Environmental Noise Assessment

Project No: PA336

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Land Adjacent to Dinting Lane, Glossop, Derbyshire SK13 7DY

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1. Summary

1.1. Proposal

A development of 20 residential dwellings is proposed at land adjacent Dinting Road / Dinting Lane, Glossop, Derbyshire SK13 7DY.

1.2. Reason for Assessment

The dwellings are to be situated in close proximity road and rail noise sources. A noise assessment is required to determine the potential for adverse impact arising from noise and façade insulation necessary to achieve desirable internal noise levels.

1.3. Planning Conditions & Criteria

Condition 32 of the Decision Notice issued by High Peak Borough Council (Determined 16/06/17) states that the following criteria are to be achieved:

- *35dB $L_{Aeq,\ 8hr}$ within bedrooms at night (23:00 – 07:00).*
- *40dB $L_{Aeq,\ 16hr}$ within living areas during the day (07:00 – 23:00).*
- *<55 dB $L_{Aeq,\ 16hr}$ within external amenity spaces (07:00-23:00).*

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.

1.5. Measurements

In order to assess noise emissions, noise measurements were undertaken over weekday and night periods from 9th – 11th August 2017. The results of the measurements are tabulated below.

Measurement Summary				
Measurement	**Date**	**Period**	**L_{Aeq} (dB)**	***L_{AFmax} (dB)**
M1	9th – 10th August 2017	Day (16hr)	**47.0**	*N/A*
M1	9th – 10th August 2017	Night (8hr)	**41.2**	**65.8**
M2	10th – 11th August 2017	Day (16hr)	**51.4**	*N/A*
M2	10th – 11th August 2017	Night (8hr)	**45.5**	**68.2**

*L_{AFmax} noise levels do not require assessment under the Local Authority's criteria, but are included for informative purposes.

1.6. Noise Assessment Outcome

It is determined that by using mitigation as specified in Section 1.7. for the building façades, the outcome summarised in the following table is achieved. **Zone 1** refers to facades facing the Railway and **Zone 2** refers to facades facing Dinting Road to the north.

Zone	Internal Space	Noise Parameter	Internal Noise Level	Within Desirable Limit (BS8233)
Zone 1 (South Facing)	Living Room	Daytime $L_{Aeq,\ 16hr}$	19.8	**Yes**
	Bedroom	Night-time $L_{Aeq,\ 8hr}$	16.7	**Yes**
Zone 2 (North Facing)	Living Room	Daytime $L_{Aeq,\ 16hr}$	24.5	**Yes**
	Bedroom	Night-time $L_{Aeq,\ 8hr}$	21.1	**Yes**
	External Space	**Noise Parameter**	**External Noise Level**	**Within Desirable Limit (BS8233)**
	Main Gardens	Daytime $L_{Aeq,\ 16hr}$	47.0	**Yes**

1.7. Mitigation Recommendations

1.7.1. Glazing & Ventilation Scheme

Zone	Internal Space	Glazing		Ventilation	
		Minimum Performance, R_w+C_{tr}	Suggested Specification	Minimum Performance, $D_{ne,w,+}C_{tr\ (open)}$	Suggested Specification
All Zones	Living Rooms	25	4/12/4mm	32	Hit and Miss Vent
	Bedroom	25	4/12/4mm	32	Hit and Miss Vent

1.8. Informatives

I. All dwellings would also achieve the Local Authority's criteria when relying on open window ventilation, whereby it is assumed that a façade with a partially open window provides attenuation of 15 dB.

II. Calculations of noise levels have been based on measurements taken close to the primary noise sources (Dinting Road and the railway to the south), with no distance corrections applied. Therefore, changes can be made to the proposed Site Layout and the results of the noise assessment will remain valid.

1.9. Site & Measurement Location

Figure 1: Site & Measurement Locations

Measurement Locations

Site Boundary (Approx.)

2. Environmental Noise Survey

2.1. Source Under Investigation

At position M1, the primary noise source was the adjacent railway line, however trains travel at relatively low speeds along the stretch of rail which borders the site location. This is likely due to the fact that the line terminates at Glossop 1km in the eastbound direction and, in the westbound direction, there is a track split approaching Dinting Station. The residual noise level in the absence of trains was subjectively low.

At position M2, passing cars were the primary noise source. Birdsong and trains were noted as secondary noise sources.

3. Survey Measurements

Daytime and night-time noise measurements have been carried out from 9th – 11th August 2017.

3.1. Measurement Location

M1 – Noise levels were measured on the embankment overlooking the railway tracks, at a height of approximately 1.5m from the ground and 10m from the railway tracks. This position was chosen to represent noise levels likely to occur within external amenity spaces and at the south facing facades of the dwellings.

M2 – Noise Levels were measured approximately 15m from the road, at a height of 1.5m from ground level. This position was chosen to be representative of noise levels at the facades of the proposed dwellings closest to traffic noise sources on Dinting Road.

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 used 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. Measurement Results

The results from the measurement intervals are summarised in the tables below. Full measurement details and information can be found in **Appendix E**.

Measured Noise Levels, 9th – 11th August 2017, SK13 7DY

	$L_{Aeq, T}$ (dB)	*L_{AFmax} (dB)
Daytime (M1)	47.0	-
Night-time (M1)	41.2	65.8
Daytime (M2)	51.4	-
Night-time (M2)	45.5	68.2

4. BS8233:2014 Noise Assessment

4.1. Criteria

Desirable internal and external noise levels are to be maintained, stipulated by High Peak Borough Council as:

- *35dB $L_{Aeq,\ 8hr}$ within bedrooms at night (23:00 – 07:00).*
- *40dB $L_{Aeq,\ 16hr}$ within living areas during the day (07:00 – 23:00).*
- *<55 dB $L_{Aeq,\ 16hr}$ within external amenity spaces (07:00-23:00).*

4.2. External Noise Analysis

Measured noise levels are shown graphically in **Appendix E** and are typical of a rural noise climate dominated by road and rail noise sources. The graphs are characterised by a decrease in noise levels during the evening and early hours of the morning when use of the road and rail network is reduced.

4.3. Internal Noise Levels – Assumed Insulation

Internal noise levels have been calculated in order to demonstrate that the proposed development can achieve suitable internal noise levels inside rooms, when appropriate glazing and ventilation systems are used.

In order to describe the likely internal exposure to environmental noise at the site, Peak Acoustics, Ltd. use suggested data from BS8233:2014 on standard construction. This will include all elements of the exposed living room and bedroom façades closest to the noise sources.

As detailed plans have not yet been finalised, a likely 'worst-case' scenario has been assumed in terms of glazed areas for living rooms and bedrooms. All assumed construction details are provided within **Appendix F.**

4.4. Daytime Internal Noise Levels

4.4.1. Living Rooms – Zone 1

Considering the insulation with the addition of 4/12/4mm glazing and hit & miss trickle ventilation, daytime environmental noise would be reduced from 47.0 dB $L_{Aeq,\ 16hr}$ to interior levels of **19.8 dB $L_{Aeq,\ 16hr}$.**

4.4.2. Living Rooms – Zone 2

Considering the insulation with the addition of 4/12/4mm glazing and hit & miss trickle ventilation, daytime environmental noise would be reduced from 51.4 dB $L_{Aeq,\ 16hr}$ to interior levels of **24.5 dB $L_{Aeq,\ 16hr}$.**

The desirable limit of BS8233:2014 suggests a guideline of 35dB $L_{Aeq,\ 16hr}$ for resting conditions, and up to 40dB is considered acceptable for necessary developments.

The assumed standard of construction would place the internal levels in living rooms in all zones as below 35dB, therefore within the desirable category.

4.5. Night-time Internal Noise Levels

4.5.1. Bedrooms – Zone 1

Considering the insulation with the addition of 4/12/4mm glazing and hit & miss trickle ventilation, night-time environmental noise in bedrooms would be reduced from 41.2 dB $L_{Aeq,\ 8hr}$ to interior levels of **16.7 dB $L_{Aeq,\ 8hr}$.**

4.5.2. Bedrooms – Zone 2

Considering the insulation with the addition of, night-time environmental noise in bedrooms would be reduced from 45.5 dB $L_{Aeq,\ 8hr}$ to interior levels of **21.1 dB $L_{Aeq,\ 8hr}$.**

BS8233:2014 suggests a desirable guideline of 30dB $L_{Aeq,\ 8hr}$ for sleeping conditions, with an acceptable limit of 35dB $L_{Aeq,\ 8hr}$.

The above standard of construction would place the internal continuous levels in bedrooms in all zones as below 30dB therefore in the desirable category.

4.6. Noise Levels in External Amenity Spaces

Noise levels of 47.0 dB $L_{Aeq,16hr}$, (measured at position M1) are representative of noise levels likely to occur within external amenity spaces of the proposed dwellings.

This is 8 dB within the Local Authority's criterion of 55 dB $L_{Aeq,16hr}$ and also achieves the 'desirable' target of 50 dB $L_{Aeq,16hr}$ of BS8233:2014. No mitigation of noise levels in external amenity spaces is therefore deemed necessary.

4.7. Effect Level and Exposure Outcomes

A summary of internal noise levels and their respective BS8233 classifications can be found below:

Zone	Internal Space	Noise Parameter	Internal Noise Level	BS8233 Classification
Zone 1 (South)	Living Room	Daytime $L_{Aeq, 16hr}$	19.8	'Desirable'
	Bedroom	Night-time $L_{Aeq, 8hr}$	16.7	'Desirable'
Zone 2 (North)	Living Room	Daytime $L_{Aeq, 16hr}$	24.5	'Desirable'
	Bedroom	Night-time $L_{Aeq, 8hr}$	21.1	'Desirable'
N/A	**External Space**	**Noise Parameter**	**External Noise Level**	**BS8233 Classification**
	Main Gardens	Daytime $L_{Aeq, 16hr}$	47.0	'Desirable'

APPENDIX A - Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A1	09/07/17	11:55	10/07/17	11:45
M2	A1	10/07/17	12:30	11/07/17	09:40

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A1	Sound Meter	Svantek	958	1	34525
A1	Pre-Amp	Svantek	SV12L	1	41651
A1	Calibrator	Svantek	SV31	1	32507

APPENDIX C - Meteorology Details

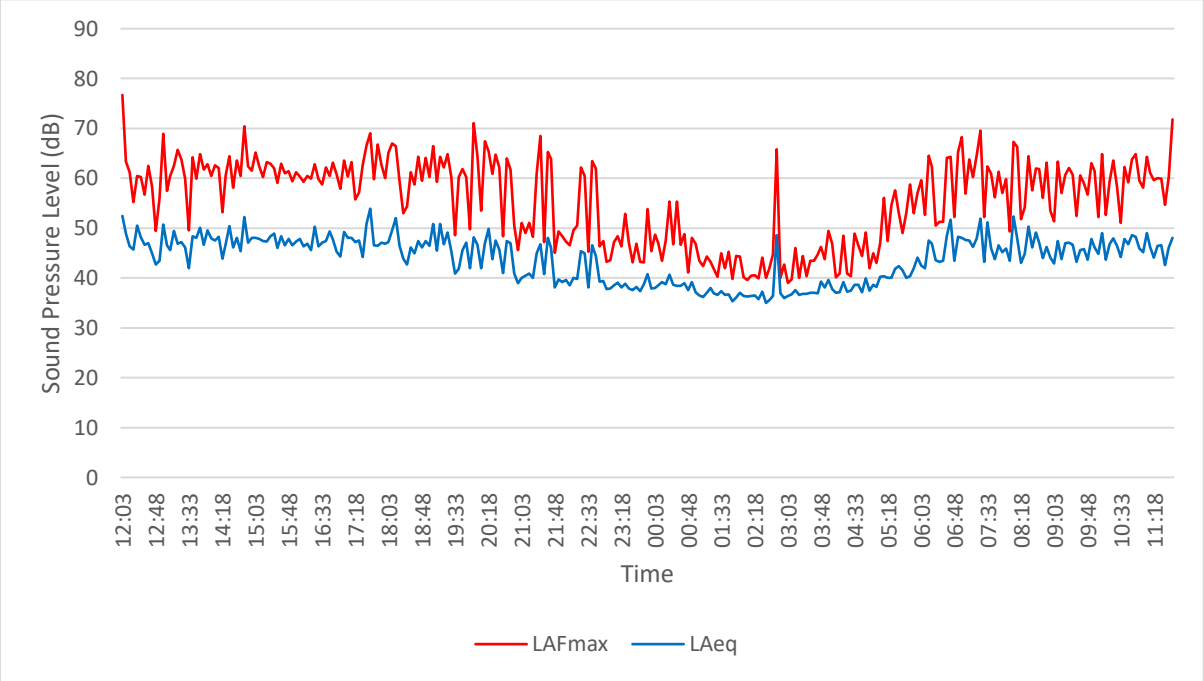
Measurement	Temp C	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
M1 09/08/17	18	0.9	S	63	0.0	6/8
M1 / M2 10/08/17	19	1.9	WNW	58	0.0	3/8
M2 11/08/17	18	3.1	SW	83	0.0	4/8

APPENDIX D - Calibration Details

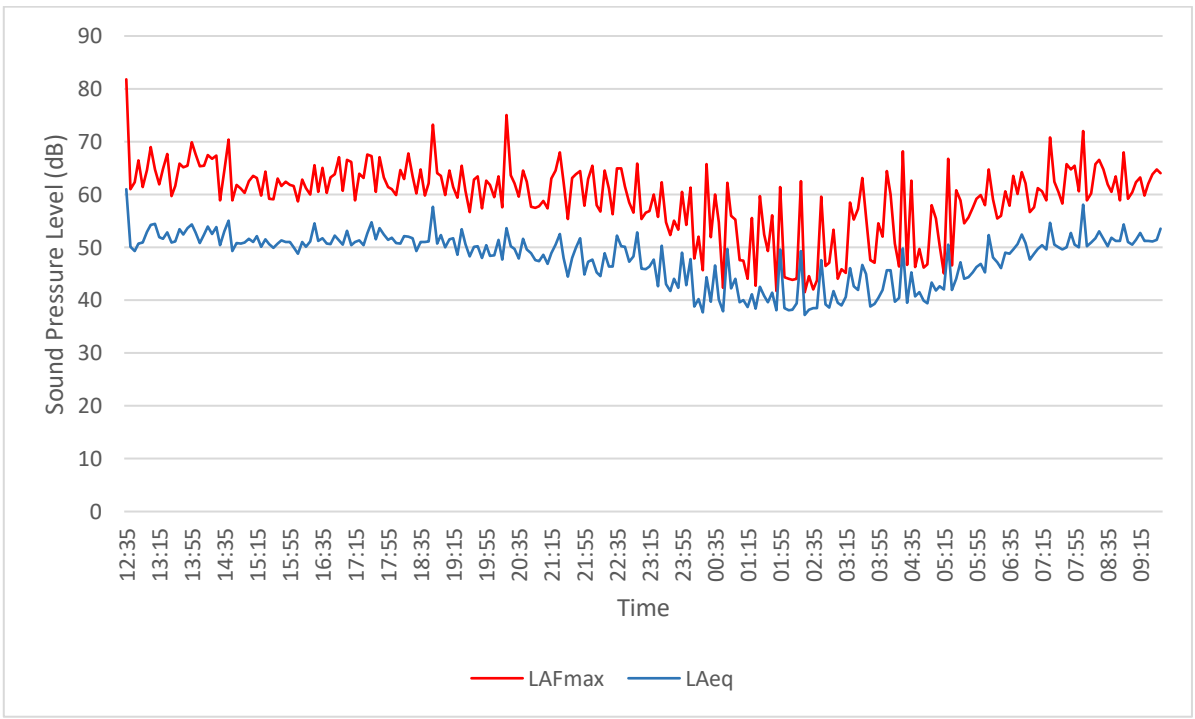
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	114.0	114.8	-0.8	114.1	-0.8
M2	114.0	114.8	-0.8	114.5	-0.5

APPENDIX E – Noise Survey Results

Environmental Noise Measurements, 9th – 10th August 2017, Measurement M1 (South)



Environmental Noise Measurements, 10th – 11th August 2017, Measurement M2 (North)



APPENDIX F – BS8233 Rigorous Design Calculations

BS8233:2014 Specification Calculation Summary

Zone 1 Living Room (07:00 - 23:00)

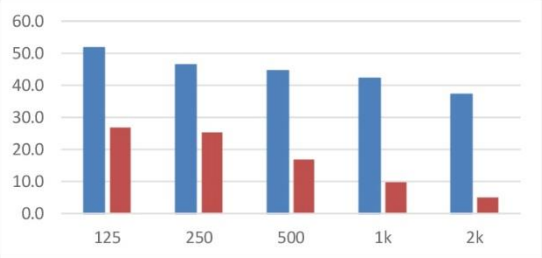
Room Properties

Room Width (m)	5.0
Room Depth (m)	4.0
Room Height (m)	2.4
Glazed Area (m^2)	3.5
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	20	25	34	37
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	47.0 dB LAeq
Internal Level	19.8 dB LAeq
Insertion Loss	27.2 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**25**	dB R_{W+Ctr}	Double Glazing *4/12/4mm*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000332	0.0017	0.00017	0.0003	0.00033
Term 2	0.001161	0.0029	0.00092	0.0001	5.8E-05
Term 3	5.63E-05	2E-05	2.2E-05	3E-06	1.1E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	26.9	25.4	16.8	9.7	5.1
Internal, dB LAeq	10.8	16.8	13.6	9.7	6.3

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

$$L_{eq,T} - L_{eq,ff} + 10\log_{10}\left(\frac{A_r}{S}10^{\frac{D_{ls}}{10}} + \frac{S_{wi}}{S}10^{\frac{R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{R_w}{10}} + \frac{S_{rf}}{S}10^{\frac{R_{rf}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

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

BS8233:2014 Specification Calculation Summary

Zone 1 Bedroom (23:00 - 07:00)

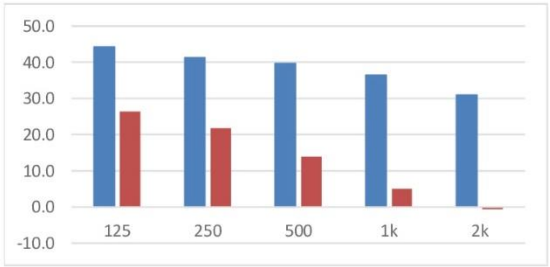
Room Properties

Room Width (m)	3.0
Room Depth (m)	4.0
Room Height (m)	2.4
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}	27	37	43	48	52
Glazing, dB R_{w+Ctr}	24	20	25	34	37
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	41.2 dB LAeq
Internal Level	16.7 dB LAeq
Insertion Loss	24.5 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**25**	dB R_{W+Ctr}	Double Glazing *4/12/4mm*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000207	0.001	0.0001	0.0002	0.00021
Term 2	0.001106	0.0028	0.00088	0.0001	5.5E-05
Term 3	5.74E-05	2E-05	2.3E-05	3E-06	1.1E-06
Term 4	0.003325	0.0003	8.4E-05	3E-05	1.1E-05
Internal, dB L_{eq}	26.3	21.8	13.9	5.0	-0.6
Internal, dB LAeq	10.2	13.2	10.7	5.0	0.6

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,T} = L_{eq,fF} + 10\log_{10}\left(\frac{A_f}{S}10^{\frac{D_{ls}}{10}} + \frac{S_{wi}}{S}10^{\frac{R_{wi}}{10}} + \frac{S_{ove}}{S}10^{\frac{R_{ve}}{10}} + \frac{S_{ri}}{S}10^{\frac{R_{ri}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

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

BS8233:2014 Specification Calculation Summary

Zone 2 Living Room (07:00 - 23:00)

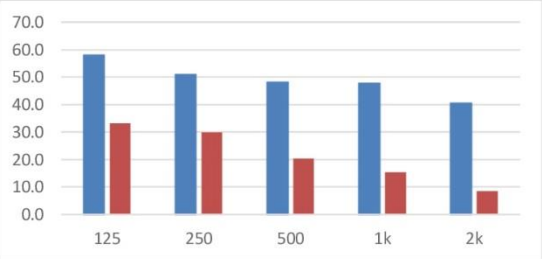
Room Properties

Room Width (m)	5.0
Room Depth (m)	4.0
Room Height (m)	2.4
Glazed Area (m^2)	3.5
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	20	25	34	37
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	51.4 dB LAeq
Internal Level	24.5 dB LAeq
Insertion Loss	26.9 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**25**	dB R_{W+Ctr}	Double Glazing *4/12/4mm*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000332	0.0017	0.00017	0.0003	0.00033
Term 2	0.001161	0.0029	0.00092	0.0001	5.8E-05
Term 3	5.63E-05	2E-05	2.2E-05	3E-06	1.1E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	33.2	29.9	20.3	15.4	8.5
Internal, dB LAeq	17.1	21.3	17.1	15.4	9.7

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

$$L_{eq,T} = L_{eq,fF} + 10\log_{10}\left(\frac{A_f}{S}10^{\frac{D_{ls}}{10}} + \frac{S_{wi}}{S}10^{\frac{R_{wi}}{10}} + \frac{S_{ove}}{S}10^{\frac{R_{we}}{10}} + \frac{S_{ve}}{S}10^{\frac{R_{ve}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

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

BS8233:2014 Specification Calculation Summary

Zone 2 bedroom (23:00 - 07:00)

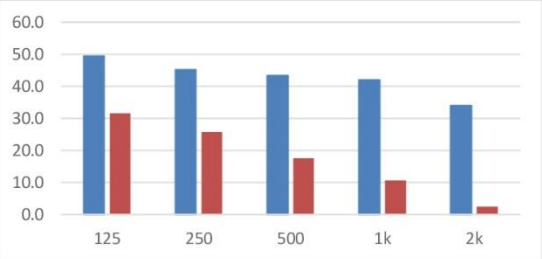
Room Properties

Room Width (m)	3.0
Room Depth (m)	4.0
Room Height (m)	2.4
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}	27	37	43	48	52
Glazing, dB R_{w+Ctr}	24	20	25	34	37
Vents, $D_{n,e,w+Ctr}$	34	27	37	35	34

Noise Levels, dB



External Level	45.5 dB LAeq
Internal Level	21.1 dB LAeq
Insertion Loss	24.4 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement		Suitable Systems
Glazing	**25**	dB R_{W+Ctr}	Double Glazing *4/12/4mm*
Ventilation	**32**	$D_{n,e,w+Ctr}$	Hit & miss trickle vent *Titon Trimvent XS13 4400EA*

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000207	0.001	0.0001	0.0002	0.00021
Term 2	0.001106	0.0028	0.00088	0.0001	5.5E-05
Term 3	5.74E-05	2E-05	2.3E-05	3E-06	1.1E-06
Term 4	0.003325	0.0003	8.4E-05	3E-05	1.1E-05
Internal, dB L_{eq}	31.5	25.8	17.6	10.6	2.5
Internal, dB LAeq	15.4	17.2	14.4	10.6	3.7

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,T} = L_{eq,ff} + 10\log_{10}\left(\frac{A_f}{S}10^{\frac{D_{ls}}{10}} + \frac{S_{wi}}{S}10^{\frac{R_{wi}}{10}} + \frac{S_{ove}}{S}10^{\frac{R_{ve}}{10}} + \frac{S_{ri}}{S}10^{\frac{R_{ri}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

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