

GMHD Developments

**New Street
Leek**

**Proposed Residential
Development**

**Noise Impact
Assessment
Report**

September 2024

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1. INTRODUCTION

At the request of GMHD Developments, an assessment of noise impact has been carried out at the proposed residential redevelopment in New Street, Leek. A noise survey has been carried out and the potential impact on the proposed development assessed according to national Planning Practice Guidance ProPG 'Planning and Noise' 2017.

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

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 CRITERIA

Planning guidance on noise is set out in the 'Noise Policy Statement for England' (NPSE) 2010 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 effect of introducing a particular noise source 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.

The requirements of BS8233:2014, relating to internal noise standards, are relevant for the assessment of traffic noise and 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 noise level criteria, WHO Guidelines recommend that internal maximum noise levels due to individual events at night, should not regularly exceed 45dB(A). In amenity areas, such as gardens, noise levels should not exceed $L_{Aeq,16hr}$ of 55dB.

4 NOISE MEASUREMENTS

Measurements of ambient noise were carried out from 16th to 17th September 2024 at three locations on the site. The positions are shown on Figure 1; the purpose was to establish noise levels across the site. Weather conditions throughout were dry and warm with negligible wind. The microphone was located in free-field positions at 1 and 2 while position 3 was a façade measurement.

Figure 1: Location of noise measurement positions



The measurement equipment is described in Appendix 1. The meters were calibrated before and after the measurements and no significant drifting of the calibration signal was observed.

Position 1 was located on the northern site boundary close to the proposed position of

Plot 1. Position 2 was located on the sloping ground near the rear of Plot 2 and Position 3 was located at a first-floor window facing Stockwell Street. Positions 2 and 3 were secure locations where unattended measurements were carried out over day and night time periods. Short-term attended measurements were carried out at Position 1 as this location was not secure. The following parameters were recorded:

- L_{Aeq} The equivalent continuous noise level over 15-minute periods
- L_{Amax} The maximum noise level during each period
- L_{A90} The level exceeded for 90% of the time, the background level

At Positions 1 and 2 the primary noise source was from traffic on Ball Haye Road. Similarly, at Position 3 the dominant noise source was traffic on Stockwell Street. It was not possible to assess noise from traffic on New Street as the road was closed for gas works; there was no advanced knowledge of this occurring. However, it is understood that traffic is light, with uses during mornings and afternoons for access to the College on Horton Street.

The detailed fifteen-minute period results are shown in Appendix 2 and the average results over the two-day period are shown below:

Table 1: Summary of measured noise levels

Results Summary			
Position			
1	$L_{Aeq,1hr}$	56.2	dB
2	$L_{Aeq,16hr}$	49.2	dB
	$L_{Aeq,8hr}$	42.9	dB
	L_{Amax}	67.0	dB
3	$L_{Aeq,16hr}$	68.7	dB
	$L_{Aeq,8hr}$	64.0	dB
	L_{Amax}	86.0	dB

5 ASSESSMENT

Internal Noise Levels

The proposed site layout is shown in Figure 2. Plots 20 and 21 near the southern boundary of the site, would be exposed to the highest noise levels from traffic on Stockwell Street while noise from traffic on Ball Halle Road would be lower at Plots 1-4 on the northern site boundary.

Figure 2: Proposed site layout with Plot numbers



Noise levels at the facades of the dwellings have been predicted, based on the measured data. The results are shown in Table 2, assuming day time levels apply to living rooms and night time levels to bedrooms.

The $L_{Aeq,1hr}$ 56.2dB at Position 1 was 7.7dB higher than the one-hour measurement over the same time period at Position 2. It was therefore reasonable to assume that the 16hr and 8hr measurements at Position 1 would be 7.7dB higher than the corresponding values at Position 2. This gave $L_{Aeq,16hr}$ 56.9dB and $L_{Aeq,8hr}$ 50.6dB at

Position 1; L_{Amax} 75dB was taken from the measured values at Position 1. The same values have been used to assess internal noise levels on New Street.

The external noise levels have been used to assess the likely sound attenuation needed to meet the internal noise guidelines of WHO and BS8233 for living rooms and bedrooms, as shown in Table 2.

Table 2: Façade attenuation needed to meet guideline levels

Plots	Room	Façade Attenuation to meet Guidelines		
		$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{Amax}
		[dB]	[dB]	[dB]
1-4, 7-19	Living Room	22	-	-
	Bedroom	-	21	30
20-21	Living Room	34	-	-
	Bedroom	-	34	41
5-6, 22-25	Living Room	14	-	-
	Bedroom	-	13	19

Based on typical bedroom and living room façade and window dimensions, from experience of similar dwellings, façade attenuation levels were estimated using the BS8233 Annex G2 method. The spectra of traffic noise were taken from the measured data. The façade attenuation achieved by the proposed mitigation measures is shown in Appendix 3 and the predicted internal noise levels are shown at the foot of each table. The internal noise levels are summarised in Table 3

Table 3: Summary of predicted internal noise levels

Plots	Room	Predicted internal Noise Levels		
		$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{Amax}
		[dB]	[dB]	[dB]
1-4, 7-19	Living Room	33	-	-
	Bedroom	-	20	42
20-21	Living Room	32	-	-
	Bedroom	-	20	44
5-6, 22-25	Living Room	24	-	-
	Bedroom	-	18	42

The internal noise levels have been achieved by applying the proposed mitigation measures shown in Table 4.

Table 4: Typical mitigation measures needed to meet the BS8233 Guidelines

Plots	Room	Glazing	Ventilator
		Rw+Ctr	Dnew
1-4, 7-19	Living Room	25dB (4-16-4)	25dB (Std. Trickle vent)
	Bedroom	25dB (4-16-4)	35dB (GAV DN)
20-21	Living Room	38dB (10-16-8.8) or (6-50-4) double windows	50dB (GAV MA3051)
	Bedroom		
5,6 22-25	Living Room	25dB (4-16-4)	25dB (Std. Trickle vent)
	Bedroom		

To meet the internal noise guidelines, windows on the northern facades need to remain closed and the proposed trickle vents/ventilators are needed to maintain background ventilation. The suggested vents would provide a minimum effective area of 5000mm² and meet Part F ventilation System 1 where background ventilation is provided through intermittent mechanical extraction through the kitchen and bathroom ventilators. However, when detailed layout plans are available, the M&E engineer should check that the airflow rates meet the Part F requirement by specifying suitable extraction fan ratings for kitchens and bathrooms and verify the number of acoustic ventilators needed for each room. If MVHR it to be implemented, there would be no need for the ventilators.

Noise in Amenity Areas

The gardens of the current proposed layout are located to the rear of the properties and are screened from direct traffic noise. The measured noise level at position 2 gave a free field day time $L_{Aeq,16hr}$ 49dB at ground level at a position and is considered representative of the likely noise level in gardens. This is expected to result in noise levels within the BS8233 recommended level of 50-55dB for amenity areas but will be checked when final layouts are confirmed.

6 CONCLUSIONS

A noise survey was carried out at the site of the proposed residential development at New Street, Leek

Based on the current proposed layout, the results showed that the guidance on internal noise levels, as recommended in BS8322:2014 and WHO Noise Guidelines, can be achieved through appropriate acoustic mitigation and ventilation measures.

It is worth noting that stringent measures are needed for the south façade of Plots 20 and 21 due to the proximity of Stockwell Street. The internal layout should prioritise non sensitive rooms on this façade and avoid bedrooms use.

The measures will be verified when a detailed design layout is available.

Noise levels in the garden amenity areas should meet the required guidelines of BS8233:2014 based on the results of the site measurements.

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APPENDIX 1 – Noise Measurement Equipment

Type	Component	Serial Number	Calibration Certificate	Calibration Due
NOR 118	Meter	31501	2022-1040	01/11/2024
NOR 1206	Preamp	30539	2022-1041	01/11/2024
NOR 1225	Microphone	52234	2022-1042	02/11/2024
SVAN 977	Meter	36438	1507274-1	30/11/2025
SV12L	Preamp	42471	1507274-1	30/11/2025
ACO 7052E	Microphone	56754	1507274-1	30/11/2025
SVAN 955	Meter	27330	2022-1043	01/11/2024
SC12L	Preamp	25705	2022-1045	01/11/2024
ACO 7052E	Microphone	49605	2022-1044	01/11/2024
NOR 1251	Calibrator	29151	U47886	22/05/2025

APPENDIX 2 - Results of Ambient Noise Measurements, 16th to 17th September 2024

Position 2

Date & time	L _{Amax} [dB]	L _{Aeq} [dB]	L _{A90} [dB]
16/09/2024 11:41	72.1	50.4	43.2
16/09/2024 11:56	69.5	50.3	41.6
16/09/2024 12:11	63.3	48.8	42.0
16/09/2024 12:26	61.7	47.9	41.9
16/09/2024 12:41	61.1	49.2	42.2
16/09/2024 12:56	66.3	48.2	41.1
16/09/2024 13:11	61.9	47.9	40.9
16/09/2024 13:26	64.4	47.7	40.1
16/09/2024 13:41	59.2	48.1	40.6
16/09/2024 13:56	57.2	47.2	40.9
16/09/2024 14:11	60.8	49.0	42.6
16/09/2024 14:26	57.9	48.2	41.0
16/09/2024 14:41	60.4	48.2	41.0
16/09/2024 14:56	64.1	48.9	41.3
16/09/2024 15:11	64.9	49.1	41.9
16/09/2024 15:26	60.3	48.7	42.0
16/09/2024 15:41	61.1	48.9	42.3
16/09/2024 15:56	66.1	48.4	41.0
16/09/2024 16:11	67.2	50.0	42.3
16/09/2024 16:26	57.4	47.5	39.9
16/09/2024 16:41	57.7	48.9	42.6
16/09/2024 16:56	67.5	49.9	41.2
16/09/2024 17:11	58.9	49.2	40.2
16/09/2024 17:26	63.3	48.5	37.8
16/09/2024 17:41	56.7	48.2	38.5
16/09/2024 17:56	61.1	48.1	38.1
16/09/2024 18:11	61.7	47.7	35.5
16/09/2024 18:26	64.9	48.3	37.0
16/09/2024 18:41	63.1	48.7	37.8
16/09/2024 18:56	61.6	48.2	38.4
16/09/2024 19:11	66.0	48.7	39.4
16/09/2024 19:26	72.9	50.8	40.6
16/09/2024 19:41	82.2	50.8	38.0
16/09/2024 19:56	58.0	47.7	37.9
16/09/2024 20:11	59.4	47.9	38.7
16/09/2024 20:26	60.1	47.0	36.0
16/09/2024 20:41	73.4	49.6	32.8

Date & time	L _{Amax} [dB]	L _{Aeq} [dB]	L _{A90} [dB]
16/09/2024 20:56	59.4	47.1	34.8
16/09/2024 21:11	57.7	45.7	32.0
16/09/2024 21:26	57.4	46.7	34.5
16/09/2024 21:41	64.4	45.2	33.0
16/09/2024 21:56	58.1	41.5	31.0
16/09/2024 22:11	58.5	43.5	31.7
16/09/2024 22:26	57.3	39.3	30.6
16/09/2024 22:41	64.6	44.9	30.6
16/09/2024 22:56	57.0	41.8	29.7
16/09/2024 23:11	56.5	41.1	28.2
16/09/2024 23:26	54.5	38.1	27.2
16/09/2024 23:41	56.6	34.8	25.8
16/09/2024 23:56	56.8	40.0	27.6
17/09/2024 00:11	60.6	34.6	25.8
17/09/2024 00:26	52.9	34.9	24.2
17/09/2024 00:41	54.5	35.0	24.3
17/09/2024 00:56	40.7	27.6	23.2
17/09/2024 01:11	56.1	33.1	22.6
17/09/2024 01:26	56.5	28.9	22.1
17/09/2024 01:41	49.7	30.2	23.2
17/09/2024 01:56	37.3	25.8	22.9
17/09/2024 02:11	47.3	29.8	24.1
17/09/2024 02:26	59.1	35.5	22.1
17/09/2024 02:41	57.4	36.4	22.3
17/09/2024 02:56	57.2	36.4	22.5
17/09/2024 03:11	55.7	33.8	23.0
17/09/2024 03:26	53.0	36.1	24.0
17/09/2024 03:41	40.2	27.4	24.0
17/09/2024 03:56	55.6	37.8	25.2
17/09/2024 04:11	40.0	29.8	24.0
17/09/2024 04:26	54.9	37.5	25.6
17/09/2024 04:41	57.8	38.5	25.0
17/09/2024 04:56	54.9	36.9	27.1
17/09/2024 05:11	66.9	46.1	30.4
17/09/2024 05:26	61.6	43.2	30.5
17/09/2024 05:41	61.2	43.5	31.6
17/09/2024 05:56	59.5	46.3	34.2
17/09/2024 06:11	66.6	47.5	35.2
17/09/2024 06:26	62.1	47.8	36.6

Date & time	L _{Amax} [dB]	L _{Aeq} [dB]	L _{A90} [dB]
17/09/2024 06:41	73.6	50.9	38.3
17/09/2024 06:56	74.6	52.4	38.3
17/09/2024 07:11	80.8	53.5	40.6
17/09/2024 07:26	68.3	50.0	41.1
17/09/2024 07:41	65.9	54.2	46.4
17/09/2024 07:56	61.8	51.3	43.5
17/09/2024 08:11	63.1	50.7	44.2
17/09/2024 08:26	62.9	52.6	49.2
17/09/2024 08:41	65.5	54.0	49.7
17/09/2024 08:56	64.1	51.4	43.3

Position 3

Date & time	L _{Amax} [dB]	L _{Aeq} [dB]	L _{A90} [dB]
16/09/2024 12:17	79.5	65.1	59.4
16/09/2024 12:32	89.7	66.3	58.6
16/09/2024 12:47	87.2	67.5	59.2
16/09/2024 13:02	79.2	67.3	60.6
16/09/2024 13:17	78.0	65.9	59.2
16/09/2024 13:32	80.8	66.8	57.5
16/09/2024 13:47	86.7	68.9	56.3
16/09/2024 14:02	81.2	69.4	58.9
16/09/2024 14:17	92.8	70.4	56.8
16/09/2024 14:32	89.2	68.1	57.1
16/09/2024 14:47	80.1	67.0	58.8
16/09/2024 15:02	86.1	65.5	59.9
16/09/2024 15:17	90.0	67.8	59.1
16/09/2024 15:32	89.6	67.5	56.6
16/09/2024 15:47	80.7	68.2	56.7
16/09/2024 16:02	92.3	70.7	56.2
16/09/2024 16:17	81.3	65.9	59.8
16/09/2024 16:32	83.6	66.8	59.0
16/09/2024 16:47	96.7	71.7	60.1
16/09/2024 17:02	79.1	67.8	59.0
16/09/2024 17:17	79.9	68.7	59.3
16/09/2024 17:32	85.5	69.9	60.8
16/09/2024 17:47	79.7	69.4	59.5
16/09/2024 18:02	81.9	69.8	61.2
16/09/2024 18:17	89.4	70.4	60.4
16/09/2024 18:32	84.3	69.5	59.5
16/09/2024 18:47	83.2	68.7	58.1
16/09/2024 19:02	83.4	69.4	59.2
16/09/2024 19:17	86.9	69.7	56.9
16/09/2024 19:32	83.3	68.9	55.6

Date & time	L _{Amax} [dB]	L _{Aeq} [dB]	L _{A90} [dB]
16/09/2024 19:47	85.4	68.4	54.7
16/09/2024 20:02	82.0	67.4	56.6
16/09/2024 20:17	85.2	68.5	55.8
16/09/2024 20:32	95.8	68.9	51.7
16/09/2024 20:47	81.0	66.3	50.3
16/09/2024 21:02	81.8	66.0	49.6
16/09/2024 21:17	79.8	66.1	49.6
16/09/2024 21:32	83.1	66.8	48.9
16/09/2024 21:47	76.9	64.7	44.0
16/09/2024 22:02	80.0	64.7	44.9
16/09/2024 22:17	82.9	66.3	48.5
16/09/2024 22:32	80.8	64.3	38.8
16/09/2024 22:47	82.1	63.6	39.8
16/09/2024 23:02	81.9	64.8	37.6
16/09/2024 23:17	83.1	64.3	35.7
16/09/2024 23:32	76.7	61.9	32.9
16/09/2024 23:47	78.6	61.4	29.2
17/09/2024 00:02	85.6	62.4	33.6
17/09/2024 00:17	82.9	59.8	30.1
17/09/2024 00:32	78.2	56.6	28.4
17/09/2024 00:47	79.7	58.0	28.0
17/09/2024 01:02	80.0	59.2	27.2
17/09/2024 01:17	74.3	52.9	26.4
17/09/2024 01:32	76.1	54.7	25.4
17/09/2024 01:47	78.4	57.9	26.3
17/09/2024 02:02	77.2	52.6	25.0
17/09/2024 02:17	77.5	53.9	28.0
17/09/2024 02:32	81.0	57.3	24.7
17/09/2024 02:47	73.9	49.8	26.0
17/09/2024 03:02	75.3	55.2	26.4
17/09/2024 03:17	76.2	54.7	26.7
17/09/2024 03:32	76.3	56.9	27.2
17/09/2024 03:47	78.2	57.8	28.2
17/09/2024 04:02	77.1	60.5	28.4
17/09/2024 04:17	79.3	58.4	27.7
17/09/2024 04:32	83.1	62.4	29.6
17/09/2024 04:47	77.8	60.2	30.0
17/09/2024 05:02	83.2	63.7	33.9
17/09/2024 05:17	85.2	66.1	41.3
17/09/2024 05:32	82.8	66.9	45.4
17/09/2024 05:47	84.5	67.9	49.2
17/09/2024 06:02	81.0	67.8	49.7
17/09/2024 06:17	81.2	67.6	48.6
17/09/2024 06:32	90.8	69.4	53.5
17/09/2024 06:47	85.7	70.4	55.2

Date & time	L _A max [dB]	L _A eq [dB]	L _A 90 [dB]
17/09/2024 07:02	83.9	71.1	58.1
17/09/2024 07:17	83.0	70.9	57.7
17/09/2024 07:32	86.9	71.5	58.1
17/09/2024 07:47	95.5	72.2	62.3
17/09/2024 08:02	87.3	71.5	62.8
17/09/2024 08:17	82.1	70.6	62.7
17/09/2024 08:32	80.3	70.9	62.4
17/09/2024 08:47	84.6	70.3	62.0
17/09/2024 09:02	83.0	70.4	61.3

Position 1

Date & time	L _A max [dB]	L _A eq [dB]	L _A 90 [dB]
16/09/2024 12:16	74.8	58.0	43.1
16/09/2024 12:31	73.9	57.5	43.1
16/09/2024 12:46	75.3	55.5	40.0
16/09/2024 13:01	72.8	53.9	41.7

APPENDIX 3 – Façade sound attenuation calculations

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Living Room Plots 1-4, 7-19							
Facade area		11.3					
Window Area		4.2					
Ceiling/Roof		0.0					
Room Vol.		30.6					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		51.1	44.8	44.1	46.0	39.8	48.6
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		28	34	40	45	49	
Absorption		11	14	16	16	15	
Vent		0.002796	0.002796	0.002221	0.000558	0.000280	
		-25.5	-25.5	-26.5	-32.5	-35.5	
Windows		0.002950	0.007409	0.001174	0.000117	0.000074	
		-25.3	-21.3	-29.3	-39.3	-41.3	
Ext. Wall		0.000063	0.000025	0.000020	0.000005	0.000002	
		-42.0	-46.0	-47.0	-53.0	-58.0	
Ceiling/roof		0.000001	0.000000	0.000000	0.000000	0.000000	
		-58.5	-64.5	-70.5	-75.5	-79.5	
Composite R		-22.4	-19.9	-24.7	-31.7	-34.5	
Abs. Correction		0.1	-0.9	-1.5	-1.5	-1.2	
Leq (int)		31.9	27.0	20.9	15.8	7.1	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		15.8	18.4	17.7	15.8	8.3	23.2
Façade Atten.		25.3 dB					
		External	Internal				
	L _{Aeq} ,16hr	57	32				

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Bedroom Plots 1-4, 7-19							
Facade area		8.1					
Window Area		2.1					
Ceiling/Roof		13.2					
Room Vol.		30.6					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		51.1	44.8	44.1	46.0	39.8	48.6
Ventilator Dne	GAV 2500EAW.	42	40	36	48	53	
Window R	4/16/4	21	17	25	35	37	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R		33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000030	0.000047	0.000118	0.000007	0.000002	
		-45.3	-43.3	-39.3	-51.3	-56.3	
Windows		0.000783	0.001967	0.000312	0.000031	0.000020	
		-31.1	-27.1	-35.1	-45.1	-47.1	
Ext. Wall		0.000028	0.000011	0.000009	0.000002	0.000001	
		-45.5	-49.5	-50.5	-56.5	-61.5	
Ceiling/roof		0.000311	0.000078	0.000020	0.000006	0.000002	
		-35.1	-41.1	-47.1	-52.1	-56.1	
Composite R		-29.4	-26.8	-33.4	-43.3	-46.0	
Abs. Correction		2.9	1.8	1.2	1.2	1.5	
Leq (int)		27.6	22.9	15.0	7.0	-1.6	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		11.5	14.3	11.8	7.0	-0.4	17.9
Façade Atten.		30.7 dB					
		External	Internal				
	L _{Aeq} ,8hr	51	20				
	L _{Amax}	75	44				

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Living Room Plots 20-21							
Facade area		11.3					
Window Area		4.2					
Ceiling/Roof		0.0					
Room Vol.		30.6					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		69.1	65.5	61.0	63.7	59.6	66.8
Ventilator Dne	MA3051	48	47	50	55	65	
Window R	4-50-6	23	33	38	42	42	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R		28	34	40	45	49	
Absorption		11	14	16	16	15	
Vent		0.000014	0.000018	0.000009	0.000003	0.000000	
		-48.5	-47.5	-50.5	-55.5	-65.5	
Windows		0.001861	0.000186	0.000059	0.000023	0.000023	
		-27.3	-37.3	-42.3	-46.3	-46.3	
Ext. Wall		0.000063	0.000025	0.000020	0.000005	0.000002	
		-42.0	-46.0	-47.0	-53.0	-58.0	
Ceiling/roof		0.000001	0.000000	0.000000	0.000000	0.000000	
		-58.5	-64.5	-70.5	-75.5	-79.5	
Composite R		-27.1	-36.4	-40.6	-45.1	-46.0	
Abs. Correction		0.1	-0.9	-1.5	-1.5	-1.2	
Leq (int)		45.1	31.2	21.9	20.1	15.4	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		29.0	22.6	18.7	20.1	16.6	30.8
Façade Atten.		36.0 dB					
		External	Internal				
	L _{Aeq} ,16hr	69	33				

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Bedroom Plots 20-21							
Facade area		8.1					
Window Area		2.1					
Ceiling/Roof		13.2					
Room Vol.		30.6					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		57.3	57.0	54.4	59.9	54.1	61.8
Ventilator Dne	MA3051	48	47	50	55	65	
Window R	10/16/8.8	28	31	42	45	50	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R		33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000007	0.000009	0.000005	0.000001	0.000000	
		-51.3	-50.3	-53.3	-58.3	-68.3	
Windows		0.000156	0.000078	0.000006	0.000003	0.000001	
		-38.1	-41.1	-52.1	-55.1	-60.1	
Ext. Wall		0.000028	0.000011	0.000009	0.000002	0.000001	
		-45.5	-49.5	-50.5	-56.5	-61.5	
Ceiling/roof		0.000311	0.000078	0.000020	0.000006	0.000002	
		-35.1	-41.1	-47.1	-52.1	-56.1	
Composite R		-33.0	-37.5	-44.0	-48.8	-53.7	
Abs. Correction		2.9	1.8	1.2	1.2	1.5	
Leq (int)		27.2	21.3	11.6	12.3	2.0	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		11.1	12.7	8.4	12.3	3.2	17.6
Façade Atten.		44.2	dB				
		External	Internal				
	L _{Aeq} ,8hr	64	20				
	L _{Amax}	86	42				

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Living Room/Bedroom Plots 5-7, 22-25							
Facade area		11.3					
Window Area		4.2					
Ceiling/Roof		0.0					
Room Vol.		30.6					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		51.1	44.8	44.1	46.0	39.8	48.6
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		28	34	40	45	49	
Absorption		11	14	16	16	15	
Vent		0.002796	0.002796	0.002221	0.000558	0.000280	
		-25.5	-25.5	-26.5	-32.5	-35.5	
Windows		0.002950	0.007409	0.001174	0.000117	0.000074	
		-25.3	-21.3	-29.3	-39.3	-41.3	
Ext. Wall		0.000063	0.000025	0.000020	0.000005	0.000002	
		-42.0	-46.0	-47.0	-53.0	-58.0	
Ceiling/roof		0.000001	0.000000	0.000000	0.000000	0.000000	
		-58.5	-64.5	-70.5	-75.5	-79.5	
Composite R		-22.4	-19.9	-24.7	-31.7	-34.5	
Abs. Correction		0.1	-0.9	-1.5	-1.5	-1.2	
Leq (int)		31.9	27.0	20.9	15.8	7.1	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		15.8	18.4	17.7	15.8	8.3	23.2
Façade Atten.		25.3 dB					
		External	Internal				
	L _{Aeq} ,16hr	49	24				
	L _{Aeq} ,8hr	43	18				
	L _{Amax}	67	42				