



4 KNEESWORTH
STREET, ROYSTON

Environmental Noise Impact Assessment

Reference: 13932.RP01.NIA.1

Prepared: 16 October 2024

Revision Number: 0

Nelson Land Limited

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4 KNEESWORTH STREET, ROYSTON

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Prepared: 16 October 2024

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0	First issue of report	08 October 2024	Martin Raisborough	Torben Andersen
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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed in to full working drawings by the lead designer to incorporate all other design disciplines.



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1.0 INTRODUCTION

RBA Acoustics has been appointed by Nelson Land Limited to undertake acoustic consultancy services related to the proposals for the refurbishment of the property at 4 Kneesworth Street in Royston to accommodate 2 new apartments in the centre of Royston, Hertfordshire.

This report presents the details of an environmental noise monitoring survey undertaken at the site and the details and results of our assessments of environmental sound affecting the site, including indicative mitigation measures that are likely to be required in order that suitable internal noise levels may be achieved within the proposed dwellings.

The following issues are considered within this report:

- Assessment of sound insulation requirements for the external building fabric
- Guidance in relation to provision of alternative ventilation with respect to noise control, and
- Initial guidance in relation to the risk of overheating
- Initial guidance in the relation to the transfer of noise from the ground floor commercial units

This report occasionally employs technical terminology. In order to assist the reader, a glossary of terms is presented in Appendix A.

2.0 SITE DESCRIPTION

The site comprises a two storey semi-detached property along Kneesworth Street in the centre of the town of Royston, Hertfordshire. The property is currently used as a commercial premises, with consent for Class E and Sui Generis.

At present, the ground floor unit at No. 4A is tenanted by Coral, while the adjacent commercial unit (No. 4) is untenanted. The first floors of the properties are unoccupied. The proposal is to refurbish the site to accommodate two new self-contained apartments at 1st floor, while retaining the commercial uses of the ground floor. A new entrance will be formed from the street to facilitate access to the new apartments at 1st floor.

The site lies within a mixed residential and commercial area in the centre of the town of Royston, Hertfordshire, and is bounded to the west by Kneesworth Street, a busy thoroughfare through the town. The site is attached to the north and south by properties of similar nature and of commercial uses.

There are existing residential uses within the buildings to the east of the site.

The site location with respect to the wider environment is shown in Figure A in Appendix B., while a photograph of the site is shown Figure B in Appendix B.

3.0 DESIGN CRITERIA

The following sections outline the proposed methodology and standards to be used in the assessment of noise for this scheme.

3.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) states that, with respect to noise, planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from a new development, including through the use of conditions;
- Recognise that development will often create some noise and existing business wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The guidance contained within the NPPF further determines that consideration should be given to the Noise Policy Statement for England (DEFRA, March 2010).

3.2 Noise Policy Statement for England (NPSE, March 2010)

The NPSE attends to three types of noise;

- “Environmental noise” which includes noise from transportation sources;
- “Neighbour noise” which includes noise from inside and outside people’s homes; and
- “Neighbourhood noise”, which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

In line with the aims determined in the NPPF, the NPSE determines three aims;

1. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;
2. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development; and,
3. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The guidance detailed within the NPSE relates a number of key phrases with regards to adverse effects which can be applied to noise impacts as used by the World Health Organisation.

- **NOEL – No Observed Effect Level** - The level below which no health effect or detrimental impact on the quality of life is observed.
- **LOAEL – Lowest Observed Adverse Effect Level** - The level at which adverse effects on health and quality of life can be detected
- **SOAEL – Significant Observed Adverse Effect Level** - The level above which significant adverse effects on health and quality of life occur.

The guidance indicates that it is not possible to have a single objective noise-based measure that defines SOAEL, and as such the SOAEL is likely to be different for different noise sources and receptors. The document indicates that further research is required to establish what may constitute a significant adverse impact on health and quality of life from noise.

While the NPSE determines the NOEL, LOAEL and SOAEL descriptions, the document indicates that, unlike other environmental disciplines, there are currently no European or national noise limits which have to be met, although the NPSE states that “there can be specific local limits for specific developments” allowing for negotiation.

3.3 Planning Practice Guidance - Noise

The Planning Practice Guidance for noise 2014 (updated July 2019) broadly considers the same issues as demonstrated within both the NPPF and the NPSE with regards to noise within the planning realm. The information detailed within the PPG indicates that noise should be considered when:

- New developments may create additional noise; and/ or,
- New developments would be sensitive to the prevailing acoustic environment.

The guidance indicates that Local Planning Authorities should 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.

The impact of noise is rated within the policy document in terms of the relative ‘Observed Effect Level’, defined in line with the guidance within the NPSE. Based upon this, the Planning Practice Guidance provides the following matrix of likely average response:

Table 3 - PPG Observed Effect Levels

Perception	Example of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			

Noticeable and disruptive	The noise causes a material change in behaviour and/ or attitude, e.g. avoiding certain activities during periods of intrusion: where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/ or an ability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

3.4 Pro PG: Planning and Noise

The Professional Practice Guidance on Planning and Noise (ProPG) provides practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

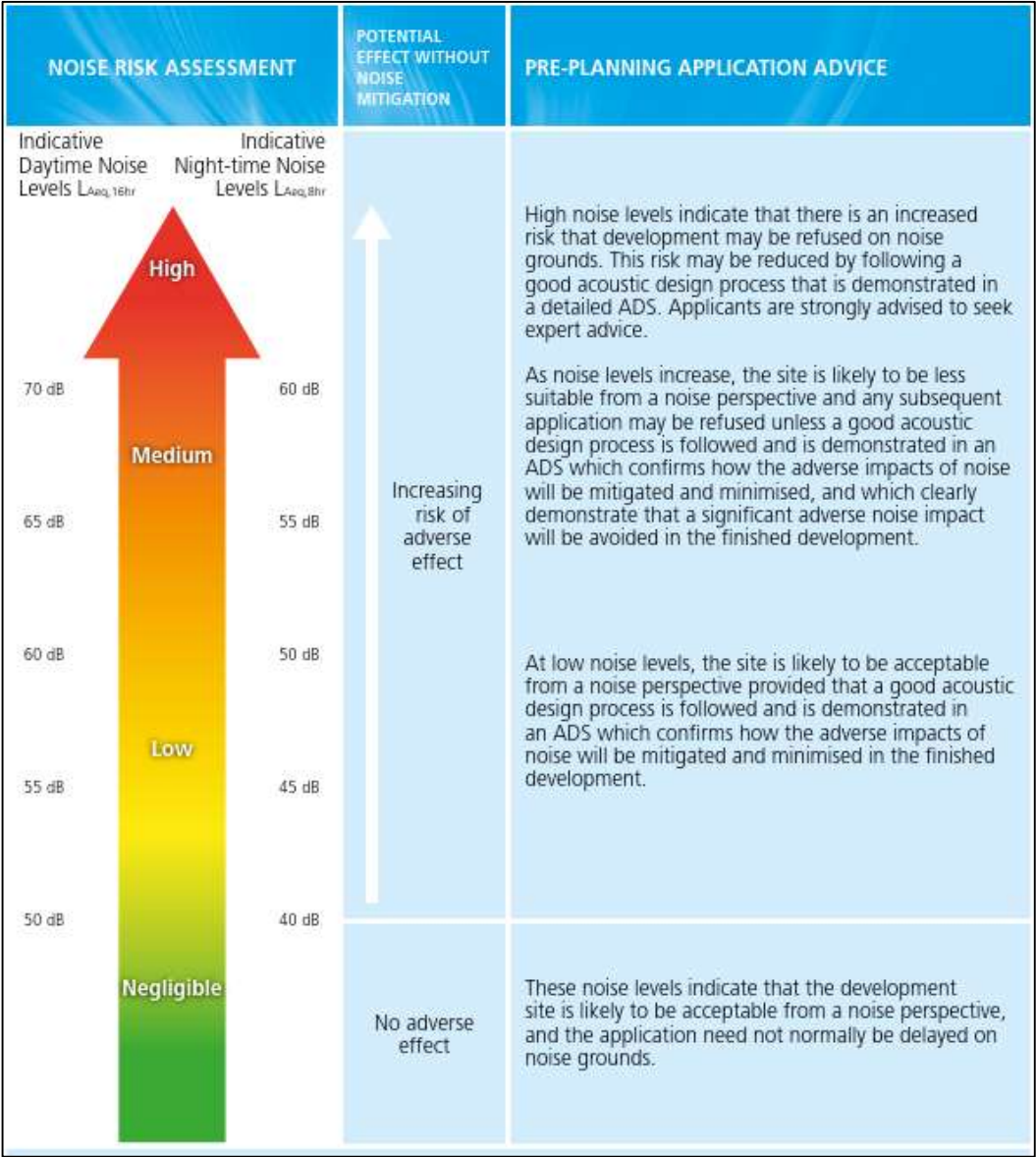
The document provides a framework for good acoustic design. Providing a framework for a holistic design process that creates places that are both comfortable and attractive to live in, where acoustics is considered integral to the living environment.

The recommended approach detailed in this guidance includes a framework to enable situations where noise is not an issue to be clearly determined, and to help identify the extent of risk at noisier sites. Higher development costs should invariably be anticipated in those areas exposed to high levels of noise that may be harmful or otherwise unacceptable. The recommended approach provides opportunities to incorporate effective design interventions that

will enable residential development to proceed in areas that might otherwise have been considered unsuitable. Inevitably, there may be some situations where it is not appropriate to build new dwellings. Even in those situations, this guide will assist as it encourages early identification of the risk of refusal and supports early decision making – thereby avoiding unnecessary development and design costs.

The document provides guidance on where external noise levels affecting a proposed residential development site may be linked with an increasing risk of adverse effect from noise and how this in turn is broadly associated with indicative noise levels derived from current guidance and experience. 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. This guidance is presented in Figure 1 below.

Figure 1 – ProPG Stage 1 Risk Assessment



3.5 British Standard 8233:2014

BS 8233:2014 *Guidance on Sound insulation and noise reduction for buildings* draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions.

The noise level values given are in terms of an average (LAeq) level.

The standard advises internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties as set out in Table 2. A brief explanation of the acoustic terminology used in this report is shown in Appendix A attached.

Table 1– BS 8233:2014 Residential Criteria

Room	Time Period	
	07:00 to 23:00	23:00 to 07:00
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

With regards to individual noise events, BS 8233 states that:

‘A guideline value may be set in terms of SEL or $L_{Amax,fast}$, depending on the character and number of events per night. Sporadic noise events could require separate values.’

The superseded version of the standard (1999 version) suggested a night time level of 45dB $L_{Amax, fast}$ which should not ‘normally’ be exceeded, which concurs with current World Health Organisation guidelines. As such, this level will be considered in the subsequent assessments of noise impact during the night for the typically highest occurring $L_{Amax, fast}$ noise events.

It is recognised within the standard that where development is desirable ‘these criteria may be relaxed by up to 5dB and reasonable internal conditions still achieved’.

With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,16h}$, with an upper guideline value of 55 dB $L_{Aeq,16h}$, which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances, such as within city centres, urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

3.6 Summary of Criteria

Considering the above guidance documents and standards, it is considered that, if the BS 8233 internal and external noise guidelines are achieved, then this would be in line with ‘No Observed Effect Level’ according to the NPSE and in line with No Observed Effect’ Planning Practice Guidance for noise.

4.0 ENVIRONMENTAL SOUND MONITORING

Baseline environmental sound monitoring was undertaken at the site over a typical weekend period to assess the prevailing sound levels on the site. The survey commenced at 19:00 hours on Tuesday 8th October and concluded at 19:00 on Wednesday 9th October 2024.

The survey was undertaken by Martin Raisborough (BEng Hons, MIOA) of RBA Acoustics. Continuous measurements of the L_{A10} , L_{A90} , L_{Amax} and L_{Aeq} noise levels were made throughout the survey period.

4.1 Measurement Location

To determine the noise climate affecting the property, measurements were undertaken at first floor level of the property, along the western façade fronting Kneesworth Street. The microphone was attached to an A-Frame suspended through the window, such that it was 1 metre from the façade of the property and approximately 3 metres above ground level. The noise climate at this position was dominated by road traffic noise from Kneesworth Street and the surrounding road network.

The measurement position is illustrated on the site plan in Figure A of Appendix B, and also in the site photograph in Figure B of Appendix B.

4.2 Instrumentation

The table in Appendix C presents the details the equipment used during the survey. The sound level meter was field-calibrated before and after measurements using the acoustic calibrators shown. No significant drift in calibration level was recorded (0.0dB).

The field calibrators and sound level meters have been calibrated by a UKAS accredited calibration laboratory within the past two years, with the field calibrators having undergone an additional in-house calibration check within the past year. Full calibration certificates are available on request.

4.3 Weather Conditions

As the majority of the survey was unattended it is not possible to comment with certainty regarding meteorological conditions. Based on observations during the site visits and historical weather reports, however, a summary of the weather conditions is presented in Table 2 below.

Table 2 – Summary of Weather Conditions

Date	Summary of Weather Conditions	
	Daytime	Night time
Tuesday 8 th October	- Temperature High – 12°C - Easterly wind 2 m/s - Cloudy, dry	- Temperature Low – 11°C - Easterly wind 3 m/s - Cloudy, rain showers
Wednesday 9 th October	- Temperature High – 12°C - North Easterly wind 5 m/s - Cloudy, rain showers	
Source : timeanddate.com		

While the above weather conditions were not ideal for the measurement of environmental sound due to periods of rain showers, it is not considered that the recorded sound levels have been adversely affected to a great extent as road traffic speeds are very low in this area and so tyre/road noise interaction is not a

significant element of the noise climate. As such, the recorded levels are considered to be a good representation of typical noise levels in the area.

4.4 Results

The results of the monitoring survey are summarised in Table 3 below, with the full results presented in the time history graphs in Appendix D.

Table 3 – Summary of Sound Measurements

Lowest Background Noise Level, $L_{A90,15min}$ [dB]		Time-Averaged Noise Level, L_{Aeq} [dB]		Typical Maximum Noise Level, L_{AFmax} [dB]
Daytime (07:00-23:00)	Night-time (23:00-07:00)	Daytime (07:00-23:00)	Night-time (23:00-07:00)	Night-time (23:00-07:00)
42.6	28	67.1	57.1	81

5.0 NOISE IMPACT ASSESSMENT

In comparing the results of the environmental sound monitoring, as presented in Table 3, with the guidance within ProPG in Figure 1, it can be seen that daytime noise levels fall into a 'Medium' risk rating during the daytime and during the night.

The ProPG document states that, for these risk ratings, 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 it is demonstrated how the adverse impacts of noise will be mitigated and minimised.

Based on the above initial assessment, it is expected that windows will need to remain closed in order that suitable internal noise levels may be achieved within the habitable rooms of the dwellings.

The non-glazed elements of the external façade are noted to be of a brick/block cavity construction. On this basis, it is expected that a sound insulation performance of at least 50dB $R_w + C_{tr}$ is provided by the external wall, such that the glazing is the clear weakest element of the façade.

5.1 Acoustic Guidance for Glazing

Appendix E presents indicative sound reduction performance specifications for the glazed elements within the external building fabric.

The glazing performance specifications apply to the glazing package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the glazing system at this stage are indicative only as the final specification will depend on many factors such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc.

For guidance purposes we would typically expect the following glazing configurations detailed Table 4 to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix E.

Table 4 – Glazing Guidance Constructions

Area	Glazing Configuration
Bedrooms – Western Facade	Thermal double glazing with differing pane thicknesses, e.g. 10mm glass/12mm cavity/6mm glass
Living Areas– Western Facade	Standard thermal double glazing with differing pane thicknesses, e.g. 4mm glass/12mm cavity/6mm glass
All Habitable Rooms – Eastern Facade	Standard thermal double glazing with differing pane thicknesses, e.g. 4mm glass/12mm cavity/6mm glass

Please note – The glazing configurations described in Table 4 are given for guidance and costing purposes only based on limited information available at planning stage. More detailed assessments may be required as the scheme develops post planning.

5.2 Provision of Alternative Ventilation

In order to achieve the required internal noise levels within the habitable rooms of the dwellings, windows would need to remain closed. As such, an alternative supply of background ventilation will be required in order to satisfy the requirements of Approved Document F of the Building Regulations.

Approved Document F describes three ventilation conditions that require consideration:

- Extract Ventilation – for kitchen, utility room, bathroom and sanitary areas
- Whole Dwelling Ventilation – For the continuous supply of air to habitable rooms
- Purge Ventilation – for each habitable room at a high ventilation rate

The strategy for complying with the requirements of Approved Document F have not been determined at this stage. It is likely, however, that Whole Dwelling ventilation (MVHR units) will be appropriate for the exposed elevation fronting Kneesworth Street, while extract ventilation with window mounted trickle ventilators is likely to be sufficient for the habitable rooms along the eastern facades of the building.

Purge Ventilation

Section 4.15 of Approved Document F of the Building Regulations suggests that, in addition to a normal ventilation rate, a higher 'purge' ventilation is also required to "aid the removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water." The document also states, however, that this higher ventilation rate is only required for short intermittent periods when such occasional activities occur.

Based on the above, and considering the short periods and infrequent nature that this higher ventilation rates would be required, it is usually considered acceptable for windows to be opened: There is a general precedent that external sound levels should not determine the acceptability of opening windows to provide intermittent, occasional and ad-hoc, ventilation in cases such as those described above.

Control of Summertime Temperature

Approved Document Part F goes on to note that, "Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under the Building Regulations." Therefore, and particularly for habitable rooms in dwellings along the western elevation fronting Kneesworth Street, the requirement for control of summertime temperature should be considered when windows are closed.

In addition, Approved Document O of the Building Regulations "Overheating" states that, in locations where external noise may be an issue the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

The issue of thermal gain, and the risk of overheating where windows are closed, will need to be assessed during the detailed design of the scheme as detailed thermal modelling will be required in accordance with CIBSE TM59.

At this early stage, however, reference may be made to the guidance within the Acoustics Ventilation & Overheating (AVO) guide by the Association of Noise Consultants (ANC), which addresses the need for an integrated approach to consider noise, ventilation, and overheating. The guide involves a two-level approach to addressing issues of overheating with respect to noise. The Level 1 assessment is appropriate for early stage design of the project and seeks to determine the level of risk associated with overheating based on the surrounding noise climate.

The AVO risk categories and their associated noise levels during the night are detailed below:

Table 5 – AVO Level 1 Risk Assessment Guide (night time)

Night-time Noise Levels ($L_{Aeq, 23:00-07:00}$)	Risk Category	Mitigation
< 48 dBA	Negligible Risk	None required – openable windows suitable for ventilation
48 – 55 dBA	Low/Medium Risk	Level 2 assessment optional in order to give more confidence regarding the suitability of internal noise conditions
> 55 dBA	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy.

The night time noise level measured during the noise survey was 57dBA. As this was a façade noise level, however, it is appropriate to correct this level by -3dB to obtain a 'free-field' level for comparison with the data in Table 5 above (i.e. 54dBA).

From this comparison, it can be seen that there is a 'medium' risk of noise being a significant factor in the relief of overheating during the warmer summer months by means of the opening of windows for short periods, however, it is likely to be easily mitigated through the careful design of scheme, using the dual aspect nature of the building for cross-ventilation.

6.0 NOISE TRANSFER FROM GROUND FLOOR COMMERCIAL UNITS

It is proposed that the commercial use of the ground floor of the property will be retained. As such, the potential impact of noise from the commercial use on the new residential apartments above needs to be considered. In relation to the impact of noise from non-domestic premises on domestic properties, Approved Document E of the Building Regulations 2010 states the following:

0.8 The performance standards set out in Tables 1a and 1b are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level.

Based on the above, and in consideration of planning Condition 4, it is considered appropriate for this assessment to consider the likely levels of activity noise generated by the ground floor commercial uses in determining the appropriate level of sound insulation between the two demises.

In order to understand the likely levels of activity sound within the ground floor commercial unit, RBA Acoustics has a library of noise data from typical small retail store activities, based on measurements of reverberant sound within typical facilities. A summary of noise measurements within a few comparable sized units of differing use is presented below.

Table 6–Sound Level Measurements in Typical Commercial Unit

Parameter	Typical Reverberant Sound Pressure Level (Leq dB re 20x10 ⁻⁶ Pa.) @ Octave Band Centre Frequency (Hz)							dBA
	125	250	500	1k	2k	4k	8k	
Typical commercial office / betting shop	62	60	58	63	65	48	40	68

The detailed construction of the separating floor between the ground floor retail unit and the dwellings above is not known. From conversations with the Client, however, it is understood that the floor is of a standard timber joisted construction. There is a plasterboard ceiling within the ground floor retail unit. It is likely that this board is fixed to the underside of the joists with mineral fibre insulation within the depths of the joists. The details of the flooring boards and finishes to the top of the joists are not known, however, it is assumed that standard flooring boards with either carpet or hard tile/wood floor finish is likely. Based on the indicative construction, it is expected that the floor is providing an airborne sound insulation performance of around 33dB $D_{nT,w} + C_{tr}$.

To put this performance estimation into context, the current Approved Document E requires a minimum airborne sound insulation performance between two adjacent domestic spaces of 43 dB $D_{nT,w} + C_{tr}$ for those formed by a material change of use.

6.1 Assessment of Noise Impact on Dwellings

Based on the predicted sound insulation performance of the separating floor between the ground floor retail unit and the proposed dwellings above and the typical worst case activity noise levels within the ground floor retail unit, as presented Table 6, an assessment of noise impact on the dwellings above the unit may be undertaken.

Table 7 below presents the predicted sound levels within the 1st floor apartment directly above the unit.

Table 7– Predicted Sound Levels within 1st Floor Apartments – No Mitigation

Parameter	Predicted Reverberant Sound Pressure Level in Apartment (dB re 20x10 ⁻⁶ Pa.) @ Octave Band Centre Frequency (Hz)							dBA	NR
	125	250	500	1k	2k	4k	8k		
L _{Aeq}	43.1	24.7	15.3	16.4	13.4	0	0	28	24

To put the above predictions in some context, British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' recommends that, for daytime resting conditions in dwellings, the indoor ambient noise level should not exceed 35dB L_{Aeq, T} (approximately equivalent to NR30).

The guidance in BS 8233 is provided specifically for 'anonymous' sources of sound (i.e. noise that does not have a specific character, contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content). The standard states that for non 'anonymous sources of sound', lower noise limits might be appropriate. The noise from the ground floor retail units is not considered to be 'anonymous' and as such, lower levels than those presented in BS 8233 are considered appropriate. It is suggested that a level 10dB lower than BS8233 levels is adopted for the non-anonymous nature of the commercial noise, i.e. 25dB L_{Aeq, T} (approximately equivalent to NR20).

6.2 Mitigation Recommendations

Based on the above, it is recommended that acoustic mitigation measures are applied to the separating floor to increase the level of airborne sound insulation performance. Given that the ground floor unit is occupied and trading, acoustic mitigation measures will be required to the top of the floor. The most efficient method of improving the sound insulation performance of the floor is to introduce a floating floor system, in line with the following specification:

- If the existing timber flooring boards are of poor quality or integrity, it is recommended that they are replaced with minimum 18mm flooring particle boards
- A further layer of 18mm cement particle board should be laid on top of the floorboards and screwed down to secure to main floor
- A floating dry acoustic floor should be installed comprising an acoustic resilient timber batten system, creating a minimum 50mm void, with floating layers above comprising minimum 18mm flooring particle board + 18mm cement particle board. The void should be fitted with 25mm mineral fibre insulation (12-30 kg/m³ density). A suitable proprietary system would be the [RESi Dry floating floor by Total Vibration Solutions](#) or the [Cradle and Batten floor by CMS Danskin](#)

Considering the above remedial measures, it is expected that the airborne sound insulation performance of the floor would increase to around 45dB D_{nT,w} + C_{tr}. Based on this performance, Table 8 below presents the predicted sound levels within the 1st floor apartment directly above the unit with the proposed mitigation measures installed.

Table 8– Predicted Sound Levels within 1st Floor Apartments – With Mitigation

Parameter	Predicted Reverberant Sound Pressure Level in Apartment (dB re 20x10 ⁻⁶ Pa.) @ Octave Band Centre Frequency (Hz)							dBA	NR
	125	250	500	1k	2k	4k	8k		
L _{Aeq}	29	18	12	15	13	0	0	20	16

The above predictions are below the recommended noise level of 25dB L_{Aeq, T} (approximately equivalent to NR20) for non-anonymous noise sources within the dwellings. As such, the proposed mitigation measures for the floor are considered sufficient to control activity noise from the ground floor retail units.

7.0 CONCLUSIONS

RBA Acoustics has been appointed by Nelson Land Limited to undertake acoustic consultancy services related to the proposals for the refurbishment of the property at 4 Kneesworth Street in Royston to accommodate 2 new apartments in the centre of Royston, Hertfordshire.

Baseline environmental sound monitoring has been undertaken at the site over a typical 24-hour weekday period to assess the prevailing sound levels on and around the site. Based on the results of the survey, indicative assessments have been undertaken to establish the impact on the proposed new dwellings due to noise. Our assessments have found the noise is not considered to be a significant constraint to residential occupation of the building.

In order to achieve recommended internal noise levels within the habitable rooms of the proposed dwellings, windows would need to remain closed. Indicative recommendations for the acoustic performance of the glazing systems have been assessed, the details of which are presented in Section 5.0 of this report.

An alternative supply of ventilation will be required in order to satisfy the requirements of Approved Document F of the Building Regulations when windows are closed. The strategy for complying with the requirements of Approved Document F have not been determined at this stage. It is expected, however, that window mounted trickle ventilators are likely to be sufficient for the various façade areas.

With regards to the Purge Ventilation rate to release high concentrations of pollutants and water vapour, and considering the short periods and infrequent nature that this higher ventilation rates would be required, it is considered acceptable for windows to be opened.

In addition to the above recommendations, the requirement for control of summertime temperature also requires consideration with respect to the noise strategy, in accordance with the requirements of Approved Document O of the Building Regulations. To this end, a Level 1 assessment has been undertaken in accordance with the Acoustics Ventilation & Overheating (AVO) guide by the Association of Noise Consultants (ANC) in order to determine risk of overheating at this site due to noise issues during the night. The results of the assessment indicate that there is a 'medium' risk of noise being a factor in the relief of overheating during the warmer summer months, however, it is likely to be easily mitigated through the careful design of scheme, using the dual aspect nature of the building for cross-ventilation.

Based on the above, it is not considered that noise is a significant constraint to relief from overheating using natural ventilation means during the hotter summer months, however, it may be considered prudent to undertake a more detailed assessment during the later design stages of the scheme.

Considering the outcomes of the above assessments and guidance, it is considered the impact on the proposed dwellings due to noise is in accordance with '*No Observed Effect Level*' according to the NPSE and in line with '*No Observed Effect*' Planning Practice Guidance for noise.

The potential impact of noise from the commercial use on the new residential apartments above has been considered. Recommendations for the acoustic treatment to the separating floors between the ground floor commercial units and the dwellings above have been provided in Section 6.2 of this report.

Appendix A Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10} , L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B Site Layout



4 Kneesworth Street, Royston
 Site Context and Measurement Location
 Project 13932

Figure A
 16 October 2024
 Not to Scale



4 Kneesworth Street, Royston
Site Photograph
Project 13932

Figure B
16 October 2024
Not to Scale

Appendix C Measurement Equipment

The following equipment was used for the measurements:

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U44036	18 April 2025
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	469005	44035	18 April 2025
Norsonic Sound Calibrator	1251	34429	U44034	18 April 2025

Appendix D – Measurement Results

4 Kneesworth Street, Royston

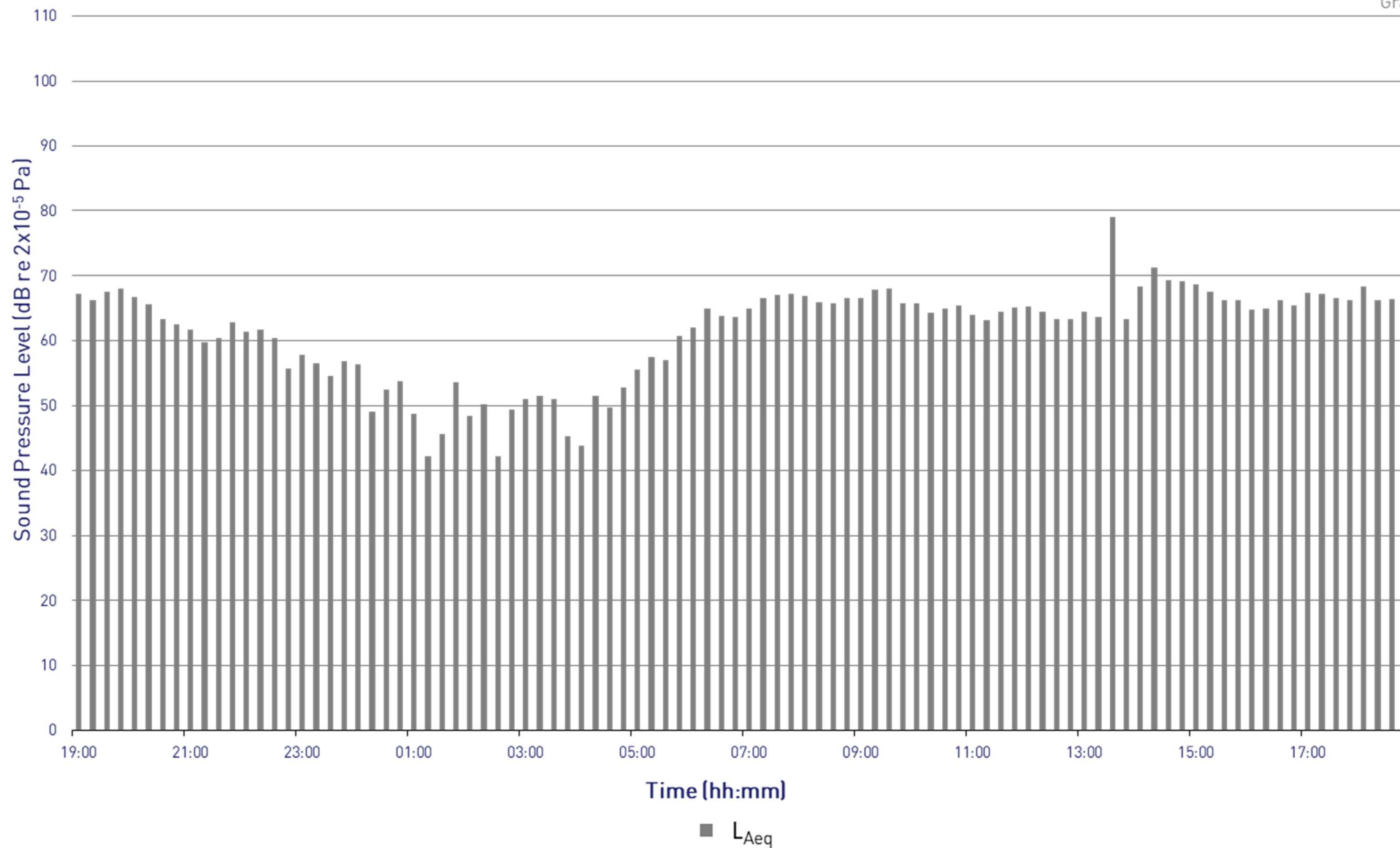
L_{Aeq} Time History

Position 1



Project:

Graph 1



4 Kneesworth Street, Royston

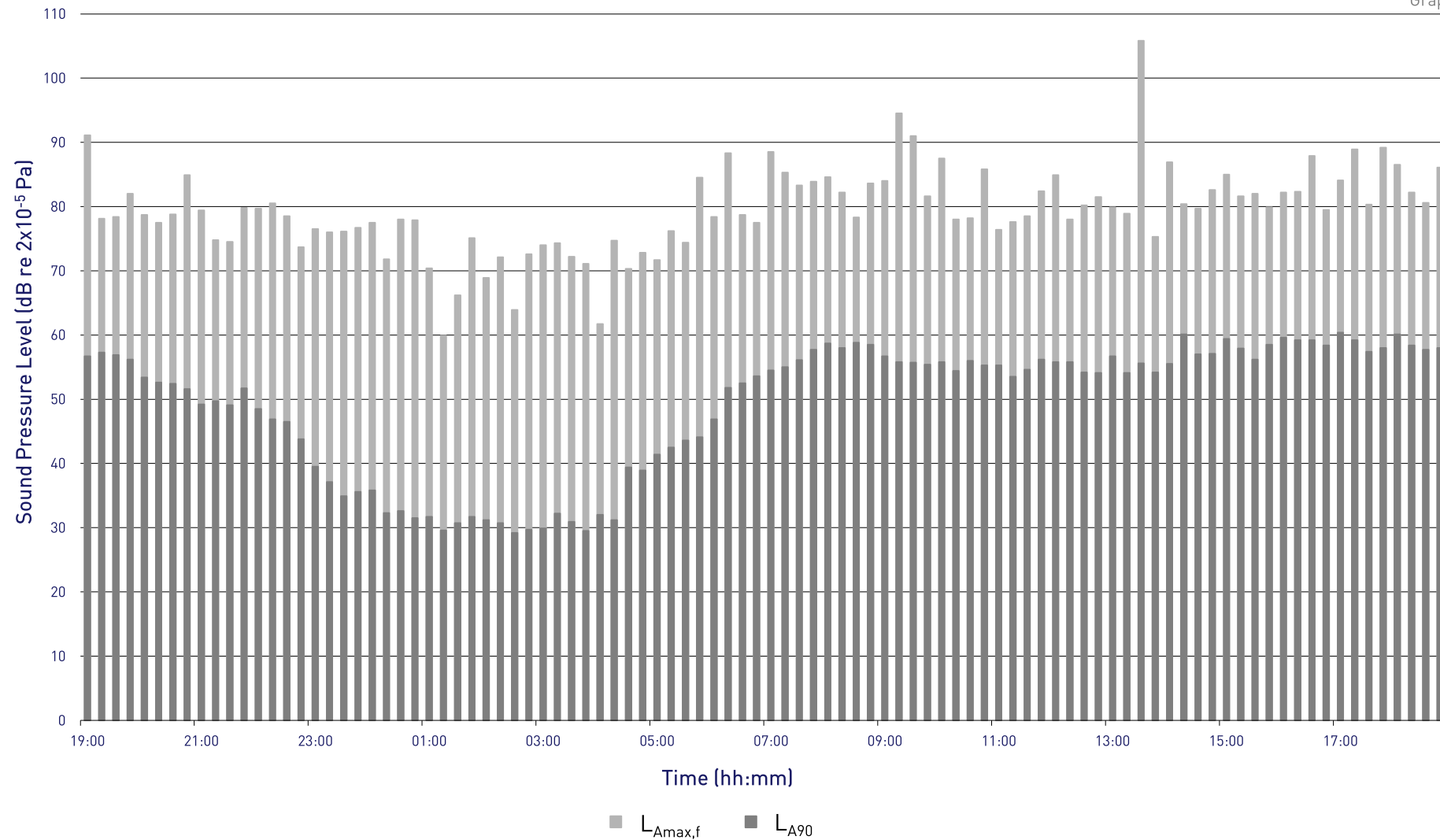
$L_{Amax,f}$ and L_{A90} Time History

Position 1



Project:

Graph 2



Appendix E Acoustic Requirements for Glazing & Ventilation

External facade constructions and components, such as brise soleil, grilles, ventilators, curtain walling systems or other architectural features, are not to give rise to intrusive whistling, creaking, rattling or other noises as a result of wind or other climatic effects.

The Contractor shall take reasonable precautions to avoid unwanted noise including creaking, rattling and whistling being generated by the Contractors works when subject to environmental conditions (including wind) and thermal expansion over the life of the façade.

Window Sound Insulation Performance

Glazed units (inclusive of glazing, louvres, timber panels, spandrel panels, infill panels, framing, opening lights, balcony/terrace doors, seals, etc. as appropriate) should achieve the following minimum sound reduction indices as tested in general accordance with BS EN ISO 10140-2:2010:

Area	Minimum Recommended Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R _w (dB)
	63	125	250	500	1k	2k	4k	8k	
Bedrooms – Western Facade	21	26	27	34	40	38	46	42	38
Other Habitable Rooms – Western Facade	19	20	19	29	38	36	45	45	33
All Habitable Rooms – Eastern Facade	19	20	19	29	38	36	45	45	33

Note: R_w is the “overall weighted sound reduction index” tested in a laboratory.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency-specific performance levels may ultimately prove acoustically acceptable. Test data for representative samples of all glazing systems shall be submitted to RBA Acoustics for approval to demonstrate compliance with the above performance specifications.

Trickle Ventilator Sound Insulation Performance

Trickle ventilators (in their open state) should achieve the following minimum element-normalised level differences as tested in accordance with BS EN 20140-10:1992:

Area	Minimum Recommended $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$ (dB)
	63	125	250	500	1k	2k	4k	8k	
Bedrooms – Western Facade	30	34	39	34	41	31	31	31	35.0
Other Habitable Rooms – Western Facade	28	32	32	31	33	31	31	31	32.0
All Habitable Rooms – Eastern Facade	28	32	32	31	33	31	31	31	32.0

Note: $D_{n,e,w}$ is the “overall weighted element normalised level difference” tested in a laboratory.

Please note the above specification(s) assumes one trickle ventilator will be installed per room. The specification(s) should be increased by a factor of $10\log(N)$ should N ventilators be required per room, i.e. increase by +3dB or +5dB respectively should two or three ventilators be required per room.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for the trickle vents in their open state shall be submitted to RBA Acoustics for approval.

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