Residential Noise Assessment

Site Address: Land to the rear of 6 Highfields, Brighton Road, Warninglid, RH17 5SY

Client Name: LPS Group

Project Reference: NP-012979

Authorisation and Version Control		
Revision	Reported By	Checked By
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Amendment History		
Revision	Date	Summary of Amendments
01	31/07/2025	--

Disclaimer

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Delivering sustainable development by promoting good health and well-being through effective management of noise.

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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for a new build residential development ('the proposed development') at land to the rear of 6 Highfields, Brighton Road, Warninglid, RH17 5SY ('the site'). The site is subject to noise from the A23 to the west of the proposed development.

The applicant is preparing to submit a planning application to the Local Planning Authority (the 'LPA'), Mid Sussex District Council. This report has been prepared to accompany the application.

A noise survey has been undertaken to establish the prevailing sound levels at the proposed development. The findings have been used to assess the suitability of the site for residential use. Measures required to mitigate noise impacts have been assessed in accordance with the relevant performance standards, legislation, policy, and guidance.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

The following performance standards, legislation, policy, and guidance have been considered to ensure good acoustic design in the assessment:

- National Planning Policy Framework (2024)
- Noise Policy Statement for England (2010)
- British Standard BS8233:2014 – 'Guidance on sound insulation and noise reduction for buildings'
- ProPG: 'Planning and Noise 2017' (including supplementary documents 1 & 2)
- Approved Document O: Overheating (2021)
- Acoustics Ventilation Overheating: Residential Design Guide 2020' (AVO Guide)

Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

The proposal is for the erection of 4 no. residential dwellings on land to the east of the A23, located to the rear of the existing property at 6 Brighton Road. The proposed development layout is shown overleaf.

Drawing Ref. LPS1291-1.1-Rev A from LPS Architecture

Figure 1 – Proposed Development Layout

2. Environmental Noise Survey

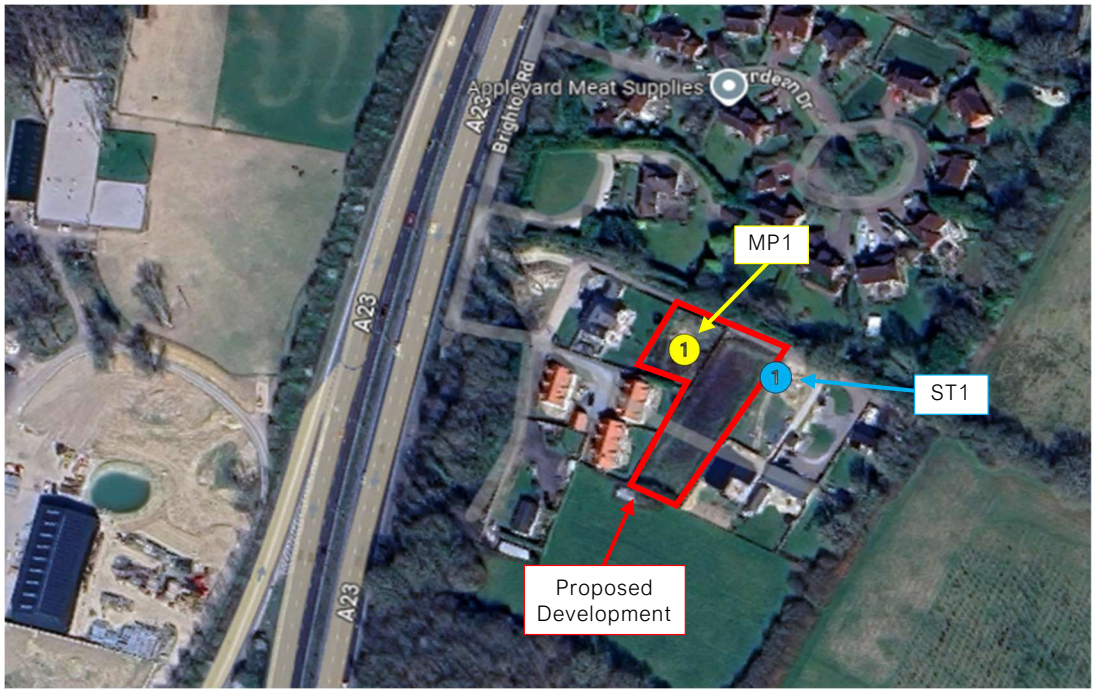
2.1 Measurement Methodology

The measurement dates and particulars are outlined in the following table. Details regarding the equipment used and the weather conditions recorded during the survey can be found in Appendix D.

Location	Survey Dates	Measurement Particulars
MP1	21/07/2025 – 22/07/2025	Equipment mounted on a tripod at a height of 2m, located at the boundary of the garden of 6 Brighton Road within the proposed footprint of the proposed properties.
ST1	21/07/2025 14:15 – 14:30	Equipment mounted on a tripod at a height of 1.5m, located to the rear of the proposed site boundary.

Table 1 – Measurement Methodology

The site surroundings and measurement locations are highlighted in the figure below:



Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025

Figure 2 – Measurement Locations and Site Surroundings

2.2 Context & Subjective Impression

The proposed development site is located on vacant land off Brighton Road in the village of Warninglid. The area surrounding the site consists primarily of residential dwellings with arable farmland to the east.

The acoustic environment is deemed to be moderate in level and dominated by road traffic noise emissions from the A23. During the site visits intermittent construction noise from a nearby development was also audible.

2.3 Environmental Noise Survey Results

A summary of the noise levels measured during the survey can be seen in the table below. The time history results can be found in Appendix D.

Location	Measurement Period ('T')	Octave Frequency Band (Hz, dB)							$L_{Aeq,T}$ (dB)	'Typical' $L_{AFmax,1min}$ (dB) [1]
		63	125	250	500	1k	2k	4k		
MP1	$L_{eq,16hr}$ (Day)	61	53	51	54	58	51	38	59	--
	$L_{eq,8hr}$ (Night)	56	48	47	50	53	47	36	55	64
ST1	21/07/25, 14:15 – 14:30	61	53	48	50	54	47	36	56	--

Notes:
[1] The typical $L_{Amax,1min}$ is the value exceeded fewer than 10 times per night.

Table 2 – Sound Level Results Summary

3. Noise Modelling

To predict the noise emissions incident on the proposed development, a noise model has been compiled using SoundPLAN 9.1 software. The modelling particulars are outlined in Appendix F. The sound maps showing the daytime $L_{Aeq,t}$, night-time $L_{Aeq,t}$ and night-time $L_{AFmax,1min}$ sound levels can be seen in the figures below.

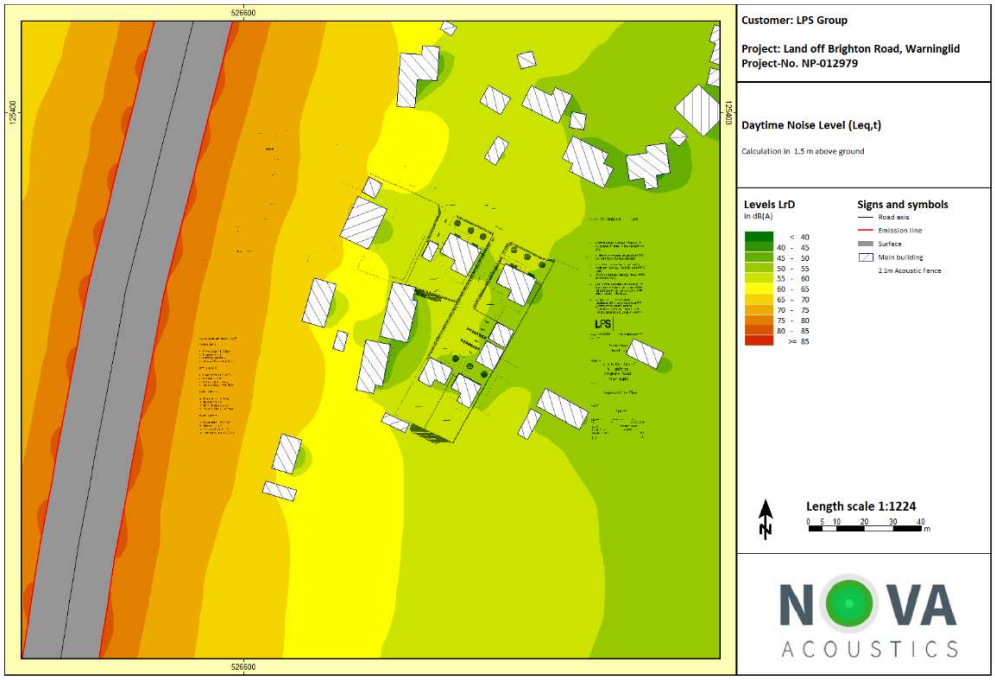


Figure 3 – $L_{Aeq,16hr}$ Ambient Sound Map

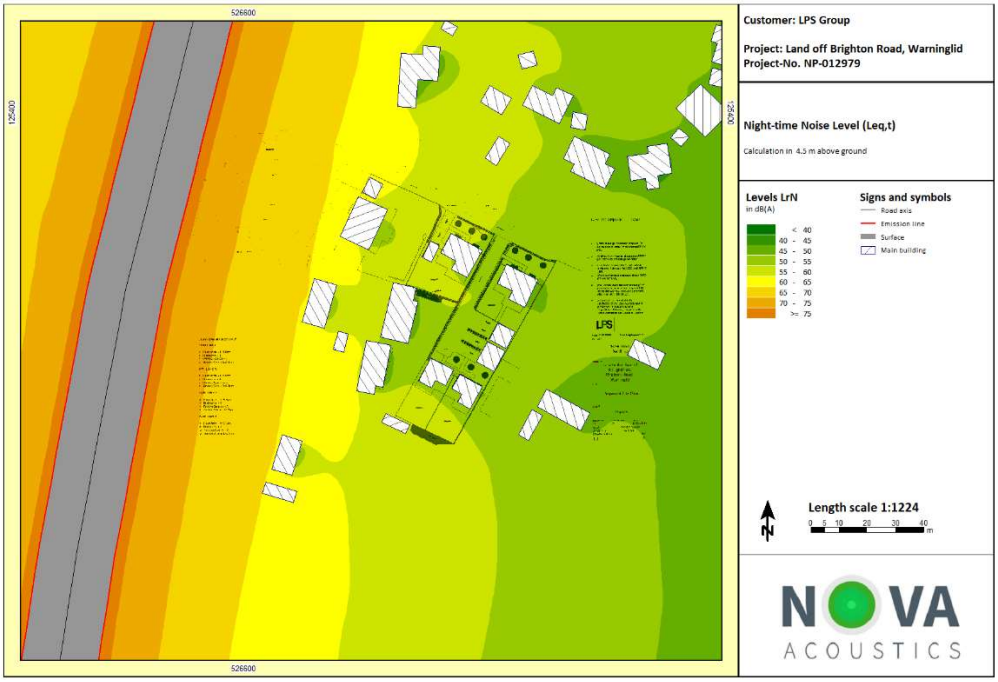


Figure 4 – $L_{Aeq,8hr}$ Ambient Sound Map

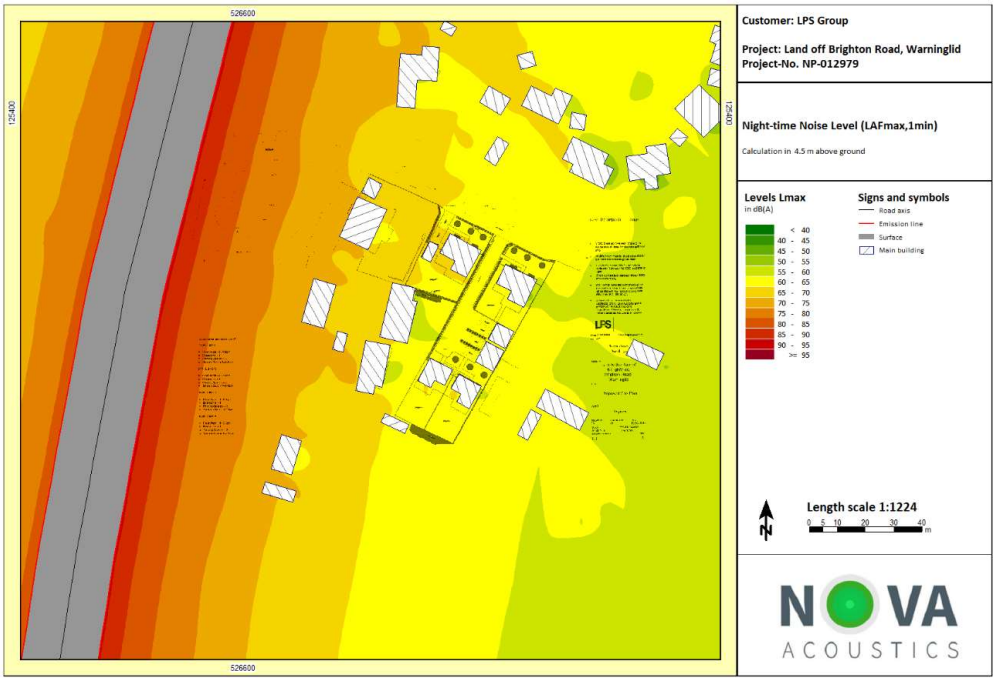


Figure 5 – $L_{AFmax,1min}$ Sound Map

4. Noise Break-in Assessment and Sound Insulation Scheme

4.1 Internal Noise Level Criteria

The noise profile of the area is dominated by road traffic, which is deemed to be an 'anonymous' noise source. As such, the criteria shown in the following table are deemed to be applicable.

BS8233:2014 Acoustic Design Criteria			
Activity	**Location**	**Daytime (07:00 – 23:00)**	**Night-time (23:00 – 07:00)**
Resting	Living Room	35 dB $L_{Aeq,16hr}$ / NR30	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$ / NR35	--
Sleeping (Daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$ / NR30	30 dB $L_{Aeq,8hr}$/ NR25 45 dB L_{AFmax}*

**NOTE 1: The maximum criteria have been taken from the World Health Organisation (WHO) Guidelines for Community Noise.*

**NOTE 2: ProPG:2017 which is relevant to 'New Residential' states; "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 3: BS8233:2014 states: "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved".

Note 4: BS8233:2014 states: "The levels shown in Table 4 (criteria shown above) are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g., 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in Table 4.

Note 5; BS8233:2014 states: "If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

Table 3 – Internal Acoustic Design Criteria

The measured sound levels at the proposed development are assessed against the relevant criteria and a sound insulation scheme is provided to achieve a good internal acoustic environment.

4.2 Glazing and Background Ventilation Specification

A glazing and background ventilation specification that achieves the relevant internal noise criteria is provided in the table below. Full calculations can be found in Appendix E.

Sound Insulation Scheme – Front Living Rooms & Bedrooms								
Description	Octave Frequency Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
6mm Glass / 16mm Air Cavity / 4mm Glass (SRI)*	20	21	20	26	38	37	39	32 (R_w) 28 (R_w + C_{tr})
Titon Standard Vent + C75 (2 No. Trickle) ($D_{n,e}$)*	28	38	36	35	42	39	42	35 ($D_{n,e,w}$) 34 ($D_{n,e,w}$ + C_{tr})

Table 4 – Glazing & Background Ventilation Specification

**Any other window or ventilation specification capable of providing this attenuation will be suitable provided the glazing suppliers can provide an acoustic test report in accordance with BS EN ISO 10140-2:2010 or an evidence-based calculation.*

4.3 Structural Envelope

To not downgrade the performance of the façades, the remaining elements of the envelope (e.g. roof and external walls) will need to achieve a sound insulation performance that is 10dB higher than the glazing specified.

Standard external wall constructions consisting of a 200mm solid masonry with 100mm cavity would be sufficient without any requirement for upgrades. However, if rooms will be located within the roof spaces directly adjacent to the roof structures, it is recommended that the roofs are constructed as follows (as a minimum):

- Roof slates/tiles
- Weatherproof membrane
- 200mm timber rafters with 100mm mineral wool insulation (min. density of 10kg/m^3)
- Resilient bars or isolation clips and furring channels
- 2no. 15mm SoundBloc plasterboards

In locations where there will be a voided loft space, the above detail would not be required.

5. Overheating Screening Assessment

In order to avoid excessively high temperatures and provide adequate levels of thermal comfort within dwellings, an overheating mitigation strategy must be developed. In low noise areas, this strategy can often rely upon opening windows as the primary source of ventilation, however, in areas with higher levels of noise, this would present a risk of adverse effects on health and quality of life.

5.1 Overheating Criteria

The threshold levels at which adverse effects may occur are defined in Approved Document O ('ADO') and the 'Acoustics Ventilation and Overheating Design Guide' ('AVO'). Considering that a partially open window provides approximately 10 dB of attenuation in areas of moderate risk (as stated in the ADO supporting documentation), the proposed internal and external noise criteria are presented in the table below, the assessment has been undertaken at Dwelling 1 of the proposed layout as the worst-case.

Period	Proposed Criteria (dB)		External Level (dB)	
	Internal	External	Measured	Exceedance
Front Façades				
Daytime ($L_{Aeq,16hr}$)	50 [1]	60	60	0
Night-time ($L_{Aeq,8hr}$)	40 [2]	50	56	+6
Night-time ($L_{AFmax,T}$) [3]	55 [2]	65	66	+1
Rear Façades				
Daytime ($L_{Aeq,16hr}$)	50 [1]	60	58	-2
Night-time ($L_{Aeq,8hr}$)	40 [2]	50	54	+4
Night-time ($L_{AFmax,T}$) [3]	55 [2]	65	66	+1

Notes:

[1] Criterion taken from the AVO guide. Above this level, it is stated: "Noise causes a material change in behaviour, e.g., having to keep windows closed most of the time."
[2] Criteria taken from Approved Document O. Above this level, it is stated: "Windows are likely to be closed during sleeping hours."
[3] L_{AFmax} exceeded fewer than 10 times per night.

Table 5 – External Noise Level Limits for Overheating Criteria – Dwelling 1

5.2 Assessment

The noise levels measured on site during the night-time exceed the external noise criteria shown in the table above. As such, an assessment of whether bedrooms are at risk of overheating would need to be undertaken by a suitably qualified person. Should the outcome indicate the site is at low risk of overheating, then a secondary ventilation strategy may not be required. If the outcome is that the site is at moderate to high risk, then it is recommended that openable windows are not used as the primary source of ventilation.

Alternative forms of ventilation include passive systems (such as acoustic louvres) and mechanical systems (such as ‘centralised mechanical extract ventilation’ and ‘mechanical ventilation with heat recovery’). The installation of passive systems is generally preferable; however, the precise requirements must be confirmed with a ventilation specialist.

From a noise perspective, overheating in living rooms can be controlled using a natural ventilation strategy (open windows); however, it would need to be confirmed by a ventilation specialist whether this is practicable considering the requirements in the bedrooms.

It should be noted that all ventilation strategies must be compliant with the requirements of Approved Document F. This assessment relates exclusively to overheating mitigation, and as such, open windows may be used for purge ventilation without acoustic constraint.

Further advice can be provided by NOVA Acoustics if required.

6. External Noise Level Assessment

The predicted noise levels in the external amenity areas (gardens) are compared with BS8233 criteria in the table below.

External Amenity Area Noise Level Assessment			
Plot No.	$L_{Aeq,16hr}$ Noise Level (dB)	BS8233:2014 Criteria (dB)	Exceedance (dB)
1	59	50 – 55 $L_{Aeq,16hr}$	+4
2	55		0
3	58		+3
4	58		+3

Table 6 – BS8233:2014 External Amenity Area Noise Level Assessment

As can be seen, The BS8233 criteria are exceeded in all but one garden plot based on the indicative layout. This is primarily because the orientation of the gardens exposes them to road traffic noise from the A23.

To reduce eternal noise levels, it is recommended that acoustic fencing is installed around the perimeters of the gardens of dwellings,1 3 & 4. The fencing must be a minimum of 2m in height, be of close-boarded timber construction, and must have a minimum surface mass of 10kg/m^2. An example product that could be used is the '12k Envirofence' manufactured by Jacksons. The proposed locations for the fencing are shown in the figure below.

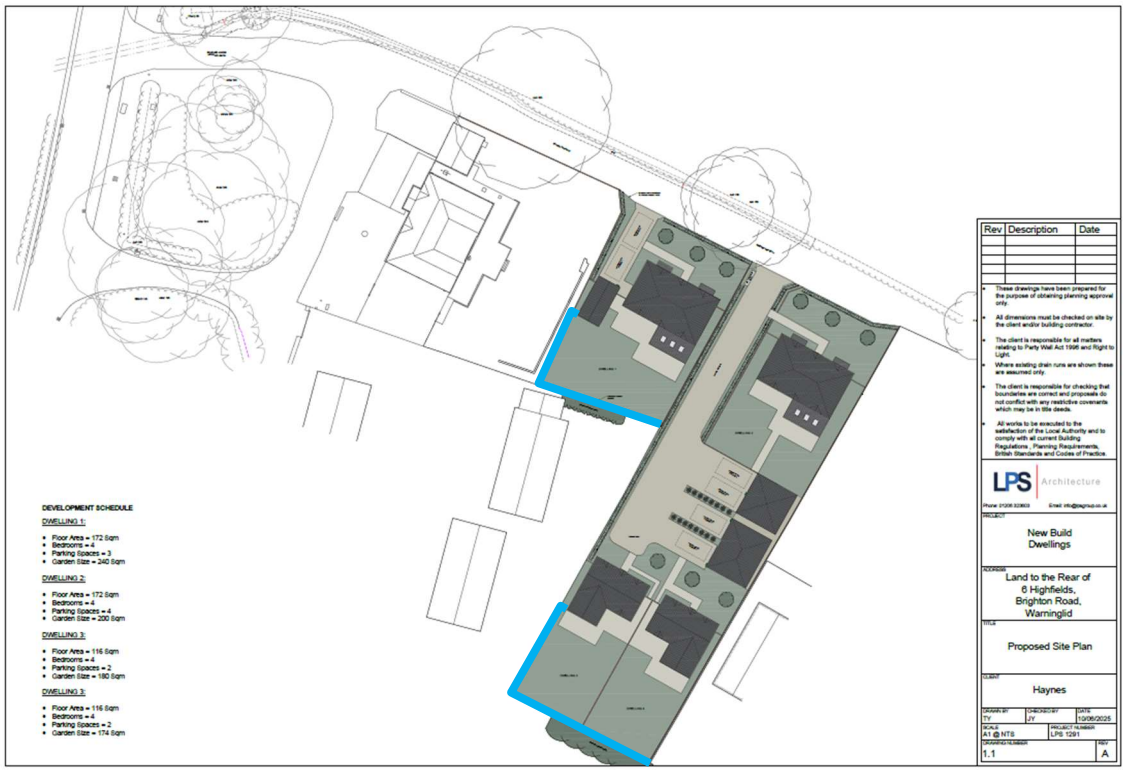


Figure 6 – Proposed Fencing Locations

The noise levels in the garden areas with the fencing installed at compared with the criteria in the table below.

External Amenity Area Noise Level Assessment			
Plot No.	$L_{Aeq,16hr}$ Noise Level (dB)	BS8233:2014 Criteria (dB)	Exceedance (dB)
1	57	50 – 55 $L_{Aeq,16hr}$	+2
2	55		0
3	56		+1
4	56		+1

Table 7 – BS8233:2014 External Amenity Area Noise Level Assessment – Post Mitigation

Although the criteria are still exceeded, the following is stated in BS8233:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T,}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

Further to the above, an exceedance of 2dB above the criteria is thought to be reasonably negligible when considering the context of the area, and that existing residential dwellings are located closer to the road, with gardens that are significantly more exposed to road noise.

7. Conclusion and Action Plan

The proposed development has been assessed against the acoustic design criteria and a sound insulation scheme has been provided to ensure the criteria can be achieved.

The following 'Action Plan' is outlined to ensure the design considerations and specifications from this report are duly implemented:

1. The proposed glazing and background ventilation system, or a suitable alternative, should be installed as shown in Section 4.2.
2. The noise levels at the front and rear facades of all proposed dwellings exceed the Approved Document O criteria for the night-time period. As such, it is recommended that an assessment of whether the bedrooms are at risk of overheating is undertaken by a suitably qualified person. Should the outcome indicate a low risk of overheating, then a secondary ventilation strategy may not be required. If the outcome is that there is a moderate to high risk, then it is recommended that openable windows are not used as the primary source of ventilation. From a noise perspective, overheating in living rooms can be controlled using a natural ventilation strategy (open windows); however, it would need to be confirmed by a ventilation specialist whether this is practicable considering the requirements in the bedrooms. Further information is included in Section 5.
3. The noise levels in gardens are predicted to exceed the BS8233 criteria without mitigation based on the indicative layout, therefore a mitigation strategy has been presented to control noise levels in proposed gardens to reduce the impact of noise on the proposed gardens. Further information is included in Section 6.

The findings of this report will require written approval from the Local Authority prior to work commencing.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Background Sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for N% of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10\log_{10}(p/p_0)^{2.}$ Wherehere: p is the root-mean-square sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy, and guidance.

B.1 – National Planning Policy Framework (2024)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2024. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 187e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

Paragraph 198 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 impact 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; and*
c) *Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes, and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 198 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

To achieve this vision the Statement identifies the following three aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life:
- Mitigate and minimise adverse impacts on health and quality of life:
- Where possible, contribute to the improvement of health and quality of life.

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

NOEL – No Observed Effect Level

This is the level 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. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

This is further expanded using the updated "Noise Exposure Hierarchy Table" which includes an additional level of impact referred to as the 'No Observed Adverse Effect Level' ('NOAEL'). It is stated that at this level: *"noise can be heard, but does not cause any change in behaviour, attitude or other physiological response"*. In addition, noise at this level *"can slightly affect the acoustic character of the area but not such that there is a change in the quality of life".*

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – BS8233:2014 'Guidance on Sound insulation and noise reduction for buildings'

BS8233 provides guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, 'WHO Guidelines on Community Noise, 1999'. The Guidelines on Community Noise (1999) document defines community noise to include noise from "industries" and "construction". The desirable criteria levels of steady state, "anonymous" noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below.

BS8233:2014 Internal Ambient Noise Level Criteria			
Activity	**Location**	**Daytime (07:00 – 23:00)**	**Night-time (23:00 – 07:00)**
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_{AFmax}*

Table 8 – BS8233:2014 Internal Ambient Noise Level Criteria

**ProPG:2017 states that's good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 time a night within noise sensitive rooms such as bedrooms. However, where it is not reasonably practicable to achieve the guideline then the judgment 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.*

It is noted, however, that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

For this assessment, the above criteria are considered to be the 'LOAEL' as defined in the NPSE in Appendix B.

B.4 – Approved Document 0: Overheating (2021)

Approved Document O states the following in relation to noise:

1. 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).
2. 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. 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).B.6 - Acoustics Ventilation and Overheating – Residential Design Guide 2020

B.5 – Acoustics Ventilation and Overheating – Residential Design Guide 2020

It is suggested that the desirable internal noise criteria within BS8233:2014 should be achieved considering adequate ventilation as defined by Building Regulations 'Approved Document F' ('ADF') whole dwelling ventilation. However, for a whole dwelling ventilation system such as MVHR it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.

The 'Institute of Acoustics' ('IOA') and the 'Association of Noise Consultant's ('ANC') have published 'The AVO Guide: 2020' document 2020. It provides guidance for those acousticians involved in the design of buildings to prevent noise ingress to and achieve reasonable internal levels. This provides valuable guidance on ventilation and overheating in support of the "Good Acoustic Design" principle advocated by ProPG. Along with guidance showing an acoustic assessment during the overheating condition, the AVO Guide (2020) provides a framework that has a two-level assessment procedure to estimate the potential impact on occupants:

Level 1 Risk Assessment

AVO 'Level 1' risk assessment criteria guide based on external free field ambient noise levels for dwellings relying on purge ventilation (e.g., opening windows) to prevent summertime overheating. AVO Guide Table 3-2 detailed in the figure below. To assess the possibility of overheating it is reasonable to relax the BS 8233:2014 internal ambient noise levels from opening a window by 5 decibels (5 dB). Also, it is assumed that a partially open window will provide a sound reduction of 13 dB. Therefore, to achieve internal noise levels in line with BS 8233:2014 the façade external noise levels should fall inside the levels shown in Table 3-2.

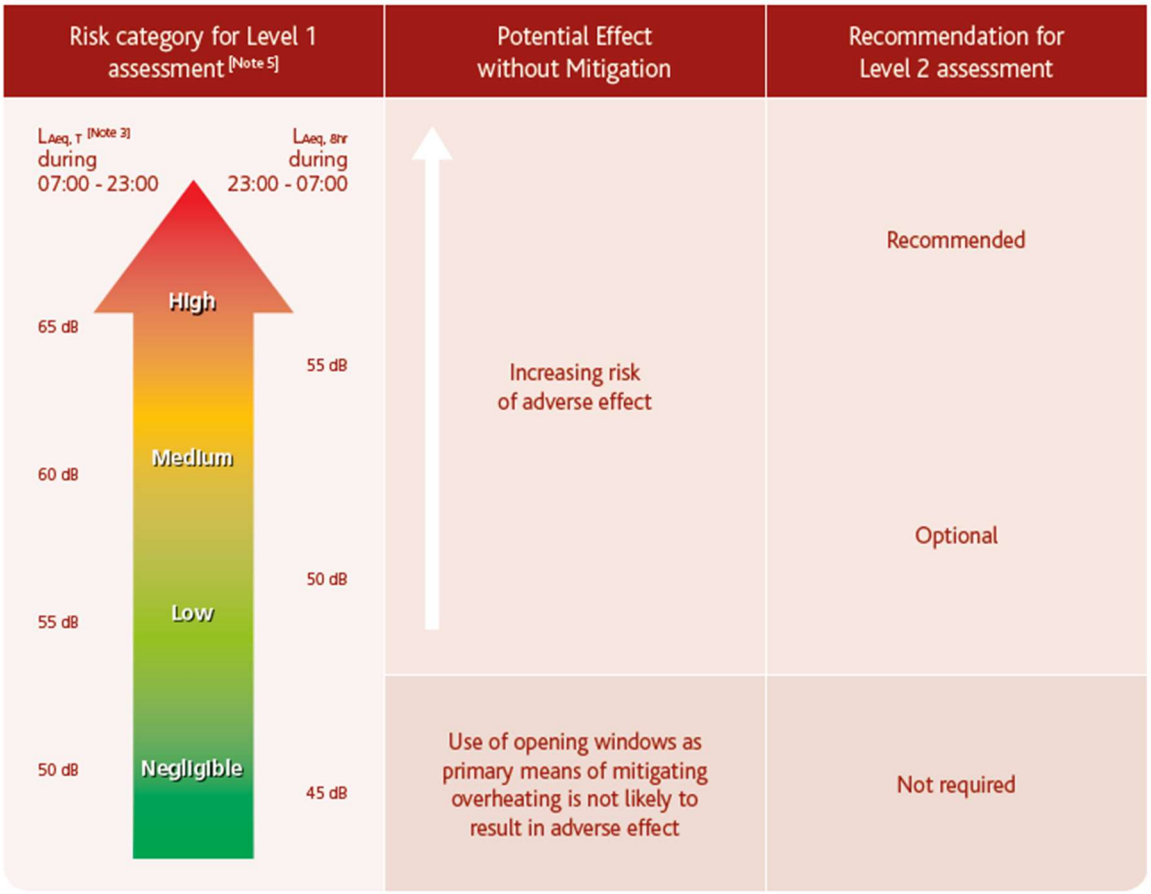


Table 3-2 of AVO Guide (2020)

Figure 7 – AVO Guide Level 1 Risk Category

The AVO Guide (2020) seeks to determine the level of risk associated with overheating in a new residential development based on the existing noise climate. The AVO risk categories are detailed in the table below with clearer categorisation.

AVO Guide (2020) Level 1 Risk Assessment			
Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)	Risk Category	Mitigation
≥63 dB $L_{Aeq,16hour}$	≥55 dB $L_{Aeq,8hour}$	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy.
57 – 62 dB $L_{Aeq,16hour}$	52 – 54 dB $L_{Aeq,8hour}$	Medium Risk	Level 2 assessment optional to give more confidence regarding the suitability of internal noise conditions.
54 – 56 dB $L_{Aeq,16hour}$	49 – 51 dB $L_{Aeq,8hour}$	Low Risk	
≤53 dB $L_{Aeq,16hour}$	≤48 dB $L_{Aeq,8hour}$	Negligible Risk	None required – openable windows suitable for ventilation

Table 9 – AVO Guide (2020) Level 1 Risk Assessment

Level 2 Risk Assessment:

A 'Level 2' assessment of noise is recommended where a dwelling using purge ventilation (e.g., open windows) reaches Level 1 'High Risk' or 'Medium Risk'. The Level 2 assessment guidance comments that where internal ambient noise levels are >50 dB $L_{Aeq,16hr}$ (day) or >42 dB $L_{Aeq,8hr}$ (night) then the outcome might be that the noise causes a material change in behaviour, e.g., having to keep windows closed for the majority of the time, or there is the potential for sleep disturbance.

To conduct a Level 2 assessment, the following minimum information is required:

- Statement of the overheating criteria being applied.
- Description of the provisions for meeting the stated overheating criteria. This should include, where relevant, the area of façade opening.
- Details of the likely internal ambient noise levels whilst using provisions for mitigating overheating, and the method used to predict these.
- Estimation of how frequently and for what duration such provisions are required to mitigate overheating.
- Consideration of the effect of individual noise events.
- Assessment of the adverse effect on occupants.

The figure below outlines the AVO Guide (2020) guidance for a Level 2 assessment of noise from transport sources relating to the Overheating Condition.

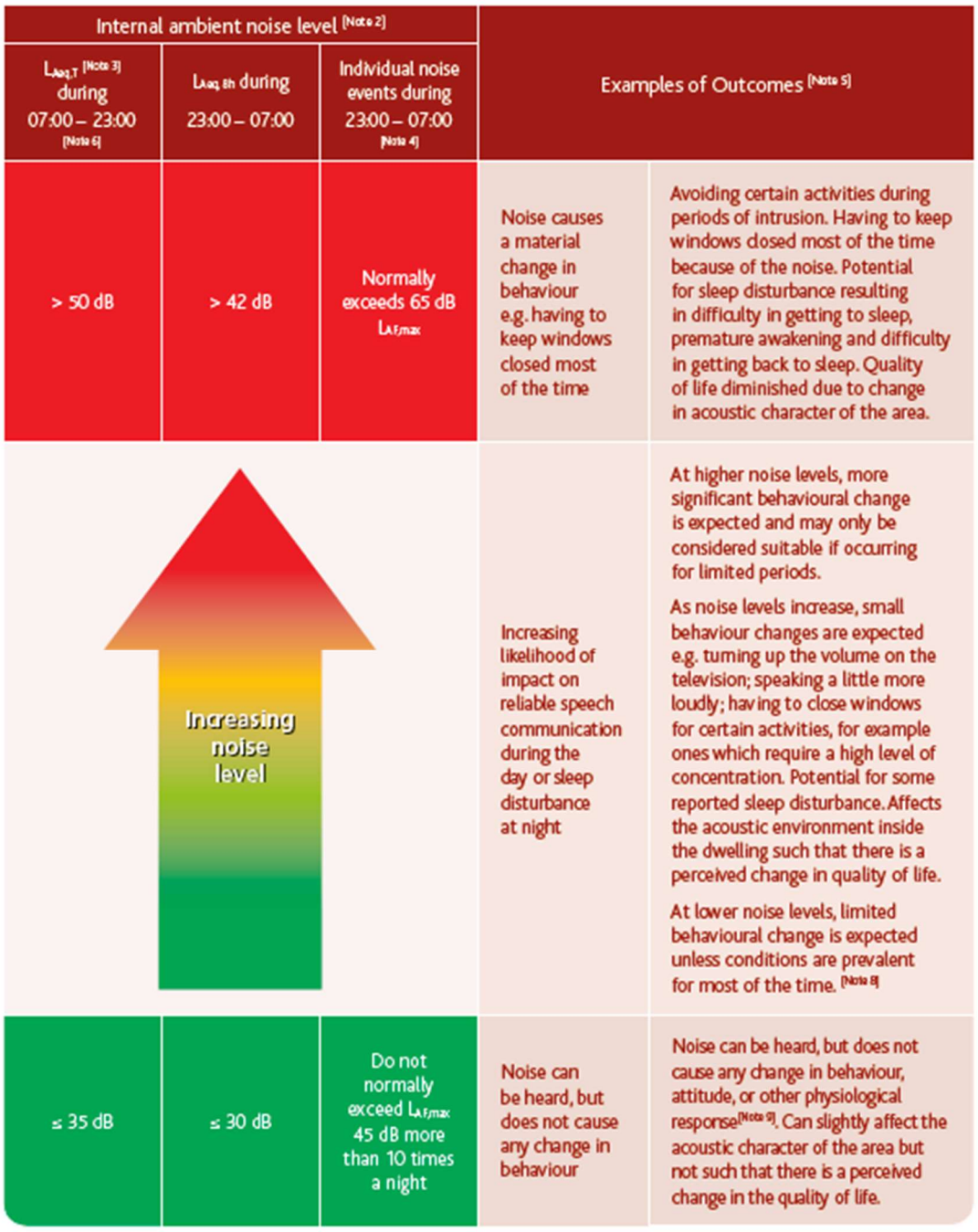


Table 3-3 of AVO Guide (2020)

Figure 8 – AVO Guide Level 2 Internal Ambient Noise Levels

Appendix C – Site Plan

Figure 9 – Site Plan

Appendix D – Environmental Survey

D.1 – Time History Noise Data

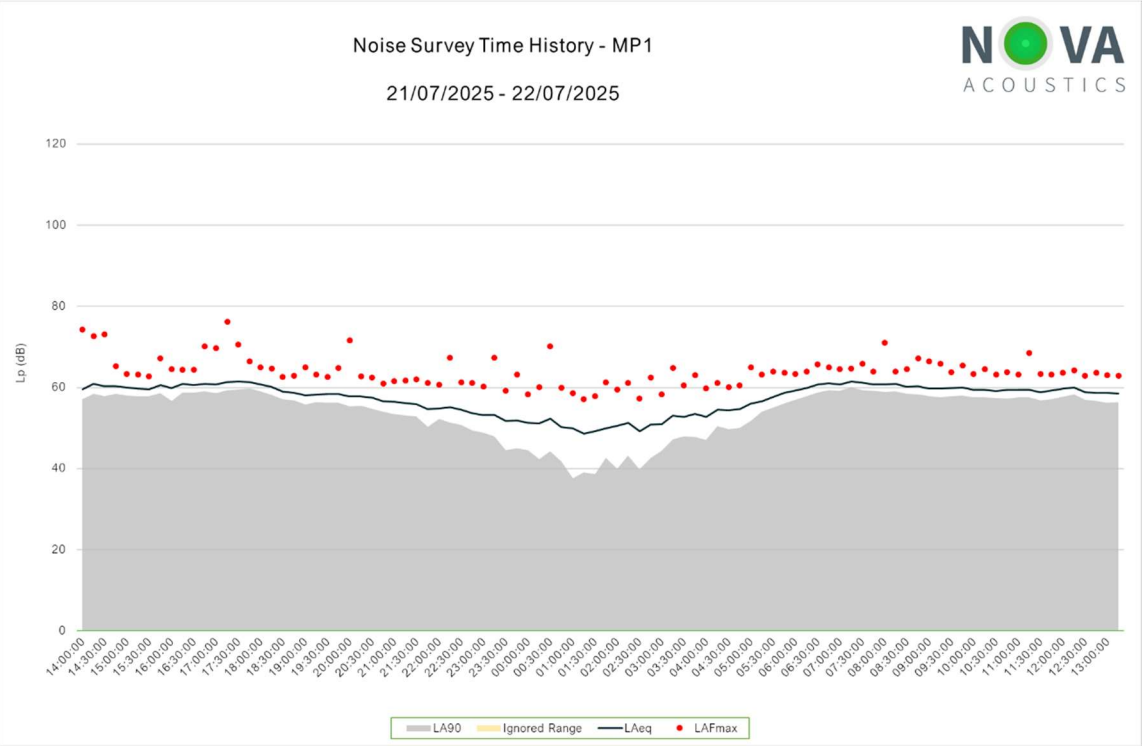


Figure 10 – MP1 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV971A Class 1 Sound Level Meter	154344	≤0.2
Svantek SV33B Calibrator	160892	
Svantek SV971A Class 1 Sound Level Meter	154271	≤0.2
Svantek SV33B Calibrator	160892	

Table 10 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.2dB. All sound level meters are calibrated every 24 months, and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined

in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Jeremys Lane (Approx. 700m SSW of Site)				
Time Period	Air Temp (^{0}C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
21/07/25 – 14:00 – 23:59	14.8 – 24.5	0.0 – 1.2 [1]	WSW	0.0 – 1.0
22/07/25 – 00:00 – 13:30	15.0 – 23.5	0.0 – 6.0 [1]	WNW	0.0 – 0.6

Notes:
[1] Rainfall took place for short periods and is not thought to have adversely affected the survey results.

Table 11 – Weather Conditions

Appendix E – Noise Break-in Calculations

The façade sound reduction and predicted internal noise levels are calculated assuming the following:

- The calculation method for façade sound reduction is in accordance with BS8233:2014 and BS EN 12354-3.
- The reverberation time is typically 0.5 seconds across the relevant frequency range for a furnished living room in the UK. This value is used for both living rooms and bedrooms.
- No scalable proposal drawings have been provided to NOVA Acoustics at this stage, therefore window areas of 2.4m^2 and room volumes of 30m^3 are used in the calculations for bedrooms and living rooms as a typical scenario based on previous experience of similar developments.
- The acoustic performance of the façade elements is taken from the relevant manufacturers' technical information, or the sound reduction has been predicted using INSUL 9.0.
- For background trickle ventilation a total Equivalent Area of 5000mm^2 per habitable room has been used in the calculations, which equates to 2 No. trickle vents (2500mm^2 each).

Living Room Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	60	61	53	51	54	58	51	38	31
Glazing Noise Ingress	22	35	26	25	22	14	8	-7	-14
Ventilation Noise Ingress	23		18	18	22	19	15	-1	-8
Wall Noise Ingress	1	18	5	1	-6	-3	-10	-23	-30
Roof Noise Ingress									
Room Absorption Correction		1	1	1	0	0	0	-1	-3
Total Noise Ingress	**29**	**39**	**31**	**29**	**28**	**24**	**19**	**2**	**-7**
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-6	-20	-17	-10	-5	-6	-7	-22	-29

Bedroom Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	60	61	53	51	54	58	51	38	31
Glazing Noise Ingress	19	32	23	22	19	11	5	-10	-17
Ventilation Noise Ingress	20		15	15	19	16	12	-4	-11
Wall Noise Ingress	-3	15	2	-2	-9	-6	-13	-26	-33
Roof Noise Ingress	17	38	26	15	12	10	3	-11	-18
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	**30**	**46**	**35**	**30**	**29**	**24**	**19**	**2**	**-6**
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-5	-13	-13	-9	-4	-6	-7	-22	-28

Bedroom Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	56	57	49	48	51	54	48	37	31
Glazing Noise Ingress	15	27	18	18	15	6	1	-12	-18
Ventilation Noise Ingress	16		10	11	15	11	8	-6	-12
Wall Noise Ingress	-7	10	-3	-6	-13	-11	-17	-28	-34
Roof Noise Ingress	12	33	21	11	8	5	-1	-13	-19
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	**26**	**42**	**31**	**27**	**25**	**20**	**16**	**1**	**-6**
NR25	30	55	43	35	28	25	21	19	17
Exceedance of Criteria	-4	-13	-12	-8	-3	-5	-5	-18	-23

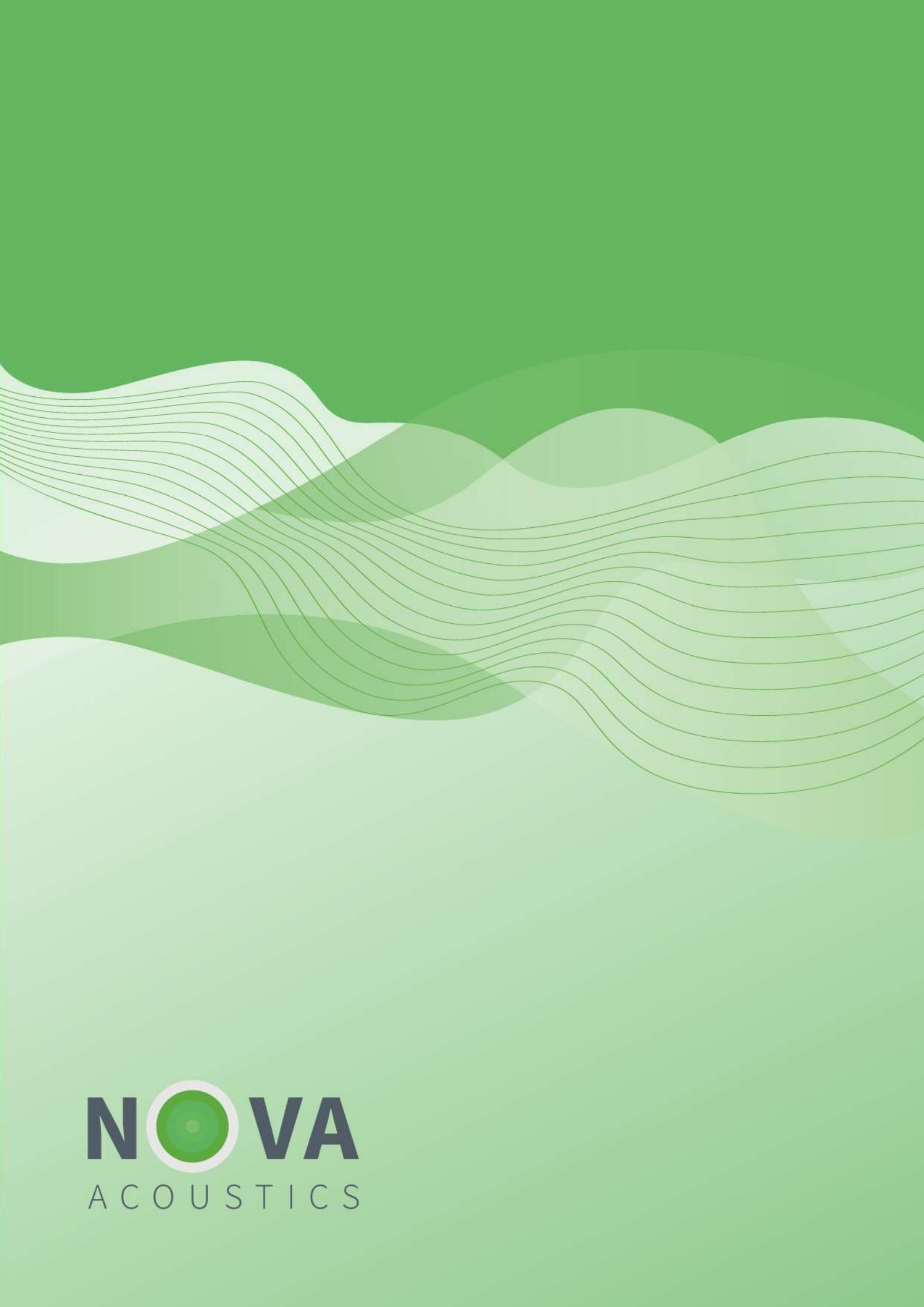
Bedroom Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Lmax Spectrum	66	74	69	66	66	63	57	50	47
Glazing Noise Ingress	31	44	38	36	30	15	10	1	-2
Ventilation Noise Ingress	30		31	30	31	21	18	8	5
Wall Noise Ingress	8	27	17	12	2	-2	-8	-15	-18
Roof Noise Ingress	29	50	41	29	23	14	8	0	-3
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	**42**	**59**	**51**	**45**	**41**	**29**	**25**	**14**	**10**
NR40	45	67	56	49	43	40	37	34	33
Exceedance of Criteria	-3	-8	-5	-4	-2	-11	-12	-20	-23

Appendix F – Noise Modelling Particulars

The SoundPLAN 9.1 noise model has been setup with the following inputs and assumptions:

- To accurately model the land surrounding the development the topographical data has been taken from the EAs 'National LIDAR Programme' on the DEFRA Data Services Platform.
- For the purpose of the assessment, the ground between the source and receiver is considered to consist primarily of acoustically 'soft' surfaces.
- The sound map grid height has been set to 1.5m, however, the noise levels used in the assessment will be taken form the most exposed point on each façade.
- All buildings and any intervening objects have been modelled according to the technical drawings provided by the applicant, and those provided by the LIDAR data.
- The noise levels presented in Table 2 have been used to calibrate the noise model.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