

REPORT



40-48 & 50 Mount Pleasant Environmental Noise Assessment

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1.0 Introduction

Clear Acoustic Design has been appointed to carry out an environmental noise assessment in relation to the proposed development at 40-48 and 50 Mount Pleasant, Reading, RG1 2TD. Proposals are for the creation of 6 new-build dwellings at 40-48 Mount Pleasant, and a refurbishment of the existing listed building at 50 Mount Pleasant. The local planning authority has requested a noise assessment, in order to safeguard the amenity of the future occupants.

Environmental noise levels on site are seen to be moderate - and are due to road traffic noise on Mount Pleasant, which is located adjacent to the proposed development site. Noise monitoring has been undertaken in order to account for a worst case of this noise source. Based on the measured noise levels, a full façade specification has been provided for the proposed residential dwellings, such that an acceptable internal acoustic environment will be provided for future occupants.

This assessment is in line with BS 8233: 2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*, and the recommendations of the WHO. These assessment criteria are seen to be in full accordance with the requirements of the local planning authority.

Additionally, Clear Acoustic Design has provided maximum noise rating level limits for any mechanical plant to be installed as part of the proposed development. This would apply to plant such as air source heat pumps.

The mitigation strategy provided is in line with achieving the *No Observed Adverse Effect Level* (NOAEL) under national planning guidance, via compliance with the aforementioned British Standard. This report has been compiled by Patrick Shuttleworth and issued by Stefan Hannan of Clear Acoustic Design. Both hold full corporate membership of the Institute of Acoustics (MIOA), and 11 / 16 years of consulting experience respectively.

2.0 Performance Standards

2.1 BS 8233: 2014 and WHO

BS 8233: 2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* provides a range of internal noise level targets for many building types, including residential buildings. This British Standard is commonly used by planning authorities to place design targets on new residential developments near major sources of noise, such as transportation networks. The guideline internal noise levels for residential buildings, taken from BS 8233:2014 are shown in Table 2.1 below.

Activity	Location	Day (0700-2300)	Night (2300-0700)
Resting	Living Room	35 dB $L_{Aeq, 16\text{hour}}$	---
Dining	Dining Room / Area	40 dB $L_{Aeq, 16\text{hour}}$	---
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16\text{hour}}$	30 dB $L_{Aeq, 8\text{hour}}$

Table 2.1 BS8233:2014 internal noise level criteria

The 2014 version of this British Standard does not give guideline values for L_{Amax} noise levels in bedrooms at night. Maximum noise levels have the potential to cause excessive night time awakenings and it is recommended that this be considered in the assessment.

The World Health Organisation Night Time Noise Guidelines for Europe provide a guideline value of 42 dB L_{Amax} . These recommendations have therefore been used to carry out an assessment of maximum noise levels in bedrooms at night. Note that this is not an absolute limit, allowing for anomalous or infrequent events. The WHO state that the internal L_{Amax} criteria should not be exceeded on average more than 10-15 times per night.

3.0 Environmental Noise Survey

In order to obtain a detailed picture of the environmental noise climate on site, a noise survey has been undertaken over a typical 24 hour period, in a position representative of a worst case of environmental noise levels.

Noise levels were measured using 5-minute samples, in 1 fixed position (F1), from 02/02/2023 – 03/02/2023. A noise monitor was placed externally at the front façade of the existing building at 50 Mount Pleasant. This is therefore representative of a worst case of road traffic noise. The fixed long term noise monitoring serves to provide the day and night time ambient noise levels ($L_{Aeq\ 16 / 8\ HOUR}$) and night time L_{Amax} due to the aforementioned sources.

Additionally, attended noise monitoring was undertaken on 03/02/2023 within 50 Mount Pleasant, in order to establish the sound insulation properties of the existing historic glazing.

3.1 Measurement Equipment and Environmental Conditions

The weather was witnessed to be overcast and dry for the duration of the survey with generally light wind speeds of less than 5 mps. The following measurement equipment was used to carry out the survey.

Equipment	Serial Number	Calibration Due
NTi XL2 sound level meter – Class 1	A2A-16925-E0	Dec 2022
NTi Microphone Capsule - MC230A	A17732	Dec 2022
NTi Preamplifier - MA220	8657	Dec 2022

Table 3.1 Measuring Equipment used for Survey

3.2 Noise Monitoring Location

Figure 3.1 below provides the noise monitoring location.

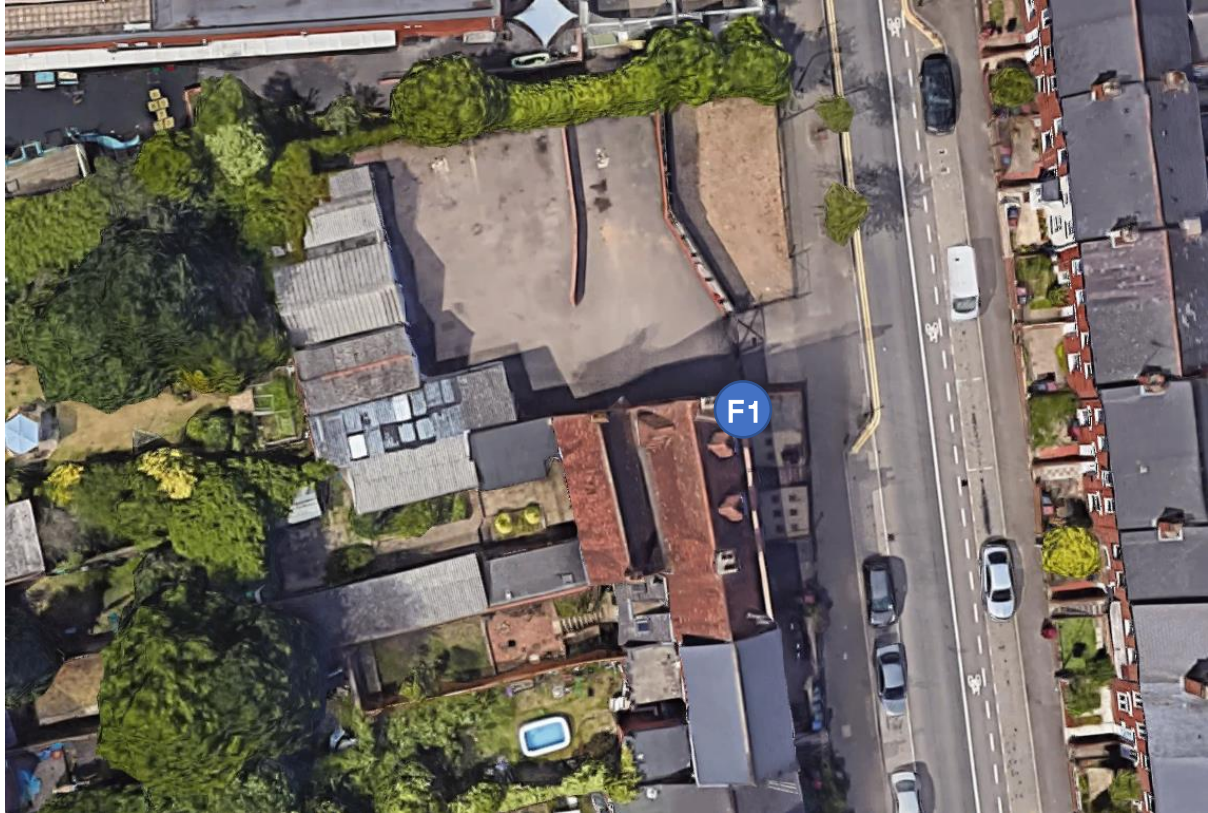


Figure 3.1 Noise Monitoring Location

3.3 Long Term Noise Survey Results – Measurement Graph – F1

Figure 3.2 below provides a graph of the measured noise levels over approximately 24 hours at position F1. The ambient (L_{Aeq}) and maximum (L_{Amax}) and background (L_{A90}) noise levels are shown.

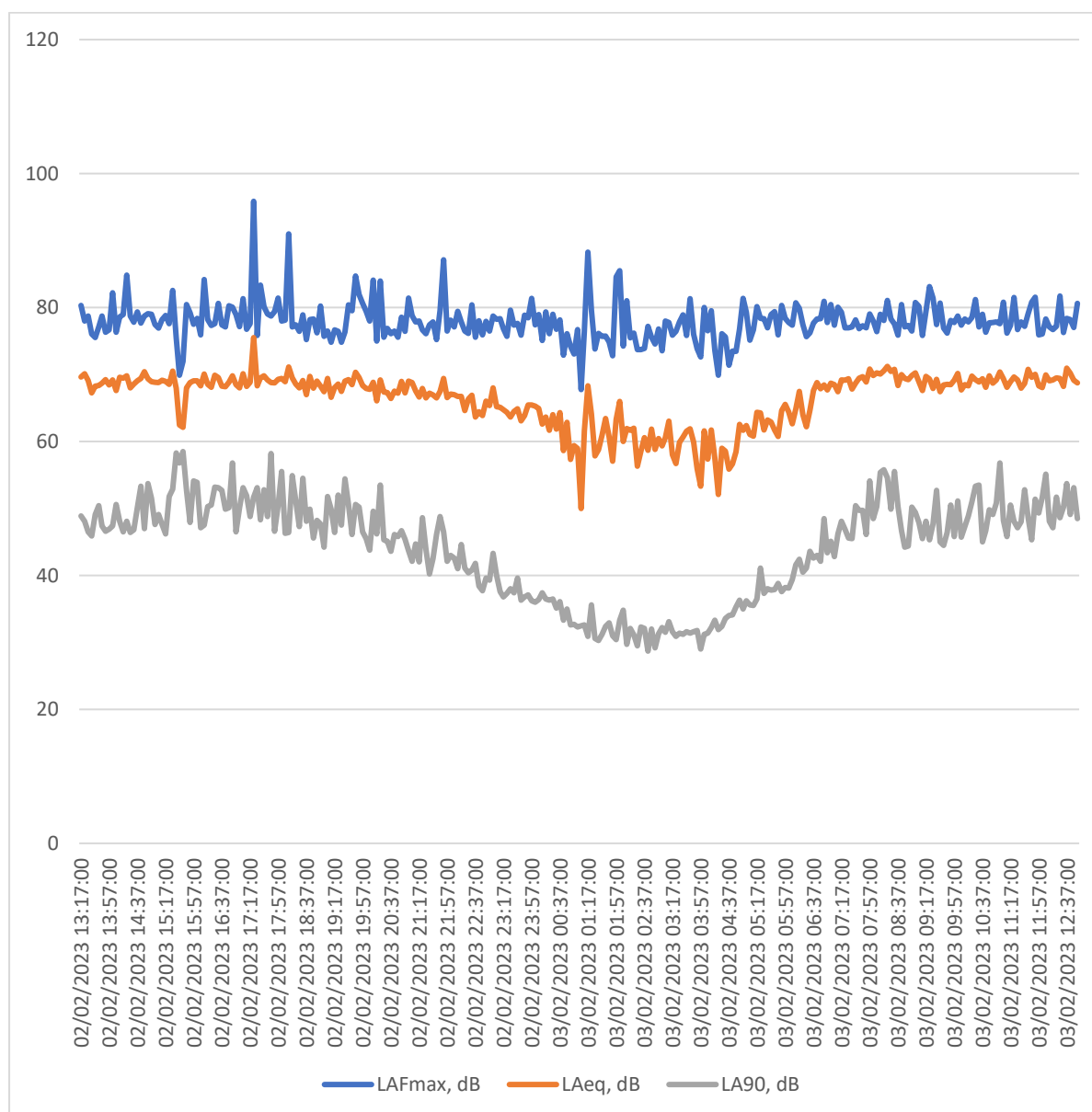


Figure 3.2 Long Term Measurement Graph – F1

3.4 Long Term Noise Survey Results – F1

Based on the results of the noise monitoring, the following external noise levels have been derived from F1, and will form the basis of the assessment in line with BS 8233: 2014. The L_{Amax} value shown is the 11th highest, in line with the recommendations of the WHO.

Monitoring Position	Time Period	Measured Ambient Noise Level, dB L_{Aeq} 16 / 8 HOUR	Representative Maximum Level, dB L_{Amax}
F1	Day (0700-2300)	68	--
	Night (2300-0700)	63	79

Table 3.2 Summary of Ambient and Maximum Noise Levels – F1

3.5 Attended Noise Monitoring – 50 Mount Pleasant

The results of the attended noise monitoring are provided in Table 3.3 below. These measurements have been conducted in order to establish the sound insulation properties of the existing historic glazing at 50 Mount Pleasant, and as such the suitability of this glazing to provide acceptable internal acoustic conditions. The external microphone F1 has been used as a reference for the sound insulation assessment.

Monitoring Position	Time Period	Measured Noise Level, dB L_{Aeq}
50 Mount Pleasant, Internal	13:00 – 13:10	41
F1, External	13:00 – 13:10	70

Table 3.3 Sound Insulation Assessment – 50 Mount Pleasant

The measured sound insulation is 29 dBA across the existing historic façade. Based on the results of the sound insulation assessment, Table 3.4 below provides the corresponding internal ambient noise levels within the existing historic building at 50 Mount Pleasant.

Monitoring Position	Time Period	Ambient Noise Level, dB L _{Aeq} 16 / 8 HOUR	Representative Maximum Level, dB L _{Amax}
50 Mount Pleasant, Internal	Day (0700-2300)	39	--
	Night (2300-0700)	35	50

Table 3.4 Internal Ambient Noise Levels, 50 Mount Pleasant

Given that the building at 50 Mount Pleasant is listed, it is not permitted to replace the historic glazing. The internal noise levels via the historic glazing are seen to be around 5 dBA above the BS 8233 criteria. BS 8233 does however allow for a 5 dBA relaxation to these targets in some circumstances where there are restrictions to the amount of sound insulation that can be achieved. The standard states that *the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved*.

Clear Acoustic Design therefore warrant that it is not necessary to provide additional sound insulation to the façade at 50 Mount Pleasant. Should the local authority require strict compliance with the internal noise criteria in Table 2.1, any secondary glazing system (single or double pane) will bring internal noise levels down to significantly below the BS 8233 criteria.

4.0 Façade Specification – 40-48 Mount Pleasant

In order to control noise ingress to the proposed new-build dwellings, it will be necessary to provide building envelope sound insulation in line with the following specification. The façade specification for this development has been designed to reduce general environmental noise to within the recommendations of BS 8233: 2014 and the World Health Organisation.

Supporting calculations can be found in Appendix A. Calculations have been based on typical room and window dimensions. Note that the calculated internal noise levels are with closed windows, and means of background ventilation enabled (trickle vents open).

4.1 External Wall and Roof

The acoustic performance requirements for the external walls and roofs in all areas of the site are provided in Table 4.1 below. These sound insulation indices are not onerous, and can be met with lightweight or masonry façade types, and a standard roof construction.

Element	Type	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	R/Dne _w
External Walls	R, dB	37	39	45	52	55	55	50
Roofs	R, dB	27	37	43	48	52	52	46

Table 4.1 Acoustic performance of external walls and roofs, All areas

4.2 Windows and Trickle Vents

The following minimum sound reduction indices will be applicable to windows (including frames) and trickle vents. These sound reduction values will therefore need to be met when choosing specific glazing / ventilation systems. The supplier should provide an acoustic test certificate to demonstrate that these criteria are met by the chosen windows / trickle vents.

Element	Type	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	R/Dne _v
Windows	R, dB	26	27	34	40	38	38	37
Trickle Ventilator – Open	Dne, dB	35	30	39	43	41	41	40

Table 4.2 Acoustic performance of windows and trickle vents

The sound reduction indices provided above will reduce general sources of environmental noise on site to within the recommendations of BS 8233: 2014 and the WHO. Supporting calculations demonstrating this compliance are provided in Appendix A.

5.0 Plant Noise - Maximum Noise Rating Levels

In the event that the proposed development introduces items of mechanical plant, the following noise rating level limits will be applicable at the nearest noise sensitive receptors. This would be applicable to air source heat pumps, air conditioning condensers, or any other such plant. The rating level limits are based on 5 dB below the background noise level. This can be adjusted as required, should the local planning authority require more strict targets.

Time Period	Background Noise Level, L_{A90} dB	Rating Level Limit, $L_{A,T}$ dB
DAY 0700 – 2300	50	45
NIGHT 2300 – 0700	32	27

Table 5.1: Background Noise Levels, Rating Level Limits for Mechanical Plant

6.0 Conclusion

Clear Acoustic Design has been appointed to carry out an environmental noise assessment in relation to the proposed development at 40-48 and 50 Mount Pleasant, Reading, RG1 2TD. Proposals are for the creation of 6 new-build dwellings at 40-48 Mount Pleasant, and a refurbishment of the existing listed building at 50 Mount Pleasant. The local planning authority has requested a noise assessment, in order to safeguard the amenity of the future occupants.

The assessment carried out is in line with BS 8233: 2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*, and the recommendations of the World Health Organisation. These assessment criteria are seen to be in full accordance with the requirements of the local planning authority.

Given that the existing building at 50 Mount Pleasant is listed, the measured internal noise levels are seen to be acceptable. This is in line with the approved 5 dBA relaxation to the internal noise criteria as defined by BS 8233. Should the local planning authority wish to further reduce internal noise levels, and secondary glazing system (single or double pane) will bring internal noise levels down to significantly below the BS 8233 criteria.

With regards to the new-build dwellings at 40-48 Mount Pleasant, it will be necessary to specify building envelope constructions in line with the façade specification in Section 4.0 of this report. Implementation of this specification will lead to compliance with the recommendations of BS 8233: 2014 and the WHO in all areas of the site.

Given that noise will be reduced to within the regulatory guidelines provided by the local planning authority - the *No Observed Adverse Effect Level* (NOAEL) is seen to have been achieved. It is therefore seen that a high standard of residential amenity will be provided by the proposed development.

Appendix A – BS 8233 Noise Break-in Calculations

CLEAR BS8233 Noise Break-in Calculation ACOUSTIC DESIGN		125	250	500	1000	2000	4000	dB(A)
Noise Level at Façade		60	61	62	66	62	51	68
Additional Safety	3 dB	3.0	3.0	3.0	3.0	3.0	3.0	
Facade Corrections	Lff	0.0	0.0	0.0	0.0	0.0	0.0	
Volume of room	51 m3							
Reverberation Time in room	0.8 s	0.8	0.8	0.8	0.8	0.8	0.8	
A = Total absorption in Sabines		10.3	10.3	10.3	10.3	10.3	10.3	
10*log(S/A)		6.9	6.9	6.9	6.9	6.9	6.9	
Facade Details Total Façade Area 50.5 m2								
External Wall	45 m2	37	39	45	52	55	55	
External Wall								
Noise ingress through element		32.6	31.8	25.9	23.1	16.3	4.9	28.5
Window	5.5 m2	26	27	34	40	38	38	
Glazing								
Noise ingress through element		34.5	34.7	27.8	26.0	24.2	12.8	31.8
Trickle Vent - n=1 = one trickle vent	n = 2	35	30	39	43	41	41	
Acoustic trickle Vent		35	30	39	43	41	41	
Trickle Vent								
Noise ingress through element		28.1	34.3	25.4	25.6	23.8	12.4	31.0
Total Noise Level in Room		37	39	31	30	27	16	35

Figure A.1: Noise Break-In Calculation – LAeq 16 HOUR

CLEAR ACOUSTIC DESIGN				BS8233 Noise Break-in Calculation							
				125	250	500	1000	2000	4000	dB(A)	
Noise Level at Façade				55	56	57	61	57	46	63	
Additional Safety				3.0	3.0	3.0	3.0	3.0	3.0		
Façade Corrections				0.0	0.0	0.0	0.0	0.0	0.0		
Volume of room				0.5	0.5	0.5	0.5	0.5	0.5		
Reverberation Time in room				10.0	10.0	10.0	10.0	10.0	10.0		
A = Total absorption in Sabines				2.6	2.6	2.6	2.6	2.6	2.6		
10*log(S/A)											
Façade Details											
Total Façade Area				18.0 m2							
External Wall				15 m2							
External Wall				Noise ingress through element							
				23.0	22.2	16.3	13.5	6.7	-4.7	18.8	
Window				3.0 m2							
Glazing				Noise ingress through element							
				27.0	27.2	20.3	18.5	16.7	5.3	24.3	
Trickle Vent - n=1 = one trickle vent				n = 1							
Acoustic trickle Vent				Noise ingress through element							
Trickle Vent				23.2	29.4	20.5	20.7	18.9	7.5	26.1	
Total Noise Level in Room				125	250	500	1000	2000	4000	dB(A)	
				30	32	24	23	21	10	29	

CLEAR BS8233 Noise Break-in Calculation ACOUSTIC DESIGN		125	250	500	1000	2000	4000	dB(A)
Noise Level at Façade		68	67	65	75	75	62	79
Additional Safety	3 dB	3.0	3.0	3.0	3.0	3.0	3.0	
Facade Corrections	Lff	0.0	0.0	0.0	0.0	0.0	0.0	
Volume of room	31 m3							
Reverberation Time in room	0.5 s	0.5	0.5	0.5	0.5	0.5	0.5	
A = Total absorption in Sabines		10.0	10.0	10.0	10.0	10.0	10.0	
10*log(S/A)		2.6	2.6	2.6	2.6	2.6	2.6	
Facade Details								
Total Façade Area		18.0 m2						
External Wall		15 m2						
External Wall		37	39	45	52	55	55	
Noise ingress through element		35.5	32.8	24.6	27.3	24.7	11.3	31.5
Window		3.0 m2						
Glazing		26	27	34	40	38	38	
Noise ingress through element		39.5	37.8	28.6	32.3	34.7	21.3	38.5
Trickle Vent - n=1 = one trickle vent		n = 1						
Acoustic trickle Vent		35	30	39	43	41	41	
Trickle Vent		35	30	39	43	41	41	
Noise ingress through element		35.7	40.0	28.8	34.5	36.9	23.5	40.6
Total Noise Level in Room		42	43	33	37	39	26	43

Figure A.3: Noise Break-In Calculation – L_{max}