

Note

Title	Acoustic Opportunities and Constraints		
Project	Berewood Phase 8, Waterloooville		
Reference	295A.NT.2.0	Author(s)	FD
Date	5 November 2024	Reviewer	RM

Introduction

1. It is proposed to develop a residential scheme comprising circa 185 dwellings to the northwest of London Road, Waterloooville. This note provides details of an acoustic review undertaken for the site, setting out developmental opportunities and constraints that should be borne in mind when developing the site layout. A more detailed noise assessment report will be produced in due course, once the site layout has been suitably developed.

Site Location and Planning Context

2. The site is located adjacent to London Road, Waterloooville 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

3. 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.”

4. 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.

5. 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.”

6. 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*’.

7. 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.”

8. 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.”

9. 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.”

10. 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.

Requirements

11. The following criteria have been adopted at this stage. The guidance and standards these have been derived from are not set out here for the sake of brevity, but will be presented formally as part of the detailed noise assessment that will be prepared in due course.

- 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 $\leq 45 \text{ dB } L_{Amax,r^2}$;
- External amenity areas (or parts thereof): aspirational threshold of $\leq 55 \text{ dB } L_{Aeq,16\text{hour}}$ ³.

12. 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.

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

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.

14. 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).

15. 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).

Site Survey

16. 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**. Measurements were taken 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.

17. 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: Noise measurement position



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)

18. 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

Opportunities and Constraints

Noise Model

19. A computational noise model of the site has been developed. The model has been created using digital plans of the site and wider area, and 1 m topographical contours produced from *DEFRA* survey data. Noise from the A3 in terms of $L_{Aeq,T}$ has been modelled using the CRTN⁵ method and noise in terms of L_{Amax} has been modelled using the ISO 9613⁶ method. Day and night time noise contour plots in terms of $L_{Aeq,16hour}$ at 1.5 m and $L_{Aeq,8hour}$ at 4.5 m respectively are set out in **Figures 3** and **4**.

20. A hypothetical site layout (drawing number SOxxx-SL-001C) has been included within the noise model to allow for the evaluation of site conditions in respect to a proposed development. This layout should be taken as indicative and for discussion only; it is subject to change and development.

⁵ Calculation of Road Traffic Noise, Department of Transport, 1988

⁶ Acoustics – Attenuation of sound during propagation outdoors, ISO 9613, 1993

Image 3: Daytime Noise Contour Plot with development

Noise level in terms of dB $L_{Aeq,16hour}$ 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 4: Night Time Noise Contour Plot with development

Noise levels in terms of dB $L_{Aeq,8hour}$ 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



Control of external noise levels

21. Taking into account the indicative layout previously discussed, it is possible that noise levels within some external amenity areas closest to the A3 could be above the target of 55 dB $L_{Aeq,16hour}$. This includes plots 64, 80, 81, 86, 106, 107, 108, 154, 167.

22. Significantly increased buffer zones between the dwellings at A3 are not deemed to be practicable mitigation measure in this instance due to space constraints on the site. Should there be any opportunities to increase the distances between the A3 and proposed dwellings however, such changes should be implemented. Similarly, large roadside acoustic screening is not considered practicable for visual and other non-acoustic reasons.

23. Two main options remain to reduce external noise levels affecting external amenity spaces across the site. In the first instance, if practicable the layout should be altered so that external amenity areas closest to the A3 are screened from the A3 by their associated dwelling. In particular, this is recommended for plots 64, 65, 85 and 86 (which will otherwise require localised screening of significant height as discussed later in this section), but the same principle should ideally be implemented for all external amenity areas adjacent to the A3. This is the preferred approach considering good acoustic design when trying to achieve the criteria.

24. If it is not practicable to significantly alter the layout, localised acoustic screening will be required to the affected garden areas. Based on the unchanged indicative layout, the hypothetical locations and heights (relative to local ground level) of these screens are indicated on **Image 5**.

Image 5: Example external amenity area acoustic screening



25. If there is a preference to make use of acoustic screening rather than reorientating dwellings, the screening must be of an imperforate construction and have a mass no less than 10kg/m². There are numerous options to achieve the above, however examples of suitable constructions include closeboard timber fencing or solid brick walls.

26. Where particularly tall acoustic screens would be required if the layout cannot be changed, there is a balance to be struck between achieving the aspiration noise criteria and other aspects of design such as visual matters, sunlight considerations and costs. It may be that marginally higher noise levels (and therefore less tall screens) could be accepted in some garden areas if balanced against other constraints.

27. It is important to note that the acoustic screening specifications shown in **Image 5** should not be taken as absolute requirements, rather mitigation considerations that may apply, depending on the site layout that is developed in due course. The key principle is that it is entirely possible to provide external amenity areas which are subject to noise conditions meeting the relevant criterion.

Control of Internal Noise Levels

28. Considering good acoustic design principles and as previously noted, the dwellings closest to the A3 should be set back from the A3 by as much as is reasonably practicable to reduce noise levels incident on the proposed dwellings.

Partially open windows

29. Taking into account screening effects provided by dwellings across the proposed hypothetical layout, and on the assumption that a partially open window can provide a loss from free field external noise level 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**:

Image 6: Extent of site where internal noise criteria are achieved with partially open windows



Highly indicative only and subject to change based on final layout

30. 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.

Façade-based Noise Mitigation

31. Again, considering the currently proposed hypothetical layout, 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..

32. 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.

33. 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.

34. 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.

35. 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.

36. 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	<i>Glidevale</i> Fresh 80 dB	$D_{n,e}$	29	33	44	46	49	57
Vent V2	<i>Glidevale</i> 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 V2, — Glazing G2 and Vent V2, Unmarked dwellings Glazing G3 and Vent V3



Image taken from Bloor Homes plan

37. For ease of build and 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 V2 and the other façades require a less spec (i.e. G2 and V2), the whole plot could be provided with G1 and V2.

38. 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

39. 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 night time** 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



40. 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.

41. 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 TM59⁷ methodology as stipulated within Approved Document O (if deemed necessary).
- Guidance provided within 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.
- Alternative means of ventilation will be provided 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.

42. 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.



⁷ TM59 - Design methodology for the assessment of overheating risk in homes (2017)

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 3 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 4 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.

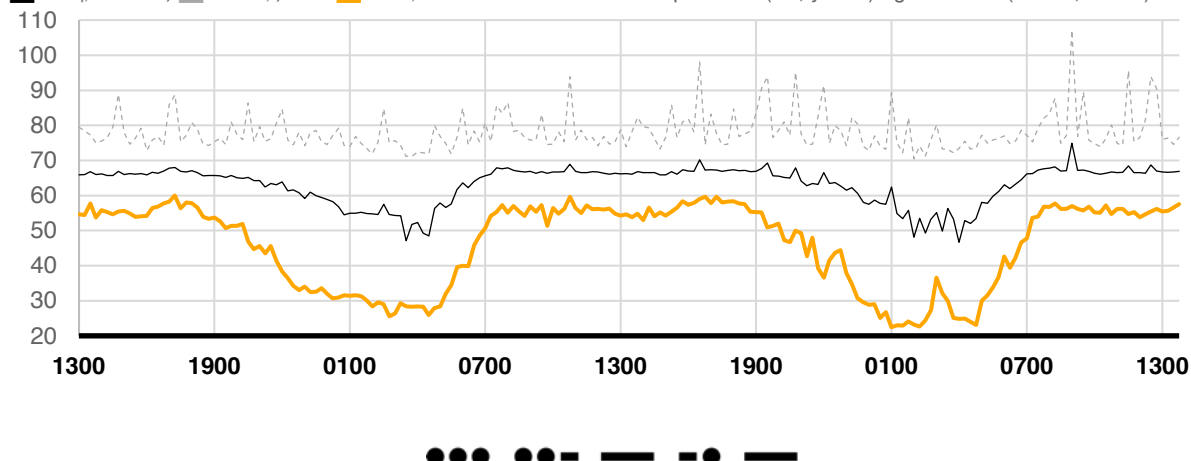
Results of the measurements are summarised in **Table 5** and are shown in the following time history plot.

Table 5 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 $L_{Amax,f}^8$
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).



⁸ Based on 10th highest magnitude $L_{Amax,F}$ figure, considering 1-minute data during each of the night times of the survey.