



PEAK acoustics

Noise Assessment Report

Rev. 0



Environmental Noise Assessment

Produced in association with SJM Environmental Consulting Ltd

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1. Summary

1.1. Proposal

It is proposed to change a gymnasium space into residential apartments at 1-3 Bakers Road, Uxbridge, UB8 1RG.

1.2. Reason for Assessment

The proposed apartments are within a development situated in a busy central location amongst commercial premises and in close proximity to Uxbridge Underground, and the Bus Station. The local authority has requested that an environmental noise assessment is submitted to ensure that the habitable rooms within the proposed apartments are adequately insulated against noise.

1.3. Planning Conditions & Criteria

No criteria have been supplied by the local planning authority; therefore, the following criteria is stipulated in accordance with British Standards.

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_{Amax} should not be regularly exceeded within bedrooms at night (23:00 – 07:00).
- 35dB $L_{Aeq, 16hr}$ within living areas during the day (07:00 – 23:00)

1.4. Assessment Standards & Justification

'BS8233:1999/2014 – Guidance on sound insulation and noise reduction for buildings' [British Standards Institution] is a recognised standard for assessing and mitigating environmental noise levels upon a proposed noise sensitive development.

1.5. Measurements

In order to assess environmental noise, a noise survey was undertaken from Tuesday 7th – Wednesday 8th May 2019. Both internal and external measurements were undertaken relative to the façade zone location. The results of the measurements are tabulated below.

Measurement Summary				
Measurement	Date(s)	Period	L _{Aeq} (dB)	Typical L _{AFmax} (dB)
M1 (External)	7 th & 8 th May 2019	Day (16hr Aggregate Periods)	61.5	N/A
	7 th – 8 th May 2019	Night (8hr)	58.1	78.1*
M2 (Internal)	7 th & 8 th May 2019	Day (16hr Aggregate Periods)	33.8	N/A
	7 th – 8 th May 2019	Night (8hr)	27.8	44.7

1.6. Noise Assessment Outcome

It is determined that the following noise levels will be achieved within the proposed residential apartments:

Internal Space	Noise Parameter	Internal Noise Level	Within Desirable Limit (BS8233)
Living Areas	Daytime L _{Aeq, 16hr}	33.8	Yes
Bedrooms (Zone A)	Night-time L _{Aeq, 8hr}	27.8	Yes
Bedrooms (Zone A)	Night-time L _{AFmax}	44.7	Yes
Bedroom (Zone B)	Night-time L _{Aeq, 8hr}	19.9	Yes
Bedroom (Zone B)	Night-time L _{AFmax}	42.0	Yes

1.7 Glazing & Ventilation Scheme

The façade zones referred to in the table below are shown in Section 1.7.2

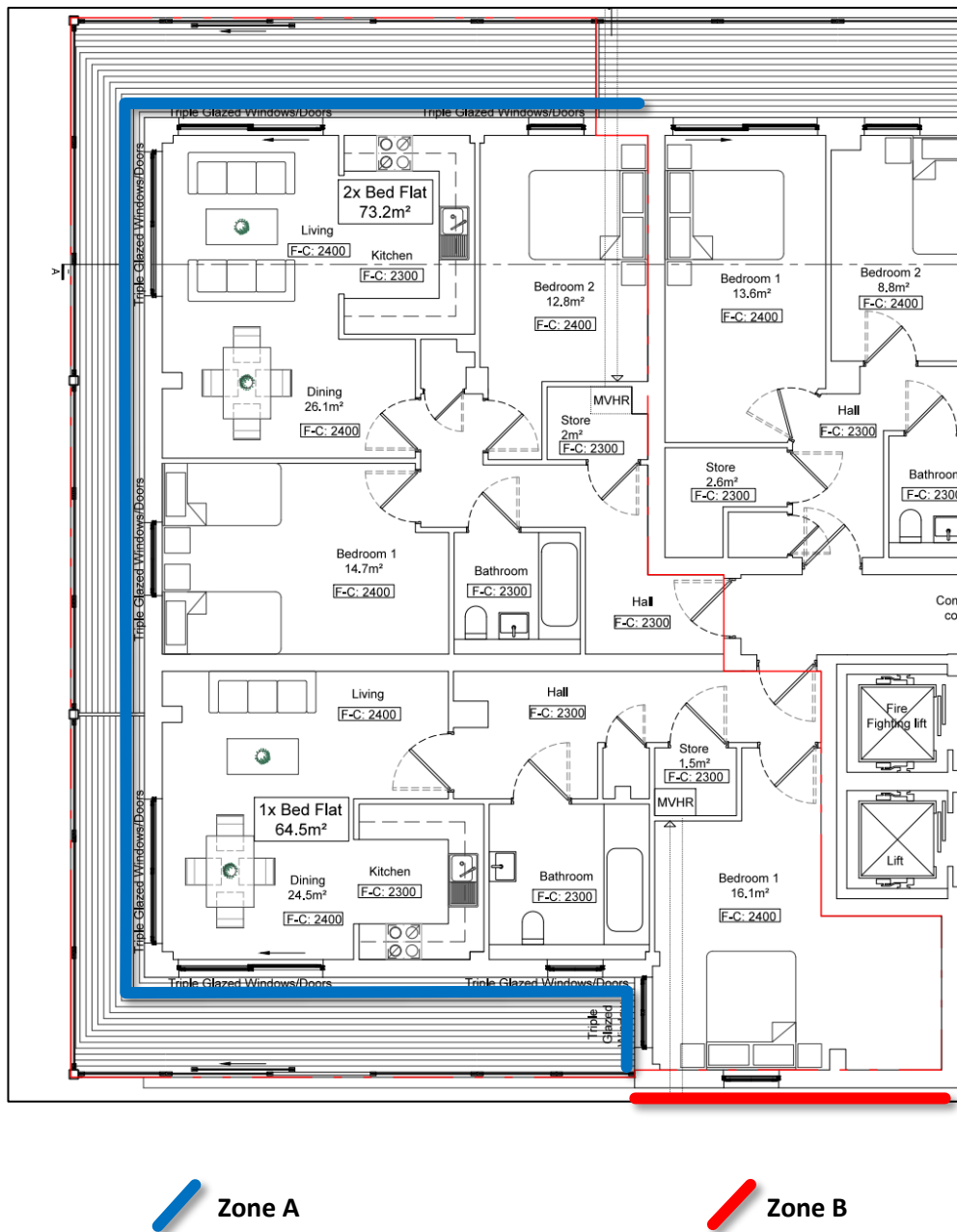
Room Location	Internal Space	Glazing		Ventilation
Zone A 	Living Areas	Existing Glazing Retained		Mechanical System
	Bedrooms	Existing Glazing Retained		Mechanical System
Room Location	Internal Space	Glazing		Ventilation
		Minimum Performance, R_w+C_{tr}	Example Specification	
Zone B 	Bedroom	32	10/12/6mm	Mechanical System

1.7.1. Ventilation System Guidance

The following should be considered in the design process of the mechanical ventilation system to ensure the assessment criteria are maintained:

- Ductwork inlets and outlets should be routed to the non-habitable rooms/spaces, such as bathrooms and built-in cupboards. Inlets/outlets introduce a weakness to the façade whereby noise ingress can occur and the introduction of these weaknesses to habitable façade locations should be avoided.
- The system should be designed to not exceed the following noise levels within habitable rooms when operating at the required ventilation capacity:
 - 30 dB $L_{Aeq,5min}$ within bedrooms
 - 35 dB $L_{Aeq,5min}$ within living rooms

1.7.2. Façade Zones



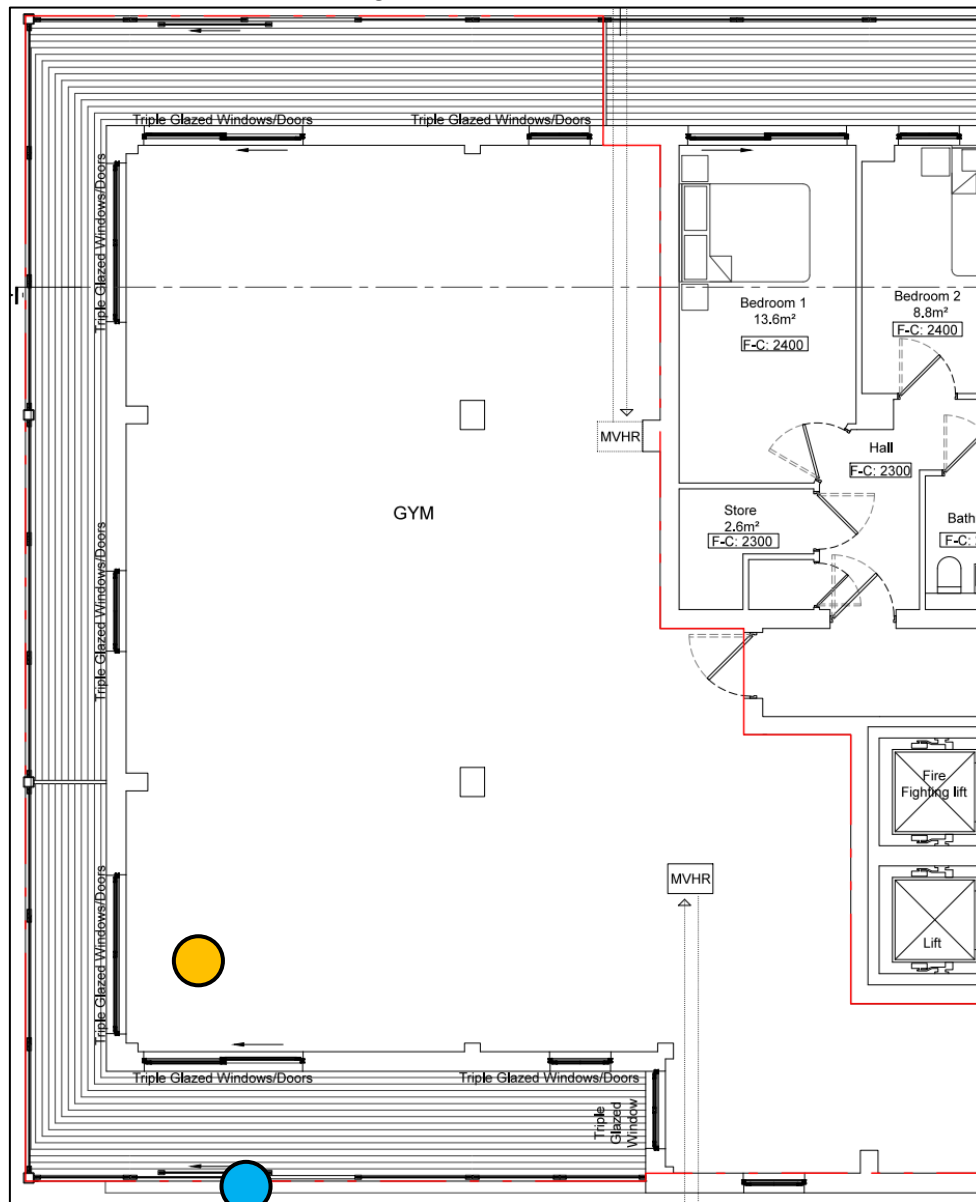
1.8. Site & Measurement Locations

Figure 1: Site Location Plan



 Site Boundary (Approx.)

Figure 2: Measurement Locations



 M1 – External Environmental Noise Measurement

 M2 – Internal Environmental Noise Measurement

2. Environmental Noise Survey

2.1. Source Under Investigation

The noise climate on site is dominated by passing buses and coaches entering and leaving the nearby Uxbridge station, whereby engine and exhaust noise are the prominent sources. Other passing vehicles accessing the station and commercial premises on Bakers Road are also common notable noise sources.

Secondary sources were noted as intermittent overhead air-traffic and conversing pedestrians.

3. Survey Measurements

Daytime and night-time noise measurements have been carried out on Tuesday 7th – Wednesday 8th May 2019; a period covering the morning and evening rush hour expected due to the nearby Uxbridge Underground and Bus Station.

3.1. Measurement Locations

The measurement locations were as follows:

- M1 - External noise was measured out of a first-floor window, fully exposed to noise from activity on Bakers Road and representative of zone B.
- M2 - Internal noise was measured within the existing gymnasium space, representative of zone A. The microphone was placed approximately 1m from the internal glazing toward the south end of the gym space to be in the closest proximity to the dominant external noise sources, therefore representative of a worst-case scenario.

3.2. Weather Conditions

Weather conditions were deemed satisfactory for conducting 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**.

Noise data for measurement M1 is inclusive of a 3 dB façade correction due to the microphone being within 1m of a reflective surface, namely the building façade.

Measurement Summary				
Measurement	Date(s)	Period	L _{Aeq} (dB)	Typical L _{AFmax} (dB)
M1 (External) [Façade Corrected]	7 th & 8 th May 2019	Day (16hr Aggregate Periods)	61.5	N/A
	7 th – 8 th May 2019	Night (8hr)	58.1	78.1*
M2 (Internal)	7 th & 8 th May 2019	Day (16hr Aggregate Periods)	33.8	N/A
	7 th – 8 th May 2019	Night (8hr)	27.8	44.7**

**M1 maxima chosen 08/05/19 @ 04:38 and is deemed representative of regularly occurring individual noise events during night-time hours.*

***M2 maxima chosen 08/05/19 @ 05:49 and is deemed representative of regularly occurring individual noise events during night-time hours.*

4. BS8233:1999 Noise Assessment

4.1. Criteria

The following criteria have been selected in accordance with BS8233:2014:

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

4.2. Internal Noise Analysis (Zone A)

Measured internal noise levels are shown graphically in **Appendix E** and are typical of a central urban area with a slight reduction in noise levels during the night when activity on Bakers Road and the surrounding area is reduced.

It is anticipated that levels would be lower following completion of the apartments due to the smaller surface area of the glazing, in relation to individual rooms, as well as an increase in acoustic absorption. Regular individual noise events do not exceed 45 dB L_{Amax} more than 10 times during the night in accordance with WHO guidelines p28.

4.3. External Noise Analysis (Zone B)

Measured external noise levels are shown graphically in **Appendix E** and are typical of a central urban area with a reduction in noise levels during the night when activity on Bakers Road and the surrounding area is reduced.

4.4. Internal Noise Levels

Internal noise levels within zone A have been derived from measurement M2 noise data as it deemed to be representative of expected levels within the proposed apartments. As stated in section 4.2, levels are anticipated to be lower following completion of the apartments, the measured internal noise levels therefore represent a worst-case scenario.

Internal noise levels within zone B have been calculated using noise data from external measurement M1 as data from measurement M2 is not deemed to be representative of the expected levels within the zone B bedroom.

Room dimensions and glazed areas have been approximated based on the current proposals. Assumed construction details are provided within **Appendix F**.

4.5. Daytime Internal Noise Levels

4.5.1. Living Areas (Zone A)

With the existing glazing retained and the proposed mechanical ventilation system implemented, daytime environmental noise would be reduced to **33.8 dB $L_{Aeq, 16hr}$** within the proposed living areas.

The achieved internal noise levels are below 35 dB(A) and would therefore achieve the 'desirable' criterion of BS8233:2014.

4.5. Night-time Internal Noise Levels

4.5.1. Bedrooms (Zone A)

With the existing glazing retained and the proposed mechanical ventilation system implemented, night-time environmental noise would be reduced to **27.8 dB $L_{Aeq, 8hr}$** with typical maximum individual noise events reduced to **44.7 L_{AFmax}** .

4.5.1. Bedroom (Zone B)

With **32 dB R_{w+Ctr}** rated glazing and the proposed mechanical ventilation system implemented, night-time environmental noise would be reduced from 58.1 dB $L_{Aeq, 8hr}$ to interior levels of **19.9 $L_{Aeq, 8hr}$** with maximum individual noise events reduced from 78.1 L_{AFmax} to **42.0 L_{AFmax}** .

The achieved internal noise levels are below 30 dB(A) with regular individual noise events below 45 dB L_{AFmax} and would therefore achieve the 'desirable' criterion of BS8233:2014.

4.6. Ground to First-Floor Separating Floor

The local authority stipulated that the floor separating the ground floor commercial unit and the proposed residential apartments at first floor should achieve a minimum 60 dB R_{w+Ctr} .

The separating floor has been modelled based on construction details obtained on site and additional sound insulation elements have been specified in order to achieve the target criteria. Details are given in the table below. A detailed sound insulation model is given in **Appendix G**.

Floor Description (Recommended Enhancements shown in <i>Bold Italics</i>)	Target	Predicted
	Airborne Sound Insulation (Minimum dB R_{w+Ctr})	Airborne Sound Insulation (Minimum dB R_{w+Ctr}) (+/- 3 dB)
60mm Floor Screed 25mm Kingspan Rigid Floor Insulation 150mm Hollowcore Concrete Slab <i>MF Ceiling system (Minimum 250mm cavity)</i> <i>100mm Fibreglass insulation within the cavity (Min. Density 10Kg/m³)</i> <i>2x No. 12.5mm Sound Resistant Plasterboard (e.g. Gyproc Soundbloc)</i>	60	64

Following implementation of the recommended enhancements, it is determined that the separating floor will achieve the target criteria set by the local planning authority.

4.7. Effect Level and Exposure Outcomes

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

Internal Space	Noise Parameter	Internal Noise Level	BS8233 Classification
Living Areas	Daytime $L_{Aeq, 16hr}$	33.8	'Desirable'
Bedrooms (Zone A)	Night-time $L_{Aeq, 8hr}$	27.8	'Desirable'
Bedrooms (Zone A)	Night-time L_{AFmax}	44.7	'Desirable'
Bedroom (Zone B)	Night-time $L_{Aeq, 8hr}$	19.9	'Desirable'
Bedroom (Zone B)	Night-time L_{AFmax}	42.0	'Desirable'

APPENDIX A - Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A2	07/05/19	12:53	08/05/19	13:17
M2	A3	07/05/19	12:54	08/05/19	13:13

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A2	Sound Meter	Svantek	971	1	40305
A2	Pre-Amp	Svantek	SV12L	1	32484
A2/A3	Calibrator	Svantek	SV31	1	43086
A3	Sound Meter	Svantek	971	1	41980
A3	Pre-Amp	Svantek	SV18	1	44331

APPENDIX C - Meteorology Details

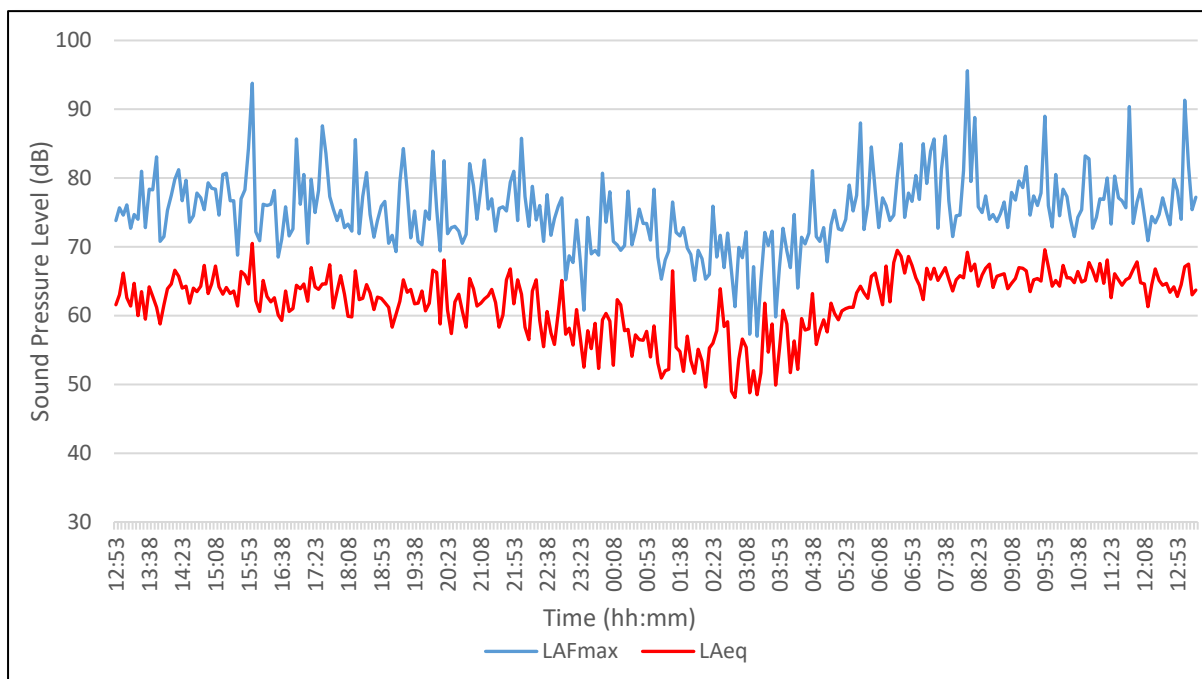
Measurement	Temp C	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
M1/M2 07 th May 2019	15	3-5	S	45	0.0	0/8
M1/M2 08 th May 2019	15	3-5	SW	82	0.2	3/8

APPENDIX D - Calibration Details

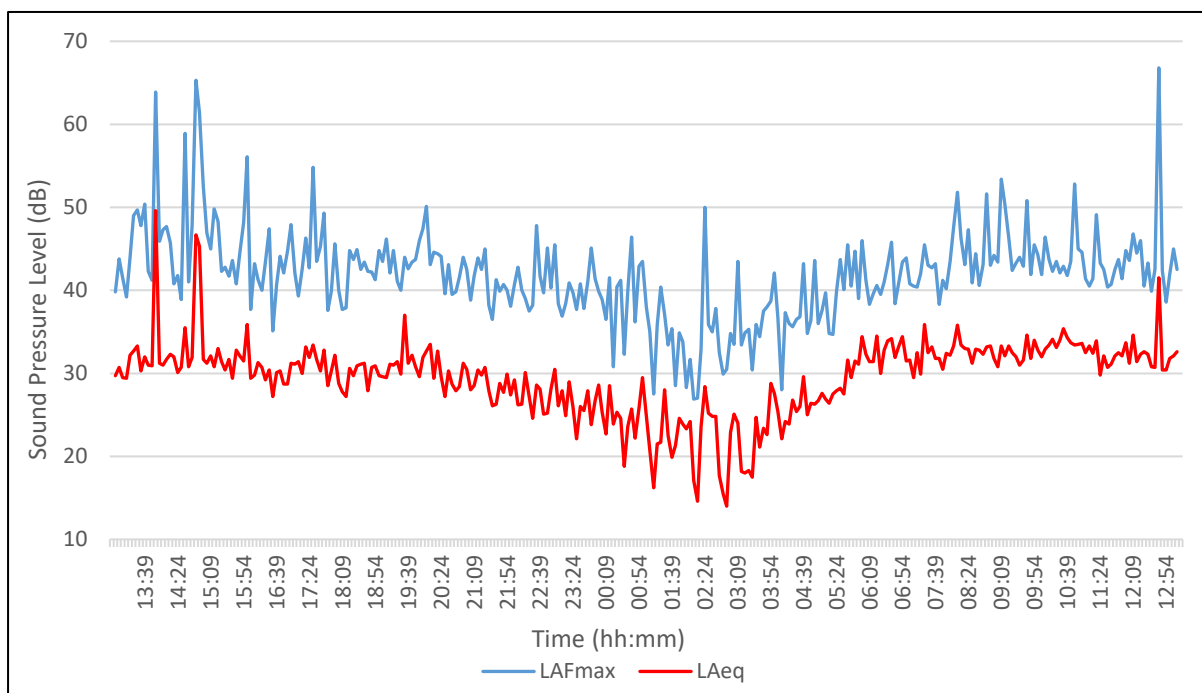
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	113.80	112.12	- 1.62	112.03	- 1.77
M2	113.90	113.30	- 0.60	113.24	- 0.68

APPENDIX E – Noise Survey Results

External Environmental Noise Measurement – M1, 7th – 8th May 2019, Pre-Façade Correction



Internal Environmental Noise Measurement – M2, 7th – 8th May 2019

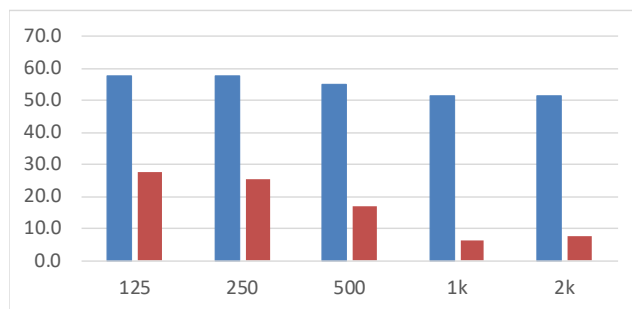


APPENDIX F – BS8233 Rigorous Design Calculations

Bedroom (Zone B) - Night (23:00 - 07:00)

Room Properties		Sound Insulation Properties					
Room Width (m)	4.1	Freq. Hz	125	250	500	1k	2k
Room Depth (m)	4.5	Wall, dB R _{W+Ctr}	41	45	45	54	58
Room Height (m)	2.4	Roof, dB R _{W+Ctr}	41	45	45	54	58
Glazed Area (m ²)	1.8	Glazing, dB R _{W+Ctr}	26	27	34	40	38
Is dwelling within roof?	☒	Vents, D _{n,e,W+Ctr}	41	45	45	54	58

Noise Levels, dB



External Level	58.1 dB LAeq
Internal Level	19.9 dB LAeq
Insertion Loss	38.2 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	32	dB R _{W+Ctr}	Double Glazing 10/12/6mm
Ventilation	-	D _{n,e,W+Ctr}	Heat recovery system Multi-room Heat Recovery System

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	8.072E-05	3.2E-05	3.2E-05	4E-06	1.61E-06
Term 2	0.0004595	0.00036	7.3E-05	1.8E-05	2.9E-05
Term 3	6.49E-05	2.6E-05	2.6E-05	3.3E-06	1.29E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	27.7	25.3	16.9	6.3	7.6
Internal, dB LAeq	11.6	16.7	13.7	6.3	8.8

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Heat recovery system

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

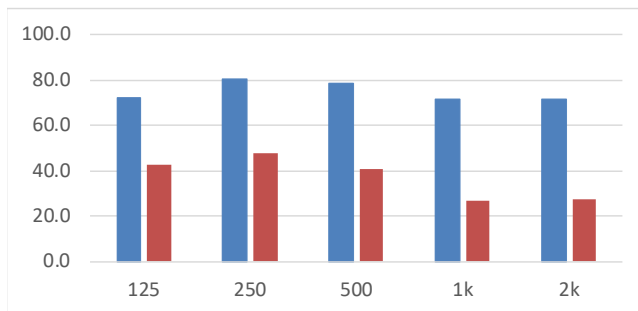
$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{0,0}}{10}} + \frac{S_{w1}}{S} 10^{\frac{-R_{w1}}{10}} + \frac{S_{w2}}{S} 10^{\frac{-R_{w2}}{10}} + \frac{S_{w3}}{S} 10^{\frac{-R_{w3}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

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

Bedroom (Zone B) - Night Maxima (23:00 - 07:00)

Room Properties		Sound Insulation Properties					
Room Width (m)	4.1	Freq. Hz	125	250	500	1k	2k
Room Depth (m)	4.5	Wall, dB R _{w+Ctr}	41	45	45	54	58
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazed Area (m ²)	1.8	Glazing, dB R _{w+Ctr}	26	27	34	40	38
Is dwelling within roof?	☒	Vents, D _{n,e,w+Ctr}	41	45	45	54	58

Noise Levels, dB



External Level 78.1 dB LAmax

Internal Level 42.0 dB LAmax

Insertion Loss 36.1 dB LAmax

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	32	dB R _{w+Ctr}	Double Glazing 10/12/6mm
Ventilation	-	D _{n,e,w+Ctr}	Heat recovery system Multi-room Heat Recovery System

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	8.072E-05	3.2E-05	3.2E-05	4E-06	1.61E-06
Term 2	0.0004595	0.00036	7.3E-05	1.8E-05	2.9E-05
Term 3	6.49E-05	2.6E-05	2.6E-05	3.3E-06	1.29E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	42.6	47.8	40.8	26.6	27.7
Internal, dB LAeq	26.5	39.2	37.6	26.6	28.9

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Heat recovery system

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{as}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{w1}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{w2}}{10}} + \frac{S_{fl}}{S} 10^{-\frac{R_{f1}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

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

APPENDIX G – Sound Insulation Model

Ground to First Floor Model

Sound Insulation Prediction (v9.0.17)

Program copyright Marshall Day Acoustics 2017
margin of error is generally within $R_w \pm 3$ dB

- Key No. 5524

Job Name:

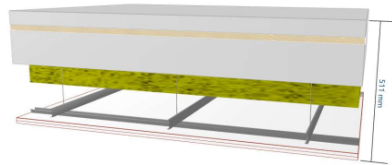
Job No.:

Date: 10/05/2019

File Name: Separating Floor.ixl

Initials: kyle

Notes:



R_w 67 dB
C -1 dB
Ctr -3 dB

Mass-air-mass resonant frequency = 23 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 349 kg/m²

System description

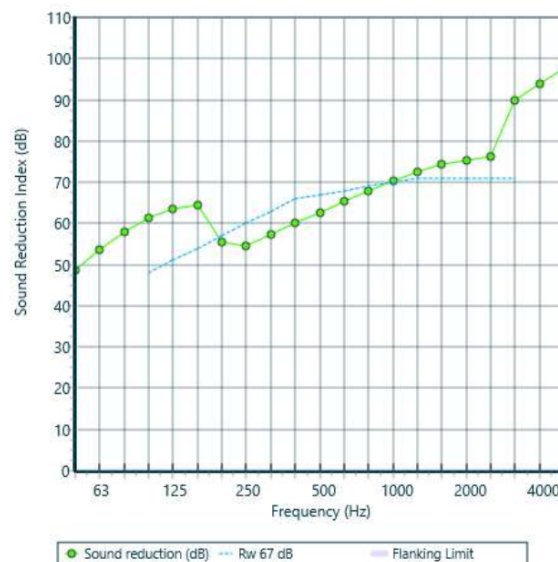
Panel 1 : 1 x 60 mm Lightweight concrete
+ 1 x 150 mm Hollow Concrete planks

+ 1 x 26 mm Kingspan KS1000 RW 30/40mm

Frame: Suspended Light Steel Grid (2.5E2 mm x 45 mm), Stud spacing 600 mm; Cavity Width 250 mm; 1 x Fibreglass (10kg/m³) Thickness 100 mm

Panel 2 : 2 x 12.5 mm Gyproc SoundBloc 12.5mm

freq.(Hz)	R(dB)	R(dB)
50	49	
63	54	52
80	58	
100	61	
125	64	63
160	65	
200	56	
250	55	56
315	57	
400	60	
500	63	62
630	65	
800	68	
1000	70	70
1250	73	
1600	74	
2000	75	75
2500	76	
3150	90	
4000	94	93
5000	98	





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 Efficiency Services.

Additional Services

We offer an extensive range of services in the sectors of Acoustic Consultancy, Building Compliance & Energy Efficiency Services. 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
- EPCs
- SBEM Calculations
- Energy Statements
- Sustainability Statements
- MEES Regulations
- Commercial EPCs

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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