PEAK acoustics



Environmental Noise Assessment

Client:	Jason Taft
Site:	Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire
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Executive Summary

An environmental noise assessment has been undertaken at Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire, where it has been proposed to demolish the existing public house and erect 5 no. new-build residential dwellings.

Environmental noise monitoring was undertaken at the site from Monday 27th – Tuesday 28th September 2021. Noise affecting the development was determined to be primarily from road traffic from Ashbourne Road (A523). No plant equipment is to be installed and none was observed to be in close proximity to the property; the noise is without character (BS8233).

The selected assessment criteria are detailed below, in accordance with relevant British Standards.

Selected Assessment Criteria

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{AFmax*}

From the noise survey data and proposed floor plans, two façade 'Zones' were defined based on the differing noise levels affecting those areas. A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the desired design criteria. The derived scheme for the three Zones is given below.

Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance R_w *(+*C_{tr}*)*	*Example Specification*	*Minimum Performance* $D_{ne,W}$,+$C_{tr\ (Open)}$	*Example Specification / Strategy*
Zone A (All floors)				
Living Rooms	30 *(26)*	*4 / 16 / 4mm*	45	*Passivent Fresh 80dB (Through Wall Ventilator)*
Bedrooms	41 *(35)*	*6 / 16 / 8.8SC*	45	*Passivent Fresh 80dB (Through Wall Ventilator)*
Zone B (All floors)				
Living Rooms	30 *(26)*	*4 / 16 / 4mm*	32	*Titon Trimvent XS13 4400EA (Window Trickle Ventilator)*
Bedrooms	30 *(26)*	*4 / 16 / 4mm*	32	*Titon Trimvent XS13 4400EA (Window Trickle Ventilator)*

With regard to external noise levels, internal noise levels for the proposed apartment scheme are able to meet criteria when appropriate glazing and ventilation systems are utilised. A passive ventilation strategy has been given for all Zones. This strategy permits occupants to fully close their windows whilst still maintaining thermal comfort and respite from the external noise.

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1. Introduction

1.1. Proposal

It has been proposed to demolish the existing public house and erect 5 no. new-build residential dwellings at the land at Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire.

1.2. Reason for Assessment

A noise assessment is to be submitted as part of the planning application to ascertain noise levels that affect the proposed development and offer solutions to ensure desirable internal noise levels are met within habitable room. The assessment aims to provide sound insulation façade mitigation in the form of a glazing & ventilation scheme.

1.3. Planning Policy

Guidance for the assessment of noise affecting new residential development is given in the National Policy Framework (NPPF). Section 109 of the NPPF states.

> *"The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of…noise pollution."*

Section 123 states the following aims:

- *"avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of a new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The NPPF seeks to limit the exposure of new development to unacceptable levels of noise, although the policy does not seek to prescribe what constitutes an unacceptable level of noise.

To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The Noise Policy Statement for England (NPSE) was published in March 2010 and covers all forms of noise other than occupational noise.

The Noise Policy Statement for England (NPSE) states the following aims in paragraph 2.2.

> **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.*

LOAEL – Lowest Observed Adverse Effect Level.
This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level.
This is the level above which significant adverse effects on health and quality of life occur.

The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the "NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

There is no local or national guidance on how the three terms should be defined numerically, it is for the assessor to collate and interpret appropriate guidance on noise, such as may be found in British Standards, and correlate the guidance with the concepts of NOEL, LOAEL and SOAEL.

1.4. Design Criteria Summary

Guidance on the assessment and design criteria have been drawn from BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings.* Table 4 in Section 7.7.2 of this standard suggests indoor ambient noise levels for dwellings. A summary of this criteria is given below.

Desirable internal noise levels are to be maintained as given in BS8233:2014:

- *35dB $L_{Aeq,\ 16hr}$ within living areas during the day (07:00 – 23:00)*
- *35dB $L_{Aeq,\ 16hr}$ within bedrooms during the day (07:00 – 23:00)*
- *30dB $L_{Aeq,\ 8hr}$ within bedrooms at night (23:00 – 07:00)*
- *45dB L_{Afmax} should not be regularly exceeded within bedrooms at night (23:00 – 07:00)*

WHO Guidelines help to define the L_{Afmax} parameter requirements:

> *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991)".*

Additional guidance may be drawn from ProPG: Planning & Noise which was published "*to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England."*

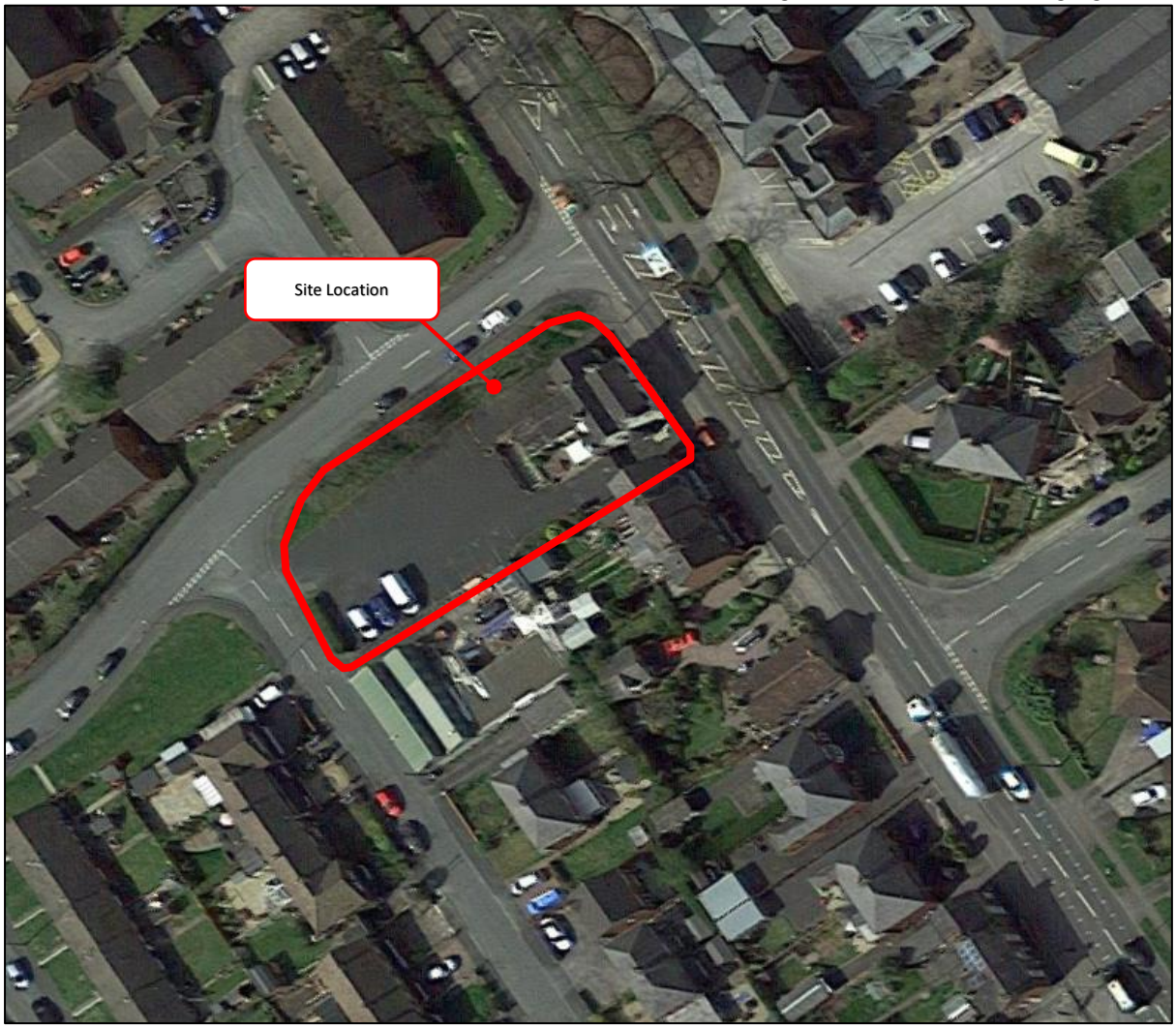
2. Site Description & Noise Sources

2.1. Site Description

The site is located on the east side of Leek and lies adjacent to the A523, a road network between Leek and Ashbourne. A high volume of all vehicle types was observed during the consultant's time on site. Noise levels affecting site were consistent throughout daytime hours with a typical diurnal pattern during the evening and into the night as surrounding road activity lessens. Other noise sources included slow moving vehicles along surrounding roads and birdsong. Residential housing makes up much of the surrounding area.

The site and locations described above are shown in Figure 1 below.

Figure 1: Site and Area – earth.google.com



3. Environmental Noise Survey

3.1. Survey Measurements

To assess the environmental noise levels affecting the proposed development, an unattended noise survey was undertaken at the site over a period of 24 hours from Monday 27th – Tuesday 28th September 2021.

Measurements of $L_{Aeq,T}$ and L_{AFmax} were logged in 5-minute intervals in accordance with the provisions of BS7445 - *'Description and Measurement of Environmental Noise'*.

3.2. Measurement Locations

Two monitoring locations were selected to capture events and noise arising from the different areas and sources that surround the site.

At position M1, the microphone was positioned directly out of the first-floor window overlooking Ashbourne Road, fully exposed to passing road traffic.

A comparative rear measurement (C1) was undertaken in conjunction with M1 to assess the level difference across the site. Plots 4 & 5 as well as rear facing bedrooms / external amenity areas are to be assessed using data obtained from the comparative measurement.

The monitoring locations are shown in **Figure 2** in Section 3.5.

3.3. Weather Conditions

Daytime temperatures of 9 - 12°C were noted during the survey with wind speeds up to 10 m/s. Light rain was monitored during infrequent periods. Any increase on noise levels due to weather conditions is deemed worst case. Detailed weather conditions are given in **Appendix C**.

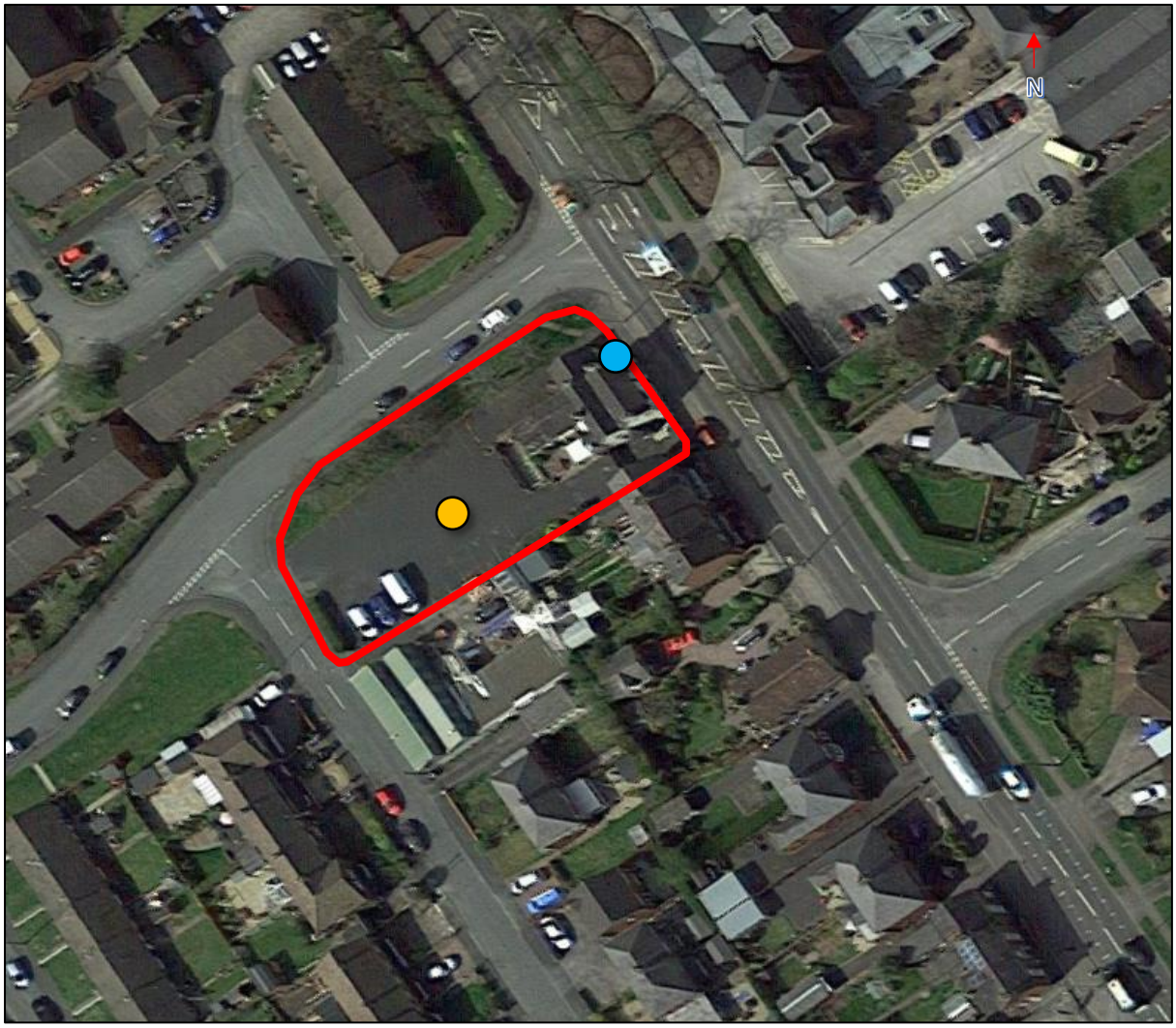
3.4. Measurement Equipment

Measurement equipment complies with accuracy requirements for common environmental noise measurement standards. Equipment was calibrated before and after use and no significant drift occurred during measurements. Up to date calibration certification can be provided upon request. A detailed equipment list is given in **Appendix B** with calibration information in **Appendix D**.

3.5. Monitoring Locations

The site and unattended noise monitoring locations are shown on Figure 2 below.

Figure 2: Site & Measurement Locations – earth.google.com



Monitoring Location (M1) – 24hrs

Rear Measurement (C1) – 30mins

Site Boundary (Approx.)

3.6. Environmental Noise Levels

The results from the noise monitoring at positions M1 are summarised below. Full environmental noise monitoring data is given in **Appendix E.**

Measurement data is subject to a 3dB correction due to the microphones being within 1m of a reflective surface, namely, the building façade.

Table 1. – Environmental Measurement Summary

Measurement	Date(s)	Period	L_{Aeq} (dB)	Typical* L_{AFmax} (dB)
M1 *(Façade Corrected)*	27th & 28th Sept 2021	Day *(16hr Aggregate Periods)*	65.4	-
	27th – 28th Sept 2021	Night *(8hr)*	58.0	84.8

* The given 'Typical' L_{AFmax} levels above are an average of the spectra of the noisiest 10 events of the night-time periods; the maxima levels selected would not ordinarily be exceeded more than 10 times within the night-time, in accordance with the WHO L_{AFmax} parameter guidance.

Further analysis was undertaken at the site, with a comparative measurement (C1) conducted at the rear of the existing building to measure representative levels for use in assessment of rear facing bedrooms, external amenity spaces and both Plots 4 & 5.

The exact same 30-minute measurement intervals from M1/C1, obtained on 27th September 2021 have been compared, this is summarised in the table below.

Table 2. – Comparative Measurement Results

Comparison	Times	Comparative Data Level $L_{Aeq,T=30min}$	Difference, dB
Location M1 *(Façade Corrected)*	10:20 – 10:50	67.3	12.6
Location C1	10:20 – 10:50	54.7	

Table 2 demonstrates that there is approximately 12-13 dB difference in noise levels between the front and rear of the site. Therefore, a -12dB correction has been applied to account for noise levels at the rear of the site.

The resulting noise levels in each zone for the assessment are given below.

Table 3. – Corrected Zone Noise Levels for Assessment

Zone(s)	Period	$L_{Aeq,T}$ (dB)	Typical L_{AFmax} (dB)
A – Front	Daytime *(16hr)*	65	-
	Night *(8hr)*	58	85
B – Rear	Daytime *(16hr)*	53	-
	Night *(8hr)*	46	73

4. Internal Noise Level Assessment

4.1. Design Criteria

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Table 4. – Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states that the guideline values given above are for 'noise without character', further stating:

> *"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."*

Table 4 of BS8233 also has accompanying notes that were subject to additions in ProPG. The relevant notes with the additions of ProPG are given below.

> *"NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night. Sporadic noise events could require separate values. 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 LAmax,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."*

In considering the noise climate affecting the proposed development, as discussed in Section 2.1, no noise of an industrial and or sporadic nature was observed to affect the site and levels recorded during the survey suggest no irregularities. Therefore, it is deemed that noise is 'without character' and typical of road noise. The internal ambient noise level criteria given in Table 4 above is therefore deemed appropriate for the assessment.

4.2. Mitigation Zone Definition

For the assessment of internal noise levels and determining a façade sound insulation scheme, two Zonal areas have been defined based on the measured and assumed noise exposure in these areas. The defined Zones are indicated below in **Figure 3** on the site plan.

Figure 3. – Zone Definition



- Zone A *- Zone B*

4.3. Internal Noise Level Calculations

Internal noise levels have been calculated to demonstrate that the proposed apartments can achieve the desired design criteria when appropriate glazing and ventilation systems are utilised. Room dimensions and glazed areas have been measured from current plans supplied to Peak Acoustics and drawn by '*MAC Architectural Design Ltd'*. Note that assessment is not required for each individual room. The selection of habitable rooms has been chosen as representative of the most noise sensitive areas, which have been selected on account of room and windows sizes.

Calculations of internal ambient noise levels have been undertaken using the 'rigorous calculation' method given in Annex G2 of BS8232:2014. Full details of the calculations are provided in **Appendix F.**

5. Glazing & Ventilation Sound Insulation Scheme

The following glazing and ventilation schemes for the development has been derived with a view of achieving the internal noise level criteria given in Table 4. The given schemes are specific to the Zones defined in Section 4.2.

Table 5. – Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation [3]	
	Minimum Performance R_w *(+*C_{tr}*)* [1]	*Example Specification* [2]	*Minimum Performance* $D_{ne,W}$,+$C_{tr\ (Open)}$	*Example Specification / Strategy*
Zone A – All floors				
Living Rooms	30 *(26)*	*4 / 16 / 4mm*	45	*Passivent Fresh 80dB (Through Wall Ventilator)*
Bedrooms	41 *(35)*	*6 / 16 / 8.8SC*	45	*Passivent Fresh 80dB (Through Wall Ventilator)*
Zone B – All floors				
Living Rooms	30 *(26)*	*4 / 16 / 4mm*	32	*Titon Trimvent XS13 4400EA (Window Trickle Ventilator)*
Bedrooms	30 *(26)*	*4 / 16 / 4mm*	32	*Titon Trimvent XS13 4400EA (Window Trickle Ventilator)*

N.B Note that other glazing configurations and ventilators can achieve the given minimum performance requirements.

SC denotes as a laminated windowpane

***[1]** The sound insulation value of the glazing should take into account the glass as well as the frame and perimeter seal.*

***[2]** Example glazing specification format given as 'XXmm / 16 mm Air gap / XXmm Float'. 'SC' denotes a laminated pane.*

***[3]** An example passive ventilator has been recommended to ensure internal noise levels remain desirable without the need to compromise acoustic performance when providing fresh air to habitable rooms.*

6. Internal Noise Levels

It is determined that by using mitigation as specified in **Table 5** for the building façades, the outcome summarised in the following table is achieved.

Table 6. – Internal Noise Levels

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Design Criteria?
Zone A – All Floors			
Living Rooms	Daytime $L_{Aeq, 16hr}$	34	Yes
Bedrooms	Daytime $L_{Aeq, 16hr}$	25	Yes
	Night-time $L_{Aeq, 8hr}$	18	Yes
	Night-time L_{AFmax}	45	Yes
Zone B – All Floors			
Living Rooms	Daytime $L_{Aeq, 16hr}$	25	Yes
Bedrooms	Daytime $L_{Aeq, 16hr}$	24	Yes
	Night-time $L_{Aeq, 8hr}$	16	Yes
	Night-time L_{AFmax}	44	Yes

For the daytime assessment for living areas, the desirable limit of BS8233:2014 suggests a guideline of 35 dB $L_{Aeq,16hr}$ for resting conditions, and up to 40 dB is considered acceptable for necessary developments.
All results, with implementation of the derived sound insulation scheme given in **Table 5**, would place the internal daytime noise levels as below 35 dB, therefore within the desired limit.

For the night-time assessment for bedrooms, BS8233:2014 suggests a desirable guideline of 30 dB $L_{Aeq, 8hr}$ for sleeping conditions, with an acceptable limit of 35 dB $L_{Aeq, 8hr.}$ Individual noise events (Measured with fast time-weighted Maximum) should not normally exceed 45 dB $L_{AFmax.}$ Implementation of the derived sound insulation scheme given in **Table 5** would place the internal continuous night-time noise levels as below 30 dB and the maximum noise events as typically below 45 dB L_{AFmax}, therefore within the desirable category.

7. External Amenity Areas

BS8233:2014 provides a desirable guideline of 50 dB $L_{Aeq,16hr}$ for external amenity spaces and an acceptable guideline of 55 dB $L_{Aeq,16hr}$ for noisier environments. Recent plans supplied by the applicant show external amenity space at the rear side of the buildings.

External daytime noise levels at the rear were corrected to 53dB $L_{Aeq,16hr.}$ Noise levels within external amenity spaces surpass the desirable guideline, by 3 dB, but falls within the acceptable limit.

The measurement undertaken at the rear was free field. It is recommended that close boarded garden fencing at 1.8m high be installed around all amenity areas from Plot 1 – 5 to ensure noise levels achieve a desirable figure.

N.B. A partial blockage in the line of sight can correspond to a reduction of 5 dB. This would ensure that noise levels in external amenity areas are within desirable guidelines for all plots.

8. Conclusions

A noise assessment has been undertaken at the land at Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire in relation to the proposal to construct 5 no. new-build residential dwellings.

Environmental noise monitoring was undertaken from Monday 27th – Tuesday 28th September 2021.

Design criteria were derived for internal noise levels with guidance drawn from BS8233:2014 and ProPG.

Glazing and ventilation schemes have been given to ensure conditions in habitable rooms remain within the design criteria. This has been provided for two designated zones.

APPENDIX A – Measurement Details

Measurement(s)	Kit	Start Date	Start Time	End Date	End Time
M1	A4	27/09/2021	10:15	28/09/2021	11:25
C1	A1	27/09/2021	10:20	27/09/2021	10:50

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A1	Sound Meter	Svantek	958	1	34525
A1	Pre-Amp	Svantek	SV12L	1	32484
A1	Microphone	Microtech Gefell	MK255	1	11561
A4	Sound Meter	Svantek	971	1	60688
A4	Pre-Amp	Svantek	SV18	1	62781
A4	Microphone	ACO	7052E	1	66703
Cal	Calibrator	Svantek	SV33B	1	83715

APPENDIX C - Meteorology Details

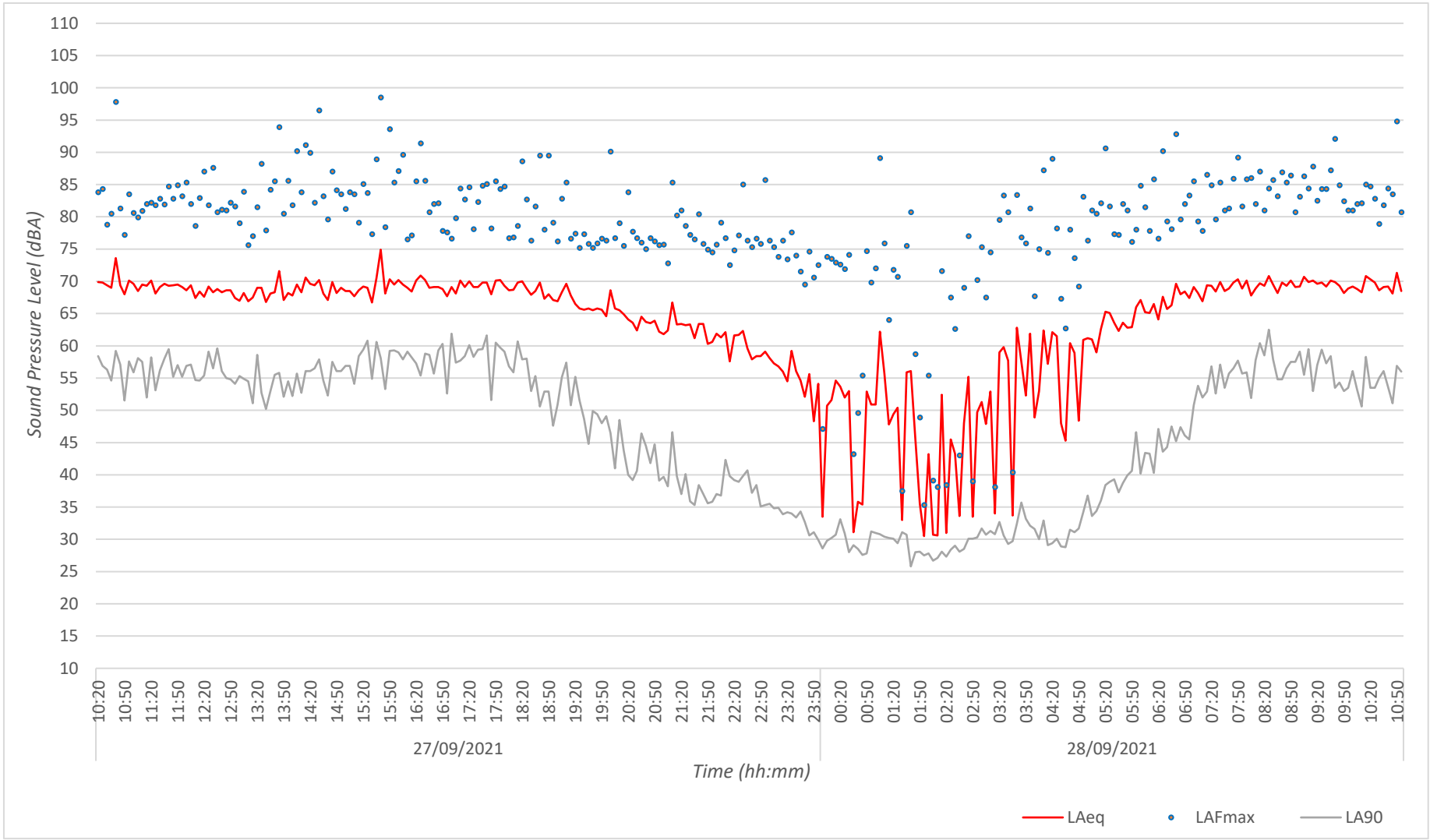
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
17/08/2021	13	6 – 7	W	99	2	8/8
18/08/2021	15	10	S	9287	3	8/8

APPENDIX D - Calibration Details

Kit	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
A4	113.9	-1.09	-1.02
A1	113.9	0.2	0.2

APPENDIX E – Noise Survey Results

Environmental Noise Measurement (M1: Pre-Façade Correction), 27th – 28th September 2021



APPENDIX F – Calculations

BS8233:2014 – Rigorous Design Calculations

Zone A Living Rooms/Kitchens - Daytime LAeq,16hr

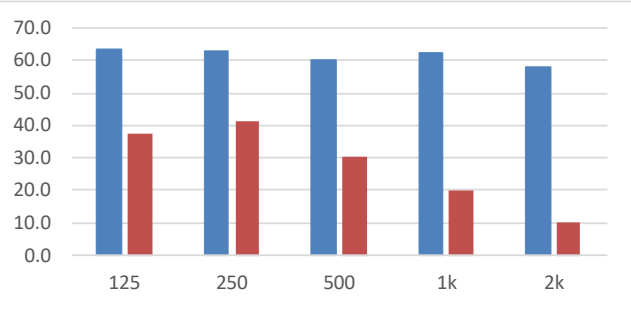
Room Properties

Room Width (m)	3.5
Room Depth (m)	8.2
Room Height (m)	2.6
Glazed Area (m^2)	3.2
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	18	26	40	45
Vents, $D_{n,e,w+Ctr}$	42	43	43	49	64

Noise Levels, dB



External Level	65.4 dB LAeq
Internal Level	34.3 dB LAeq
Insertion Loss	31.1 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**30(26)**	dB $R_{W(+Ctr)}$	Double Glazing *4 / 16 / 4*
Ventilation	**45**	$D_{n,e,w+Ctr}$	Passive thru-wall vent *Passivent Fresh 80dB*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	6.93E-05	6E-05	5.5E-05	1E-05	4.4E-07
Term 2	0.001417	0.0056	0.00089	4E-05	1.1E-05
Term 3	5.12E-05	2E-05	2E-05	3E-06	1E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	37.4	41.4	30.6	20.1	10.0
Internal, dB LAeq	21.3	32.8	27.4	20.1	11.2

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Passive thru-wall vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{ns}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rf}}{S}10^{\frac{-R_{rf}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone A Bedrooms - Daytime LAeq,16hr

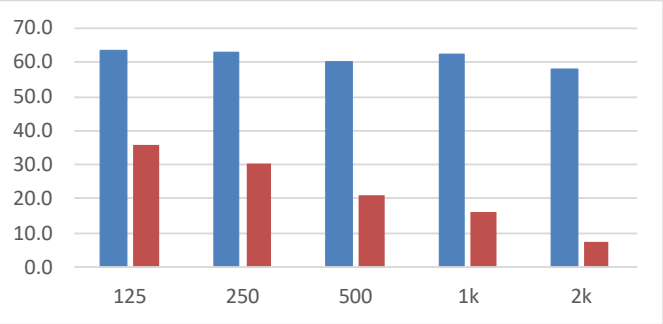
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	28	39	48	46
Vents, $D_{n,e,w+Ctr}$	42	43	43	49	64

Noise Levels, dB



External Level	65.4 dB LAeq
Internal Level	25.3 dB LAeq
Insertion Loss	40.1 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**41(35)**	dB $R_{W(+Ctr)}$	Laminated Double Glazing *6 / 16 / 8.8SC*
Ventilation	**45**	$D_{n,e,w+Ctr}$	Passive thru-wall vent *Passivent Fresh 80dB*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	6.93E-05	6E-05	5.5E-05	1E-05	4.4E-07
Term 2	0.000866	0.0003	2.7E-05	3E-06	5.5E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	35.6	30.1	21.1	16.0	7.5
Internal, dB LAeq	19.5	21.5	17.9	16.0	8.7

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Laminated Double Glazing
Vents	Passive thru-wall vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{tr}}{S}10^{\frac{-R_{tr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone A Bedrooms - Night-time LAeq,8hr

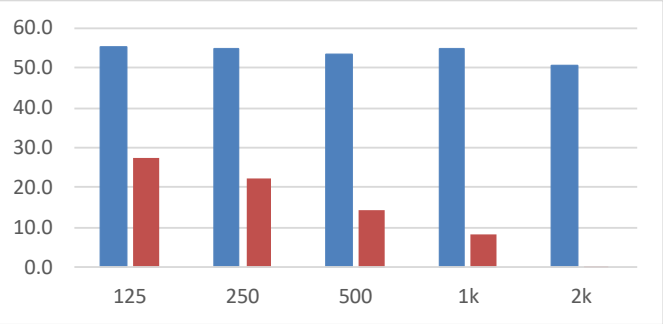
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	28	39	48	46
Vents, $D_{n,e,w+Ctr}$	42	43	43	49	64

Noise Levels, dB



External Level	58.0 dB LAeq
Internal Level	17.6 dB LAeq
Insertion Loss	40.4 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**41(35)**	dB $R_{W(+Ctr)}$	Laminated Double Glazing *6 / 16 / 8.8SC*
Ventilation	**45**	$D_{n,e,w+Ctr}$	Passive thru-wall vent *Passivent Fresh 80dB*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	6.93E-05	6E-05	5.5E-05	1E-05	4.4E-07
Term 2	0.000866	0.0003	2.7E-05	3E-06	5.5E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	27.5	22.1	14.2	8.4	0.1
Internal, dB LAeq	11.4	13.5	11.0	8.4	1.3

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Laminated Double Glazing
Vents	Passive thru-wall vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{tr}}{S}10^{\frac{-R_{tr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone A Bedrooms - Night-time LAFmax

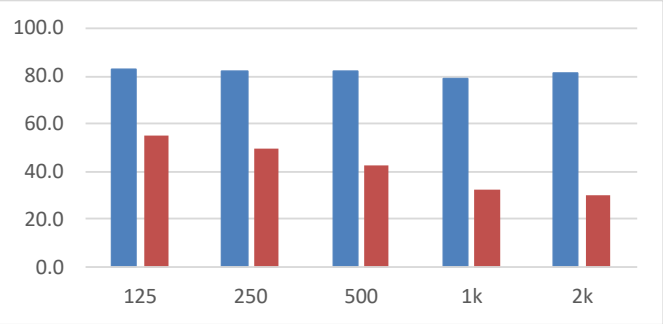
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	28	39	48	46
Vents, $D_{n,e,w+Ctr}$	42	43	43	49	64

Noise Levels, dB



External Level	84.8 dB LAmax
Internal Level	45.1 dB LAmax
Insertion Loss	39.7 dB LAmax

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**41(35)**	dB $R_{W(+Ctr)}$	Laminated Double Glazing *6 / 16 / 8.8SC*
Ventilation	**45**	$D_{n,e,w+Ctr}$	Passive thru-wall vent *Passivent Fresh 80dB*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	6.93E-05	6E-05	5.5E-05	1E-05	4.4E-07
Term 2	0.000866	0.0003	2.7E-05	3E-06	5.5E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	55.1	49.4	42.6	32.8	30.2
Internal, dB LAeq	39.0	40.8	39.4	32.8	31.4

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Laminated Double Glazing
Vents	Passive thru-wall vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{tr}}{S}10^{\frac{-R_{tr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone B Living Rooms/Kitchens - Daytime LAeq,16hr

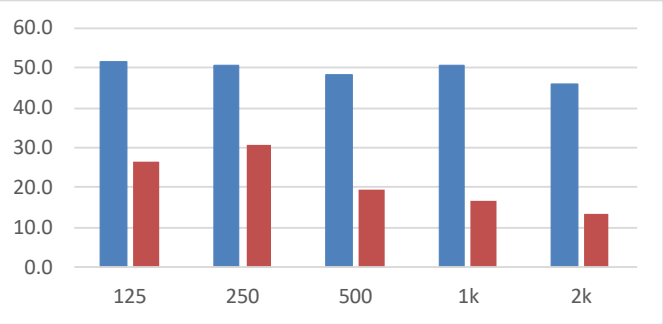
Room Properties

Room Width (m)	3.5
Room Depth (m)	8.2
Room Height (m)	2.6
Glazed Area (m^2)	3.2
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	18	26	40	45
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	53.4 dB LAeq
Internal Level	24.7 dB LAeq
Insertion Loss	28.7 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**30(26)**	dB $R_{W(+Ctr)}$	Double Glazing *4 / 16 / 4*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000437	0.0022	0.00022	0.0003	0.00044
Term 2	0.001417	0.0056	0.00089	4E-05	1.1E-05
Term 3	5.12E-05	2E-05	2E-05	3E-06	1E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	26.4	30.8	19.3	16.8	13.5
Internal, dB LAeq	10.3	22.2	16.1	16.8	14.7

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone B Bedrooms - Daytime LAeq,16hr

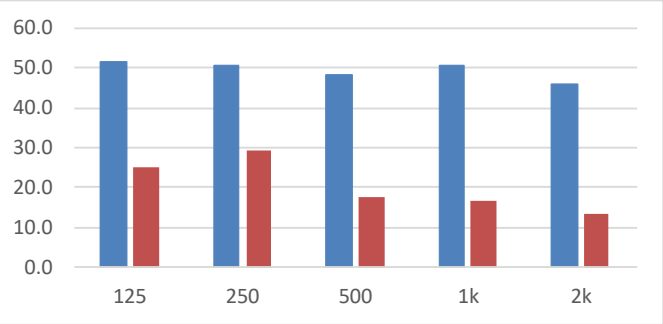
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	18	26	40	45
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	53.4 dB LAeq
Internal Level	23.6 dB LAeq
Insertion Loss	29.8 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**30(26)**	dB $R_{W(+Ctr)}$	Double Glazing *4 / 16 / 4*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000437	0.0022	0.00022	0.0003	0.00044
Term 2	0.000866	0.0034	0.00055	2E-05	6.9E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	24.9	29.4	17.7	16.7	13.4
Internal, dB LAeq	8.8	20.8	14.5	16.7	14.6

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone B Bedrooms - Night-time LAeq,8hr

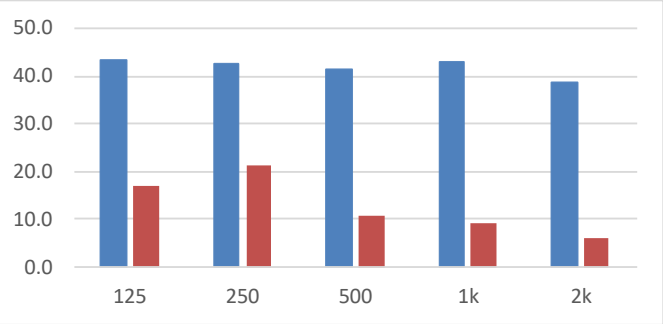
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	18	26	40	45
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	46.0 dB LAeq
Internal Level	15.9 dB LAeq
Insertion Loss	30.1 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**30(26)**	dB $R_{W(+Ctr)}$	Double Glazing *4 / 16 / 4*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000437	0.0022	0.00022	0.0003	0.00044
Term 2	0.000866	0.0034	0.00055	2E-05	6.9E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	16.8	21.4	10.8	9.1	6.0
Internal, dB LAeq	0.7	12.8	7.6	9.1	7.2

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Zone B Bedrooms - Night-time LAFmax

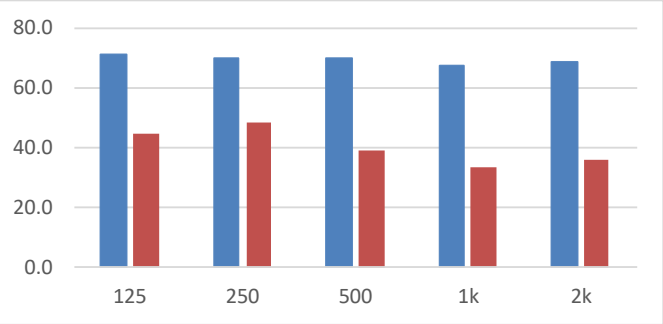
Room Properties

Room Width (m)	3.5
Room Depth (m)	3.3
Room Height (m)	2.6
Glazed Area (m^2)	2.0
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R_{w+Ctr}	41	45	45	54	58
Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazing, dB R_{w+Ctr}	24	18	26	40	45
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	72.8 dB LAmax
Internal Level	43.5 dB LAmax
Insertion Loss	29.3 dB LAmax

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**30(26)**	dB $R_{W(+Ctr)}$	Double Glazing *4 / 16 / 4*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000437	0.0022	0.00022	0.0003	0.00044
Term 2	0.000866	0.0034	0.00055	2E-05	6.9E-06
Term 3	6.21E-05	2E-05	2.5E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	44.5	48.7	39.3	33.4	36.1
Internal, dB LAeq	28.4	40.1	36.1	33.4	37.3

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

APPENDIX G – Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140dB. Here are some examples common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 metre away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level ($2x10^{-5}$ Pa – threshold of hearing).

$L_{Aeq,\,T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level in which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{Amax} – the maximum RMS A-weighted sound pressure level occurring within a specified time period; the time weighting is typically either Fast or Slow.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.

$D_{n,e,W}$ – The Weighted Sound Reduction Index specifically for ventilators.

C_{tr} – C_{tr} is a spectrum adaptation term which method is defined in BS EN ISO 717. The standard uses a reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation terms C and C_{tr} may are used to take into account different source spectra. 'C_{tr}' is the A-weighted urban traffic noise spectrum.

PEAK acoustics



Let us introduce ourselves

Peak Acoustics formed in 2011, we are a fully accredited specialist consultancy and testing organisation.

We are a diverse team of Acoustic Consultants, Specialist Engineers and Building Compliance Technicians, with a network spanning the UK. We are proud to offer our services nationally, with no job too big or small.

We provide Acoustic Consultancy, Building Compliance Testing and Energy Services.

Additional Services

We offer an extensive range of services in the sectors of Acoustic Consultancy, Building Compliance & Energy Efficiency. We are able to put together custom packages combining multiple services which saves both time and money for you.

Building Compliance

- **Sound Insulation Testing**
- **Air Tightness Testing**
- **Ventilation Testing**
- **Water Efficiency Calculations**
- **Sound Insulation Specification**

Energy Efficiency

- **SAP Calculations**
- **EPC's**
- **SBEM Calculations**
- **Energy Statements**
- **Sustainability Statements**
- **MEES Regulations**
- **Commercial EPC's**

Acoustic Consultancy

- **Noise Assessment for planning conditions**
- **Construction site noise monitoring**
- **Noise at work assessments**
- **Noise & Vibration Impact Assessments**

Peace of mind

We are accredited and registered by all the relevant major UK authorities to provide the services we offer. Peak Acoustics is UKAS accredited for sound insulation testing, ATTMA registered for Air Leakage Testing. and our Energy team are all Domestic On-Completion Energy Assessors.

Our Added Value

We combine our detailed knowledge of building regulations with our technical understanding of building physics, acoustics and environmental sciences to maximise development quality. Our work ensures appropriate strategies and studies are prepared to demonstrate to local authorities how proposed developments will be of high quality and generate acceptable impact on the surrounding environment.

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