels, would be classified as “negligible”. For these areas, windows are considered suitable for ventilation.

6.4.4 The Level 2 assessment will need to consider the following:

Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a CIBSE TM59 assessment)
How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a CIBSE TM59 assessment)
Design, extent and construction of attenuated passive ventilation.

6.5 Recommendations

6.5.1 It is recommended that the Energy Statement describes the measures, other than the use of opening windows, that are to be incorporated within the design that reduce overheating within the apartments. Typical these measures will include:

Minimising internal heat generation through energy efficient designs
Reducing the amount of heat entering the building by:
- o Reducing the proportion of glass
- o Reducing the glazing's G-value
- o Installing internal blinds
- o Adopting balconies to increase external solar shading

Exposing thermal mass within the apartments
Operating the mechanical ventilation on "boost" mode
Providing shared amenity which will be comfort cooled.

6.5.2 Through a combination of the above and other measures, such as fans within bedrooms, the total amount of time that windows will need to be open to control overheating is expected to be reduced. It is recommended that the overheating strategies developed during subsequent design phases provide feedback on the duration of time when overheating is expected to occur and the extent of opening required, so that further analyses of internal noise levels and their effects can be provided.

6.5.3 With regards to the noise implications of the overheating strategy, thermal modelling calculations should be undertaken to inform the design team on the type of overheating strategy which will be adopted. The internal noise level would be dependent on the open area required to manage overheating and the time that the element would be required to be open.

6.5.4 Various solutions to control overheating and noise passively are outlined in Table 6.5. Please note that the preferable solution would need to be assessed in full by AF Acoustics to confirm the viability to provide a compliant internal noise level.

Mitigation Type	Description and References	Approximate Level Difference[1]	Improvement Relative to a Window Providing the Same Amount of Ventilation
1. Standard opening windows	Window(s) open sufficiently to provide a ventilation free-area equivalent to 2% of the floor area	13 dB	0 dB
2. Open windows with sound attenuating balconies	1. plus balconies w solid balustrade or enclosed to a further degree (maintaining ar open area for ventilation). Absorption may be provided to the balcony soffit or potentially to other surfaces	17-23 dB	4-10 dB
3. Attenuated or plenum windows	Dual windows (space by around 200mm) with staggered openings and absorptive linings to the cavity reveals. Various other configurations also possible in principle	17-24 dB	4-11 dB
4. Attenuated vents/louvres	Ventilation openings with means of attenuating sound. Typically acoustic	17-29 dB	4-16 dB

Mitigation Type	Description and References	Approximate Level Difference[1]	Improvement Relative to a Window Providing the Same Amount of Ventilation
	louvres or acoustically lined ducts/plena		
Combination of 2, 3 and 4.	Combined use of options 2, 3 and 4. Refer to the descriptions above	21-39 dB	8-26 dB

TABLE 6.5: EXAMPLES OF PASSIVE VENTILATION SYSTEMS (REF: AVO GUIDE)

6.6 Element 3 – External Amenity Area Noise Assessment

6.6.1 Provision for external amenity will be provided in the following areas:

Second-floor, front elevation

Third-floor, front elevation

First to fourth floor on rear elevation

6.6.2 Second and third floor balconies, front elevation - On the basis of a solid glass balustrade, 0.9m in height, proposed to surround the balconies, a 5dB correction can be applied. A further 5dB loss can be applied to correct for the difference between the measurement location and the balcony location. On that basis, noise levels of 58dB are predicted, which exceeds the 50-55dB $L_{Aeq,16hour}$ level recommended by BS8233 by a margin of 3dB.

6.6.3 Despite this, BS8233 states, '*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.*'

6.6.4 First to fourth floor balconies, rear elevation - On the basis of measured noise levels, external amenity spaces along the rear elevation are expected to comfortably achieve the 50-55dBA level recommended in BS8233:2014, and should therefore be considered acceptable.

6.7 Element 4 – Assessment of other relevant issues

6.7.1 This section considers the 'Other Relevant Issues' listed under this heading in the ProPG document.

4(i) Compliance with relevant national and local policy

Local policy in respect of noise supports the aims of the NPPF and so adopting the approach set out in the ProPG guidance will not conflict with those aims.

4(ii) Magnitude and extent of compliance with ProPG

The degree of compliance with the ProPG criteria has been addressed in this report.

4(iii) Likely occupants of the development

The likely occupiers of the properties are expected to be professionals and small families. The design of the properties leads to good acoustic conditions internally.

4(iv) Acoustic design versus unintended adverse consequences

ProPG states, 'Design measures taken to reduce intrusion by noise may have unintended adverse consequences for the building or the nearby environment and may affect the attractiveness of the living environment for the occupants.'

The windows will be openable for rapid or purge ventilation, or at the occupant's choice, which will aid personal control over the internal environment. If the scheme changes any unintended adverse effects arising from the design choices can be taken into account as the scheme emerges.

4(v) Acoustic design versus wider planning objectives

There is no known conflict between the acoustic design of the site and the wider planning objectives. If the development changes then the interaction of acoustic design with other amenity considerations can be addressed.

Planning Conditions 15 and 18

6.7.2 On the basis of the preceding assessments, the requirements of Planning Condition 15 and 18 are considered to have been achieved.

7. VIBRATION ASSESSMENT

7.1.1 When assessing vibration reference should be made to the following guidelines:

Vibration

7.1.2 BS 6472-1:2008 “Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration sources other than blasting” provides guidance on predicting human response to vibration in buildings over the frequency range 0.5Hz to 80Hz.

7.1.3 BS 6472 is based on the evaluation of vibration movements with regards to adverse comment from occupants, rather than criteria to health and safety or structural damage.

7.1.4 In terms of assessing what impact the perceptibility of structure-borne vibration has on a person the standard promotes the use of the vibration dose value (VDV). The VDV determines an overall dose value accounting for intermittent, impulsive or continuous vibration experienced by a person and rates the level in terms of subjective response. Table 7.1 details the relationship between vibration dose and human annoyance.

Place and Time	Low probability of adverse comment ($m/s^{-1.75}$)	Adverse comment possible ($m/s^{-1.75}$)	Adverse comment possible ($m/s^{-1.75}$)
Residential Buildings 16h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential Buildings 8h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

TABLE 7.1: VDV VALUES

7.1.5 The above values can be used for both vertical and horizontal vibration, provided that they are calculated according to the appropriate frequency weightings.

7.2 Road Traffic

7.2.1 The main potential source of vibration is from road traffic Finchley Road, which the proposed building overlooks, located at a distance of 3m from the site boundary.

7.3 Vibration Measurements

7.3.1 The equipment used for the noise survey is shown in Table 7.2

Measurement Position	Name	Serial Number	Last Laboratory Calibrated
Vibration	Rion XV-2P Triaxial Vibration Meter	00370025	October 2023
	Rion Accelerometer PV-83C	72424	

TABLE 7.2: VIBRATION EQUIPMENT

7.3.2 Measurements were undertaken with the high-sensitivity PCB triaxial accelerometer mounted on a DIN mounting plate. The plate was placed on an existing concrete hardstanding at the site, along the front site boundary.

7.3.3 The approximate location of the vibration measurement is shown in Figure 4.1.

7.3.4 The duration of the survey was between 14:10 on Wednesday 14 February and 14:15 on Thursday 15 February 2024.

7.4 Measured Vibration Levels

7.4.1 Table 7.3 details the measured Vibration Dose Values (VDVs) for both the daytime and night-time periods, based upon the 24-hour unattended on-site survey.

Period	Predicted Vibration Dose Value (m/s $^{1.75}$) by Axis		
	X	Y	Z
Day (07:00 -23:00)	0.006	0.002	0.057
Night (23:00 – 07:00)	0.007	0.002	0.051

TABLE 7.3: VIBRATION DOSE VALUE RESULTS

7.4.2 As indicated above, the measured VDV results for all axes are negligible and fall substantially below the "low probability of adverse comment" as defined by BS6472.

Planning Condition 15

7.4.3 Vibration levels on site should be considered acceptable, with no requirement for vibration mitigation strategies. On that basis, the requirements of Planning Condition 15 have been achieved.

8. ATMOSPHERIC PLANT NOISE EMISSIONS

Planning Condition 12 and 14

8.1.1 As presented in Section 3.8, Barnet London Borough Council has imposed two conditions relating to atmospheric noise emission from building services plant.

8.1.2 It is understood that no building services plant will be installed at the development. On that basis, AF Acoustics considers that the conditions required to discharge Planning Condition 12 and 14 have been achieved.

9. CONCLUSION

9.1.1 AF Acoustics have been appointed by Proma Beta Ltd to provide an acoustic design statement for the site at 402 Finchley Road, London NW2. This report provides the required acoustic assessments for Phases 11-12 of the development.

9.1.2 The development proposals include the demolition of the existing building on site and the construction of a 5 storey building, to provide commercial space on the ground floor and 8No. self-contained apartments.

9.1.3 A baseline noise and vibration survey was undertaken in February 2024. From this survey, and in accordance with the relevant criteria, the daytime and night-time ambient and background noise levels have been determined, as well as the maximum noise levels at night.

9.1.4 AF Acoustics has undertaken an assessment in relation to the noise levels likely to be incident on the proposed building facades and to provide acoustic performan specifications such that acceptable internal noise criteria can be achieved, in accordance with the guidance provided by WHO and BS8233.

9.1.5 Furthermore, we have provided an Acoustic Design Statement at an appropriate level of detail for an application to demonstrate how design measures and other relevant matters can be applied.

9.1.6 By following the recommendations in this acoustic design statement, it is expected that no significant effects will be observed.

9.1.7 Based on the above-mentioned findings, the report has demonstrated that the development is suitable for residential purposes.

9.1.8 AF Acoustics considers that criteria required by Planning Conditions 15 and 18 have been achieved.

9.1.9 In addition, on the basis of no building services plant being installed, AF Acoustics considers that the conditions required to discharge Planning Condition 12 and 14 have been achieved.

9.1.10 The limitations to this report are presented in Appendix D.

AF Acoustics

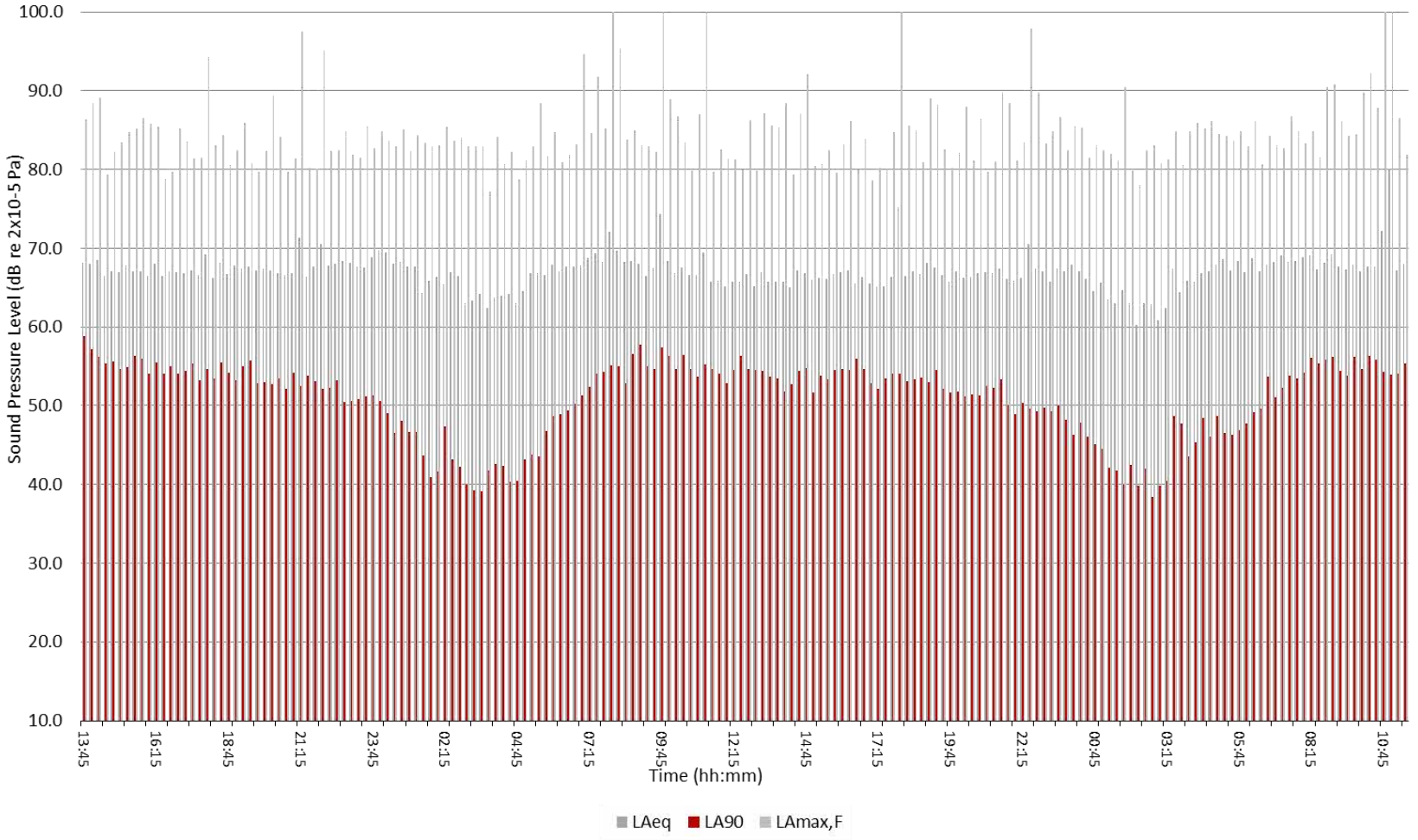
APPENDIX A: FIGURES

2058 - 402 Finchley Road, London NW2

Graph 1

Position 1 - Front of site

Time History - 14 February to 16 February 2024



2058 - 402 Finchley Road, London NW2

Graph 2

Position 2 - Rear of site

Time History - 14 February to 16 February 2024

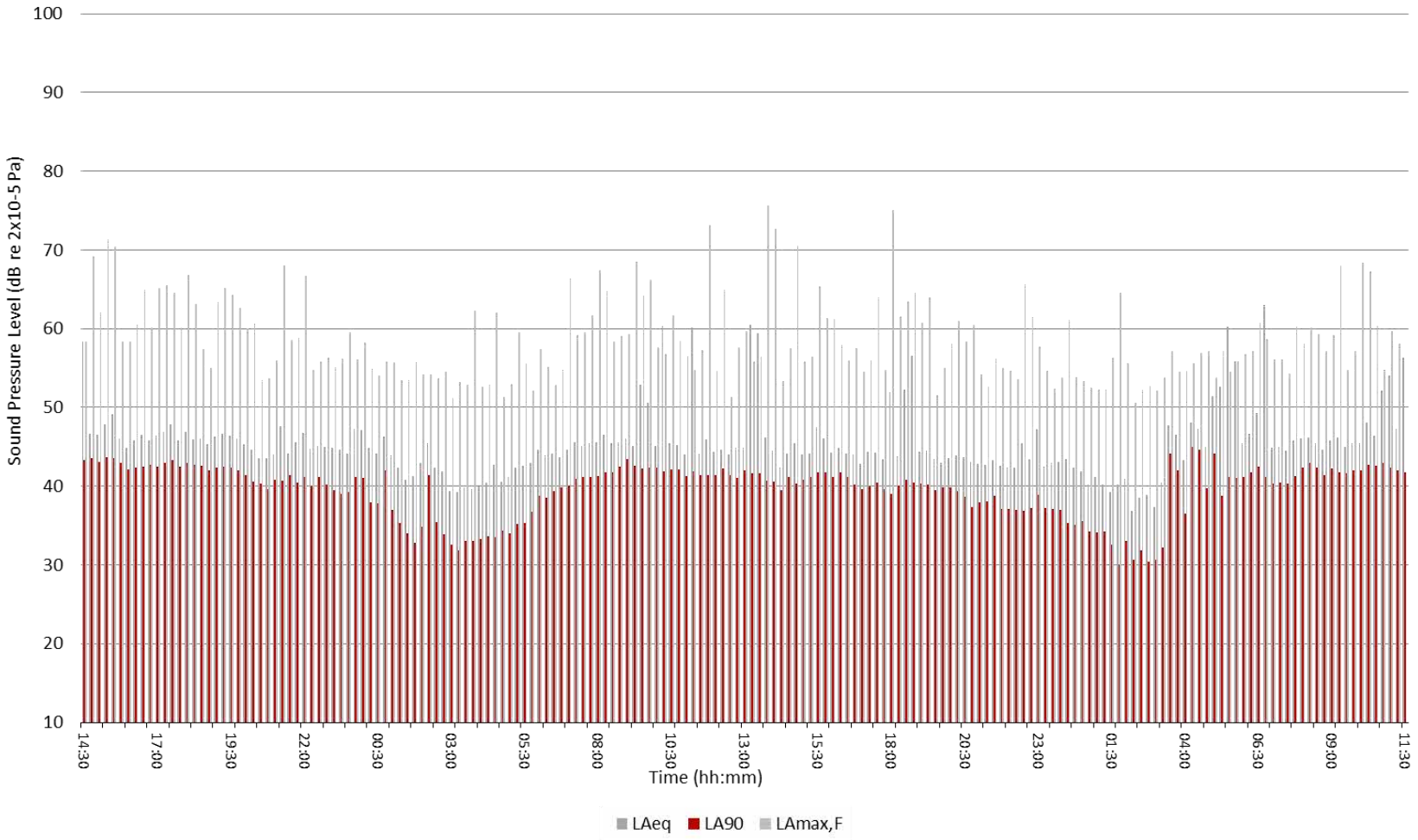


FIGURE A1: SITE WIDE GLAZING ZONING PLAN – GROUND FLOOR TO SECOND FLOOR

FIGURE A2: SITE WIDE GLAZING ZONING PLAN – THIRD TO FOURTH FLOOR

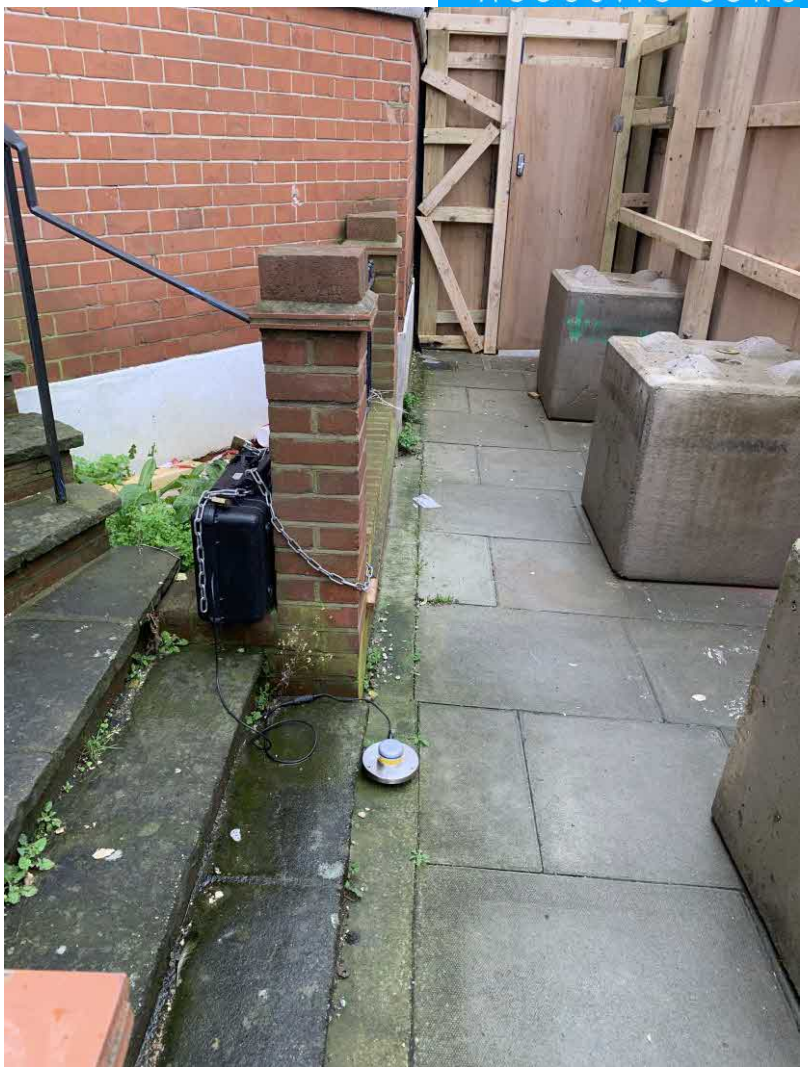


FIGURE A3: NOISE AND VIBRATION MONITORING POSITIONS AT FRONT OF SITE

FIGURE A4: NOISE MONITORING POSITION AT REAR OF SITE

Job No.	Job Title
2058	402 Finchley Road
Room Description	
Living Room - First Floor	

Room Length	11	Area of Windows (S_{wi})	7.5
Room Width	7.5	Area of Ext Wall (S_{ew})	11.0
Room Height	2.4	Area of Roof (S_{rf})	0.0
		Total Area of Façade	18.5

Noise Levels

		Octave Band Centre Frequency, Hz								
Period	**Parameter**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
L_{eq}	Day	68.3	64.0	61.4	60.4	62.3	59.7	53.4	46.9	66.0
L_{eq}	Night	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
$L_{max,f}$	Night	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0

Assessment

		Octave Band Centre Frequency, Hz								
Element	**Description**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**R_w**
Window SRI		17.0	21.0	20.0	31.0	39.0	37.0	47.0	47.0	34.0
External Wall SRI	Brick/Block Cavity Wall (8233)	36.0	41.0	45.0	45.0	54.0	58.0	58.0	58.0	52.0
Tickle Ventilator Insulation	Trickle Vent with Indirect Air-Path (800(	29.0	33.0	33.0	33.0	31.0	32.0	32.0	32.0	33.0
Roof/Ceiling SRI	No Roof Transmission	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	100.0

		Octave Band Centre Frequency							
Element	**Description**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Reverberation Time	RT60 (s)	0.8	0.7	0.6	0.6	0.6	0.6	0.5	0.5
Equivalent Absorption Area	A	38.1	45.7	50.8	55.8	55.8	55.8	58.4	68.5

Results

		Octave Band Centre Frequency, Hz								
Period	**Parameter**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
L_{eq}	Day	47.7	38.6	36.4	26.5	27.3	24.2	16.9	9.7	33.2
L_{eq}	Night	-20.6	-25.4	-25.0	-33.9	-35.0	-35.5	-36.5	-37.2	-27.4
$L_{max,f}$	Night	-20.6	-25.4	-25.0	-33.9	-35.0	-35.5	-36.5	-37.2	-27.4

FIGURE A5: CALCULATION – FIRST FLOOR LIVING ROOM

Job No.	Job Title
2058	402 Finchley Road
Room Description	
Forth Floor Bedroom	

Room Length	4	Area of Windows (S_{wi})	5.0
Room Width	3	Area of Ext Wall (S_{ew})	8.0
Room Height	2.4	Area of Roof (S_{rr})	0.0
		Total Area of Façade	13.0

Noise Levels

		Octave Band Centre Frequency, Hz								
Period	**Parameter**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
L_{eq}	Day	65.1	60.8	58.2	57.2	59.1	56.5	50.2	43.7	62.8
L_{eq}	Night	59.8	54.9	52.9	53.9	57.0	55.4	51.5	45.5	61.1
$L_{max,f}$	Night	78.1	72.6	68.7	67.6	68.9	67.9	65.3	60.3	74.0

Assessment

		Octave Band Centre Frequency, Hz								
Element	**Description**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**R_w**
Window SRI		23.0	23.0	23.0	30.0	38.0	36.0	43.0	43.0	35.0
External Wall SRI	Brick/Block Cavity Wall (8233)	36.0	41.0	45.0	45.0	54.0	58.0	58.0	58.0	52.0
Tickle Ventilator Insulation	Trickle Vent with Direct Air-Path (4000r	31.0	35.0	35.0	34.0	36.0	34.0	34.0	34.0	35.0
Roof/Ceiling SRI	No Roof Transmission	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	100.0

		Octave Band Centre Frequency							
Element	**Description**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Reverberation Time	RT60 (s)	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Equivalent Absorption Area	A	8.6	10.4	14.4	15.6	17.9	18.4	18.4	18.4

Results

		Octave Band Centre Frequency, Hz								
Period	**Parameter**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
L_{eq}	Day	44.2	38.2	34.2	27.9	24.8	24.0	16.8	10.3	32.0
L_{eq}	Night	38.9	32.3	28.9	24.6	22.7	22.9	18.1	12.1	29.3
$L_{max,f}$	Night	57.2	50.0	44.7	38.3	34.6	35.5	32.0	27.0	43.2

FIGURE A6: CALCULATION – FOURTH FLOOR BEDROOM

APPENDIX B: ACOUSTIC SPECIFICATION FOR WINDOWS AND VENTILATORS

Glazed units (inclusive of glazing, louvres, timber, panels, spandrel panels, infill panels, framing, opening lights, balcony/terrace doors, seals etc. as appropriate) should achieve the following minimum sound reduction indices as tested general accordance with BS EN ISO 101400-2:2010, and evidence to this effect shall be published as part of the tender response.

Type	Minimum Sound Reduction Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R_w
	63	125	250	500	1k	2k	4k	8k	
G1	19	23	24	23	32	38	35	35	31
G2	17	21	20	31	39	37	47	47	34
G3	23	23	23	30	38	36	43	43	35

Trickle Ventilators (in their open state) should achieve the following minimum element normalised level differences as tested in accordance with BS EN 20140-10:1992, and evidence to this effect shall be published as part of the tender response.

Type	Minimum Sound Reduction Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$
	63	125	250	500	1k	2k	4k	8k	
V1	27	31	36	31	38	28	28	28	32
V2	29	33	33	33	31	32	32	32	33
V3	31	35	35	34	36	34	34	34	35

APPENDIX C: TERMINOLOGY RELATING TO NOISE

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20_{μ}Pa ($20x10^{-6}$ Pascals) on a decibel scale.
Sound Power Level (Lw)	is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by 20 $\log_{10}$ (s_1 / s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20_{μ}Pa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Specific Noise	The noise source under investigation for assessing the likelihood of complaints.
Rating Level	The specific noise level plus any adjustment for the characteristic features of the noise.
Free field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX D: LIMITATIONS TO THE REPORT

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of AF Acoustics Ltd. AF Acoustics Ltd accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/or AF Acoustics Ltd and agree to indemnify AF Acoustics Ltd for any and all loss or damage resulting therefrom. AF Acoustics Ltd accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

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