Noise impact assessment of a proposed residential development

141 – 145 Kentish Town Road, London NW1 8PB

Client: Ian Heitner

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0. SUMMARY

0.1. ACA Acoustics Limited has been commissioned to assess external noise intrusion to a proposed new residential development at the 1st floor of 141 – 145 Kentish Town Road, London. The assessment has been prepared to support a planning application to the Local Planning Authority of London Borough of Islington Council.

0.2. A sound level survey has been carried out between 16th and 18th of July 2024. Whilst on site ACA Acoustics' consultant considered the dominant sound source to be local road traffic and pedestrian activity.

0.3. Sound levels measured at the façade closest to Kentish Town Road are $L_{Aeq\ 16\text{-hour}}$ 62dB during the daytime and $L_{Aeq\ 8\text{-hour}}$ 58dB overnight. Short-term individual noise events overnight do not regularly exceed a level of LAfmax 76dB. Towards the rear of the site, levels reduce to $L_{Aeq\ 16\text{-hour}}$ 52dB during the daytime and $L_{Aeq\ 8\text{-hour}}$ 47dB overnight. Short-term individual noise events overnight do not regularly exceed a level of LAfmax 65dB.

0.4. A Stage 1: Initial Site Noise Risk Assessment, in accordance with ProPG Planning & Noise, identifies the site as being in an area with a medium noise risk, and therefore an Acoustic Design Statement has been prepared.

0.5. A Stage 2 detailed acoustic design process has been followed, in accordance with ProPG. Details of the Acoustic Design Statement are included in this report. A scheme for sound insulation of the building envelopes has been developed such that internal sound levels meet the guideline limits for a good standard of amenity to living rooms and bedrooms set out in ProPG and BS 8233:2014. Details of the sound insulation scheme are provided within this report.

0.6. The assessment includes the benefit of mechanical ventilation to the rooms fronting Kentish Town Road.

0.7. A survey of groundborne vibration confirms that Vibration Dose Values are considerably below the "low probability of adverse comment" within BS 6472:2008, and no additional vibration mitigation will be required.

0.8. In conclusion, it is recommended that the site is suitable for the residential development, subject to implementation of noise control measures set out in this report, and planning consent may be granted for the proposed development.

1. INTRODUCTION

A planning application is to be submitted for a new residential development on the first floor of the existing building at 141 – 145 Kentish Town Road, London. The site is currently occupied by a dance studio/school.

ACA Acoustics Limited has been commissioned by the client to carry out a survey and assessment of external sound and vibration levels and, where necessary, to make recommendations for a suitable mitigation scheme.

The objective of the assessment is to determine the impact that existing noise and vibration sources would have on the proposed residential units in accordance with ProPG: Planning & Noise, national planning policies and other relevant British Standards and guidance documents.

This report presents results of the sound and vibration level surveys, along with ProPG Stage 1 and Stage 2 assessments.

2. ACOUSTIC CRITERIA

2.1. National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE)

The National Planning Policy Framework (referred to as NPPF) sets out the Government's planning policies for England and provides guidance on how these are expected to be applied, providing a framework within which Local Authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 180 of the NPPF states that,

> "*Planning policies and decisions should contribute to and enhance the natural and local environment by … e) 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*".

Paragraph 191 also talks specifically about noise and advises,

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

- *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.*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*."

The Government's long-term policy aims relating to noise are contained in the Noise Policy Statement for England (referred to as NPSE). Stated aims of the NPSE are:

"*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy of 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.*"

Paragraphs 2.19 to 2.24 clarify the above aims, referring to established concepts from toxicology; NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). It also introduces a new concept relating to *"significant adverse*" of SOAEL (Significant Observed Adverse Effect Level), however noting,

"*It is not possible to have a single objective noise-based measure that describes SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times*".

The first aim of NPPF Paragraph 191 and the second underlying aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development, as set out in the NPPF. As neither the NPPF nor NPSE includes any numerical criteria, it is necessary to consider guidance provided in other documents to determine suitable limits that would define the LOAEL on an individual basis.

Finally, it is also of benefit to consider Paragraph 2.7, which advises that,

"*… the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications*".

This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing noise to an excessively low level if this creates or increases some other adverse impact. Similarly, it may be appropriate in some cases for noise to

have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development.

2.2. Planning Practice Guidance – Noise (PPG-N)

Related to the NPSE and the NPPF, The Department for Communities and Local Government has published additional guidance and clarifications within the Planning Practice Guidance – Noise (PPG-N), available at https://www.gov.uk/guidance/noise--2.

Paragraph 003 of the PPG advises that:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *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.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure … is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

This guidance is like that set out in the NPPF and NPSE, however, Paragraph 005 of the PPG-N provides outline guidance of the definition of "*significant adverse*" and "*adverse*" effects. A copy of the table appended to Paragraph 005 is repeated below.

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

Figure 1: Noise exposure hierarchy, taken from Planning Practice Guidance – Noise

Although this table provides descriptions of definitions for the NOEL, LOAEL and SOAEL, as with the NPPF and NPSE there are no numerical values provided.

Paragraph 011 of the PPG-N also provides examples where the noise impact may be offset, including through the use of local amenity areas, noting:

"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).*"

2.3. ProPG: Planning & Noise

ProPG: Planning & Noise is a collaborative document prepared by the Institute of Acoustics, Association of Noise Consultants, and the Chartered Institute of Environmental Health.

The document brings together guidance and recommendations in assessing the noise impact on new residential developments from various documents including the NPPF, NPSE, PPG-N, BS 8233:2014 and the World Health Organisation guidance. The aim is to regularise the assessment process and to encourage good acoustic design for new noise-sensitive developments.

The assessment process is split into two sequential stages:

- Stage 1 – An initial noise risk assessment of the proposed development site; and
- Stage 2 – A systematic consideration of four key elements:
  - Element 1 – Demonstrating a "Good Acoustic Design Process";
  - Element 2 – Observing internal "Noise Level Guidelines";
  - Element 3 – Undertaking an "External Amenity Area Noise Assessment"; and
  - Element 4 – Consideration of "Other Relevant Issues".

The Stage 1 risk assessment requires sound levels to be measured at the site over daytime and night-time periods and, if necessary, any anticipated significant changes to the climate to be predicted to determine a "'*typical worst case' 24-hour day either now or in the foreseeable future*".

The assessment should include all relevant sources of transport noise that affect the site, (including road, railway, and aircraft sources). It may also include industrial and commercial noise, where this is present but not dominant.

The measured/calculated daytime $L_{Aeq,\ 16\text{-hour}}$ and night-time $L_{Aeq,\ 8\text{-hour}}$ sound levels are then compared with Figure 1 of ProPG to complete the site's initial noise risk assessment. Copy of Figure 1 from ProPG is included in Figure 2 below.

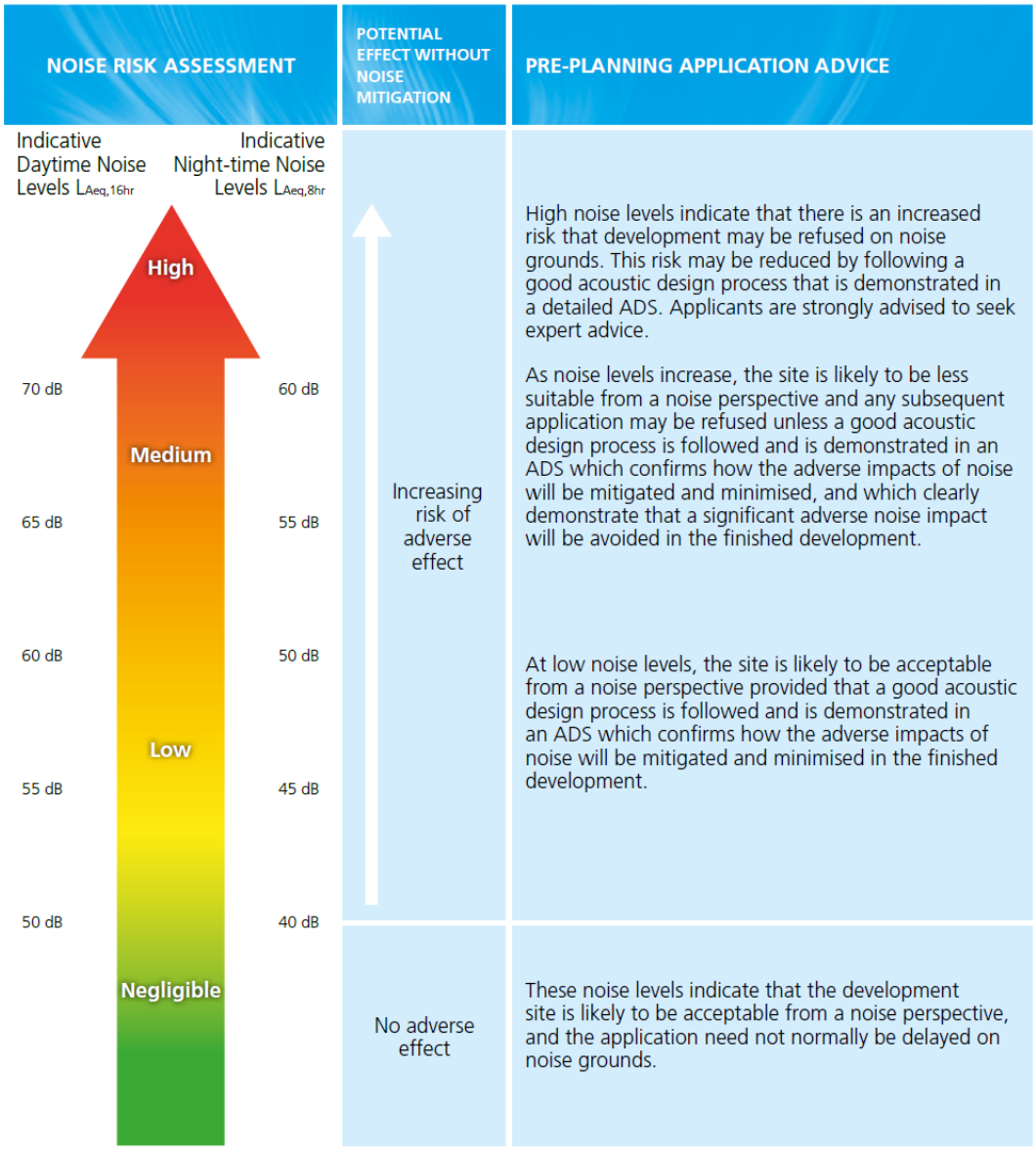

Figure 1 Notes:

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

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

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

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

Figure 2: Noise Risk Assessment, taken from Figure 1 of ProPG Planning & Noise

The outcome of the Stage 1 initial risk assessment determines the next step and whether an Acoustic Design Statement is necessary. It is of benefit to note guidance in Paragraph 2.10 of ProPG:

"*The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the locality, the project and the wider context.*"

A site being placed in the High-Risk category is not necessarily an indication that the development should be refused, but rather should be viewed taking into account the context of the development and highlights the importance of following a good acoustic design process from an early stage.

Element 2 of the Stage 2 assessment provides recommended internal sound levels to the residential dwellings. Criteria are taken from BS 8233:2014 with an additional criterion for individual short-term sound levels at night (LAfmax) and various clarifications and notes. These include an expansion on advice relating to the potential relaxation of the internal sound levels which is often overlooked when considering BS 8233:2014.

Paragraphs 2.33 to 2.36 discuss the impact of ventilation and opening windows. It is clearly stated that:

"*Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open*".

However, Paragraph 2.33 confirms that an open window typically reduces the sound insulation performance of the façade to 10 to 15dBA. This means that any site with a noise risk assessment above "*Negligible*" would fail to achieve the internal sound level criteria with windows open. Paragraph 2.34 acknowledges this, confirming that internal sound levels for sites in urban areas and adjacent to transportation noise sources may only be practically achieved with windows closed.

"*In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position. Furthermore, in this scenario the internal LAeq target noise levels should not generally be exceeded.*"

Copy of Figure 2 of ProPG is included in Figure 3 below.

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\ hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\ hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\ hr}$	30 dB $L_{Aeq,8\ hr}$ **45 dB $L_{Amax,F}$** (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

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 $L_{Amax,F}$, 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 $L_{Amax,F}$ 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).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} 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 L_{Aeq} 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)**.

Figure 3: Internal sound level guidelines, taken from Figure 2 of ProPG: Planning & Noise

Sound levels in external amenity areas are considered in Element 3 of the Stage 2 assessment. This requires that, where practical, sound levels in amenity areas that are an intrinsic part of the overall design, should ideally not be above the range $L_{Aeq,\ 16\text{-hour}}$ 50dB to 55dB. It does however quote BS 8233:2014, that:

> *"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 amenity spaces but should not be prohibited."*

2.4. The Building Regulations Approved Document O

Although not applicable to planning matters, it is beneficial to consider the impact of how complying with The Building Regulations Approved Document O will affect the ventilation strategy.

Requirement O1 of Schedule 1 to The Building Regulations 2010 requires that the following is met.

Requirement

Requirement	*Limits on application*
O1 Overheating mitigation	
(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to—	
(a) limit unwanted solar gains in summer;	
(b) provide an adequate means to remove heat from the indoor environment.	
(2) In meeting the obligations in paragraph (1)—	
(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and	
(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.	

Figure 4: Requirement O1 of The Building Regulations 2010

The aim of Requirement O1 is to protect the health and welfare of the occupants of residential buildings, by reducing the occurrence of high indoor temperatures.

Where practical, this should be achieved through limiting solar gains through the design of the building and façade elements. Excess heat should then be removed through opening windows, ventilation louvres in external walls, a mechanical ventilation system, or a mechanical cooling system. Paragraph 2.11 of Approved Document O confirms that "*The building should be constructed to meet the requirement O1 using passive means as far as reasonably practicable*".

However, requirement O1(2)(a) requires that any successful overheating mitigation strategy must also consider other potential adverse impacts, including sound levels inside bedrooms at night.

Paragraphs 3.2 and 3.3 consider the impact of noise on the overheating strategy. These have been included below.

> "*3.2 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).*

3.3 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)."

The Institute of Acoustics and Association of Noise Consultants have issued guidance on complying with the requirements of Approved Document O. They recommend that a 4dB open window loss is suitable for high-risk areas, such as within London.

On this basis, where sound levels incident on a bedroom window do not exceed $L_{Aeq,\ 8\text{-hour}}$ 44dB and LAfmax 59dB more than 10 times per night, then the criteria in paragraph 3.3 of Approved Document O should be achieved and an overheating mitigation strategy allowing for open windows is appropriate. When external sound levels exceed these levels then it is likely windows will be closed by occupants overnight and an alternative strategy is required.

Note that this does not mean that windows should be sealed closed as most residents would desire the choice of whether to open windows or not. For example, a resident may choose to open windows to a bedroom to help mitigate overheating to the property whilst the bedroom is not in use during the daytime, then close the windows when sleeping in the bedroom overnight.

In accordance with The Building Regulations Approved Document F, it is recommended that if continuous mechanical ventilation is used, sound levels in bedrooms overnight should not exceed a level of LAeq 30dB when the system is operating at its minimum low rate. Although, evidence referenced in The Association of Noise Consultants' *Acoustics Ventilation and Overheating: Residential Design Guide*, notes that "*a more prudent limit for mechanical services noise around 24-26dBA is likely to be required to prevent an adverse reaction from most occupants while falling asleep*".

2.5. British Standard 8233:2014

The introduction to BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* advises that "*this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria*". As such it is considered that guideline noise limits set out in BS 8233:2014 are suitable to protect future occupants of the dwelling from noise disturbance and compliance with these values would ensure sound levels within the new development are below the Lowest Observed Adverse Effect Level and comply with the principles of the NPPF, NPSE and PPG-N, along with corresponding to the recommended criteria provided by the Local Authority.

Guidance limits for internal sound levels within living rooms and bedrooms, taken from Table 4 of BS 8233:2014, are shown in Table 1 below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35dB LAeq, 16hr	-
Dining	Dining Room/Area	40dB LAeq, 16hr	-
Sleeping (daytime resting)	Bedroom	35dB LAeq, 16hr	30dB LAeq, 8hr *

Table 1: BS 8233:2014 indoor ambient sound levels for dwellings

The above criteria are generally considered suitable for noise from traffic and other 'anonymous' sources. The accompanying notes to Table 4 in BS 8233:2014 confirm that the levels can be relaxed by 5dB and still achieve reasonable criteria.

ACA Acoustics' consultant considered that no noise of an industrial or commercial nature was subjectively audible to the proposed development site, and as such the guideline criteria within Table 1 is considered appropriate for this assessment.

2.6. Vibration Criteria

British Standard 6472-1:2008 *Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting* is commonly used to assess the suitability of a site for residential development where there is potential for raised levels of groundborne vibration, particularly where a proposed residential development site is close to railway lines.

BS 6472-1:2008 provides detailed guidance on the measurement and assessment of vibration levels and offers guideline criteria for levels of vibration which may cause adverse comment. For intermittent vibration, as in the case of trains, the standard recommends vibration is assessed in terms of Vibration Dose Values (VDV). This takes account of the severity of the vibration for each event (trains passing), the frequency, and the duration of vibration events to give separate day and night-time VDV levels for comparison with guideline limits.

The significance for human response to vibration within residential dwellings, taken from Table 1 of BS 6472-1:2008. Is shown in Table 2 below.

Accompanying notes to the table confirm that below these ranges adverse comment is not expected, and where VDV values are above the upper range then adverse comment is very likely. ACA Acoustics recommends designing daytime and night-time VDV to not exceed the range of values defined in BS 6472-1:2008 as achieving a 'low probability of adverse comment'. It is considered this will provide a good standard of amenity for future residential occupants.

Reference Time	Low Probability of Adverse Comment $m/s^{-1.75}$	Adverse Comment Possible $m/s^{-1.75}$	Adverse Comment Probable $m/s^{-1.75}$
Daytime (07:00 – 23:00)	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
Night-time (23:00 – 07:00)	0.1 – 0.2	0.2 – 0.4	0.4 – 0.8

Table 2: BS 6472-1:2008 assessment results criteria

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The site is a former London Underground Station but currently comprises a commercial unit on the ground floor (Cash Converters Retail Outlet), which is to remain in situ and a dance school/studio on the first floor. This development proposal comprises converting the first floor into two residential dwelling flats.

The surrounding area is a typical London High Street, with a dense mixture of residential and commercial premises. The site fronts a busy junction on Kentish Town Road, which has consistent heavy slow moving road traffic and high levels of pedestrian activity. The other facades of the site are somewhat quieter.

The acoustic climate in the vicinity is dominated by local road traffic noise and pedestrian activity.

A site location plan showing the existing building, and measurement locations is included in Figure 5 below.

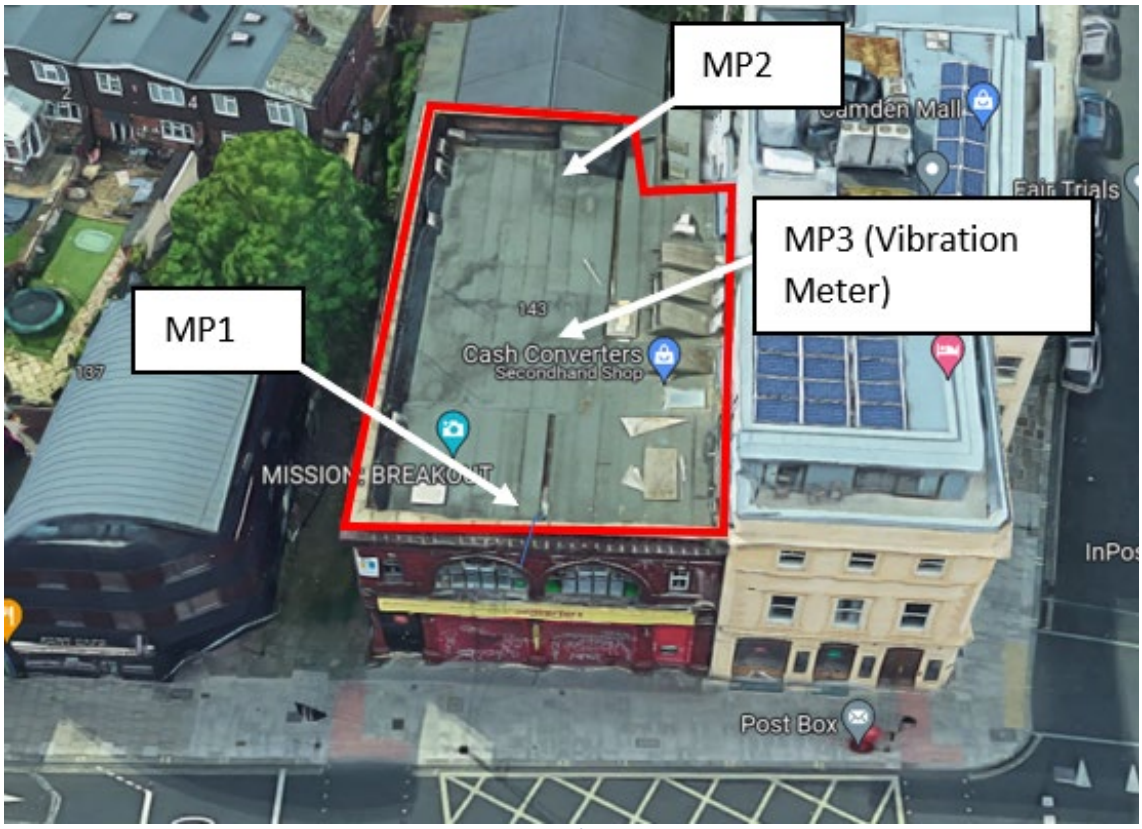

Figure 5: Site Location Plan (available at www.google.com/maps)

4. SOUND LEVEL SURVEY

To assess the impact of existing sound sources, a sound level survey has been conducted at the development site to determine sound levels incident on the various facades.

The sound level survey was set up by Sam Thorpe of ACA Acoustics and carried out over a 2-day period between 16th to 18th July 2024.

The measurement position is marked on the aerial photograph in Figure 5 and described below.

Position Reference	Description
MP1	In a free-field position at the front of the site, at rooftop level, which corresponds to the front of the flats to the road. At a height of nominally 1.5m with the microphone mounted on a tripod (with direct line of sight to the road).

MP2	In a free-field position at the rear of the site, at rooftop level, which corresponds to the rear façade of the flats. At a height of nominally 1.5m with the microphone mounted on a tripod.
MP3	Vibration Meter, positioned at a central location on the roof. Whilst not at 1st floor level, it is considered that this location is still representative of the 1st floor flats.

Table 3: Sound level survey measurement position

The following equipment was used during the survey; the sound level meters were calibrated before the survey and checked after with no deviation noted.

Equipment	**Serial Number**
NTi Audio Class 1 sound level meter type XL2 complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
Rion Class 1 sound level meter type NL-52 complete with weatherproof and lockable outdoor environmental kit	00564867
Rion vibration meter type XV-2P	00380062
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	83826

Table 4: Equipment used during the sound level survey

Weather conditions at the time of setting up the survey consisted of 50% cloud cover, light southerly winds, dry ground conditions and a temperature of around 25°C. Weather conditions have been reviewed at www.worldweatheronline.com, using the closest available commercial weather station. Weather conditions remained predominantly calm and dry with wind speeds below recommended limits during the proposed equipment operation times. Meteorological conditions are considered acceptable and will not have adversely impacted the survey results.

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Results of the survey in terms of raw data are shown in Figure 7 and Figure 8 below.

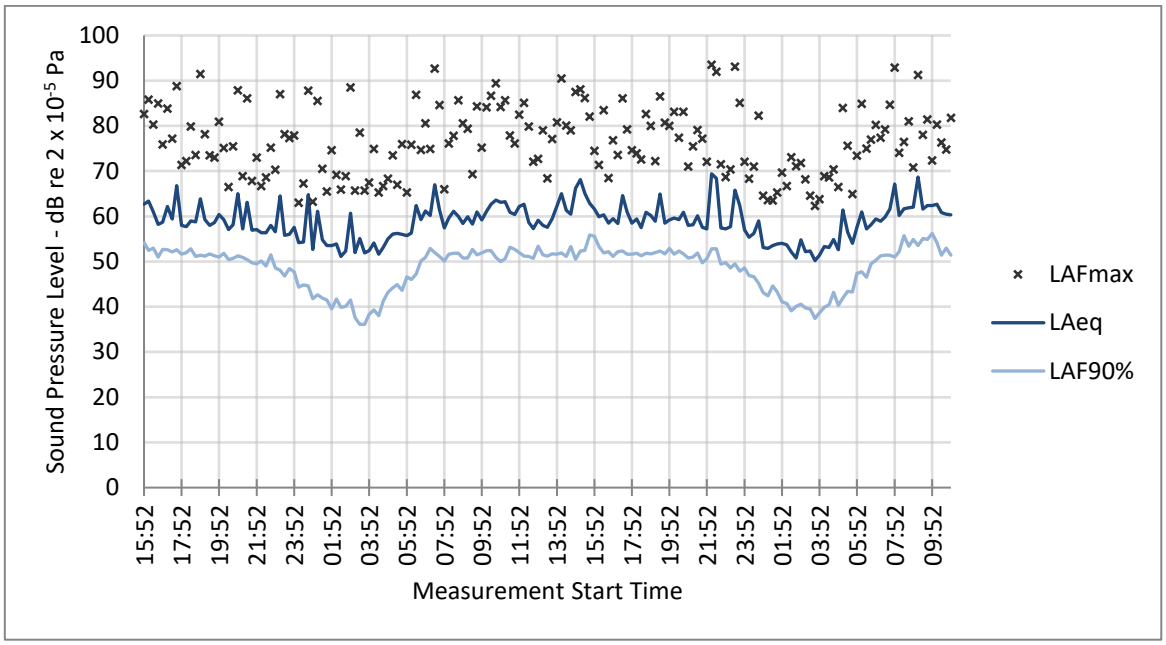


Figure 6: Sound level survey results at MP1 – 16th – 18th July 2024

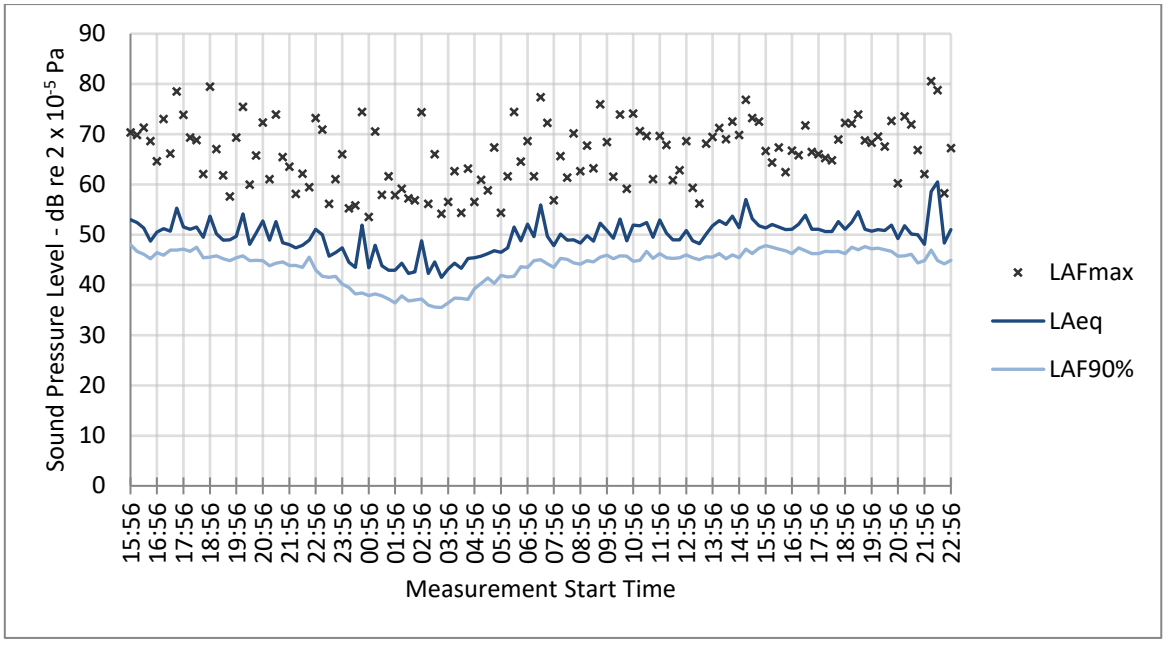


Figure 7: Sound level survey results at MP2 – 16th – 17th July 2024

Sound level measurements were recorded in consecutive 15-minute samples of overall LAfmax, LAeq, and LA90 values along with other statistical indices and octave band spectra. The sound level meter was set to log short-term levels simultaneously, to assist with assessment of individual noise events overnight.

Summary of the daytime and night-time sound level results are shown in tabular form in Table 5 below. In accordance with criteria in Figure 3, short-term individual noise events should not exceed LAfmax 45dB inside residential bedrooms more than 10-15 times per night and therefore the 10th highest measured LAfmax value is shown in the table.

Assessment Location	Daytime (07:00 – 23:00) LAeq	Night-Time (23:00 – 07:00) LAeq	Night-Time (23:00 – 07:00) Typical LAfmax
MP1	62dB	58dB	76dB
MP2	52dB	47dB	65dB

Table 5: Summary sound level survey results

5. ProPG STAGE 1 INITIAL NOISE RISK ASSESSMENT

Results of the sound level survey have been plotted on the image in Figure 2 to determine the relevant noise risk category.

Results of the initial risk assessment using the measured sound levels are included in Figure 8 & 9 below.

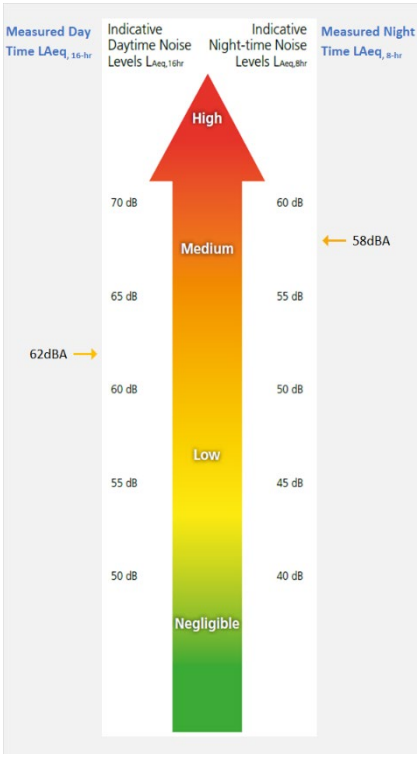


Figure 8: ProPG initial noise risk assessment – MP1

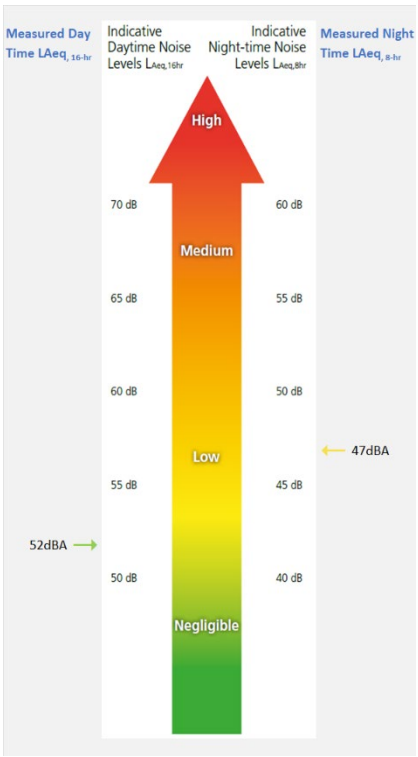


Figure 9: ProPG initial noise risk assessment – MP2

The initial site risk assessment indicates that the front of the site is an area of medium risk, reducing to a low risk towards the rear of the site.

It is appropriate to consider that this is the raw data and does not include any proposed mitigation. Paragraph 2.12 of ProPG confirms that:

> *"It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced."*

At these noise levels the site is likely to be acceptable from a noise perspective, as long as an appropriate acoustic design is implemented.

6. ProPG STAGE 2 ACOUSTIC DESIGN STATEMENT

As discussed in Section 2.3, Stage 2 of ProPG is separated into four elements: an overview ensuring a good acoustic design process, assessment of internal sound levels, consideration of sound levels in external amenity areas, and finally an assessment of any other relevant issues.

The four elements are considered in more detail within this Section.

6.1. Element 1 – Good Acoustic Design Process

The pre-planning application advice contained in ProPG confirms:

> "*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* [Acoustic Design Statement] *which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development.*"

ProPG and the supplementary documents provide guidance on the typical matters that should be considered in an Acoustic Design Statement. These matters are discussed in Table 6.

Principle/Topic	**Discussion**
Identify significant existing and potential noise sources and measure or estimate sound levels	Road noise has been identified as the dominant noise source. Results of the sound level survey are included in Section 4.
Consider the feasibility of reducing sound levels or relocating noise sources	It is not feasible to relocate the noise sources as part of this application.
Consider the potential to mitigate sound through planning of the site and orientation of the buildings	Due to the proposed number of rooms and developments, it is not feasible to mitigate sound through the orientation of all noise-sensitive rooms to the rear of the site.
Mitigating the sound through use of barriers or screens	The height of the development precludes the practical use of a noise barrier.
Select construction types and methods to achieve the internal sound level criteria	An appropriate acoustic specification for façade elements has been proposed. Refer Section 6.3.
Consider the acoustic impact of the proposed ventilation strategy	This is discussed in more detail in Section 6.2
Assess sound levels to external amenity areas	This is discussed in more detail in Section 6.4.
Assess the viability of alternative solutions	Where appropriate, alternative solutions are discussed, and the most appropriate scheme has been put forward.

Principle/Topic	Discussion
Examine the effects of noise control measures on ventilation, fire regulation, H&S, costs, CDM, or other unintended consequence	Under the Construction (Design and Management) Regulations 2015, ACA Acoustics are acting as a Designer. This Acoustic Design Statement and the supporting evidence has considered best practice to reduce or control foreseeable risks. It is recommended that other relevant parties, including the Principal Designer, consider all non-acoustic aspects of the design.

Table 6: Acoustic Design Statement details

6.2. Ventilation Strategy

Section 2.3 confirms that any site with a noise risk assessment above '*Negligible*' would fail to achieve internal sound level criteria with windows open and in this instance ProPG and the supplementary guidance requires that internal sound level criteria are achieved whilst providing the '*whole dwelling ventilation*' rate as set out in The Building Regulations Approved Document F through the use of above-window or through-wall trickle ventilators.

It is usual to satisfy internal sound level criteria whilst achieving the background ventilation rate defined by Approved Document F of the Building Regulations, rather than for the purge ventilation rate. It is therefore anticipated that it will be necessary to incorporate an acoustic ventilation scheme into the design such that residents can achieve background ventilation without necessarily needing to open windows.

Values in Table 7 below show a specification schedule of ventilator sound insulation performance for the development, used in the computer model. Note that there are many different passive ventilators including through-wall type and those built into the window frame. If the Dn,e,w performance is not lower than that shown Table 7 then any alternative ventilator may be used.

Description	Dn,e,w (dB)	Typical Ventilator Type	Location
Mechanical Ventilation	N/A		For both bedrooms in Flat 2 (i.e rooms facing Kentish Town Road)
Passive Ventilation	31	Trickle vent with Indirect Air Path	All other rooms

Table 7: Specification for ventilator Element Normalized Level Difference – Dn,e,w (dB)

In accordance with Approved Document O of The Building Regulations, where sound levels to inside bedrooms do not exceed $L_{Aeq,\ 8\text{-hour}}$ 40dB or LAfmax 55dB more than 10 times per night, then it would be appropriate to rely on open windows to mitigate overheating.

Based on the measured sound levels summarised in Table 5 for the quieter facades, and allowing a reduction through an open window of 4dBA as detailed in Section 2.4, internal sound levels within bedrooms at the quieter facades will be nominally LAeq 43dB and LAfmax 61dB with windows open.

An alternative overheating strategy may therefore be appropriate to ensure that occupants will not need to open windows in order to mitigate overheating to these bedrooms at night. However, detailed thermal and ventilation design is beyond the scope of this assessment and should be considered by others accordingly.

This discussion is irrelevant for the front façade bedrooms as mechanical ventilation is already required to achieve the required sound level criteria.

6.3. Element 2 – Internal Noise Level Guidelines

A scheme for sound insulation is necessary to ensure sound levels inside rooms of the new residential dwelling are reasonable and comply with the requirements of BS 8233:2014 and ProPG.

A computer model has been set up using the measured sound levels incident on the façade of the development along with anticipated façade elements. The computer model is based on the calculation procedures outlined in BS EN ISO 12354-3:2000 and BS 8233:2014.

The assessment is based on the layout drawings provided by the client. Confirmation of the acoustic performance of the building envelope elements used in the calculation model is provided below.

Description	**Rw (dB)**	**Rw + C'tr (dB)**	**Typical Construction**
Façade walls	52	48	Typical masonry construction
Glazing to front façade	34	30	Upgraded thermal double glazing such as 4-16-6 configuration or similar
Glazing to other facades	29	25	Traditional thermal double glazing such as 4-16-4 configuration or similar
Roof	52	47	100mm Reinforced concrete or similar

Table 8: Acoustic performance specification for facade elements

Note that the constructions provided are typical and variations on the specification would be acceptable, so long as the installed construction achieved the specified sound insulation performance. The specification for glazed elements is for the window/door as a complete unit, including frames and seals. It is recommended the glazing supplier submit test data confirming their unit will comply with the specified performance.

A copy of the acoustic calculations for daytime and night-time noise intrusion into sample rooms is provided in Appendix A. Summary results are confirmed in Table 9 below and demonstrate that sound levels within rooms of the proposed residential units will comply with guidance limits in British Standard BS 8233:2014.

Plot/Room	Description	Calculated Internal Sound Level	Criteria
Flat 1 – Living Room	Daytime LAeq	23dB	≤ 35dB
	Night-time LAeq	-	-
	Night-time LAfmax	-	-
Flat 1 - Typical Bedroom	Daytime LAeq	27dB	≤ 35dB
	Night-time LAeq	22dB	≤ 30dB
	Night-time LAfmax	40dB	≤ 45dB
Flat 2 - Living Room	Daytime LAeq	33dB	≤ 35dB
	Night-time LAeq	-	-
	Night-time LAfmax	-	-
Flat 2 - Typical Bedroom	Daytime LAeq	30dB	≤ 35dB
	Night-time LAeq	26dB	≤ 30dB
	Night-time LAfmax	44dB	≤ 45dB
	Night-time LAfmax	-	-

Table 9: Summary internal sound levels within sample habitable rooms

6.4. Element 3 – External Amenity Area Noise Assessment

There is no external amenity area provision for this development.

6.5. Element 4 – Assessment of Other Relevant Issues

On the ground floor, it is understood the current Cash Converters store will remain. It is assessed that as long as the separating floor complies with the relevant standards stipulated in Approved Document E, the sound insulation performance will be adequate to ensure the noise levels in the above flats comply with the relevant criteria in section 2.3.

7. VIBRATION SURVEY & ASSESSMENT

ACA Acoustics have undertaken a vibration survey on a central point on the roof of the existing building. Access was unavailable to within the first-floor demise, but it is assessed that the roof position is representative of this floor. Additionally, numerous subjective assessments were undertaken by the consultant during the survey on the first floor and confirmed no vibration whatsoever could be felt at any point.

Equipment used during the survey are shown in the table below.

Equipment	Serial Number
Rion vibration meter type XV-2P with tri-axial pickup type PV-83CW	00380062
Extension cable and mounting block arrangement	-

Table 10: Equipment used for the vibration survey

Results of this survey can be found below in Table 11.

Location	X-axis VDV	Y-axis VDV	Z-axis VDV	Criteria (all axis)
Daytime Period	0.03	0.04	0.08	$0.2m/s^{1.75}$
Nighttime period	0.02	0.01	0.06	$0.1m/s^{1.75}$

Table 11: Vibration survey results

The measured VDV values are considerably below the “Low probability of adverse comment” within BS 6472:2008, and no additional mitigation will be required.

8. CONCLUSION

A planning application is to be submitted to London Brough of Islington Council for the construction of a new residential development on the first floor of 141 – 145 Kentish Town Road, London

ACA Acoustics have undertaken a sound level survey in the vicinity. A ProPG Stage 1 initial noise risk assessment has indicated the site is in a medium risk area. Through a good acoustic design process ACA Acoustics have developed an Acoustic Design Statement, included in this report.

Allowing for the benefit of the acoustic specification of façade elements shown in this report, calculated internal sound levels within habitable rooms will comply with recommended criteria set out in ProPG and BS 8233:2014.

It is the author's opinion that the Acoustic Design Statement has demonstrated that potential adverse or significant adverse impacts can be adequately mitigated to ensure noise is not detrimental to the amenity of future occupants.

Measured groundborne vibration at the development site is low and comfortably below the levels where there is a low probability of adverse comment, as set out in BS 6472:2008.

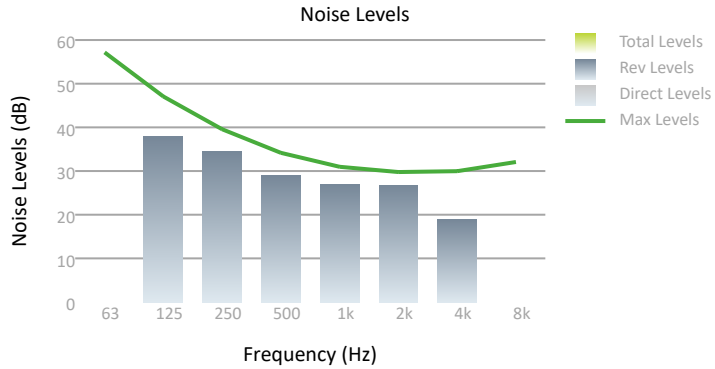
In accordance with guidance in ProPG and BS 8233:2014, it is recommended that planning consent may be granted for the proposed development.

Appendix A

Acoustic Calculations

141 -145 Kentish Town Road

Reference	Flat 2 - Living Room
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	33.3dB(A)
Calculated Tmf T60 (s)	0.5
Volume (m^3)	52.4



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	37.8	34.6	29.1	26.9	26.8	18.9	-

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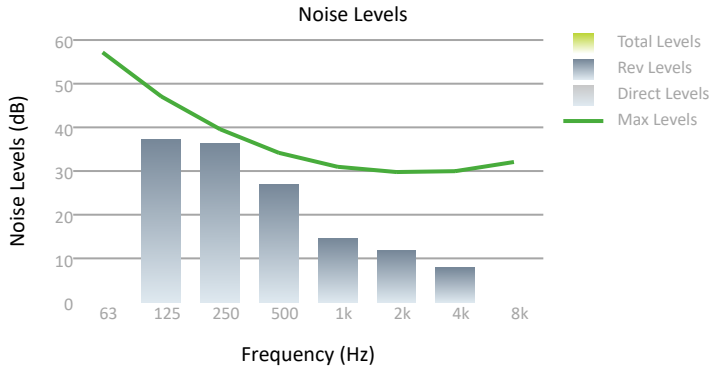
141 -145 Kentish Town Road

Reference	Flat 2 - Bedroom 2 Day
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	30.1dB(A)
Calculated Tmf T60 (s)	0.45
Volume (m^3)	34.6



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	37.1	36.4	27.0	14.6	11.8	7.8	-

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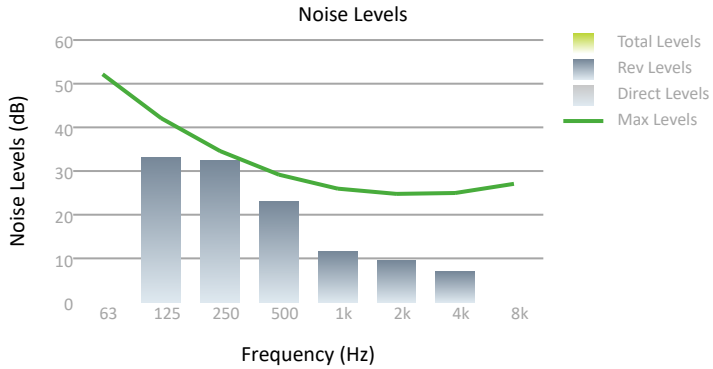
Reference	Flat 2 - Bedroom 2 Night
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	26.2dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m^3)	-



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	-	33.2	32.4	23.1	11.6	9.5	7.0	-

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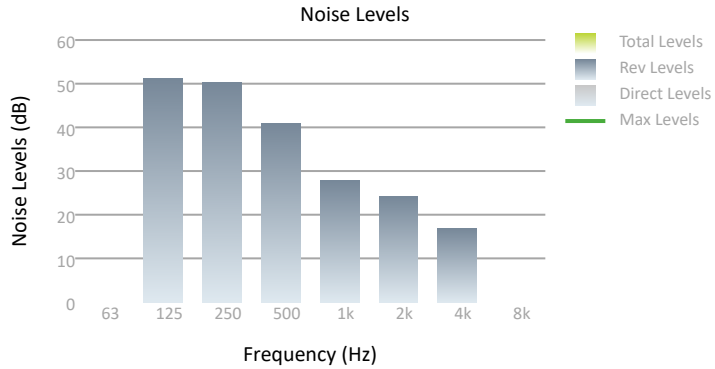
Reference	Flat 2 - Bedroom 2 Night Max
Description	
Target Sound Level	45dB(A)
Max Sound Level	-
Calculated Sound Level	44dB(A)
Calculated Tmf T60 (s)	0.45
Volume (m^3)	-



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff (Night)	1	-	51.1	50.4	41.0	27.8	24.2	17.0	-

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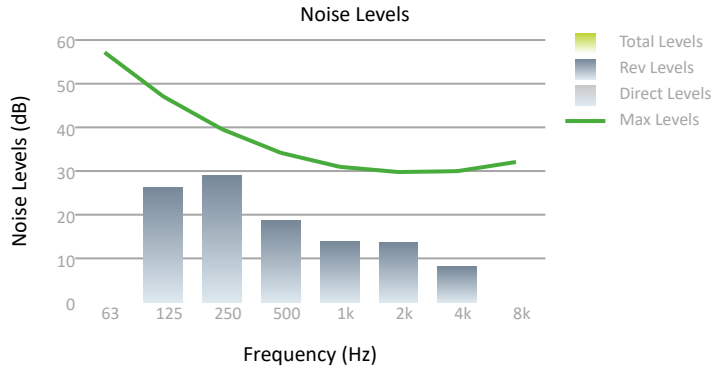
141 -145 Kentish Town Road

Reference	Flat 1 - Living Room
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	23.4dB(A)
Calculated Tmf T60 (s)	0.5
Volume (m^3)	126



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	26.3	29.0	18.6	14.0	13.6	8.0	-

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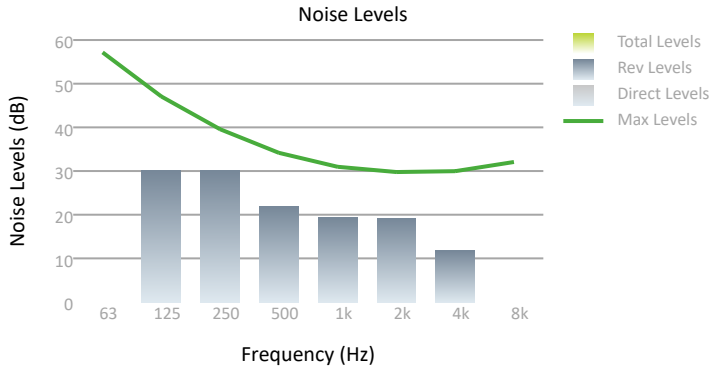
141 -145 Kentish Town Road

Reference	Flat 1 - Bedroom 2 Day
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	26.6dB(A)
Calculated Tmf T60 (s)	0.45
Volume (m^3)	28.1



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	30.1	30.1	22.0	19.4	19.2	11.8	-

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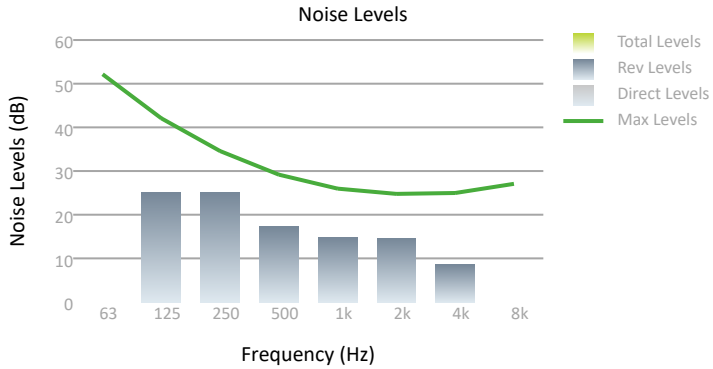
141 -145 Kentish Town Road

Reference	Flat 1 - Bedroom 2 Night
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	21.9dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m^3)	-



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	-	25.1	25.2	17.2	14.8	14.6	8.6	-

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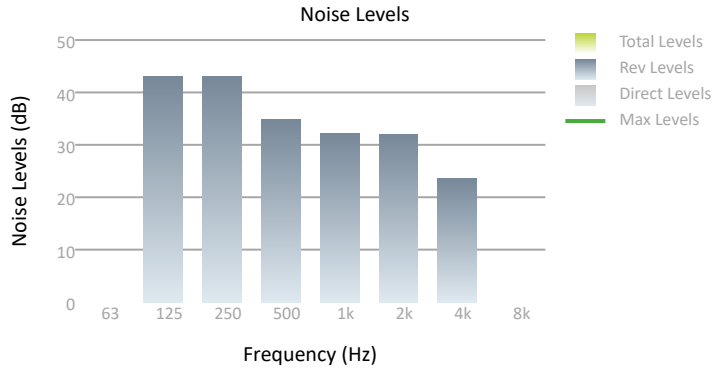
Reference	Flat 1 - Bedroom 2 Night Max
Description	
Target Sound Level	45dB(A)
Max Sound Level	-
Calculated Sound Level	39.5dB(A)
Calculated Tmf T60 (s)	0.45
Volume (m^3)	-



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff (Night)	1	-	43.0	43.1	34.8	32.2	32.0	23.6	-

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Calculation Sheet

Flat 2 - Living Room

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	**62.0**									
Octave Band Frequencies										
Leq,ff		**66.0**	**64.0**	**60.0**	**58.0**	**58.0**	**54.0**	**49.0**	**43.0**	**Row A**
Facade Wall Element										
		-42.9	*-45.9*	*-49.9*	*-49.9*	*-58.9*	*-62.9*	*-64.9*	*-69.9*	
Facade Glazed Element										
		-	*-36.1*	*-32.1*	*-39.1*	*-53.1*	*-52.1*	*-54.1*	*-*	
Facade Roof Element										
		-38.4	*-41.4*	*-42.4*	*-51.4*	*-55.4*	*-59.4*	*-62.4*	*-*	
Ventilators										
		-33.1	*-33.1*	*-34.1*	*-34.1*	*-35.1*	*-31.1*	*-34.1*	*-35.1*	
Cumulative Lp										
Result		**-**	**33.2**	**30.3**	**25.2**	**23.0**	**22.9**	**15.0**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*4.7*	*4.3*	*3.9*	*3.9*	*3.9*	*3.9*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 2 - Living Room **Reverberant Field, LPrev:**		**-**	**37.8**	**34.6**	**29.1**	**26.9**	**26.8**	**18.9**	**-**	

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Calculation Sheet

Flat 2 - Bedroom 2 Day

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)										
Source dBA	**62.0**									
Octave Band Frequencies										
Leq,ff		**66.0**	**64.0**	**60.0**	**58.0**	**58.0**	**54.0**	**49.0**	**43.0**	**Row A**
Facade Wall Element										
		-42.6	*-45.6*	*-49.6*	*-49.6*	*-58.6*	*-62.6*	*-64.6*	*-69.6*	
Facade Glazed Element										
		-	*-32.0*	*-28.0*	*-35.0*	*-49.0*	*-48.0*	*-50.0*	*-*	
Facade Roof Element										
		-39.9	*-42.9*	*-43.9*	*-52.9*	*-56.9*	*-60.9*	*-63.9*	*-*	
Cumulative Lp										
Result		**-**	**32.5**	**32.1**	**23.2**	**10.8**	**8.0**	**4.5**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*4.7*	*4.3*	*3.8*	*3.8*	*3.8*	*3.3*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 2 - Bedroom 2 Day **Reverberant Field, LPrev:**		**-**	**37.1**	**36.4**	**27.0**	**14.6**	**11.8**	**7.8**	**-**	

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Calculation Sheet

Flat 2 - Bedroom 2 Night

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)										
Source dBA	**58.0**									
Octave Band Frequencies										
Leq,ff		**62.0**	**60.0**	**56.0**	**54.0**	**54.0**	**50.0**	**45.0**	**39.0**	**Row A**
Facade Wall Element										
		-42.6	*-45.6*	*-49.6*	*-49.6*	*-58.6*	*-62.6*	*-64.6*	*-69.6*	
Facade Glazed Element										
		-	*-32.0*	*-28.0*	*-35.0*	*-49.0*	*-48.0*	*-50.0*	*-*	
Facade Roof Element										
		-39.9	*-42.9*	*-43.9*	*-52.9*	*-56.9*	*-60.9*	*-63.9*	*-*	
Cumulative Lp										
Result		**-**	**28.5**	**28.1**	**19.3**	**7.8**	**5.7**	**3.7**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*4.7*	*4.3*	*3.8*	*3.8*	*3.8*	*3.3*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 2 - Bedroom 2 Night **Reverberant Field, LPrev:**		**-**	**33.2**	**32.4**	**23.1**	**11.6**	**9.5**	**7.0**	**-**	

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Calculation Sheet

Flat 2 - Bedroom 2 Night Max

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Lmax)										
Source dBA	**76.0**									
Octave Band Frequencies										
Leq,ff		**80.0**	**78.0**	**74.0**	**72.0**	**72.0**	**68.0**	**63.0**	**57.0**	**Row A**
Facade Wall Element										
		-42.6	*-45.6*	*-49.6*	*-49.6*	*-58.6*	*-62.6*	*-64.6*	*-69.6*	
Facade Glazed Element										
		-	*-32.0*	*-28.0*	*-35.0*	*-49.0*	*-48.0*	*-50.0*	*-*	
Facade Roof Element										
		-39.9	*-42.9*	*-43.9*	*-52.9*	*-56.9*	*-60.9*	*-63.9*	*-*	
Cumulative Lp										
Result		**-**	**46.5**	**46.1**	**37.2**	**24.0**	**20.4**	**13.7**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*4.7*	*4.3*	*3.8*	*3.8*	*3.8*	*3.3*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 2 - Bedroom 2 Night Max **Reverberant Field, LPrev:**		**-**	**51.1**	**50.4**	**41.0**	**27.8**	**24.2**	**17.0**	**-**	

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Calculation Sheet

Flat 1 - Living Room

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	**52.0**									
Octave Band Frequencies										
Leq,ff		**56.0**	**54.0**	**50.0**	**48.0**	**48.0**	**44.0**	**39.0**	**33.0**	**Row A**
Facade Wall Element										
		-40.8	*-43.8*	*-47.8*	*-47.8*	*-56.8*	*-60.8*	*-62.8*	*-67.8*	
Facade Glazed Element										
		-	*-32.4*	*-23.4*	*-33.4*	*-46.4*	*-54.4*	*-46.4*	*-*	
Ventilators										
		-34.8	*-34.8*	*-35.8*	*-35.8*	*-36.8*	*-32.8*	*-35.8*	*-36.8*	
Cumulative Lp										
Result		**-**	**23.8**	**26.9**	**16.8**	**12.2**	**11.8**	**6.3**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*2.5*	*2.2*	*1.7*	*1.7*	*1.7*	*1.7*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 - Living Room **Reverberant Field, LPrev:**		**-**	**26.3**	**29.0**	**18.6**	**14.0**	**13.6**	**8.0**	**-**	

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Calculation Sheet

Flat 1 - Bedroom 2 Day

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)										
Source dBA	**52.0**									
Octave Band Frequencies										
Leq,ff		**56.0**	**54.0**	**50.0**	**48.0**	**48.0**	**44.0**	**39.0**	**33.0**	**Row A**
Facade Wall Element										
		-40.0	*-43.0*	*-47.0*	*-47.0*	*-56.0*	*-60.0*	*-62.0*	*-67.0*	
Facade Glazed Element										
		-	*-36.3*	*-27.3*	*-37.3*	*-50.3*	*-58.3*	*-50.3*	*-*	
Facade Roof Element										
		-41.3	*-44.3*	*-45.3*	*-54.3*	*-58.3*	*-62.3*	*-65.3*	*-*	
Ventilators										
		-33.1	*-33.1*	*-34.1*	*-34.1*	*-35.1*	*-31.1*	*-34.1*	*-35.1*	
Cumulative Lp										
Result		**-**	**23.1**	**23.6**	**15.9**	**13.3**	**13.1**	**6.2**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*6.9*	*6.5*	*6.1*	*6.1*	*6.1*	*5.6*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 - Bedroom 2 Day **Reverberant Field, LPrev:**		**-**	**30.1**	**30.1**	**22.0**	**19.4**	**19.2**	**11.8**	**-**	

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Calculation Sheet

Flat 1 - Bedroom 2 Night

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)										
Source dBA	**47.0**									
Octave Band Frequencies										
Leq,ff		**51.0**	**49.0**	**45.0**	**43.0**	**43.0**	**39.0**	**34.0**	**28.0**	**Row A**
Facade Wall Element										
		-40.0	*-43.0*	*-47.0*	*-47.0*	*-56.0*	*-60.0*	*-62.0*	*-67.0*	
Facade Glazed Element										
		-	*-36.3*	*-27.3*	*-37.3*	*-50.3*	*-58.3*	*-50.3*	*-*	
Facade Roof Element										
		-41.3	*-44.3*	*-45.3*	*-54.3*	*-58.3*	*-62.3*	*-65.3*	*-*	
Ventilators										
		-33.1	*-33.1*	*-34.1*	*-34.1*	*-35.1*	*-31.1*	*-34.1*	*-35.1*	
Cumulative Lp										
Result		**-**	**18.2**	**18.6**	**11.1**	**8.7**	**8.6**	**3.0**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*6.9*	*6.5*	*6.1*	*6.1*	*6.1*	*5.6*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 - Bedroom 2 Night **Reverberant Field, LPrev:**		**-**	**25.1**	**25.2**	**17.2**	**14.8**	**14.6**	**8.6**	**-**	

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Calculation Sheet

Flat 1 - Bedroom 2 Night Max

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Lmax)										
Source dBA	**65.0**									
Octave Band Frequencies										
Leq,ff		**69.0**	**67.0**	**63.0**	**61.0**	**61.0**	**57.0**	**52.0**	**46.0**	**Row A**
Facade Wall Element										
		-40.0	*-43.0*	*-47.0*	*-47.0*	*-56.0*	*-60.0*	*-62.0*	*-67.0*	
Facade Glazed Element										
		-	*-36.3*	*-27.3*	*-37.3*	*-50.3*	*-58.3*	*-50.3*	*-*	
Facade Roof Element										
		-41.3	*-44.3*	*-45.3*	*-54.3*	*-58.3*	*-62.3*	*-65.3*	*-*	
Ventilators										
		-33.1	*-33.1*	*-34.1*	*-34.1*	*-35.1*	*-31.1*	*-34.1*	*-35.1*	
Cumulative Lp										
Result		**-**	**36.1**	**36.6**	**28.8**	**26.1**	**25.9**	**18.1**	**-**	
ISO 12354-3 Lfs Correction										
		-	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-*	
Room Corrections										
		-	*6.9*	*6.5*	*6.1*	*6.1*	*6.1*	*5.6*	*-*	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 - Bedroom 2 Night Max **Reverberant Field, LPrev:**		**-**	**43.0**	**43.1**	**34.8**	**32.2**	**32.0**	**23.6**	**-**	

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