

Pentangle Design

**6 Station Road
Letchworth**

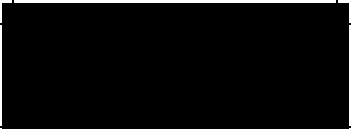
**Ground Floor
Conversion from
Commercial to
Residential**

**Noise Impact Assessment
Report**

August 2024

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1. INTRODUCTION

At the request of Pentangle Design, a noise impact assessment has been carried out for the proposed conversion of the ground floor commercial premises to residential at 6 Station Road, Letchworth. The assessment has been carried out according to the noise guidelines of BS8233:2014 as specified in national planning policy and ProPG 'Planning and Noise' 2017.

The measurements and assessment have been carried out by John Hyde, a Member of the Institute of Acoustics and Chartered Physicist who has over 35 years' experience as a noise and acoustics consultant.

2. TERMINOLOGY

It has become practice to measure sound levels in decibels (dB). The decibel scale is logarithmic rather than linear. It is helpful to remember that a noise level change of 3dB on a sound meter reading would be just perceptible, and that an increase of 10 dB is perceived, subjectively, as a doubling of loudness. The human ear responds differently to sounds of different frequencies. The ear "hears" high frequency sound of a given level more loudly than low frequency sound of the same level. The A-weighted sound level, dB(A), takes this response into consideration and is commonly used for measurement of environmental noise in UK. It indicates the subjective human response to sound.

Environmental noise levels vary continuously from second to second. It is clearly impractical to specify the sound level for each second thus time averaging is required. In practice human response has been related to various units which include allowance for the fluctuating nature of sound with time. For the purpose of this report these include:

$L_{Aeq,T}$: the equivalent A-weighted continuous sound level over period T. This unit relates to the equivalent level of continuous sound for a specific time period T, for example 16 hr for daytime noise. It contains all the sound energy of the varying sound levels over the same time period, and expresses it as a continuous sound level over that period. The unit is used for assessing traffic, transportation and industrial noise for planning purposes.

$L_{A90,T}$: the A-weighted level of sound exceeded for 90% of the time period T. This latter unit is commonly used to represent the background noise, and is used in assessing the effects of industrial noise in UK.

L_{Amax} : the maximum A-weighted sound level over a period of measurement.

3 NOISE GUIDELINES

The requirements of BS8233 are summarised as follows:

<i>Criterion</i>	<i>Situation</i>	<i>L_{Aeq,T}</i>
Reasonable resting or sleeping conditions	Living Rooms	35dB Day (16hrs)
	Bedrooms	30dB Night (8hrs)

In addition to internal average noise level criteria, BS8233 recommends that a limit should be placed on maximum internal noise levels at night due to individual external events, such as passing vehicles, although a specific guideline is not proposed. However, WHO Noise Guidelines recommend that internal maximum noise levels due to individual events at night, should not regularly exceed 45dB(A) on no more than 10 occasions. It is also recommended that ambient noise in external amenity spaces should not exceed a free-field $L_{Aeq,16hr}$ 55dB.

4 NOISE MEASUREMENTS

Noise measurements were carried out over a 24-hour period from 12th to 13th August 2024 at the first-floor front facade of the building overlooking Station Road. The microphone was covered by an outdoor weatherproof system to protect from wind and rain noise. The weather conditions were warm and dry with negligible wind and were within the parameters recommended in BS7445-1:1991 'Description and measurement of environmental noise'.

The noise measurements were carried out using the following equipment:

SVAN 955 Sound Level Meter	S/N 27330
SV12L pre-amp	S/N 25706
ACO 7052E Microphone	S/N 49605
NOR 1251Calibrator	S/N 29151

The above equipment fulfils IEC 61672-3:2013 - Class 1 and is traceable to calibration under BS7580: Part 1:1997. The meter was calibrated before and after the measurement and no significant drifting of the calibration signal was observed.

Figure 1: Noise measurement position

The following parameters were measured at 15-minute intervals.

- L_{Aeq} The equivalent continuous noise level
 - L_{Amax} The maximum noise level during each period
 - L_{A90} The level exceeded for 90% of the time, the background level
- Octave band frequency levels were measured for the façade sound insulation calculations.

Based on limited daytime observation, the dominant noise source at the front of the building was from road on Station Road. The results are summarised below in Table 1 and shown in detail in Appendix 1.

Table 1: Results of noise measurements

Date & time	LAeq,T [dB]	LAmaz [dB]*
FRONT		
12/08/24 11:24-23:00	61.5	-
12/08/24 23:00-07:00	53.4	77
13/08/24 07:00-11:24	61.5	-

* Level exceeded on no more than 3 occasions

The octave band frequency levels used for the calculations of façade sound insulation are shown in Table 2.

Table 2: Octave Band Frequency Levels

Façade	Octave Band Frequency Levels [dB]				
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz
Front	65.7	61.0	57.3	58.0	53.2

The measured noise levels were effectively façade measurements which included the façade correction factor of 3dB. The calculation methodology uses free-field data and includes the façade correction thus the following free-field levels, to the nearest 1dB, were used for the calculations.

LAeq,16hr 59dB

LAeq,8hr 50dB

LAmaz 74dB

5 ASSESSMENT

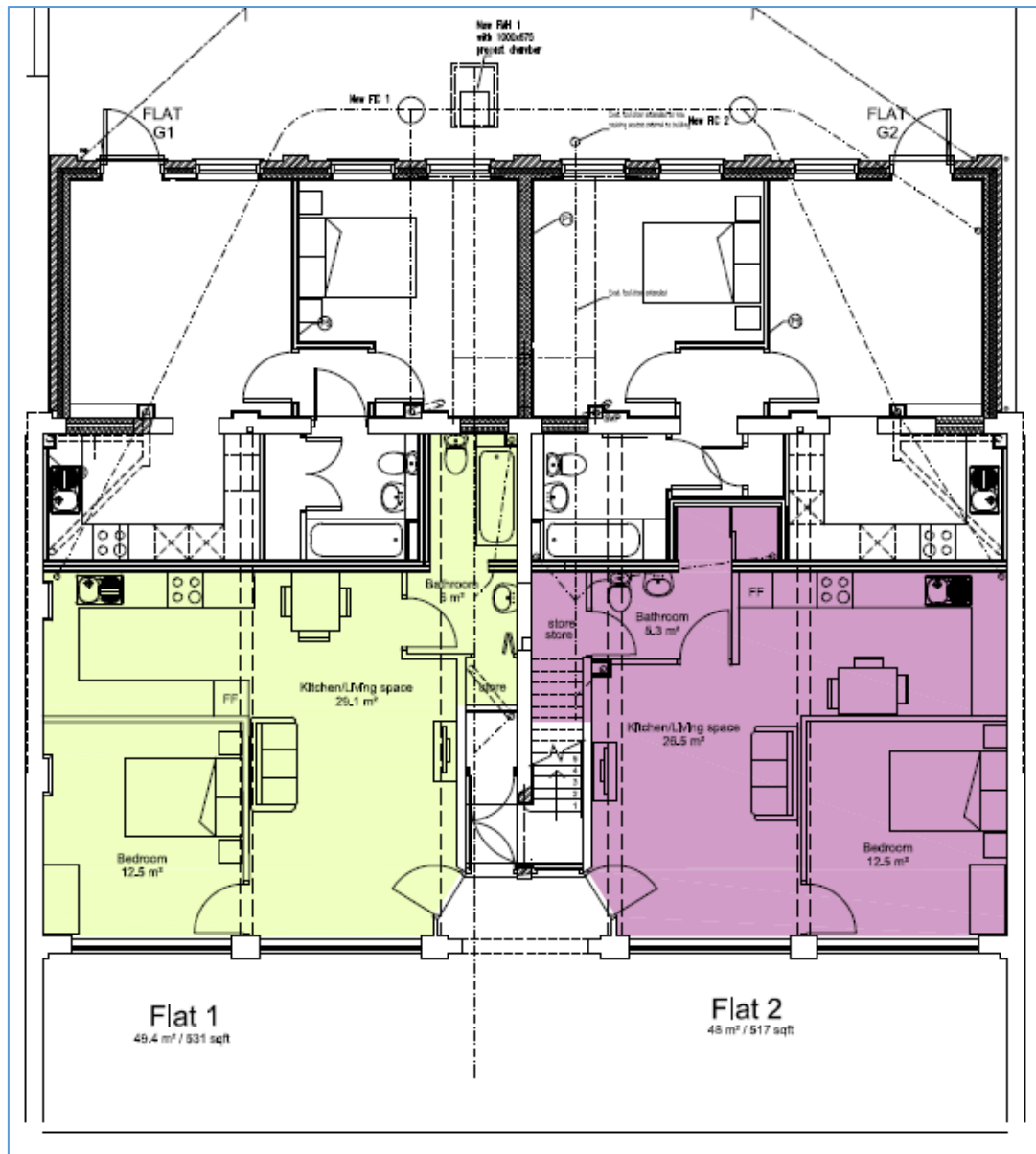
Façade Sound Insulation

The measured facade noise levels have been used to determine internal noise levels by selecting appropriate glazing and ventilation mitigation measures, using the BS8233:2014 Annexe G2 methodology. The spectrum of external noise was taken over a 3-hour period at the start of the measurement as shown in Table 2.

The G2 sound insulation calculation method takes account of the room dimensions, acoustic absorption, the façade area and the window area meaning that a particular form of glazing will result in varying internal noise levels depending on the room characteristics. A room façade with a high percentage area of glazing will have a lower

sound insulation than a room façade with a lower percentage area of the same glazing. The room façade and glazing dimensions have been taken from the floor layouts of the apartments shown in Figures 2 and 3.

Figure 2: Proposed Ground Floor Plan



Façade attenuation calculations were carried out for bedroom and the living room of both flats. The calculations are shown in Appendix 2. Each table shows the glazing and ventilator assumptions for each room and the resulting internal noise level is shown at the foot of the table.

The sound insulation required for the façade of each room is shown in Table 3 for day and night time periods. The sound insulation likely to be achieved by the proposed measures in the calculations in Appendix 2 are also shown.

Table 3: Calculated façade sound insulation for each Flat

Flat	Room	Façade Level [dB]		Attenuation needed to meet guidelines [dB]			Attenuation Achieved (dB)
		LAeq	LAmx	Day(35)	Night(30)	LAmx(45)	
1	Living Room	59	-	24	-	-	29
1	Bedroom	50	74	-	20	29	31
2	Living Room	59	-	24	-	-	29
2	Bedroom	50	74	-	20	29	31

The data shows that the windows would need to remain closed to achieve the required internal noise levels. A window slightly opened for ventilation purposes gives an attenuation of only 13dB which would not be sufficient to adequately meet the guidelines. Therefore, provision for background ventilation, through the Part F systems, needs to be made in order to be able to maintain closed windows. This does not mean that residents need to keep windows closed, it means that there is a choice between meeting a high standard of sound insulation and accepting that these standards are not achieved when windows are open.

Based on the calculations, the living rooms of both flats would require acoustic glazing with an insulation specification of R_w+C_{tr} 34dB, such as (6-16-6.8 Optiphon)). An acoustic ventilator would be needed meeting a minimum specification of $D_{ne,w}$ 39dB, such Greenwood through wall ventilator GAV AWW39 or, if new window frames are installed, acoustic trickle vents could fitted to frames providing the same attenuation, such as GAV EAQ42W.

The bedrooms of both flats would require a slightly higher specification of acoustic glazing with an insulation of R_w+C_{tr} 36dB, such as (6-16-8.8 Optiphon) together with an acoustic ventilator, as for the living room. The requirement for a high standard of glazing is due to the high percentage of glazed areas on each facade. The mitigation measures are summarised as follows:

Living rooms: Glazing R_w+C_{tr} 34dB (eg 6-16-6.8 Optiphon)

Bedrooms: Glazing R_w+C_{tr} 36dB (eg 6-16-8.8 Optiphon)

The proposed acoustic ventilators for all rooms would meet Part F System 1 where background ventilation is achieved through intermittent mechanical extractors in kitchens and bathrooms or through a Continuous Mechanical Extract system. The M&E engineer should ensure that the selected extract system provides adequate air flow to meet the Part F requirements.

6 SUMMARY

A survey has been carried out at the site of the proposed residential conversion at 50 High Street, Stevenage, to establish the external noise levels on the building façade and to assess the potential noise impact. The measured noise levels take account of road traffic and pedestrian activity at the front of the building.

The survey results and sound insulation calculations showed that the guidance on internal noise levels, as recommended by ProPG 'Planning and Noise' 2017 using BS8233:2014 and WHO guidelines, can be achieved through appropriate glazing and ventilators.

APPENDIX 1 - Results of Ambient Noise Measurements

Front Facade

Date & time	L _{Amax} [dB]	L _{Aeq,T} [dB]	L _{A90} [dB]
13/08/2024 11:03	82.5	60.9	54.1
13/08/2024 11:18	73.8	58.9	53.8
13/08/2024 11:33	76.7	60.7	54.2
13/08/2024 11:48	85.2	63.8	55.1
13/08/2024 12:03	88.5	61.4	56.0
13/08/2024 12:18	73.2	60.4	55.3
13/08/2024 12:33	70.7	60.2	55.5
13/08/2024 12:48	72.1	60.1	55.8
13/08/2024 13:03	73.6	59.9	54.9
13/08/2024 13:18	70.2	61.7	59.0
13/08/2024 13:33	71.2	60.3	55.5
13/08/2024 13:48	76.5	60.0	55.1
13/08/2024 14:03	80.3	60.5	55.7
13/08/2024 14:18	77.1	60.2	55.3
13/08/2024 14:33	79.0	61.3	55.1
13/08/2024 14:48	69.3	60.1	55.8
13/08/2024 15:03	71.7	60.8	56.8
13/08/2024 15:18	94.0	63.7	56.1
13/08/2024 15:33	78.6	61.4	55.0
13/08/2024 15:48	89.8	65.2	55.6
13/08/2024 16:03	80.8	60.8	55.5
13/08/2024 16:18	71.6	60.1	56.1
13/08/2024 16:33	77.2	61.6	56.2
13/08/2024 16:48	79.9	61.5	57.0
13/08/2024 17:03	80.2	61.2	56.4
13/08/2024 17:18	77.3	63.2	57.1
13/08/2024 17:33	82.6	62.8	56.2
13/08/2024 17:48	77.3	60.8	55.9
13/08/2024 18:03	76.6	60.9	56.6
13/08/2024 18:18	79.0	61.1	56.9
13/08/2024 18:33	76.4	61.8	56.9
13/08/2024 18:48	74.2	61.0	56.6
13/08/2024 19:03	78.1	61.2	56.4
13/08/2024 19:18	92.8	64.6	56.6
13/08/2024 19:33	77.8	60.1	55.3
13/08/2024 19:48	81.0	61.8	56.6
13/08/2024 20:03	81.2	62.7	56.6
13/08/2024 20:18	80.7	61.0	55.7
13/08/2024 20:33	88.4	62.3	54.4
13/08/2024 20:48	73.7	60.5	55.1
13/08/2024 21:03	86.1	62.0	55.4

Date & time	L _{Amax} [dB]	L _{Aeq,T} [dB]	L _{A90} [dB]
13/08/2024 21:18	77.5	60.4	55.2
13/08/2024 21:33	70.8	60.1	54.9
13/08/2024 21:48	92.7	62.1	53.8
13/08/2024 22:03	88.8	65.8	53.2
13/08/2024 22:18	74.3	57.6	51.6
13/08/2024 22:33	85.3	60.1	52.5
13/08/2024 22:48	78.5	59.5	49.2
13/08/2024 23:03	74.0	57.0	48.9
13/08/2024 23:18	69.1	56.0	48.3
13/08/2024 23:33	74.0	58.5	48.8
13/08/2024 23:48	70.2	55.9	46.6
14/08/2024 00:03	74.7	54.1	45.9
14/08/2024 00:18	85.4	59.3	46.8
14/08/2024 00:33	73.2	54.0	46.8
14/08/2024 00:48	77.1	55.8	45.4
14/08/2024 01:03	65.1	49.5	44.3
14/08/2024 01:18	63.1	50.5	44.3
14/08/2024 01:33	66.1	52.6	44.4
14/08/2024 01:48	62.5	49.5	44.1
14/08/2024 02:03	63.8	50.2	44.3
14/08/2024 02:18	68.4	50.1	44.0
14/08/2024 02:33	63.4	46.5	43.8
14/08/2024 02:48	62.2	47.6	43.9
14/08/2024 03:03	66.1	49.1	44.0
14/08/2024 03:18	65.3	47.3	44.3
14/08/2024 03:33	68.1	50.9	43.9
14/08/2024 03:48	67.5	47.5	44.1
14/08/2024 04:03	59.8	46.5	44.1
14/08/2024 04:18	59.1	46.7	44.3
14/08/2024 04:33	73.7	56.6	45.0
14/08/2024 04:48	56.0	47.0	45.0
14/08/2024 05:03	67.5	52.0	45.3
14/08/2024 05:18	68.6	52.2	45.6
14/08/2024 05:33	67.0	52.7	46.6
14/08/2024 05:48	72.9	55.5	50.8
14/08/2024 06:03	72.0	56.7	51.7
14/08/2024 06:18	74.2	58.1	49.5
14/08/2024 06:33	70.3	57.1	50.2
14/08/2024 06:48	70.7	58.9	51.7
14/08/2024 07:03	71.1	60.0	53.4
14/08/2024 07:18	74.2	61.1	55.4
14/08/2024 07:33	73.7	61.2	54.9

Date & time	L _{Amax} [dB]	L _{Aeq,T} [dB]	L _{A90} [dB]
14/08/2024 07:48	85.3	62.0	55.1
14/08/2024 08:03	74.3	61.0	54.9
14/08/2024 08:18	80.3	61.0	54.4
14/08/2024 08:33	75.6	60.7	54.1
14/08/2024 08:48	80.3	61.6	54.5

Date & time	L _{Amax} [dB]	L _{Aeq,T} [dB]	L _{A90} [dB]
14/08/2024 09:03	73.4	60.6	54.7
14/08/2024 09:18	70.2	59.8	54.8
14/08/2024 09:33	89.7	61.8	55.1
14/08/2024 09:48	79.0	61.0	54.9

APPENDIX 2 – Calculation of internal noise levels

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Living Room Flat 1/2							
Wall area		10.4					
Window Area		9.0					
Roof	n/a	0.0					
Room Vol.		75					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Façade ff Leq		64.4	60.9	55.9	56.4	52.3	60.3
Ventilator Dne	GAV AWV39	38	37	38	39	47	
Window R	6/16/6.8	21	28	37	48	48	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	n/a	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000152	0.000192	0.000152	0.000121	0.000019	
		-38.2	-37.2	-38.2	-39.2	-47.2	
Windows		0.006867	0.001370	0.000173	0.000014	0.000014	
		-21.6	-28.6	-37.6	-48.6	-48.6	
Ext. Wall		0.000013	0.000005	0.000004	0.000001	0.000000	
		-48.7	-52.7	-53.7	-59.7	-64.7	
Ceiling/roof		0.000000	0.000000	0.000000	0.000000	0.000000	
		-63.2	-69.2	-75.2	-80.2	-84.2	
Composite R		-21.5	-28.0	-34.8	-38.7	-44.8	
Abs. Correction		-0.2	-1.3	-1.9	-1.9	-1.6	
Leq (int)		45.6	34.6	22.2	18.9	8.9	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		29.5	26.0	19.0	18.9	10.1	31.7
Façade Atten.		28.6	dB				
	Ext. L _{Aeq} ,16hr	59	Internal	30	Guideline	35	

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Bedroom Flat 1/2							
Wall area		10.4					
Window Area		9.0					
Roof	n/a	0.0					
Room Vol.		35					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Façade ff Leq		65.7	61.0	57.3	58.0	53.2	61.5
Ventilator Dne	GAV AWV39	38	37	38	39	47	
Window R	6/16/8.8	25	27	38	48	47	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	n/a	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000152	0.000192	0.000152	0.000121	0.000019	
		-38.2	-37.2	-38.2	-39.2	-47.2	
Windows		0.002734	0.001725	0.000137	0.000014	0.000017	
		-25.6	-27.6	-38.6	-48.6	-47.6	
Ext. Wall		0.000013	0.000005	0.000004	0.000001	0.000000	
		-48.7	-52.7	-53.7	-59.7	-64.7	
Ceiling/roof		0.000000	0.000000	0.000000	0.000000	0.000000	
		-63.2	-69.2	-75.2	-80.2	-84.2	
Composite R		-25.4	-27.2	-35.3	-38.7	-44.3	
Abs. Correction		-0.2	-1.3	-1.9	-1.9	-1.6	
Leq (int)		43.1	35.6	23.1	20.5	10.3	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		27.0	27.0	19.9	20.5	11.5	30.9
Façade Atten.		30.7	dB				
	Ext. L _{Aeq} ,8hr	50	Internal	19	Guideline	30	
	Ext. L _{Amax}	74	Internal	43	Guideline	45	