

PEAK acoustics

Noise Assessment Report

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Rev. 0.0

Environmental Noise Assessment

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Site: Land Adjacent to Rakeway Grange, Rakeway Road, Cheadle Staffordshire

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1. Summary

1.1. Proposal

The erection of 6 No. residential dwellings is proposed at Land Adjacent To Rakeway Grange, Rakeway Road, Cheadle, Staffordshire.

1.2. Reason for Assessment

The Local Authority has conditioned the requirement of a noise assessment to ensure desirable internal noise levels are met within habitable rooms of the proposed development.

1.3. Planning Conditions & Criteria

Staffordshire Moorlands District council issued the following planning condition:

> *"Condition 10) - Within three months from the date of commencement, a site specific scheme for protecting the proposed residential units from noise, has been submitted to, and approved in writing by the Local Planning Authority.*
>
> *The submitted scheme shall have due regard for the British Standard BS8233:2014 Guidance on Sound Insulation for Buildings and the ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development and be designed to achieve noise levels of less than 30 dB LAeq in bedrooms, less than 40 dB LAeq in living areas and 50dB LAeq in outside living areas. The approved scheme shall be implemented prior to the first occupation of the dwellings to which it relates."*

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

- *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).*
- *40dB $L_{Aeq,\ 16hr}$ within living areas during the day (07:00 – 23:00)*
- *50dB $L_{Aeq,\ 16hr}$ in external amenity spaces*

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)".*

1.4. Assessment Standards & Justification

'BS8233:2014 – Guidance on sound insulation and noise reduction for buildings' is a recognised standard for assessing and mitigating environmental noise levels upon a proposed noise sensitive development. The standard gives a rigorous calculation method for determining interior noise levels based on measured environmental noise levels.

'World Health Organisation Guidelines for Community Noise (1999)' details suitable noise levels for various activities within residential and commercial buildings

1.5. Environmental Noise Measurements

In order to assess environmental noise levels, a noise survey was undertaken at the site from Thursday 11th – Friday 12th June 2020. The results from these measurements are tabulated below.

Table 1. – Environmental Measurement Summary

Measurement	Date(s)	Period	L_{Aeq} (dB)	Typical L_{AFmax} (dB)
M1	11th & 12th June 2020	Day *(16hr Aggregate Periods)*	58.6	-
	11th – 12th June 2020	Night *(8hr)*	49.0	77.8

The full measured sound levels are shown graphically in **Appendix E**.

1.6. Noise Assessment Outcome

It is determined that by using mitigation as specified in section 1.7 for the building facades, the outcome summarised in the following table is achieved.

Table 2. – Noise Assessment Outcome

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Desirable Limit (BS8233)
Living Rooms	Daytime $L_{Aeq, 16hr}$	27	Yes
Bedrooms	Night-time $L_{Aeq, 8hr}$	16	Yes
Bedrooms	Night-time L_{AFmax}	45	Yes
External Space	**Noise Parameter**	**External Noise Level Range (dB)**	**Within Desirable Limit (BS8233)**
Rear Gardens	Daytime $L_{Aeq, 16hr}$	47 – 53	Yes *(See Section 4.5)*

1.7. Mitigation Recommendations

1.7.1. Glazing & Ventilation Scheme

Table 3. – Glazing and Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance R_w *(+*C_{tr}*)*	*Example Specification*	*Minimum Performance* $D_{nw,w,+}C_{tr}$ (Open)	*Example Specification*
Living Rooms	30 *(26)*	*4 / 16 / 4mm*	*32*	*Titon Trimvent XS13 4400EA*
Bedrooms	34 *(29)*	*4 / 16 / 6mm*	*32*	*Titon Trimvent XS13 4400EA*

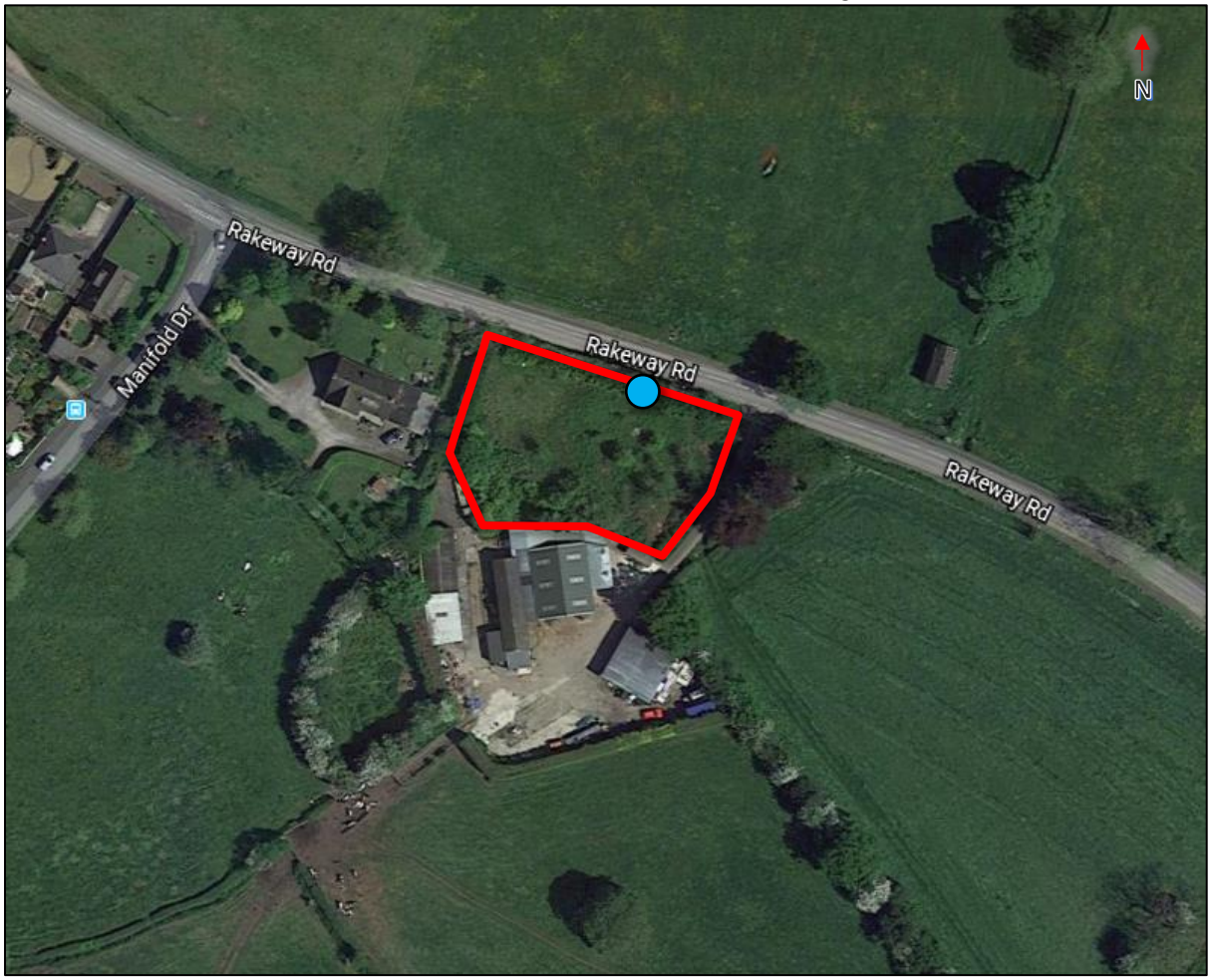
N.B: The sound insulation value of the glazing should take into account the glass as well as the frame and perimeter seal.

1.8. Site & Measurement Location

The site is situated on the eastern outskirts of the village of Cheadle, East of Stoke-on-Trent, on the Rakeway Road. Farmland makes up much of the land to the North, South and East of the site. Residential housing estates are located to the west. A large quarry site is located approximately 1km west of the site location.

The site and measurement location are shown on Figure 1 below.

Figure 1: Site & Measurement Location



Environmental Monitoring Location (M1)

Site Boundary (Approx.)

2. Environmental Noise Survey

2.1. Sources Under Investigation

The primary noise source identified on site was passing traffic on Rakeway Road, inclusive of occasional HGV's. Distant agricultural related noise was audible during the consultant's time on site and birdsong was noted as an additional secondary noise source.

3. Survey Measurements

Day and night-time environmental noise measurements have been carried out over a 24-hour period from Thursday 11th – Friday 12th June 2020.

3.1. Measurement Location

At position M1, the microphone was positioned at the site boundary with Rakeway Road approximately 2m from local ground level and away from any nearby reflective surfaces; fully exposed to passing traffic and the surrounding environment.

3.2. Weather Conditions

Weather conditions were deemed satisfactory for environmental noise measurements; detailed weather conditions are given in **Appendix C**.

3.3. Measurement Equipment

Measurement equipment complies with accuracy requirements for common environmental noise measurement standards. A detailed equipment list is given in **Appendix B** with calibration information in **Appendix D**.

3.4. External Noise Levels

The measurement intervals from measurement M1 are summarised in the table below.

The measured sound levels are shown graphically in **Appendix E**.

Table 4. – Selected Measurement Results

Measurement	Date(s)	Period	L_{Aeq} (dB)	Typical L_{AFmax} (dB)
M1	11th & 12th June 2020	Day *(16hr Aggregate Periods)*	58.6	-
	11th – 12th June 2020	Night *(8hr)*	49.0	77.8*

**The selected L_{AFmax} corrected noise level spectra, is an average of the spectra of the noisiest 10 events of the night-time period; the maxima levels selected would not ordinarily be exceeded more than 10 times within the night-time, in accordance with the guidance.*

4. BS8233:2014 Environmental Noise Assessment

4.1. Criteria

The following planning condition was issued the by the Local Authority:

> *"Condition 10) - Within three months from the date of commencement, a site specific scheme for protecting the proposed residential units from noise, has been submitted to, and approved in writing by the Local Planning Authority.*
>
> *The submitted scheme shall have due regard for the British Standard BS8233:2014 Guidance on Sound Insulation for Buildings and the ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development and be designed to achieve noise levels of less than 30 dB LAeq in bedrooms, less than 40 dB LAeq in living areas and 50dB LAeq in outside living areas. The approved scheme shall be implemented prior to the first occupation of the dwellings to which it relates."*

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

- *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).*
- *40dB $L_{Aeq,\ 16hr}$ within living areas during the day (07:00 – 23:00)*
- *50dB $L_{Aeq,\ 16hr}$ in external amenity spaces*

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)"*

4.2. Internal Noise Levels – Proposed Insulation

Internal noise levels have been calculated to demonstrate that the proposed dwellings can achieve suitable internal noise levels when appropriate glazing and ventilation systems are utilised.

Room dimensions and glazed areas have been approximated based on the drawings supplied to Peak Acoustics and drawn by '*Hewitt & Carr Architects*' and dated Oct 19. 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. Construction details and calculations are provided within **Appendix F.**

4.3. Assessment Outcome – Internal Noise Levels

Internal noise levels have been calculated to demonstrate that the proposed residential dwellings can achieve suitable noise levels inside habitable rooms when appropriate glazing and ventilation systems are used. The recommended mitigation and corresponding internal noise levels are summarised in table 5 below.

Table 5. – Assessment Outcome

Internal Space	Glazing Minimum Performance R_w *(+C_{tr})*	Ventilation *Minimum Performance* $D_{nw,w,+}C_{tr}$ (Open)	Internal Noise Level, dB
Living Rooms	30 *(26)*	32	27 $L_{Aeq,\ 16hr}$
Bedrooms	34 *(29)*	32	16 $L_{Aeq,\ 8hr}$
			45 L_{AFmax}

N.B: The sound insulation value of the glazing should consider the glass as well as the frame and perimeter seal.

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 the proposed construction, would place the internal levels in kitchen/living areas as below 35 dB, therefore within the desirable category.

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} (as in BS8233:1999).

The proposed construction would place the internal continuous levels in bedrooms as below 30 dB and the maximum noise events as typically below 45 dB L_{AFmax}, therefore within the desirable category.

External noise levels are such that suitable internal levels will be maintained when windows are partially open for ventilation purposes, as given in the *ANC Acoustic Ventilation and Overheating Design Guide.*

4.4. External Noise Levels

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.
External daytime noise levels at position M1 were measured at 58.6 dB $L_{Aeq,16hr,}$ however, once erected, the dwellings themselves will provide a significant degree of shielding from the primary noise sources on Rakeway Road. This shielding can correspond to a 5 – 10 dB reduction in noise levels and therefore noise levels within the completed rear amenity spaces are likely to range from 47 – 53 dB $L_{Aeq,16hr,}$ achieving desirable to acceptable external noise levels.

APPENDIX A – Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A1	11/06/2020	11:15	12/06/2020	11:45

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
A1	Calibrator	Svantek	SV33A	1	90273

APPENDIX C - Meteorology Details

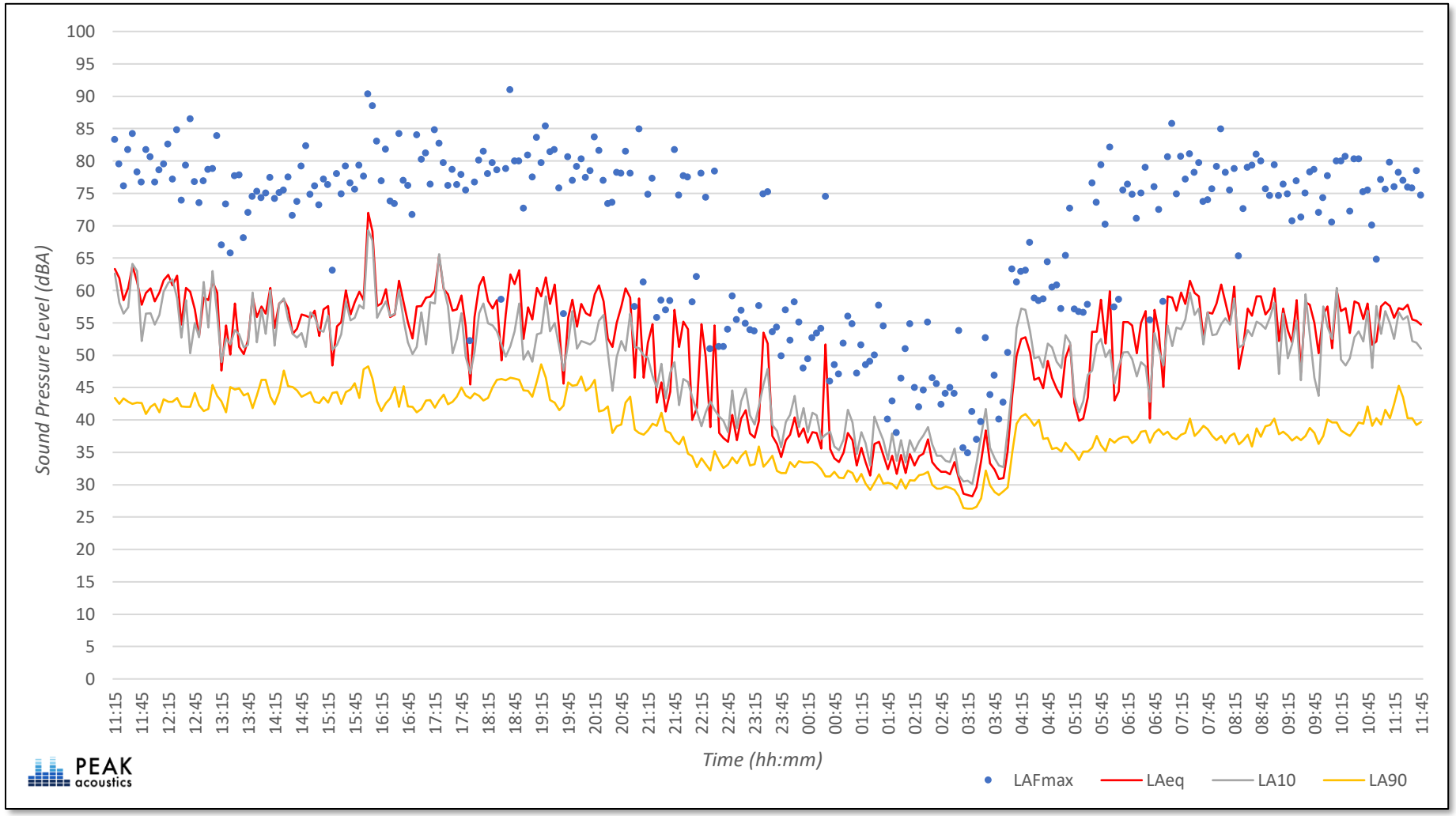
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
11/06/20 *(Start of Survey)*	15	4 - 5	NE	82	0.0	7/8
12/06/20 *(End of Survey)*	19	3 - 5	NE	77	0.0	6/8

APPENDIX D - Calibration Details

Measurement	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
M1	114.0	0.5	0.5

APPENDIX E – Noise Survey Results

Environmental Noise Measurement (M1), 11th – 12th June 2020



APPENDIX F – BS8233 Rigorous Design Calculations

Living Room - Daytime LAeq (07:00 - 23:00)

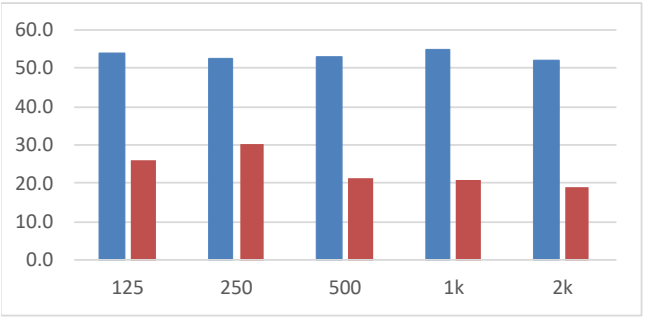
Room Properties

Room Width (m)	4.7
Room Depth (m)	5.5
Room Height (m)	2.4
Glazed Area (m^2)	1.2
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	58.6 dB LAeq
Internal Level	26.5 dB LAeq
Insertion Loss	32.1 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**26**	dB R_{W+Ctr}	Double Glazing *4/16/4mm*
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	0.000353	0.0018	0.00018	0.0003	0.00035
Term 2	0.000424	0.0017	0.00027	1E-05	3.4E-06
Term 3	7.1E-05	3E-05	2.8E-05	4E-06	1.4E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	26.2	30.1	21.3	20.8	19.2
Internal, dB LAeq	10.1	21.5	18.1	20.8	20.4

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

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

Bedroom - Night LAeq (23:00 - 07:00)

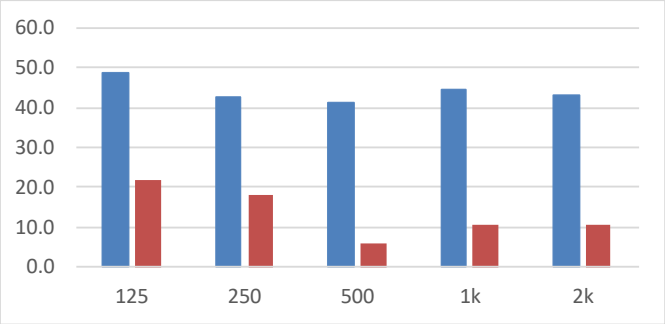
Room Properties

Room Width (m)	4.2
Room Depth (m)	4.7
Room Height (m)	2.4
Glazed Area (m^2)	1.9
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	26	39	45	42
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	49.0 dB LAeq
Internal Level	16.1 dB LAeq
Insertion Loss	32.9 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**29**	dB R_{W+Ctr}	Double Glazing *4 / 16 / 6mm*
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	0.000395	0.002	0.0002	0.0003	0.00039
Term 2	0.00075	0.0005	2.4E-05	6E-06	1.2E-05
Term 3	6.45E-05	3E-05	2.6E-05	3E-06	1.3E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	22.0	18.1	5.9	10.7	10.5
Internal, dB LAeq	5.9	9.5	2.7	10.7	11.7

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

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

Bedroom - LAmax

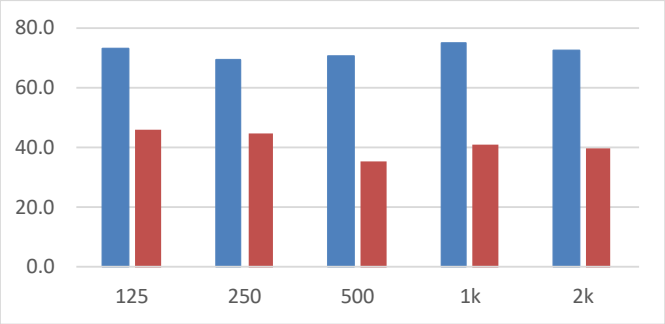
Room Properties

Room Width (m)	4.2
Room Depth (m)	4.7
Room Height (m)	2.4
Glazed Area (m^2)	1.9
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	26	39	45	42
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	77.8 dB LAmax
Internal Level	44.9 dB LAmax
Insertion Loss	32.9 dB LAmax

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**29**	dB R_{W+Ctr}	Double Glazing *4 / 16 / 6mm*
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	0.000395	0.002	0.0002	0.0003	0.00039
Term 2	0.00075	0.0005	2.4E-05	6E-06	1.2E-05
Term 3	6.45E-05	3E-05	2.6E-05	3E-06	1.3E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	46.2	44.6	35.6	40.9	39.7
Internal, dB LAeq	30.1	36.0	32.4	40.9	40.9

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

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

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.

Contact Us

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