

Noise impact assessment of a proposed residential development

Tavistock Works, Tavistock Road, Yiewsley, UB7 7QX



Client: Linea UB7 Limited

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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 Tavistock Works, Tavistock Road, Yiewsley. The assessment is required by the Local Planning Authority, London Borough of Hillingdon Council, in accordance with their noise supplementary planning document, to assist their consideration of a planning application for the development.
- 0.2. A sound level survey has been carried out between Tuesday 19th January and Monday 25th January 2021 and supplemented with more recent data between 9th – 10th March 2026. Whilst on site the author considered the sound climate during the daytime primarily consists of movements on the nearby trainline, along with traffic noise from nearby routes.
- 0.3. The author considered that noise emissions from nearby industrial and commercial units, such as The Old Coal Depot recycling and skip hire locations were subjectively inaudible while on site.
- 0.4. The assessment is based on measured sound levels incident on the front façade of LAeq_{16-hour} 66dB during the daytime and LAeq_{8-hour} 61dB overnight. Short-term individual noise events overnight do not regularly exceed a level of LAFmax 81dB.
- 0.5. 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/high noise risk, therefore an Acoustic Design Statement has been prepared.
- 0.6. 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.
- 0.7. Resultant internal sound levels during the daytime will not exceed LAeq 35dB. Sound levels at night shall not exceed LAeq 30dB and LAFmax 45dB.
- 0.8. A vibration survey was conducted at the development site over the same period as the noise survey. A single position was used for the survey, to the front of the site closest to the railway lines. Measured Vibration Dose Values are within the range of values where there is a low probability of adverse comment and no mitigation to control ground borne vibration to the new buildings will be necessary.
- 0.9. The development is at an early stage and at the time of writing this report final selections for mechanical services equipment had not been issued. It is recommended that the cumulative sound level from all proposed equipment does not exceed a Rating Level of 37dBA at 1m from the closest noise-sensitive properties, when assessed in accordance with BS 4142:2014+A1:2019. This is 5dBA below the lowest measured background sound level and complies with Policy OE1 of the Hillingdon Unitary Development Plan. This may be controlled through the use of an appropriately worded planning condition.

0.10. In conclusion, it is recommended that the site is suitable for residential development, subject to implementation of noise control measures as set out in this report.

1. INTRODUCTION

ACA Acoustics Limited has been commissioned to carry out a survey and assessment of external sound levels to a proposed residential development at Tavistock Works, Tavistock Road, Yiewsley and, where necessary, to make recommendations for a suitable sound mitigation scheme.

The objective of the assessment is to determine the impact that existing noise sources would have on the proposed residential unit in accordance with ProPG: Planning & Noise, national planning policies and other relevant British Standards and guidance documents. Consideration has also been given to sound levels in external amenity areas and of potential for noise emissions from any proposed mechanical services plant and equipment.

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 187 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 198 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 of the NPSE 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 198 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 of the NPSE, 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.

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”;
 - 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 (road, railway, aircraft). It may also include industrial and commercial noise, where this is present but not dominant.

The measured/calculated daytime LAeq, 16-hour and night-time LAeq, 8-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.

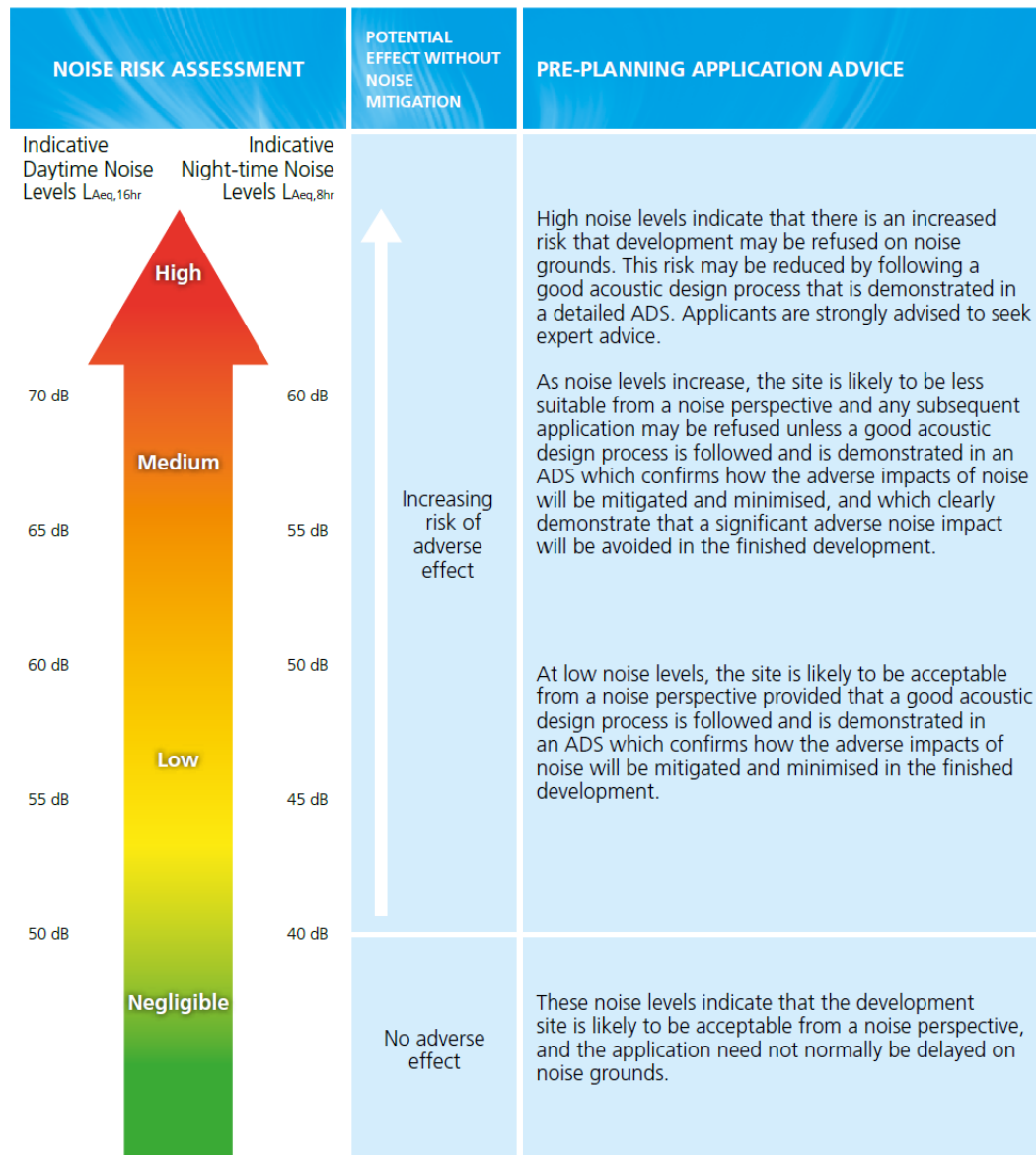


Figure 1 Notes:

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- 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".
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- 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 $L_{Aeq,16\text{ hr}}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\text{ hr}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\text{ hr}}$	30 dB $L_{Aeq,8\text{ hr}}$ 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 $L_{Aeq,16\text{-hour}}$ 50 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. 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

*: Note 4 of Table 4 confirms 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 LAFmax, depending on the character and number of events per night*”; no specific criteria is set within the 2014 revision of the standard. The previous edition of the standard and World Health Organisation guidance agreed that individual noise events should not exceed LAFmax ≤ 45 dB more than 10-15 times per night. The author considers that this criterion is suitable to protect future residents from regular individual noise events.

2.5. 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	
<i>Requirement</i>	<i>Limits on application</i>
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 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 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 heavily built-up areas such as this.

On this basis, where sound levels incident on a bedroom window do not exceed LAeq,8-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.

If external sound levels exceed these levels then it is likely windows will be closed by occupants overnight. 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".

2.6. Externally Located Mechanical Plant

London Borough of Hillingdon provide their own interpretation of the BS 4142 assessment outcome, set out in Section 6.2 of the Supplementary Planning Document. This is included below for ease of reference.

As a general rule, the Boroughs will seek to achieve the external noise standards detailed in Table 2 below (all terms are as defined in BS4142).

Table 2: New Industrial and Commercial Development - External Noise Standards

Noise Impact From Relevant Proposed Industrial Or Commercial Premises Or Plant	Development Outcome
Rating Level (LAr,Tr) is at least 5 dB(A) below the Background Level LA90	Normally acceptable
Rating level (LAr,Tr) is no more than 5 dB(A) above the Background Level LA90	Acceptable only if there are overriding economic or social reasons for development to proceed
Rating level (LAr,Tr) is more than 5 dB(A) above the Background Level LA90	Normally unacceptable

Note: All terms as defined in BS4142

Based on the table above, ACA Acoustics therefore propose the cumulative rating level from the new mechanical equipment shall be designed to be at least 5dBA below the representative background sound level to outside the closest noise-sensitive windows.

2.7. British Standard 6472-1:2008

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 ground-borne 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.

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

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.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site was formerly a commercial property on Tavistock Road, Yiewsley.

The adjacent sites to the north and east have been redeveloped for residential use and the site to the west has planning consent for new residential dwellings. High Street is around 70m to the east of the site and railway lines pass around 30m to the south. Image of the site, taken from Google Maps, is shown in Figure 5 below.



Figure 5: Aerial photograph of Tavistock Works (Available at www.google.com/maps)

The proposal is for the demolition of the existing building and the construction of a 6-storey building comprising 31 flats, with associated communal amenity spaces at ground floor, first floor podium and roof level. Private external terraces are provided to all ground floor flats, with all residential units at first floor level and above benefitting from private external space in the form of balconies.

Although the presence of existing recently constructed, residential dwellings in the immediate vicinity does not, by itself, confirm that the area is suitable for residential development, it does somewhat indicate the general suitability of the area.

4. SOUND LEVEL SURVEY

To assess the impact of existing sound sources, a sound level survey was conducted at the development site to determine levels incident on the proposed residential units. Details of the sound level survey used within the assessment carried out by ACA Acoustics are provided below.

The site was considered secure and therefore an unattended survey was carried out over nominally a 6-day period between Tuesday 19th January and Monday 25th January 2021 at a single measurement position using a microphone extended above the level roof of the existing building overlooking the nearby railway lines, the Old Coal Depot, and the Old Coal Depot access road. Sound level measurements were recorded in consecutive 15-minute samples of overall LAFmax,

L_{Aeq}, and L_{A90} 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. Due to the relatively long intervening time period, this survey has been repeated more recently on the 9th to 10th March 2026, with the microphone setup in the exact same position.

It is understood that the Local Authority has previously raised concern that noise from the nearby Old Coal Depot may result in adverse impacts to future occupants. As per the last sound level survey in 2021, the author considered the sound climate during the daytime to consist primarily of nearby road traffic activity, along with trains passing on the adjacent line. The author's subjective opinion is that noise from the industrial unit was still inaudible at the development site. Vehicular activity on the access road was subjectively audible, however the character of this noise was indistinguishable from general traffic activity in the vicinity. Levels measured from vehicles on the access road will be included within the long-term noise monitoring survey. The measurement position was around 9m from ground level, with line of sight to the railway lines, Old Coal Depot, and Old Coal Depot access road.

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

Survey Date	Equipment	Serial Number
19 th – 25 th January 2021	NTi Audio Class 1 sound level meter type XL2 complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
	Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	83826
9 th – 10 th March 2026	Rion NL-53 Class 1 sound level meter complete with weatherproof and lockable outdoor environmental kit	01052664
	Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	83826

Table 3: Equipment used.

Weather conditions at the time of setting up the survey consisted of 40% cloud cover, dry ground conditions, calm winds and a temperature of around 14°C. Weather conditions over the unattended survey have been reviewed for the closest available commercial weather station at www.worldweatheronline.com. Weather conditions are not considered to have adversely impacted the outcome of the assessment.

Results of the survey in terms of raw data are shown in Figure 8 & 9 below.

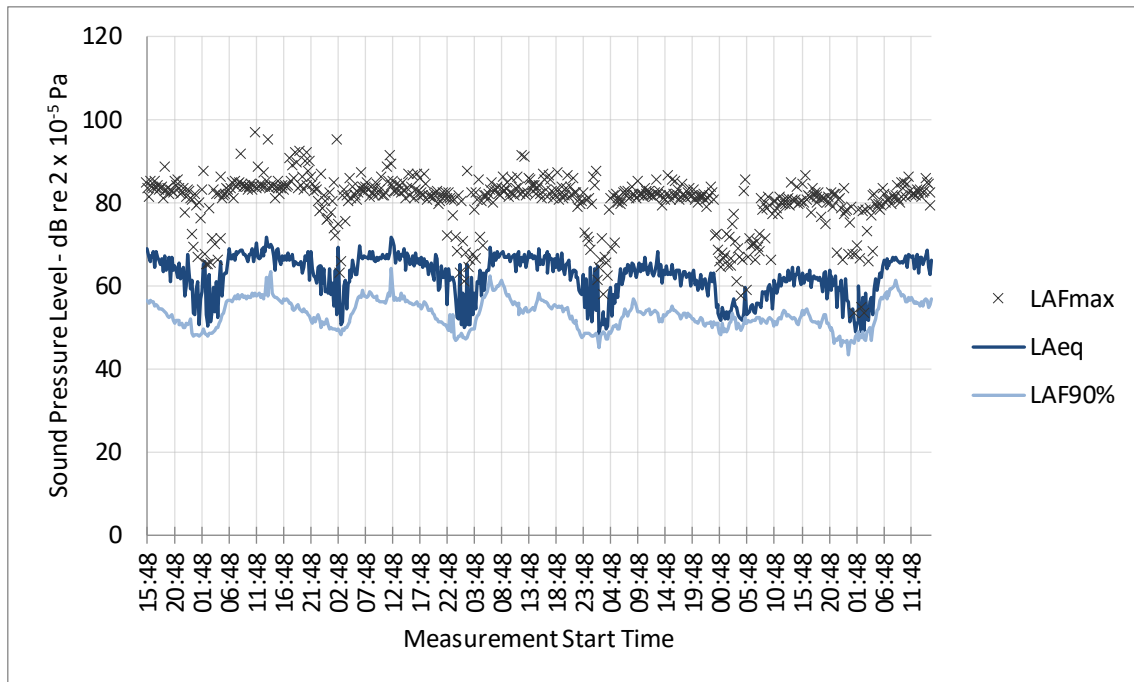


Figure 6: Sound level survey results 19th – 25th January 2021

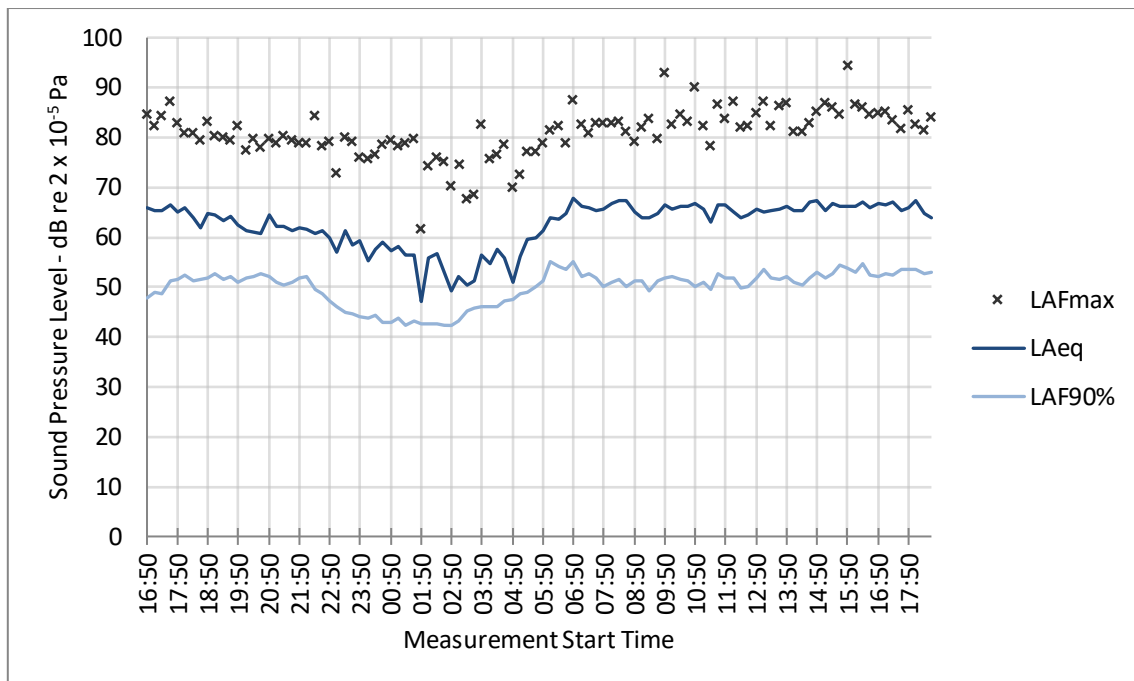


Figure 7: Sound level survey results 9th – 10th March 2026

Summary of the daytime and night-time sound level results are shown in tabular form in Table 4. Short-term individual noise events at night inside bedrooms should not exceed LAFmax 45dB more than 10-15 times per night. Table 4 records the 10th highest measured LAFmax value during the night survey period.

Date	Daytime (07:00 – 23:00) LAeq	Night Time (23:00 – 07:00) LAeq	Night Time (23:00 – 07:00) Typical LAfmax	Lowest Measured LA90
Tue, 19 Jan 2021	66 dB	62 dB	82 dB	48 dB
Wed, 20 Jan 2021	67 dB	63 dB	83 dB	48 dB
Thu, 21 Jan 2021	66 dB	62 dB	82 dB	47 dB
Fri, 22 Jan 2021	66 dB	59 dB	81 dB	45 dB
Sat, 23 Jan 2021	63 dB	57 dB	72 dB	48 dB
Sun, 24 Jan 2021	61 dB	59 dB	79 dB	43 dB
Mon, 25 Jan 2021	66 dB	-	-	-
Mon, 9 March 2026	65 dB	62 dB	79 dB	42 dB
Level over survey	66 dB	61 dB	81 dB	42 dB

Table 4: Summary sound level survey results

The results of the latest survey are very much aligned with the previous survey data measured in 2021 and have not materially affected the overall average results.

Design of the façade sound insulation performance has been conducted allowing for levels of LAeq 66dB during the daytime, and LAeq 61dB and LAfmax 81dB overnight. In addition, an acoustic model of the site has been developed. This confirms sound levels to the rear façade being nominally 10dB lower than those to the front.

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 are included in Figure 8 below.

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

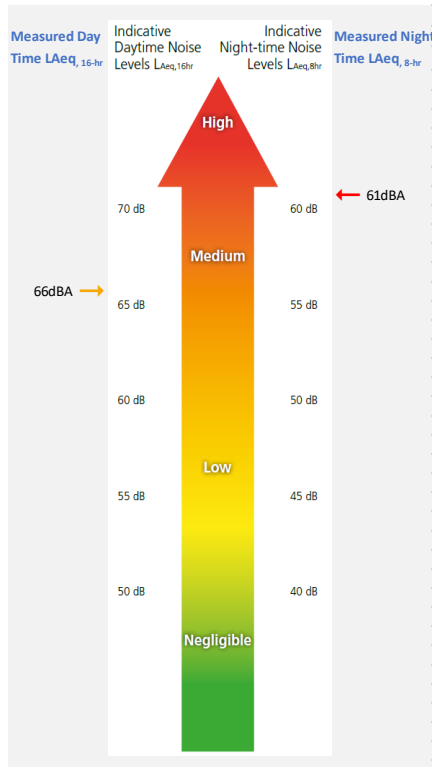


Figure 8: ProPG initial noise risk assessment

The initial site risk assessment indicates that the front of the site is in an area where there is a medium - high risk of adverse impacts to future occupants of the dwellings unless an appropriate noise mitigation strategy is implemented.

6. ProPG STAGE 2 ACOUSTIC DESIGN STATEMENT

As discussed in Section 2.5, 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 5.

Principle/Topic	Discussion
Identify significant existing and potential noise sources and measure or estimate sound levels	Road and rail traffic 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	As with most apartment developments, it is not feasible to mitigate sound through the orientation of noise-sensitive rooms in the building, whilst continuing to meet other planning requirements in relation to design quality.
Mitigating the sound through use of barriers or screens	The source of the levels in the area (road and rail), along with the height of the proposed development makes this impractical.
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.
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 5: Acoustic Design Statement details

6.2. Ventilation Strategy

Section 2.7 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.

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.

It is recommended that living rooms and bedrooms throughout the development incorporate mechanical ventilation such as MVHR or similar, allowing occupants to achieve appropriate ventilation rates without the need to open windows if they chose not to. Suitable mechanical ventilation systems should incorporate a summer bypass mode and boost functions. Noise intrusion via the ducted system and self-noise from the fan should not exceed a level of LAeq 25dB inside habitable rooms.

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.

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 drawings provided by the client, with references 0010-ADE-XX-00-DR-A-0100-REV 06, 0010-ADE-XX-01-DR-A-0101-REV 06 and 0010-ADE-XX-05-DR-A-0105-REV 06.

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	53	48	Facing brickwork. Insulated metal or timber frame with plasterboard to the inner face. Note that blockwork may also be used and will achieve similar acoustic performance.

Description	Rw (dB)	Rw + C'tr (dB)	Typical Construction
Glazing-01 Windows and patio doors to Front/Side Living Rooms and Rear Living Rooms & Bedrooms	39	34	Double-glazing with laminated or toughened pane, such as 10-16-6 configuration or similar.
Glazing-02 Windows and doors to front and side bedrooms	46	40	Double-glazing with laminated or toughened panes, such as 10.6-16-12 configuration or similar.
Roof/ceiling to top-floor rooms	52	47	Reinforced concrete slab. Ceiling formed from one layer 12.5mm WallBoard plasterboard on timber joists or MF system.

Table 6: 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.

Summary results from the calculation model to sample receptors are confirmed in Table 7 below. The sample receptors selected are considered the likely most noise-affected properties/rooms; sound levels to other rooms will be lower. This demonstrates that sound levels within rooms of the proposed residential units will comply with guidance limits in ProPG and BS 8233:2014. Printouts from the computer model are included in Appendix A. The location of the assessed plots are included in Appendix B.

Plot / Room	Description	Calculated Internal Sound Level	Criteria
Plot 01-02 Living Room	Daytime LAeq	33dB	≤ 35dB
	Night Time LAeq	-	-
	Night Time LAfmax	-	-
Plot 01-02 Bedroom	Daytime LAeq	28dB	≤ 35dB
	Night Time LAeq	24dB	≤ 30dB
	Night Time LAfmax	43dB	≤ 45dB
Plot 01-05 Rear Bedroom	Daytime LAeq	22dB	≤ 35dB
	Night Time LAeq	19dB	≤ 30dB
	Night Time LAfmax	37dB	≤ 45dB
Plot 05-01 Living Room	Daytime LAeq	32dB	≤ 35dB
	Night Time LAeq	-	-

Plot / Room	Description	Calculated Internal Sound Level	Criteria
	Night Time LAfmax	-	-
Plot 05-01 Bedroom 1	Daytime LAeq	29dB	≤ 35dB
	Night Time LAeq	24dB	≤ 30dB
	Night Time LAfmax	43dB	≤ 45dB

Table 7: Summary internal sound levels within sample habitable rooms

6.4. Element 3 – External Amenity Area Noise Assessment

There is a small communal amenity space on the ground floor and a large 1st floor rooftop garden area to the rear of the site available to use for all residents, significantly screened from existing transportation/industrial noise sources. Noise levels at this position will be at least 10dB lower than at the front of the development. These levels therefore achieve the guideline limits of ProPG and BS 8233:2014 and ensures a good standard of amenity and that future occupants will have access to a relatively protected amenity space.

Sound levels at the 6th floor rooftop garden will be lower than the measured levels due to the additional height and balustrades, however, it is acknowledged that the levels may slightly exceed the BS8233:2014 guidance levels.

Balconies/terraces are provided to all units and are located on the front (south) of the building. Similarly to the 6th floor rooftop garden, the expected daytime noise levels to these amenity areas will be higher than BS8233:2014 guidance levels (61 – 66dBA depending on floor height).

Notwithstanding this, as discussed in BS 8233:2014 and the PPG- N, development should be designed to achieve the lowest practicable noise levels in amenity spaces and should not be prohibited where there is a slight excess. The benefit of having external amenity space, even with slightly raised sound levels, would outweigh the alternative of not having a large communal landscaped amenity area and private amenity spaces available to residents.

6.5. Element 4 – Assessment of Other Relevant Issues

Consideration of noise from mechanical services plant and equipment and groundborne vibration are included in the following sections of this report.

No further relevant issues have been identified.

7. ASSESSMENT OF NOISE FROM EXTERNAL MECHANICAL SERVICES EQUIPMENT

It is understood that external mechanical services equipment will be included within the design. Details of a mechanical scheme have not yet been finalised, and as such it has not been possible to undertake a detailed acoustic assessment.

In order to comply with the requirements of the local planning authority, London Borough of Hillingdon Council, and as detailed within Section 2.4 above, rating levels from the proposed equipment should not exceed a level of 5dB below the lowest measured background LA90 sound level when assessed in accordance with BS 4142:2014+A1:2019. This is considered by the author to be achievable with standard mitigation techniques, and may be controlled through the use of an appropriately worded planning condition.

Once the mechanical scheme has been finalised then a full acoustic assessment can be undertaken by ACA Acoustics, alongside recommendation for acoustic mitigation treatment where required.

8. VIBRATION SURVEY AND ASSESSMENT

To assess vibration from trains passing close to the site, vibration was measured in terms of rms acceleration, Vibration Dose Values (VDV) and peak particle velocity. This was carried out using an accelerometer fixed to a mounting block located at ground floor level at the nominal location of the of the proposed development, closest to the adjacent railway lines.

Vibration levels were measured as 30 second samples in the vertical (z-axis) and horizontal directions (x- and y-axis). The following equipment was used during the survey.

Equipment	Serial Number
Rion vibration meter type VM-54	00360146
Rion vibration pick-up type PV-83CW (accelerometer)	0063644
Extension cable and mounting block arrangement	-

Table 8: Equipment used for vibration survey

The measured VDV's are used to assess the likelihood of adverse impact due to vibration within the proposed residential buildings.

Daytime and night-time VDV's have been calculated for the site in accordance with procedures outlined in Section 3.5 and Annex B of BS 6472-1. The maximum calculated day and nighttime

VDVs for the site are shown in Table 9 below. These results reflect the more recent survey undertaken 9th – 10th March 2026.

Period	X-Axis VDV m/s ^{-1.75}	Y-Axis VDV m/s ^{-1.75}	Z-Axis VDV m/s ^{-1.75}	Comments
Daytime	0.124646	0.279375	0.089357	Vibration is within the range where there is a low probability of adverse comment
Night time	0.143223	0.163514	0.081001	Vibration is within the range where there is a low probability of adverse comment

Table 9: Summary vibration survey VDV results for daytime and night time periods

Measured vibration levels at the proposed development site during the day are within the range of values where there is a low probability of adverse comment, as defined in BS 6472-1:2008. As such, it is recommended that the site is suitable for residential development and no vibration mitigation measures are necessary.

9. CONCLUSION

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 to high-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 and is also aligned with the London Borough of Hillingdon Noise Supplementary Planning Document.

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.

An assessment of ground borne vibration confirms that the site is in an area where there is a low probability of adverse comment by future residents and no vibration mitigation measures will be required.

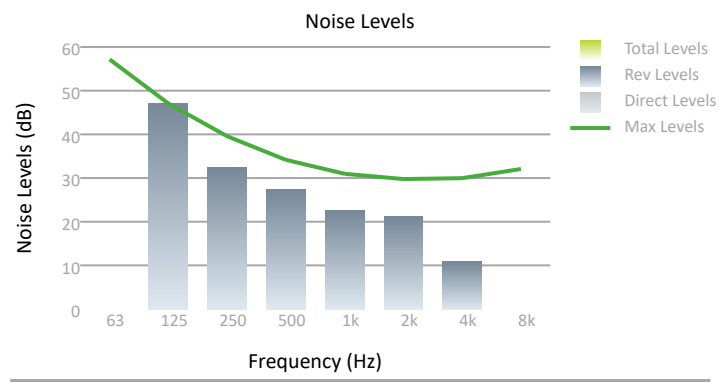
In accordance with guidance in ProPG, it is recommended that planning consent may be granted for the proposed development.

Appendix A

Acoustic Calculations

Tavistock Works

Reference	Flat 01-02 Living
Description	Living Room
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	33.3dB(A)
Calculated Tmf T60 (s)	0.5
Volume (m³)	59.2

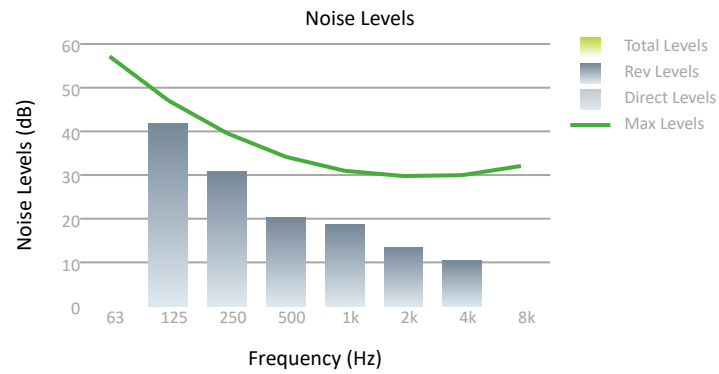


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	47.2	32.5	27.4	22.5	21.1	10.8	-

Tavistock Works

Reference	Flat 01-02 Bedroom (Daytime)
Description	Bedroom
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	28.4dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	22.8

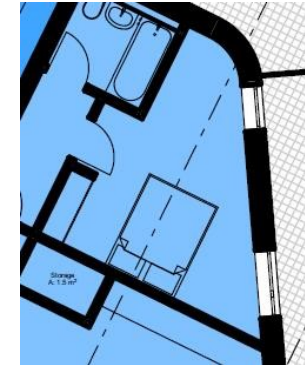
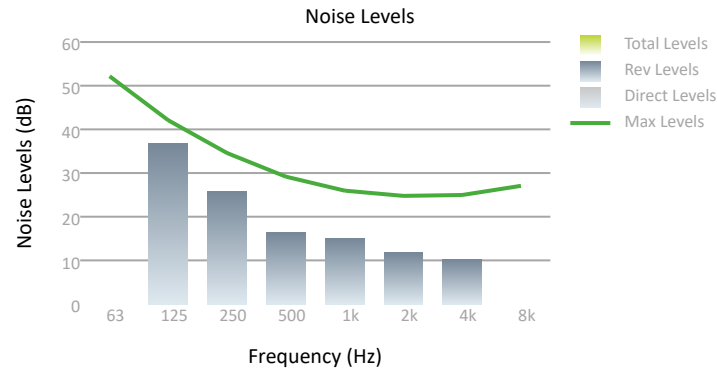


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	41.7	30.7	20.3	18.7	13.5	10.5	-

Tavistock Works

Reference	Flat 01-02 Bedroom (Night Time)
Description	Bedroom
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	24.1dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	22.8

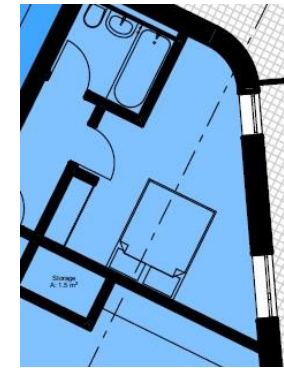
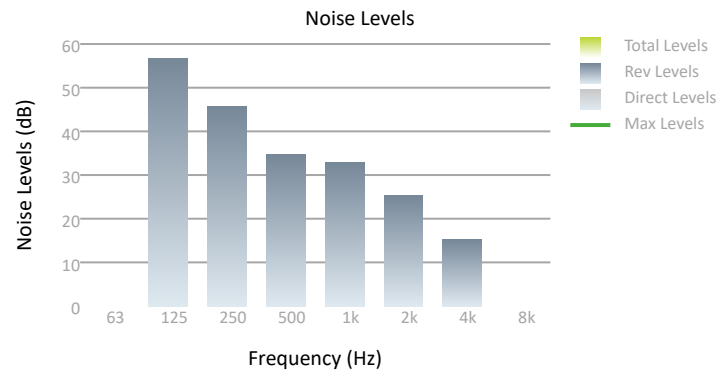


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	-	36.7	25.9	16.3	15.1	11.8	10.3	-

Tavistock Works

Reference	Flat 01-02 Bedroom (Lmax)
Description	Bedroom
Target Sound Level	45dB(A)
Max Sound Level	-
Calculated Sound Level	43.1dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	22.8

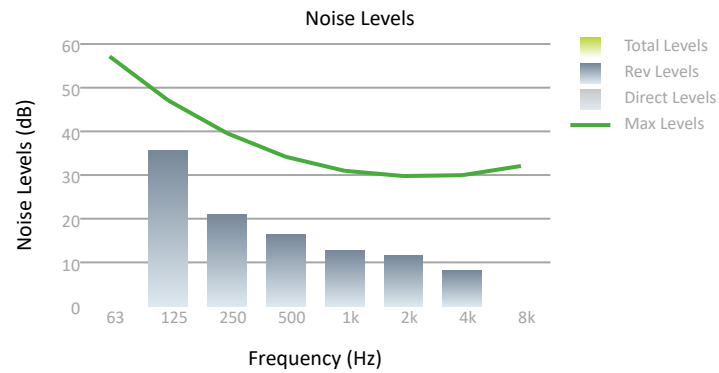


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff (Night)	1	-	56.7	45.7	34.7	32.8	25.4	15.2	-

Tavistock Works

Reference	Flat 01-05 Rear Bedroom (Daytime)
Description	Bedroom
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	22.3dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	39

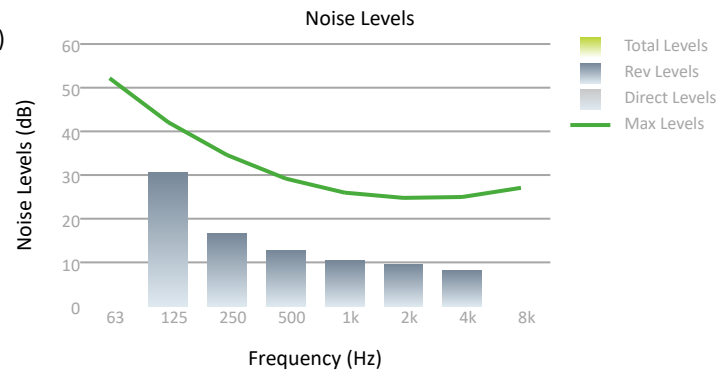


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	35.5	21.0	16.4	12.7	11.6	8.2	-

Tavistock Works

Reference	Flat 01-05 Rear Bedroom (Night Time)
Description	Bedroom
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	18.7dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	39

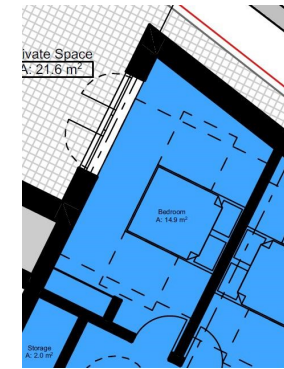
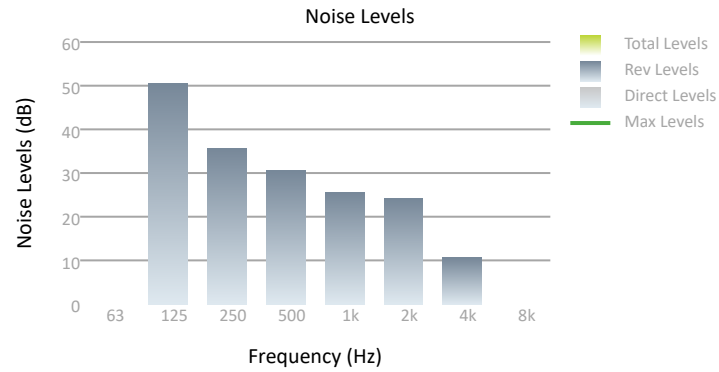


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	-	30.5	16.5	12.7	10.3	9.5	8.1	-

Tavistock Works

Reference	Flat 01-05 Rear Bedroom (Lmax)
Description	Bedroom
Target Sound Level	45dB(A)
Max Sound Level	-
Calculated Sound Level	36.6dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	39

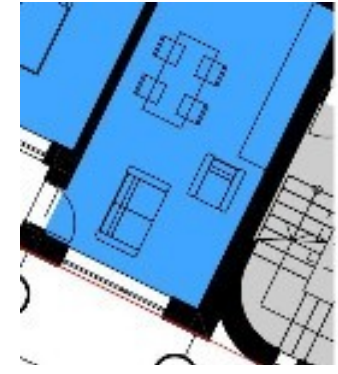
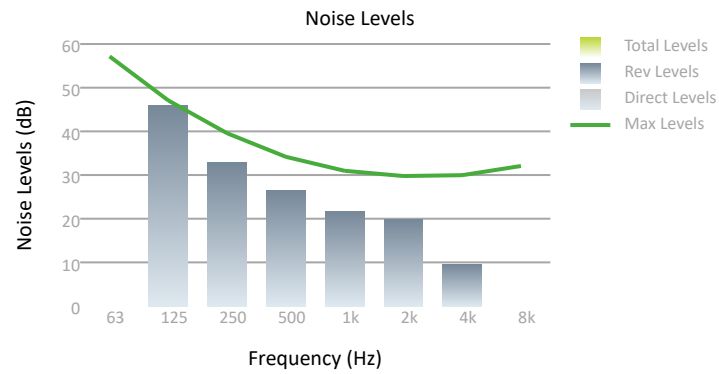


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff (Night)	1	-	50.5	35.7	30.6	25.6	24.1	10.6	-

Tavistock Works

Reference	Flat 05-01 Living
Description	Living
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	32.4dB(A)
Calculated Tmf T60 (s)	0.5
Volume (m³)	46.8

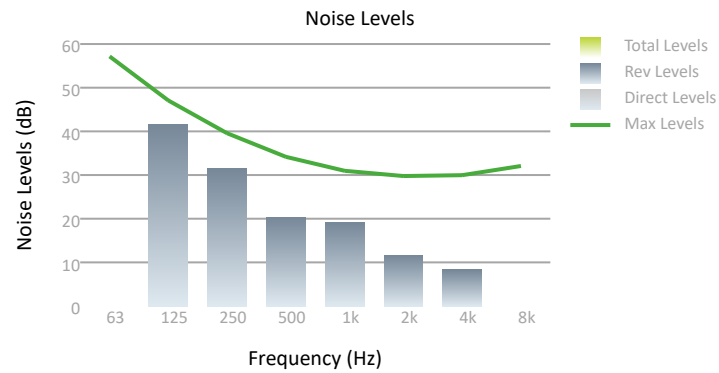


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	45.9	32.8	26.5	21.8	19.8	9.6	-

Tavistock Works

Reference	Flat 05-01 Bedroom 1 (Daytime)
Description	Bedroom
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	28.5dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	23.4

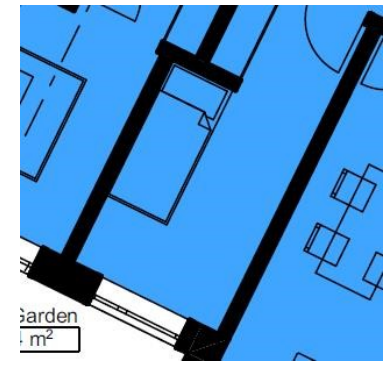
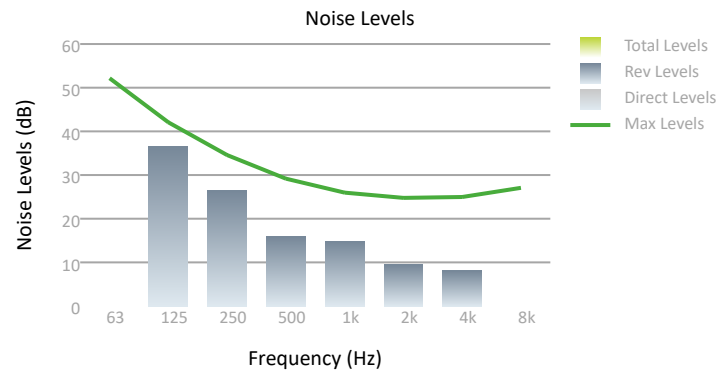


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	-	41.5	31.5	20.4	19.1	11.7	8.3	-

Tavistock Works

Reference	Flat 05-01 Bedroom 1 (Night Time)
Description	Bedroom
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	23.8dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	23.4

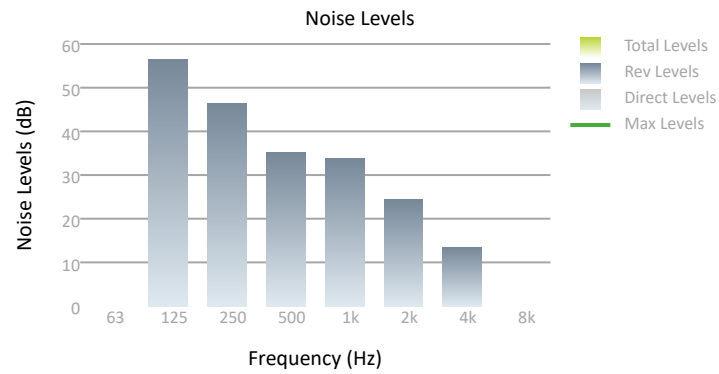


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	-	36.5	26.5	15.9	14.9	9.5	8.1	-

Tavistock Works

Reference	Flat 05-01 Bedroom 1 (Lmax)
Description	Bedroom
Target Sound Level	45dB(A)
Max Sound Level	-
Calculated Sound Level	43.3dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	23.4



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff (Night)	1	-	56.5	46.4	35.1	33.8	24.3	13.5	-

Calculation Sheet

Flat 01-02 Living

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-33.6	-38.6	-44.6	-52.6	-58.6	-56.6	-60.6	-64.6	
Facade Glazed Element									
	-	-28.1	-39.1	-41.1	-46.1	-43.1	-56.1	-	
Cumulative Lp									
Result	-	40.3	26.0	21.3	16.4	15.5	5.6	-	
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	5.7	5.1	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 01-02 Living									
Reverberant Field, LPrev:	-	47.2	32.5	27.4	22.5	21.1	10.8	-	

Calculation Sheet

Flat 01-02 Bedroom (Daytime)

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-33.1	-38.1	-44.1	-52.1	-58.1	-56.1	-60.1	-64.1	
Facade Glazed Element									
	-	-35.6	-42.6	-51.6	-51.6	-57.6	-71.6	-	
Cumulative Lp									
Result	-	34.4	23.8	13.8	12.2	7.5	5.1	-	
ISO 12354-3 Lfs Correction									
	-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	-	7.4	6.9	6.5	6.5	6.0	5.4	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 01-02 Bedroom (Daytime)									
Reverberant Field, LPrev:	-	41.7	30.7	20.3	18.7	13.5	10.5	-	

Calculation Sheet

Flat 01-02 Bedroom (Night Time)

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)									
Source dBA	61.0								
Octave Band Frequencies									
Leq,ff	65.0	63.0	59.0	57.0	57.0	53.0	48.0	42.0	Row A
Facade Wall Element									
	-33.1	-38.1	-44.1	-52.1	-58.1	-56.1	-60.1	-64.1	
Facade Glazed Element									
	-	-35.6	-42.6	-51.6	-51.6	-57.6	-71.6	-	
Cumulative Lp									
Result	-	29.4	18.9	9.8	8.6	5.8	4.9	-	
ISO 12354-3 Lfs Correction									
	-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	-	7.4	6.9	6.5	6.5	6.0	5.4	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 01-02 Bedroom (Night Time)									
Reverberant Field, LPrev:	-	36.7	25.9	16.3	15.1	11.8	10.3	-	

Calculation Sheet

Flat 01-02 Bedroom (Lmax)

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Lmax)										
Source dBA	81.0									
Octave Band Frequencies										
Leq,ff		85.0	83.0	79.0	77.0	77.0	73.0	68.0	62.0	Row A
Facade Wall Element										
		-33.1	-38.1	-44.1	-52.1	-58.1	-56.1	-60.1	-64.1	
Facade Glazed Element										
		-	-35.6	-42.6	-51.6	-51.6	-57.6	-71.6	-	
Cumulative Lp										
Result		-	49.4	38.7	28.2	26.3	19.4	9.8	-	
ISO 12354-3 Lfs Correction										
		-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections										
		-	7.4	6.9	6.5	6.5	6.0	5.4	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 01-02 Bedroom (Lmax)										
Reverberant Field, LPrev:		-	56.7	45.7	34.7	32.8	25.4	15.2	-	

Calculation Sheet

Flat 01-05 Rear Bedroom (Daytime)

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	56.0								
Octave Band Frequencies									
Leq,ff	60.0	58.0	54.0	52.0	52.0	48.0	43.0	37.0	Row A
Facade Wall Element									
	-33.9	-38.9	-44.9	-52.9	-58.9	-56.9	-60.9	-64.9	
Facade Glazed Element									
	-	-27.5	-38.5	-40.5	-45.5	-42.5	-55.5	-	
Cumulative Lp									
Result	-	30.8	16.7	12.5	8.8	8.2	4.9	-	
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	3.3	3.3	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 01-05 Rear Bedroom (Daytime)									
Reverberant Field, LPrev:	-	35.5	21.0	16.4	12.7	11.6	8.2	-	

Calculation Sheet

Flat 01-05 Rear Bedroom (Night Time)

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)									
Source dBA	51.0								
Octave Band Frequencies									
Leq,ff	55.0	53.0	49.0	47.0	47.0	43.0	38.0	32.0	Row A
Facade Wall Element									
	-33.9	-38.9	-44.9	-52.9	-58.9	-56.9	-60.9	-64.9	
Facade Glazed Element									
	-	-27.5	-38.5	-40.5	-45.5	-42.5	-55.5	-	
Cumulative Lp									
Result	-	25.8	12.3	8.9	6.5	6.2	4.8	-	
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	3.3	3.3	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 01-05 Rear Bedroom (Night Time)									
Reverberant Field, LPrev:	-	30.5	16.5	12.7	10.3	9.5	8.1	-	

Calculation Sheet

Flat 01-05 Rear Bedroom (Lmax)

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Lmax)										
Source dBA	71.0									
Octave Band Frequencies										
Leq,ff		75.0	73.0	69.0	67.0	67.0	63.0	58.0	52.0	Row A
Facade Wall Element										
		-33.9	-38.9	-44.9	-52.9	-58.9	-56.9	-60.9	-64.9	
Facade Glazed Element										
		-	-27.5	-38.5	-40.5	-45.5	-42.5	-55.5	-	
Cumulative Lp										
Result		-	45.8	31.4	26.8	21.8	20.8	7.2	-	
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	3.3	3.3	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 01-05 Rear Bedroom (Lmax)										
Reverberant Field, LPrev:		-	50.5	35.7	30.6	25.6	24.1	10.6	-	

Calculation Sheet

Flat 05-01 Living

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-38.7	-43.7	-49.7	-57.7	-63.7	-61.7	-65.7	-69.7	
Facade Glazed Element									
	-	-29.9	-40.9	-42.9	-47.9	-44.9	-57.9	-	
Facade Roof Element									
	-38.3	-41.3	-42.3	-51.3	-55.3	-59.3	-62.3	-	
Cumulative Lp									
Result	-	38.6	25.8	19.9	15.2	13.7	4.0	-	
ISO 12354-3 Lfs Correction									
	-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	-	7.4	7.0	6.6	6.6	6.1	5.6	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 05-01 Living									
Reverberant Field, LPrev:	-	45.9	32.8	26.5	21.8	19.8	9.6	-	

Calculation Sheet

Flat 05-01 Bedroom 1 (Daytime)

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-39.2	-44.2	-50.2	-58.2	-64.2	-62.2	-66.2	-70.2	
Facade Glazed Element									
	-	-33.7	-40.7	-49.7	-49.7	-55.7	-69.7	-	
Facade Roof Element									
	-39.3	-42.3	-43.3	-52.3	-56.3	-60.3	-63.3	-	
Cumulative Lp									
Result	-	35.2	25.5	14.9	13.7	6.7	3.4	-	
ISO 12354-3 Lfs Correction									
	-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	-	6.3	5.9	5.5	5.5	5.0	5.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 05-01 Bedroom 1 (Daytime)									
Reverberant Field, LPrev:	-	41.5	31.5	20.4	19.1	11.7	8.3	-	

Calculation Sheet

Flat 05-01 Bedroom 1 (Night Time)

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)										
Source dBA	61.0									
Octave Band Frequencies										
Leq,ff		65.0	63.0	59.0	57.0	57.0	53.0	48.0	42.0	Row A
Facade Wall Element										
		-39.2	-44.2	-50.2	-58.2	-64.2	-62.2	-66.2	-70.2	
Facade Glazed Element										
		-	-33.7	-40.7	-49.7	-49.7	-55.7	-69.7	-	
Facade Roof Element										
		-39.3	-42.3	-43.3	-52.3	-56.3	-60.3	-63.3	-	
Cumulative Lp										
Result		-	30.2	20.6	10.5	9.4	4.5	3.1	-	
ISO 12354-3 Lfs Correction										
		-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections										
		-	6.3	5.9	5.5	5.5	5.0	5.0	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 05-01										
Bedroom 1 (Night Time)										
Reverberant Field, LPrev:		-	36.5	26.5	15.9	14.9	9.5	8.1	-	

Calculation Sheet

Flat 05-01 Bedroom 1 (Lmax)

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Lmax)										
Source dBA	81.0									
Octave Band Frequencies										
Leq,ff		85.0	83.0	79.0	77.0	77.0	73.0	68.0	62.0	Row A
Facade Wall Element		-39.2	-44.2	-50.2	-58.2	-64.2	-62.2	-66.2	-70.2	
Facade Glazed Element		-	-33.7	-40.7	-49.7	-49.7	-55.7	-69.7	-	
Facade Roof Element		-39.3	-42.3	-43.3	-52.3	-56.3	-60.3	-63.3	-	
Cumulative Lp										
Result		-	50.2	40.5	29.6	28.3	19.4	8.5	-	
ISO 12354-3 Lfs Correction		-	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections		-	6.3	5.9	5.5	5.5	5.0	5.0	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 05-01 Bedroom 1 (Lmax)										
Reverberant Field, LPrev:		-	56.5	46.4	35.1	33.8	24.3	13.5	-	

Appendix B

Assessed plot location(s)

