Focus 360 Energy

The Stuffed Dormouse
Ponthir Road
Caerleon
Newport

Residential Development

Noise Impact Assessment

September 2023

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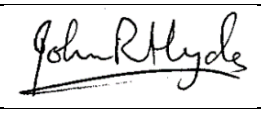
Signature			
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1. INTRODUCTION

At the request of Focus 360 Energy, an assessment of potential noise impact has been carried out at The Stuffed Dormouse, Ponthir Road, Caerleon, Newport. The assessment has been carried out according to the guidelines of BS8233:2014 as recommended in planning policy and ProPG 'Planning and Noise' 2017. The proposed development includes new build town houses on the car park site and conversion of the existing restaurant into 9 apartments. An environmental noise survey has been carried out which has been used to determine appropriate mitigation for the proposed dwellings, in order to meet the required guidelines.

The measurements and assessment have been carried out by John Hyde, a Chartered Physicist and Member of the Institute of Acoustics who has over 30 years' experience as a noise and acoustics consultant.

2. TERMINOLOGY

Sound levels are measured 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. It is clearly impractical to specify the sound level for such variation 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 CRITERIA

Planning guidance on noise is set out in the 'Noise Policy Statement for England' (NPSE) which reinforces the three policy aims of the 'National Planning Policy Framework' as follows:

- *Avoid significant adverse impacts on health and quality of life*
- *Mitigate and minimise adverse impacts on health and quality of life*
- *Where possible, contribute to the improvement of health and quality of life*

In order to apply objective standards to the assessment of noise which uphold these policy aims, the effects of noise may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. BS8233:2014 and WHO 'Guidelines for Community Noise' contain such guidelines
- The effect may be determined by considering the change in noise level that would result from the proposal in an appropriate noise index for the characteristic of the noise in question.
- Another method is to compare the resultant noise level against the background noise level of the area, as used in BS4142 to determine the likelihood of impact from noise of an industrial nature.

Guidance for the effects of noise on residential development is given in ProPG Planning and Noise 2017, which uses requirements of BS8233:2014, to assess potential impacts. Internal noise guidelines are summarised as follows:

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

BS8233 recommends that a limit should be placed on internal maximum noise levels

from individual events but does not specify a limit. WHO Noise Guidelines recommend that internal maximum noise levels due to individual events at night, should not regularly exceed 45dB(A).

4 NOISE MEASUREMENTS

Measurements of ambient traffic noise were carried out on 11th September 2023 at the site. It was not possible to leave unattended equipment at the site as, at ground floor, it would have been clearly visible from the public highway and a high security risk.

A four-hour attended measurement was therefore carried out and the noise levels assessed according to the 'Shortened Method' specified in Calculation of Road Traffic Noise (CRTN). Noise levels were measured at a free-field position, as indicated in Figure 1, at 5m from the kerbside. The microphone was positioned at a height of 1.5m. The levels were recorded in 15-minute samples from 10:08 to 14:08, to determine the equivalent continuous sound level, L_{Aeq}, the L_{Amax} values and the percentile L_{A10} / L_{A90} values. Weather conditions were warm and dry with a light westerly wind.

Measurements were made with a calibrated, precision grade sound level meter, SVAN 955 S/N 27330 in accordance with BS EN 60651 and BS 7445:2003. The equipment was calibration-checked before and after the survey; no significant drift was observed. The results of the survey are shown in Table 1.

Table 1 Results of noise measurements

Date & time	LAFmax [dB]	LAeq [dB]	LA10 [dB]	LA90 [dB]
11/09/2023 10:08	74.1	65.4	69.5	51.2
11/09/2023 10:23	76.9	66.2	69.3	55.0
11/09/2023 10:38	73.1	64.3	68.7	49.3
11/09/2023 10:53	74.7	64.5	68.8	46.4
11/09/2023 11:08	79.2	65.6	69.3	48.8
11/09/2023 11:23	74.8	63.9	68.6	45.4
11/09/2023 11:38	85.9	65.6	69.2	47.7
11/09/2023 11:53	75.0	65.5	69.8	50.5
11/09/2023 12:08	78.8	65.4	69.4	50.4
11/09/2023 12:23	79.1	65.5	69.6	49.6
11/09/2023 12:38	75.1	64.3	69.0	50.4
11/09/2023 12:53	79.3	64.9	69.0	48.3
11/09/2023 13:08	77.4	65.7	69.6	53.0
11/09/2023 13:23	76.0	63.6	68.2	46.0
11/09/2023 13:38	77.4	65.8	69.6	47.8

Date & time	LAFmax [dB]	LAeq [dB]	LA10 [dB]	LA90 [dB]
11/09/2023 13:53	78.4	66.3	70.0	53.1
11/09/2023 14:08	77.5	65.7	69.6	54.1
11/09/2023 14:23	73.9	64.9	68.6	52.6
11/09/2023 14:38	73.2	64.2	68.2	47.7
11/09/2023 14:53	77.4	64.8	69.4	46.3

The dominant source of noise was from road traffic with buses and HGV's causing the L_{Amax} values of 77-79dB. The L_{Amax} value of 85dB at 11:38 was caused by an emergency services vehicle and was omitted from the assessment.

The three hourly values of L_{A10} were determined from the measurements and averaged to give $L_{A10,3hr}$. Based on the CRTN 'Shortened Method', the $L_{A10,18hr}$ was taken as $L_{A10,3hr}$ – 1. The $L_{Aeq,16hr}$ was determined as $L_{A10,18hr}$ – 2 and the $L_{Aeq,8hr}$ (night time) taken from the method established by TRL in the report PR/SE/451/02 for converting the UK traffic noise index $L_{A18,18hr}$ to EU Indices for noise mapping. The calculations are summarised in Table 2.

Table 2: Calculation of L_{Aeq} values from L_{A10} measurements

Traffic Noise Index Calculations	
	dB
LA10,1hr, 13:00	69.1
LA10,1hr, 14:00	69.2
LA10,1hr, 15:00	69.3
LA10,3hr:	69.2
LA10,18hr = LA10,3hr - 1:	68.2
LAeq,16hr = LA10,18hr - 2:	66.2
LAeq,8hr = 0.9*LA10,18hr - 3.77:	61.0
LAmax, (estimated -night)	79

The free field measured noise levels at 5m from kerbside, are therefore summarised as follows, to the nearest 1dB:

$L_{Aeq,16hr}$ Daytime 66dB
$L_{Aeq,8hr}$ Night time 61dB
L_{Amax} Night time 79dB

Figure 1: Noise measurement position

5 ASSESSMENT

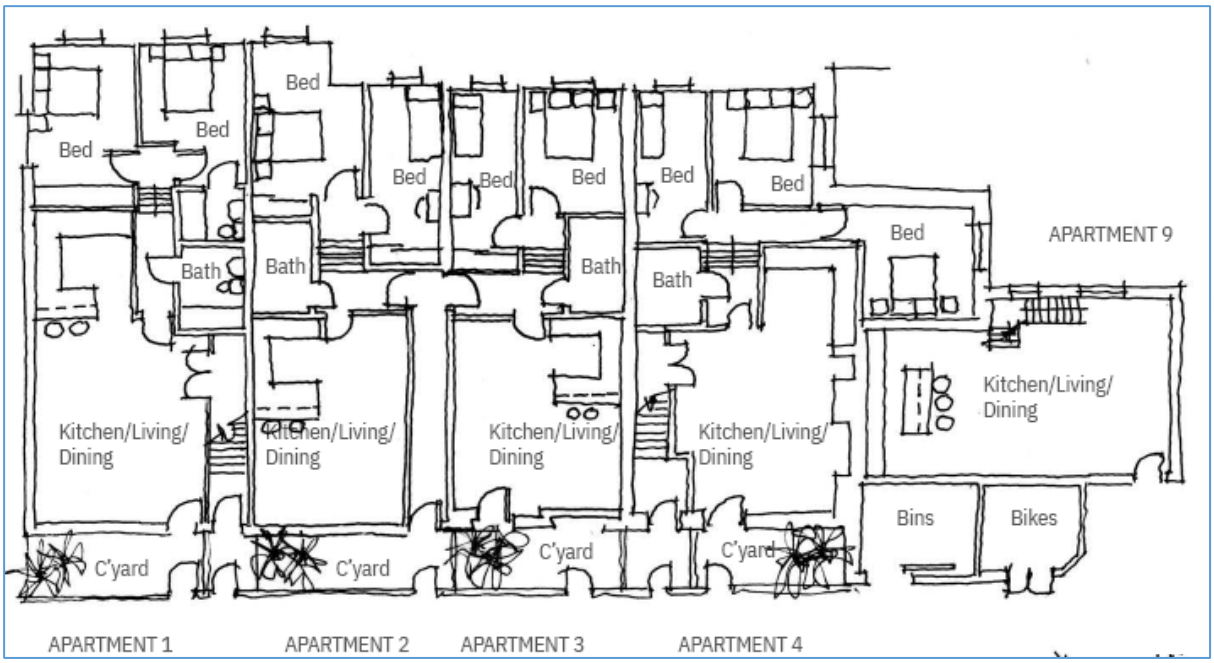
Conversion of restaurant into 9 apartments

The internal room layouts are shown in Figure 2. The layout has taken account of traffic noise on Ponthir Road by locating living rooms at the front of the building and bedrooms at the rear, apart from bedroom 3 of Apartment 9 which faces Ponthir Road.

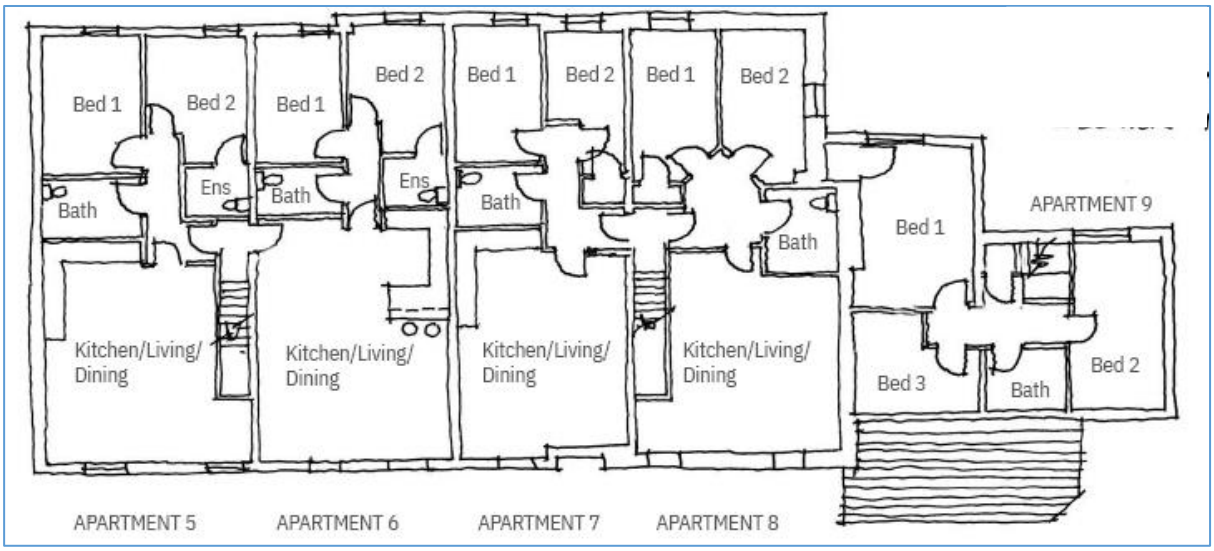
The measured noise levels have been used to assess the sound attenuation needed to meet the internal noise guidelines of WHO and BS8233, that is, $L_{Aeq,16hr}$ 35dB for living rooms, $L_{Aeq,8hr}$ 30dB for bedrooms and L_{Amax} 45dB for bedrooms at night. It has been assumed that night time L_{Amax} values would be the same as day time values as the principal cause of the events was from buses and HGV's, both of which are likely to operate before 07:00, within the night time period.

Figure 2: Proposed layout of apartments

Ground Floor



First Floor



The measured noise levels on Ponthir Road were corrected to take account of façade reflection and then used to determine the attenuation needed to meet the required guidelines. The noise level at the rear façade of the building would be due to traffic noise reflected from the buildings opposite the proposed bedrooms, as can be seen in Figure 1. Based on the restricted angle of view of the road from these buildings and distance from the road, the estimated night time façade noise levels would be $L_{Aeq,8hr}$ 47dB and L_{Amax} 59dB. The façade attenuation required would be as follows:

Living/Dining Rooms:	External $L_{Aeq,16hr}$ 69dB	Attenuation needed 34dB
Apt 9 Bedroom 3	External $L_{Aeq,8hr}$ 64dB	Attenuation needed 34dB
	External L_{Amax} 82dB	Attenuation needed 37dB
Apts. 1-8 Bedrooms	External $L_{Aeq,8hr}$ 47dB	Attenuation needed 17dB
	External L_{Amax} 59dB	Attenuation needed 14dB

Based on the approximate room dimensions, façade and window sizes, taken from the layout plans shown in Figure 2, the façade attenuation levels were calculated according to BS8233 Annexe G2, as shown in Appendix 1. The external noise spectrum was taken from the measured data and standard cavity masonry was assumed for façade construction.

Various combinations of glazing and ventilator types were tested in the calculations until a façade attenuation was achieved that met the required attenuation. Based on Pilkington Optiphon glazing, the assessment shows that the required façade attenuation of 34dB in living rooms, would be achieved with 6-16-6.8 laminated glazing (R_w+C_{tr} 34dB) with acoustic trickle vents ($D_{ne,w}+C_{tr}$ 40dB) giving a façade attenuation of 36dB. This would also meet the guideline requirement for bedroom 3 of Apartment 9

For bedrooms of Apartments 1-8 at the rear of the building, standard double glazing (4-16-4) and standard trickle vents, would provide adequate sound attenuation to meet the required guidelines.

All windows need to remain closed to achieve the required levels of noise attenuation and the acoustic trickle vents are needed to maintain background ventilation. The proposed measures would meet Part F ventilation System 1 where background ventilation is provided through intermittent mechanical extraction through the kitchen and bathroom. However, the M&E engineer should check the airflow rates to determine the number and size of ventilator needed for each room. Examples of suitable acoustic trickle ventilators would be Greenwood 2500EAW.AC1 or Titon SF Xtra

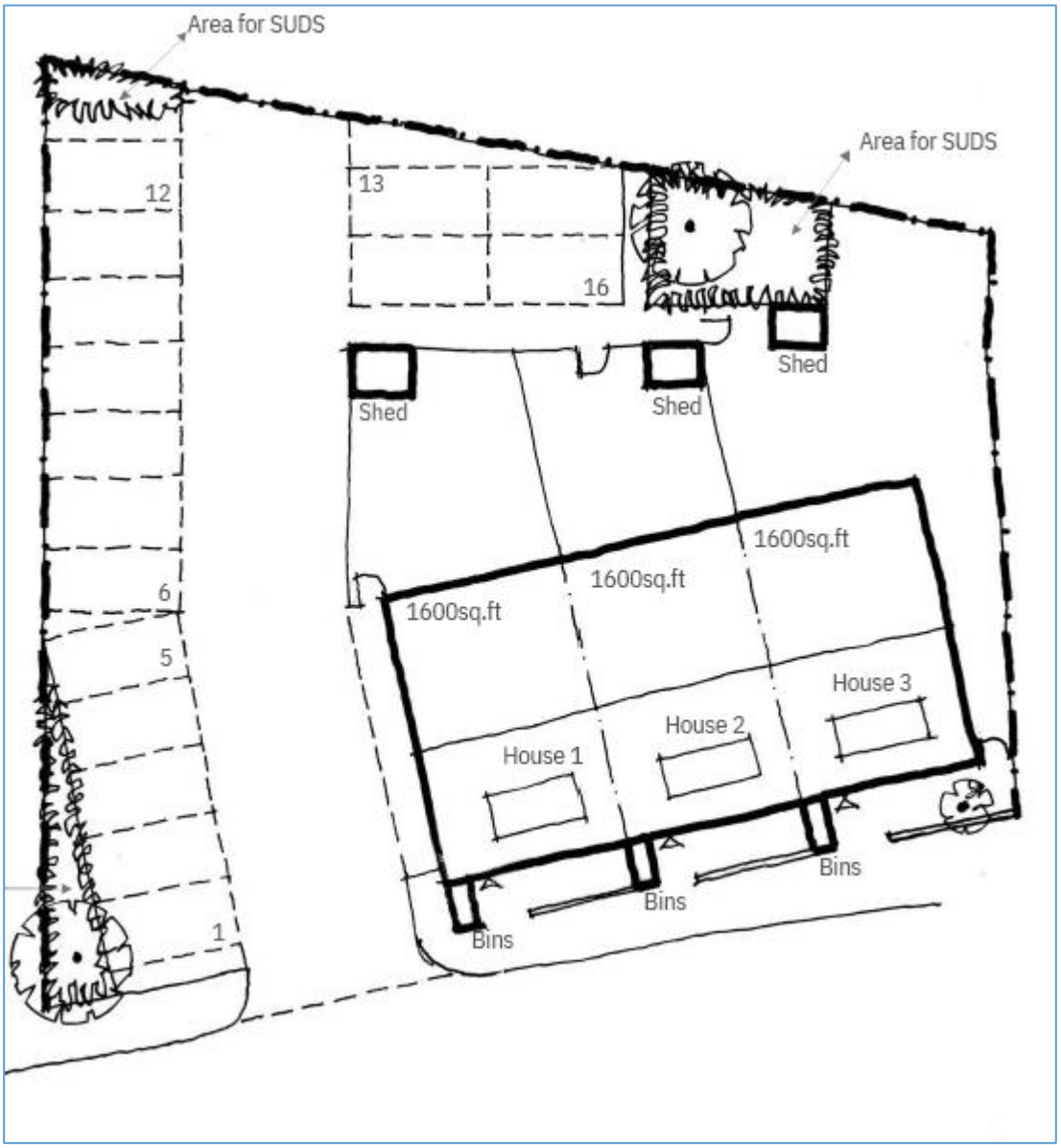
Proposed construction of town houses on the site of the car park

The proposed location of the town houses is shown in Figure 3. Room layout plans are not available for these houses, however, as the houses would be positioned at a similar distance from Ponthir Road as that of the restaurant, it can be assumed that the façade sound insulation requirements would also be similar.

This means that, ideally, bedrooms should be located at the rear of the building and all other rooms at the front. Based on the results at the restaurant building, living rooms on the front façade would require (6-16-6.8) laminated glazing (R_w+C_{tr} 34dB) with acoustic trickle vents ($D_{ne,w}+C_{tr}$ 40dB) to meet the recommended guidelines. If

bedrooms are located on the front façade, the same acoustic treatment would be needed. All rooms located at the rear of the buildings would meet the required façade noise attenuation by installing standard double glazing (4-16-4) and standard trickle vents.

Figure 3: Proposed location of town houses



The proposed acoustic mitigation measures should be verified when room layout plans become available.

7 CONCLUSIONS

A noise survey has been carried out at the site of the proposed residential development at The Stuffed Dormouse, Ponthir Road, Caereon, Newport, in order to assess the acoustic mitigation that would be needed to meet the noise guidelines of BS8233:2014, as recommended in ProPG *Planning & Noise* 2017

The results of the survey confirmed the need for acoustic double glazing to the windows of habitable rooms fronting on to Ponthir Road together with acoustic trickle ventilators in order to meet the internal noise guidelines. Suitable specifications and examples have been recommended. This applies to the proposed restaurant conversion and to the proposed town houses to be constructed in the carpark.

Habitable rooms at the rear of the restaurant conversion and the town houses would meet the recommended internal noise guidelines using standard double glazing and trickle ventilators.

The mitigation measures should be verified when layout plans for the town houses become available.

All windows need to remain closed to achieve the required levels of noise attenuation and trickle vents are needed to maintain background ventilation. However, the M&E engineer should check the airflow rates to determine the number and size of ventilators needed for each room.

APPENDIX 1 – Façade sound insulation calculations

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Typical Living/Dining Room							
Wall area		18.6					
Window Area		3.9					
Ceiling/Roof		40.9					
Room Vol.		122					
Frequency (Hz)		125	250	500	1000	2000	LAeq
Measured Leq		58.7	59.1	59.3	62.6	58.2	**65.0**
Ventilator Dne	GAV 2500EAW.AC1	41	39	37	47	44	
Window R	6/16/6.8	21	28	37	48	48	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	Roof	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000013	0.000021	0.000034	0.000003	0.000007	
		-48.7	-46.7	-44.7	-54.7	-51.7	
Windows		0.000521	0.000104	0.000013	0.000001	0.000001	
		-32.8	-39.8	-48.8	-59.8	-59.8	
Ext. Wall		0.000025	0.000010	0.000008	0.000002	0.000001	
		-46.1	-50.1	-51.1	-57.1	-62.1	
Ceiling/roof		0.000345	0.000087	0.000022	0.000007	0.000003	
		-34.6	-40.6	-46.6	-51.6	-55.6	
Composite R		-30.4	-36.5	-41.2	-48.8	-49.6	
Abs. Correction		7.3	6.3	5.7	5.7	6.0	
Leq (int)		38.6	31.8	26.9	22.5	17.7	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
LAeq (internal)		22.5	23.2	23.7	22.5	18.9	**29.4**
Façade Atten.		**35.6**	**dB**				
	External LAeq,16hr	69.2	Internal	33.6	Guideline	35	

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Typical Bedroom, Apartments 1-8							
Wall area		7.3					
Window Area		1.4					
Ceiling/Roof		19.5					
Room Vol.		43					
Frequency (Hz)		125	250	500	1000	2000	LAeq
Measured Leq		58.7	59.1	59.3	62.6	58.2	**65.0**
Ventilator Dne	Trickle vent	25	25	26	32	35	
Window R	4/16/4	21	17	25	35	37	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	Roof	28	34	40	45	49	
Absorption		11	14	16	16	15	
Vent		0.001180	0.001180	0.000937	0.000235	0.000118	
		-29.3	-29.3	-30.3	-36.3	-39.3	
Windows		0.000415	0.001042	0.000165	0.000017	0.000010	
		-33.8	-29.8	-37.8	-47.8	-49.8	
Ext. Wall		0.000022	0.000009	0.000007	0.000002	0.000001	
		-46.6	-50.6	-51.6	-57.6	-62.6	
Ceiling/roof		0.001153	0.000290	0.000073	0.000023	0.000009	
		-29.4	-35.4	-41.4	-46.4	-50.4	
Composite R		-25.6	-26.0	-29.3	-35.6	-38.6	
Abs. Correction		3.9	2.8	2.2	2.2	2.5	
Leq (int)		40.0	38.9	35.3	32.2	25.1	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
LAeq (internal)		23.9	30.3	32.1	32.2	26.3	**37.0**
Façade Atten.		**28.0**	**dB**				
	External LAeq,8hr	47.3	Internal	19.3	Guideline	30	
	External LAmax	59.0	Internal	31.0	Guideline	45	

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Bedroom 3 Apartment 9							
Wall area		7.3					
Window Area		1.4					
Ceiling/Roof		19.5					
Room Vol.		43					
Frequency (Hz)		125	250	500	1000	2000	LAeq
Measured Leq		58.7	59.1	59.3	62.6	58.2	**65.0**
Ventilator Dne	GAV 2500EAW.AC	41	39	37	47	44	
Window R	6/16/6.8	21	28	37	48	48	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	Roof	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000030	0.000047	0.000074	0.000007	0.000015	
		-45.3	-43.3	-41.3	-51.3	-48.3	
Windows		0.000415	0.000083	0.000010	0.000001	0.000001	
		-33.8	-40.8	-49.8	-60.8	-60.8	
Ext. Wall		0.000022	0.000009	0.000007	0.000002	0.000001	
		-46.6	-50.6	-51.6	-57.6	-62.6	
Ceiling/roof		0.000365	0.000092	0.000023	0.000007	0.000003	
		-34.4	-40.4	-46.4	-51.4	-55.4	
Composite R		-30.8	-36.4	-39.4	-47.6	-47.2	
Abs. Correction		3.9	2.8	2.2	2.2	2.5	
Leq (int)		34.7	28.5	25.2	20.2	16.6	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
LAeq (internal)		18.6	19.9	22.0	20.2	17.8	**26.9**
Façade Atten.		**38.1**	**dB**				
	External LAeq,8hr	64.2	Internal	26.1	Guideline	30	
	External LAmax	82.0	Internal	43.9	Guideline	45	