NOISE IMPACT ASSESSMENT

BS 8233:2014

Residential Development – Impact from Road Noise

NOISE ASSESSMENTS LTD

YOUR LOCAL ACOUSTIC SPECIALIST

REPORT DETAILS

Report Title	Residential Development – Impact Road Noise
Site Address	640 Oxford Road, Reading, RG30 1EH
Project No.	NALPRO251125.01
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QUALITY ASSURANCE

Issue No.	Status	Issue Date	Comments	Author	Approved
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Contents

Assessment Summary 1
1. Proposal 3
2. Noise Policy and Guidance 3
3. Subjective Impressions 10
4. Measurement Location 10
5. Measurement Procedure 11
6. Measurement Equipment 11
7. Weather Conditions 12
CRTN: Calculation of Road Traffic Noise Assessment 12
8. Noise Survey 12
9. Noise level Calculations 13
10. Summary 16
APPENDIX A - Measurement Details 18
APPENDIX B - Equipment Details 18
APPENDIX C - Calibration Details 18
APPENDIX D - Meteorology Details 18
APPENDIX E – Traffic Survey Data 19
APPENDIX F – BS8233 Rigorous Design Calculation example 20
APPENDIX G Terminology and Definitions 22

Assessment Summary

Noise Assessments Ltd was commissioned with undertaking a Planning Approval Condition for the mixed-use development comprising 3 x separate commercial units (one at basement level and two at ground floor level) and 2 additional self-contained dwellings (two at first floor and two at second floor) with associated extensions and alterations at 640 Oxford Road, Reading, RG30 1EH (herein referred to as the site).

A noise assessment has been requested to demonstrate current road noise from the three sides does not impact future residents in the new dwellings on the first and second floor.

Road Noise at the Façade, M1

The daytime and night-time road traffic noise exposure levels are shown below:

Location	**Daytime dB LAeq** **(07:00 – 23:00 hrs)**	**Night time dB LAeq** **(23:00 – 07:00 hrs)**
Development property façade M1	68	58

Peaks of noise from passing vehicles at night was 71 – 76 dB LAmax at Location M1.

No external amenity spaces are proposed for the development.

The results demonstrate that, with windows open, internal LAeq and LAmax noise levels during the day and night-time within habitable rooms at the facades of the development are expected to exceed the recommended target levels from time to time and openable windows cannot therefore be relied upon for ventilation for an extended period.

The assessment suggests that an alternative means of ventilation is required to provide occupants with the ability to maintain adequate background ventilation rates without having to rely entirely on openable windows. Care should be taken not to confuse a reliance on closed windows to achieve the noise level criteria with the need to have sealed glazing units. Windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Internal Noise Levels in Habitable Rooms Facing the Road

Assuming the use of minimum 35 dB Rw+Ctr rated glazing (10/12/6mm) and 41 dB Dne,w+Ctr acoustic trickle ventilation (Titon Xtra Sound Attenuator V75+C60), daytime road noise would be reduced from 68 dB LAeq,16hr to interior levels of 33 dB LAeq,16hr within habitable rooms facing the road. The

assumed standard of construction would place the internal levels in habitable rooms below 35 dB, therefore within the desirable category.

Assuming the use of minimum 35 dB Rw+Ctr rated glazing (10/12/6mm) and 41 dB Dne,w+Ctr acoustic trickle ventilation (Titon Xtra Sound Attenuator V75+C60), night-time road noise in bedrooms on the 1st/2nd floors would be reduced from 58 dB LAeq,8hr to interior levels 23 dB LAeq,8hr with maximum individual noise events reduced from 76 dB LAFmax to 41 dB LAFmax, therefore within the desirable category.

No external amenity is proposed.

In Summary

A noise intrusion assessment has demonstrated that, via the adoption of the proposed glazing, ventilation strategy internal noise levels within proposed habitable rooms at the front/side/rear of the site are consistent with the guide values outlined in BS 8233 and by the WHO. Products with higher acoustic performance specifications may be utilised if desired.

The assessment includes a means of ventilation to provide occupants with the ability to maintain adequate background ventilation rates for heating and cooling without having to rely entirely on openable windows.

1. Proposal

1.1 Noise Assessments Ltd was commissioned with undertaking a Planning Approval Condition for the mixed-use development comprising 3 x separate commercial units (one at basement level and two at ground floor level) and 2 additional self-contained dwellings (two at first floor and two at second floor) with associated extensions and alterations at 640 Oxford Road, Reading, RG30 1EH (herein referred to as the site).

1.2 A noise assessment has been requested to demonstrate current road noise from the three sides does not impact future residents in the new dwellings on the first and second floor.

Existing Context

1.3 The site is in a mainly commercial area with main roads to the front, side and rear residential apartments located nearby, and commercial sites along the street.

2. Noise Policy and Guidance

Noise Policy Statement for England (NPSE)

2.1 The NPSE sets out the Government's policy on noise and includes the long term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

2.2 This long term vision is supported by the following aims:

2.3 Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

2.4 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL (No Observed Effect Level) – this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL (Lowest Observed Adverse Effect Level) – this is the level above which adverse effects on health and quality of life can be detected.

2.5 Extending these concepts further, NPSE leads to the concept of a significant observed adverse effect level:

- SOAEL (Significant Observed Adverse Effect Level) – this is the level above which significant adverse effects on health and quality of life occur.

2.6 NPSE acknowledges that it is not possible to have a single objective noise-based measure that defines NOEL, LOAEL and SOAEL that is applicable to all sources of noise in all situations. It is therefore suggested that more specific advice from other applicable noise standards and guidance could be employed to determine suitable noise level criteria within the overall principles of the NPSE.

National Planning Policy Framework (NPPF)

2.7 The revised NPPF was updated in February 2025 and sets out the government's planning policies for England and how these are expected to be applied. This document replaces the first NPPF published in March 2012 and includes minor clarifications to the revised version published in July 2018, February 2019, July 2021, and 2023.

2.8 Where issues of noise impact are concerned the NPPF provides brief guidance in Chapter 15 '*Conserving and enhancing the natural environment*' as follows:

Paragraph 170:

Planning policies and decisions should contribute to and enhance the natural and local environment by 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 180:

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:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Paragraph 182:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

Planning Practice Guidance (PPG)

2.9 PPG is written in support of the NPPF and provides an increased level of specific planning guidance.

2.10 It suggests that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It is also suggested that noise should not be considered in isolation and separately from issues such as the economic, social and other environmental dimensions of proposed development.

2.11 Local planning authorities' plan-making and decision taking 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.

Technical Guidance

ProPG: Planning and Noise

2.12 Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was published May 2017 by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been produced to provide practitioners with guidance on the management of noise within the planning system in England.

2.13 The guidance focuses on proposed new residential development and existing transport noise sources and reflects the Government's overarching Noise Policy Statement for England (NPSE, the National Planning Policy Framework (NPPF) and Planning Practice Guidance (including PPGN), as well as other authoritative sources of guidance.

2.14 The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

2.15 ProPG provides guidance for the producing an initial site noise risk assessment, pre-mitigation, based on the prevailing daytime and night-time noise levels across the site, from which the site (or areas thereof) can be zoned. The Figure below shows the noise risk assessment criteria taken from Figure 1 of the ProPG.

2.16 ProPG recommends internal and external sound levels in line with those described in BS 8233 and WHO Guidelines.

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

2.17 This British Standard was published in February 2014 and supersedes BS 8233:1999, which is withdrawn.

2.18 This Standard provides guidance for the control of noise in and around buildings and is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

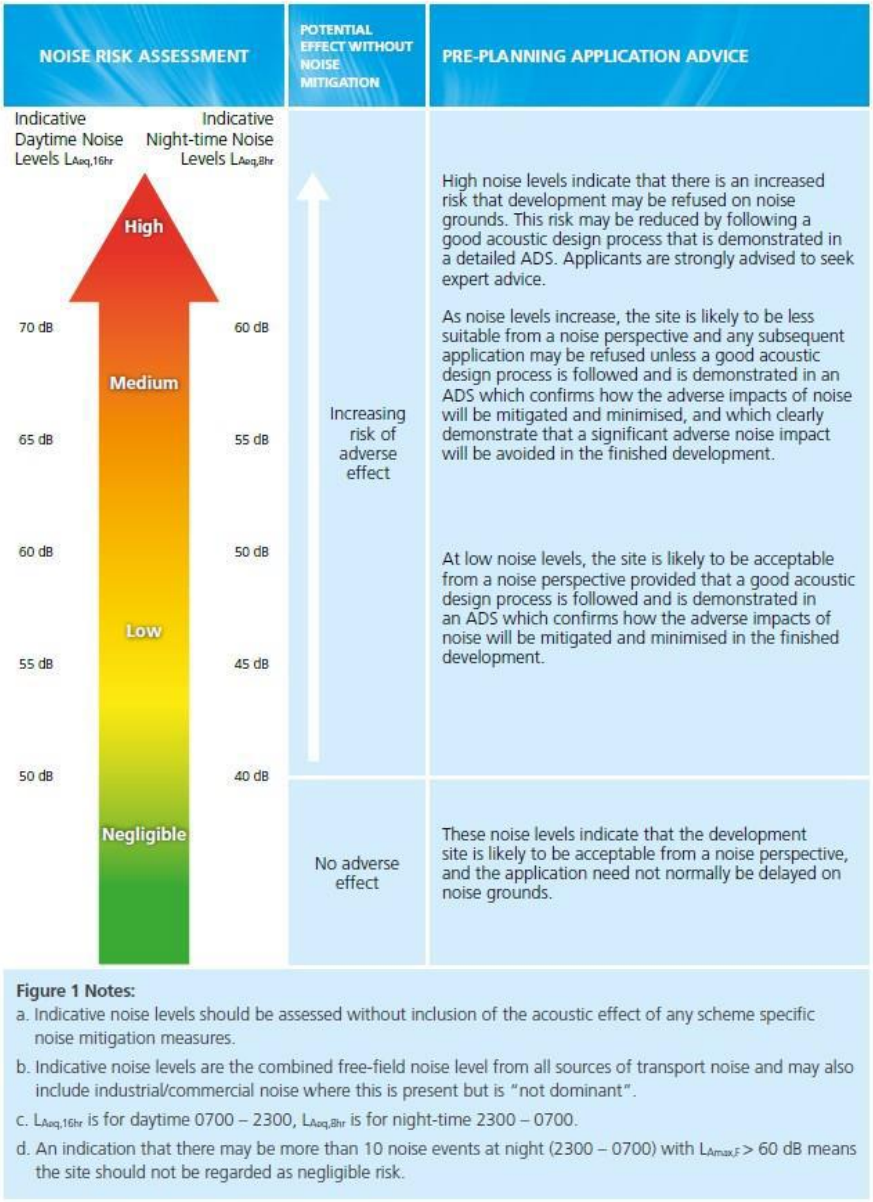

Figure 1 Notes:

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

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

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

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

2.19 For dwellings, the main considerations are:

- for bedrooms, the acoustic effect on sleep; and
- for other rooms, the acoustic effect on resting, listening and communicating.

2.20 It is desirable that the internal ambient noise level does not exceed the following guideline values.

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

2.21 For traditional external areas that are used for amenity space, such as gardens, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

2.22 However, it is also recognized that these external noise guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

2.23 When determining the sound insulation of a building envelope, the requirements should be determined on the basis of the assessment of:

- the level and characteristics of the noise outside the building
- the design noise levels in the rooms and other spaces of the building

2.24 Initial estimates may be obtained using calculations based on single-figure data, however, for detailed noise intrusion calculations to be undertaken, knowledge or assumptions of the following are required.

- Frequency characteristics of the noise source(s).
- Frequency characteristics of the sound reducing elements.
- Surface area of the common construction separating the two areas.
- Reverberation time of the receiving space.

World Health Organisation (WHO)

2.25 The World Health Organisation '*Guidelines for Community Noise*' 1999 aims to provide environmental health authorities and professionals with guidance on the adverse health effects of community noise on people.

2.26 This document presents a summary of research and opinions on the impacts of noise and recommends guideline values for avoidance of particular effects e.g. annoyance and sleep

disturbance. It is the primary reference point for other guidance value based documents, such as BS 8233.

2.27 The following guideline values have been derived according to specific environments. The values relevant to residential development are shown in the table below.

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

2.28 The above values are consistent with those recommended within BS 8233, however unlike BS 8233:2014, the WHO guidelines present a specific guide value for L_{Amax} levels affecting bedrooms. The research suggests that sleep disturbance effects have been observed at individual L_{Amax} exposures of 45 dB or less. Consequently, it is important to limit the number of individual noise events with a L_{Amax} exceeding 45 dB.

AVO: Acoustics, Ventilation and Overheating Residential Design Guide

2.29 The AVO guide recommends an approach to acoustic assessments for residential development that takes into consideration the interdependence of provisions for acoustics, ventilation and overheating. The application of the AVO Guide is intended to demonstrate good acoustic design in accordance with ProPG. A two-stage assessment approach is advised as:

- Stage 1: Site Risk Assessment
- Stage 2: Detailed Assessment of Adverse Effect

2.30 The guide provides a means of assessment to satisfy the need to consider acoustics, ventilation and overheating at the planning stage. It also assists in educating clients, environmental health officers, planning officers and other stakeholders of the interdependence of design for acoustics, ventilation and overheating.

CRTN: Calculation of Road Traffic Noise – 1988

2.31 This document was published by the Department for Transport and the Welsh office in 1988. It sets out the procedures used to calculate noise generated by road traffic. The calculation method is based on various input variables such as traffic speed, road surface and the

percentage of heavy's (HGVs) as well as the site geometry and barrier attenuation. The calculation inputs allow for the LA10, 18hour and LA10, 1hour to be calculated at any given receiver.

2.32 The document also provides methods for measuring the noise produced by road traffic stating three different methodologies. The first, "The Measurement Method" is used for direct measurement of the LA10, 18hour. The second, "The Shortened Measurement Procedure" for measurement of the LA10, 3hour noise level from which the LA10, 18hour and LAeq, 16hour level can be derived. The third method Comparative Measurements' is a procedure to ascertain noise levels from a single road traffic route at various points, where the road traffic on that route is the dominant source. CRTN states that if the Shortened Measurement Procedure is followed, a correction of -1dB can be applied to approximate the LA10,18hour noise level a further subtraction -2dB gives and approximation of the LAeq,16hour.

3. Subjective Impressions

3.1 The noise climate in and around the site is dominated by people chatting and vehicle noise. The site forms part of a mainly commercial area along a main road.

4. Measurement Location

4.1 Noise monitoring equipment for measuring sound levels was set up to capture daytime and night-time noise on 18th and 19th December 2025. The location of the measurement position is shown in Figure 1.

4.2 The data collected during this period has been used to characterise the existing acoustic environment at the proposed development site.

4.3 Measurement and site location are shown in figure 1 below:

Figure 1: Site & Measurement Location

Measurement location M1

Site location

5. Measurement Procedure

5.1 Noise levels were measured from the 18th and 19th December 2025. Full measurement times and durations can be found in **Appendix A**.

6. Measurement Equipment

6.1 Measurements were undertaken using a calibrated, Pulsar N45 class 1 sound level meters. Full equipment details can be found in **Appendix B.**

6.2 Measurements at the monitoring locations were 'free field' (no vertical reflective surfaces within 3.5 metres of the microphone) and at a height of between 1.2 – 1.5 metres above ground level. During all measurements the microphone was protected with an outdoor windshield.

6.3 The calibration level of the meters was checked before and after the survey with a sound calibrator with no variation in the levels observed.

6.4 The sound level meter was set to measure various noise parameters including LAeq and LAmax values using a 'fast' time weighting.

6.5 Full calibration details can be found in **Appendix C**.

7. Weather Conditions

7.1 Weather conditions were deemed acceptable for noise measurement. Full meteorological conditions are detailed in **Appendix D**.

CRTN: Calculation of Road Traffic Noise Assessment

8. Noise Survey

8.1 A noise survey at monitoring location M1 was conducted on the 18th and 9th December 2025.

8.2 The traffic noise survey was carried out at the site from location M1 for representative periods of the daytime and night/early morning. The traffic noise monitoring was carried out for several 15-minute sample periods.

8.3 The measured daytime noise levels have been evaluated in accordance with the 'shortened measurement method' described in the Department of Transport document 'Calculation of Road Traffic Noise' (CRTN), 1988.

8.4 The CRTN shortened measurement method involves taking traffic noise measurements (LA10) over representative sample periods within any three consecutive hours. By using the LA10 (3 hour), as the arithmetic mean of the measured LA10 values, the LA10 (18 hour) value can then be calculated. The LA10 (18 hour) values have then been converted into the equivalent LAeq (16 hour) values using the -2 dB correction that is described in BS 8233:2014.

8.5 The measured night/early morning period LAeq values have been logarithmically averaged to obtain the LAeq (3 hour) night-time value which has been taken as representative of the LAeq(8 hour) night-time value.

8.6 The daytime and night-time road traffic noise exposure levels are shown below (see **Appendix E**).

Location	**Daytime dB LAeq** **(07:00 – 23:00 hrs)**	**Night time dB LAeq** **(23:00 – 07:00 hrs)**
Development property façade M1	68	58

8.7 Peaks of noise from passing vehicles at night was 71 – 76 dB LAmax at Location M1.

8.8 No external amenity spaces are proposed for the development.

9. Noise level Calculations

9.1 Noise intrusion levels with windows have been determined assuming that the insulation provided by a window open.

Parameter	Measured External Free-Field Noise Level at facade	Internal Noise Level with Windows Open for Ventilation	Internal Noise Level with Windows Closed and Vents Open	ProPG Guidance	BS 8233 Classification
Living Space					
Daytime $L_{Aeq,16hr}$ (dB)	68	53	**33**	**Low Risk of Adverse Effects**	**Desirable** (≤35)
Bedrooms					
Daytime $L_{Aeq,16hr}$ (dB)	68	53	**33**	**Low Risk of Adverse Effects**	**Desirable** (≤35)
Bedrooms					
Night-time $L_{Aeq,8hr}$ (dB)	58	43	**23**	**Low Risk of Adverse Effects**	**Desirable** (≤30)
Night-time $L_{Amax(f)}$ (dB)	76	61	**41**	**Low Risk of Adverse Effects**	**Desirable** (≤45)

AVO – Stage 1 Overheating Risk Assessment

9.2 In January 2020 the Acoustics Ventilation and Overheating: Residential Design Guide (AVO) was published by the Association of Noise Consultants. Therefore, the risk of overheating within proposed dwellings can be considered in line with the AVO guide.

9.3 In accordance with AVO, the noise levels across the proposed development site as described in the table above have been compared to the Level 1 risk assessment shown in Table 3.2 of AVO, to establish the potential risk of an overheating condition.

9.4 The table in Section 11 above indicates that site will be subject to a 'Medium' risk of an overheating condition during the daytime during periods of high volumes of traffic. Therefore, mitigation is considered necessary and discussed below.

Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

9.5 The results demonstrate that, with windows open, internal LAeq and LAmax noise levels during the day and night-time within habitable rooms at the facades of the development are expected to exceed the recommended target levels and openable windows cannot therefore be relied upon for ventilation for an extended period.

9.6 The assessment suggests that an alternative means of ventilation is required to provide occupants with the ability to maintain adequate background ventilation rates without having to rely entirely on openable windows. Care should be taken not to confuse a reliance on closed windows to achieve the noise level criteria with the need to have sealed glazing units. Windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

9.7 In situations where there is a reliance on closed windows to meet the guide value, there needs to be an appropriate alternative means of ventilation that does not compromise the façade insulation or the resulting internal noise level. Typically trickle ventilators can be used and sound attenuating types are available.

9.8 The following is a list of manufacturers and suppliers of ventilation products.

Rytons
http://rts.vents.co.uk/blog/products/background-ventilators/

Titon
https://www.titon.com/uk/products/ventilation-systems/window-vents/

R.W.Simon Ltd
https://www.rwsimon.co.uk/products/window-ventilation/

Greenwood
https://www.greenwood.co.uk/window-vents

Internal Noise Levels in Habitable Rooms Facing the Road

9.9 Assuming the use of minimum 35 dB Rw+Ctr rated glazing (10/12/6mm) and 41 dB Dne,w+Ctr acoustic trickle ventilation (Titon Xtra Sound Attenuator V75+C60), daytime road noise would be reduced from 68 dB LAeq,16hr to interior levels of 33 dB LAeq,16hr within habitable rooms facing the road. The assumed standard of construction would place the internal levels in habitable rooms below 35 dB, therefore within the desirable category.

9.10 Assuming the use of minimum 35 dB Rw+Ctr rated glazing (10/12/6mm) and 41 dB Dne,w+Ctr acoustic trickle ventilation (Titon Xtra Sound Attenuator V75+C60), night-time road noise in bedrooms on the 1st/2nd floors would be reduced from 58 dB LAeq,8hr to interior levels 23 dB LAeq,8hr with maximum individual noise events reduced from 76 dB LAFmax to 41 dB LAFmax, therefore within the desirable category.

Noise Levels in External Amenity Areas

9.11 No external amenity areas are provided with this development.

10. Summary

10.1 Noise Assessments Ltd was commissioned with undertaking a Planning Approval Condition for the mixed-use development comprising 3 x separate commercial units (one at basement level and two at ground floor level) and 2 additional self-contained dwellings (two at first floor and two at second floor) with associated extensions and alterations at 640 Oxford Road, Reading, RG30 1EH (herein referred to as the site).

10.2 A noise assessment has been requested to demonstrate current road noise from the three sides does not impact future residents in the new dwellings on the first and second floor.

Road Noise at the Façade, M1

10.3 The daytime and night-time road traffic noise exposure levels are shown below:

Location	**Daytime dB LAeq (07:00 – 23:00 hrs)**	**Night time dB LAeq (23:00 – 07:00 hrs)**
Development property façade M1	68	58

10.4 Peaks of noise from passing vehicles at night was 71 – 76 dB LAmax at Location M1.

10.5 No external amenity spaces are proposed for the development.

10.6 The results demonstrate that, with windows open, internal LAeq and LAmax noise levels during the day and night-time within habitable rooms at the facades of the development are expected to exceed the recommended target levels from time to time and openable windows cannot therefore be relied upon for ventilation for an extended period.

10.7 The assessment suggests that an alternative means of ventilation is required to provide occupants with the ability to maintain adequate background ventilation rates without having to rely entirely on openable windows. Care should be taken not to confuse a reliance on closed windows to achieve the noise level criteria with the need to have sealed glazing units. Windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

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In Summary

10.8 A noise intrusion assessment has demonstrated that, via the adoption of the proposed glazing, ventilation strategy internal noise levels within proposed habitable rooms at the front/side/rear of the site are consistent with the guide values outlined in BS 8233 and by the WHO. Products with higher acoustic performance specifications may be utilised if desired.

10.9 The assessment includes a means of ventilation to provide occupants with the ability to maintain adequate background ventilation rates for heating and cooling without having to rely entirely on openable windows

Appendices

APPENDIX A - Measurement Details				
Measurement	Start Date	Start Time	End Date	End Time
M1	18/12/25	10:30	19/12/25	10:30

APPENDIX B - Equipment Details				
Equipment	Make	Model	Class	Serial Number
Sound Meter	Pulsar	N45	1	1365
Calibrator	Pulsar	PM1	1	011121C

APPENDIX C - Calibration Details					
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	94.0	94.0	0	94.0	0

APPENDIX D - Meteorology Details						
Date	Temp C	Wind Speed m/s*	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
18/12/25	10	2.3	SW	81	0.1	2/8
19/12/25	9	2.5	SW	82	0.0	3/8

APPENDIX E – Traffic Survey Data

M1

Daytime (18/12/25)

Start	**End**	**L_{Amax}**	**L_{A10}**	**L_{Aeq}**	**L_{A90}**
16:00	17:00	84.8	71.2	67.8	58.0
17:00	18:00	77.2	70.2	66.4	55.8
18:00	19:00	77.4	70.1	66.3	56.0

LA10 (3 hr) = 70.5 dB

LA10 (18 hr) = LA10 (3 hr) -1 = 69.5 dB

LAeq (16 hr) = LA10 (18 hr) -2 = 67.5 dB

Night/Early Morning (19/12/25)

Start	**End**	**L_{Amax}**	**L_{A10}**	**L_{Aeq}**	**L_{A90}**
04:00	05:00	76.6	63.7	59.4	47.5
05:00	06:00	73.5	58.7	56.9	45.0
06:00	07:00	79.0	62.1	58.4	45.8

Log Average LAeq = 58.4 dB LAeq(3 hr)

APPENDIX F – BS8233 Rigorous Design Calculation example

BS8233:2014 Specification Calculation Summary

Bedroom - night time

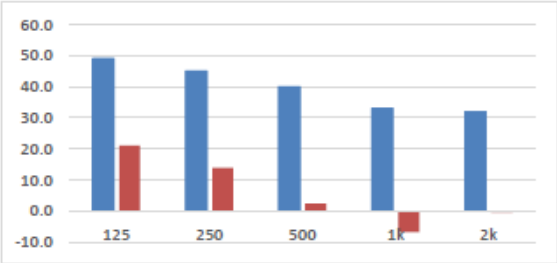
Room Properties

Room Width (m)	3.0
Room Depth (m)	4.0
Room Height (m)	2.4
Glazed Area (m^2)	1.8
Is dwelling within roof?	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	26	27	34	40	38
Vents, $D_{n,e,w+Ctr}$	34	38	43	42	34

Noise Levels, dB



External Level	42 dB LAeq
Internal Level	9 dB LAeq
Insertion Loss	33 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	32	dB R_{W+Ctr}	Double Glazing *10/12/6mm*
Ventilation	40	$D_{n,e,w+Ctr}$	Acoustically treated trickle vent *Titon Xtra Sound Attenuator V75+C50*

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000553	0.00022	7E-05	8.8E-05	0.00055
Term 2	0.000628	0.0005	1E-04	2.5E-05	4E-05
Term 3	5.96E-05	2.4E-05	2.4E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	21.1	13.8	2.4	-6.8	-0.5
Internal, dB LAeq	5.0	5.2	-0.8	-6.8	0.7

Façade Components

Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Acoustically treated trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$\left(A_{\ldots}\ldots^{\frac{-D_{n,e}}{\ldots}}\ S_{\ldots}\ldots^{\frac{-R_{w}}{\ldots}}\ S_{\ldots}\ldots^{\frac{-R_{w}}{\ldots}}\ S\ldots^{\frac{-R_{w}}{\ldots}}\right)\ldots\left(S\right)$$

Suitable systems gives as reference only. Other products that achieve the required sound insulation values are available.

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources [Note 1] relating to overheating condition

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,T}$ [Note 3] during 07:00 - 23:00 / $L_{Aeq,8hr}$ during 23:00 - 07:00 High: 65 dB / 55 dB Medium: 60 dB / 50 dB Low: 55 dB / 45 dB Negligible: 50 dB	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines [23].

Note 4 Refer also to references [1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.

Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

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

APPENDIX G Terminology and Definitions

Noise
Sound only becomes noise (often defined as 'unwanted sound' or sound that is considered undesirable or disruptive) when it causes or contributes to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance.

Acoustic Environment
Sound from all sound sources as modified by the environment.

Equivalent continuous A-weighted sound pressure level LAeq,T

Value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval T, has the same mean square sound pressure as a sound under consideration whose level varies with time.

A-weighting
The human ear is most sensitive to frequencies in the range 1 kHz to 5 kHz. On each side of this range the sensitivity falls off. A-weighting is used in sound level meters to replicate this sensitivity and respond in the same way as the human ear.

Octave Band
Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.

Maximum Sound Pressure Level LAmax,T
Highest value of the A-weighted sound pressure level with a specified time weighting that occurs during a given event or measuring period.

The LA10,T Sound Level
The A-weighted sound pressure that is exceeded for 10% of a given time interval, T. It is often used to evaluate road traffic noise.

The LA90,T Sound Level
The A-weighted sound pressure that is exceeded for 90% of a given time interval, T, measured using time weighting F. It is often referred to as the background noise level and which might in part be an indication of relative quietness at a given location

Free-field Level
The sound pressure level away from reflecting surfaces.
NOTE Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the

measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Façade Level
The sound pressure level 1 m in front of the façade.
NOTE Facade level measurements of LpA are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.

Indoor Ambient Noise
Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants.

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