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Environmental Noise Survey

Prepared: 1st December 2025

Report No	23045-1-R5
Client	Bloor Homes (South Midlands)
Site	Land off Stow Road Kimbolton Huntingdon

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1. Quality Management

Report Number	23045 – 1-R5
Issue	Revision 5
Prepared	1st December 2025
Prepared By	Jonathan Seiffert BSc, MIOA
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3. Executive Summary

3.1.1. An environmental noise assessment has been carried out for a proposed residential development at Land off Stow Road, Kimbolton, Huntingdon ("Proposed Development").

3.2. Measurement, Assessment and Evaluation

3.2.1. The survey was carried out to BS7445-1:2003[1] and BS7445-2:1991[2].

3.3. Scope

3.3.1. This report covers all aspects of the noise survey, including:

- the identification of acoustic design criteria;
- an objective sound pressure level survey of the existing site;
- analysis of the data; and,
- the design of any mitigation to meet the required internal noise criteria.

3.4. Conclusions Summary

Internal Guideline Noise Assessment

3.4.1. The facade sound insulation required to meet the guideline values from BS8233:2014 are summarised in Table 1. The glazing performance has been specified in terms of the road traffic corrected weighted sound reduction index, $R_w + C_{tr}$, and the ventilator performance has been specified in terms of the road traffic corrected element normalised level difference $D_{ne,w} + C_{tr}$.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$	29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$
Specification 2	
27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$	27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$

Table 1 – Required facade sound insulation (Glazing/Ventilator)

3.4.2. In this situation, to meet the recommended internal ambient noise criteria, windows will need to remain closed; therefore, an alternative means of ventilation has been provided in accordance with BS8233:2014. It should be noted that this does not mean windows are fixed shut; they can be opened at the occupant's discretion, for purposes such as rapid or purge ventilation or personal preference.

3.4.3. Additionally, an assessment has been carried out in accordance with the Institute of Acoustics (IOA) Guidance to demonstrate compliance with the noise requirements specified in ADO. The findings indicate that bedrooms facing away from the road are likely to meet the noise requirements with windows open during sleeping hours (23:00–07:00). However, for bedrooms facing or overlooking the road, the predicted sound pressure levels are >50 dBA, suggesting it is unlikely the internal noise requirements will be achieved with windows open.

External Amenity Area Noise Assessment

3.4.4. The proposed layout for the development ensures that most garden areas can achieve the recommended guideline values in BS8233, with dwellings set back from the main noise sources and gardens effectively screened. For garden areas where the guideline values are predicted to be exceeded, acoustic screening measures have been recommended to reduce sound pressure levels, ensuring that the guideline values can be achieved. A noise barrier specification has also been provided to ensure that noise is effectively mitigated.

[1] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Description of quantities and procedures"
[2] BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

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5. Background

5.1. Noise Policy Statement for England

5.1.1. The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

5.1.2. This long-term vision is supported by the following aims; 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;
- Where possible, contribute to the improvement of health and quality of life.

5.1.3. The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

5.2. National Planning Policy Framework

5.2.1. The National Planning Policy Framework (NPPF) was published on the 27th of March 2012 and is regularly updated; it sets out the Government's planning policies for England and how these are expected to be applied. The framework states that the planning system should contribute to and enhance the natural and local environment by:

> *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability".*

5.2.2. The NPPF requires that new developments be appropriate to their locations such that the effects of pollution on health have been taken into account. Planning policies and decisions should aim to:

1. avoid noise giving rise to significant adverse impacts on health and the quality of life;
2. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development; and,
3. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.

5.2.3. Existing businesses near to proposed development 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.

5.3. National Planning Practice Guidance

5.3.1. The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) which was published on the 29th November 2016 and is regularly updated to reflect the changes made to the NPPF and make it more accessible.[3]

[3] http://planningguidance.communities.gov.uk/

5.3.2. There are a number of factors that determine whether a noise could be a concern to a receptor. These include: the absolute level of the noise and when it occurs, whether it is existing or new to the area, temporal characteristics, spectral content and the acoustic absorption in the area.

Perception	Examples of outcomes	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 (NOAEL)	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
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 (SOAEL)			
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 acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very intrusive	Extensive and regular changes in behaviour and/or an inability 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

Table 2 – Noise exposure hierarchy

5.3.3. It is emphasised in the PPG that the planning process should be used to mitigate and minimise the impact of noise. This could include: engineering the noise sources to be quiet, minimising the impact of noise through layout, using conditions/obligations to restrict activities, mitigating the impact in places where noise is likely to be experienced (e.g. using facade sound insulation).

6. Introduction

6.1.1. An environmental noise survey has been carried out for a proposed residential development at Land off Stow Road, Kimbolton, Huntingdon.

6.2. Proposed Development

6.2.1. An image showing the proposed location and layout of the Proposed Development is given in Figure 1.

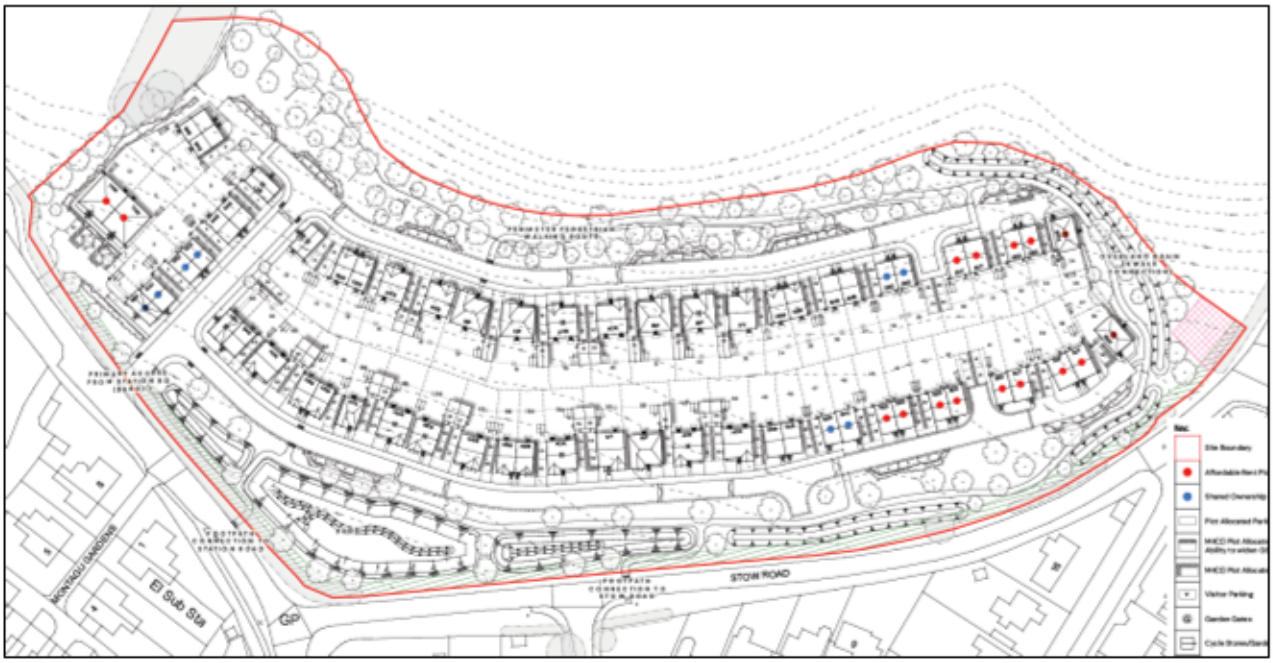


Figure 1 - Plan showing the location and layout of the Proposed Development

7. Assessment Criteria

7.1. Guideline Values

BS8233:2014 Internal Ambient Noise Criteria

7.1.1. BS8233:2014 draws on the results of research and experience to provide information on the design of buildings that have internal acoustic environments appropriate to their function. The standard provides guideline internal values for dwellings for steady external noise sources. These have been summarised in Table 3.

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

Table 3 – BS8233:2014 guideline values for internal ambient noise levels from steady external noise sources

7.1.2. The guideline values are issued by the World Health Organisation (WHO) and assume normal diurnal fluctuations in external noise. They are expected to be achieved based on normal annual data and not in all circumstances. For example, it is normal to exclude occasional events such as fireworks night or New Year's Eve.

BS8233:2014 Garden Criteria

7.1.3. For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In such cases, the lowest practicable levels should be achieved in external amenity areas but the development should not be prohibited.

8. Survey

8.1. Measurement Locations

8.1.1. Fixed position monitoring took place at two positions to account for the likely dominant noise sources. The monitoring equipment was located 1.5m from the ground and at least 3m from the nearest reflecting surface. The monitoring positions are shown in Figure 2.

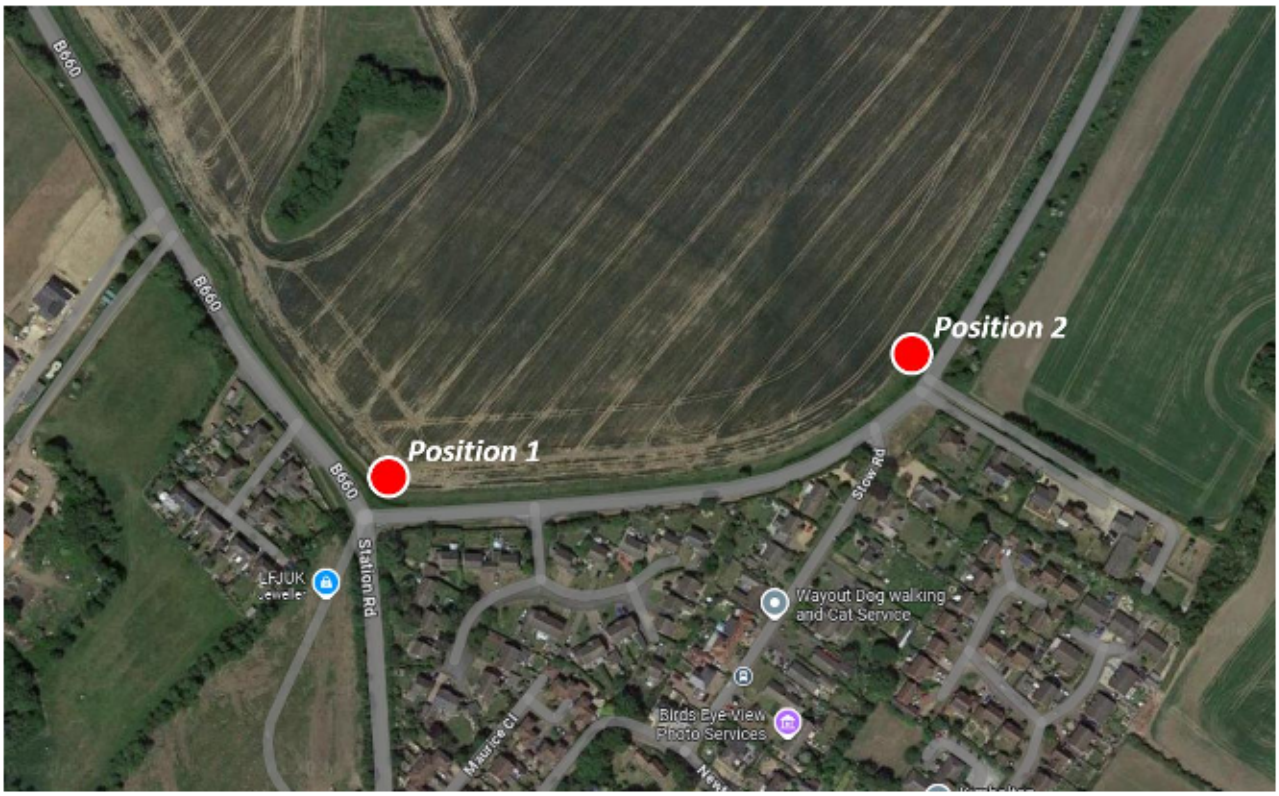


Figure 2 - Noise monitoring locations on site

8.1.2. The measurement instrumentation used during the survey is detailed in the appendix. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003[4] before and after the surveys. The calibration details are also detailed in the appendix.

8.2. Noise Climate

8.2.1. The attending survey technician reported that, at the time of the survey visits, the noise climate was dominated by road traffic noise from Station Road (B660) and Stow Road.

8.3. Meteorology

8.3.1. During the survey the weather information was noted. This is summarised in Table 4.

	24th October 2024	27th October 2024
Roads(Wet/Dry)	Dry	Dry
Wind Speed (ms^{-1})/Direction	4 / S	3 / W

Table 4 - Meteorological data noted during the survey

[4] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures"

8.4. Measurement and Timescale

8.4.1. Unattended noise monitoring was carried out between 24th October 2024 and 27th October 2024. The measurements that have been made are summarised in Table 5.

Monitoring position	Date	Type	Quantity
1	24th October 2024 – 27th October 2024	Fixed/unattended	$L_{Aeq,\ 1\text{-}min}$
2	24th October 2024 – 27th October 2024	Fixed/unattended	$L_{Aeq,\ 5\text{-}min}$

Table 5 – Measurements made at the site of the Proposed Development

8.4.2. Sound pressure measurements were subsequently averaged into hourly, daytime and night-time periods. The acoustic measurements and their interpretation have been in accordance with BS 7445: Parts 1, and 2[5]. All sound pressure levels are in dB (re 20μPa).

8.5. Results Summary

8.5.1. The worst case daytime and night-time levels measured during the survey have been summarised in Table 6.

Measurement location	Daytime dB, $L_{Aeq,16hr}$	Night-time dB, $L_{Aeq,8hr}$
1	67.1	60.8
2	67.1	60.2

Table 6 - Summary of the external sound pressure levels measured

[5] BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

9. 3D Noise Model

9.1.1. A 3D noise model has been constructed using SoundPLAN™ in order to predict the propagation of sound across the site of the Proposed Development. The calculation procedure has been used from ISO9613-2:1996[6] to predict the propagation of sound from source to receiver, taking into account distance, screening, and atmospheric and ground conditions.

9.1.2. Station Road and Stow Road have been calibrated to the values in Table 6 for Position 1 and Position 2, respectively. Both roads have been modelled as line sources.

9.1.3. CAD information provided by the client was used to model the proposed development and existing buildings, while Google Maps was utilised to map the roads. Terrain data has been sourced from the Department for Environment, Food & Rural Affairs (DEFRA). Standard 1.8m tall garden fences have been included. The results of the model have been illustrated in noise contour maps in Figure 3 and Figure 4.

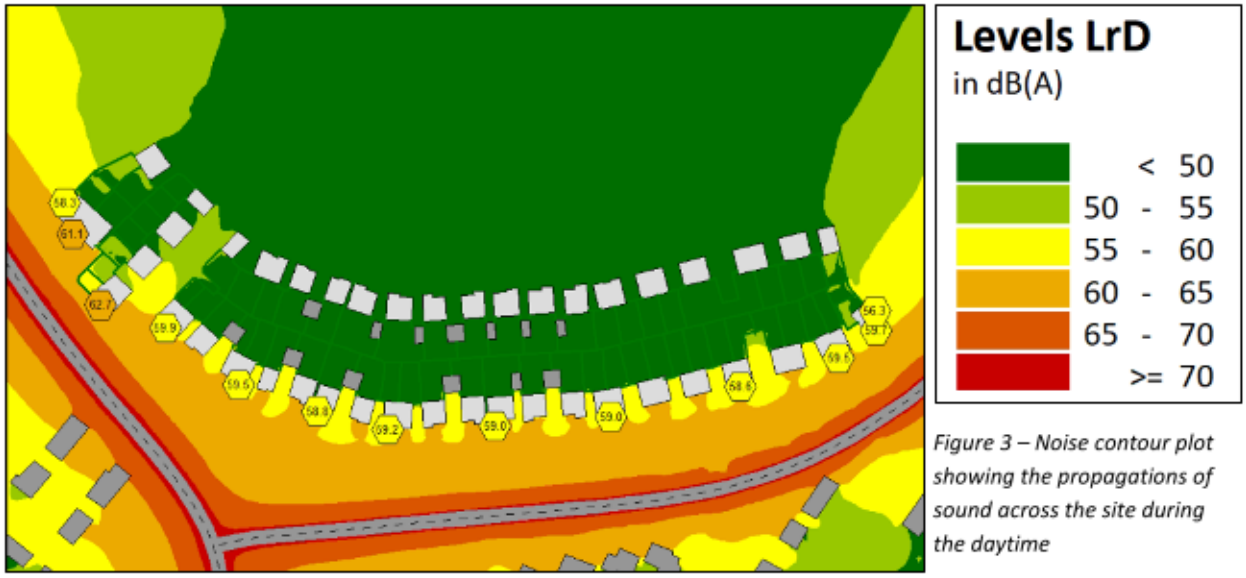


Figure 3 – Noise contour plot showing the propagations of sound across the site during the daytime



Figure 4 – Noise contour plot showing the propagation of sound across the site during the night-time

Measurement location	Daytime dB, $L_{Aeq,16hr}$	Night-time dB, $L_{Aeq,8hr}$
Highest predicted façade level	63.8	57.5

Table 7 - Summary of the predicted external sound pressure levels

[6] ISO9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"

10. Mitigation

10.1. Methodology

10.1.1. Based on the measured and predicted free-field sound pressure levels at the worst affected facades, the simple calculation method from BS8233:2014 has been used to determine the necessary sound reduction to meet the guideline values. Standard forms of construction are assumed such that the glazing is likely to be the lowest performing facade element.

10.2. Required Mitigation

10.2.1. The single figure glazing and ventilator performance requirements in order to achieve the internal design criteria are summarised in Table 8. The glazing performance has been specified in terms of the road traffic corrected weighted sound reduction index, $R_w + C_{tr}$, and the ventilator performance has been specified in terms of the road traffic corrected element normalised level difference $D_{ne,w} + C_{tr}$.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$	29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$
Specification 2	
27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$	27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$

Table 8 – Required facade sound insulation (Glazing/Ventilator)

10.2.2. In this situation, to meet the recommended internal ambient noise criteria, windows will need to remain closed; therefore, an alternative means of ventilation has been provided in accordance with BS8233:2014. It should be noted that this does not mean windows are fixed shut; they can be opened at the occupant's discretion, for purposes such as rapid or purge ventilation or personal preference.

10.2.3. It should be noted that most standard thermal double glazed units achieve 26/27dB R_w+C_{tr}.

10.3. Glazing and Ventilator Specifications

10.3.1. The glazing performance has been specified based on the performance data provided by Saint-Gobain. These are example configurations and any other glazing can be used provided it achieves the minimum performance levels given in Table 8. The recommended glazing specification is given in Table 9.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
4 (12) 6	4 (12) 6
Specification 2	
4 (12) 4	4 (12) 4

Table 9 - Our recommended glazing configurations

10.3.2. Should penetrations be required for ventilation purposes the ventilator performance ($D_{ne,w}$ + C_{tr}) is calculated to work in conjunction with the above glazing specifications, are summarised in Table 10. The specification provides an equivalent area of at least 5000mm^2. A suitably qualified person should verify that the ventilator specifications meet the requirements of Approved Document F. It is critical that any vent or total combination of vents specified achieve the ventilator performances given in Table 8.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
1 x Greenwood Vent 5000EA + 1 Acoustic Set	1 x Greenwood Vent 5000EA + 1 Acoustic Set
Specification 2	
1 x Greenwood Vent 5000 EA	1 x Greenwood Vent 5000 EA

Table 10 - Our recommended ventilator configurations.

10.3.3. A plan showing where these specifications apply has been provided in the appendix.

10.3.4. Given the assumptions in this method the information in this section should be treated as general guidance only. The acoustic performance of third party products cannot be guaranteed by noise.co.uk.

10.4. External Amenity Area Noise Assessment

10.4.1. BS8223 states that it is desirable that the external noise level for amenity spaces, such as gardens and patios, does not exceed 50dB $L_{Aeq,T}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

10.4.2. However, the standard acknowledges that there may be areas where development is desirable where these guideline values are not achievable. This will be true for higher noise areas such as city centres or urban areas adjoining the strategic transport network. In these situations, a compromise between elevated noise levels and other factors might be warranted, such as:

- the convenience of living in these locations; and/or,
- making efficient use of land resources to ensure development needs can be met.

10.4.3. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

10.4.4. The noise contour map in Figure 3 demonstrates that most of the gardens can achieve the guideline values in BS8233 due to the proposed layout, with dwellings set back from the dominant noise source and gardens positioned behind the dwellings, which provides effective screening.

10.4.5. For gardens predicted to exceed the recommended guideline values, acoustic screening measures have been implemented to reduce the sound pressure levels. Figure 5 provides a noise contour map illustrating the impact of these screening measures, highlighted in blue.

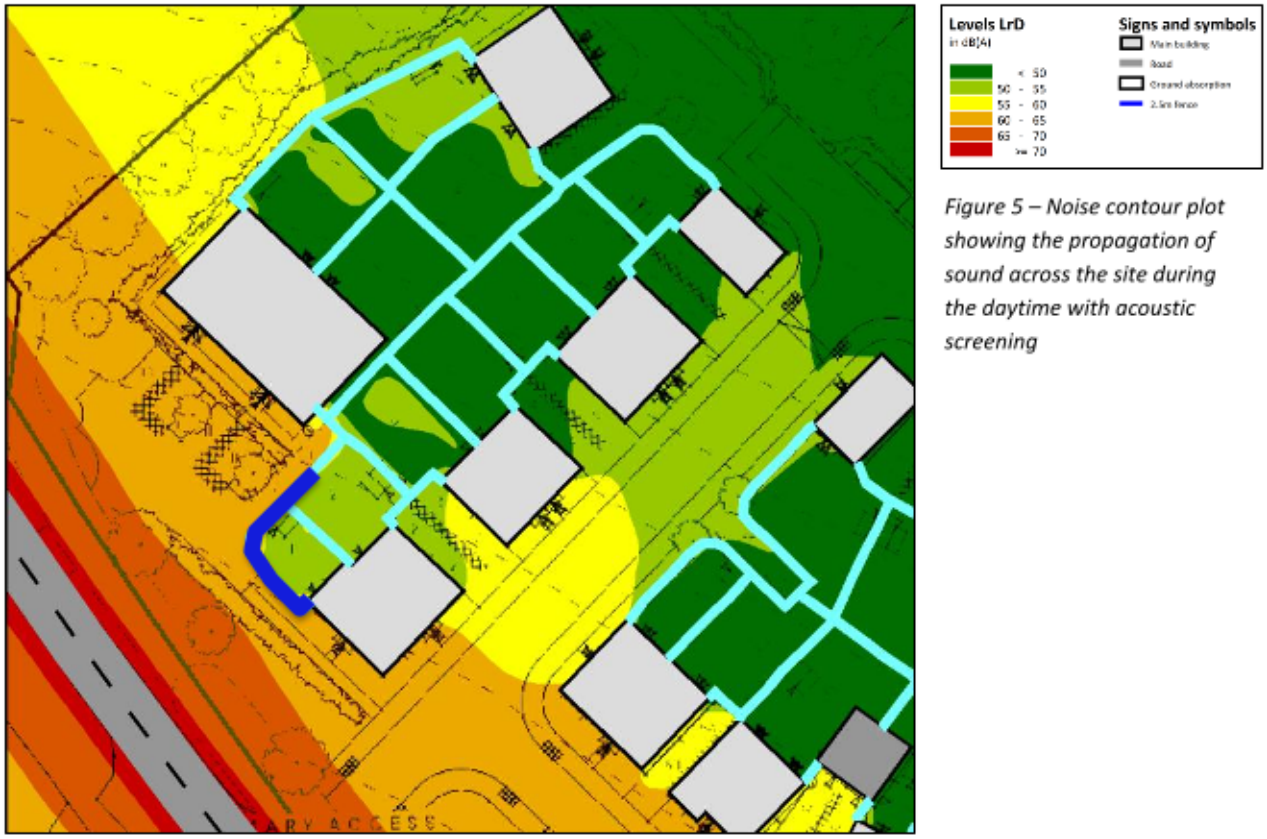


Figure 5 – Noise contour plot showing the propagation of sound across the site during the daytime with acoustic screening

10.4.6. The acoustic screening in the south-western corner of the development has been modelled at a height of 2.5m.

10.4.7. Figure 5 demonstrates that the recommended guideline values in these garden areas can be achieved where screening has been implemented.

Noise Barrier Specifcation

10.4.8. The most significant property of the barrier that affects its sound insulation is the mass per unit area. The Department for Transport provides specific guidance on the specification of the minimum mass per unit area for such barriers.[7]

10.4.9. The fences that border residential private gardens can be basic, wooden, standard close-boarded fences with no gaps between the panels and the ground or panels and the posts, and have a minimum wooden panel mass of 10 Kg/m^2 to optimise their barrier performance.

10.4.10. A plan showing where these specifications apply has been provided in the appendix.

[7] Department for Transport (1976) Noise Barriers – Standards and materials, Technical Memorandum H14/76

10.5. Approved Document - Part O - Noise

10.5.1. Approved Document O[8] (ADO) was published in 15th December 2021 and was most recently updated on June 2022. The intention of this Approved Document is to assess the overheating risk of new residential dwellings.

Noise Related Requirements

10.5.2. ADO does not provide specific internal noise criteria but does provide sound pressure levels that, if exceeded the windows are likely to be kept closed by the occupant. These values are given below.

> *'Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*
>
> *b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am).'*

10.6. Approved Document O – Noise guide

10.6.1. Approved Document O Noise guide[9] ("ADO Noise Guide") provides guidance for acousticians to demonstrate compliance with the noise requirements of ADO.

10.6.2. This guidance document identifies the scope of the assessment and proposes that it be limited to bedrooms at night with reference to paragraphs 3.2 and 3.3 of ADO. The guidance document also proposes that the scope of the assessment be limited to 'non-natural' sources, i.e. not including sound from water (rainfall/flowing water) or non-domestic animals (birdsong) etc.

10.6.3. The guidance document provides external levels, above which the simplified method for determining overheating risk should not be used and dynamic thermal modelling should be used to demonstrate compliance, or a ventilation system installed in the identified properties to deal with overheating. These values are given in Table 11.

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,8h}$, averaged over 8 hours (between 11pm and 7am)	45 dB	50 dB
L_{AFmax}, more than 10 times a night (between 11pm and 7am	60 dB	65 dB

Table 11 - Table 1 from ADO Noise Guide - External Noise Levels Above which the simplified method cannot be used

10.6.4. High risk locations are identified in ADO as parts of London and Manchester. A list of postcodes for these high risk locations are given in Appendix C of ADO. All areas that are not considered high risk are considered moderate risk Locations.

10.6.5. The noise model has been used to highlight the facades that are predicted to exceed the sound pressure level values given in Table 11 for 'Moderate Risk Locations'.

10.6.6. The facades marked in Red are predicted to exceed these values and facades marked in Green are predicted to meet, or fall below, these values. It should be noted that this assessment is intended only for bedrooms, so where there are no bedrooms located on a façade marked in Red, this can be considered the same as a façade marked in Green. The results of the 3D noise model are given in Figure 6.

[8] The Building Regulations 2010 – Overheating - Approved Document O – HM Government – 15th June 2022
[9] Approved Document O – Noise Guide – November 2024 – Version 1.1



Figure 6 – 3D noise model predicting facades that will achieve the internal sound pressure level values given in Approved Document O with windows open during the night-time

10.6.7. Figure 6 shows that the predicted sound pressure levels at facades facing away from the road are ≤50 dBA. Therefore, the internal noise requirements for bedrooms, as specified in ADO, are likely to be met with windows open during sleeping hours (23:00–07:00). However, for facades with bedrooms facing or overlooking the road, the predicted sound pressure levels are >50 dBA, suggesting that the internal noise requirements are unlikely to be met with windows open.

11. Conclusions

11.1.1. An environmental noise survey has been carried out at the site of a proposed residential development at Land off Stow Road, Kimbolton, Huntingdon to determine typical ambient sound levels.

Internal Guideline Noise Assessment

11.1.2. The sound levels have been used to calculate the required facade sound insulation to meet the guideline internal levels from BS8233:2014. Table 8 in section 10 gives the required facade sound reduction by any glazing and ventilator combination to be compliant with the guideline values.

11.1.3. Additionally, an assessment has been carried out in accordance with the Institute of Acoustics (IOA) Guidance to demonstrate compliance with the noise requirements specified in ADO. The findings indicate that facades facing away from the road are likely to meet the noise requirements in bedrooms with windows open during sleeping hours (23:00–07:00). However, for facades with bedrooms facing or overlooking the road, the predicted sound pressure levels are >50 dBA, suggesting that the internal noise requirements are unlikely to be met with windows open.

External Amenity Area Noise Assessment

11.1.4. The proposed layout for the development ensures that most garden areas can achieve the recommended guideline values in BS8233, with dwellings set back from the main noise sources and gardens effectively screened. For garden areas where the guideline values are predicted to be exceeded, acoustic screening measures have been recommended to reduce sound pressure levels, ensuring that the guideline values can be achieved. A noise barrier specification has also been provided to ensure that noise is effectively mitigated.

12. Appendix

APPENDIX A: Summary Information

Required ISO Test Report Information (cross referenced where required)			
		Measurements carried out to:	Analysed to:
A	Standards	BS 7445-1: 2003 BS 7445-2: 1991	BS 8233:2014
B	Organisation performed the measurements	noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU.	
C	Name of Client	Bloor Homes (South Midlands)	
D	Full site address	Land off Stow Road Kimbolton Huntingdon	
E	Date of surveys	Survey Date: 24th October 2024 - 27th October 2024	
F	Description & identification of Proposed Development	It is proposed to develop the site for residential use.	
G	Brief Description of details of Procedure & equipment	See Section 5 of this report.	

APPENDIX B: Technical Appendix

12.1.1. Measurements were made using the following equipment:

Monitoring Position	Sound Level Meter (Serial Number)	Calibrator (Serial Number)
1	SoftdB Piccolo 2 (PO221070105)	BSWA CA114 (590010)
2	SoftdB Piccolo 2 (PO221070104)	BSWA CA114 (590010)

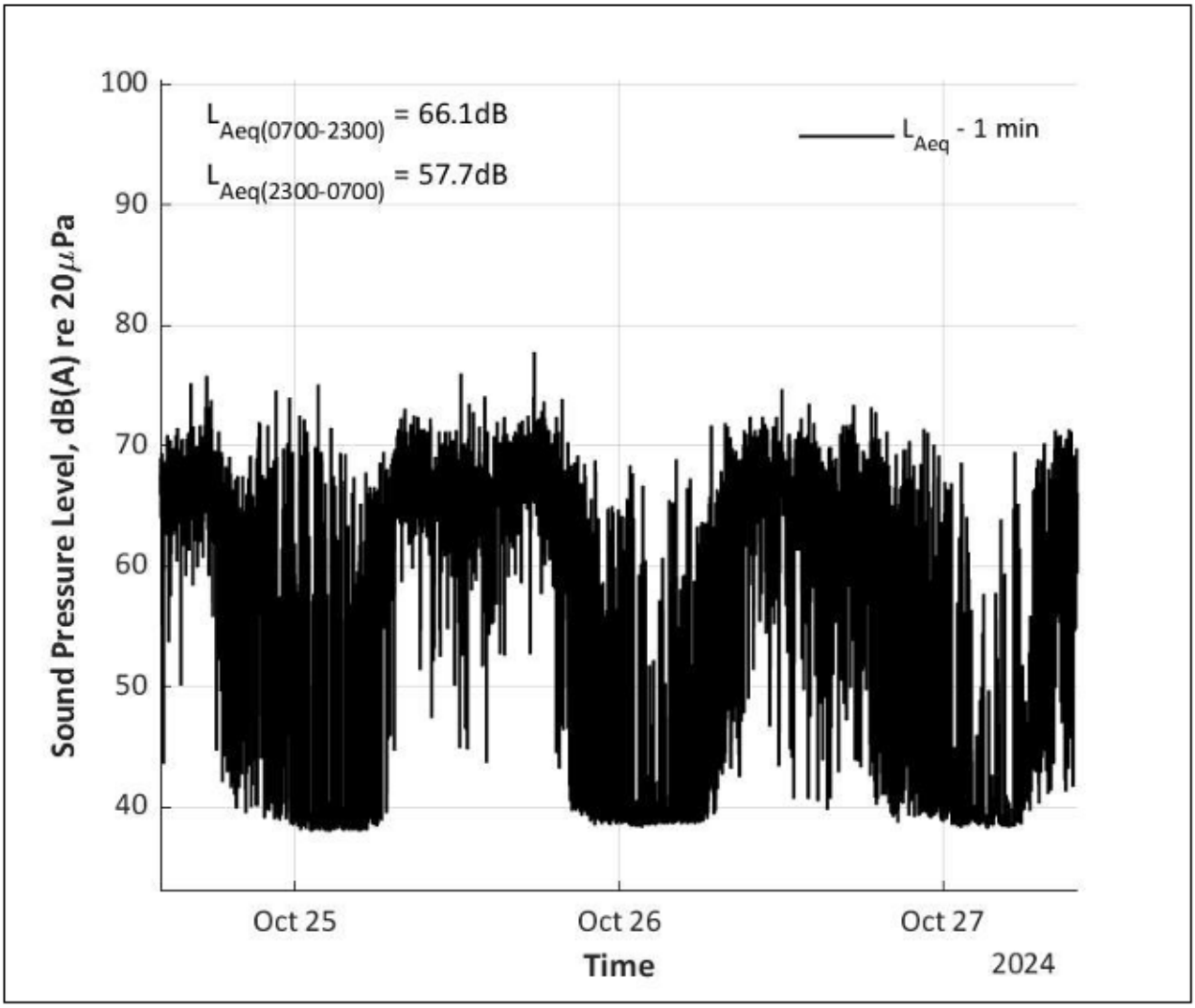
12.1.2. The equipment has traceable calibration. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

Sound Level Meter	Before	After
SoftdB Piccolo 2 (PO221070105)	94.0 dB	94.0 dB
SoftdB Piccolo 2 (PO221070104)	94.0 dB	94.0 dB

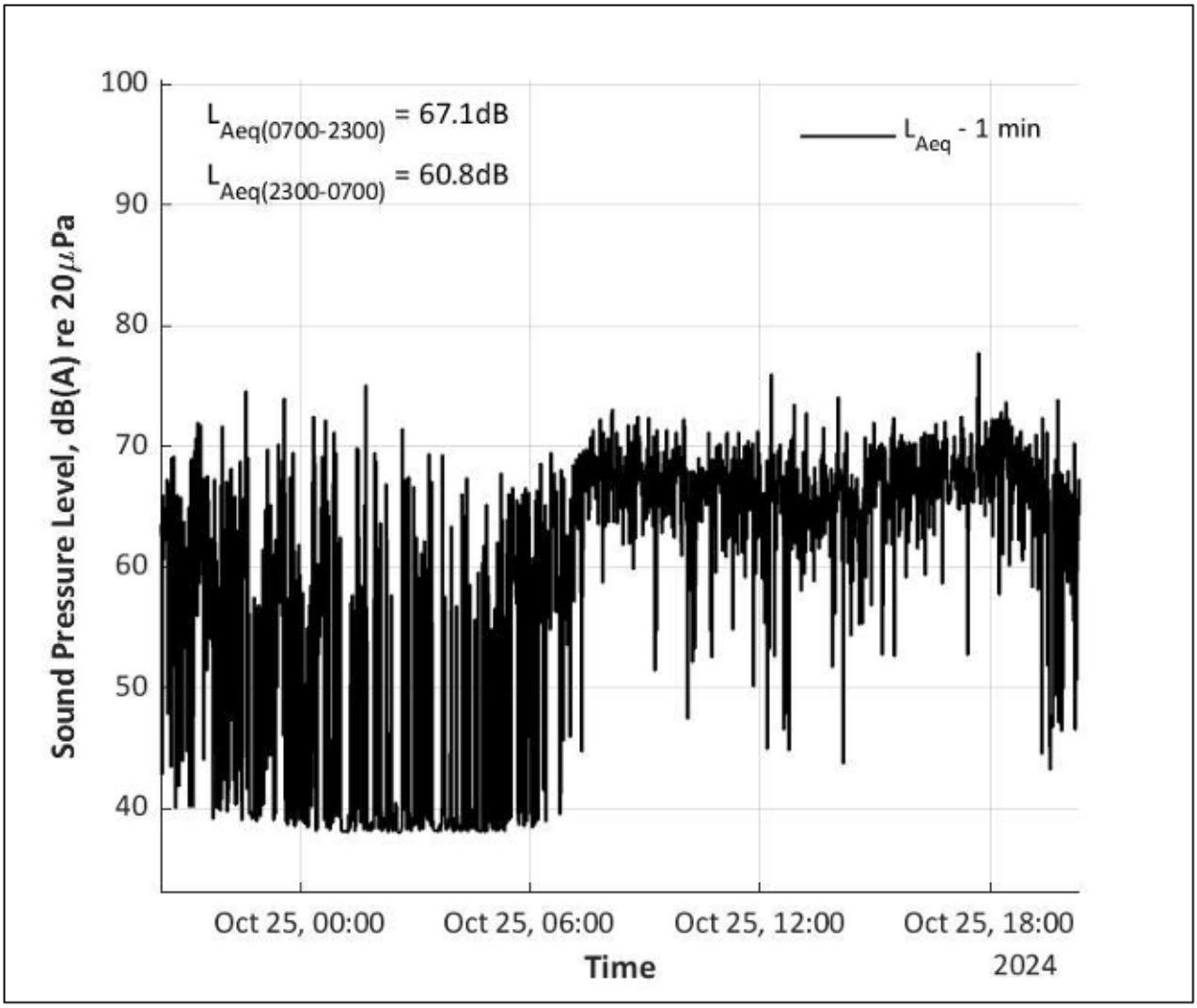
12.1.3. There was no adverse deviation.

APPENDIX C: Raw Data

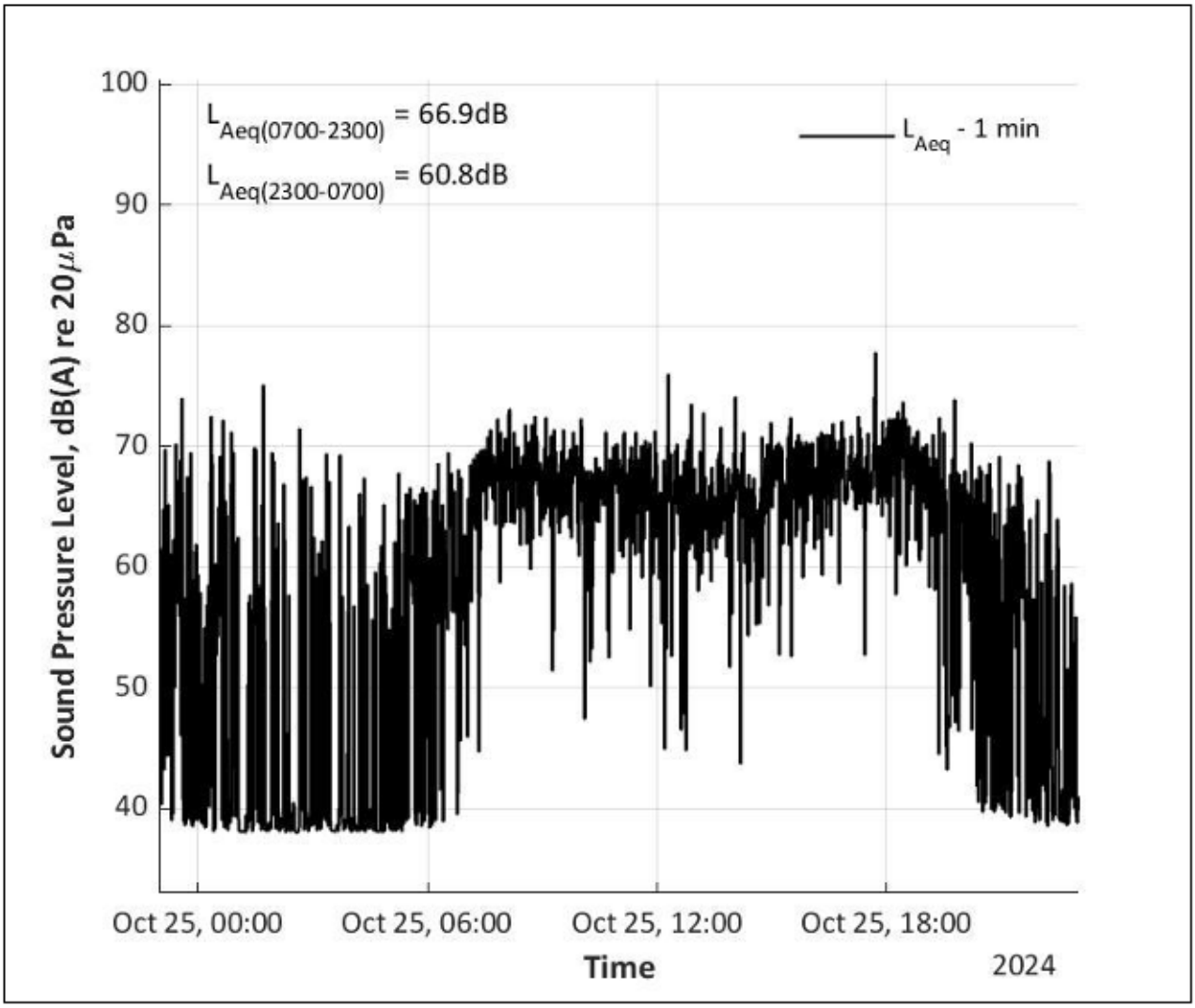
Position 1 - 24th October 2024 – 27th October 2024



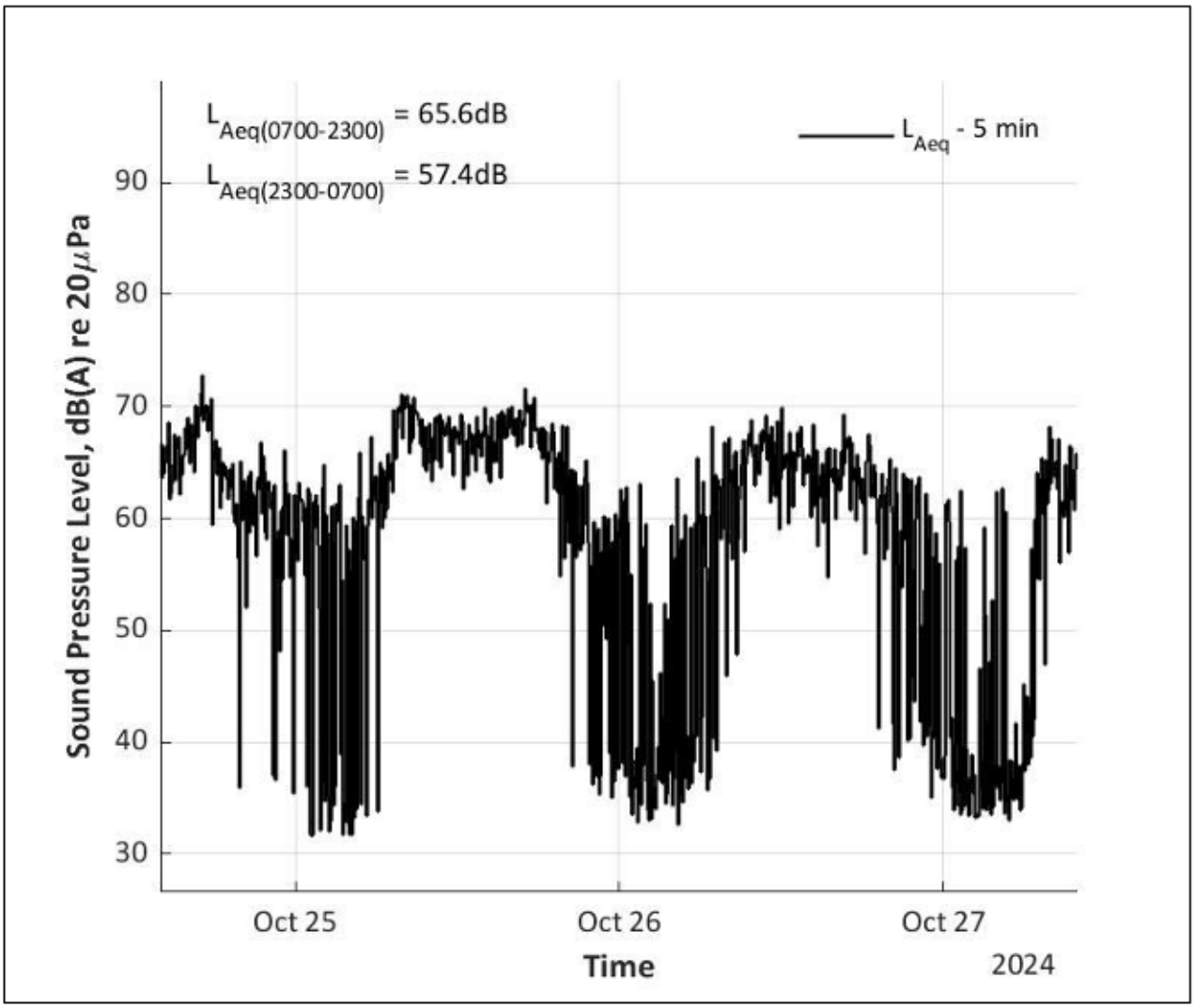
Position 1 - Worst-case Daytime levels



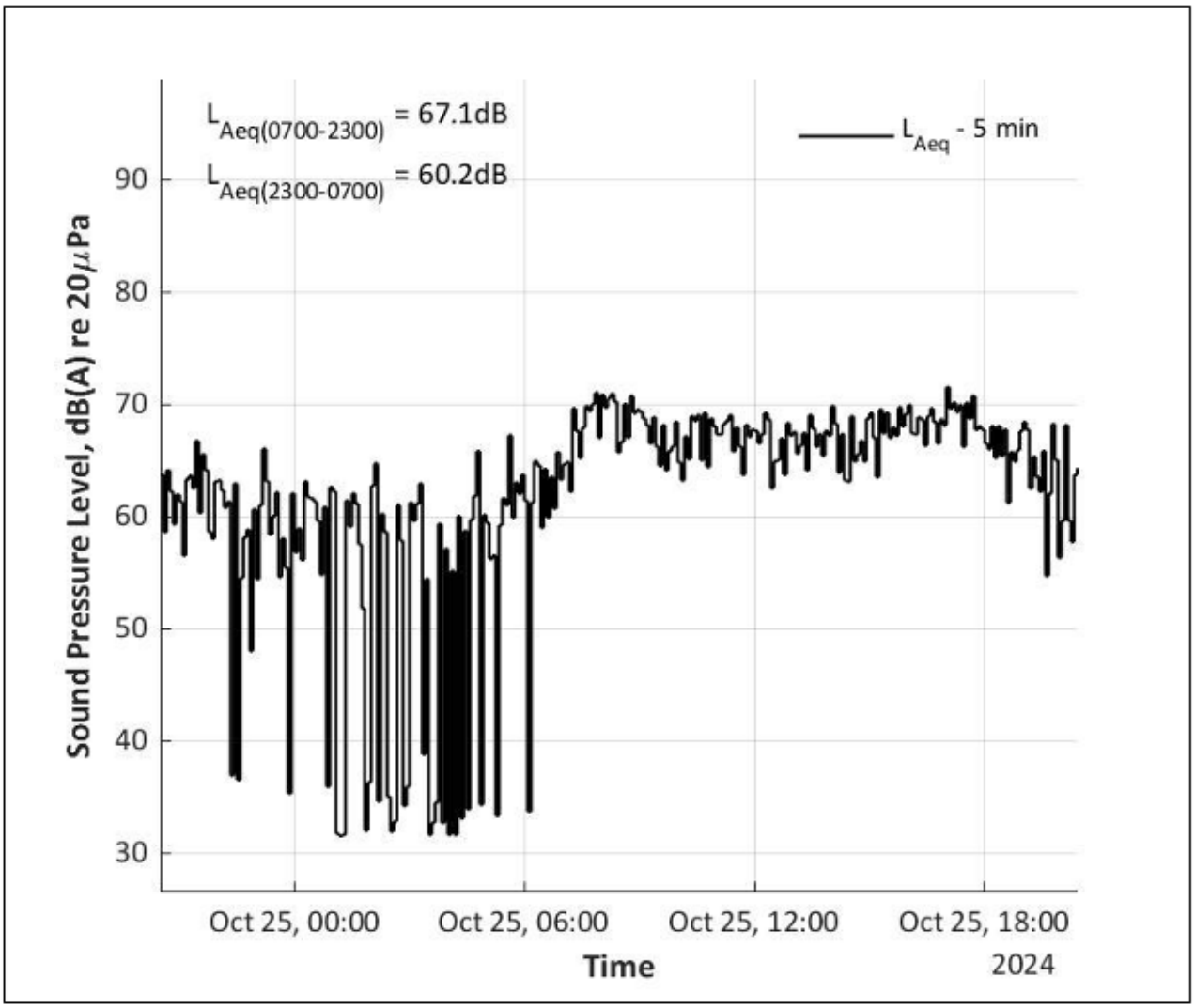
Position 1 - Worst-case Night-time levels



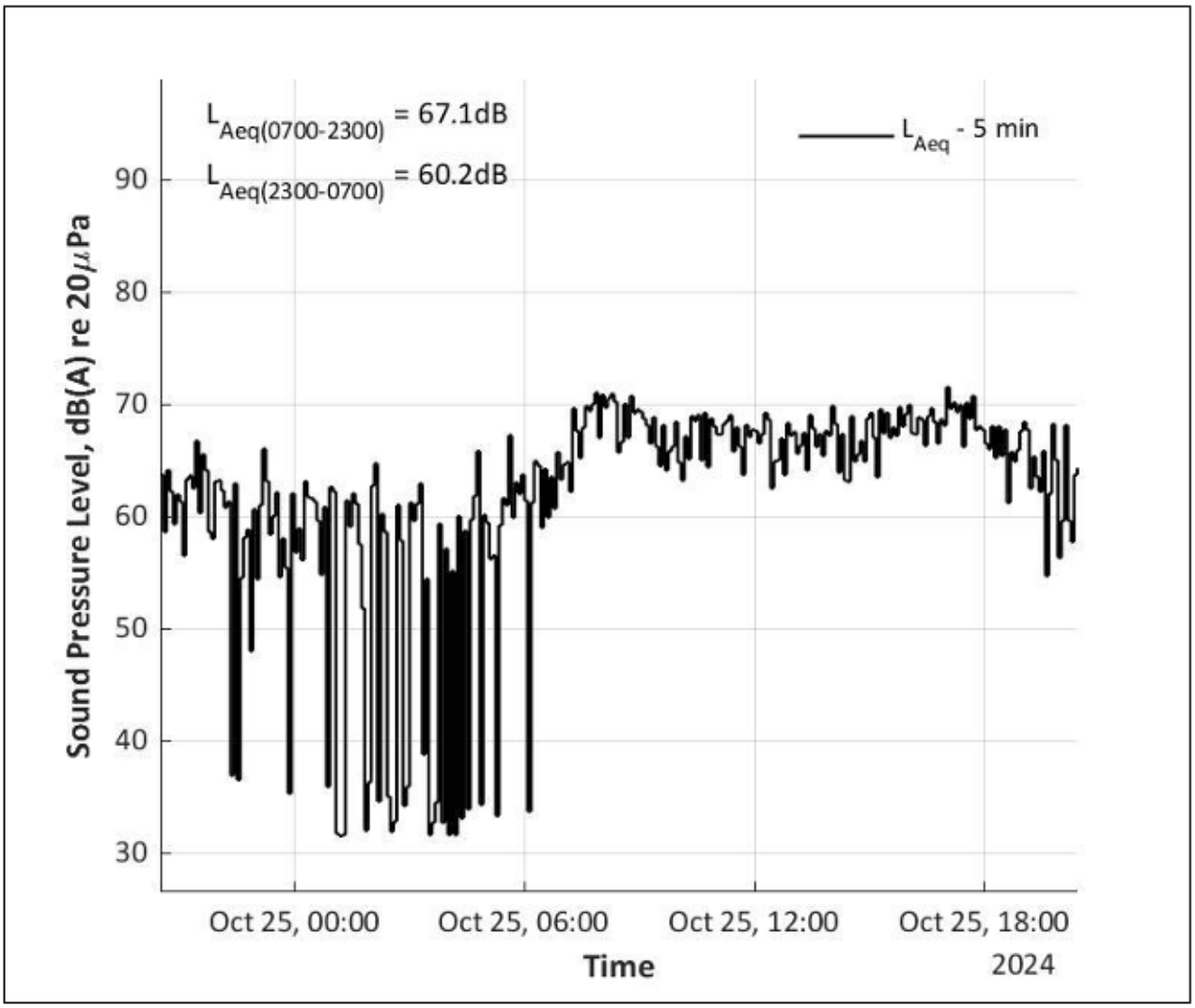
Position 2 – 24th October 2024 – 27th October 2024



Position 2 – Worst-case Daytime noise levels



Position 2 – Worst-case Night-time levels



APPENDIX D: Glazing Markup Plan



Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$	29 dB $R_w + C_{tr}$ /35 dB $D_{ne,w} + C_{tr}$
Specification 2	
27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$	27 dB $R_w + C_{tr}$ /33 dB $D_{ne,w} + C_{tr}$