Land East and West of Hyde End Road, Shinfield

Planning Noise Assessment

Report 2949.RP.1.4 // 6 August 2025

prepared for

University of Reading

and

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Contents

1.0 Introduction

1.1 Planning permission is to be sought for the development of 184 new dwellings together with associated hard and soft landscaping, drainage infrastructure, parking, access and associated works off Hyde End Road, Shinfield.

1.2 This report sets out an assessment of noise to the proposed residential development. Noise related local and national planning policy and guidance have been considered, noise conditions across the site have been quantified, good acoustic design practices have been considered, and an assessment has been undertaken to guide the noise control strategy for the scheme.

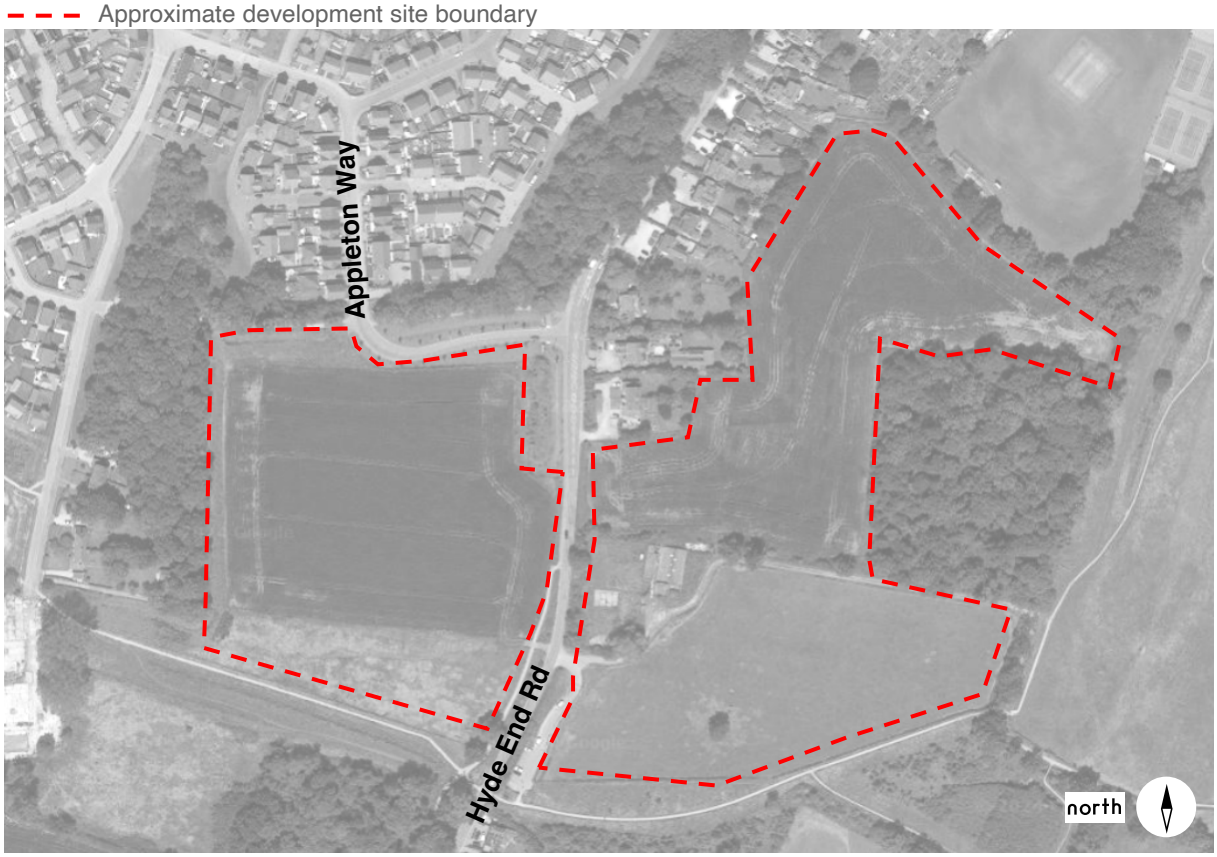
2.0 Site Locality and Planning Context

Wider Site Location and Description

2.1 The proposed development site is to be located within two parcels of land separated by Hyde End Road, on the southern boundary of Shinfield. The approximate extent of the site can be seen outlined in **red** on the following **Image 1**.

Image 1: Aerial photograph showing site location

Approximate development site boundary



Aerial imagery courtesy of Google

Development Proposals

2.2 The current development proposals include the construction of 184 no. dwellings (C3 Use Class) together with associated hard and soft landscaping, drainage infrastructure, parking, access and associated works. This will occupy the majority of the available space within the site boundaries as approximately indicated within **Image 1**. Vehicular access will be provided to the site via both Hyde End Road and Appleton Way.

Planning Context

2.3 The site is within the jurisdiction of Wokingham Borough Council (WBC). Liaison with Chris Christofis, Senior Environmental Protection Officer at WBC has highlighted the council's noise policy CC06 as a basis for assessment of noise to new residential developments, set out below for ease of reference and which have been considered throughout the assessment works:

> *'Policy CC06: Noise*
>
> *1. Proposals must demonstrate how they have addressed noise impacts to protect noise sensitive receptors (both existing and proposed) from noise impacts in line with Appendix 1 of the MDD.*
>
> *2. Noise impact of the development must be assessed. Where there is no adverse impact (No Observed Effect Level) then noise will not be a material consideration.*
>
> *3. Where there is an adverse effect (Lowest Observed Adverse Effect Level to Significant Observed Adverse Effect Level), then*
>
> > *a) The development layout must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.*
> >
> > *b) Where there is still an adverse impact then internal layout must be reviewed. Where this results in there no longer being an adverse impact then design and measures should be incorporated accordingly.*
> >
> > *c) Where there is still an adverse impact then physical mitigation measures such as barriers/mechanical ventilation must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.*
> >
> > *d) Where there is still an adverse impact and the development falls within the significant observed adverse effect level then planning permission will normally be refused.'*

3.0 Design Criteria

3.1 In lieu of specific guidance on assessment criteria from WBC, the following acoustic design criteria have been adopted, which are based upon relevant national standards and guidance documents[1].

[1] Largely drawn from BS 8233:2014 – "*Guidance on sound insulation and noise reduction for buildings*" and the ProPG: Planning & Noise 2017.

- Bedrooms and living rooms (daytime[2]): 35 dB $L_{Aeq,16hr}$;
- Bedrooms (night time[3]): 30 dB $L_{Aeq,8hr}$ and 45 dB $L_{Amax,F}$ not normally exceeded more than 10 times per night.

- External amenity areas (or parts thereof): aspirational target of 55 dB $L_{Aeq,16hr}$[4]

3.2 Additionally, to satisfy the noise requirements of the Building Regulations Approved Document O (ADO), in locations where external free field noise levels exceed 50 dB $L_{Aeq,8hr}$ and / 65 dB $L_{Amax,f}$ during the night time period, it is necessary to provide a building overheating control strategy that does not rely on partially open windows to bedrooms at night. As discussed later in this report, the above approach is based upon acoustics industry guidance[5] on how to demonstrate compliance with the Building Regulations Approved Document O and may be subject to change should the guidance be revised.

4.0 Noise Survey

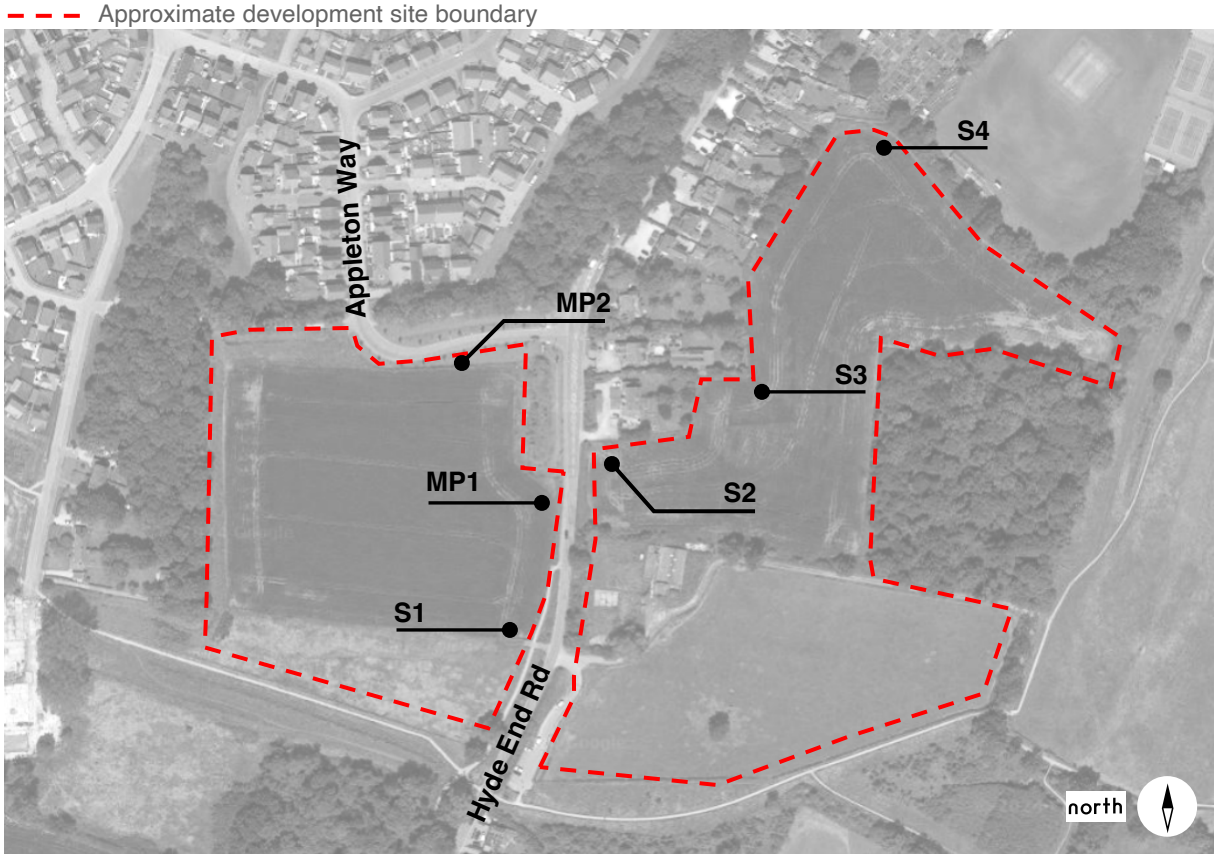
4.1 An unattended noise survey was undertaken at free field positions between 1730 on Thursday 27th June and 1730 on Monday 1st July 2024. The unattended measurement positions are denoted as 'MP1' and 'MP2' on the following **Image 2**.

4.2 Additional attended spot-check measurements were also undertaken at the positions labelled 'S1' to 'S4' on the following image. The unattended noise monitor at MP1 remained operational to establish the deviation of noise levels across the site.

[2] Daytime is taken to relate to the period between 07:00 and 23:00
[3] Night-time is taken to relate to the period between 23:00 and 07:00
[4] Noting that it may not be practicable to achieve this in all areas.
[5] Approved Document O Noise Guide, Version 1.1 (IoA and ANC, November 2024)

Image 2: Aerial photograph showing noise measurement locations

Approximate development site boundary



Aerial imagery courtesy of Google

4.3 The measurement positions were chosen to be representative of noise ingress to the proposed residential development from Hyde End Road and Appleton Way surrounding the site as labelled on **Image 2**.

Results

4.4 Time history graphs illustrating the captured results of the unattended noise monitoring are set out within the attached **Appendix A**.

4.5 Daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$ period noise levels along with the typical $L_{Amax,f}$ event noise levels recorded over the course of the unattended noise survey are set out within **Table 1**, with the corresponding octave band spectra set out within the attached **Appendix A**.

Table 1 Summary period noise levels measured during the unattended noise survey

Measurement Position	Daytime (0700-2300)	Night-time (2300-0700)	
	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{Amax}
MP1: Site central area, along Hyde End Road	63	54	75
MP2: Site northern boundary with Appleton Way	54	52	65

4.6 Ambient noise levels across the site were controlled by road traffic noise along Hyde End Road and Appleton Way, with some distant construction noise to the west noted.

5.0 Noise Assessment

Computational Model

5.1 An acoustic noise mapping program, *Wölfel Meßsysteme* "IMMI 2024", has been used to model noise propagation across the proposed development. The local area, existing site buildings and proposed development have all been modelled using provided drawings and plans, including information on expected building heights. The model used CRTN[6] and ISO 9613[7] to calculate noise propagation from Hyde End Road and Appleton Way across the site.

5.2 Source emission levels within the model have been calibrated to ensure predictions at the unattended and spot measurement positions shown previously on **Image 2** correspond closely to the levels measured at the site.

5.3 The modelled development layout is based on the *Pegasus Group* 'Detailed Site Layout' drawing (ref: P24-0288_DE_01_W_23, dated 28th March 2025). All new dwellings featured within the model have been set to a height of 7 metres above local ground level, with garages set to a height of 3.5 m and brick walls at a height of 1.8 m. It is noteworthy that the current detailed site layout drawing has reference P24-0288_DE_01_ZD_23 and is dated 31 July 2025. Acoustically the July drawing version, is not materially different from the March version so the noise model remains based on the previous drawing.

5.4 The following window heights (to centre of windows) have been used within contour and 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.

Baseline Noise Conditions

5.5 The following **Image 3** shows the predicted daytime, baseline noise conditions (in terms of $L_{Aeq,16hr}$) across the proposed RMA3 development site, based on the results of the noise surveys. Baseline noise predictions/contours have also been prepared for the night-time and are included within the attached **Appendix B** for the sake of brevity.

[6] Calculation of Road Traffic Noise, Department of Transport, 1988

[7] ISO 9613-1:1993 – Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere

Image 3: Site Baseline – daytime noise contour plot

Daytime noise levels in terms of dB $L_{Aeq,16hr}$ at 1.5 metres above local ground level

Good Acoustic Design and Layout Development

5.6 The proposed layout has been developed to mitigate noise where practicable, taking into account the other non-noise related constraints that exist on the site. This is achieved through incorporating good acoustic design practices, such as careful building placement and orientation.

5.7 The use of large noise barriers/bunds as a primary mitigation measure to control noise from Hyde End Road was not practicable due to the space available and visual/layout constraints. It is also not considered good placemaking in this instance. Dwellings are set back from the site boundaries on either side of the road to provide acoustic 'buffer zones'.

5.8 With respect to the development of the site layout, where practicable and taking into account non-acoustic factors, such as access, dwellings have been orientated such that garden areas are screened from noise sources by their attached dwellings or brick walls where necessary. This approach has reduced noise across the wider development site beyond the initial rows of dwellings (relative to Hyde End Road and Appleton Way).

5.9 The location and nature of the proposed development site means that dwellings will inevitably be affected (to varying degrees) by road noise but the layout has been optimised as far as practicable to minimise these noise impacts. The implementation of the measures set out within this report mean that a suitable noise climate can be expected to be provided both internally and externally, in line with the requirements of WBC.

5.10 Noise contour plots illustrating the noise levels across the proposed development layout are presented as **Image 4** and **Image 5** for daytime and night-time respectively. Baseline noise contours for the existing site without any development are included in the attached **Appendix C** for the sake of brevity.

Image 4: Daytime noise contour plot with development

Daytime noise levels in terms of dB $L_{Aeq,16hr}$ at 1.5 metres above local ground level

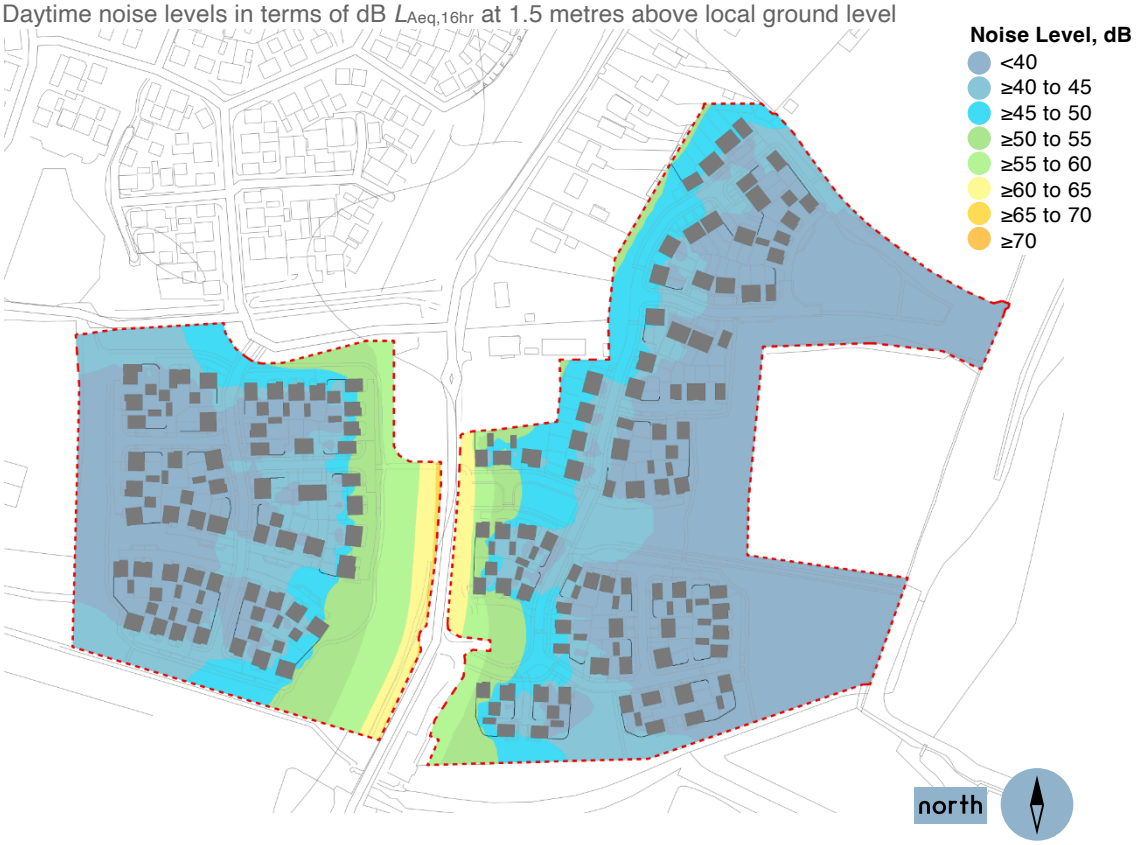
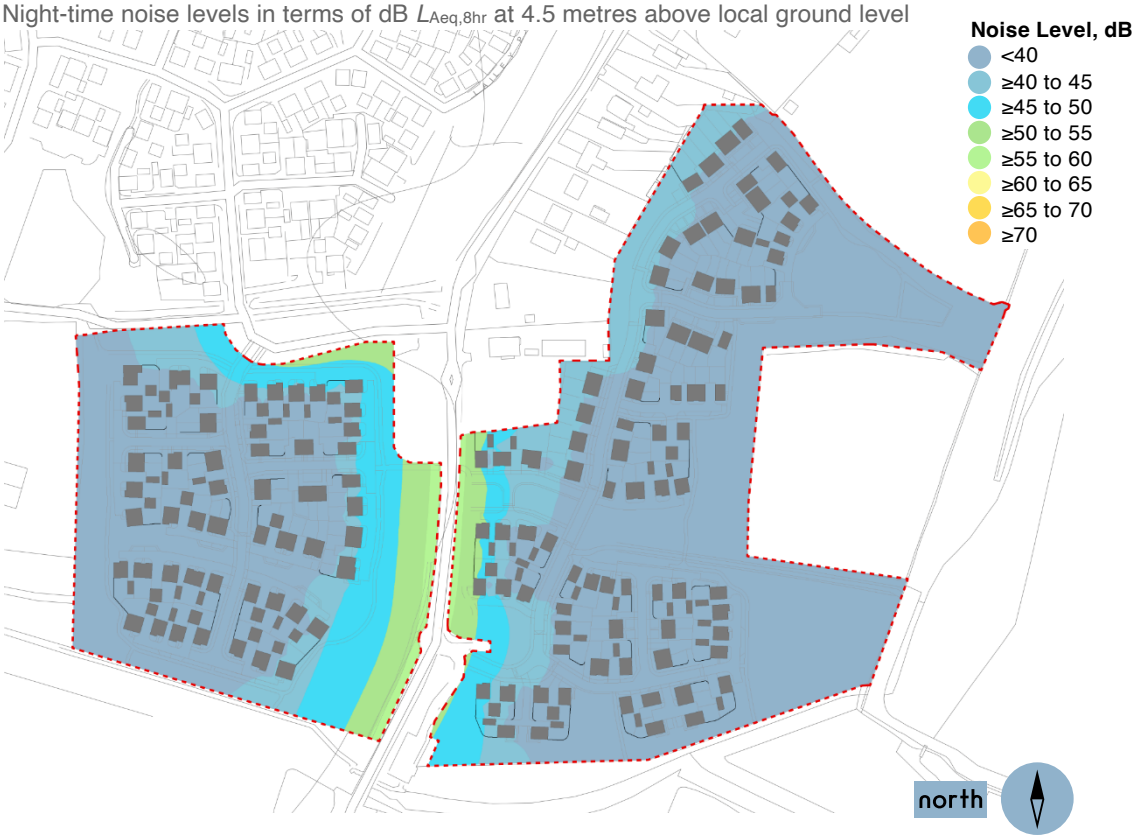


Image 5: Night-time noise contour plot with development

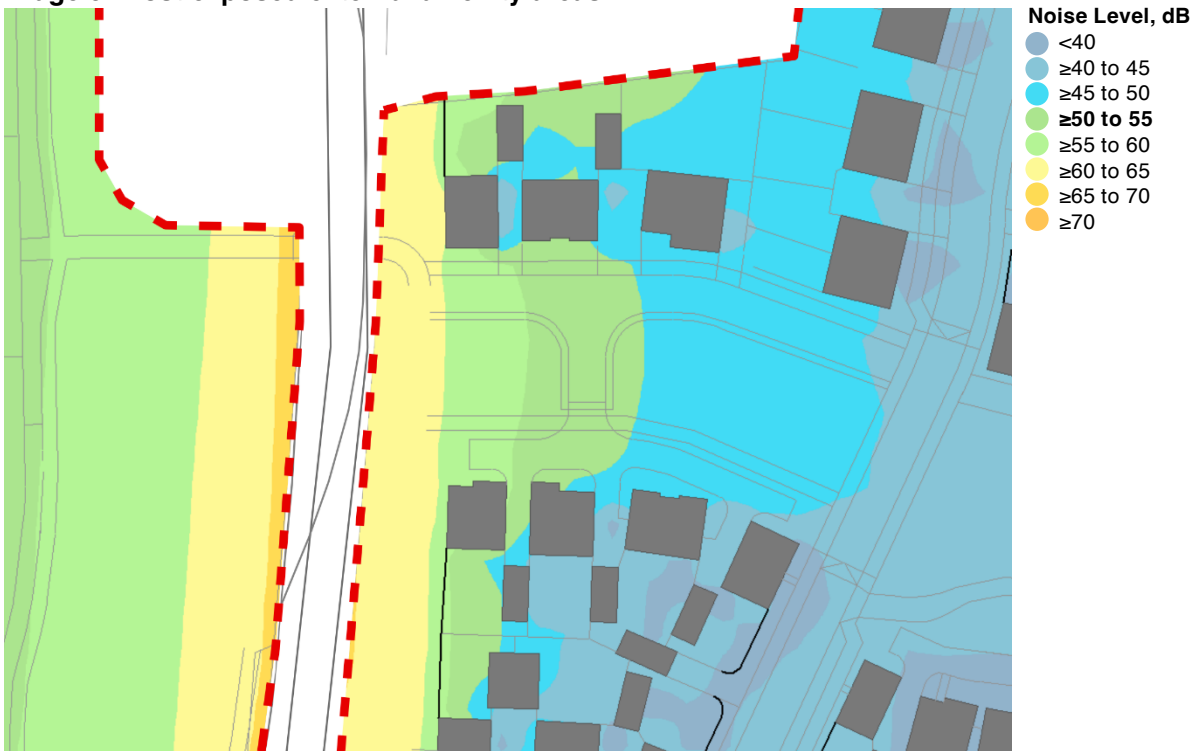
Night-time noise levels in terms of dB $L_{Aeq,8hr}$ at 4.5 metres above local ground level



External Amenity Areas

5.11 As can be seen on the previous **Image 4**, all gardens are calculated to observe noise levels below the aspirational target of 55 dB $L_{Aeq,16hr}$. This is achieved through good acoustic design being incorporated within the layout and providing screening through building placement and the use of screening through the use of appropriate boundary treatments. This can be seen as evidenced within the following **Image 6** which shows the most exposed external amenity areas around Plots 109, 110 and 114.

Image 6: Most exposed external amenity areas



5.12 Brick walls of a height of 1.8 m have been modelled as part of the development layout as indicated on the *Pegasus Group* 'Detailed Site Layout' drawing. Close boarded barriers of the same height would also be suitable alternative if preferred for aesthetic reasons; these must feature no holes or gaps and exhibit a mass of at least 10 kg/m^2.

Glazing, Ventilation and Control of Overheating

Overview

5.13 To suitably control noise to the proposed dwellings, noise mitigation in the form of acoustically appropriate glazing and ventilation provision has been specified. A detailed acoustic specification for the required mitigation measures is set out in the attached **Appendix C**.

Dwelling Parameters

5.14 The façades of the proposed dwellings are understood to comprise of a cavity masonry brick / blockwork construction. This does not preclude the use of alternative lightweight constructions if there is a subsequent preference to do so, but Suono must be consulted to verify that any such proposed construction offers the require sound insulation performance.

5.15 Similarly, the proposed roofs are understood to be of a typical tiled construction, plasterboard ceilings to the rooms below and thermal insulation to the loft spaces.

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

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

5.17 These dimensions should not be taken as limitations, but rather reasonable figures used for the purposes of the assessment.

Partially Open Windows

5.18 Noise levels across the site, away from the site boundaries, are largely controlled by contributions from Hyde End Road and Appleton Way. As noted previously acoustic buffer zones have not been considered practicable along both the site boundaries along Hyde End Road, however the provision of vehicular access to dwellings along these boundaries has allowed for some distance to be introduced between the first row of dwellings and the nearest boundaries.

5.19 As shown on **Image 7**, it is expected that, despite incorporation of good inherent acoustic design measures, it will not be practicable to achieve the internal noise thresholds with windows open along some façades in closer proximity to the adjacent road links. The results presented on the figure assume an indicate loss through a partially open window of 13 dBA from free field external level to reverberant internal level.

Image 7: Noise assessment openable window constraints

5.20 Windows should still be openable as desired by the occupants of all the proposed dwellings and, as discussed in the following sections, noise intrusion can be expected to be comfortably

controlled when windows are closed. This approach is in line with the relevant guidance set out within **section 3.0** (**Design Criteria**) and the attached **Appendix D**.

5.21 It is noteworthy that the commentary in **paragraph 5.18** relates to standard thermal conditions. The control of overheating and consideration to noise in respect to Approved Document O is discussed later in this report.

Glazing

5.22 The results of the noise modelling indicate that standard thermal double glazing (expected to provide a single figure sound reduction performance of circa 30 dB R'_w) will be sufficient for all habitable rooms across the development. Full details on the requirements for glazing to be installed across the development are set out in **Appendix C**.

5.23 It is again noteworthy that windows do not need to be sealed shut in any part of the development and should be openable for times when purge ventilation is required or for thermal comfort (taking due regard of the commentary later in this section).

Ventilation

5.24 Trickle ventilators are to be used across the proposed development in a mechanical extract ventilation (MEV) configuration to provide the required background ventilation rates. Ventilation for the purposes of overheating control is discussed later in this report.

5.25 Noise intrusion calculations have included the effects of up to three trickle ventilators in living rooms and two within bedroom areas (noting that fewer would be acoustically acceptable). The ventilation strategy should confirmed as acceptable by a suitable qualified party, in relation to the requirements of Approved Document F[8].

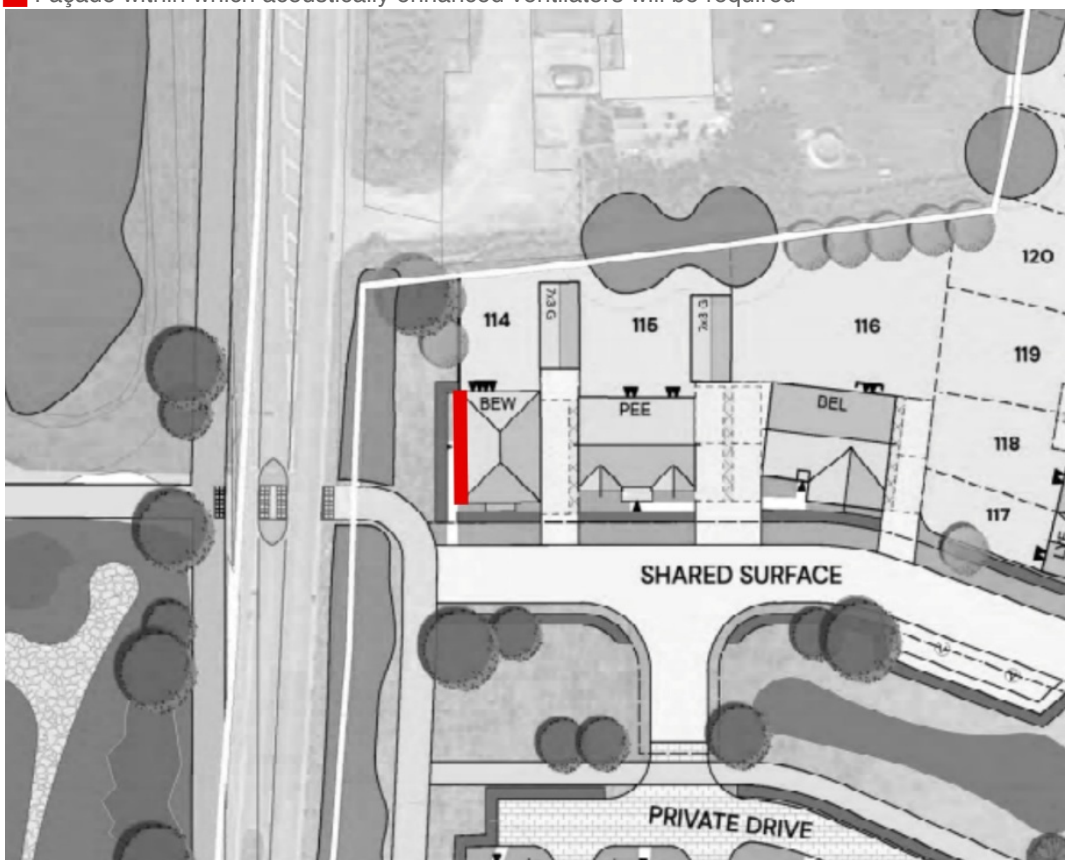
5.26 It has been assumed that all residences will be of a standard layout, with living rooms on ground floor level, and bedrooms at first floor.

5.27 Based on the assessed development layout, non-acoustic trickle ventilators (through wall or frame) meeting a sound reduction performance of 35 dB $D_{n,e,w}$ will be sufficient for all habitable rooms across the development with the exception of the western façade of plot 114 (the location of which can be seen on the following **Image 8**. The full requirements for these are set out within the attached **Appendix C**.

[8] Building Regulations Approved Document F: Ventilation

Image 8: Location of acoustically enhanced trickle ventilators

Façade within which acoustically enhanced ventilators will be required



Overheating

5.28 It is also necessary to consider ventilation in the context of overheating. Based on the guidance set out in **Appendix D** and the indicative layout, it has been determined that it may not be possible to rely on partially open windows for overheating control for dwellings within the area shaded in **orange** on the following **Image 9**.

The above constraint applies to bedrooms windows at night only.

Image 9: Overheating assessment noise constraints

Areas where it may not be possible to rely on partially open windows to bedrooms at night for overheating control

5.29 For all other areas of the site, acceptable internal noise conditions are expected to be provided during periods of overheating, with windows partially open.

5.30 The 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 (discussed below).

5.31 The developer's energy compliance specialist (*Briary Energy*) has provided the following information with respect to how the requirements of ADO will be addressed and therefore overheating is suitably controlled, taking into account the scheme's noise constraints:

- A full dynamic simulation will be carried out using the TM59[9] methodology as stipulated within Approved Document O.

- Guidance provided within this 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. **Image 9** demonstrates the facades that will not utilise windows to bedrooms during the night-time hours of 23:00 - 07:00 for

[9] TM59 - Design methodology for the assessment of overheating risk in homes (2017)

ventilation to alleviate overheating on certain façades across the development's northern and eastern boundaries.

- Alternative means of ventilation will be provided within 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.

- An example of the type of fans used where boost ventilation is required is the *Vent-Axia Lo-Carbon NBR dMEVc*. These fans are selected for the ventilation rates they can provide and low noise emissions (noting that other suitable alternative fans are available).

5.32 External noise emissions from any mechanical ventilation systems should ideally be limited to 30 dB $L_{Ar,Tr}$ at 3 m (when running at normal operating duty) from each termination to avoid disturbance to the properties they are serving and to immediate neighbours.

Air Source Heat Pumps

5.33 It is not deemed necessary nor practicable to undertake detailed assessments of noise from every air source heat pump (ASHP) that may be proposed as part of the development. Instead, it is recommended that noise from these sources can be effectively controlled through the following mechanisms:

Install ASHPs Under Permitted Development Rights

5.34 The permitted development rights under Class G of '*The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2025'* (an amendment to '*The Town and Country Planning (General Permitted Development) (England) Order 2015*'), set out noise related requirements for ASHPs installed under the order.

5.35 The relevant permitted development right (PDR) requires that ASHPs must be installed in compliance with *Micro Generation Certification (MCS) standard MCS 020a) Issue 1.1*. This standard sets out a basis for the consideration and control of noise from ASHPs. Noise emissions from ASHPs are deemed to be suitably controlled to nearby receptors if the unit(s) in question are installed in line with the requirements of the relevant PDR.

Noise Control Via Condition

5.36 A suitably worded planning condition could be applied to the scheme to control noise from any ASHPs to be installed on the proposed development site, where these are not covered under PDRs. Recommended wording for such a condition is set out below:

> *"Condition XX - In the event that an Air Source Heat Pump (ASHP) is fitted at any property, and does not meet the noise related requirements of Micro Generation Certification (MCS) standard MCS 020a) Issue 1.1 (or any superseding issue), noise from the equipment fitted shall be assessed to the nearest sensitive receptors, drawing from British Standard BS 4142:2014+A1:2019 (BS 4142) as appropriate. Noise from the unit(s) must be controlled through the specification and installation of mitigation measures if necessary to either:*
>
> *a) Meet a noise limit (set as a rating noise level, dB $L_{Ar,Tr}$) 5 dB below the background noise level when assessed 1 metre from the nearest window of habitable rooms of nearby receptors;*

b) *Or, may be controlled to meet a suitable internal noise criterion, the basis for which must be provided by a suitably qualified acoustic consultant, taking into account all pertinent factors (such as, but not limited to, existing ambient noise climate, nature of receptors, context, building fabric/design etc.) in line with the guidance set out within BS 4142.*

Reason - To ensure that any ASHP plant does not have an adverse impact in respect of noise upon any residential property.

6.0 Conclusions

6.1 Planning permission is to be sought for the development of 184 new dwellings together with associated hard and soft landscaping, drainage infrastructure, parking, access and associated works off Hyde End Road, Shinfield.

6.2 A noise survey has been undertaken at the site to quantify the prevailing noise climate. From this data, a 3D noise model of the site has been prepared to allow for a detailed appraisal of site conditions.

6.3 A noise mitigation strategy has been developed to ensure suitable noise conditions for future residents, taking into account noise effects relating to building overheating control measures where appropriate.

6.4 For the entirety of the site, standard thermal double glazing will be sufficient to suitably control noise to the proposed dwellings and openable windows will be sufficient to control overheating effects for a large proportion of the site (in combination with the proposed ventilation strategy).

6.5 Noise levels in external amenity areas are expected to meet the aspirational noise target agreed with the local authority, taking into account localised 1.8 m tall acoustic screening to a small number of gardens as per the proposed development layout.

6.6 Noise from ASHPs has been considered and methods for controlling noise emissions from such units set out.

6.7 It has been demonstrated that it will be entirely possible to ensure a suitable noise climate internally and externally for future residents of the proposed development and a detailed noise mitigation strategy is set out herein for approval by the local authority.

Appendix A: Noise Survey

Details and results of the environmental noise survey

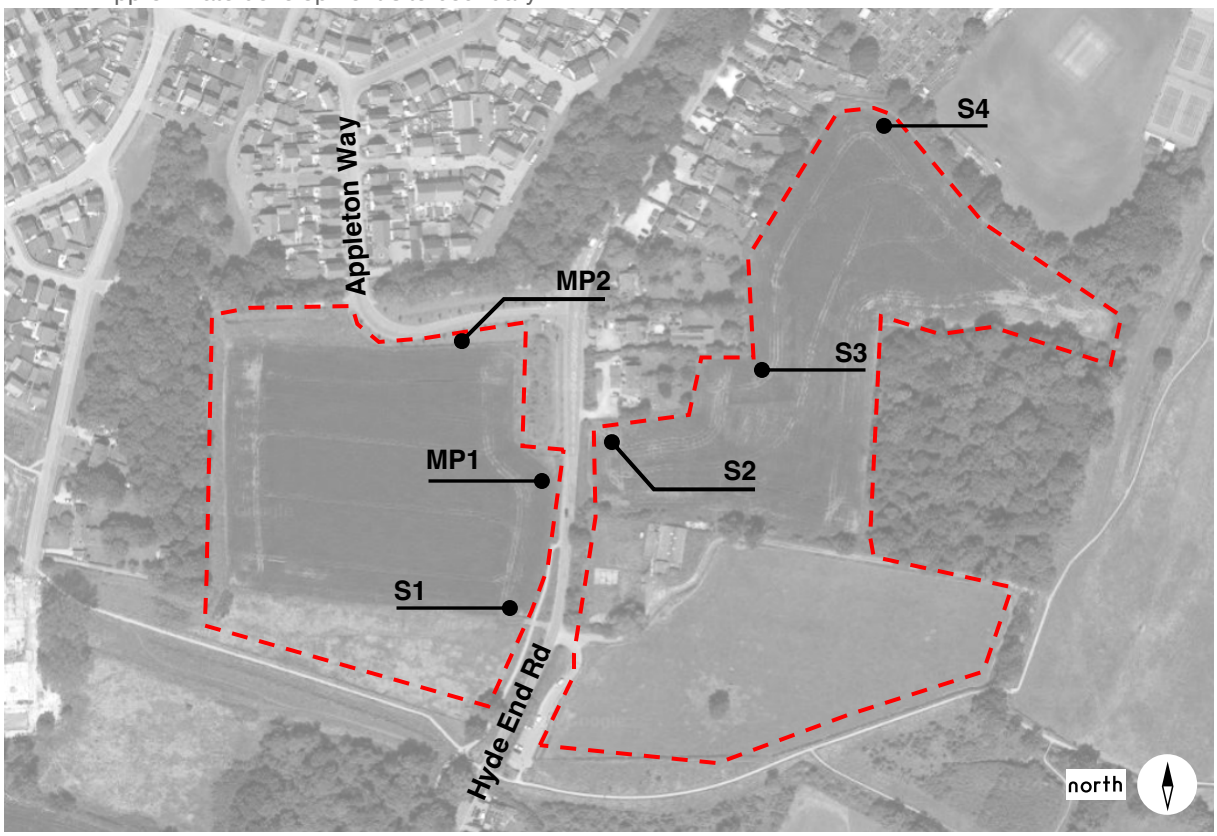
Methodology and Instrumentation

An unattended noise survey was undertaken at free field positions between 1730 on Thursday 27th June and 1730 on Monday 1st July 2024. The unattended measurement positions are denoted as 'MP1' and 'MP2' on the following image.

Additional attended spot-check measurements were also undertaken at the positions labelled 'S1' to 'S4' on the following image. The unattended noise monitor at MP1 remained operational in order to establish the deviation of noise levels across the site.

Image A1: Aerial photograph showing noise measurement locations

Approximate development site boundary



Aerial imagery courtesy of Google

Measurements of the L_{Aeq}, L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the survey. Detailed summaries of the measurement positions are set out in the following table.

Noise measurement locations

Location	Detail
MP1	Microphone at approximately 1.5 m above local ground level, in a free-field position on the eastern boundary of the western site parcel alongside Hyde End Road. Measurements were unattended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.
MP2	Microphone at approximately 1.5 m above local ground level, in a free-field position on the northern boundary of the site alongside Appleton Way. Measurements were unattended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.
S1	Microphone at approximately 1.5 m above local ground level, in a free-field position on the northern boundary of the site alongside Appleton Way, to the south of position MP1. Measurements were attended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.
S2	Microphone at approximately 1.5 m above local ground level, in a free-field position on the northwestern corner of the eastern site parcel along Hyde End Road. Measurements were attended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.
S3	Microphone at approximately 1.5 m above local ground level, in a free-field position on the northwestern central corner of the eastern site parcel, to the northeast of position S2. Measurements were attended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.
S4	Microphone at approximately 1.5 m above local ground level, in a free-field position on the northern boundary of the eastern site parcel. Measurements were attended. The noise climate was controlled by road traffic noise, with some distant construction noise to the west.

Noise measurements were made using the equipment set out within the following table. The sound level meters were fitted within weatherproof enclosures and the meters calibrated both before and after the survey to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

Noise measurement equipment

Location	Item	Detail
MP1	Sound Level Analyser	Svantek 971
	Outdoor Microphone Kit	Svantek SA 271A
	Acoustic Calibrator	Svantek SV33B
MP2, S1-S4	Sound Level Analyser	Norsonic Nor118
	Outdoor Microphone Kit	Norsonic Nor1251
	Acoustic Calibrator	Norsonic Nor1217

The weather conditions when setting up the survey equipment were clear and warm with dry roads. When collecting the equipment, the conditions were overcast and cool with dry roads.

Results

The following tables set out the period noise levels captured across the duration of the unattended noise survey.

Summary period noise levels measured during the unattended noise survey, dB

Measurement Position	Daytime (0700-2300)	Night-time (2300-0700)	
	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{Amax}
MP1: Site central area, along Hyde End Road	63	54	75
MP2: Site northern boundary with Appleton Way	54	52	65

The following table sets out the octave band spectra pertaining to the period noise levels set out in the table above.

Unattended noise survey octave band results

Measurement Position	Index	Noise Level, dB							
		63	125	250	500	1k	2k	4k	8k
MP1	$L_{Aeq,16hr}$	64	59	56	55	60	57	45	35
	$L_{Aeq,8hr}$	56	52	53	47	51	48	36	28
	L_{Amax}	78	72	69	69	71	69	58	50
MP2	$L_{Aeq,16hr}$	60	55	51	47	48	48	47	29
	$L_{Aeq,8hr}$	52	46	40	38	40	46	48	26
	L_{Amax}	66	58	56	51	55	59	62	44

The table below sets out a summary of the results captured at the attended spot check positions, S1 – S4.

Summary noise levels captured at attended measurement positions

Measurement Position	Start Time	$L_{Aeq,5min}$	L_{Amax}	$L_{A90,5min}$
S1	01/07/2024 16:35	56	65	59
S2	01/07/2024 16:44	63	73	68
S3	01/07/2024 16:53	47	56	49
S4	01/07/2024 17:03	46	54	48

The table below sets out a summary of the representative background noise levels captured during the day and night-time periods.

Representative background noise levels

Measurement Position	Representative Background Noise Level, $L_{A90,T}$ dB	
	Daytime (0700-2300)	Night-time (2300-0700)
MP1	40	30
MP2	41	30

The following time history graphs present the measured noise levels captured at both assessment positions throughout the survey duration.

Image A2: Noise measurement results at position MP1

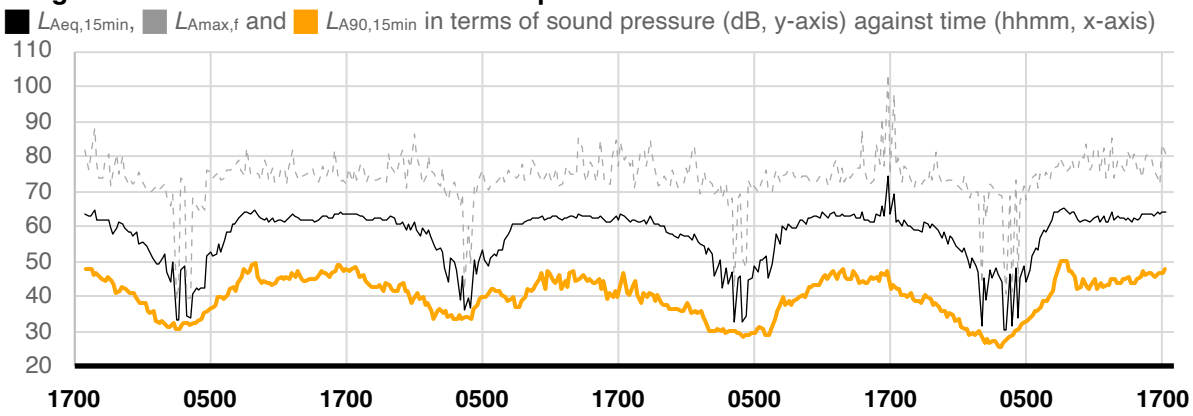
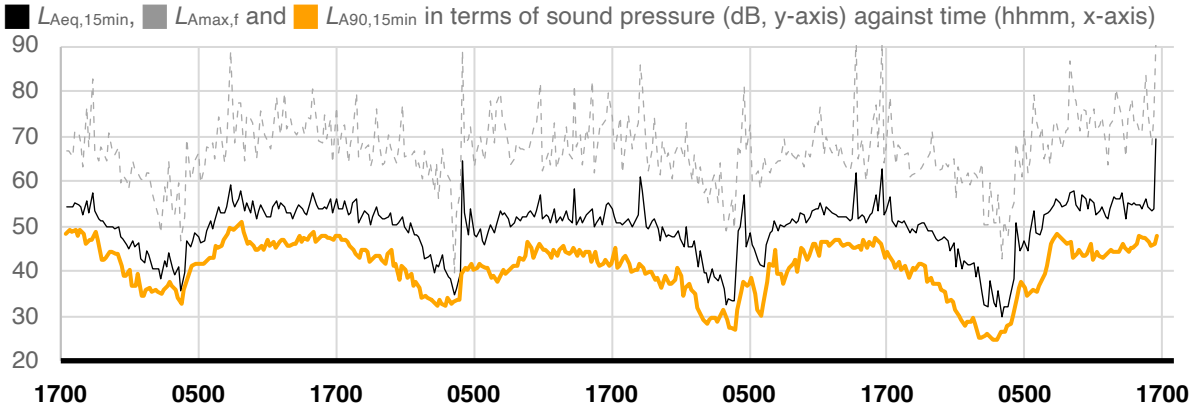


Image A3: Noise measurement results at position MP2



Appendix B: Noise Modelling

Details of computational noise model

Noise Modelling Software

A computer-based noise prediction program (*Wölfel* IMMI 2024 has been used to determine the road traffic noise levels generated across the site by this noise source, using CRTN[10] and ISO 9613[11] 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 (taken to be flat within the model)
- The surrounding built up area.

Model Input and Calibration

The modelled development layout is based on the *Pegasus Group* 'Detailed Site Layout' drawing (ref: P24-0288_DE_01_W_23, dated 28th March 2025).

Building heights across the scheme are taken to be 7 metres for all new residences with garages set to a height of 3.5 m and brick walls at a height of 1.8 m. These heights are deemed to be suitable for the purposes of this assessment.

Topographical data has been based on LIDAR information publicly available through DEFRA.

The model used CRTN to define traffic noise propagation from Tonbridge Road in terms of daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$ period noise levels.

Noise Modelling Assumptions and Limitations

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

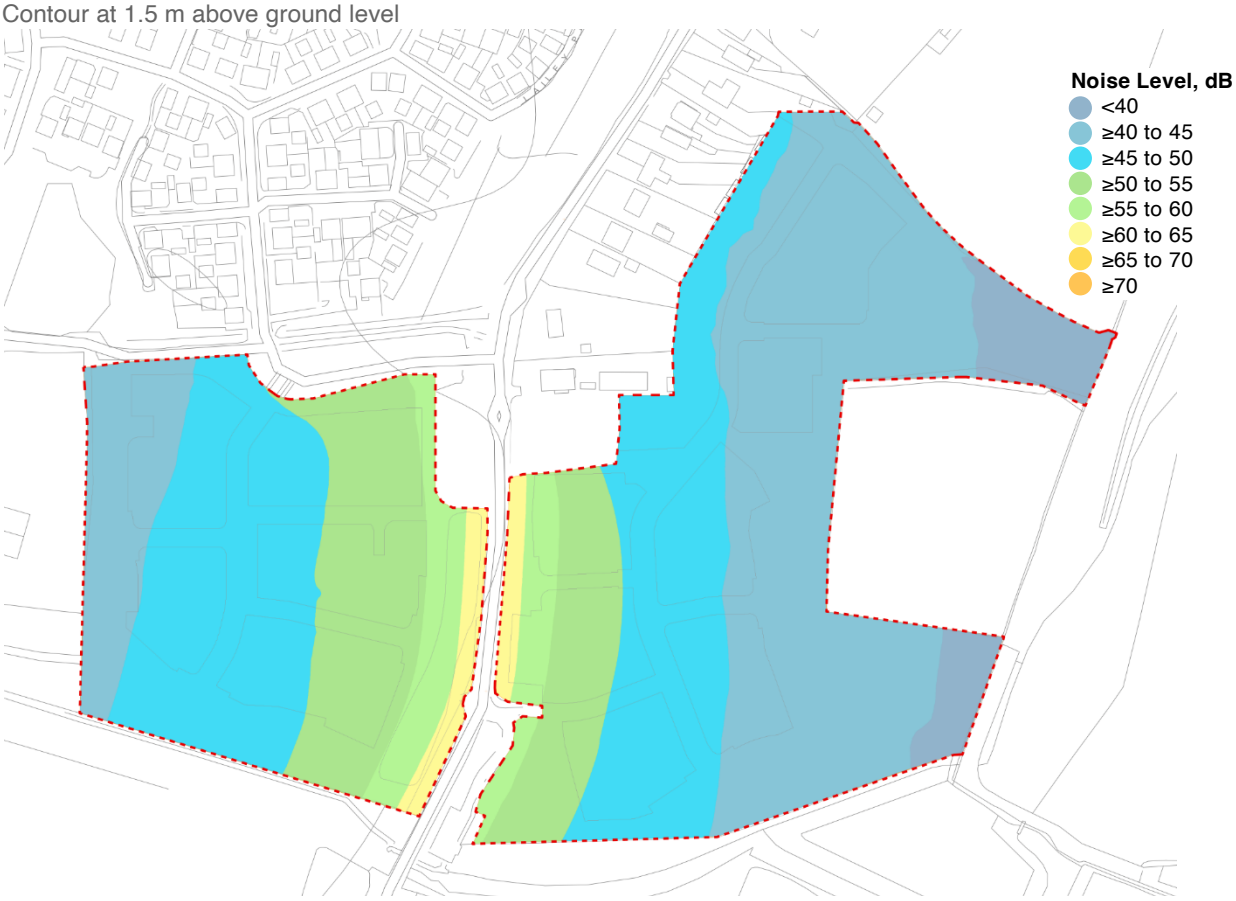
Window heights (to centre of windows) are taken as 1.5 m for ground floor and 4.5 m for first floor.

[10] Calculation of Road Traffic Noise, Department of Transport, 1988
[11] ISO 9613-1:1993 – Acoustics – Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere

Baseline daytime ($L_{Aeq,16hour}$) noise contour plots

Image B1

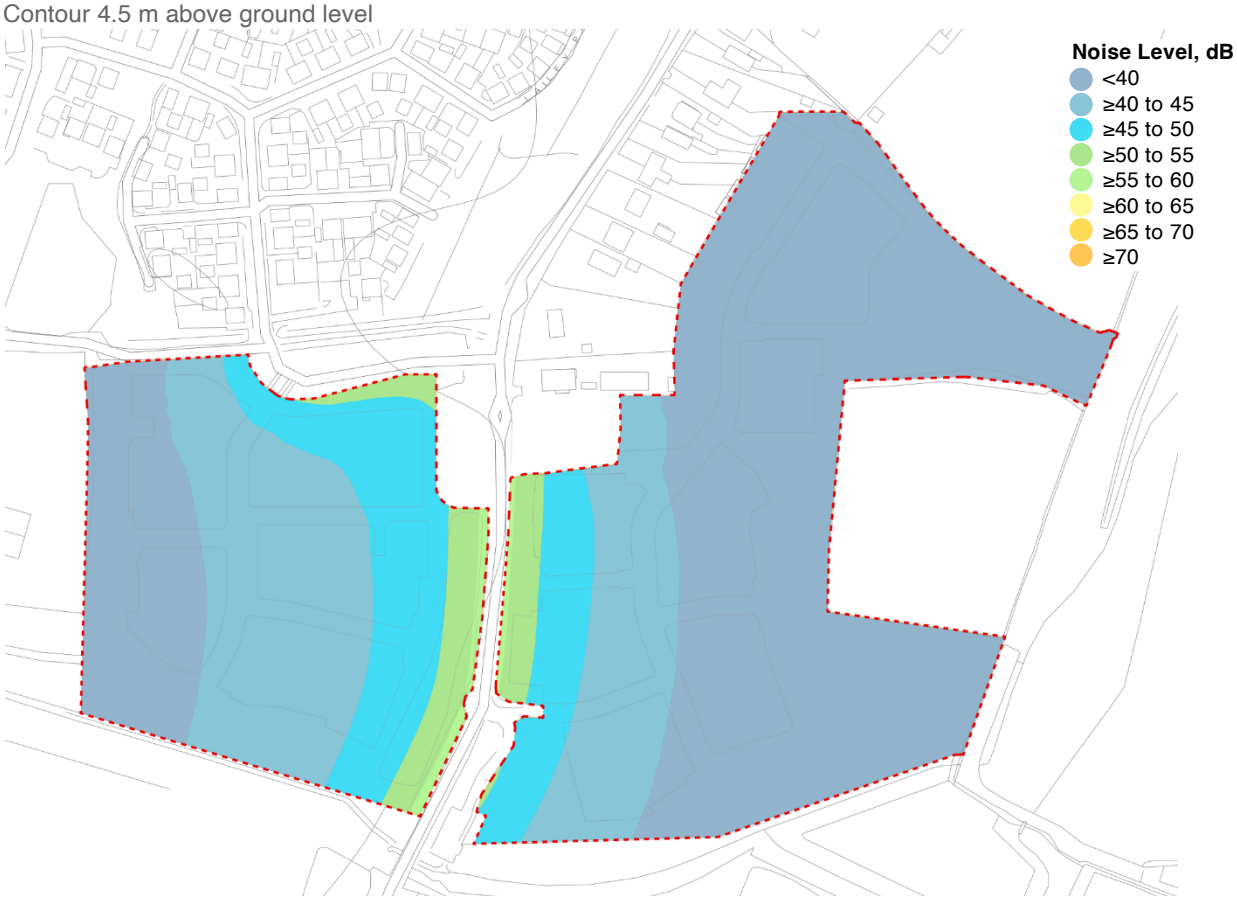
Contour at 1.5 m above ground level



Baseline night-time ($L_{Aeq,8hour}$) noise contour plots

Image B2

Contour 4.5 m above ground level



Baseline night-time max (L_{Amax}) noise contour plots

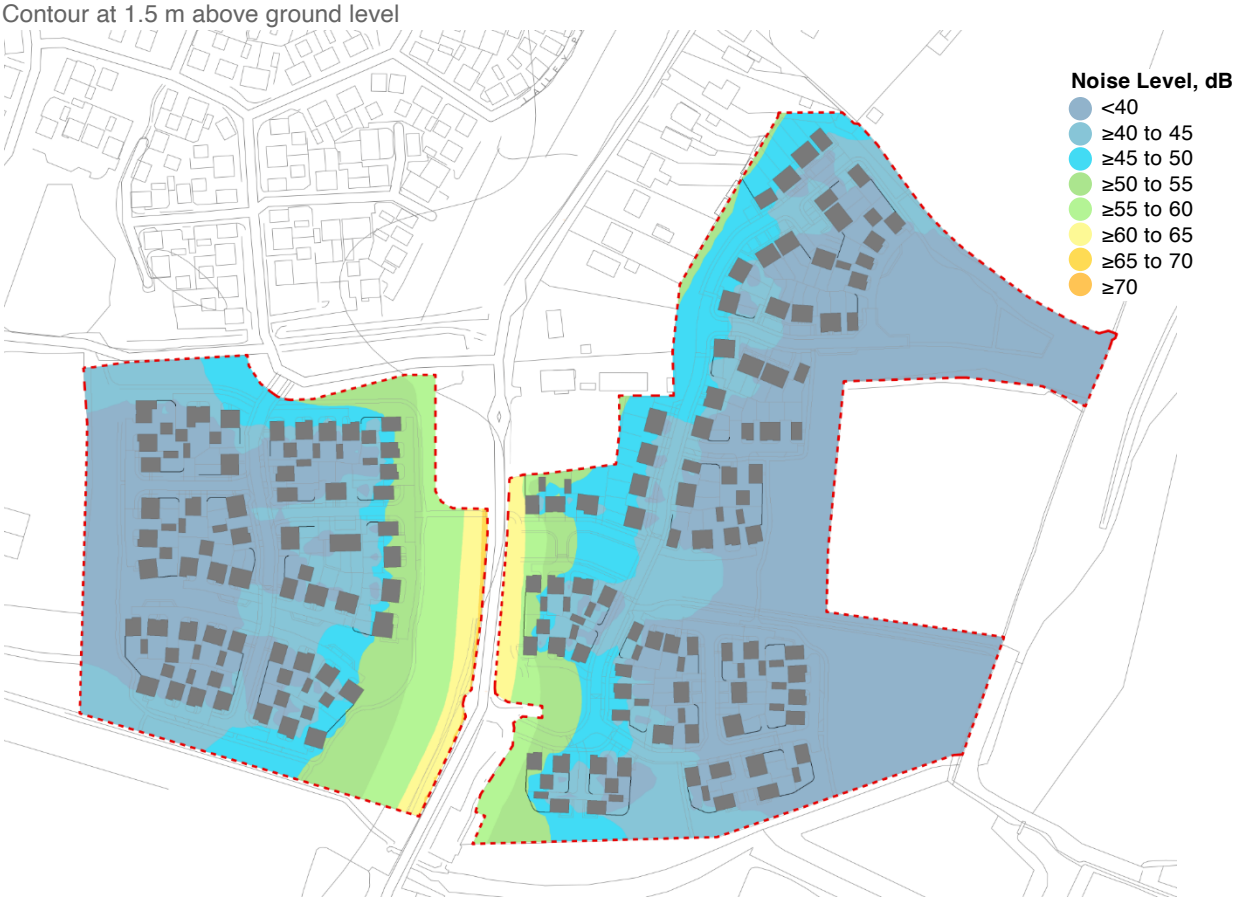
Image B3

Contour 4.5 m above ground level

Daytime ($L_{Aeq,16hour}$) noise contour plots with development

Image B4

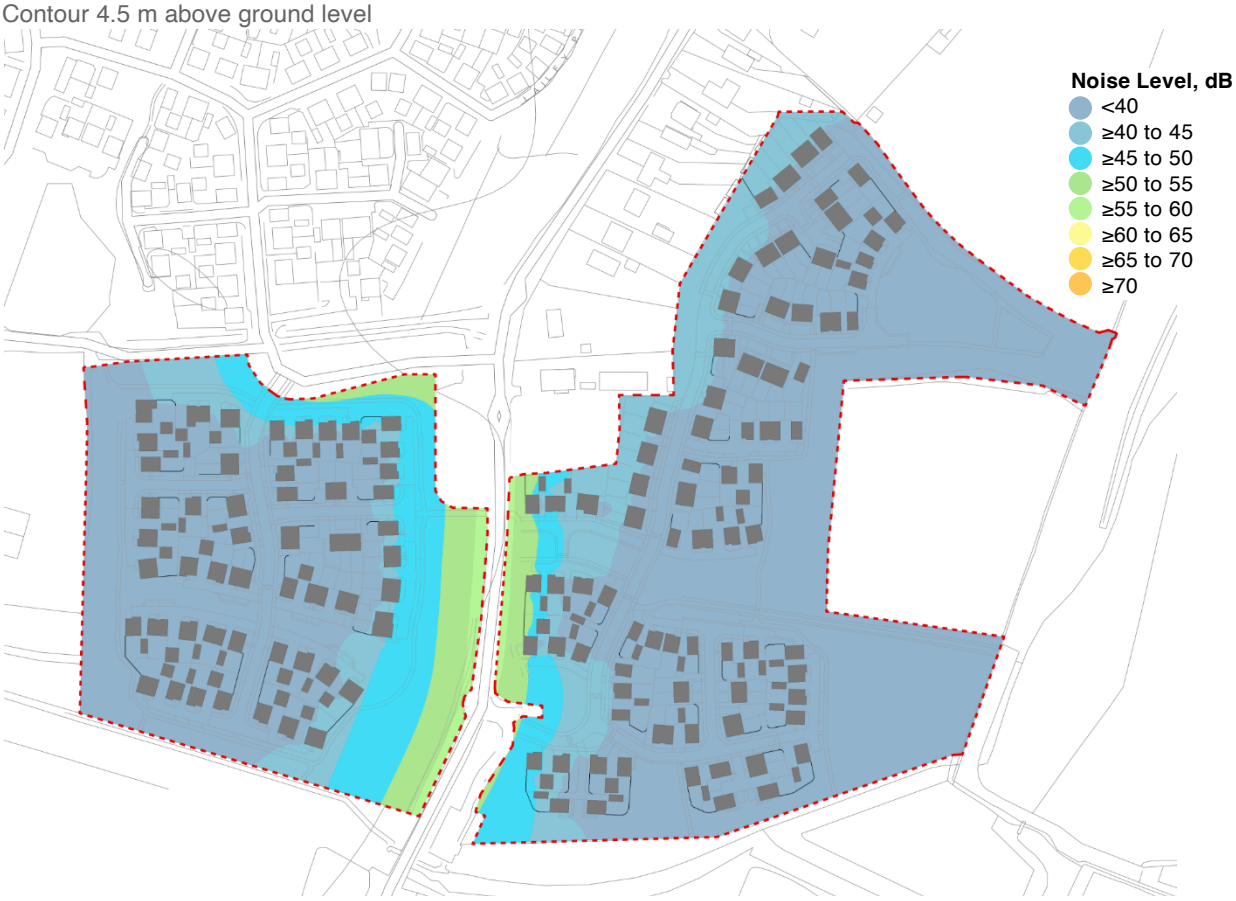
Contour at 1.5 m above ground level



Night-time ($L_{Aeq,8hour}$) noise contour plots with development

Image B5

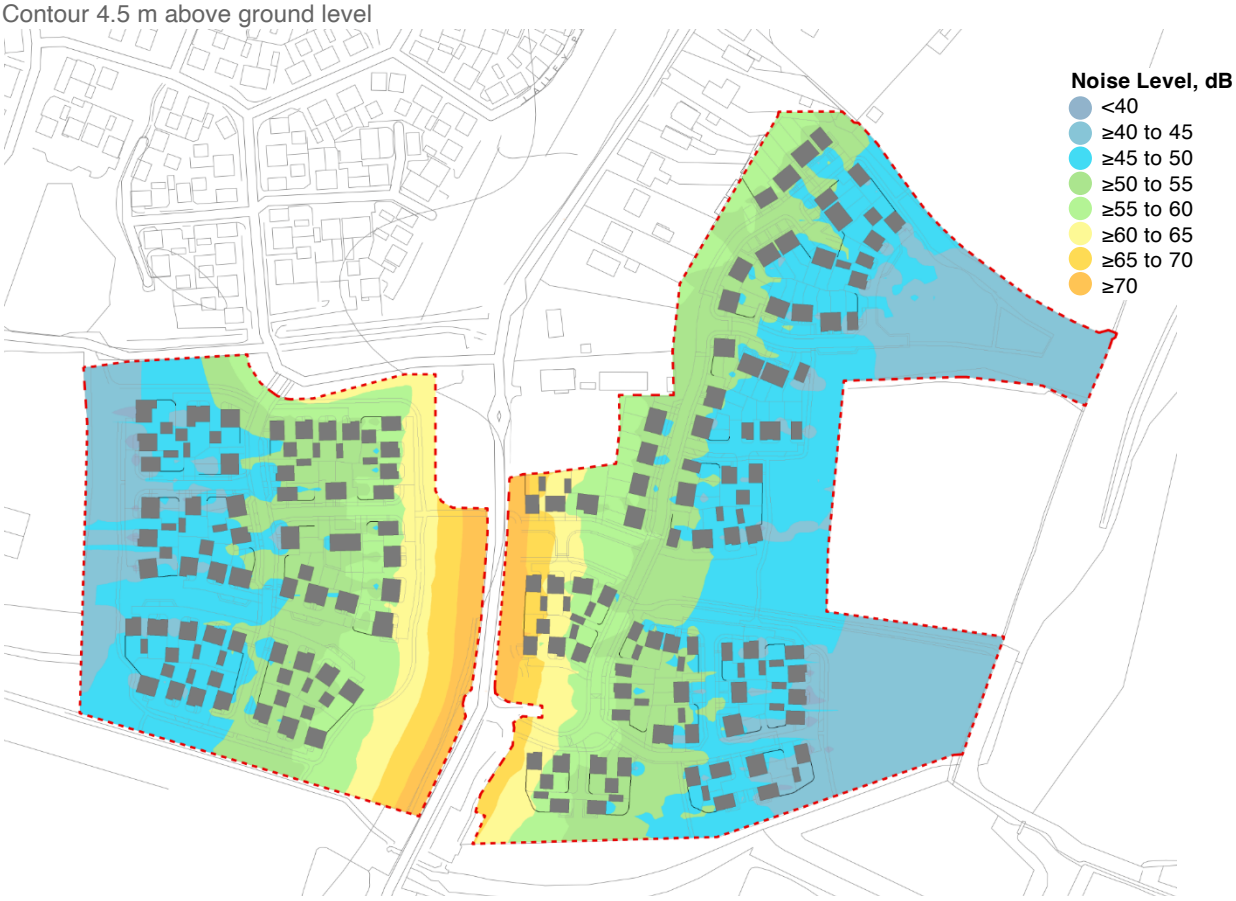
Contour 4.5 m above ground level



Night-time max (L_{Amax}) noise contour plots with development

Image B5

Contour 4.5 m above ground level



Appendix C: Noise Mitigation Measure Summary

Mitigation measures to achieve internal and external noise criteria

Façade Mitigation Measures

Mitigation measures requirements should be read in conjunction with the performance specifications set out later in this Appendix. Where “Part F” if stated to in relation to overheating control and ventilation rates, this refers to the Building Regulations Approved Document F: Volume 1 (ventilation for dwellings). Additional ventilation requirements for overheating control are set out later in this Appendix.

Glazing Specifications

Acoustic performance of glazing elements, dB

Type.	Typical Configuration	Apparent Sound Reduction Index, *R'* dB at Octave Band Centre Frequency, Hz						Single number value, R'_w dB
		125	250	500	1k	2k	4k	
G1	4 mm glass, 16 mm air space, 4 mm glass (standard thermal)	Single number requirement only						30

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 above must be achieved by the glazing systems taken as a whole, in their installed condition.

Ventilator Specifications

Acoustic performance of trickle ventilator elements, dB

Type	Example Ventilator Product	Element Normalised Level Difference, $D_{n,e}$ dB at Octave Band Centre Frequency, Hz						Single number value, $D_{n,e,w}$ dB
		125	250	500	1k	2k	4k	
V1	Glidevale Fresh 100 dB	40	38	39	41	50	60	43
V2	Non-acoustic direct air path trickle ventilator	Single number requirement only						35

The above $D_{n,e}$ value relates to the noise reduction provided by a single[12] vent, based on its area, standardised to an absorption area of 10 m^2 . 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.

[12] The noise intrusion calculation allows for three vents in living rooms and 2 in bedrooms however the $D_{n,e}$ value is to be achieved by each vent. If a greater number of trickle vents is required to the areas above, the ventilator specification should be reconfirmed by Suono.

Façade Mitigation Groups

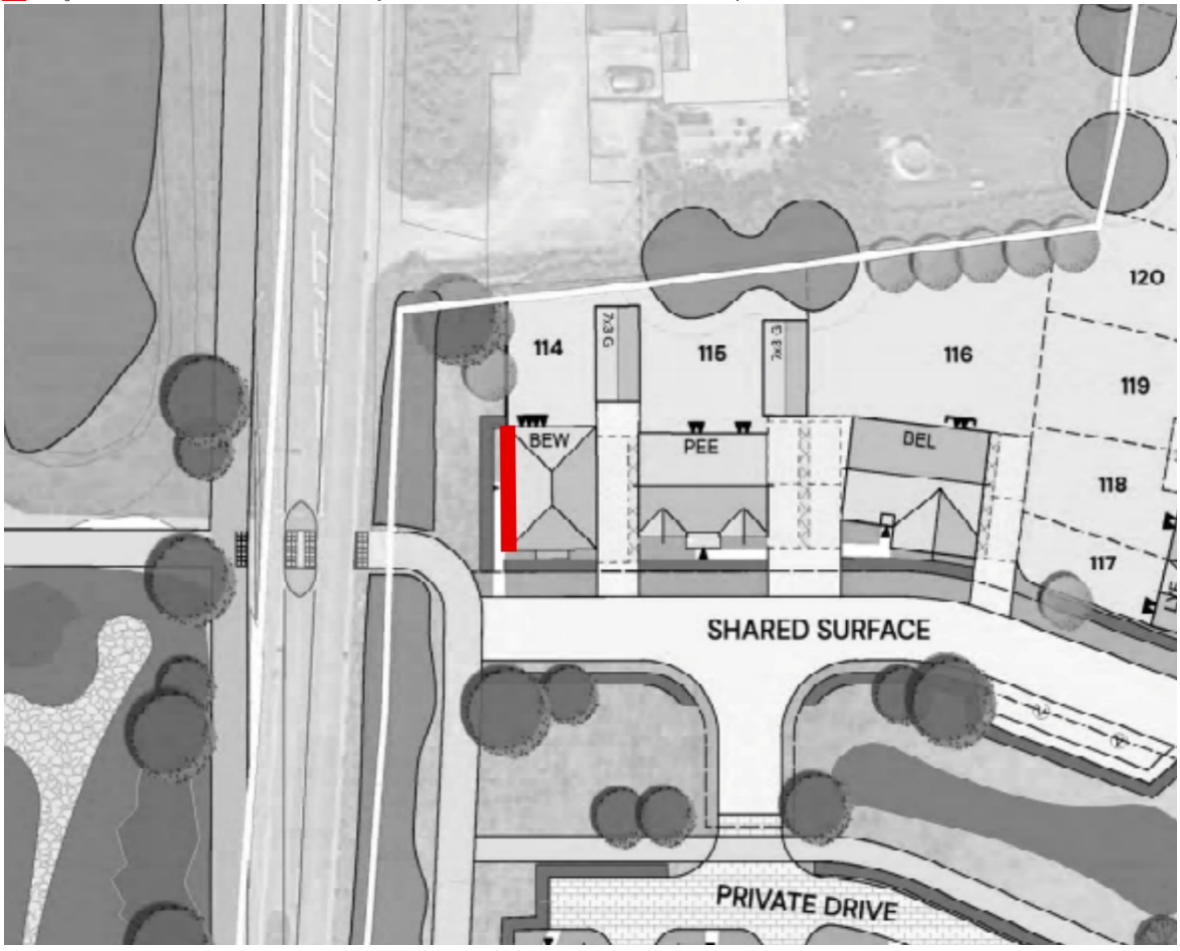
The table and **Image C1** below display how the glazing and ventilator types set out above should be implemented across the development. This information should be read in conjunction with the commentary on overheating control in the following section.

Summary of Façade mitigation measures

Noise Mitigation Group	Glazing Type	Ventilator Type	Plot Numbers
Group 1	G1	V1	114
Group 2	G1	V2	All remaining plots

Image C1: Location of acoustically enhanced trickle ventilators

Façade within which acoustically enhanced ventilators will be required



Ventilation for Overheating Control

The use of open windows to control overheating effects in relation to the requirements of the Building Regulations ADO will be acceptable for a large proportion of the development.

Image C2 on the following page, however, sets out the areas of the development where noise within the proposed dwellings may exceed the ADO internal thresholds with openable windows used for the purposes of overheating control (as per the commentary on ADO set out in **Appendix D**).

Where **bedrooms** are located on facades subject to noise levels which may cause the ADO internal thresholds to be exceeded (areas shown in **orange** on **Image C2**) the overheating control strategy for those rooms should **not** rely on open windows during the night-time period (0700 - 2300).

It is again noted that the above thresholds are taken to apply to **bedrooms only** and open windows may be used as part of a dwelling's overheating strategy in other habitable rooms.

Image C2: Proposed Site Layout with ADO External Noise Thresholds

Areas where it may not be possible to rely on partially open windows for overheating control

To further clarify, the following table sets out the areas of the site that should **not** use open windows to bedrooms at night as part of an overheating control strategy).

Where open windows to bedrooms are not permissible for overheating control, it is expected that the developer will provide a boosted MEV system/additional boost fans to provide the necessary airflow rates.

Use of open windows to control overheating

Bedroom Overheating Control Measure	Plot Number
Alternative with windows closed (applies to bedroom windows in sections of identified plots, in or touching **orange** regions in **Image C1** only)	109, 110, 114
Open windows acceptable	All other plots

Appendix D: Planning Policy & 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 2024.

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 187 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 198 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 198 makes reference the Noise Policy Statement for England which is discussed in the following section.

The '*agent of change'* principle is discussed in paragraph 200 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 exposure[13]] above which significant adverse effects on health and quality of life occur.

Lowest Observed Adverse Effect Level (LOAEL): This is the level [of noise exposure[2]] above which adverse effects on health and quality of life can be detected.

No Observed Effect Level (NOEL): This is the level [of noise exposure[2]] 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

[13] 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 1.1. 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).

Local Policy

Wokingham Borough Council

The site is within the jurisdiction of Wokingham Borough Council (WBC). Liaison with Chris Christofis, Senior Environmental Protection Officer at WBC has highlighted the council's noise policy CC06 as a basis for assessment of noise to new residential developments, set out below for ease of reference:

'Policy CC06: Noise

1. Proposals must demonstrate how they have addressed noise impacts to protect noise sensitive receptors (both existing and proposed) from noise impacts in line with Appendix 1 of the MDD.

2. Noise impact of the development must be assessed. Where there is no adverse impact (No Observed Effect Level) then noise will not be a material consideration.

3. Where there is an adverse effect (Lowest Observed Adverse Effect Level to Significant Observed Adverse Effect Level), then

a) The development layout must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.

b) Where there is still an adverse impact then internal layout must be reviewed. Where this results in there no longer being an adverse impact then design and measures should be incorporated accordingly.

c) Where there is still an adverse impact then physical mitigation measures such as barriers/mechanical ventilation must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.

d) Where there is still an adverse impact and the development falls within the significant observed adverse effect level then planning permission will normally be refused.'

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 1.2. 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);

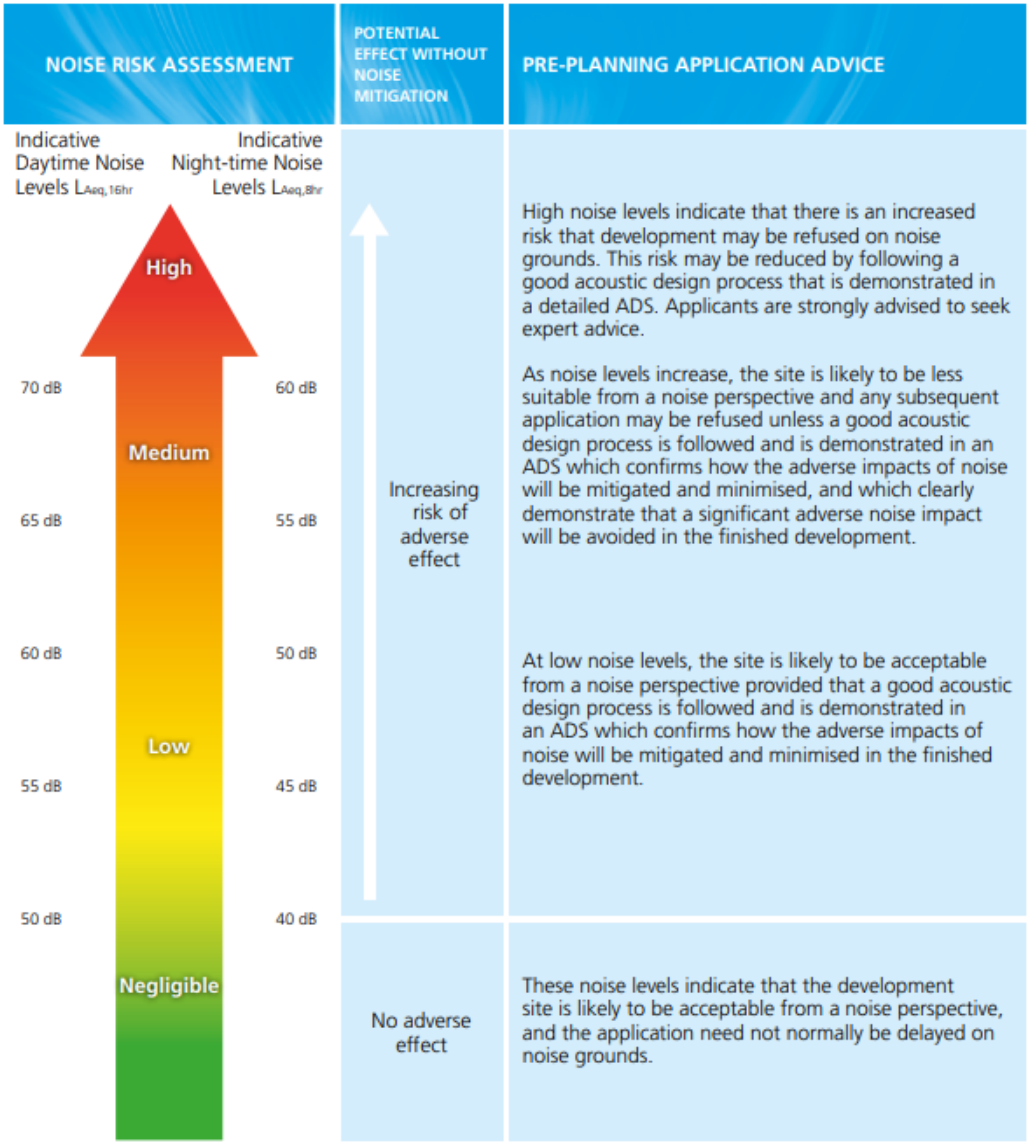
- Information regarding the steps taken to minimise overheating where this is relevant to noise;

- 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, I 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



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.

a. Noise at night – paragraphs 3.2 to 3.4.
b. Pollution – paragraph 3.5.
c. Security – paragraphs 3.6 and 3.7.
d. Protection from falling – paragraphs 3.8 to 3.10.
e. 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.

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).

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" is 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.

Approved Document O Noise Guide, November 2024

The above-titled guide provides guidance for practitioners when implementing the requirements of Approved Document. It is designed to assist the acoustics industry in the understanding of what is published in the regulation and provides an agreed interpretation of the content.

The following external noise thresholds are set out in table 1 of the guidance. These thresholds apply when using the Simplified Method set out within ADO and relate to high and moderate overheating risk areas (again, as described within ADO):

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

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,8h}$, 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

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 façade 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 achieving the 40 dB $L_{Aeq,8hour}$ and 55 dB $L_{Amax,f}$ thresholds set out in the ADO, but a 5 dB reduction in noise offered by a façade opening in high overheating risk areas or a 10 dB reduction in moderate overheating risk locations. These losses are linked to the areas of opening that related to the ventilation provision requirements of the ADO Simplified Method.

As Shinfield 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 levels of 50 dB $L_{Aeq,8hour}$ and 65 dB L_{AFmax} can be taken as a thresholds to identify where open windows could not be used to control overheating effects.

Where the Simplified Method cannot be used, or where the developer decides they want to use an alternative approach to the Simplified Method, dynamic thermal modelling is required. The ADO noise guide provides a means for acoustic consultant to provide guidance to the dynamic thermal modelling consultant (DTMC) to support this more detailed approach.

The ADO Noise Guide sets out a means to calculate the permitted Equivalent Area of facade opening that can be considered during dynamic thermal modelling, based on the noise constraints of a given site. This essentially limits the amount of window (or other ventilation) opening than can be considered by the DTMC, based on the noise level difference that is required through the façade to achieve the relevant ADO noise thresholds. When considering façade incident external noise levels, the following formula applies:

Equation 1[8]

$$EA\ based\ on\ façade\ level\ difference = V \times 10^{\left(\frac{-(D_{2m,nT}+5)}{10}\right)}$$

Where

$D_{2m,nT}$ *is the is the façade level difference between the A-weighted level 2m in front of the façade ($L_{1,2m}$), and the standardised internal A-weighted level ($L_{eq,2,nT}$). In the absence of any better alternative method, the same principle can be applied to L_{AFmax}.*

V *is the room volume (m^3)*

EA *is the Equivalent Area of the open window (m^2)*

When considering free field external noise levels, the following formula applies:

Equation 2[8]

$$EA\ based\ on\ freefield\ level\ difference = V \times 10^{\left(\frac{-(D_{nT}+8)}{10}\right)}$$

Further guidance is provided in the guide with respect to ventilation louvres. This is not replicated here for the same of brevity but shall be considered when necessary and appropriate.

Where it is necessary to either totally or partially restrict the use of open windows due to external noise constraints and provide additional ventilation or cooling through mechanical means, the following suggested internal noise thresholds are set out within the ADO noise guide:

Parameter	Bedrooms
Mechanical ventilation or mechanical cooling system noise	$L_{Aeq,T}$ 30 (±5) dB

Further to the above, the following is noted:

> *"Higher noise levels than those in Table 2, e.g. by up to 10 dBA, may be appropriate in some operating scenarios, where rapid changes to the cooling or ventilation rates quickly improve the thermal comfort of the occupant. Equally, lower noise levels may be appropriate for some types of residential development"*

The guide also provides information regarding assessment uncertainty, post-completion noise measurements (not recommended to be undertaken), reporting and other factors. These elements are not set out here for the sake of brevity but are considered where necessary and appropriate.

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 1.3. 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.