



Noise Impact Assessment

Site Address: 8 Wood Lane, Norton-Juxta-Twycross, Atherstone, CV9 3QB

Client Name: 2012 Partnership Homes

Project Reference: NP-013486-2



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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for a new-build residential development ('the proposed development') at 8 Wood Lane, Norton-Juxta-Twycross, Atherstone, CV9 3QB ('the site').

The applicant is preparing to submit a planning application to the Local Planning Authority ('LPA'), (Hinckley & Bosworth Borough 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 (NPPF, 2024)
- Noise Policy Statement for England (NPSE, 2010)
- British Standard BS8233:2014 – 'Guidance on sound insulation and noise reduction for buildings'
- British Standard BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'
- Approved Document O: Overheating (2021)
- Acoustics Ventilation Overheating: Residential Design Guide 2020' (AVO Guide)

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

1.2 Proposal Brief

The proposal is for the construction of 4no. dwellings. The proposed layout of the development is shown below.

At this stage, it is unknown whether there will be any items of externally fixed mechanical plant at the development. Therefore, to form a robust approach, the impact of this will be assessed in the event proposals confirm that plant will be installed.

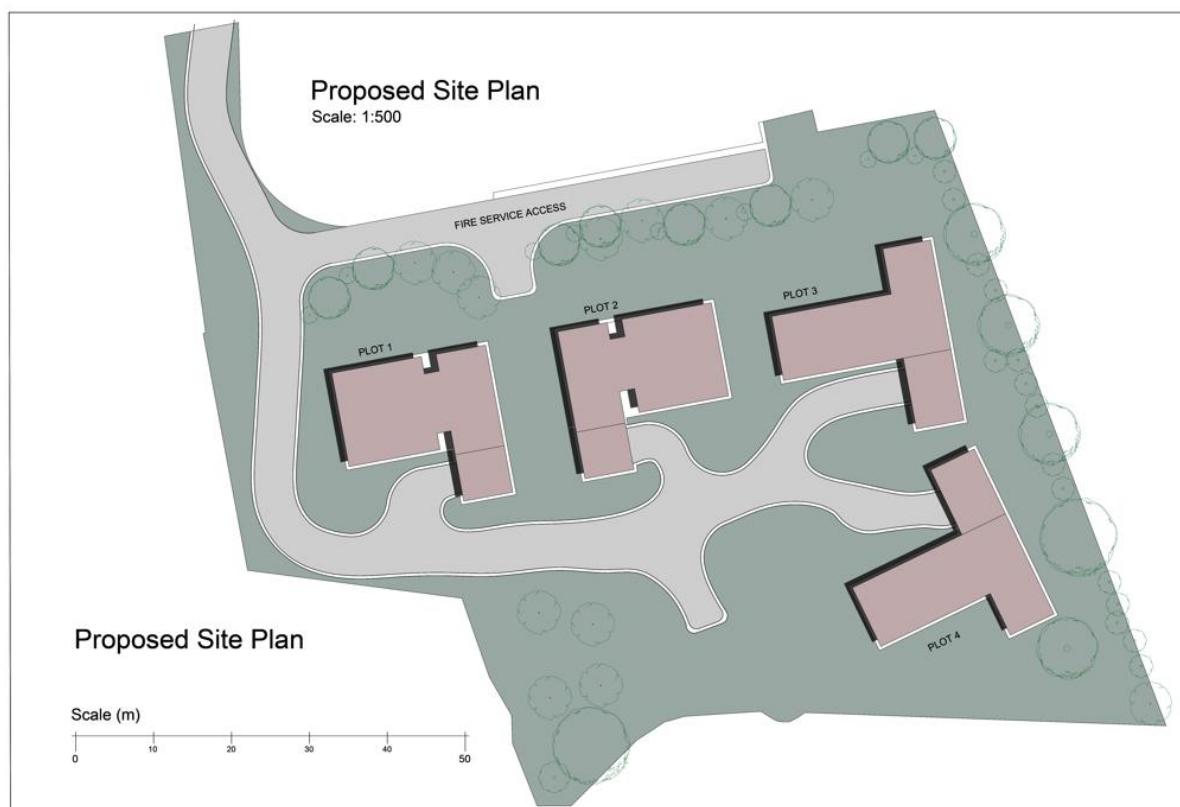


Figure 1 – Proposed Development

1.3 Local Planning Authority & Background

The site has previously received conditional permission for prior approval for the change of use of two agricultural buildings to two office buildings (Planning Ref: 25/00871/P3CR). This application has since been withdrawn, however, the noise impact assessment for this application was also undertaken by Nova Acoustics with an unattended noise survey completed offsite at previously identified receptors and this will be used to inform this assessment.

2. Environmental Noise Survey

2.1 Measurement Methodology

An attended and unattended environmental noise survey was undertaken at the site to determine the existing noise climate affecting the proposed development. The measurement dates and particulars are outlined in the following table.

All measurements were undertaken under free-field conditions. A 130mm diameter windshield was fitted to each microphone. The equipment was field calibrated before and after the survey with negligible levels of drift noted.

Location	Survey Dates	Measurement Particulars
MP1	10/11/2025 – 12/11/2025	Equipment mounted to a telegraph pole 4m above the ground overlooking Wood Lane.
MP2	10/11/2025 – 12/11/2025	Equipment mounted to a telegraph pole 4m above the ground overlooking Main Street.
ST1	10/03/2026 11:33 – 14:09	Equipment mounted on a tripod at an approximate height of 1.5m above ground In the southeast corner of the proposed development site.
ST2	10/03/2026 11:31 – 14:09	Equipment mounted on a tripod at an approximate height of 1.5m above ground In the northeast corner of the proposed development site.
ST3	10/03/2026 11:46 – 14:12	Equipment mounted on a tripod at an approximate height of 1.5m above ground In the northwest corner of the proposed development site.

Table 1 – Measurement Methodology

The site surroundings and measurement locations are highlighted in the following figure.



Imagery ©2026 Airbus Imagery ©2026 Airbus, Maxar Technologies, Map data ©2026

Figure 2 – Measurement Locations and Site Surroundings

2.2 Context & Subjective Impression

The proposed development site is located on land with currently two large agricultural buildings to the south of Wood Lane, central to the village of Norton Juxta Twycross. The immediate surrounding consists of a working farm to the east, and residential dwellings to the north and west. Approximately 620m to the south is the A444, a busy road leading from the M42 towards Twycross, and approximately 3.2km to the northwest is the M42.

The acoustic environment is deemed to be low in level with vehicular pass-by's being dominant and it was noted on location by the engineer that distant road noise was audible, likely from the M42.

To the east of the development site boundary is a commercial unit operated by Overhead Line Fittings UK Ltd. It is understood that the commercial business manufacture metal frames for high tension powerlines and as such some noise breakout of metal and fabrication works and from a radio were audible at the attended measurement positions ST1 and ST2. It has been confirmed by the client that the site only operates during daytime hours (07:00 – 23:00 hours).

2.3 Environmental Noise Survey Results – Ambient and Maximum Noise Levels

A summary of the ambient sound levels measured during the attended and unattended noise survey is presented in the table below.

Location	Measurement Period ('T')	Octave Frequency Band (Hz, $L_{eq,T}$, dB)							Overall (dBA)	Typical $L_{AFmax,1min}$
		63	125	250	500	1k	2k	4k		
MP1	Average $L_{eq,16hr}$ (Day)	57	50	48	47	46	44	42	51	--
	Average $L_{eq,8hr}$ (Night)	48	42	41	40	40	38	37	45	60 ^[1]
MP2	Average $L_{eq,16hr}$ (Day)	57	53	52	51	51	49	46	56	--
	Average $L_{eq,8hr}$ (Night)	51	45	44	44	45	42	39	49	73 ^[1]
ST1	10/03/2026 11:33 – 14:09	57	49	46	45	44	38	35	48	51 ^[2]
ST2	10/03/2026 11:31 – 14:09	54	45	45	45	45	40	38	49	53 ^[2]
ST3	10/03/2026 11:46 – 14:12	50	44	42	41	39	33	38	44	47 ^[2]
Notes ^[1] Exceeded less than 10 times per night ^[2] 90 th percentile										

Table 2 – Sound Level Results Summary

2.4 Environmental Noise Survey Results – Background Noise Levels

A summary of the typical background sound levels measured previously during the noise survey is shown in the table below. The levels have been derived via statistical analysis of the measured $L_{A90,15min}$ data and were chosen depending on the ranges and distributions of measurement results. Full noise survey time histories and histograms can be found in Appendix D.

Location	Period	Typical Background Sound Level $L_{A90,15min}$ (dB)
MP1	Day: 07:00 – 23:00	39
	Night: 23:00 – 07:00	30
MP2	Day: 07:00 – 23:00	42
	Night: 23:00 – 07:00	32
ST1	10/03/2026 11:33 – 14:09	44
ST2	10/03/2026 11:31 – 14:09	43
ST3	10/03/2026 11:46 – 14:12	36

Table 3 – Background Sound Level Results Summary

The background level of 36dB as measured at ST3 has been used to form the basis of the BS4142 assessment from the neighbouring Overhead Line Fittings UK building to form a robust assessment. It was noted during the attended measurements by the engineer that noise breakout from the commercial

property was not audible at this location. It is understood from communications with the applicant that the commercial business is only operational during the daytime period.

2.5 BS4142 Noise Impact Assessment

A BS4142 assessment has been undertaken of the potential noise breakout from the Overhead Line Fittings UK building on the proposed development and this is shown below. The distance from the commercial property to the closest and most affected NSR is approximately 15m. As per the communications with the applicant, it is understood that the commercial property is only operational in the daytime period and as such the assessment has been undertaken during this period.

Due to restricted access, it has not been possible to carry out internal measurements within the building. Therefore, internal levels for the commercial property have been derived from a previous assessment undertaken by Nova Acoustics of a metal supplier workshop (Report Reference: 8706RB). The commercial building construction was observed to be a composite of brickwork and corrugated steel cladding. As a worst-case scenario and to form a robust assessment, an SRI performance of 0.6mm Steel has been applied to the full façade.

Please note that the only open areas of the building appeared to be open roller shutter doors that are located away from the site to the east. As these are entirely screened from the proposed development, these will not be considered in the below assessment. Please note a wall area of 288m² has been included for. To account for the breakout from the side walls and roof, a nominal +3dB correction has been applied.

Description	1/1 Octave Frequency Band (Hz, dB)							Overall (dBA)
	63	125	250	500	1k	2k	4k	
Metal Workshop Internal Level	71	72	69	67	68	66	66	73
Façade SRI (R _w) 0.6mm Steel	7	10	14	19	24	30	35	--
Internal to External Correction (C _d)	-3							
Sound Power Level of Façade (L _w)	86	84	77	70	66	58	53	73
Propagation Correction	-32 (x=0, y=0, d=15)							--
Specific Sound Level at Nearest Property (L _{eq})	57	55	48	41	37	29	24	45
BS4142 Subjective Acoustic Feature Correction	A +3dB penalty has been applied to account for the potential intermittency of noise breakout from the commercial unit.							+3
Rating Sound Level (L _{Ar,Tr})	Specific sound level plus rating penalties.							48
Background Sound Level	ST3 L _{A90,15min} – Table 3.							36
Exceedance	L _{Ar,Tr} – L _{A90,15min}							+12
BS4142 Assessment Outcome	'Significant Adverse impact, dependant on context'							

Table 4 – BS4142 Noise Impact Assessment

Based on the above assessment, there would be an indication of 'significant adverse impact, dependent on context' at the NSR.

It is noted that the specific noise level breakout is 5dB below the lower guideline value stated in BS8233 for external amenity spaces (50dB $L_{Aeq,16hr}$) and 10dB below its upper guideline value (55dB $L_{Aeq,16hr}$). As such, it is unlikely to negatively impact the amenity of the space, especially given that there are existing residential units almost equidistant to the commercial noise sources.

Furthermore, it was observed by the site engineer that the dominant noise source at the site was from road traffic noise emissions and that noise breakout from the commercial unit was only audible in lulls of traffic flow and when situated close to the building. Therefore, it is unlikely that the impact on residential amenity would be impacted by noise breakout from the commercial unit and that the proposed sound insulation scheme presented in section 3 of this report is sufficient to protect residents from the noise breakout of the commercial unit. Therefore, given the context of the area, it is thought that the impact of commercial activity on the proposed dwellings is low impact.

3. Noise Break-in Assessment and Sound Insulation Scheme

3.1 Internal Noise Level Criteria

The acoustic environment is dominated by transport noise, which is generally considered to be an “anonymous” noise source, the internal noise criteria shown in the following table are thought to be appropriate for the development.

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} *

Notes:

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

[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”.

[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”.

[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.

[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 5 – Internal Acoustic Design Criteria

However, it is noted that the specific noise level predicted at the proposed development is similar to the spot measurements undertaken at ST1 and ST2. As such a sound insulation scheme is proposed to ensure that noise breakout from the commercial unit is controlled to 10 dB below the above criterion.

3.2 Determined External Noise Levels

The external free-field noise levels incident on the façades of the proposed development have been determined and are presented in the figure and table below. The difference between the day and the nighttime measurement at the long-term monitors is 6dB at MP1 and 7dB at MP2. Therefore a 6dB correction has been applied to the on-site spot measurements to determine the nighttime noise levels at the façade of the proposed development. The spectrum shape used to form the assessment has been derived from the road traffic levels monitored at MP1 and MP2. Maximum noise levels have derived by applying noise propagation calculations to the measured levels at MP1 and MP2.

Due to the similarity in noise levels across the site, the single highest figure has been used in order to assess the noise break assessment on all facades.

Elevation	Daytime Noise Levels (dB) (07:00 – 23:00)	Night-time Noise Levels (dB) (23:00 – 07:00)	
	Ambient ($L_{Aeq,16hr}$)	Ambient ($L_{Aeq,8hr}$)	Maximum (L_{AFmax})
All Facades	≤49	≤43	≤57

Table 6 – Determined External Free-field Noise Levels

3.3 Glazing and Whole Dwelling (Background) Ventilation Specification

Glazing and background ventilation specifications that achieve the relevant internal noise criteria are shown in the table below. Detailed noise ingress calculations can be found in Appendix E.

Description	Octave Frequency Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
All Facades								
6mm Glass / 16mm Air Cavity / 4mm Glass	20	21	20	26	38	37	39	32 R_w (-4 C_{tr})
Titon Standard Vent + C25 (2no. Trickle) ($D_{n,e}$)	-	36	38	36	32	37	39	35 $D_{n,e,w}$ (-2 C_{tr})

Notes:

[1] 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.

[2] Please note that the above performance requirements for the trickle vents should be achieved with them in the 'open' position.

Table 7 – Glazing & Background Ventilation Specification

3.4 Structural Building Envelope Elements

In order to not downgrade the performance of the façade, the remaining elements of the external envelope, e.g., the roof & external wall should be designed to achieve 10dB above the glazing sound insulation performances presented above (39dB R'_w).

This is not an onerous requirement and in relation to the external walls and roof, this would be readily achievable with a standard cavity masonry wall construction and a pitched insulated roof.

3.5 Noise Break-in from Industrial Noise Sources

Please note that during periods where there are lulls in road traffic and noise levels reduce such that the industrial noise sources predicted in Table 4 become dominant, the above glazing and ventilation specification would control internal noise levels to not exceed 20dB(A) within living rooms and 24dB(A) within bedrooms.

Given that internal noise level assessments from commercial / industrial noise sources is outside the scope of BS4142, in such situations, BS8233 notes the following:

“NOTE Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.”

As such, the above external envelope specification would control noise levels to be at least 11dB the requirements within Table 5. At this level, noise break-in is likely to be inaudible in comparison to the noise sources generated within the rooms themselves and, therefore, general amenity is deemed to be protected.

4. Overheating Screening Assessment

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.

4.1 Overheating Screening Assessment

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 summarised below alongside an assessment.

Period	Proposed Criteria (dB)		External Level (dB)	
	Internal	External	Measured	Exceedance
Daytime ($L_{Aeq,16hr}$)	50 [1]	60	49	-11
Night-time ($L_{Aeq,8hr}$)	40 [2]	50	43	-7
Night-time ($L_{AFmax,T}$) [3]	55 [2]	65	57	-8

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 8 – Overheating Screening Assessment

The external noise levels measured on site are below the threshold criteria shown in the table above. Given this, it is thought that opening windows can be used as the primary means of mitigating overheating. However, this is dependent on the development being inherently at risk of overheating which would need to be determined by others.

Regardless of the ventilation strategy, it must be ensured that all designs are compliant with the requirements of Approved Document F.

5. BS4142 Noise Impact Assessment

5.1 BS4142 Fixed Plant Noise Limit Levels

The proposed plant equipment specification has not yet been finalised. Consequently, plant noise limit levels have been defined to ensure that the noise emissions do not exceed the background sound levels at the closest NSRs.

It should be noted however that the night-time background noise measurement of **30dBA** is very low, and under such circumstances, the following is stated in BS4142:

“...the absolute sound levels may be as, or more, relevant than the margin by which the rating sound level exceeds the background sound level; this is particularly true at night.”

Consequently, an absolute criterion is deemed appropriate for the night-time assessment. Outdoor amenity areas are unlikely to be used during the night; therefore, the primary concern comes from achieving suitable internal levels within the bedrooms as to avoid sleep disturbance.

BS8233 prescribes a night-time internal ambient noise level within bedrooms of $\leq 30\text{dB L}_{\text{Aeq},8\text{h}}$. Therefore, it is considered that an external noise limit of **33dBA** outside the nearest bedroom window is reasonable, which would ensure that internal noise levels do not exceed **20dBA** (when considering that a partially open window provides 13dB sound reduction). At this level, noise from any plant is unlikely to be audible against the prevailing noise climate within the rooms themselves and would therefore form a robust criterion. Whilst the BS8233 criterion is based upon anonymous transport sources, it is unlikely that any acoustic features would be perceptible within the NSR bedrooms at this level. Nonetheless, good acoustic design should still be implemented to reduce the likelihood of any tonality, intermittency and any other features not described.

The limit levels are inclusive of any rating penalties that should be applied to account for audible characteristics of the noise which could be deemed to cause increased annoyance, such as intermittency, impulsivity, or tonality. The limit levels have been calculated for the daytime and night-time periods, depending on when the plant will be operational. The calculated plant noise limit levels are shown in the table below.

Description	Daytime Period (dBA)	Night-time Period (dBA)
Background Sound Level	36	-
Cumulative Plant Noise Limit Level at NSR	36	33
BS4142 Assessment Outcome	'Low Impact'	
NPSE & NPPF Assessment Outcome	'No Observed Adverse Effect Level' ('NOAEL')	

Table 9 – BS4142 External Plant Noise Limit Levels

Discussion:

As can be seen in the assessment above, provided the plant limit levels are not exceeded, when assessed in accordance with BS4142 this indicates 'low impact', and when assessed with the NPPF and NPSE this is classed as 'No Observed Adverse Effect Level' (NOAEL).

6. External Noise Level Assessment

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

Plot No.	L _{Aeq,16hr} Noise Level (dB)	BS8233:2014 Criteria (dB)	Exceedance (dB)
All Plots	≤49	50 – 55 L _{Aeq,16hr}	-1

Table 10 – BS8233 External Amenity Area Noise Level Assessment

As can be seen, external noise levels are predicted to be within the BS8233 criteria. As such, further mitigation is not required, and external noise levels should be appropriate for resting/relaxation.

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. A BS4142 assessment has been undertaken of the nearby commercial unit to the east of the site. The findings show the potential for significant adverse impact, however given the context that the noise breakout is very low, it is thought that the impact will be low and can be controlled by the sound insulation scheme, as such the sound insulation scheme presented has been done so to control noise break in levels to at least 10 dB below the presented criteria.
2. The proposed glazing and background ventilation system, or a suitable alternative, should be installed as shown in **section 3**.
3. An overheating assessment is presented in **section 4**.
On all facades, the external noise levels are low enough such that openable windows can be utilised as the ventilation strategy during periods of overheating (where the site is inherently deemed at risk of overheating)
4. Plant noise limits have been provided for any potential externally fixed mechanical plant. This is detailed in **section 5**.
5. Noise levels within the external amenity area are low enough such that the criteria within BS8233 would not be exceeded. This assessment is shown 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 p_0 is the reference sound pressure (20 μ Pa)
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: $L_p = 10 \log_{10} (p/p_0)^2$. Where: p is the root-mean-square sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
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), updated 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.

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 11 – 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 O: 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.

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.

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 12 – AVO Guide (2020) Level 1 Risk Assessment

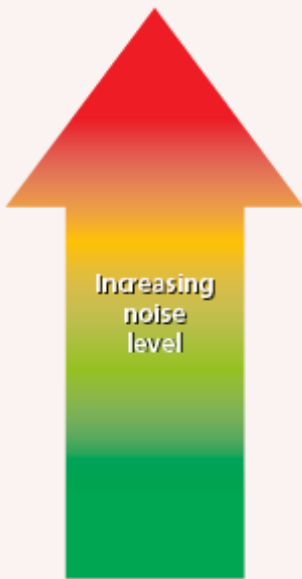
Level 2 Risk Assessment:

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.

Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,sh}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A,Fmax}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A,Fmax}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 9] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

Table 3-3 of AVO Guide (2020)

Figure 4 – AVO Guide Level 2 Internal Ambient Noise Levels

B.6 – BS4142:2014+A1:2019 – ‘Methods for rating and assessing industrial and commercial sound’

Overview

BS4142 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{A,r,T}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;*
- b) objective method for tonality;*
- c) reference method."*

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2dB is applicable for a tone which is "just perceptible", +4dB where a tone is "clearly perceptible", and +6dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3dB is applicable for impulsivity which is "just perceptible", +6dB where it is "clearly perceptible", and +9dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142 states that where *"the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3dB can be applied."*

d) Intermittency

BS4142 states that when the *“specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time ... if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3dB can be applied.”*

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a ‘typical’ background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142 states: *“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”*. An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- *“Typically, the greater this difference, the greater the magnitude of the impact.”*
- *“A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”*
- *“A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”*
- *“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

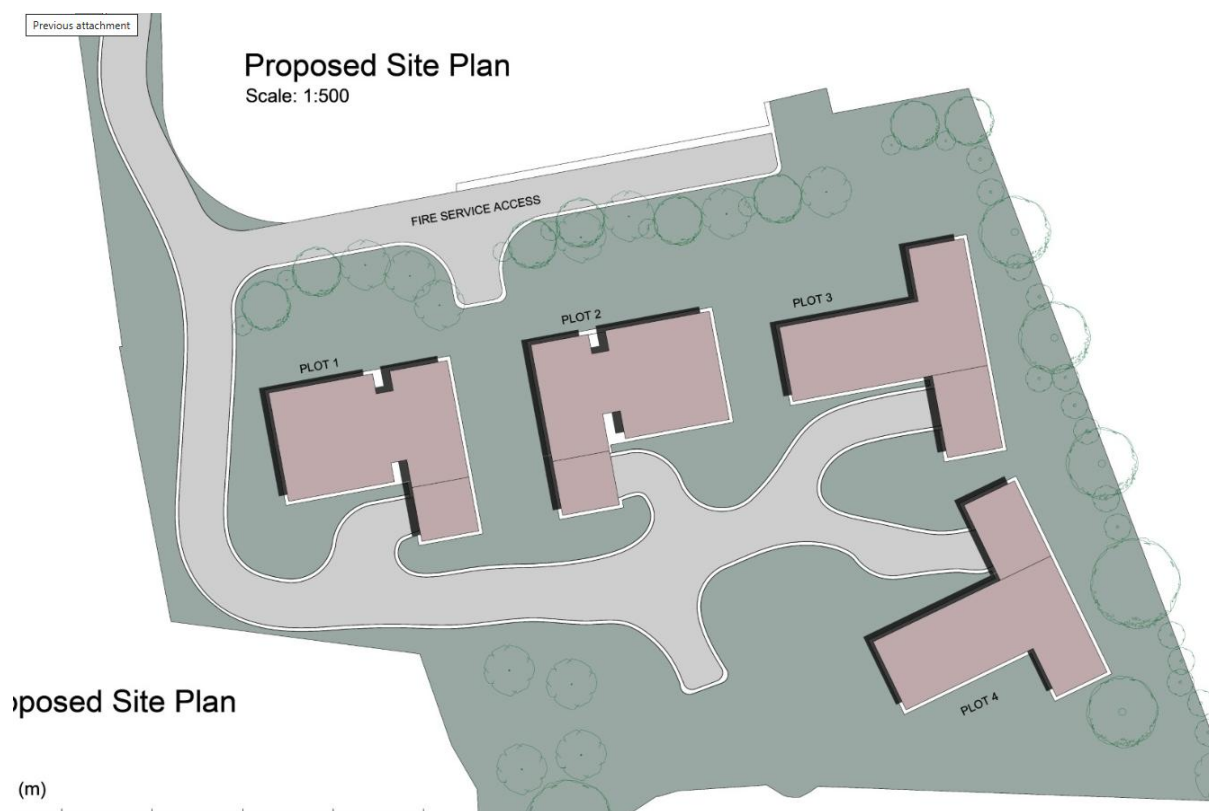
Interpreting the guidance given in BS4142, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10dB above the background sound level is likely to be an indication of a ‘Significant Observed Adverse Effect Level’;

- A rating sound level that is +5dB above the background sound level is likely to be an indication of a 'Lowest Observed Adverse Effect Level';
- The lower the rating sound level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating sound level does not exceed the background sound level, this is an indication of the specific sound source having a low impact and would therefore classify as 'No Observed Adverse Effect Level';
- At levels significantly below the measured background sound level (i.e. greater than 10dB), this is an indication of a 'No Adverse Effect Level'.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

Appendix C – Site Plans



Appendix D – Environmental Survey

D.1 – Time History Noise Data

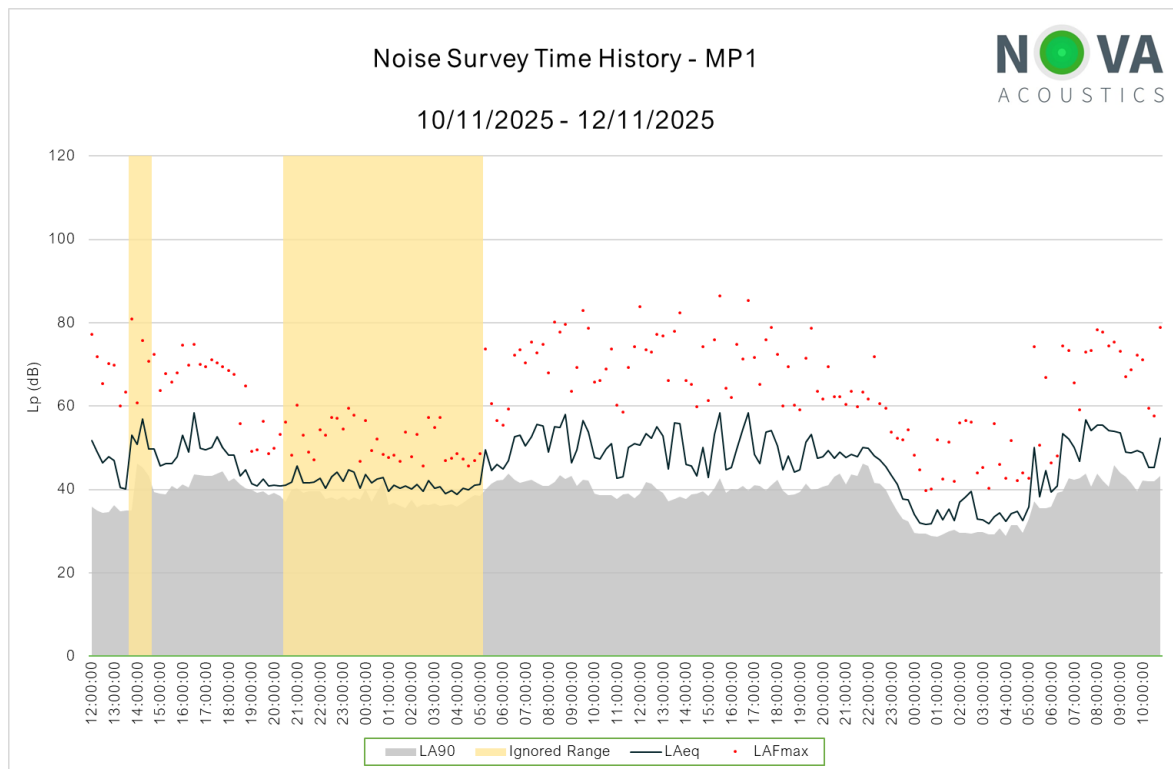


Figure 5 – MP1 Noise Survey Time History

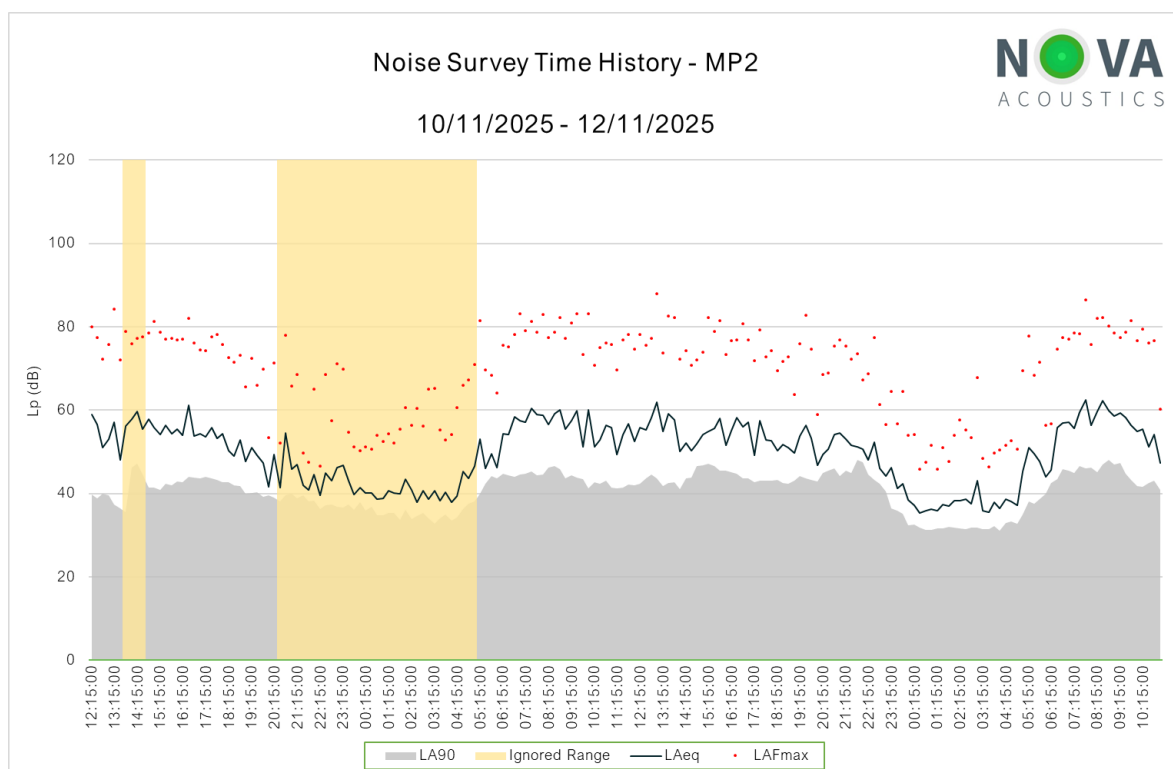


Figure 6 – MP2 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV971a Class 1 Sound Level Meter	127628	≤0.1
Svantek SV977 Class 1 Sound Level Meter	34826	≤0.1
Svantek SV33B Class 1 Calibrator	116639	--

Table 13 – Surveying Equipment – Unattended Measurements

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV971A Class 1 Sound Level Meter	T246458	≤0.1
CESVA CB006 Class 1 Calibrator	901955	
Svantek SV971A Class 1 Sound Level Meter	T250681	≤0.1
CESVA CB006 Class 1 Calibrator	901955	
Svantek SV971 Class 1 Sound Level Meter	44018	≤0.1
CESVA CB006 Class 1 Calibrator	901955	

Table 14 – Surveying Equipment – Attended Measurements

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation. 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

When unattended measurements were undertaken at the site. It was observed on site that wind speeds were below 5 m/s and suitable for the measurement of noise. No rainfall was observed when undertaking the measurements with the conditions clear and dry.

As the previous 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 – The Hut, Atherstone (Approx. 9.2km S of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
10/11/2023: 00:00 – 23:59	7.3 – 12.7	0.0 – 18.6	ESE	0.0 – 3.1
11/11/2023: 00:00 – 23:59	6.6 – 14.4	0.0 – 4.8	SE	0.0 – 5.1
12/11/2023: 00:00 – 23:59	11.9 – 14.4	0.0 – 4.8	SE	0.0 – 2.9
Note: The measurements taken during the heavy burst of rain on the 10/11/25 have been omitted from analysis, and the subsequent elevated background noise levels due to wet ground tyre roar from the M42.				

Table 15 – 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.
- Internal room layouts are not yet presented at this stage of the development, as such window areas of 2m² and room volumes of 24.8m³ are used in the calculations for bedrooms as a worst-case scenario. For living rooms, the calculations are based on a window area of 2m² and room volume of 38m³ as a worst-case scenario.
- The acoustic performance of the façade elements are taken from the relevant manufacturer's technical information or the sound reduction has been predicted using INSUL 10.0.
- For background trickle ventilation a total Equivalent Area of 5000mm² per habitable room has been used in the calculations, which equates to 2no. trickle vents (2500mm² each).

Living Room Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	49	54	47	45	44	43	41	39	39
Glazing Noise Ingress	13	28	20	19	12	-1	-2	-6	-6
Ventilation Noise Ingress	17	15	11	12	15	8	4	4	
Wall Noise Ingress	-8	12	0	-4	-15	-17	-19	-21	-21
Roof Noise Ingress									
Room Absorption Correction		0	0	0	-1	-1	-1	-2	-4
Total Noise Ingress	21	31	24	22	17	17	10	5	3
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-14	-28	-24	-17	-16	-13	-16	-19	-19

Bedroom Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	49	54	47	45	44	43	41	39	39
Glazing Noise Ingress	11	25	17	16	9	-4	-5	-9	-9
Ventilation Noise Ingress	14	12	8	9	12	5	1	1	
Wall Noise Ingress	-11	8	-4	-8	-19	-21	-23	-25	-25
Roof Noise Ingress	9	31	20	9	2	-5	-7	-10	-10
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	23	40	30	24	19	19	12	7	5
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-12	-19	-18	-15	-14	-11	-14	-17	-17

Bedroom Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Leq,T Spectrum	43	46	40	39	38	38	36	35	34
Glazing Noise Ingress	4	16	9	9	2	-10	-11	-14	-15
Ventilation Noise Ingress	8	4	1	2	6	-1	-4	-5	
Wall Noise Ingress	-18	-1	-12	-15	-26	-27	-29	-30	-31
Roof Noise Ingress	1	22	12	2	-5	-11	-13	-15	-16
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	17	31	22	17	12	13	6	2	-1
NR25	30	55	43	35	28	25	21	19	17
Exceedance of Criteria	-13	-24	-21	-18	-16	-12	-15	-17	-18

Bedroom Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Corrected Lmax Spectrum	57	73	62	56	52	49	47	47	48
Glazing Noise Ingress	23	44	32	27	17	2	1	-1	0
Ventilation Noise Ingress	21	27	19	17	18	11	9	10	
Wall Noise Ingress	2	27	11	3	-11	-15	-17	-17	-16
Roof Noise Ingress	25	50	35	20	10	1	-1	-2	-1
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	35	58	44	35	27	24	17	14	14
NR40	45	67	56	49	43	40	37	34	33
Exceedance of Criteria	-10	-9	-12	-14	-16	-16	-20	-20	-19

Living Room (Industrial Source) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	45	57	55	48	41	37	29	24	24
Glazing Noise Ingress	15	30	27	21	8	-8	-15	-22	-22
Ventilation Noise Ingress	12	22	13	8	8	-5	-12	-12	-12
Wall Noise Ingress	-5	14	7	-2	-19	-24	-32	-37	-37
Roof Noise Ingress									
Room Absorption Correction		0	0	0	-1	-1	-1	-2	-4
Total Noise Ingress	20	33	31	24	13	10	-3	-11	-12
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-15	-26	-17	-15	-20	-20	-29	-35	-34

Bedroom (Industrial Source) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	45	57	55	48	41	37	29	24	24
Glazing Noise Ingress	13	27	24	18	5	-11	-18	-25	-25
Ventilation Noise Ingress	10	19	10	5	5	-8	-15	-15	-15
Wall Noise Ingress	-9	10	3	-6	-23	-28	-36	-41	-41
Roof Noise Ingress	13	33	27	11	-2	-12	-20	-26	-26
Room Absorption Correction		5	4	4	4	4	3	2	1
Total Noise Ingress	24	42	37	27	15	12	-1	-9	-10
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-11	-17	-11	-12	-18	-18	-27	-33	-32



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