

PEAK acoustics



Noise Impact Assessment

Client: Roger Finch

Site: 194 Rochdale Road, Middleton, M24 2QA

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Executive Summary

An Environmental Noise Assessment has been undertaken at 194 Rochdale Road, Middleton, where it has been proposed to convert the 1st floor to a residential flat.

Environmental noise monitoring was undertaken at the site from the 26th – 27th of October 2022. Noise affecting the development was determined to be primarily road noise from Rochdale Road.

A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the desired design criteria of BS8233:2014. A recommended roof specification has also been provided in Appendix J. The derived scheme is summarised 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
Living Areas	34 (29)	Double Glazing – 4/16/6	45	Passive thru-wall vent: Passivent Fresh 80dB
Bedrooms	39 (33)	Double Glazing – 6/16/9.5	45	Passive thru-wall vent: Passivent Fresh 80dB

Site plans are provided in **Appendix G**.

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1. Introduction

1.1. Proposal

It is proposed to convert the 1st floor of the property at 194 Rochdale Road into a residential flat, hereafter referred to as ‘the site’. The site is currently associated with the ground floor commercial use.

1.2. Reason for Assessment

A noise assessment is to be submitted as part of the planning application to ensure desirable noise levels are met within the habitable rooms of the proposed development. The assessment aims to provide a sound insulation scheme for the development.

1.3. Planning Conditions

The local authority has advised the client to have a noise assessment undertaken to guide the design of the project and to achieve the required internal noise levels.

1.4. Assessment Guidance Documentation

Guidance on the assessment and design criteria will be 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.

Additional guidance will 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.*”

Where necessary, mitigation recommendations will be given to comply with the requirements of the National Planning Policy Framework (2019) and the Noise Policy Statement for England (2010). Further information on all guidance documentation can be found in **Appendix H**.

2. Environmental Noise Survey

2.1. Survey Measurement

To assess the environmental noise levels affecting the proposed development, an unattended noise survey was undertaken at the site from the 26th – 27th of October 2022. This period was selected to capture events and noise levels on a typical weekday from the A664 Rochdale Road, as well as noise from other nearby residential and commercial sources.

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*’.

2.2. Measurement Location

Monitoring position M1 is located on the South-West facing façade of the site. The microphone was positioned approximately 4 meters above ground level out of a 1st-floor window. The measurement was within 1 metre of the façade and so a -3dB façade correction will be applied to the measured data.

The site and monitoring locations are shown below in **Figure 1**.

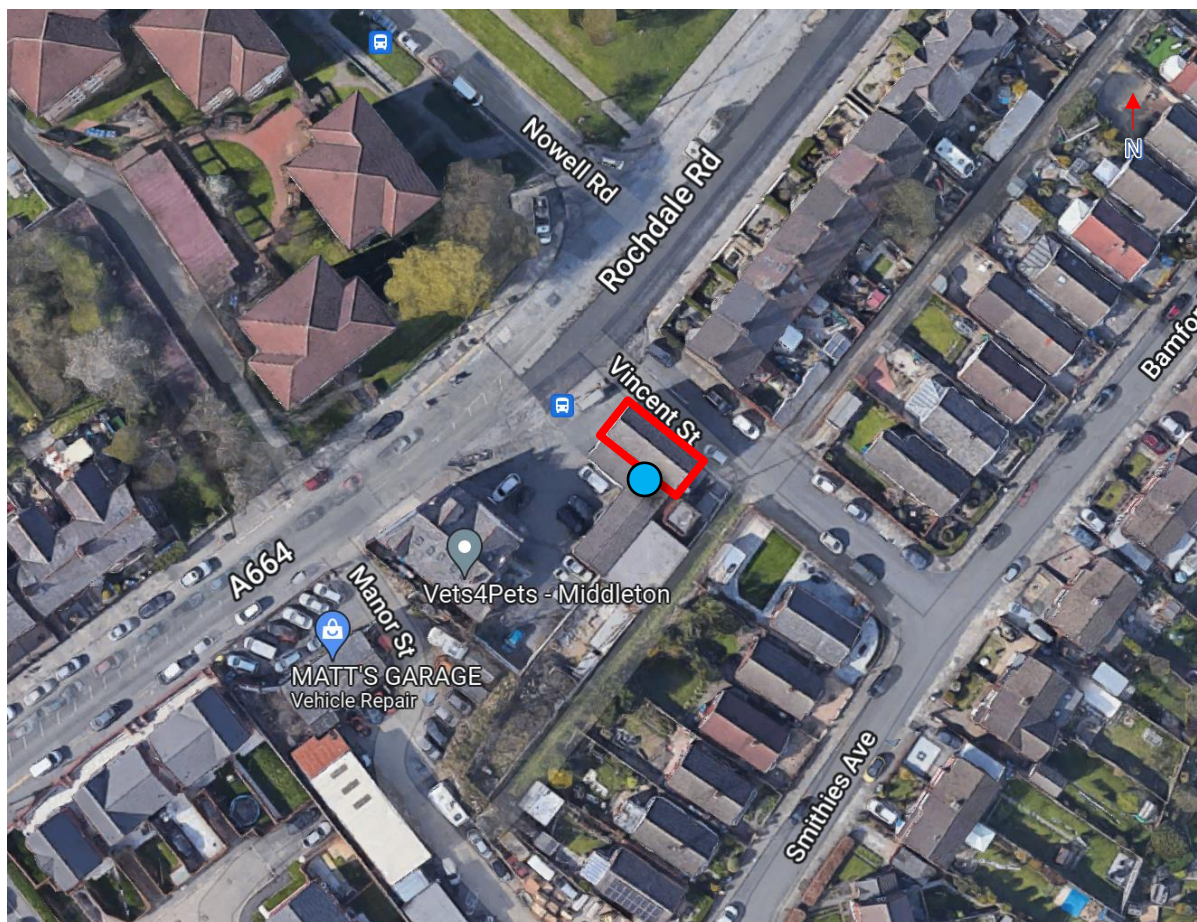


Figure 1: Site & Measurement Locations – google.com/maps

 Monitoring Location (M1)

 Site Boundary (Approx.)

2.3. Site Descriptions

The site is located above the commercial unit and 194 Rochdale Road, Middleton. Rochdale Road (A664) is a busy main road which joins Middleton to the South with the M62 to the North. To the North, East and South of the site are a mix of terraced and detached houses and smaller residential streets. To the West of the site is the former 'Black Bull Inn' which is now a veterinary clinic with residential use on the upper floors. There is also a Bus Stop adjacent to the North West corner of the site.

2.4. Noise Affecting the Development

The primary noise source affecting the development was identified as traffic on the main road including busses approximately every 10 minutes. A commercial yard was also noted beside the 'Black Bull Inn' which is used for car repairs, visited intermittently by recovery trucks.

2.5. Environmental Noise Survey Results

The results from the noise monitoring location M1 are summarised below.

The full-time history of the noise monitoring data is given in **Appendix E**.

Table 1. – Environmental Measurement Summary

Measurement	Date(s)	Period	L _{Aeq} (dB)	Typical* L _{AFmax} (dB)
M1	26 th & 27 th October 2022	Day (16hr Aggregate Periods)	59	-
	26 th – 27 th October 2022	Night (8hr)	54	77

* The given 'Typical' L_{AFmax} levels are an average of the spectra of the noisiest 10 events of the night-time period.

2.6. Weather Conditions

Daytime temperatures of 14°C were noted during the survey with winds observed between 3 and 6 m/s. Detailed weather conditions are given in **Appendix C**.

2.7. 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. Internal Noise Level Assessment

3.1. 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 2. – 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.

“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.”

In considering the noise climate affecting the proposed development, as discussed in Section 2.4, it is deemed appropriate to use guidelines set out in BS8233 and ProPG to ensure the internal criteria set out by the WHO for internal noise maxima LAmax and internal LAeq.

3.2. Assessment Noise Levels

In the interest of a robust assessment, the loudest of the measurement intervals, subject to irregular events, are to be considered in the assessment of internal noise levels and determining the sound insulation scheme.

During the night-time measurement period, 3 events attributed to passing emergency vehicles with sirens on within a 15-minute period starting at 1:35 am which were observed via event recording on the Sound Level Meter.

These are discounted from the LAmax results as it appears to be a ‘one-off’ event nearby as opposed to a pattern spread throughout the night-time period.

The resultant external noise levels for the assessment of internal ambient noise levels are summarised in the table below.

Table 3. – Assessment Noise Levels

Period	LAeq,T (dB)	LAmax (dB)
Daytime (1hr)	63	-
Night (1hr)	59	77

3.3. Internal Noise Calculations

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

Internal arrangements of the dwellings have been submitted by the client, proposed drawings have been provided by the client and used to scale room and glazing dimensions, these can be found in **Appendix G**.

Assessment is not required for each individual room therefore a worst-case situation will be used in which the worst affected rooms/floors will be used.

Calculations of internal ambient noise levels have been undertaken using the 'rigorous calculation' method given in Annex G2 of BS8233:2014. Full details of the calculations are provided in **Appendix F**.

4. Sound Insulation Scheme

4.1. External Building Envelope

Material build-up of the façade will significantly dictate the noise levels within the proposed dwelling. For the purposes of this report, the heavyweight construction of the façade is assumed to provide a minimum sound reduction of 49 dB R_w .

4.2. Bedroom within Roofspace

For the bedroom, a higher specification of roof insulation is required. For the consideration of night-time L_{Amax} levels, a recommended example roof specification has been provided within Appendix J. This is modelled to achieve 60dB R_w via a resilient rail system and double boarding.

4.3. Glazing and Ventilation

The following glazing and ventilation scheme for the development has been derived with a view of achieving the internal noise level criteria given in Table 2.

Table 4. – Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance $R_w (+C_{tr})$ ^[1]	Example Specification ^[2]	Minimum Performance $D_{ne,W} (+C_{tr} \text{ (Open)})$	Example Specification ^[3]
Living Areas	34 (29)	Double Glazing – 4/16/6	45	Passive thru-wall vent: Passivent Fresh 80dB
Bedrooms*	39 (33)	Double Glazing – 6/16/9.5	45	Passive thru-wall vent: Passivent Fresh 80dB

*In conjunction with the roof specification provided in Appendix J being used for the bedroom area in order to reduce night time 'Max' noise levels.

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

[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 Float / 16mm Air gap / XXmm Float'

[3] It is noted that BS8233 section 7.2.2 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'. This statement implies that the use of closed windows and an alternative means of ventilation is acceptable.

5. Internal Noise Levels

It is determined that by using mitigation as specified in **Table 4** for the building façades, the outcome summarised in the following table is achieved.

Table 5. – Internal Noise Levels

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Design Criteria?
Living Room	Daytime $L_{Aeq, 16hr}$	34	Yes
	Daytime $L_{Aeq, 16hr}$	30	Yes
Bedroom	Night-time $L_{Aeq, 8hr}$	26	Yes
	Night-time $L_{Amax, F}$	45	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 the implementation of the derived sound insulation scheme given in **Table 4**, would place the internal daytime noise levels 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 $L_{Aeq, 8hr}$.

Implementation of the derived sound insulation scheme given in **Table 4** would place the internal continuous night-time noise levels below 30 dB, therefore within the desirable category.

For the night-time assessment for bedrooms, ProPG suggests that individual noise events do not normally exceed 45dB $L_{Amax, F}$ more than 10 times a night.

Implementation of the derived sound insulation scheme given in **Table 4** would place the internal $L_{Amax, F}$ night-time events below 45 dB, therefore within the criteria.

6. External Amenity Areas

Plans provided by the client do not show any external amenity areas for the site and so external amenity noise levels are not considered.

7. Sound Insulation to Commercial Units

The guidance in Approved Document E (ADE) regarding commercial uses is simply that a higher standard of sound insulation may be required between spaces separating domestic and non-domestic purposes, and that the appropriate level of sound insulation required will depend on the noise generated in the non-domestic space.

For guidance, an improvement of +10dB compared with the normal residential sound insulation requirements might typically be suitable for general commercial use. As the site is a change of use, a target airborne floor sound insulation figure would be 53dB $R_w + Ctr$.

Where a basic timber joist floor exists with floorboards on the top side and a single layer of plasterboard below, this will achieve approximately 35db $R_w + Ctr$.

An example recommended upgraded specification is provided in Appendix K.

8. Conclusions

A noise assessment has been undertaken at 194 Rochdale Road in relation to the proposed conversion of the 1st floor to a residential flat.

Environmental noise monitoring was undertaken at the site from the 26th – 27th of October 2022. Noise affecting the development was determined to be primarily from Rochdale Road.

A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the design criteria.

Internal noise levels are anticipated to be within the guidelines of BS8233 with comments from ProPG.

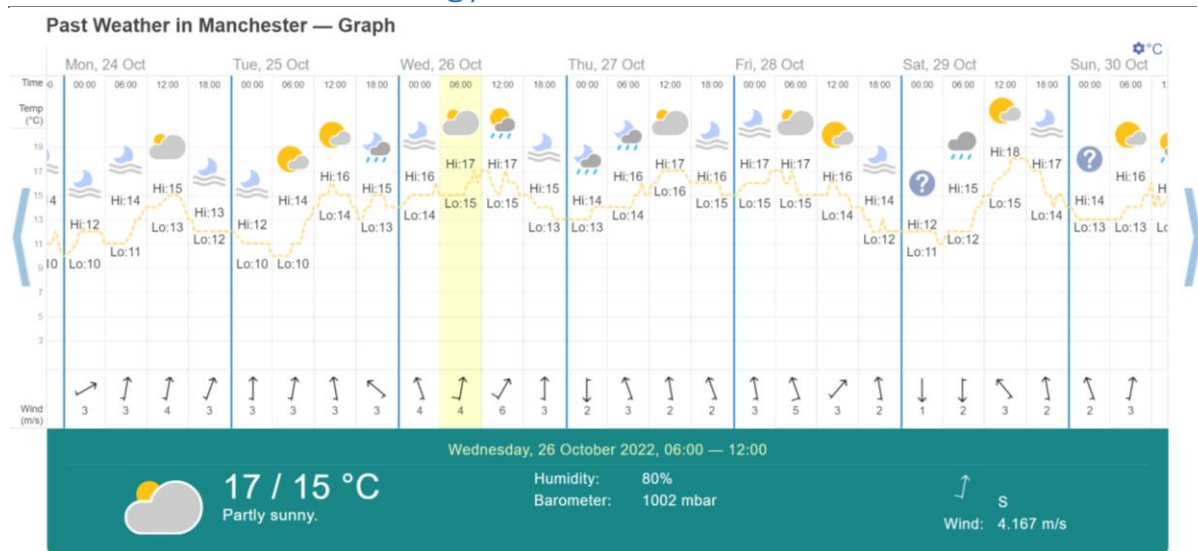
APPENDIX A – Measurement Details

Measurement(s)	Kit	Start Date	Start Time	End Date	End Time
M1	A3	26/10/22	09:55	27/10/22	09:35

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A3	Sound Meter	Svantek	971	1	41980
A3	Pre-Amp	Svantek	SV18	1	44331
A3	Microphone	ACO	7052E	1	60249
1	Calibrator	Svantek	SV33A	1	90273

APPENDIX C - Meteorology Details

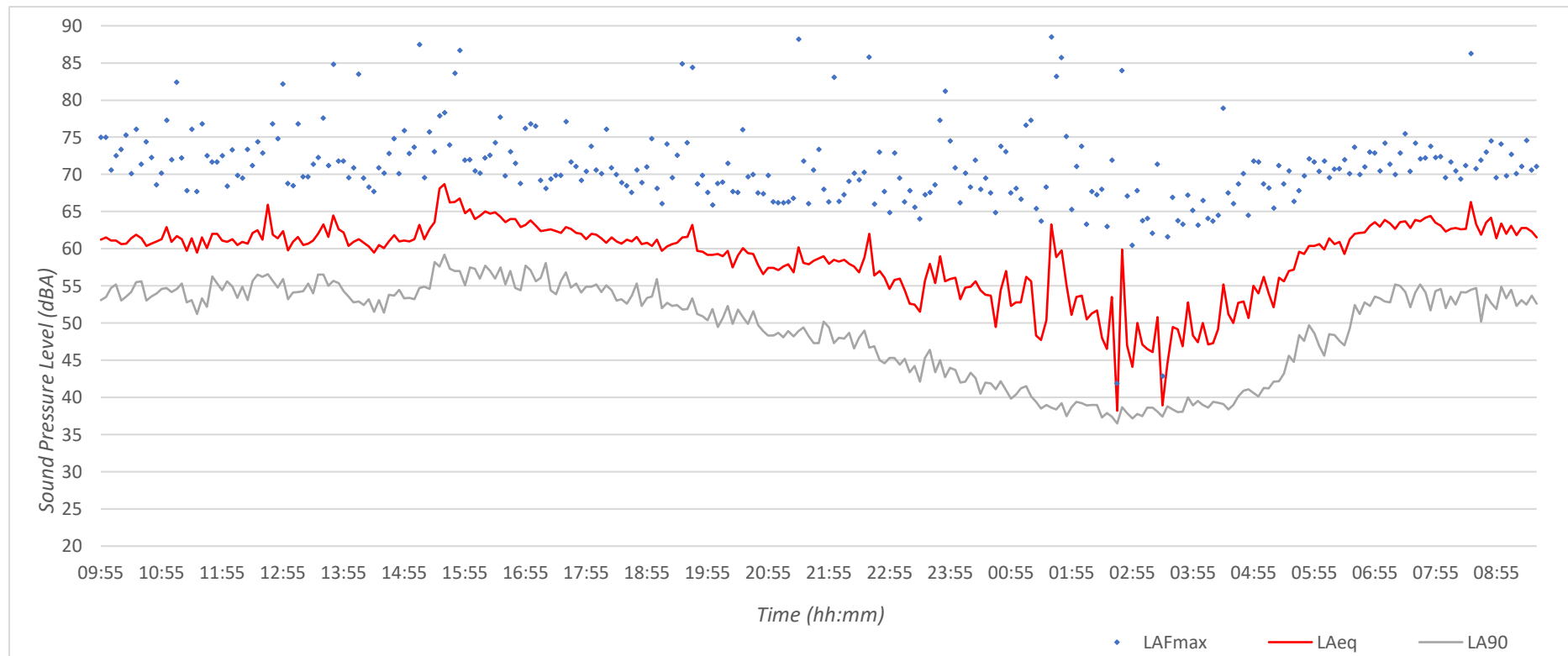


APPENDIX D - Calibration Details

Kit	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
A3	113.8	0.47	0.47

APPENDIX E – Noise Survey Time History

Environmental Noise Measurement M1 Time History: 26th – 27th October 2022

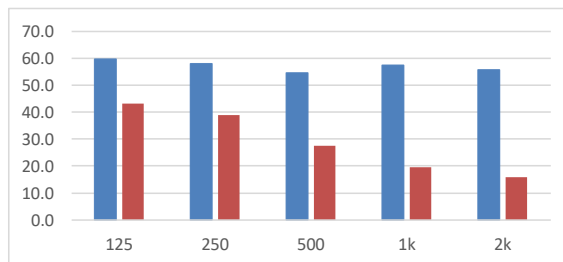


APPENDIX F – BS8233 Rigorous Design Calculations

1. Living Area - Daytime - LAeq

Room Properties		Sound Insulation Properties							
Room Width (m)	5.0	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.5	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	22	27	37	43	48	52	56
Glazed Area (m ²)	4.0	Glazing, dB R _{w+Ctr}	22	24	21	29	43	43	45
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	40	42	43	43	49	64	68

Noise Levels, dB



External Level	63.0 dB LAeq
Internal Level	34.1 dB LAeq
Insertion Loss	28.9 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	34(29)	dB R _{w(+Ctr)}	Double Glazing <i>4 / 16 / 6</i>
Ventilation	45	D _{n,e,w+Ctr}	Passive thru-wall vent <i>Passivent Fresh 80dB</i>

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

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	3.39E-05	2.1E-05	1.7E-05	1.7E-05	4.3E-06	1.35E-07	5.37E-08
Term 2	0.002103	0.00133	0.00265	0.00042	1.7E-05	1.67E-05	1.05E-05
Term 3	0.000106	5.3E-05	2.1E-05	2.1E-05	2.7E-06	1.06E-06	6.67E-07
Term 4	0.009201	0.00291	0.00029	7.3E-05	2.3E-05	9.2E-06	3.66E-06
Internal, dB L _{eq}	53.8	43.1	38.8	27.5	19.6	15.9	15.3
Internal, dB LAeq	27.6	27.0	30.2	24.3	19.6	17.1	16.3

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Passive thru-wall vent

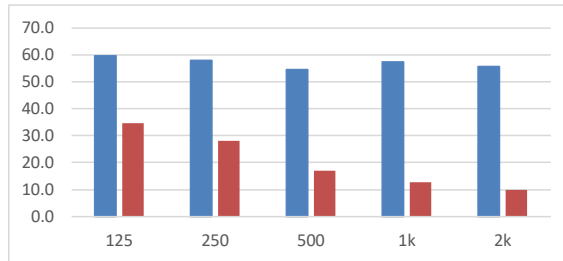
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_{10}}{S} 10^{-\frac{D_{10}}{10}} + \frac{S_{w1}}{S} 10^{-\frac{R_{w1}}{10}} + \frac{S_{w2}}{S} 10^{-\frac{R_{w2}}{10}} + \frac{S_{w3}}{S} 10^{-\frac{R_{w3}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

2. Bedroom - Daytime - LAeq

Room Properties			Sound Insulation Properties						
Room Width (m)	3.6	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.5	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	19	37	50	59	64	65	64
Glazed Area (m ²)	1.0	Glazing, dB R _{w+Ctr}	22	24	26	39	45	42	50
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	40	42	43	43	49	64	68

Noise Levels, dB



External Level	63.0 dB LAeq
Internal Level	29.6 dB LAeq
Insertion Loss	33.4 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement	Suitable Systems
Glazing	39(33) dB R _{w(+Ctr)}	Double Glazing 6 / 16 / 9.5
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	63	125	250	500	1k	2k	4k
Term 1	4.71E-05	3E-05	2.4E-05	2.4E-05	5.9E-06	1.87E-07	7.46E-08
Term 2	0.00073	0.00046	0.00029	1.5E-05	3.7E-06	7.3E-06	1.16E-06
Term 3	0.00014	7E-05	2.8E-05	2.8E-05	3.5E-06	1.4E-06	8.84E-07
Term 4	0.018359	0.00029	1.5E-05	1.8E-06	5.8E-07	4.61E-07	5.81E-07
Internal, dB L _{eq}	54.6	34.6	28.1	17.1	12.8	9.9	6.5
Internal, dB LAeq	28.4	18.5	19.5	13.9	12.8	11.1	7.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Passive thru-wall vent

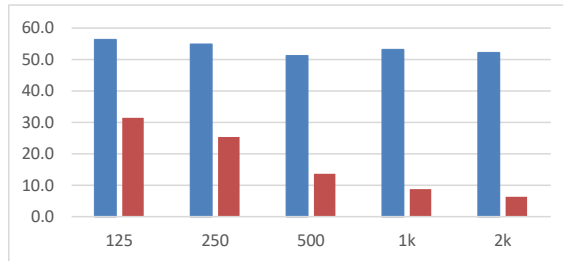
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,0}}{10}} + \frac{S_{01}}{S} 10^{-\frac{R_{01}}{10}} + \frac{S_{02}}{S} 10^{-\frac{R_{02}}{10}} + \frac{S_{03}}{S} 10^{-\frac{R_{03}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

3. Bedroom - Night-time - LAeq

Room Properties			Sound Insulation Properties						
Room Width (m)	3.6	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.5	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	19	37	50	59	64	65	64
Glazed Area (m ²)	1.0	Glazing, dB R _{w+Ctr}	22	24	26	39	45	42	50
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	40	42	43	43	49	64	68

Noise Levels, dB



External Level	63.0 dB LAeq
Internal Level	25.9 dB LAeq
Insertion Loss	37.1 dB LAeq

Sound Insulation Requirement

	Minimum Sound Insulation Requirement	Suitable Systems
Glazing	39(33) dB R _{w(+Ctr)}	Double Glazing 6 / 16 / 9.5
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	63	125	250	500	1k	2k	4k
Term 1	4.71E-05	3E-05	2.4E-05	2.4E-05	5.9E-06	1.87E-07	7.46E-08
Term 2	0.00073	0.00046	0.00029	1.5E-05	3.7E-06	7.3E-06	1.16E-06
Term 3	0.00014	7E-05	2.8E-05	2.8E-05	3.5E-06	1.4E-06	8.84E-07
Term 4	0.018359	0.00029	1.5E-05	1.8E-06	5.8E-07	4.61E-07	5.81E-07
Internal, dB L _{eq}	50.8	31.4	25.2	13.7	8.7	6.3	0.2
Internal, dB LAeq	24.6	15.3	16.6	10.5	8.7	7.5	1.2

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Passive thru-wall vent

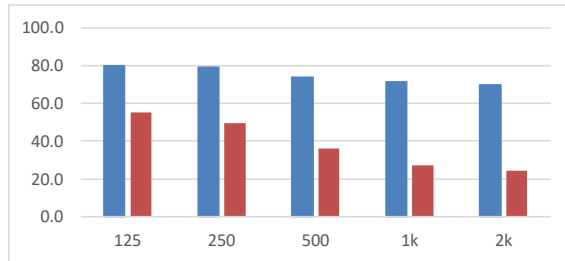
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,0}}{10}} + \frac{S_{01}}{S} 10^{-\frac{R_{01}}{10}} + \frac{S_{02}}{S} 10^{-\frac{R_{02}}{10}} + \frac{S_{03}}{S} 10^{-\frac{R_{03}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

4. Bedroom - Night-time - LAmax

Room Properties			Sound Insulation Properties						
Room Width (m)	3.6	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.5	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	19	37	50	59	64	65	64
Glazed Area (m ²)	1.0	Glazing, dB R _{w+Ctr}	22	24	26	39	45	42	50
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	40	42	43	43	49	64	68

Noise Levels, dB



External Level	63.0 dB LAmax
Internal Level	44.9 dB LAmax
Insertion Loss	18.1 dB LAmax

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	39(33)	dB R _{w(+Ctr)}	Double Glazing 6 / 16 / 9.5
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	63	125	250	500	1k	2k	4k
Term 1	4.71E-05	3E-05	2.4E-05	2.4E-05	5.9E-06	1.87E-07	7.46E-08
Term 2	0.00073	0.00046	0.00029	1.5E-05	3.7E-06	7.3E-06	1.16E-06
Term 3	0.00014	7E-05	2.8E-05	2.8E-05	3.5E-06	1.4E-06	8.84E-07
Term 4	0.018359	0.00029	1.5E-05	1.8E-06	5.8E-07	4.61E-07	5.81E-07
Internal, dB L _{eq}	65.4	55.1	49.4	36.2	27.0	24.1	16.1
Internal, dB LAeq	39.2	39.0	40.8	33.0	27.0	25.3	17.1

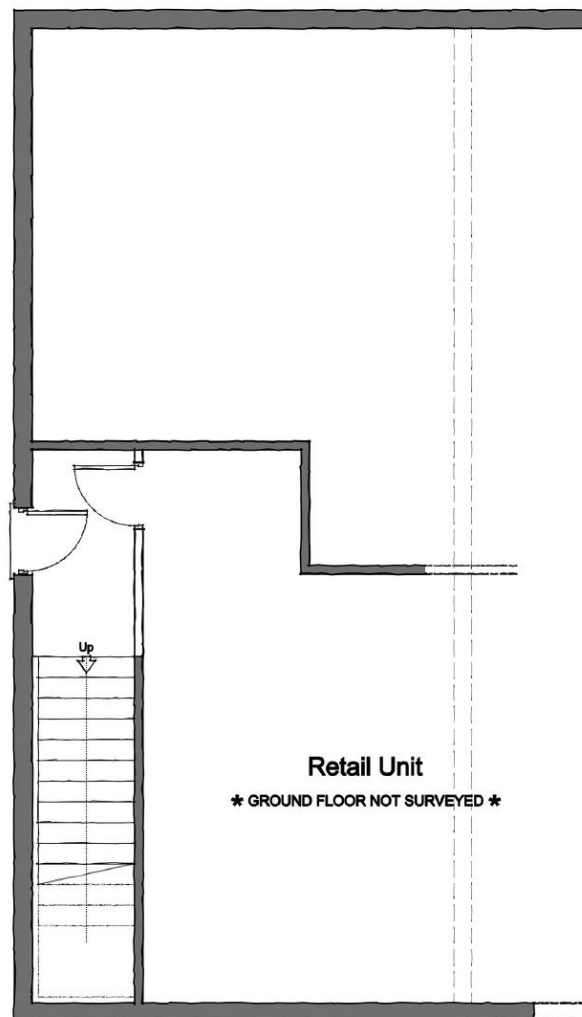
Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Passive thru-wall vent

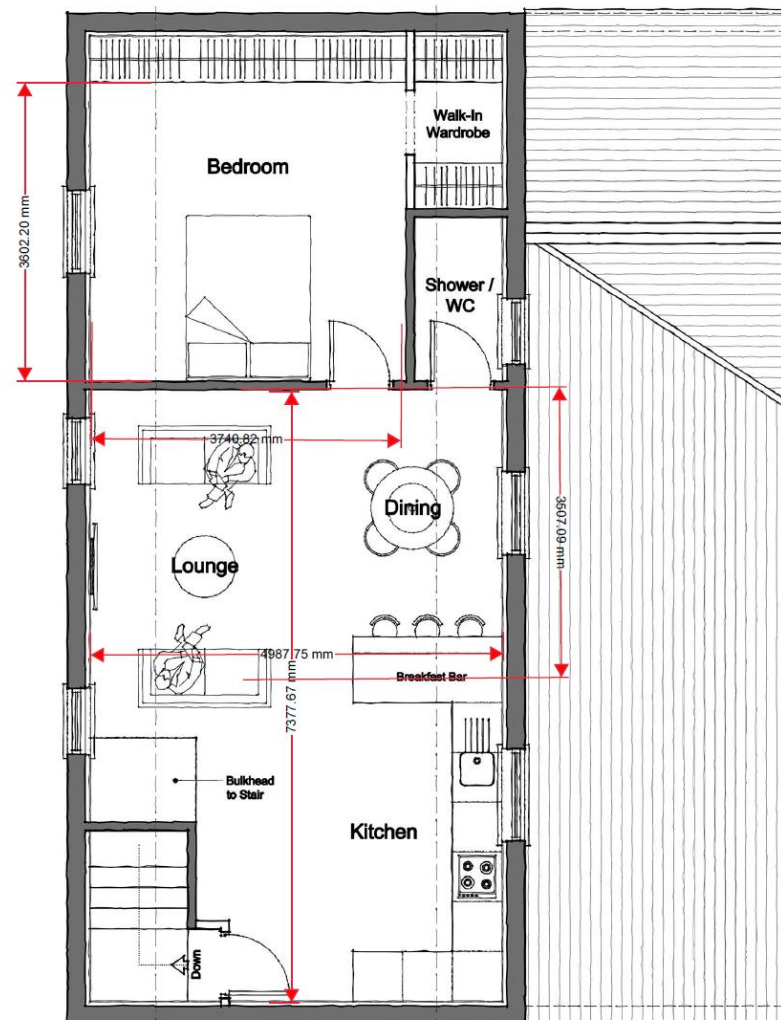
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_{10}}{S} 10^{-\frac{D_{10}}{10}} + \frac{S_{w1}}{S} 10^{-\frac{R_{w1}}{10}} + \frac{S_{w2}}{S} 10^{-\frac{R_{w2}}{10}} + \frac{S_{w3}}{S} 10^{-\frac{R_{w3}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

APPENDIX G – Site Plans



Proposed Ground Floor Plan
Scale 1:50



Proposed First Floor Plan
Scale 1:50

APPENDIX H – Legislation, Policy and Guidance

Guidance for the assessment of noise affecting new residential development is given in the National Planning Policy Framework (NPPF). Section 15 of the NPPF states:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

E) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of...noise pollution.”

Section 185 further 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:

- 1. 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;*
- 2. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Section 187 states:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

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.

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.

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 $L_{Amax,F}$, 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 $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

"NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

APPENDIX I – 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 of 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 meter 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 (2×10^{-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 over 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 be used to take into account different source spectra. ' C_{tr} ' is the A-weighted urban traffic noise spectrum.

APPENDIX J – Roof Specification (Example)

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017

Margin of error is generally within $R_w \pm 3$ dB

- Key No. 5547

Job Name:

Job No.:

Date: 01/11/2022

File Name: insul

Initials: GuestWed



Notes:



R_w 60 dB

C -3 dB

Ctr -9 dB

Mass-air-mass resonant frequency = 49 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 54.1 kg/m²

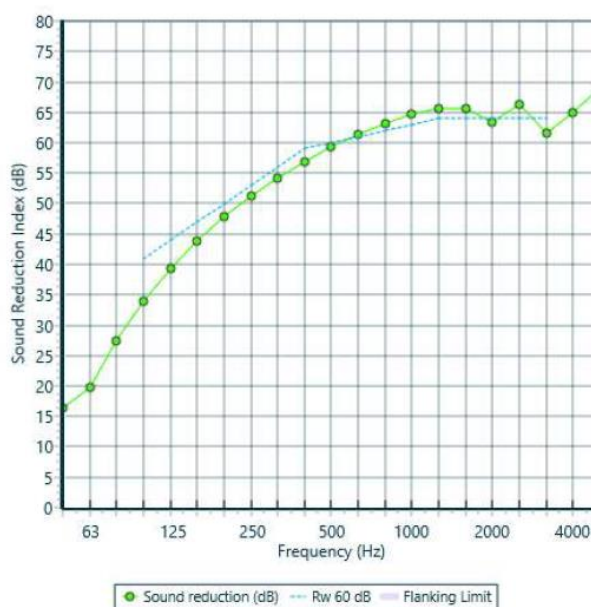
System description

Panel 1 : 1 x 14 mm Roofing tiles

Frame: Timber stud + Resilient rail/bar (78 mm x 45 mm), Stud spacing: 600 mm; Cavity Width 90 mm; 1 x Fibreglass (10kg/m³) Thickness: 60 mm

Panel 2 : 2 x 12.5 mm Knauf FireShield™ 12.5mm

freq.(Hz)	R(dB)	R(dB)
50	16	
63	20	19
80	27	
100	34	
125	39	37
160	44	
200	48	
250	51	50
315	54	
400	57	
500	59	59
630	61	
800	63	
1000	65	64
1250	66	
1600	66	
2000	63	65
2500	66	
3150	62	
4000	65	64
5000	69	



APPENDIX K – Residential to Commercial Floor Specification (Example)

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017

Margin of error is generally within $R_w \pm 3$ dB

- Key No. 5547

Job Name:

Initials: GuestWed

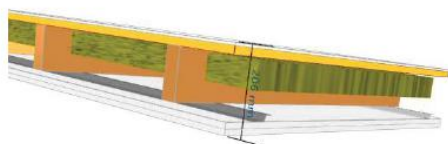
Job No.:

Date: 01/11/2022

File Name: insul



Notes:



R_w 59 dB
C -2 dB
Ctr -6 dB

Mass-air-mass resonant frequency = 40 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 45.7 kg/m²

System description

Panel 1 : 1 x 6 mm Rubber

+ 1 x 20 mm Flooring Particle Board

Frame: Solid Joist with resilient rail (1.3E2 mm x 45 mm), Stud spacing 600 mm; Cavity Width 150 mm, 1 x Fibreglass (22kg/m³) Thickness 75 mm

Panel 2 : 2 x 15 mm Gyproc SoundBloc 15mm

freq.(Hz)	R(dB)	R(dB)
50	17	
63	25	21
80	31	
100	37	
125	41	40
160	45	
200	48	
250	51	50
315	53	
400	55	
500	57	57
630	59	
800	60	
1000	61	61
1250	62	
1600	60	
2000	63	61
2500	60	
3150	65	
4000	69	68
5000	73	

