



Berewood Phase 8, Waterloooville

Noise assessment

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prepared for

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1.0 Introduction

1.1 It is proposed to develop a residential scheme comprising circa 185 dwellings to the northwest of London Road, Waterlooville. The outline application decision notice for the scheme contains a noise related planning condition which requires the assessment of noise from the London Road to be assessed to ensure that future receptors are adequately protected against noise.

1.2 This report sets out the requirements of the planning condition, sets out the local and national noise criteria for acoustic-related matters pertaining to new residential dwellings, in addition to the results of the noise survey and assessment for the site. Where mitigation is required to meet the criteria, specifications are set out within this report.

2.0 Locality and Planning Context

Site Location

2.1 The site is located adjacent to London Road, Waterlooville and in principal falls under the jurisdiction of Havant Borough Council (HBC). The location of the proposed development land is shown in **Image 1**, with the approximate site boundary shown in **orange**.

Image 1: Site location

— Approximate site location



Aerial image courtesy of Google

Planning Context

2.2 The wider Berewood development is largely within the jurisdiction of Winchester City Council (WCC). The decision notice for the wider scheme (reference 10/02862/OUT) was issued by WCC, but with the decisions made by a joint committee including both WCC and HBC. The outline application decision notice contains condition 16 which states the following:

“No relevant phase of the development hereby permitted shall commence until a scheme for protecting proposed dwellings and their gardens from noise from the London Road has been submitted to and approved in writing by the local planning authority. These dwellings shall not be occupied until the implementation of all works formation part of such approved noise protection scheme has been completed in full accordance with all detailed components of such a scheme.”

2.3 HBC do not have specific noise related guidance that relates to planning applications. Winchester City Council however provide guidance on noise within their ‘Technical Guidance for Noise’ dated 2022. The guidance is designed to assist developers, agents and their consultants where noise is a consideration for any proposed development.

2.4 The document refers to national planning policy and WCC’s Local Plan. The policy of most relevance in part 2 of the local plan which was adopted in April 2017 states the following:

“Development which generates noise pollution or is sensitive to it will only be permitted where it accords with the Development Plan and does not have an unacceptable impact on human health or quality of life.

A noise generating or noise sensitive development should include an assessment to demonstrate how it prevents, or minimises to an acceptable level, all adverse noise impacts. Assessment of these impacts should have regard to the advice contained within the Department for Environment Food and Rural Affairs (DEFRA) Noise Policy Statement for England (NPSE), March 2010, or its recognised replacement.

Development will not be permitted where levels above the Significant Observed Adverse Effect Level (SOAEL) exist and mitigation measures have not been proposed that will reduce impacts to as near to the Lowest Observed Effect Level (LOAEL) as is reasonably possible. Mitigation measures should not render the design and amenity spaces unacceptable.”

2.5 The document sets both internal and external noise criteria following guidance within BS 8233:2014¹ and states that the criteria should ‘be achievable with windows open for ventilation and the prevention of overheating unless demonstrated this is not necessary’.

2.6 It then proceeds to set out the principles of good acoustic design as follows:

“ Location of buildings on the site to minimise noise exposure (this will include maximising separation of noise sources and sensitive receptors and use of buildings or topography to screen noise).

· Layout of habitable rooms within buildings to reduce noise exposure to more noise-sensitive rooms.

· Ensuring dwellings exposed to high noise levels are dual aspect to provide each unit with access to a relatively quiet façade when possible.

¹ BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

- Access to relatively quiet external amenity space
- Measures to reduce noise at source and/or on the transmission path where possible.
- Design and insulation of the building envelope.”

2.7 In light of these points, the document states the following:

“Such measures should always be implemented in preference to sole reliance on insulation of the building envelope.”

2.8 Guidance is also provided on overheating. Section 4.3.4 of the note states the following:

“Where internal noise levels are predicted to be close to or just above the noise criteria specified in BS8233:2014, or if the assessment relies on windows being closed to achieve internal noise levels, the Institute of Acoustics (IOA) and Association of Noise Consultants (ANC) AVO Guide 11 (Acoustic Ventilation and Overheating Residential Design Guide: 2020) should be applied to demonstrate that the internal space will not be subjected to overheating.

If the use of mechanical ventilation to achieve internal noise levels is unavoidable, any noise assessment should take account of the noise levels generated by such ventilation when predicting the internal noise levels.”

2.9 In summary therefore, it is necessary to implement good acoustic design measures (discussed later) to achieve the relevant internal noise criteria with windows to the dwellings partially open where practicable. Where this is not practicable, suitable facade noise mitigation measures must be proposed with full account given to ventilation and overheating control. Similarly, good acoustic design measures should be implemented where practicable to control noise to external amenity areas.

3.0 Design Criteria

3.1 The following criteria have been adopted at this stage. The guidance and standards these have been derived from are detailed in the attached **Appendix B**.

- Bedrooms and Living Rooms (daytime): $\leq 35 \text{ dB } L_{Aeq,16\text{hour}}$;
- Bedrooms (night-time): $\leq 30 \text{ dB } L_{Aeq,8\text{hour}}$ and $\leq 45 \text{ dB } L_{Amax,1^2}$;
- External amenity areas (or parts thereof): aspirational threshold of $\leq 55 \text{ dB } L_{Aeq,16\text{hour}}^3$.

3.2 The Building Regulations Approved Document O: Overheating (ADO) was published in December 2021. It sets out overheating mitigation requirements for new buildings and has a requirement for noise to be considered when ensuring occupants’ “reasonable enjoyment” of their dwellings.

3.3 It is noted that compliance with the Building Regulations is not a matter for planning, however the requirements of ADO in relation to noise are intrinsically linked to the considerations that apply when undertaking noise assessments for residential development. To follow the good acoustic

² Not normally exceeded more than 10 times per night

³ Noting that it may not be possible to achieve this in a practicable manner in all areas.

design practices and an aspiration for more sustainable/energy conscious development, the requirements of the ADO have been considered.

3.4 The stance is taken that the requirements of the ADO and the Association of Noise Consultants (ANC) guidance on compliance with the ADO guidance⁴ supersedes the guidance set out within the AVO (as referenced by WCC within their technical noise guidance).

3.5 Therefore, taking into account the above and the location of the site, where external noise levels exceed 49 dB $L_{Aeq,8hour}$ and / or 64 dB $L_{Amax,F}$ during the night time period, it will be necessary to provide a building overheating control strategy that does not necessarily rely solely on partially open windows. This approach is based on the simplified method set out within acoustics industry guidance and may be subject to change should the guidance be revised (It is understood that revised acoustics industry guidance is to be published toward the end of November 2024).

4.0 Noise Survey

Methodology

2. An unattended noise survey has been undertaken to quantify the noise climate impacting the site. Measurements were taken at a single location which can be seen in **Image 2** and took place between 13:00 on Monday 12th August to 13:45 on Wednesday 14th August 2024. Further details are set out in **Appendix A** with a summary provided below.

3. Additional attended noise measurements were taken in the vicinity of a pedestrian crossing and a bus stop on London Road towards the eastern corner of the site. It has been determined that noise impacts from buses operating on London Road have been suitably captured by the unattended measurements and that noise from the crossing is not significant.

Image 2: Measurement position

— Approximate site location



Aerial image courtesy of Google Maps

⁴ Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O, July 2022 V1.0 (Consultation Draft)

4.1 The measured/derived day and night time noise levels at MP1 are set out in **Table 1** below, in terms of the key metrics typically used for the purposes of noise assessment.

Table 1 Noise survey results summary

Position	Day Time (0700-2300)	Night Time (2300-0700)	
	dB $L_{Aeq,16hour}$	dB $L_{Aeq,8hour}$	dB $L_{Amax,f}$
MP1	67	59	78

5.0 Noise Assessment

Overview

5.1 This assessment has been based on the *Bloor Homes* 'Site Layout' drawing, ref: SOxxx-SL-001L), which includes the locations of the proposed 185 dwellings and their associated external amenity areas. The layout set within the context of the immediate surrounding area is included as **Image 3**.

Image 3: Berewood Phase 8A site layout



5.2 The dwellings will utilise a cavity masonry façade construction. This does not preclude the use of alternative lightweight constructions if there is a subsequent preference to do so (not that such a substitution is expected at this time), but Suono must be consulted to verify that any such proposed construction offers the required sound insulation performance.

5.3 Typical internal room dimensions have been taken as follows (expected to be suitably representative of the proposed dwellings):

- 5 m x 4 m x 2.7 m for living rooms with 5 m² of glazing;
- 4 m x 3 m x 2.7 m for bedrooms with 1.8 m² of glazing.

5.4 These dimensions should not be taken as limitations, but rather reasonable figures used for the purposes of the assessment given the variability of dwelling design. Should the above information differ significantly from the proposed rooms layouts, this assessment may require updating.

5.5 An acoustic model has been created using a computer-based noise prediction program (*Wölfel* IMMI version 24). This has been used to determine the noise levels across the site generated by noise from London Road. Full details of the noise model can be seen in **Appendix B** attached to this document. Noise contour plots illustrating daytime noise levels within external amenity areas, night time noise levels and maximum noise levels can also be seen within this appendix.

Good Acoustic Design Considerations

5.6 To control noise to the proposed development, optimisation of the site layout at an early stage was considered, balancing the need to maximise the developmental potential of the site, the control of noise and considering other non-acoustic related factors, such as visual and other technical constraints.

5.7 Increased buffer zones between the dwellings at A3 were investigated and implemented where practicable, however more extensive set-back distances were not possible due to on-site space constraints.

5.8 Similarly, continuous roadside acoustic screening was not considered practicable on this site due for visual constraints. Instead, buildings have been oriented to screen garden areas where practicable (again balanced against the access requirements for the plots). Where this is not possible, localised screening is proposed to gardens (discussed later in this report).

Control of external noise levels

5.9 The following contour plot shows the predicted daytime noise levels across the proposed development in terms of $L_{Aeq,16hour}$ at 1.5 metres above local ground level. It can be seen that nearly all garden areas observe noise levels not exceeding 55 dB $L_{Aeq,16hour}$.

Image 4: Daytime (dB $L_{Aeq,16hour}$) noise contour at 4.5 m above local ground level (with dev.)

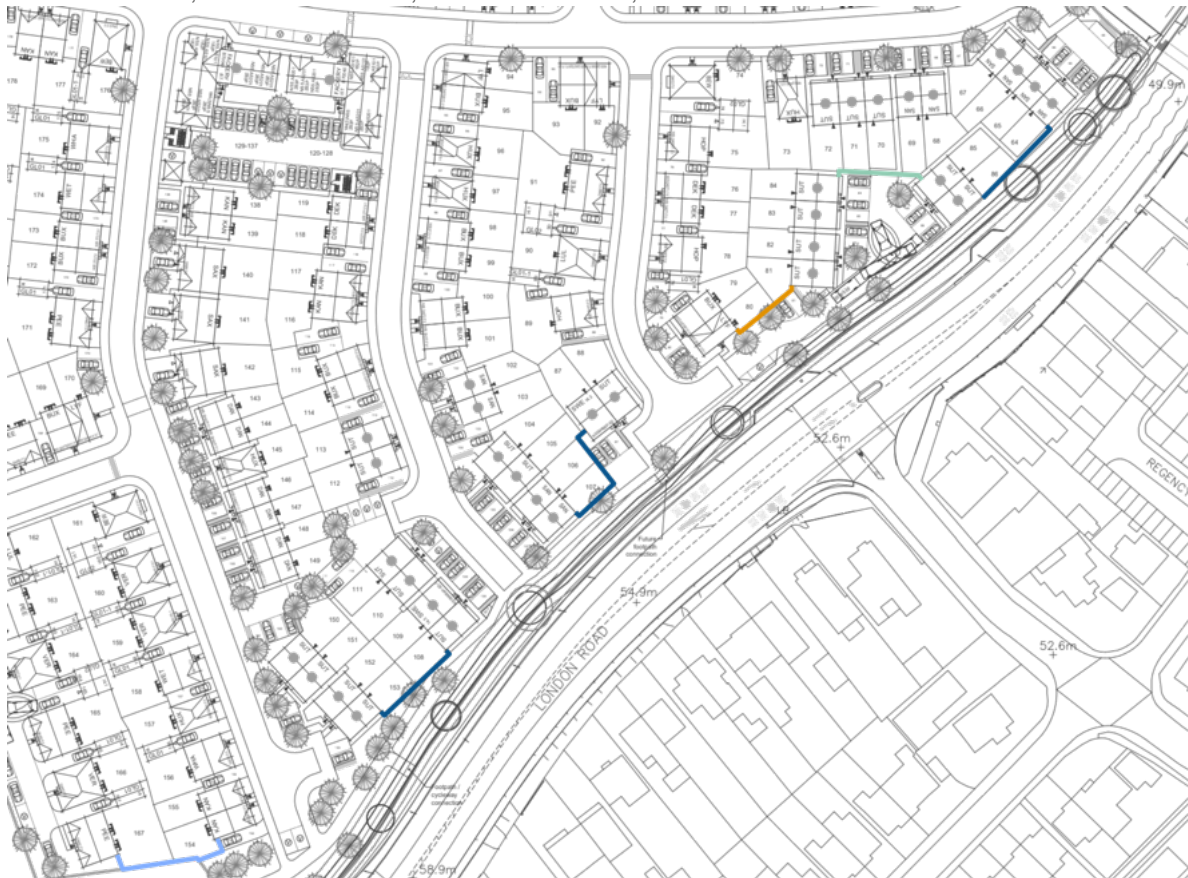
● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



5.10 To control noise to the most exposed gardens (i.e. those of plots 64, 80, 81, 86, 106, 107, 108, 153, 154 and 167), localised acoustic screening will be required to their south east boundaries. The locations and heights relative to local ground level) of these screens are indicated on **Image 4**.

Image 5: External amenity area acoustic screening

— 2.5 m screen, — 2.2 m screen, — 2.0 m screen, — 1.8 m screen



5.11 The screening must be of an imperforate construction and have a mass no less than 10 kg/m². There are numerous options to achieve this, however example of suitable constructions includes suitably specified close board timber fencing or solid brick walls.

5.12 Within the gardens of plots 64 and 86, noise levels are predicted to marginally exceed the aspiration external noise criteria by between 1 to 2 dB. With regard to achieving the aspirational target of 55 dB $L_{Aeq,16hour}$, BS 8233 states the following:

"It is also recognized that these 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."

5.13 To achieve the aspirational garden area noise target, localised screening to the southern boundaries of the affected garden would need to be at least 3 metres in height which is not deemed to be practicable when also taking into account visual constraints. Given that the scheme has outline planning consent, it can be inferred that the development is indeed desirable and therefore specification of a 2.5 metre screen to the southern boundaries of plots 64 and 86 represents a balance between controlling noise to the lowest practicable levels and visual constraints.

5.14 It is also noteworthy that residents of the proposed development will have access to public open spaces that are expected to be subject to noise levels below the aspirational external noise target.

5.15 It is therefore concluded that noise can be suitably controlled to all external amenity spaces across the entire development.

Control of internal noise levels

Partially open windows

5.16 Considering screening effects provided by dwellings across the proposed layout, and on the assumption that a partially open window can provide a loss from free field external noise levels externally to reverberant level internally of approximately 13 dBA, the following **Image 6** demonstrates the extent of the development expected to achieve the relevant internal noise criteria with partially open windows in **blue**. It is noteworthy that the figure must be taken as indicative only due the variation in potential loss that can be achieved through a partially open window.

Image 6: Extent of site where internal noise criteria may be met with partially open windows



5.17 The criteria can be expected to be met with partially open windows for a significant proportion of the site. There are some areas however where it will be necessary to make use of façade elements to control noise intrusion (as per the guidance within the ProPG and BS 8233).

Façade-based Noise Mitigation

5.18 Some dwellings will require the use of acoustically rated glazing and trickle vents (the latter of which being included as part of mechanical extract ventilation (MEV) systems). The required performances of these façade treatments can be seen in **Table 2** and **Image 7** indicates the required locations for each of the mitigation specification.

5.19 Typical glazing configurations are quoted for guidance only and alternatives may be utilised, in any case acoustic performance of the system proposed must be demonstrated to the satisfaction of Suono. The sound reduction performances quoted must be achieved by the glazing systems taken as a whole, in their installed condition.

5.20 The performance specifications therefore apply to the glazing, frames and all seals on any openable parts of the systems and any required ventilation or condensation control mechanisms. This list is not exhaustive: no part of the glazing system shall cause the below figures not to be achieved. The glazing supplier should be expected to prove that the sound reduction figures can be achieved by the system being proposed.

5.21 Noise intrusion calculations have included the effects of up to three trickle ventilators to living rooms and two to bedroom areas (noting that fewer would be acceptable with regards to noise). The ventilation strategy should be confirmed as acceptable by a suitably qualified party, in relation to the requirements of Approved Document F of the Building Regulations.

5.22 The below $D_{n,e}$ values relates to the performance of a single vent in its “open” position, based on its area, standardised to an absorption area of 10 m². Therefore, the figure is higher than the actual insertion loss that will be provided by the ventilator, as it is dependent on the area of the vent. The $D_{n,e}$ figure is only therefore useful in specifying the product against a given $D_{n,e}$ requirement.

5.23 The ventilator examples set out in the table below are through wall products; these are provided as examples only and other through-frame or wall configurations may be acceptable, providing the minimum octave band performance requirements are met. The ventilator product supplier should be expected to demonstrate that the sound reduction figures can be achieved by the system being proposed (in an open position).

Table 2 Acoustic performance of façade elements

Code	Typical Construction / Indicative Product	Index	Minimum Apparent Sound Reduction dB at Octave Band Centred Frequency, Hz					
			125	250	500	1k	2k	4k
Glazing G1	10 mm glass, 12 mm air gap, 6 mm glass	R'	26	27	34	40	39	46
Glazing G2	6 mm glass, 12 mm air gap, 4 mm glass	R'	22	22	28	39	39	42
Glazing G3	Good quality standard thermal double glazing achieving an acoustic performance of R_w 30 dB							
Vent V1	Glidevale Fresh 80 dB	$D_{n,e}$	29	33	44	46	49	57
Vent V2	Glidevale Fresh 100 dB	$D_{n,e}$	26	27	34	40	39	46
Vent V3	Non-acoustic trickle ventilators							

Image 7: Enhanced acoustic glazing and ventilation locations

— Glazing G1 and Vent V1, — Glazing G2 and Vent V2, Unmarked dwellings: Glazing G3 and Vent V3

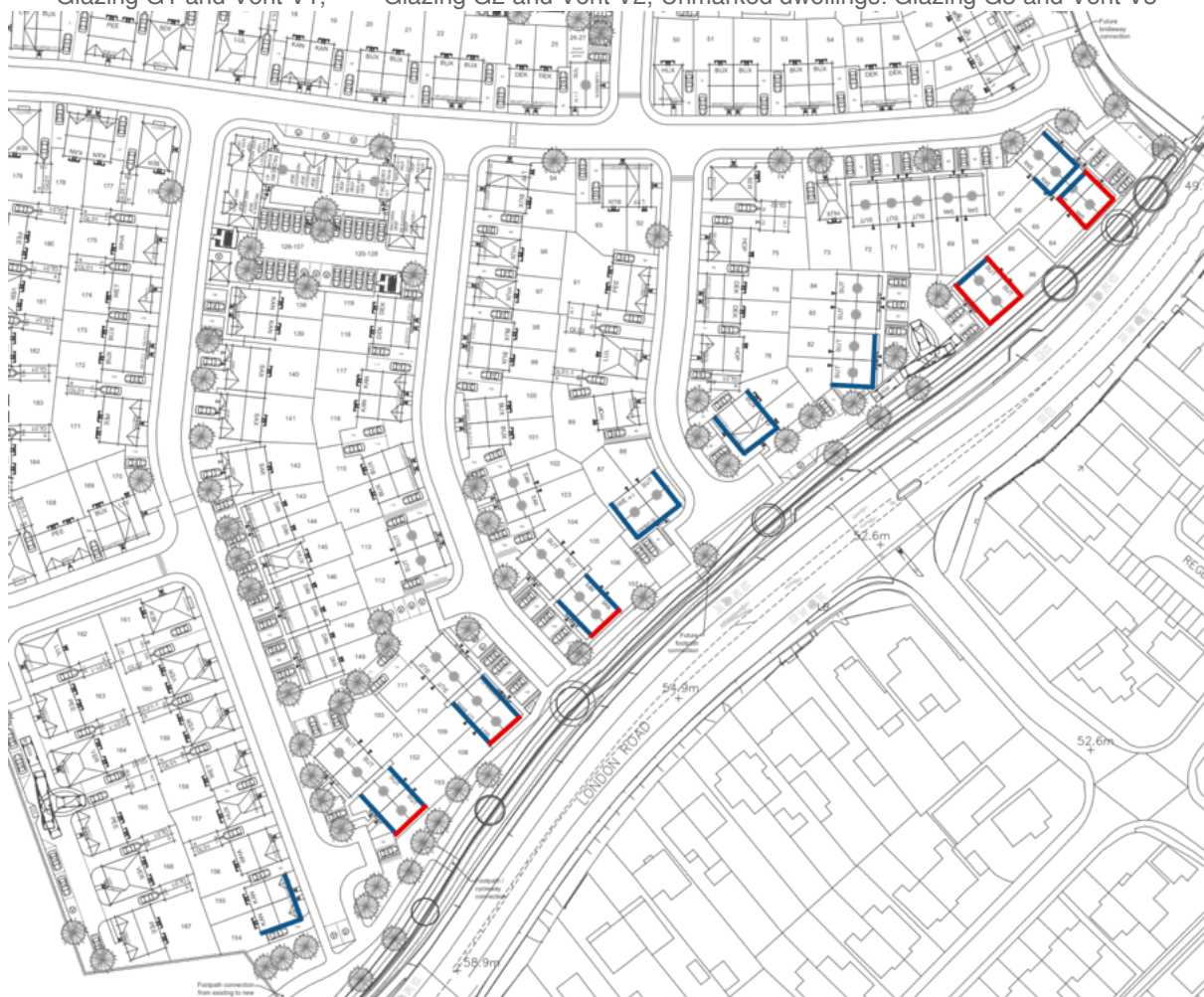


Image taken from Bloor Homes plan

5.24 For ease of build and to reduced chances of incorrect installations on site, glazing and ventilation specifications can be rationalised on a plot-by-plot basis, using the higher specification glazing/vent specified for any given plot. For example, if one façade of a plot requires Glazing G1 and Vent V1 and the other façades of the same plot require a lesser specification (i.e. G2 and V2), the whole plot could be provided with G1 and V1. The table below provides a summary of the required mitigation measures on a plot-by-plot basis, using the rationalisation method described above:

Table 3 Mitigation requirement by plot number

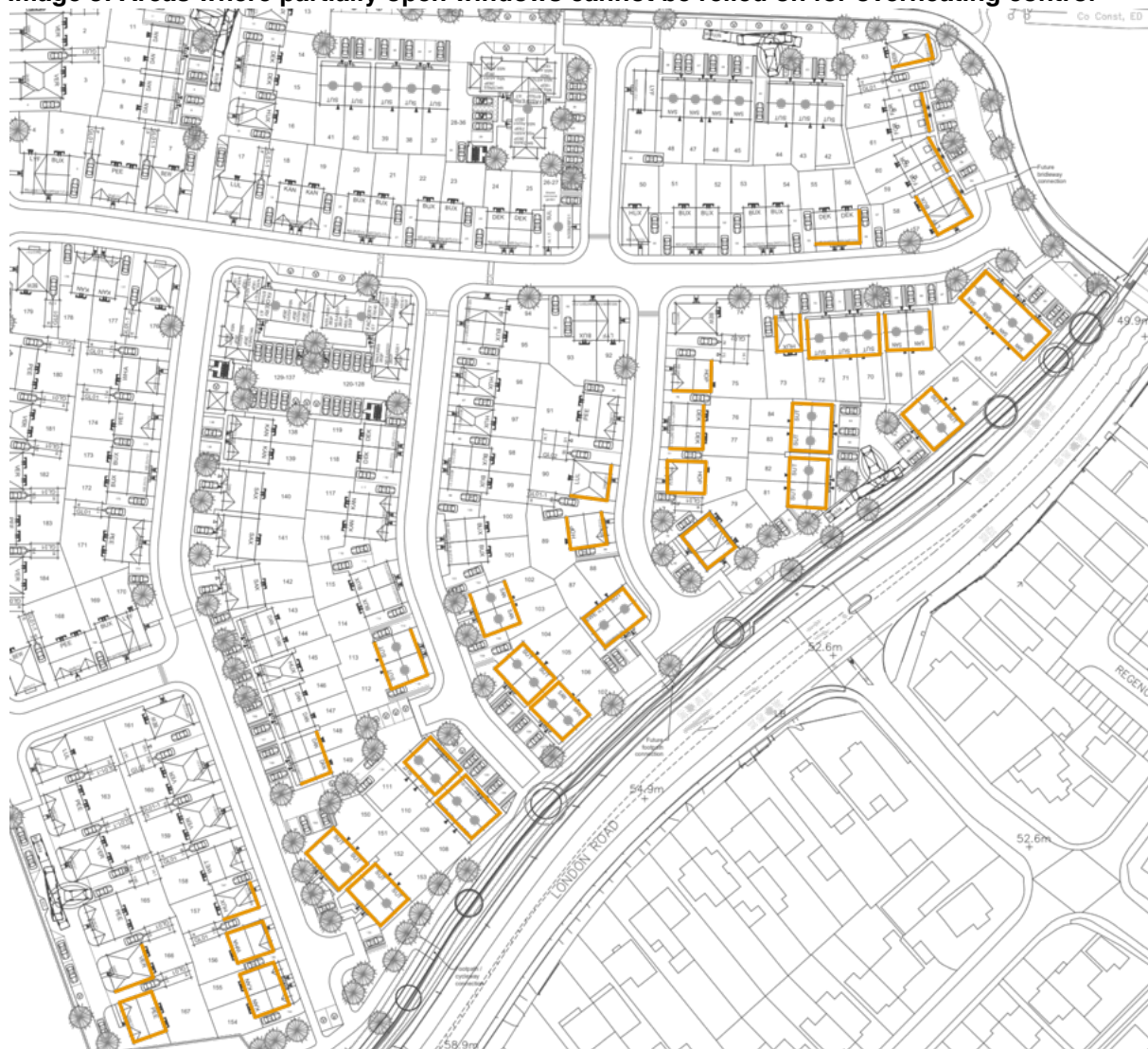
Glazing and Ventilator Requirement	Plot Number (s)
G1 + V1	64, 65, 85, 86, 107, 108,153
G2 + V2	66, 67, 79, 80, 81, 82, 87, 88, 106, 109, 152, 154, 155
G3 + V3	All other plots

5.25 Taking into account the various measures discussed in this section, it will therefore be possible to provide all dwellings with suitable internal noise conditions, including with windows partially open to a significant proportion of the site.

Control of Overheating

5.26 It has been determined that it will not be possible to rely on partially open windows for overheating control (in relation to the requirements of the ADO) for **bedrooms during the nighttime** on façades indicated in **orange** on **Image 8** below. For all other locations across the site, acceptable internal noise conditions are expected to be provided during periods of overheating, with windows partially open.

Image 8: Areas where partially open windows cannot be relied on for overheating control



5.27 The typical approach adopted by the developer is to provide appropriately specified boost fans/boosted MEV systems to provide the additional ventilation rates required by ADO to provide relief from overheating where noise levels are such that open windows cannot be used for this purpose.

5.28 The developer's energy compliance specialist has provided the following information with respect to how the requirements of ADO would typically be addressed, taking into account the scheme's noise constraints:

- A full dynamic simulation will be carried out using the TM59⁵ methodology as stipulated within Approved Document O (if deemed necessary).
- Guidance provided within the noise report on the extent to which openable windows may be utilised for purge ventilation as a component of the TM59 overheating assessment strategy will be taken into account.

⁵ TM59 - Design methodology for the assessment of overheating risk in homes (2017)

- Alternative means of ventilation will be provided to bedrooms in the identified areas through the use of additional fans, with a flow rate sufficient to meet the TM59 temperature criteria for bedrooms during sleeping hours. A dynamic simulation will be carried out for each plot that has acoustic constraints, in order that the specific overheating mitigation requirements are met.

5.29 It is therefore expected that potential overheating can be controlled while also addressing both the noise related requirements of the ADO and WCC's requirements in respect to overheating.

6.0 Conclusions

6.1 It is proposed to develop a residential scheme comprising circa 185 dwellings to the northwest of London Road, Waterloooville. A noise related condition attached to the outline application decision notice for the scheme requires that the impact of noise from London Road be assessed across the site to ensure that suitable noise levels can be achieved.

6.2 Suono have undertaken a noise survey on site to quantify the noise climate. This has formed the basis of a noise assessment, in which mitigation has been specified to achieve noise criteria set by the local planning authority.

6.3 Within Section 5.0, this report sets out details of the glazing and ventilation related measures required to control noise intrusion for the scheme to ensure suitable internal noise conditions for its future occupants. It also specifies heights and locations of noise barriers to ensure suitable noise levels are achieved within external amenity areas.

6.4 By implementing the scheme of noise mitigation set out within this report, all properties and their gardens across the development will be suitably protected from noise. It is therefore suggested that the requirements of condition 16 are met.



Appendix A: Noise Survey

Methodology and Instrumentation

An unattended noise survey was conducted on the site to quantify noise along London Road (the A3).

Noise measurements were undertaken at a single location indicated in **Image A.1** below and described in the following table. Measurements were taken between 13:00 on Monday 12th August to 13:45 on Wednesday 14th August 2024.

Image A.1 Location of noise measurement positions

— Approximate site location



Aerial image courtesy of Google Maps

Table 1.1. Measurement location

Location	Detail
MP1	Microphone at approximately 1.5 m above local ground level, at a horizontal distance of approximately 9 m from the nearest kerb edge of the A3. Measurements were unattended. The noise climate was controlled by road traffic noise on the A3.

Noise measurements were made using the equipment set out within the following table. The unattended sound level meter was fitted within a weatherproof enclosure, and the metres was

calibrated both before and after the survey to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

Table 1.2. Measurement equipment.

Location	Item	Detail
MP1	Sound level analyser	Svantek 971A
	Outdoor microphone kit	Svantek SA 271A
	Acoustic calibrator	Svantek SV33B

Measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the unattended and attended survey elements. One minute noise profile information was also recorded.

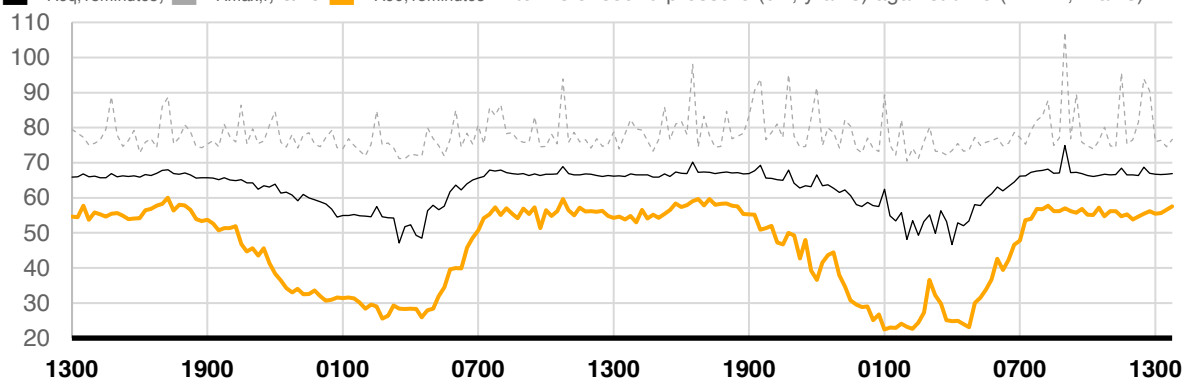
Results of the measurements are summarised in **Table 1.3.** and are shown in the following time history plot.

Table 1.3. Summary day and night noise levels at MP1

Position	Day Time (0700-2300)	Night Time (2300-0700)	
	dB $L_{Aeq,16hour}$	dB $L_{Aeq,8hour}$	dB $L_{Amax,f}^6$
MP1	67	59	78

Noise Measurement Results at Location MP1

■ $L_{Aeq,15minutes}$, ■ $L_{Amax,f}$, and ■ $L_{A90,15minutes}$ in terms of sound pressure (dB, y-axis) against time (hhmm, x-axis).



● ● ● ● ● — — ● — —

⁶ Based on 10th highest magnitude $L_{Amax,F}$ figure, considering 1-minute data during each of the night times of the survey.

Appendix B: Noise Modelling

Noise Modelling Software

An acoustic model of the site has been developed based on the *Bloor Homes* 'Site Layout' drawing, ref: SOxxx-SL-001L. This has been used to determine the noise levels across the site generated by the A3.

A computer-based noise prediction program (*Wölfel* IMMI version 24) has been used to determine the noise levels generated across the site by this noise source, using CRTN⁷ as a basis to determine noise propagation paths throughout the model.

This software allows for the calculation of noise levels at specific points around a model, from a series of noise sources simultaneously, or produce noise contour plots. The noise model used has taken account of the following effects:

- Distance
- screening
- Surface reflections
- Topography
- The surrounding built up area.

Topographical data for the site and its surrounds have been included within the model.

The noise source within the noise model has been calibrated as best as is reasonably practicable to the levels measured during the unattended noise survey. The noise survey position has been replicated within the model, day and night time noise level predictions have been calibrated to within ± 0.0 dB at MP1.

Noise Modelling Assumptions and Limitations

Assumptions have been made to allow for effective noise modelling to be undertaken.

The following building heights (taken from local ground level to the tallest point) have been used with the noise model:

- Houses: 9 m
- Garages: 4 m

The following window heights (to centre of windows) have been used within point calculations at the proposed building façades to determine the likely required façade noise mitigation:

- Ground Floor: 1.5 m
- First Floor: 4.5 m

Noise Contour Plots

Noise contour plots have been produced to illustrate the night time noise levels at second storey level and noise levels within external amenity areas with the proposed noise barriers in place. Within the contour plots, houses and garages are indicated by the grey boxes and the garden fences are indicated by the faint grey lines. The noise barriers are indicated by the black lines.

⁷ CRTN – Calculation of Road Traffic Noise, Department of Transport, 1988

Image B1: Baseline daytime (dB $L_{Aeq,16hour}$) noise contour at 1.5 m above local ground level

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Image B2: Baseline night time (dB $L_{Aeq,8hour}$) noise contour at 4.5 m above local ground level

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Image B3: Daytime (dB $L_{Aeq,16hour}$) noise contour at 1.5 m above local ground level (with dev.)

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Image B4: Daytime (dB $L_{Aeq,16hour}$) noise contour at 4.5 m above local ground level (with dev.)

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Image B5: Nighttime (dB $L_{Aeq,8hour}$) noise contour at 1.5 m above local ground level (with dev.)

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Image B6: Nighttime (dB $L_{Amax,t}$) noise contour at 4.5 m above local ground level (with dev.)

● <40, ● ≥40 to 45, ● ≥45 to 50, ● ≥50 to 55, ● ≥55 to 60, ● ≥60 to 65, ● ≥65 to 70, ● ≥70



Appendix C: Planning Policy and Guidance

National Policy

National Planning Policy Framework

The NPPF is the relevant document for defining the national policy toward noise sensitive development. The document was originally published in March 2012 and most recently updated in December 2023.

Paragraph 135 states that planning policies and decisions should ensure that developments:

“create places that [...] promote health and well-being, with a high standard of amenity for existing and future users...”

Further to this and on the subject of noise, paragraph 180 states that 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”

Paragraph 191 of the NPPF states:

“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;”*

Clause “a)” in paragraph 191 makes reference the Noise Policy Statement for England which is discussed in the following section.

The 'agent of change' principle is discussed in paragraph 193 of the NPPF. In terms of noise, this principle requires that those proposing a new noise sensitive development incorporate sufficient mitigation such that the operation of existing premises in the area is not unreasonably restricted in order to control noise impact upon the new development:

“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."

Noise Policy Statement for England

The NPSE (March 2010) also does not set quantitative guidelines for the suitability of noise sensitive development in an area depending on the prevailing levels of noise. Absent, therefore, is reference to specific noise thresholds which determine whether noise sensitive development is suitable and, if so, whether mitigation factors need to be considered.

Instead, the NPSE sets out the principle of "SOAEL, LOAEL and NOEL" which are defined as follows:

Significant Observed Adverse Effect Level (SOAEL): This is the level [of noise exposure⁸] above which significant adverse effects on health and quality of life occur.

Lowest Observed Adverse Effect Level (LOAEL): This is the level [of noise exposure²] above which adverse effects on health and quality of life can be detected.

No Observed Effect Level (NOEL): This is the level [of noise exposure²] 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.

Given the overall thrust of the NPSE, the SOAEL is an important assessment threshold although the NPSE also comments in section 2.22 that:

"It is not possible to have a single objective noise based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times."

Attention is drawn to the fact that the SOAEL is the level above which significant adverse effects can be observed. Importantly, it should be noted again in respect of the NPPF that the overall objective is to avoid or minimise significant adverse impacts; some degree of impact is acceptable, and it is not necessary or reasonable to seek to achieve no impact at all.

In addition to the principles set out above, the NPSE sets out three key aims:

The first aim of the Noise Policy Statement for England

"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

The second aim of the Noise Policy Statement for England

"Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

The third aim of the Noise Policy Statement for England

⁸ Additional text drawn from the Planning Practice Guidance Definition

“Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

Paragraph 2.24 of the NPSE states that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life. It also states that this does not mean that such adverse effects cannot occur.

Each development site must be judged on its ability to deliver on each of these aims, and while rating the prevailing noise against predefined thresholds is no longer necessary, defining the prevailing noise levels is an essential first step in assessing a given site under the current regime.

Planning Practice Guidance (PPG)

In March 2014 the Department for Communities and Local Government (DCLG) launched the national Planning Practice Guidance (PPG) web-based resource. The PPG on Noise (last updated in July 2019) expands upon the NPPF and NPSE and sets out more detailed guidance on noise assessment.

Like the NPPF and NPSE, the guidance does not include any specific noise levels but sets out further principles that should underpin an assessment. The PPG includes a section on noise, paragraph 003 of the which states:

“Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur;*
- whether or not an adverse effect is occurring or likely to occur; and*
- whether or not a good standard of amenity can be achieved.”*

It then refers to the NPSE and states that the aim is to identify where the overall effect of the noise exposure falls in relation to the relevant SOAEL, LOAEL and, by inference, the NOEL. Definitions for these thresholds are provided again with the PPG, which differ very slightly in wording to the NPSE, but are taken to be identical in their meaning.

In relation to the SOAEL, LOAEL and NOEL, the PPG makes the following important statement:

“Although the word ‘level’ is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs.”

The guidance then presents a table, which is reproduced in the following table. The implication of the final line of the table is that only the 'present and very disruptive' outcomes are unacceptable and should be prevented. All other outcomes (i.e. all other lines in the table) can be acceptable, depending upon the specific circumstances and factors such as the practicalities of mitigation.

On that basis, noise levels deemed to be below the SOAEL can be considered acceptable providing noise has been mitigated and reduced to a minimum.

Table 1.4. Planning Practice Guidance summary of noise exposure hierarchy.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
NOEL - No Observed Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL - Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

It is noteworthy that the PPG states that:

"Noise impacts may be partially offset if residents have access to one or more of:

- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;

- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony).
Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;

- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or

- a relatively quiet, protected, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance).

Guidance Documents

The ProPG and BS 8233:2014

The Professional Practice Guidance on Planning & Noise – New Residential Development, 2017 (ProPG) was prepared by the Institute of Acoustics, the Chartered Institute of Environmental Health and the Association of Noise Consultants.

In relation to residential development, the ProPG builds on the principles and criteria set out BS 8233:2014 – Guidance on sound insulation and noise reduction for buildings (BS 8233).

While the ProPG it is helpful in many ways, it must be noted that the guidance and supplementary documents “does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate”.

Section 2.27 of the ProPG states:

“It is considered that suitable guidance on internal noise levels can be found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”. Table 4 in Section 7.7.2 of the standard suggests indoor ambient noise levels for dwellings (when unoccupied) and states that “in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”. The standard states (Section 7.7.1) that “occupants are usually more tolerant of noise without a specific character” and only noise without such character is considered in Table 4 of the standard.”

Indeed, ProPG expands on the advice and notes of BS 8233 Table 4, with relevant sections presented below:

Table 1.5. BS8233/ProPG internal noise criteria

Activity	Location	Internal Ambient Noise Level	
		Daytime (0700-2300)	Night time (2300-0700)
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 $L_{Aeq,8hour}$ 45 dB $L_{Amax,f}$ (Note 4)

Note 4

“... In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events”

Note 5

“... Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded subject to the further advice in Note 7.”

Note 7

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.”

With respect to external amenity spaces, ProPG again points to BS 8233 that states:

“the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$...”

“... These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”

The above thresholds (adjust as necessary taking into account the relevant notes) are taken to correspond to LOAELs, when considered in relation to the PPG and NPSE.

The ProPG sets out the principle of the “Acoustic Design Statement” (ADS) in which noise is quantified and assessed, and mitigation measures determined in line with the methodology set out therein. The preparation of an ADS is not relevant or appropriate for all sites, however many of the principles are those which would typically be adopted when preparing noise assessment for planning submissions etc.

Features which may be included within an ADS comprise:

- An initial site noise risk assessment;
- A description of external site noise levels before and after mitigation measures;
- Demonstrations of good acoustic design principles;

- Details of how internal noise guidelines will be achieved;
- Assessment of the impact of $L_{Amax,F}$ noise levels where guidelines values are exceeded;
- An aim to achieve internal noise guidelines with windows open where practical, noting this approach will not necessarily be possible. Due consideration should be given to ventilation and thermal comfort with windows closed;
- Acoustic design to achieve good living conditions where internal noise guidelines can only be achieved with windows closed (noting the guidelines are not applicable when windows are open to provide purge ventilation);
- Information regarding the steps taken to minimise overheating where this is relevant to noise;
- A consideration of noise to external amenity areas;
- A presentation of the findings of the assessment, resulting noise impacts and any mitigation measures that may be required.

With regard to the initial site noise risk assessment, the ProPG sets out the following table. It is important to understand that a site with external noise levels categories as high risk does not mean that site is necessary unsuitable for development. Instead, it means that a good acoustic design process must be followed to ensure suitable conditions are provided to future occupants.

Image 1: ProPG Stage 1 Initial Site Risk Assessment

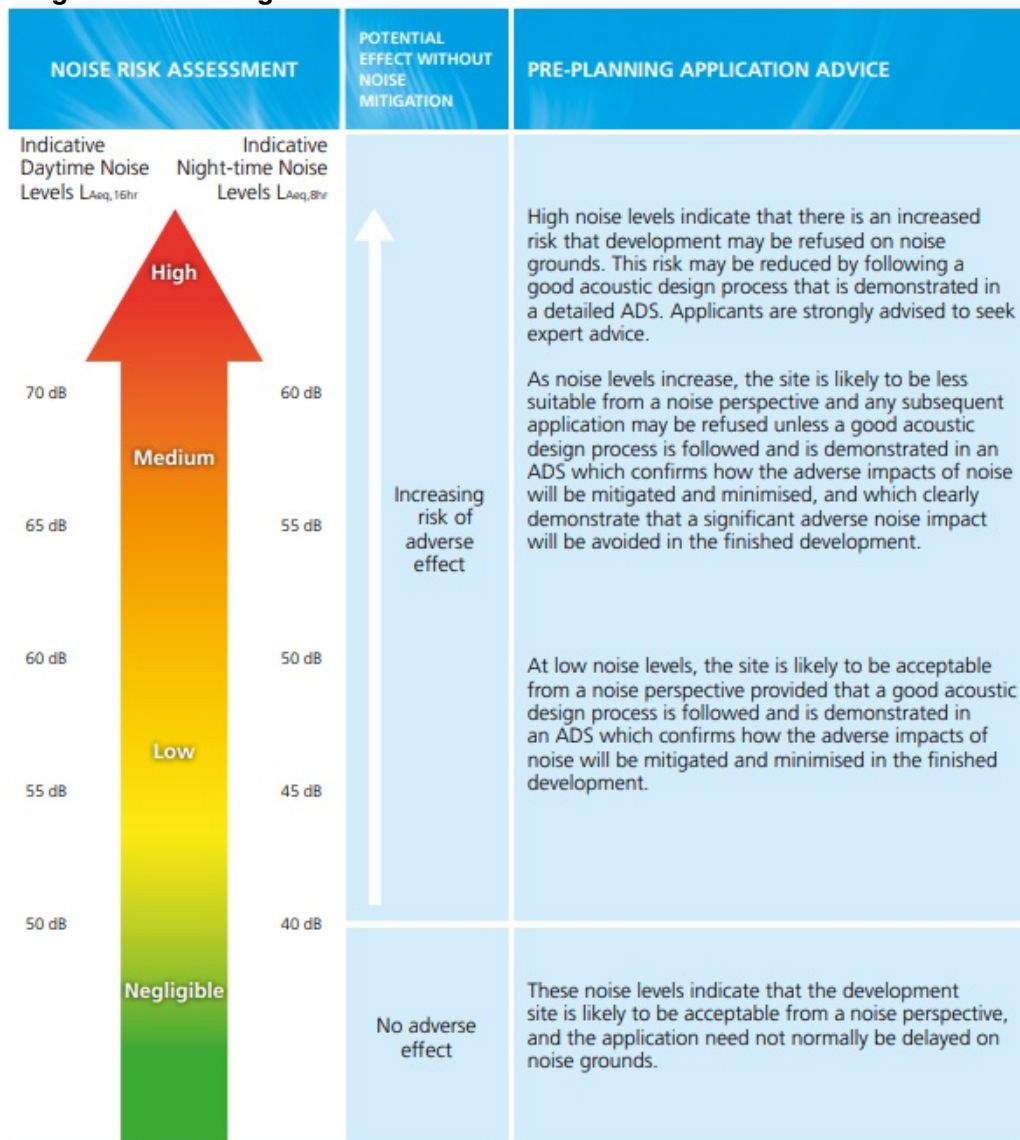


Figure 1 Notes:

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

As neither the ProPG of BS 8233 form statutory guidance or regulations, it falls to the acoustics practitioner (or other similar party) to determine how the documents should be interpreted and how their contents are applied to any given scheme.

Building Regulations Approved Document O: Overheating

The Building Regulations Approved Document O (ADO) on overheating was published In December 2021. It sets out requirements to ensure that overheating (and related effects) within new residential buildings are suitably controlled.

ADO took effect on 15 June 2022 in England but does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building was started before 15 June 2023.

The statutory, legal requirements of ADO are replicated below, with particular attention drawn to part O1(2)(a):

Requirement O1(2)(a)

This section deals with requirement O1(2)(a) of Schedule 1 to the Building Regulations 2010.

Requirement	
Requirement	Limits on application
O1 Overheating mitigation	
(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to—	
(a) limit unwanted solar gains in summer;	
(b) provide an adequate means to remove heat from the indoor environment.	
(2) In meeting the obligations in paragraph (1)—	
(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and	
(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.	

Intention

In the Secretary of State's view, requirement O1(2)(a) is met in a new residential building if the building's overheating mitigation strategy for use by occupants takes account of all of the following.

- Noise at night – paragraphs 3.2 to 3.4.
- Pollution – paragraph 3.5.
- Security – paragraphs 3.6 and 3.7.
- Protection from falling – paragraphs 3.8 to 3.10.
- Protection from entrapment – paragraph 3.11.

It can be seen that accounting for potential noise effects at night is an important consideration when addressing the requirements of part O1(2)(a), in relation to ensuring the "reasonable enjoyment of the residence".

Section 3.2-3.4 of ADO sets out the following guidance with respect to noise. This does not form part of the statutory requirement but serves as guidance for how, in the Secretary of State's view, noise should be addressed when considering overheating:

Noise

- 3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).
- 3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.
- 40dB $L_{Aeq,T}$ averaged over 8 hours (between 11pm and 7am).
 - 55dB L_{AFmax} more than 10 times a night (between 11pm and 7am).
- 3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' *Measurement of Sound Levels in Buildings* with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the *National Model Design Code: Part 2 – Guidance Notes* (MHCLG, 2021) and the Association of Noise Consultants' *Acoustics, Ventilation and Overheating: Residential Design Guide* (2020).

The language of the text preceding the “limits” in section 3.3 suggest that these could be taken as guideline figures to assist the designer in identifying where noise issues may arise. The guidance does not state that noise levels must not exceed the “limits”, or that windows would always be shut where the above thresholds are exceeded, only that “windows are likely to be closed during sleeping hours” under such noise conditions.

At time of writing draft acoustics industry guidance on the interpretation of the ADO is subject to consultation (discussed in the following section). It may therefore be necessary to revise the approach regarding how overheating is considered in the context of noise.

It is important to note that in the context of ADO, the use of mechanical ventilation (e.g. MVHR) is considered a “passive means” of cooling a building. As per the requirements of ADO, “mechanical cooling” such as air conditioning may only be considered where all other passive methods of cooling are found to be insufficient.

Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O, July 2022 (Draft for Consultation)

The above-titled guide provides guidance for practitioners when implementing the requirements of Approved Document O. It is stated as being designed to assist the industry in the understanding of what is published in the regulation and provides interpretation and clarification on the content of the published regulation. The guidance set out within the document must however be given an appropriate weight in relation to its draft status and may be subject to change.

The following external noise thresholds are set out in table 1 of the guidance, which relate to high and moderate overheating risk areas (as described within ADO):

Table 1 External Noise Levels Above Which the Simplified Method Cannot Be Used

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,8hr}$ averaged over 8 hours (between 11pm and 7am)	44 dB	49 dB
L_{AFmax} more than 10 times a night (between 11pm and 7am)	59 dB	64 dB

Note: Several assumptions have been used to determine the outside-to-inside level difference. These are: 2.4m bedroom height, 0.5s bedroom RT, simple hole in the facade of area sufficient to provide the required equivalent area, no sound transmission other than via the opening. Calculation according to Equation G.1 of BS 8233:2014 [Ref. 7].

The table sets external noise thresholds based on achieved the 40 dB $L_{Aeq,8hour}$ level set out in ADO, but with a 4 dB reduction in noise offered by an open window in high overheating risk areas (based on an approximation of extended open areas) or a 9 dB reduction in moderate-risk locations.

As Waterlooville falls outside of London (and the other areas identified in Appendix C of the ADO), it is classed as a having a “moderate” overheating risk when considered in accordance with the simplified method set out within the ADO. Therefore, external level of 49 dB $L_{Aeq,8hour}$ and 64 dB L_{AFmax} can be taken as a pessimistic thresholds to identify where open windows could not be used to control overheating effects. This is on the basis that windows would be circa 30° open.

Appendix A of the guide provides a method for calculating the potential loss through a partially open window where further detailed assessment is required. The calculation method is replicated below:

To estimate the internal noise level from the predicted acoustic open area, Equation G.1 of BS 8233:2014 can be used, reduced for a single element as follows:

Equation 1

$$L_2 = L_{1,ff} - R + 10 \log \left(\frac{ST}{V} \right) + 11$$

Where:

L_2 is the internal level

$L_{1,ff}$ is the free-field external level (i.e. assumed to be 3 dB lower than a level 1m away from the façade according to BS 8233)

R is the sound reduction index, assumed to be zero for the open area, S (m²)

T is the reverberation time, 0.5 seconds for the standardised internal level

V is the room volume (m³). Consider as the floor area x room height.

S, open area as a fraction of floor area, e.g. 0.05 x floor area.

The floor areas cancel, and for 5 % of the floor area to be open and a room height of 2.4 m:

Equation 2

$$L_{1,ff} - L_2 = 0 - 10 \cdot \log \left(\frac{0.05 \times 0.5}{2.4} \right) - 11 = 9 \text{ dB}$$

AVO Residential Design Guide, 2020

The Acoustics, Ventilation and Overheating Residential Design (AVO) Guide, prepared by the Association of Noise Consultants was written to provide guidance on the control of noise in the context of overheating control. It is noteworthy that this guidance was published before both the ADO and ANC guidance set out in the previous section and therefore has to a large degree been superseded. It is still however useful reference and a helpful guide for context.

A key principle of the AVO is that internal noise in excess of the normal criteria set out within the ProPG and BS 8233:2014 are acceptable during the overheating condition, when open windows are used to provide a cooling effect. The amount by which internal noise conditions may be elevated is related to the duration over which overheating occurs and the guidance regencies the numerous methods to control overheating (beyond simple open windows).

Where external noise levels are equal to or fall below circa 53 dB $L_{Aeq,16hour}$ or 48 dB $L_{Aeq,8hour}$ the use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect. Above these thresholds, it is for the acoustics practitioner to determine the potential for adverse effect.

Where external noise levels are high (above approximately 65 dB $L_{Aeq,16hour}$ or 55 dB $L_{Aeq,8hour}$) a “Level 2 assessment” is recommended, where the internal noise levels in the above BS 8223 table are effectively taken as the LOAEL.

Interpreted values of the AVO guide Table 3-3 (for Level 2 assessment) are repeated below with reference to the PPG thresholds for clarity.

Table 1.6. Summary of AVO Criteria

Bedroom Internal Ambient Noise Level (with windows open)			Action
Daytime $L_{Aeq,16hour}$	Night $L_{Aeq,8hour}$	Night $L_{Amax,F}$	
NOAEL – No Observed Adverse Effect Level			
≤ 35 dB	≤ 30 dB	Not normally exceeding 45 dB more than 10 times per night	No specific measures required
LOAEL - Lowest Observed Adverse Effect Level			
35 dB	30 dB	Exceeding 45 dB more than 10 times per night but not exceeding 65 dB	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
50 dB	42 dB	Normally exceeds 65 dB	Avoid / Prevent

The implication is that for circumstances where additional ventilation is necessary for cooling, but internal noise levels with windows open are between the LOAEL and a SOAEL, means to reduce noise should be introduced where possible but it is not necessary to achieve the BS 8233 levels.

