



Tel: 0845 680 2624

Web: www.acoustictests.com

Email: info@acoustictests.com

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Mr M. Hamu

Assessment of noise climate at 127
Oldham Road, Middleton, M24 1AU for
the redevelopment of an existing building
into 5 no. apartments.

Prepared for :-
Mr M. Hamu.

Prepared by :-
Andrew Frisby MIOA PgDip BSc

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1.0 SUMMARY

The day time existing noise climate was regarded as being urban in character with the principal contributor being road traffic on mainly Oldham Road and Townley Street, with Oldham Road being the busier of the two.

During the night time survey, the sources remained the same, but reduced in frequency relative to the daytime rush hour period.

'Desirable' conditions (ref: BS8233:2014) should be achievable internally with upgraded glazing and ventilation solutions, following their correct implementation.

We are not aware of any proposed outdoor living spaces serving these flats.

Please see Section 5.1 – 5.3 for full details regarding BS8233 assessments and the glazing and ventilation solutions that the predicted levels are based upon.



A P Frisby MIOA BSc PgDip

2.0 INTRODUCTION

Acoustic Tests were asked to carry out an independent assessment of the above site with regards to its suitability for residential development from a noise perspective.

This report begins by summarising assessment standards and, where appropriate, discusses alternative interpretations.

After a brief statement of survey details we discuss basic results and the resulting assessment, along with any mitigation which might be implied. We sum-up and conclude at the end, along with brief recommendations.

3.0 ASSESSMENT STANDARDS

3.1 NPPF, NPSE and NPPG

The National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and the National Planning Practice Guidance (NPPG) provide nothing in the way of quantitative criteria but instead provide general policy aims and statements and some guidance on how certain situations can be interpreted.

The NPPF's main statement on noise is to be found in paragraph 185:-

- 185. 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:**
- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁵;**
 - b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and**
 - c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.**

Paragraph 187 is also relevant:-

187. 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.

The NPPF refers to the NPSE which sets out the following aims:-

1. *avoid significant adverse impacts on health and quality of life;*
2. *mitigate and minimise adverse impacts on health and quality of life;*
- and*
3. *where possible, contribute to the improvement of health and quality of life.*

It also introduces the concepts of:

- *NOEL – No Observed Effect Level. 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.*

SOAEL is clearly something the policy seeks to avoid in aim 1. Aim 2 represents situations between SOAEL and LOAEL, and seeks to minimise and mitigate the effects.

The NPPG section on noise adds some further detail, much of it reproducing the NPPF and NPSE, but some useful qualitative guidance is provided Noise Exposure Hierarchy, as follows:-

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

It also makes the point that the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation, including the level of the noise in absolute terms and how it might compare with the underlying background noise, the impulsiveness or intermittence pattern of the noise, its spectral content, and the time of day. It discusses in very general terms the issues to consider when introducing noise sources to existing noise sensitive area, new residential development in areas affected by existing noise sources

(most of which have their own specific guidance, such as BS 4142, BS 8233, etc.) and the potential impact on wildlife.

3.2 BS8233

BS8233 was updated in March 2014. Quantitatively, however, the design criteria are little changed – just expressed differently to reduce ambiguity in certain situations.

Table 4 of BS8233 gives the desirable criteria for indoor ambient noise levels for dwellings as follows:-

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 (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,16hour}$

Note that the standard accepts the widely used rule of thumb that, for a partly open window, the levels just outside will be 15dB higher than those just inside. This brings us to an external equivalent of the above table, as follows:-

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	50 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	55 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	50 dB $L_{Aeq,16hour}$	45 dB $L_{Aeq,16hour}$

It goes on to state that, where necessary, the criteria can be relaxed by up to 5 dB and still achieve reasonable conditions. Note that the new version no longer states criteria for bedroom noise in terms of dB L_{Amax} .

Garden area criteria are unchanged with 50 dB L_{Aeq} and 55 dB L_{Aeq} being considered desirable and reasonable respectively.

Note that the new version of BS8233 more explicitly specifies the assessment periods as 16 hour and 8 hour for daytime and night time respectively.

3.3 Local Authority

The local authority have requested the following:

“Development shall not commence until a noise survey has been submitted to and approved in writing by the Local Planning Authority. The noise survey shall demonstrate how the following internal noise levels can be achieved:

- 35 dB(A) L_{eq} (1 hour) in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;

- 30dB(A) Leq 5mins in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;
- 35 dB(A) Leq (1 hour) in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;
- 40dB(A) Leq (1 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times.”

Post-completion, we assume that one measurement of a one hour period in living rooms, and bedrooms will suffice to satisfy the requirements between 07:00 – 23:00, and one single measurement of 5 minutes in a bedroom will satisfy the requirements between 2300 – 0700.

We have contacted the local authority for clarification - as other possible interpretations could have a significant effect on the feasibility of the development complying with the above criteria - but we have not received a response at the time of writing.

4.0 SURVEY DETAILS

4.1 Site Times and Personnel

The measurements were carried out by Rob Smith MIOA of Druk Ltd.

Daytime measurements were carried out on 10th August 2023 between 16:00 and 19:00 to represent a busy ‘rush hour’ period, and between 23:20 hours and 01:20 hours (on the 10th to 11st August 2023) representing what was likely to be a noisier time of night.

4.2 Instrumentation

The sound level meter was calibrated before the start and at the end of each period and no deviation was noted.

Equipment description	Manufacturer	Model number	Serial number
Sound level meter	Norsonic AS	Nor 140	1402738
Microphone pre-amplifier	Norsonic AS	Nor 1209	12075
Microphone	Norsonic AS	Nor 1225	72843
Acoustic calibrator	Norsonic AS	Nor 1251	31522

The sound level meter was calibrated at the beginning and end of each survey period with no significant drift noted.

4.3 Measurement Positions

The two measurement locations are shown below.



The red dot to the south represents the noise level incident upon the front elevations of the proposed flats, as sufficient space was not available on the footpath immediately outside the development to set up a tripod. We will refer to this as 'Position 1'.

The red dot to the north represents the noise level incident upon the rear elevations of the proposed flats. We will refer to this as 'Position 2'.

The majority of measurement time was focused at Position 1 with measurements periodically taken at intervals at position 2.

The microphone was 1.8m above ground and as far away from other reflecting surfaces as was practicable, given each location.

4.4 Survey Conditions

Weather conditions were as follows:-

Afternoon 'Rush' Survey 10th August 2023:

Weather: surfaces dry, cloud cover $\approx$ 30%, temperature $\approx$ 26°C, barometric pressure $\approx$ 1004mb, wind speed $\approx$ 0.9m/s average.

Night time Survey 10th – 11st August 2023

Weather: surfaces damp, sky - overcast, temperature $\approx 19^{\circ}\text{C}$, barometric pressure $\approx 1003\text{mb}$, wind speed $\approx 1.3\text{m/s}$ average.

We have no reason to believe that the conditions we found on the survey were anything other than representative of normal conditions.

5.0 RESULTS AND DISCUSSIONS

5.1 Basic Results & Observations

The existing daytime noise climate was regarded as being urban in character with the principal contributor being road traffic on mainly Oldham Road but also traffic on Townley Street. The majority of the traffic comprised private cars, taxis and a few buses. Several light and heavy goods vehicles were also noted travelling along both Oldham Road and Townley Street.

Additional noise contributions were made by occasional emergency vehicles on both Oldham Road and Townley Street and occasional overflying aircraft - mainly commercial but a couple of light aircraft were also noted.

During the night time survey period, the noise climate was of the same character as was the case during the afternoon period, again being dominated by vehicles on, mainly, Oldham Road. Overall the volume of traffic was much reduced and the majority of the vehicles at this time comprised private cars, taxis, food delivery mopeds and small motorcycles.

Full survey details are given in Appendix 2. A summary is as follows:-

Position 1:

<i>Time</i>	<i>Index</i>	<i>dB(A)</i>
16:00 - 19:00	Leq	74
	Lmax	88
	L90	63
23:20 - 01:20	Leq	63
	Lmax	84
	L90	48

Position 2:

<i>Time</i>	<i>Index</i>	<i>dB(A)</i>
16:00 - 19:00	Leq	57
	Lmax	78
	L90	50
23:20 - 01:20	Leq	49
	Lmax	61
	L90	43

5.2 Assessments

In terms of BS8233, we are mainly concerned with the dB(A) L_{eq} values, or the dB L_{Aeq} levels. See definition of Acoustic terms in Appendix 1. The new version of BS8233 no longer has night time criteria in terms of dB(A) L_{max} values, or dB L_{Amax} values, but some local authorities still like to see them presented.

The above results and discussions give the following assessments:

Required Reductions for BS8233 Guidelines

Environment	Position	Required Reductions	
		Desirable	Reasonable
Living Rooms	1	39 dB	34 dB
	2	22 dB	17 dB
Bedrooms	1	33 dB	28 dB
	2	19 dB	14 dB

Reductions in excess of 30 dB are significant, and in turn will require significant mitigation to control the internal noise levels.

Note, of course, that these assertions are based upon the assumption that night-time noise levels are represented by measurements around midnight and that daytime noise levels are represented by measurements during the afternoon rush period. In other words, they should represent a worst-case.

5.3 Mitigation & Predicted Summary¹

A partly open window can be expected to provide about 15 dB reduction.

With the measured levels being significantly more than 15 dB above both 'desirable' and 'reasonable' conditions (ref: BS8233:2014), this implies that ventilation will be required such that occupants have the realistic option of keeping windows shut if they so choose.

As noise levels have been measured to be in excess of 70 dB L_{Aeq} on the front elevation, the usage of an active ventilation system, i.e a whole-development MVHR (mechanical ventilation and heat recovery system) will be required.

Strictly speaking, rooms with windows exclusively on the rear elevation (represented by position 2 – i.e. Flat 4 Bedroom, Flat 1 Bedroom 3, Flat 2 Kitchen / Living / Dining Room) may have slightly upgraded trickle ventilation (see below table), and standard double glazing (either new, or in good / 'as new' condition) instead, but being that all rooms on the front elevations will have to be served by mechanical ventilation, it may make sense to extend the MVHR throughout the whole development - although this is not a requirement from a noise perspective.

Where modelled, we have used specific passive trickle ventilation and double glazing specifications in the calculations below, but any glazing or ventilation system with the same (or greater) R_w dB (for glazing) or $D_{n,e,w}$ dB performance (ventilation) should be sufficient. Note that no $D_{n,e,w}$ dB value is provided for areas served by MVHR as we assume no significant noise break-in through the system.

A list of the assumed building fabric and proposed mitigation is as follows:

¹ No elevations of the front facades overlooking Oldham Road / Townley Street are available, and therefore window sizes are estimated from google street view.

Façade	Room Type	Make-Up on Which Calculations are Based
Front Elevations (Townley Street, Oldham Road)	Flat 5 Kitchen / Living / Dining Room	Walls: Traditional Masonry Glazing: $R_w = 49$ dB (e.g. 6/200/6) Vents: None. Whole House MVHR System
	Flat 1 Kitchen / Living / Dining Room	Walls: Traditional Masonry Glazing: $R_w = 49$ dB (e.g. 6/200/6) Vents: None. Whole House MVHR System
	Flat 1 Bedroom 1	Walls: Traditional Masonry Glazing: $R_w = 45$ dB (e.g. 10+16+9.1 Optiphon) Vents: None. Whole House MVHR System
Rear Elevation	Flat 2 Kitchen / Living / Dining Room	Walls: Traditional Masonry Glazing: Basic thermal glazing in good repair / condition (eg. 4+20+4) Vents: $D_{n,e,w} = 33$ dB (e.g. Simon acoustic TTF slimline 3000, frame vent)
	Flat 4 Bedroom	Walls: Traditional Masonry Glazing: Basic thermal glazing in good repair / condition (eg. 4+20+4) Vents: $D_{n,e,w} = 33$ dB (e.g. Simon acoustic TTF slimline 3000, frame vent)

The key points to be noted are as follows:

- Both of Flat 1 and Flat 5 Kitchen / Living / Dining Area's windows should have a performance of no less than 49 dB R_w .
- All other windows on the front elevations (over-looking Oldham Road OR Townley Street) should have a performance of no less than 45 dB R_w .
- Ventilation for all rooms on the front elevations (over-looking Oldham Road OR Townley Street) must be provided via an MVHR system.
- The MVHR air inlet must be situated on the quieter, rear elevation of the building, so it is subject to lesser external noise levels, and the main inlet or outlet must not be installed in a habitable room.
- The MVHR system must be installed and balanced so as to not create any additional noise internally within the rooms from its operation.
- Standard double glazing (e.g. 4/20/4) will be sufficient for rooms with windows exclusively situated on the rear elevation – if existing units are to be retained, they should be inspected by a glazing specialist and ensured they are in an 'as new' condition with regards to seals and acoustic performance.
- Acoustic trickle ventilation with a performance of 33 dB $D_{n,e,w}$ is suitable for rooms with windows exclusively situated on the rear elevation, although the ventilation requirement may already be fulfilled by the MVHR system, in which case trickle ventilation would not be necessary.

The above mitigation yields the following predicted internal noise levels with windows shut and an alternate means of ventilation provided²:

² We assume that the proposed development is subject to no significant structural noise transfer from nearby roads or adjoined buildings, and that no significant airborne noise travels through the party walls or floors (from adjoined buildings) into the proposed flats. We also assume that the building fabric (main walls, roof, entrance doors, etc) is in good condition, with no significant defects, holes, gaps, etc.

Predicted Summary

Elevation	Flat / Room	Time	Index	dB(A)
Front	Flat 5 Kitchen / Living / Dining Room	Rush	Leq	35
		Night	Leq	25
			Lmax	44
Front	Flat 1 Kitchen / Living / Dining Room	Rush	Leq	35
		Night	Leq	24
			Lmax	43
Rear	Flat 2 Kitchen / Living / Dining Room	Rush	Leq	31
		Night	Leq	25
			Lmax	34
Front	Flat 1 Bedroom 1	Rush	Leq	35
		Night	Leq	24
			Lmax	43
Rear	Flat 4 Bedroom	Rush	Leq	33
		Night	Leq	25
			Lmax	34

Full calculation details may be found in Appendix 2 of this report.

Of course, these assessments are very robust as they use what are likely to be the noisier times of day and night instead of the average of the entire 16 hour day, and 8 hour night periods.

6.0 CONCLUSIONS/RECOMMENDATIONS

‘Desirable’ conditions (ref: BS8233:2014) should be achievable internally with upgraded glazing and ventilation solutions.

Please see Section 5.3 for further information.

Appendix 1

Definition of Acoustic Terms

The Decibel

The decibel is the basic unit of noise measurement and is denoted dB. Technically, it is a means of expressing the difference in noise level between the measured noise and a standard level of noise. Most often the threshold of human hearing is used as the standard reference but it really should be stated. The threshold of human hearing is a sound pressure of $20\mu\text{Pa}$ or a sound power of 1pW .

A sound pressure level or SPL should be expressed in dB(re. $20\mu\text{Pa}$). A sound power level or SWL should be expressed in dB(re. 1pW). If the reference levels are omitted, it will often (but not always) be safe to assume that they are referenced to the threshold of human hearing.

A-Weighting and dB(A)

The human hearing system responds differently to different frequencies. The A-weighting system takes account of this by emphasising mid and high frequencies more than low frequencies to give an overall level. An A-Weighted noise level, therefore, reflects the way normal, healthy hearing would perceive the overall level of the noise. The basic unit is dB(A), although other systems of expressing an A-weighted level are discussed below.

Other weighting systems, such as C-Weighting, denoted dB(C), reflect the human hearing system's response at higher noise levels.

Equivalent Continuous Sound Level, L_{eq}

This is a kind of mean noise level.

The unit is dB L_{eq} . For A-weighted levels the unit is dB(A) L_{eq} or, in more modern units, dB L_{Aeq} . The Noise at Work Regulations use $L_{eq(s)}$ which refers to a sample level.

Maximum Level, L_{max}

This is the maximum level reached (usually for a fraction of a second) in the measurement period.

The unit is dB L_{max} . For A-weighted levels the unit is dB(A) L_{max} or, in more modern units, dB L_{Amax} .

Statistical (Percentile) Levels, L_n

During a measurement of fluctuating noise, it is often useful to establish the levels exceed for a percentage of the time. L_n is the index representing the level exceeded for $n\%$ of the measurement period.

The unit is dB L_n . For A-weighted levels, the unit is dB(A) L_n or, in more modern units, dB L_{A_n} .

Common examples are as follows :-

dB L_{A90} is the A-weighted level exceeded for 90% of the time and is often used to describe the underlying background noise.

dB L_{A50} is the A-weighted level exceeded for 50% of the time. Mathematically, it is the median, another kind of average.

dB L_{A10} is the A-weighted level exceeded for 10% of the time and has traditionally been used to describe the intermittent highs in the noise climate such as passing cars or aircraft.

Frequency Analysis

Here the audible frequency range is divided up into bands and the noise level is expressed in each frequency band from low pitches to high pitches.

Octave Band analysis is where the frequency range is divided into 8 bands from 63 Hz to 8kHz, or sometimes into 10 bands from 31.5 Hz to 16kHz.

1/3 Octave Band analysis provides more detailed subdivision into 24 bands from 50 Hz to 10kHz, or sometimes into 30 bands from 20Hz to 20kHz.

Narrow Band analysis takes this further with the possibility of many thousands of bands, possibly only 1Hz wide, or even less.

In all types of frequency analysis, the level in each band can be expressed in terms of L_{eq} , L_{max} , L_n , etc. as defined above.

Appendix 2

Measurement and Calculation Details

Position 1

10th August 2023

Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
16:00											
<i>L</i> _{eq}	70	72.7	74.9	71	69	65	66	61	55	54	46
<i>L</i> _{max}	84	87.7	91.0	84	83	76	75	73	70	82	72
<i>L</i> ₁₀	73	75.7	77.9	75	71	68	69	65	58	52	44
<i>L</i> ₉₀	63	66.0	66.6	63	62	59	59	56	48	39	29
16:05											
<i>L</i> _{eq}	69	75.2	75.0	70	67	64	65	62	56	54	46
<i>L</i> _{max}	83	90.8	84.1	85	78	76	75	75	70	80	73
<i>L</i> ₁₀	71	77.8	78.1	73	69	66	67	64	58	52	45
<i>L</i> ₉₀	63	67.7	69.2	65	62	59	59	56	49	41	30
16:10											
<i>L</i> _{eq}	70	76.4	75.2	71	67	65	66	63	57	52	45
<i>L</i> _{max}	88	88.5	86.9	87	81	83	85	81	77	73	66
<i>L</i> ₁₀	72	79.8	78.1	73	70	67	68	65	59	54	47
<i>L</i> ₉₀	65	69.2	69.4	65	63	61	61	56	50	42	32
16:20											
<i>L</i> _{eq}	69	73.4	76.5	72	68	65	65	62	56	50	41
<i>L</i> _{max}	86	87.9	90.6	89	87	80	81	80	72	67	59
<i>L</i> ₁₀	72	76.1	79.3	73	70	67	68	64	58	51	44
<i>L</i> ₉₀	64	67.6	69.2	64	63	60	60	56	49	41	31
16:25											
<i>L</i> _{eq}	70	75.6	77.2	72	69	66	66	62	57	51	44
<i>L</i> _{max}	85	91.7	90.3	90	84	83	79	77	70	69	65
<i>L</i> ₁₀	72	77.7	80.2	74	71	68	68	65	59	53	45
<i>L</i> ₉₀	65	68.2	70.0	64	63	61	61	58	50	42	32
16:30											
<i>L</i> _{eq}	70	73.1	77.4	79	71	64	65	61	56	53	55
<i>L</i> _{max}	88	81.7	93.7	100	89	74	81	79	74	77	78
<i>L</i> ₁₀	71	76.1	79.2	77	71	66	67	63	58	54	47
<i>L</i> ₉₀	63	67.5	68.6	64	62	59	59	55	48	40	31
16:40											
<i>L</i> _{eq}	69	72.7	75.5	72	67	65	65	61	54	48	42
<i>L</i> _{max}	79	86.8	90.7	86	79	77	73	70	63	61	63
<i>L</i> ₁₀	72	75.6	78.1	74	70	67	68	64	57	51	44
<i>L</i> ₉₀	64	66.4	68.3	64	62	60	60	57	49	40	29
16:45											
<i>L</i> _{eq}	69	72.5	74.4	68	66	64	66	62	55	49	39
<i>L</i> _{max}	80	84.3	86.5	82	76	74	77	72	67	68	57
<i>L</i> ₁₀	72	75.7	77.5	71	69	67	68	65	58	51	42
<i>L</i> ₉₀	64	66.8	67.7	63	62	59	60	56	49	40	29
16:50											
<i>L</i> _{eq}	69	73.5	75.8	71	67	65	65	62	56	50	42
<i>L</i> _{max}	81	85.8	91.2	90	80	77	75	72	68	64	65
<i>L</i> ₁₀	72	76.6	78.4	72	70	67	68	64	59	53	44
<i>L</i> ₉₀	64	67.7	69.2	64	63	60	61	57	50	42	31
17:00											
<i>L</i> _{eq}	86	72.7	74.5	70	67	66	84	80	66	52	42
<i>L</i> _{max}	112	84.6	93.0	88	79	83	111	104	90	77	62
<i>L</i> ₁₀	72	75.8	77.3	72	69	67	69	65	59	51	43
<i>L</i> ₉₀	63	66.2	67.5	63	61	59	59	55	48	40	29

17:05											
L_{eq}	68	72.2	74.5	68	66	63	64	60	53	47	45
L_{max}	77	82.9	85.7	77	73	76	73	68	61	63	69
L_{10}	70	75.4	77.6	71	68	65	67	62	55	50	42
L_{90}	63	66.3	68.2	63	61	59	59	55	48	39	29
17:10											
L_{eq}	70	74.9	77.6	70	67	65	66	62	57	51	42
L_{max}	89	93.1	94.6	85	89	83	85	79	78	72	59
L_{10}	71	76.8	79.5	73	68	66	67	63	58	52	43
L_{90}	64	67.1	68.5	63	62	59	60	56	49	40	29
17:20											
L_{eq}	70	72.2	76.3	74	72	67	65	61	55	48	40
L_{max}	85	90.5	95.1	93	88	83	74	77	69	64	59
L_{10}	72	75.2	78.8	75	72	67	67	63	57	51	42
L_{90}	63	66.3	68.7	63	62	59	60	56	48	40	29
17:25											
L_{eq}	69	72.7	76.8	70	67	64	65	61	54	47	43
L_{max}	81	82.5	93.2	87	78	77	74	73	69	63	67
L_{10}	71	75.7	79.0	71	69	66	68	63	57	50	42
L_{90}	64	67.3	68.3	63	63	60	60	57	49	40	29
17:30											
L_{eq}	71	73.1	76.3	73	72	67	65	63	57	49	47
L_{max}	88	83.4	85.8	89	91	86	81	80	73	63	73
L_{10}	72	75.8	79.8	76	73	69	67	64	60	53	44
L_{90}	63	67.4	69.2	63	62	59	59	56	50	41	30
17:40											
L_{eq}	75	77.8	79.3	80	74	74	71	65	61	53	43
L_{max}	101	92.4	101.0	103	97	100	97	89	89	80	69
L_{10}	72	79.3	79.4	75	72	68	67	63	58	51	43
L_{90}	63	66.6	67.7	63	62	59	59	55	48	39	29
17:45											
L_{eq}	69	75.4	75.6	69	68	65	65	61	55	50	56
L_{max}	85	92.1	89.7	80	85	80	79	78	70	72	84
L_{10}	71	76.4	78.6	72	70	66	67	63	56	51	41
L_{90}	62	66.5	68.4	63	62	58	58	55	48	40	28
17:50											
L_{eq}	72	73.0	76.2	74	74	68	67	64	58	51	42
L_{max}	97	85.1	93.1	99	101	93	90	89	84	76	66
L_{10}	72	75.9	78.7	74	72	68	68	64	58	51	42
L_{90}	63	66.7	68.3	64	62	59	60	56	48	40	28
18:00											
L_{eq}	68	73.5	74.4	68	68	65	64	60	55	48	42
L_{max}	82	88.5	88.3	79	83	80	75	73	74	68	66
L_{10}	71	76.2	78.0	71	70	66	67	63	57	50	43
L_{90}	62	64.6	65.4	61	60	58	58	54	46	37	26
18:05											
L_{eq}	68	77.0	74.6	69	66	64	65	60	54	47	49
L_{max}	80	89.0	87.6	83	77	74	75	72	67	62	72
L_{10}	71	82.1	77.4	72	69	66	67	63	56	49	41
L_{90}	63	66.6	67.7	63	62	59	59	55	48	39	28
18:10											
L_{eq}	70	71.8	74.6	70	72	68	64	60	55	48	40
L_{max}	85	84.4	84.3	83	89	85	75	72	68	62	57
L_{10}	71	74.7	78.0	73	71	67	67	63	57	51	42
L_{90}	63	65.7	67.2	63	62	59	59	56	48	40	29
18:20											
L_{eq}	68	72.0	74.7	72	66	63	64	60	55	49	42
L_{max}	87	84.5	91.5	95	82	80	84	80	73	69	63
L_{10}	71	75.4	77.6	71	68	66	67	63	58	52	44
L_{90}	62	65.0	66.5	61	60	57	58	54	46	37	26
18:25											
L_{eq}	70	74.0	76.1	73	69	67	65	61	55	50	41
L_{max}	91	87.7	90.2	90	84	91	85	79	79	72	64
L_{10}	71	77.4	79.7	75	71	67	67	63	58	51	42
L_{90}	64	67.2	68.8	64	63	60	60	56	49	40	29

18:30

L_{eq}	68	72.0	75.5	69	66	64	64	60	53	46	38
L_{max}	79	83.3	87.9	85	75	75	75	72	66	58	55
L_{10}	71	75.6	78.6	72	69	66	67	63	56	49	40
L_{90}	62	65.9	67.6	62	61	58	59	55	47	39	28

18:40

L_{eq}	72	72.3	77.8	79	74	69	64	60	53	49	40
L_{max}	89	83.1	92.7	95	92	85	84	75	66	66	59
L_{10}	73	76.2	81.0	82	74	69	67	62	57	51	44
L_{90}	62	64.6	66.1	61	59	57	58	54	44	36	25

18:45

L_{eq}	68	76.7	75.5	71	68	63	63	60	55	47	46
L_{max}	82	91.1	92.2	90	84	79	74	72	71	63	69
L_{10}	70	79.1	78.1	71	70	65	66	61	55	49	40
L_{90}	61	66.2	66.9	62	60	57	58	53	45	36	25

18:50

L_{eq}	68	73.6	74.7	69	66	63	65	60	54	47	39
L_{max}	83	83.4	85.5	82	78	73	81	74	67	57	61
L_{10}	71	77.6	78.2	71	69	66	67	63	57	50	40
L_{90}	63	65.1	67.8	62	61	58	59	55	48	39	27

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Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:20											
<i>L</i> _{eq}	60	62.8	64.3	59	56	55	56	54	50	44	37
<i>L</i> _{max}	72	74.9	78.9	72	67	71	66	64	62	56	56
<i>L</i> ₁₀	65	67.7	69.1	63	61	60	61	58	55	50	40
<i>L</i> ₉₀	43	48.3	50.2	46	43	38	39	35	28	21	14
23:25											
<i>L</i> _{eq}	64	64.4	65.8	62	59	58	60	57	55	49	40
<i>L</i> _{max}	75	78.9	78.2	78	70	69	70	68	67	63	54
<i>L</i> ₁₀	69	67.4	70.6	66	64	63	64	62	60	54	45
<i>L</i> ₉₀	53	53.1	53.3	50	49	48	50	46	37	28	17
23:30											
<i>L</i> _{eq}	63	65.4	63.6	59	58	57	59	57	54	49	39
<i>L</i> _{max}	76	81.3	76.0	72	70	69	72	68	67	62	55
<i>L</i> ₁₀	67	68.5	68.1	63	61	60	62	61	58	52	41
<i>L</i> ₉₀	48	50.9	51.3	48	46	42	44	41	35	26	14
23:40											
<i>L</i> _{eq}	69	70.3	70.8	67	68	67	64	61	58	52	55
<i>L</i> _{max}	87	85.6	90.6	84	86	85	82	77	74	69	84
<i>L</i> ₁₀	70	71.8	73.0	68	65	64	66	64	60	55	47
<i>L</i> ₉₀	52	51.6	54.4	52	51	49	48	43	35	26	16
23:45											
<i>L</i> _{eq}	64	69.1	66.5	59	57	57	61	58	54	49	40
<i>L</i> _{max}	83	88.1	85.4	75	70	74	80	77	70	66	57
<i>L</i> ₁₀	66	72.2	69.7	62	61	60	61	59	56	50	40
<i>L</i> ₉₀	46	51.8	52.0	48	45	41	42	37	31	24	15
23:50											
<i>L</i> _{eq}	65	65.5	70.0	62	63	61	61	58	55	49	40
<i>L</i> _{max}	80	85.8	87.2	77	82	79	73	70	69	64	59
<i>L</i> ₁₀	69	67.3	69.8	63	63	62	65	62	58	54	44
<i>L</i> ₉₀	49	50.8	52.4	50	50	45	46	41	31	21	14
00:00											
<i>L</i> _{eq}	64	65.9	66.6	61	60	59	60	58	53	49	38
<i>L</i> _{max}	79	85.9	82.5	75	72	71	72	74	68	71	57
<i>L</i> ₁₀	68	67.8	70.1	65	64	63	64	62	57	52	42
<i>L</i> ₉₀	49	50.4	52.2	48	47	44	46	41	30	21	14
00:05											
<i>L</i> _{eq}	61	61.6	62.8	58	58	56	58	54	48	43	33
<i>L</i> _{max}	73	78.4	80.1	70	69	66	69	65	64	65	51
<i>L</i> ₁₀	66	64.8	66.2	63	62	61	63	59	52	45	36
<i>L</i> ₉₀	49	48.7	51.3	48	48	43	46	40	29	18	14
00:10											
<i>L</i> _{eq}	65	67.0	67.2	60	60	58	60	59	54	48	42
<i>L</i> _{max}	84	83.1	86.1	76	77	76	76	80	74	68	65
<i>L</i> ₁₀	66	67.8	70.0	63	62	61	63	59	53	46	36
<i>L</i> ₉₀	43	47.8	50.0	46	42	38	39	33	28	21	15
00:20											
<i>L</i> _{eq}	64	61.7	62.1	57	58	58	61	56	48	41	37
<i>L</i> _{max}	78	77.2	75.5	73	71	75	75	68	59	54	61
<i>L</i> ₁₀	68	65.1	66.0	62	63	62	65	61	53	46	36
<i>L</i> ₉₀	43	49.4	51.3	47	44	40	40	34	24	18	14
00:25											
<i>L</i> _{eq}	65	65.3	66.6	67	63	62	62	56	49	42	32
<i>L</i> _{max}	87	85.2	86.3	89	88	83	84	77	69	62	47
<i>L</i> ₁₀	68	65.3	68.8	67	65	64	65	60	53	45	36
<i>L</i> ₉₀	45	48.2	49.4	47	45	41	42	36	26	20	15

00:30											
L_{eq}	62	63.7	65.8	58	57	56	60	55	47	39	30
L_{max}	74	76.8	81.8	72	69	69	71	66	58	51	43
L_{10}	67	68.4	68.7	62	62	61	65	60	52	44	34
L_{90}	44	49.6	49.5	46	43	40	41	35	26	20	16
00:40											
L_{eq}	58	57.2	57.3	56	56	53	55	50	42	34	26
L_{max}	73	73.4	73.4	72	77	69	69	62	54	45	42
L_{10}	62	60.9	60.4	61	60	57	58	55	47	38	31
L_{90}	41	46.1	48.5	45	41	36	37	30	23	19	16
00:45											
L_{eq}	61	61.2	64.4	60	59	56	58	54	47	41	33
L_{max}	75	78.1	79.5	77	73	71	70	67	62	56	53
L_{10}	64	63.4	68.3	65	62	59	61	57	50	42	32
L_{90}	44	47.7	49.7	46	44	40	41	35	24	19	16
00:50											
L_{eq}	59	68.3	65.6	59	55	55	56	52	45	38	36
L_{max}	72	80.7	81.9	74	67	67	69	66	58	53	61
L_{10}	63	73.9	68.4	63	59	59	59	56	50	42	33
L_{90}	47	48.5	51.6	47	45	43	44	39	29	21	17
01:00											
L_{eq}	58	62.9	58.3	52	53	52	55	52	44	43	33
L_{max}	72	82.9	75.3	65	66	65	69	64	58	64	53
L_{10}	63	63.2	61.0	56	58	57	60	57	49	41	32
L_{90}	39	46.5	50.9	45	40	35	35	29	23	19	17
01:05											
L_{eq}	58	64.0	59.0	55	56	53	54	51	45	39	32
L_{max}	72	79.0	81.0	75	66	68	68	63	57	54	58
L_{10}	63	70.0	68.4	64	58	59	58	58	51	41	33
L_{90}	44	48.0	50.0	45	44	42	40	35	27	20	17
01:10											
L_{eq}	58	61.0	59.0	55	55	53	54	51	45	39	31
L_{max}	73	81.0	77.0	73	69	70	68	65	59	55	55
L_{10}	62	68.0	65.0	58	59	57	57	56	48	42	33
L_{90}	41	46.5	50.0	44	41	36	38	33	25	19	16

Time	Index	dB(A)	63	125	250	500	1k	2k	4k	8k
16:00 - 19:00	Leq	74	76	73	70	66	71	67	57	50
	Lmax	88	87	87	81	83	85	81	77	73
	L90	63	68	63	62	59	59	55	48	40
23:20 - 01:20	Leq	63	66	61	60	59	59	56	52	46
	Lmax	84	86	76	77	76	76	80	74	68
	L90	48	52	48	47	44	45	40	32	23

Position 2:

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Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
16:15											
L_{eq}	59	64	61	57	58	58	54	50	47	47	42
L_{max}	71	75	71	67	68	68	63	64	63	60	57
L_{10}	63	67	63	60	61	61	57	53	51	50	46
L_{90}	50	61	58	54	51	47	47	41	32	23	13
16:35											
L_{eq}	61	69	63	60	57	60	55	52	49	47	42
L_{max}	75	88	79	74	74	72	71	64	61	58	53
L_{10}	64	72	65	64	59	64	58	55	52	51	47
L_{90}	51	63	58	55	50	47	47	42	38	31	21
16:55											
L_{eq}	55	67	62	60	55	52	51	46	41	35	26
L_{max}	77	85	82	83	79	74	69	64	65	60	51
L_{10}	57	69	64	62	57	53	53	48	41	36	27
L_{90}	51	62	58	55	50	47	47	41	32	23	14
17:15											
L_{eq}	53	65	62	55	51	49	50	44	36	30	24
L_{max}	65	75	76	70	63	62	60	57	53	47	49
L_{10}	57	68	64	58	54	52	54	48	38	32	26
L_{90}	48	61	57	51	47	45	45	39	31	23	14
17:35											
L_{eq}	58	65	60	59	55	55	54	50	48	40	32
L_{max}	83	80	79	85	78	76	76	75	77	66	57
L_{10}	59	67	63	59	56	56	55	51	45	39	32
L_{90}	50	60	56	53	50	47	47	40	32	24	16
17:55											
L_{eq}	53	64	61	55	52	49	50	44	35	28	23
L_{max}	71	85	79	78	73	68	66	63	49	41	44
L_{10}	56	65	63	56	54	51	53	47	37	31	24
L_{90}	48	58	57	51	47	45	44	39	31	23	14
18:15											
L_{eq}	58	64	61	58	55	56	54	50	42	32	25
L_{max}	82	75	72	77	74	80	77	76	68	55	50
L_{10}	58	67	63	60	56	54	55	49	40	32	26
L_{90}	50	59	57	54	50	47	47	40	32	23	14
18:40											
L_{eq}	58	66	65	62	60	54	52	48	43	35	28
L_{max}	78	82	80	81	81	71	67	72	70	61	54
L_{10}	59	68	68	62	58	55	56	50	43	37	29
L_{90}	49	60	59	52	49	46	45	39	31	21	13
18:55											
L_{eq}	54	64	63	58	54	50	51	45	36	28	18
L_{max}	65	72	74	66	66	62	60	56	48	39	32
L_{10}	57	67	65	60	57	53	54	48	38	31	20
L_{90}	50	60	58	55	51	47	47	40	31	22	14

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Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:35											
<i>L</i> _{eq}	54	55	55	57	56	52	49	42	37	31	22
<i>L</i> _{max}	64	69	66	69	67	63	59	51	47	40	37
<i>L</i> ₁₀	59	57	57	63	61	57	53	46	41	36	26
<i>L</i> ₉₀	45	49	50	47	45	42	41	35	31	24	16
23:55											
<i>L</i> _{eq}	48	54	55	49	46	44	45	40	35	30	23
<i>L</i> _{max}	61	65	63	55	54	52	55	54	54	51	45
<i>L</i> ₁₀	50	57	57	50	48	46	47	42	37	31	21
<i>L</i> ₉₀	44	50	51	47	44	41	39	34	28	21	16
00:15											
<i>L</i> _{eq}	48	55	59	50	48	44	44	39	36	33	30
<i>L</i> _{max}	64	66	71	60	62	57	56	55	59	56	53
<i>L</i> ₁₀	50	57	62	54	52	45	46	41	35	30	22
<i>L</i> ₉₀	43	49	51	46	43	41	39	34	27	20	15
00:35											
<i>L</i> _{eq}	48	54	58	50	46	43	44	40	32	26	23
<i>L</i> _{max}	58	63	68	60	55	52	54	52	42	34	38
<i>L</i> ₁₀	51	57	61	52	48	46	48	44	36	29	27
<i>L</i> ₉₀	42	48	51	46	43	40	38	33	27	21	17
00:55											
<i>L</i> _{eq}	48	52	55	50	49	45	44	38	32	26	24
<i>L</i> _{max}	61	67	69	58	59	55	57	50	53	49	39
<i>L</i> ₁₀	52	54	56	53	52	48	48	42	34	25	27
<i>L</i> ₉₀	41	46	51	46	43	39	36	31	25	19	16
01:15											
<i>L</i> _{eq}	43	52	53	47	43	40	39	33	29	23	26
<i>L</i> _{max}	56	68	60	50	47	48	54	46	39	38	49
<i>L</i> ₁₀	45	53	56	48	45	41	41	35	30	26	25
<i>L</i> ₉₀	41	47	50	45	42	39	35	31	26	20	15

Time	Index	dB(A)	63	125	250	500	1k	2k	4k	8k
16:00 - 19:00	Leq	57	62	59	56	55	53	49	44	41
	Lmax	78	80	81	81	71	67	72	70	61
	L90	50	57	54	49	46	46	40	33	25
23:20 - 01:20	Leq	49	56	52	50	47	45	39	34	29
	Lmax	61	63	55	54	52	55	54	54	51
	L90	43	51	46	43	40	38	33	28	21

Calculation Details:

Position 1			dB(A)	63	125	250	500	1k	2k	4k	8k
Flat 1 Kitchen / Living / Dining Room											
Width of Exposed Façade 1	9.50 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 2	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 3	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 4	0.00 m		-	-	-	-	-	-	-	-	-
Total Exposed Façade Width	9.50 m		-	-	-	-	-	-	-	-	-
Element Height	2.50 m		-	-	-	-	-	-	-	-	-
Room Depth (re. Exposed façade 1)	0.00 m										
Element Area	23.75 m2		-	-	-	-	-	-	-	-	-
Effective Area (ie. with vents)	23.75 m2		-	-	-	-	-	-	-	-	-
Room Volume	56.52 m3		-	-	-	-	-	-	-	-	-
Assumed RT	0.50 s		-	-	-	-	-	-	-	-	-
Element Area Correction			-	14	14	14	14	14	14	14	14
Room Correction 10 x Log (RT/0.163/V)			-	-13	-13	-13	-13	-13	-13	-13	-13
Walls: Traditional Masonry	18.05 m2		-	23	32	41	47	49	53	58	55
Glazing: Rw = 49 dB (e.g. 6/200/6)	5.70 m2		-	28	37	41	48	54	47	47	44
Vents: None. Whole House MVHR System	0.00 m2		-	0	0	0	0	0	0	0	0
Composite SRI	23.75 m2		-	24	33	41	47	50	51	52	49
Level Difference (Reverberant only)			-	-23	-32	-40	-46	-49	-50	-51	-48
Allowance for flanking/workmanship	4 dB		-	4	4	4	4	4	4	4	4
Predicted Internal Levels	Rush	Leq	35	57	45	34	24	27	22	10	6
	Night	Leq	24	47	33	24	17	15	11	5	2
		Lmax	44	67	48	41	33	31	35	27	24

Position 2			dB(A)	63	125	250	500	1k	2k	4k	8k
Flat 2 Kitchen / Living / Dining Room											
Width of Exposed Façade 1	2.50 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 2	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 3	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 4	0.00 m		-	-	-	-	-	-	-	-	-
Total Exposed Façade Width	2.50 m		-	-	-	-	-	-	-	-	-
Element Height	2.50 m		-	-	-	-	-	-	-	-	-
Room Depth (re. Exposed façade 1)	0.00 m										
Element Area	6.25 m2		-	-	-	-	-	-	-	-	-
Effective Area (ie. with vents)	16.25 m2		-	-	-	-	-	-	-	-	-
Room Volume	36.00 m3		-	-	-	-	-	-	-	-	-
Assumed RT	0.50 s		-	-	-	-	-	-	-	-	-
Element Area Correction			-	12	12	12	12	12	12	12	12
Room Correction 10 x Log (RT/0.163/V)			-	-11	-11	-11	-11	-11	-11	-11	-11
Walls: Traditional Masonry	4.00 m2		-	23	32	41	47	49	53	58	55
Glazing: Basic thermal glazing in good repair / condition (eg. 4+20+4)	2.25 m2		-	15	24	20	25	35	38	35	32
Vents: Dne,w = 33 dB (e.g. Simon acoustic TTF slimline 3000, frame vent)	10.00 m2		-	32	38	35	35	31	32	35	40
Composite SRI	16.25 m2		-	22	31	28	32	33	34	36	38
Level Difference (Reverberant only)			-	-21	-30	-27	-31	-31	-32	-34	-37
Allowance for flanking/workmanship			-	4	4	4	4	4	4	4	4
Predicted Internal Levels											
	Rush	Leq	31	45	33	33	28	25	20	14	8
	Night	Leq	24	39	26	28	20	18	11	4	-3
		Lmax	33	46	30	31	26	27	26	24	18

Position 1			dB(A)	63	125	250	500	1k	2k	4k	8k
Flat 5 Kitchen / Living / Dining Room											
Width of Exposed Façade 1	8.50 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 2	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 3	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 4	0.00 m		-	-	-	-	-	-	-	-	-
Total Exposed Façade Width	8.50 m		-	-	-	-	-	-	-	-	-
Element Height	2.50 m		-	-	-	-	-	-	-	-	-
Room Depth (re. Exposed façade 1)	0.00 m										
Element Area	21.25 m2		-	-	-	-	-	-	-	-	-
Effective Area (ie. with vents)	21.25 m2		-	-	-	-	-	-	-	-	-
Room Volume	44.00 m3		-	-	-	-	-	-	-	-	-
Assumed RT	0.50 s		-	-	-	-	-	-	-	-	-
Element Area Correction			-	13	13	13	13	13	13	13	13
Room Correction 10 x Log (RT/0.163/V)			-	-12	-12	-12	-12	-12	-12	-12	-12
Walls: Traditional Masonry	16.21 m2		-	23	32	41	47	49	53	58	55
Glazing: Rw = 49 dB (e.g. 6/200/6)	5.04 m2		-	28	37	41	48	54	47	47	44
Vents: None. Whole House MVHR System	0.00 m2		-	23	28	26	26	29	29	29	36
Composite SRI	21.25 m2		-	24	33	41	47	50	51	52	49
Level Difference (Reverberant only)			-	-22	-31	-39	-46	-48	-49	-51	-48
Allowance for flanking/workmanship	4 dB		-	4	4	4	4	4	4	4	4
Predicted Internal Levels	Rush	Leq	35	57	45	34	24	27	22	10	6
		Leq	25	47	33	24	17	15	11	5	2
	Night	Lmax	44	68	48	41	34	31	35	27	24

Position 1			dB(A)	63	125	250	500	1k	2k	4k	8k
Flat 1 Bedroom 1											
Width of Exposed Façade 1	3.67 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 2	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 3	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 4	0.00 m		-	-	-	-	-	-	-	-	-
Total Exposed Façade Width	3.67 m		-	-	-	-	-	-	-	-	-
Element Height	2.50 m		-	-	-	-	-	-	-	-	-
Room Depth (re. Exposed façade 1)	0.00 m										
Element Area	9.18 m2		-	-	-	-	-	-	-	-	-
Effective Area (ie. with vents)	9.18 m2		-	-	-	-	-	-	-	-	-
Room Volume	36.62 m3		-	-	-	-	-	-	-	-	-
Assumed RT	0.50 s		-	-	-	-	-	-	-	-	-
Element Area Correction			-	10	10	10	10	10	10	10	10
Room Correction 10 x Log (RT/0.163/V)			-	-11	-11	-11	-11	-11	-11	-11	-11
Walls: Traditional Masonry		5.95 m2	-	23	32	41	47	49	53	58	55
Glazing: Rw = 45 dB (e.g. 10+16+9.1 Optiphon)		3.23 m2	-	23	29	33	44	46	49	57	57
Vents: None. Whole House MVHR System		0.00 m2	-	0	0	0	0	0	0	0	0
Composite SRI		9.18 m2	-	23	31	36	46	48	51	58	56
Level Difference (Reverberant only)			-	-24	-32	-38	-47	-49	-52	-59	-57
Allowance for flanking/workmanship			4 dB	-	4	4	4	4	4	4	4
Predicted Internal Levels	Rush	Leq	35	56	45	36	24	26	19	2	-3
		Lmax	43	66	48	43	33	31	32	19	15
	Night	Leq	24	46	33	26	16	15	8	-3	-7

Position 2 Flat 4 Bedroom			dB(A)	63	125	250	500	1k	2k	4k	8k
Width of Exposed Façade 1	2.40 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 2	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 3	0.00 m		-	-	-	-	-	-	-	-	-
Width of Exposed Façade 4	0.00 m		-	-	-	-	-	-	-	-	-
Total Exposed Façade Width	2.40 m		-	-	-	-	-	-	-	-	-
Element Height	2.50 m		-	-	-	-	-	-	-	-	-
Room Depth (re. Exposed façade 1)	0.00 m										
Element Area	6.00 m2		-	-	-	-	-	-	-	-	-
Effective Area (ie. with vents)	16.00 m2		-	-	-	-	-	-	-	-	-
Room Volume	23.40 m3		-	-	-	-	-	-	-	-	-
Assumed RT	0.50 s		-	-	-	-	-	-	-	-	-
Element Area Correction			-	12	12	12	12	12	12	12	12
Room Correction 10 x Log (RT/0.163/V)			-	-9	-9	-9	-9	-9	-9	-9	-9
Walls: Traditional Masonry	4.04 m2		-	23	32	41	47	49	53	58	55
Glazing: Basic thermal glazing in good repair / condition (eg. 4+20+4)	1.96 m2		-	15	24	20	25	35	38	35	32
Vents: Dne,w = 33 dB (e.g. Simon acoustic TTF slimline 3000, frame vent)	10.00 m2		-	32	38	35	35	31	32	35	40
Composite SRI	16.00 m2		-	23	31	28	32	33	34	36	38
Level Difference (Reverberant only)			-	-19	-28	-25	-29	-30	-31	-33	-35
Allowance for flanking/workmanship			4 dB	-	4	4	4	4	4	4	4
Predicted Internal Levels	Rush	Leq	33	47	35	35	30	27	22	16	10
		Leq	25	41	28	29	21	19	13	6	-2
		L max	34	47	31	32	27	29	27	26	20
Predicted Internal Levels	Night	Leq	25	41	28	29	21	19	13	6	-2
		L max	34	47	31	32	27	29	27	26	20
		L max	34	47	31	32	27	29	27	26	20

Predicted Summary

Elevation	Flat / Room	Time	Index	dB(A)	63	125	250	500	1k	2k	4k	8k
Front	Flat 5 Kitchen / Living / Dining Room	Rush	Leq	35	57	45	34	24	27	22	10	6
		Night	Leq	25	47	33	24	17	15	11	5	2
			Lmax	44	68	48	41	34	31	35	27	24
Front	Flat 1 Kitchen / Living / Dining Room	Rush	Leq	35	57	45	34	24	27	22	10	6
		Night	Leq	24	46	33	26	16	15	8	-3	-7
			Lmax	43	66	48	43	33	31	32	19	15
Rear	Flat 2 Kitchen / Living / Dining Room	Rush	Leq	31	45	33	33	28	25	20	14	8
		Night	Leq	25	41	28	29	21	19	13	6	-2
			Lmax	34	47	31	32	27	29	27	26	20
Front	Flat 1 Bedroom 1	Rush	Leq	35	56	45	36	24	26	19	2	-3
		Night	Leq	24	46	33	26	16	15	8	-3	-7
			Lmax	43	66	48	43	33	31	32	19	15
Rear	Flat 4 Bedroom	Rush	Leq	33	47	35	35	30	27	22	16	10
		Night	Leq	25	41	28	29	21	19	13	6	-2
			Lmax	34	47	31	32	27	29	27	26	20