

J O S T E C
BUILDING REGULATIONS COMPLIANCE SERVICES

REPORT TITLE: BS8233:2014 ASSESSMENT OF PROPOSED DEVELOPMENT AT 58 KINGS ROAD,
READING RG1 3AA

REPORT REFERENCE: 25480-02

ISSUED TO: THE KEEN PARTNERSHIP

ISSUED BY: ANTONIO MARIA GRANIERI

DATE: 13 October 2025

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1.0 Introduction

- 1.01 JosTec has been commissioned to undertake a noise impact survey and assessment for the proposed change of use of the first, second, and loft floors of 58 Kings Road, Reading RG1 3AA from Class E (office use) to Class C3 (residential use) to create three self-contained flats.
- 1.02 The purpose of this report is to support the client's planning application for said development by assessing internal noise levels in accordance with the British Standard BS8233:2014.
- 1.03 The methodologies used for this assessment will be BS8233:2014 as this is for a proposed new residential development within the designated area.
- 1.04 The report will look at the measured external and resulting internal noise levels in accordance with the BS8233:2014 standard.

2.0 Development Description

- 2.0.1 The proposed development is located on 58 Kings Road, Reading RG1 3AA. The site is situated in a mixed commercial and residential area.
- 2.0.2 The site is bounded by:
- Kings Road to the north
 - The river Kennet and a parking lot to the south on the other side of the river (approx. 50m away from the site) and Queens Road (approx. 110m away from the site)
 - residential properties to the east (adjacent to site)
 - residential and commercial properties and a church to the west (adjacent to site)
- 2.0.3 The main noise source likely to disrupt the inhabitants of the proposed conversion is the traffic along Kings Road and parking lot activities.

2.1 Locations of Monitors

- 2.1.1 Two Type 1 sound level meters were installed at the first floor windows to the front and rear of the existing 58 Kings Road building. The sound level meters were fixed to their own tripods and were extended outside of the windows, with the capsules of the sound level meters overlooking Kings Road to the front and the parking lot to the rear.
- 2.1.2 The sound level meters were installed on the 19th of August 2025 and started measuring at 13:34 at the front and at 13:04 at the rear. The sound level meters were collected on the 20th of August 2025, after stopping the measurement at 13:24 at the front and at 13:29 at the rear.
- 2.1.3 Figure 1 and Figure 2 show where the monitors were installed at the front and rear respectively, and Figure 3 shows such locations on an aerial view from online maps. Figure 4 shows a general site plan of the proposed development.

Figure 1 - Noise Monitor Location 1 - Front



Figure 2 - Monitoring Location 2 - Rear



- 2.1.4 Measurements were made in 15 minute periods, on 1 second averaging, to allow for the removal of anomalies and increased accuracy. The data was averaged into $L_{Aeq\ 16hr}$ daytime and $L_{Aeq\ 8hr}$ night-time with data also recorded for L_{Amax} in both day and night periods for the BS8233:2014 assessment.
- 2.1.5 The monitoring was conducted using 1x Type 1 Svantek SV971A sound level meter and outdoor microphone protection at the front, and 1x Type 1 Svantek SV307 sound level meter and outdoor microphone protection at the rear.

- 2.1.6 The measurements were taken by a fully qualified engineer with MIOA status with the institute of Acoustics.
- 2.1.7 All measurements were taken after a field calibration was undertaken to ensure accuracy and repeatability of measurements.
- 2.1.8 Further data such as wind speed, wind direction, rainfall intensity, temperature and cloud cover were all recorded at the beginning and end of the assessment at the monitoring location.
- 2.1.9 Any anomalies (such as noise by the engineer during setup and collection of the kit) were removed from the survey for a true reflection of the ambient levels in the vicinity. This was done by recording audio throughout the survey at each location and listening back through the files during the analysis process to confirm what was recorded manually during the survey.

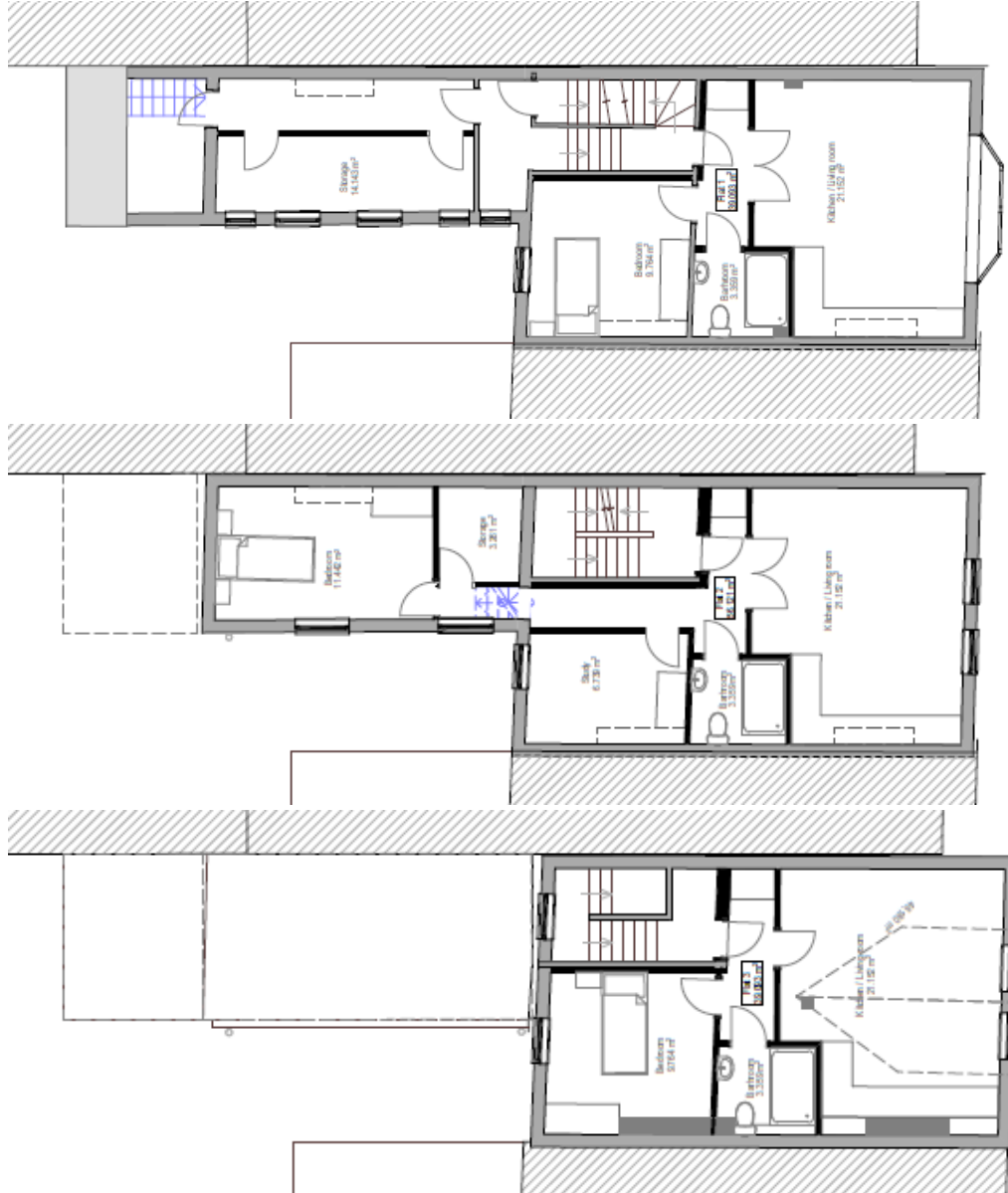
2.2 Plan Views of Site with Designated Work Areas

Figure 3 - Site Location



2.3 Proposed Site Layout

Figure 4 - Site Plans – First to Third Floor



3.0 Noise Assessment Criteria

3.1 National Legislation & British Standards

- 3.1.1 The National Planning Policy Framework dated 2024 (NPPF) sets out the Government's economic, environmental and social planning policies for England and *"these policies articulate the Government's vision of sustainable development."*

Paragraphs 7 and 8 of the NPPF, Section 2 – Achieving Sustainable Development, states the following:

"The purpose of the planning system is to contribute to the achievement of sustainable development, including the provision of homes, commercial development and supporting infrastructure in a sustainable manner. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs [...]
Achieving sustainable development means that the planning system has [...] c) an environmental objective – to protect and enhance our natural, built and historic environment; including [...] minimising waste and pollution [...].

Paragraph 11 of the same Section mentions that:

*"Plans and decisions should apply a presumption in favour of sustainable development. For **plan-making** this means that:*
a) all plans should promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects;
b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas⁴), unless:
i. the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type or distribution of development in the plan area; or
ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."

Section 12 – Achieving Well-Designed Places of the NPPF states that:

"131. The creation of high quality, beautiful and sustainable buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how

these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.

132. Plans should, at the most appropriate level, set out a clear design vision and expectations, so that applicants have as much certainty as possible about what is likely to be acceptable. Design policies should be developed with local communities so they reflect local aspirations, and are grounded in an understanding and evaluation of each area's defining characteristics. [...]

135. Planning policies and decisions should ensure that developments:

a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;

b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping; [...]

f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; {...}

137. [...] Applicants should, where applicable, provide sufficient information to demonstrate how their proposals will meet the design expectations set out in local and national policy, and should work closely with those affected by their proposals to evolve designs that take account of the views of the community. Applications that can demonstrate early, proactive and effective engagement with the community should be looked on more favourably than those that cannot.

138. Local planning authorities should ensure that they have access to, and make appropriate use of, tools and processes for assessing and improving the design of development. [...]

139. Development that is not well designed should be refused, especially where it fails to reflect local design policies and government guidance on design⁵⁴, taking into account any local design guidance and supplementary planning documents such as design guides and codes.

Conversely, significant weight should be given to:

a) development which reflects local design policies and government guidance on design, taking into account any local design guidance and supplementary planning documents such as design guides and codes; and/or

b) outstanding or innovative designs which promote high levels of sustainability, or help raise the standard of design more generally in an area, so long as they fit in with the overall form and layout of their surroundings.

140. Local planning authorities should ensure that relevant planning conditions refer to clear and accurate plans and drawings which provide visual clarity about the design of the development, and are clear about the approved use of materials where appropriate. This will provide greater certainty for those implementing the planning permission on how to comply with the permission and a clearer basis for local planning authorities to identify breaches of planning control. Local planning authorities should also seek to ensure that the quality of approved development is not materially diminished between permission and completion, as a result of changes being made to the permitted scheme (for example through changes to approved details such as the materials used)."

In respect of noise, Paragraph 187 of the NPPF states the following:

"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 goes on to mention:

"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;"

3.1.2 The NPPF reinforces the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"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."*

3.1.3 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"[...] all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

3.1.4 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation (WHO) "Guidelines for Community Noise" contain such guidelines.
- Another method is to compare the resultant noise level against the background noise level (LA90) of the area. This is the method employed by BS 4142:2014 to determine the likelihood of complaint from noise of an industrial nature. It is best suited to the assessment of steady or pseudo-steady noise.

BS8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

3.1.5 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

3.1.6 The WHO guideline values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. The WHO/BS 8233 guideline noise values are summarised in Table 1:

Table 1 - Guideline Noise Values

Guidance Document	L _{AeqT}	L _{AMax}	Outcome
World Health Organisation "Community Noise 2000"	55dB		Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	50dB		Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	35dB		Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	30dB		Sleep disturbance, night-time (indoors)
		60dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
		45dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)
BS 8233:2014 "Sound Insulation and noise reduction for buildings"	55dB		Upper limit for external steady noise. (gardens and patios).
	50dB		Desirable limit for external steady noise. (gardens and patios).
	L _{Aeq} 16 hours = 35 dB		Resting, living room day. (Internal – steady noise)
	L _{Aeq} 16 hours = 40 dB		Dining, dining room day. (Internal – steady noise)
	L _{Aeq} 16 hour = 35 dB		Sleeping, bedroom day (Internal – steady noise)
	L _{Aeq} 8 hours = 30 dB		Sleeping, bedroom night (Internal – steady noise)

3.1.7 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. All surveys are conducted on 1 hour daytime and 15 minute night values – based on 1 second readings on a Type 1 sound level meter. The readings are taken every 5 mins for noise to allow the elimination of erroneous data if required.

3.1.8 The WHO guidelines are also concerned with the L_{Amax} for night-time sleep disturbance. The guideline states:

“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night”

3.1.9 On this basis, for the purpose of assessing night-time L_{Amax} noise events, it is considered appropriate to adopt the 10th highest L_{Amax} noise event occurring in a typical night-time (23:00 – 07:00) period.

3.1.10 Audio recordings are taken throughout the measurements to allow for further assessments on high levels. Listening to the audio and performing tonal analysis will allow anomalies to be removed from the data, if required.

3.2 Local Policies

Reading Borough Council – Reading Borough Local Plan (Adopted November 2019)

3.2.1 With regards to noise, Policy CC8: Safeguarding Amenity of the Reading Borough Local Plan (2019), states that:

*“Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:
[...]
Noise and disturbance; [...]”*

3.2.2 Additionally, Policy EN16: Pollution and Water Resources clearly states that:

“Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution; where it would result in no deterioration in, or ideally enhance, ground and surface water quality; and where adequate water resources, sewerage and wastewater treatment infrastructure will be in place to support the proposed development prior to occupation. Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.”

3.2.3 For new residential developments in central Reading, Policy CR6: Living in Central Reading further explains that:

"Proposals for residential development within the central area will be assessed against the following criteria:

[...]

ii) Proposals for new residential development within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable levels of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated."

4.0 Results

4.1 Noise Assessment

4.1.1 Table 2 below presents measured noise levels at the monitoring locations. Figure 5 and Figure 6 present the entire baseline noise levels obtained at the front and rear monitoring locations respectively. Weather conditions at the time of installation and collection are presented in Table 3. The main noise source was road traffic noise on Kings Road to the front and rear of the property.

Table 2 - Baseline Noise Monitoring Results

Noise Monitoring Location	L _{Aeq} , 16hr	L _{Aeq} , 8hr	L _{Amax} (10th highest)	L _{A90} , 16hr	L _{A90} , 8hr
Front					
Day	64.5 dBA	-	-	54.8 dBA	-
Night	-	58.2 dBA	78.6 dBA	-	41.9 dBA
Rear					
Day	50.5 dBA	-	-	46.1 dBA	-
Night	-	45.9 dBA	62.3 dBA	-	40.8 dBA

Figure 5 – Baseline Noise Data - Front

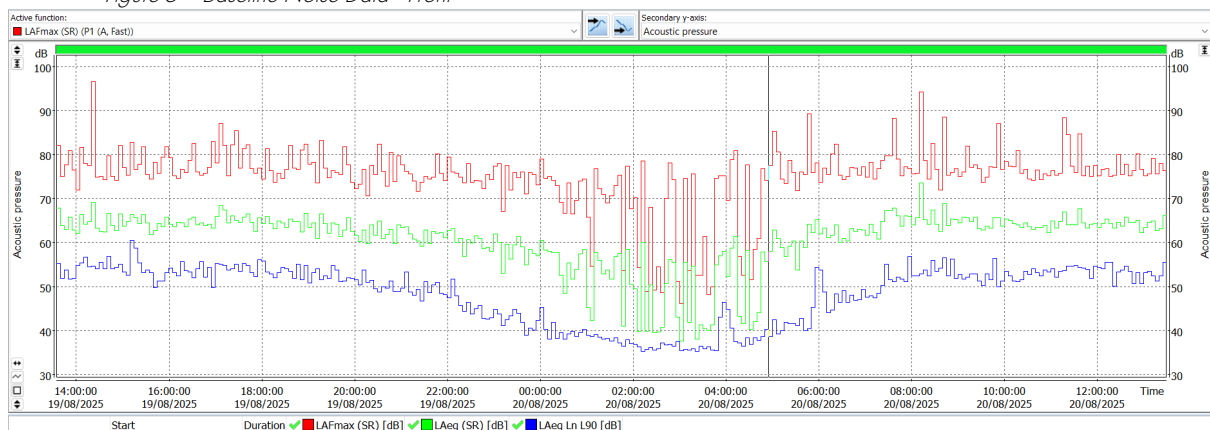


Figure 6 - Baseline Noise Data - Rear

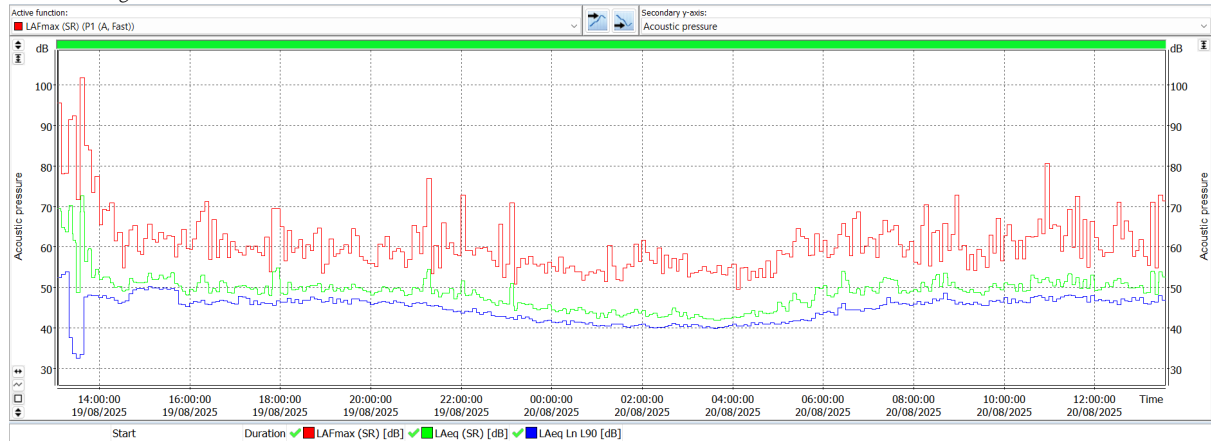


Table 3 - Weather Conditions

Day/Time	Cloud Cover	Temperature (Celsius)	Prescence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
Installation	Medium	23	No	5-6	NE
Collection	Low	20	No	5-6	NNE

4.2 Comparison of Results to BS8233

Table 4 - Comparison of Results to BS8233

	L_{AeqT} (16hr Day & 8hr Night)	L_{Amax}	BS8233 & WHO Internal noise	BS8233 & WHO External Noise	Difference to L_{Aeq} (internal/external)	Difference to Max (internal)
Front – Kitchens/Living Rooms						
Day (0700-2300)	65dBA	-	35dBA	55dBA	(+30dBA/+10dBA)	-
Rear – Bedrooms						
Day (0700-2300)	51dBA	-	35dBA	55dBA	(+16dBA/-4dBA)	-
Night (2300-0700)	46dBA	62dBA (10 th Highest)	30dBA (45dBA L_{Amax})	(60dBA L_{Amax})	(+16dBA)	(+17dBA)

5.0 Observations and Further Discussions

- 5.0.1 The measured L_{Aeq} values for both the day and the night periods are shown in Table 4.
- 5.0.2 The day period at the front of proposed development is 30dBA above the daytime levels in accordance with BS8233:2014. Only the daytime levels are assessed as the proposed development will have kitchens and living rooms at the front.
- 5.0.3 The day period at the rear of the proposed development, where the proposed bedrooms will be, is 16dB above the daytime levels in accordance with BS8233:2014. The night value at the proposed development is 16dBA above the recommended value for internal noise to prevent sleep disturbance.
- 5.0.4 BS8233 assumes that a standard double-glazed window will provide up to 15dB reduction when open (with some council guidelines leaning on the side of caution and assuming a 10dB reduction) and up to 30dB reduction when closed.
- 5.0.5 Based on the above, the criteria for good living and resting conditions specified in BS8233 would not be achieved with an open, double-glazed window. They would however be achieved with standard double-glazed windows when kept closed.
- 5.0.6 Double-glazed windows in the building cannot be relied upon as the only source of ventilation without the chance of sleep disturbance being had by the inhabitants of the proposed dwellings to the front of the building. Trickle/acoustic vents will therefore be required at the front of the property to avoid the need to open windows to ventilate.
- 5.0.7 The L_{AMax} value to prevent the likelihood of sleep disturbance is set at 60dBA external and 45dBA internal. Based on the highest value from the tenth-highest daily value measured during the monitoring period, the reading for L_{AMax} night was 62dBA at the rear of the proposed development. This value is 2dB above the required value externally for sleep disturbance.

6.0 Glazing, Structural and Ventilation Recommendations

6.1 External Walls

- 6.1.1 External walls of the proposed building are understood to be traditional 9" brick and block with cavity.
- 6.1.2 Table 5 shows the Sound Reduction Index (R, dB) in 1/1 octave band values for the external walls and roof construction.

Table 5 - Sound Reduction Index for Walls

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index R dB					
	125	250	500	1k	2k	4k
Traditional solid 9" brick & block with cavity	47	47	49	59	69	79
Roof	29	45	52	57	58	63

6.2 Glazing

- 6.2.1 Based on the external measured noise data presented in Table 4, any double-glazing of typically $\geq R_w 30\text{dB}$ would achieve suitable sound insulation performance. Table 6 presents an example product for noise reduction.

Table 6 - Glazing Options

Description	Octave Band Centre Frequency (Hz)						Rw (C; Ctr)	Rw+Ctr
	Sound Reduction Index R dB							
	125	250	500	1k	2k	4k		
Front – Pilkington 6 mm / (16 mm Krypton) / 4 mm	29	30	44	51	49	51	37 (-2;-6)	31dB
Rear - Pilkington 4 mm / (6-16 mm) / 4 mm	21	17	25	35	37	31	29 (-1;-4)	25dB

6.3 Ventilation

- 6.3.1 It is anticipated that a basic ventilation system will be needed to be incorporated into the scheme design to reduce the impact of the $L_{A_{Max}}$ levels, such that residents of the properties are able to have background ventilation without necessarily needing to open windows. Example product details are shown in Table 7.

Table 7 - Standard Trickle Vent Sound Reduction Index

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index $D_{n,e}$ dB					
	125	250	500	1k	2k	4k
Front – DucoMax acoustic trickle ventilator $\geq D_{n,e,w}$ 45dB	32	34	41	50	42	40
Rear - Standard non-acoustic trickle ventilator typically $\geq D_{n,e,w}$ 30dB	30	30	30	30	30	28

6.4 BS8233 Calculations – First Floor

Bedroom

6.4.1 The bedroom at the first floor will not be directly exposed to external noise via the roof. The calculations do not consider any roof element in the assessment, as there will be rooms above which will effectively shield the space from direct external noise ingress.

6.4.2 Therefore, the below shows the daytime BS8233 calculations including the proposed external wall, standard non-acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	53	51	48	46	40	36
Dn,e	30	30	30	30	30	28
$(A0/S) \cdot 10^{(-Dn,e/10)}$	0.0004	0.0004	0.0004	0.0004	0.0004	0.000633957
Rwi	21	17	25	35	37	31
$(Swi/Sf) \cdot 10^{(-Rwi/10)}$	0.001191492	0.002992893	0.000474342	4.74342E-05	2.99289E-05	0.000119149
Rew	47	47	49	59	69	79
$(Sew/Sf) \cdot 10^{(-Rew/10)}$	1.69597E-05	1.69597E-05	1.07009E-05	1.07009E-06	1.07009E-07	1.07009E-08
$10\log(B+C+D+E)$	-28	-25	-31	-33	-34	-31
A (furnished)	11	14	16	16	15	14
$10\log(S/A)$	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	31.6	31.8	22.4	17.5	11.6	10.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	15.6	22.8	19.4	17.5	12.6	11.3
		Overall	Difference			
L _{Aeq,2}		26.1	-			
Limit (day)		35	-8.9			

6.4.3 The below shows the night-time BS8233 calculations including the proposed external wall, standard non-acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the night.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	48	46	43	42	34	31
Dn,e	30	30	30	30	30	28
(A0/S)*10 [^] (-Dn,e/10)	0.0004	0.0004	0.0004	0.0004	0.0004	0.000633957
Rwi	21	17	25	35	37	31
(Swi/Sf)*10 [^] (-Rwi/10)	0.001191492	0.002992893	0.000474342	4.74342E-05	2.99289E-05	0.000119149
Rew	47	47	49	59	69	79
(Sew/Sf)*10 [^] (-Rew/10)	1.69597E-05	1.69597E-05	1.07009E-05	1.07009E-06	1.07009E-07	1.07009E-08
10log(B+C+D+E)	-28	-25	-31	-33	-34	-31
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	26.6	26.8	17.4	13.5	5.6	5.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	10.6	17.8	14.4	13.5	6.6	6.3
		Overall	Difference			
L _{Aeq,2}		21.2	-			
Limit (night)		30	-8.8			
MAX		45	-23.8			

Kitchen/Living Room

- 6.4.4 The kitchen and living rooms at the first floor will not be directly exposed to external noise via the roof. The calculations do not consider any roof element in the assessment, as there will be rooms above which will effectively shield the space from direct external noise ingress. As the BS8233 standard does not provide internal noise level criteria for living rooms and dining rooms during the night-time, only the daytime has been assessed.
- 6.4.5 The below shows the daytime BS8233 calculations including the proposed external wall, acoustic trickle ventilators and the Pilkington 6 mm / (16 mm Krypton) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	63	62	62	61	57	50
Dn,e	32	34	41	50	42	40
(A0/S)*10 [^] (-Dn,e/10)	0.000252383	0.000159243	3.17731E-05	0.000004	2.52383E-05	0.00004
Rwi	28.7	29.5	44.4	51.3	49.4	51
(Swi/Sf)*10 [^] (-Rwi/10)	0.000202344	0.000168303	5.44617E-06	1.11197E-06	1.72223E-06	1.19149E-06
Rew	47	47	49	59	69	79
(Sew/Sf)*10 [^] (-Rew/10)	1.69597E-05	1.69597E-05	1.07009E-05	1.07009E-06	1.07009E-07	1.07009E-08
10log(B+C+D+E)	-33	-35	-43	-52	-46	-44
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	36.3	32.9	23.7	13.8	16.5	11.7
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	20.3	23.9	20.7	13.8	17.5	12.7
		Overall	Difference			
L _{Aeq,2}		27.6	-			
Limit (day)		35	-7.4			

6.5 BS8233 Calculations – Second Floor

Bedroom

- 6.5.1 The below shows the daytime BS8233 calculations including the proposed external wall, standard non-acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	53	51	48	46	40	36
Dn,e	30	30	30	30	30	28
(A0/S)*10 ⁻¹ (-Dn,e/10)	0.0004	0.0004	0.0004	0.0004	0.0004	0.00063396
Rwi	21	17	25	35	37	31
(Swi/Sf)*10 ⁻¹ (-Rwi/10)	0.00119149	0.00299289	0.00047434	4.7434E-05	2.9929E-05	0.00011915
Rew	47	47	49	59	69	79
(Sew/Sf)*10 ⁻¹ (-Rew/10)	1.696E-05	1.696E-05	1.0701E-05	1.0701E-06	1.0701E-07	1.0701E-08
Rrr	29	45	52	57	58	63
(Srr/Sf)*10 ⁻¹ (-Rrr/10)	0.00188839	4.7434E-05	9.4644E-06	2.9929E-06	2.3773E-06	7.5178E-07
10log(B+C+D+E)	-25	-25	-30	-33	-34	-31
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	35.0	31.9	22.5	17.5	11.6	10.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	19.0	22.9	19.5	17.5	12.6	11.3
		Overall	Difference			
	L _{Aeq,2}	26.5	-			
	Limit (day)	35	-8.5			

- 6.5.2 The below shows the night-time BS8233 calculations including the proposed external wall, standard non-acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the night.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	48	46	43	42	34	31
Dn,e	30	30	30	30	30	28
(A0/S)*10 ⁻¹ (-Dn,e/10)	0.0004	0.0004	0.0004	0.0004	0.0004	0.00063396
Rwi	21	17	25	35	37	31
(Swi/Sf)*10 ⁻¹ (-Rwi/10)	0.00119149	0.00299289	0.00047434	4.7434E-05	2.9929E-05	0.00011915
Rew	47	47	49	59	69	79
(Sew/Sf)*10 ⁻¹ (-Rew/10)	1.696E-05	1.696E-05	1.0701E-05	1.0701E-06	1.0701E-07	1.0701E-08
Rrr	29	45	52	57	58	63
(Srr/Sf)*10 ⁻¹ (-Rrr/10)	0.00188839	4.7434E-05	9.4644E-06	2.9929E-06	2.3773E-06	7.5178E-07
10log(B+C+D+E)	-25	-25	-30	-33	-34	-31
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	30.3	26.8	17.7	13.4	5.1	5.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	14.3	17.8	14.7	13.4	6.1	6.3
		Overall	Difference			
	L _{Aeq,2}	21.7	-			
	Limit (day)	35	-13.3			

Living Room/Dining Room

- 6.5.3 The kitchen and living rooms at the second floor will not be directly exposed to external noise via the roof. The calculations do not consider any roof element in the assessment, as there will be rooms above which will effectively shield the space from direct external noise ingress. As the BS8233 standard does not provide internal noise level criteria for living rooms and dining rooms during the night-time, only the daytime has been assessed.
- 6.5.4 The below shows the daytime BS8233 calculations including the proposed external wall, acoustic trickle ventilators and the Pilkington 6 mm / (16 mm Krypton) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	63	62	62	61	57	50
Dn,e	32	34	41	50	42	40
(A0/S) * 10 ⁻¹ (-Dn,e/10)	0.000252383	0.000159243	3.17731E-05	0.000004	2.52383E-05	0.00004
Rwi	28.7	29.5	44.4	51.3	49.4	51
(Swi/Sf) * 10 ⁻¹ (-Rwi/10)	0.000202344	0.000168303	5.44617E-06	1.11197E-06	1.72223E-06	1.19149E-06
Rew	47	47	49	59	69	79
(Sew/Sf) * 10 ⁻¹ (-Rew/10)	1.69597E-05	1.69597E-05	1.07009E-05	1.07009E-06	1.07009E-07	1.07009E-08
10log(B+C+D+E)	-33	-35	-43	-52	-46	-44
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	36.3	32.9	23.7	13.8	16.5	11.7
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	20.3	23.9	20.7	13.8	17.5	12.7
		Overall	Difference			
	L _{Aeq,2}	27.6	-			
	Limit (day)	35	-7.4			

6.6 BS8233 Calculations – Third Floor

Bedroom

- 6.6.1 The below shows the daytime BS8233 calculations including the proposed external wall, standard acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	53	51	48	46	40	36
Dn,e	30	30	30	30	30	28
(A0/S)*10*(-Dn,e/10)	0.0004	0.0004	0.0004	0.0004	0.0004	0.00063396
Rwi	21	17	25	35	37	31
(Swi/Sf)*10*(-Rwi/10)	0.00119149	0.00299289	0.00047434	4.7434E-05	2.9929E-05	0.00011915
Rew	47	47	49	59	69	79
(Sew/Sf)*10*(-Rew/10)	1.696E-05	1.696E-05	1.0701E-05	1.0701E-06	1.0701E-07	1.0701E-08
Rrr	29	45	52	57	58	63
(Srr/Sf)*10*(-Rrr/10)	0.00188839	4.7434E-05	9.4644E-06	2.9929E-06	2.3773E-06	7.5178E-07
10log(B+C+D+E)	-25	-25	-30	-33	-34	-31
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	35.0	31.9	22.5	17.5	11.6	10.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	19.0	22.9	19.5	17.5	12.6	11.3
		Overall	Difference			
L _{Aeq,2}		26.5	-			
Limit (day)		35	-8.5			

6.6.2 The below shows the night-time BS8233 calculations including the proposed external wall, standard acoustic trickle ventilators and the Pilkington 4 mm / (6-16 mm) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the night.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	48	46	43	42	34	31
Dn,e	30	30	30	30	30	28
(A0/S)*10*(-Dn,e/10)	0.0004	0.0004	0.0004	0.0004	0.0004	0.00063396
Rwi	21	17	25	35	37	31
(Swi/Sf)*10*(-Rwi/10)	0.00119149	0.00299289	0.00047434	4.7434E-05	2.9929E-05	0.00011915
Rew	47	47	49	59	69	79
(Sew/Sf)*10*(-Rew/10)	1.696E-05	1.696E-05	1.0701E-05	1.0701E-06	1.0701E-07	1.0701E-08
Rrr	29	45	52	57	58	63
(Srr/Sf)*10*(-Rrr/10)	0.00188839	4.7434E-05	9.4644E-06	2.9929E-06	2.3773E-06	7.5178E-07
10log(B+C+D+E)	-25	-25	-30	-33	-34	-31
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	30.3	26.8	17.7	13.4	5.1	5.3
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	14.3	17.8	14.7	13.4	6.1	6.3
		Overall	Difference			
L _{Aeq,2}		21.7	-			
Limit (day)		35	-13.3			

Living Room/Dining Room

6.6.3 As the BS8233 standard does not provide internal noise level criteria for living rooms and dining rooms during the night-time, only the daytime has been assessed.

6.6.4 The below shows the daytime BS8233 calculations including the proposed external wall, acoustic trickle ventilators and the Pilkington 6 mm / (16 mm Krypton) / 4 mm glazing solution with the measured 1/1 octave band values obtained during the day.

BS8233:2014 - Table G.2 The calculation of the noise level inside a room						
Term from Equation (G.1)						
	Octave band centre frequency (Hz)					
	125	250	500	1000	2000	4000
Leq,ff	63	62	62	61	57	50
Dn,e	32	34	41	50	42	40
(A0/S)*10*(-Dn,e/10)	0.00025238	0.00015924	3.1773E-05	0.000004	2.5238E-05	0.00004
Rwi	125	250	500	1000	2000	4000
(Swi/Sf)*10*(-Rwi/10)	4.7434E-14	1.5E-26	1.5E-51	1.5E-101	1.5E-201	0
Rew	47	47	49	59	69	79
(Sew/Sf)*10*(-Rew/10)	1.696E-05	1.696E-05	1.0701E-05	1.0701E-06	1.0701E-07	1.0701E-08
Rrr	29	45	52	57	58	63
(Srr/Sf)*10*(-Rrr/10)	0.00188839	4.7434E-05	9.4644E-06	2.9929E-06	2.3773E-06	7.5178E-07
10log(B+C+D+E)	-27	-37	-43	-51	-46	-44
A (furnished)	11	14	16	16	15	14
10log(S/A)	3.6	2.5	1.9	1.9	2.2	2.5
Leq,2	42.9	31.0	24.1	15.0	16.6	11.6
A-weighting dB	-16	-9	-3	0	1	1
Leq,2 + A-weighting	26.9	22.0	21.1	15.0	17.6	12.6
		Overall	Difference			
LAeq,2		29.5	-			
Limit (day)		35	-5.5			

7.0 Further Discussion and Conclusion

7.0.1 Based on the calculations shown in paragraphs 6.4, 6.5 and 6.6, it is considered that the proposed development will meet the regulations for acoustic performance in accordance with BS8233:2014 for both day and night-time, with the proposed external wall and roof build, and with the use of the double-glazing and acoustic trickle ventilation suggested in Section 6.

8.0 Credentials

Name	Title	Credentials
Antonio Maria Granieri MSc, BA(Hons)	Senior Acoustic Consultant	Member of the Institute of Acoustics
Signed		

Appendix A – Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_x	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A – weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

Appendix B - Noise Survey Instrumentation

Type	Manufacturer	Model	Serial Number
SLM	Svantek	SV307	100911
Microphone		ST30	78375
Calibrator		SV33B	109969

Type	Manufacturer	Model	Serial Number
SLM	SvanTek	SV971	147728
Microphone		ST30	148354
Calibrator		SV33B	109969