

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3447

27 February 2023

Dex Construction Group Ltd
Second Floor
Northern Assurance Building
9-21 Princess Street
MANCHESTER
M2 4DN

COLLYHURST VILLAGE, MANCHESTER

SCHEME OF SOUND INSULATION MEASURES

ACOUSTIC CONSULTANCY REPORT ADT 3447/SSM

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1.0 BASIS OF ASSESSMENT

1.1 Site Location

The site is located on Rochdale Road, on the north-eastern outskirts of Manchester. Rochdale Road forms the western site boundary, with Thornton Street North to the east. The site is currently cleared for development with fences surrounding the site.

The surrounding area is mostly residential, with houses in all directions. Blocks of houses are located on the opposite side of Rochdale Road, and houses on the Thornton Street North side.

The A664 Rochdale Road joins the A6010 ring road around 130 metres away to the north-east.

1.2 Development Details

Planning permission 129393/VO/2021 has been granted for the erection of 168, three and four storey dwelling houses and two, five and six storey apartment buildings to form 76 residential apartments with associated ground floor flexible commercial unit.

1.3 Assessment Criteria

Planning condition 19 from 129393/VO/2021 reads as follows:

...prior to the first occupation of a phase of the development a scheme for acoustically insulating the proposed residential accommodation against noise from the local traffic network shall be submitted for approval in writing by the City Council.

Noise survey data must include measurements taken during the rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time – 23.00 – 07.00) 30 dB L Aeq)individual noise events shall not exceed 45 dB L Amax, F by more than 15 times)

Living Rooms (daytime – 07.00 – 23.00) 35 dB L Aeq

Gardens and terraces (daytime) 55dB LAeq

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Introduction

A fully attended environmental noise survey was undertaken over three sample periods to cover the most critical parts of the day and night. The first was between 14:00 hours and 17:00 hours on Thursday 08 February 2023, the second between 05:00 and 07:00 hours on Friday 09 February 2023 and the third between 23:00 hours on Monday 13 February 2023 and 01:00 hours the following morning.

2.2 Instrumentation

The instrumentation used, and the field calibration values before and after the survey are detailed in Appendix A of this report.

2.3 Procedure

Two measurement positions were selected as described below and indicated on the attached site plan 3447/SP1:

- i. on the site, at the western site boundary approximately 10 metres from the Rochdale Road kerb
- ii. on the site, further behind from position 1 approximately 26 metres from the Rochdale Road kerb.

At both positions the microphone was mounted on a tripod approximately 1.2 metres above the ground and least 3.5 metres from any other acoustically reflective surface.

Measurements were taken hourly at each positions using the Norsonic sound level meter and the Black Solo sound level meter both set to store the octave band and A-weighted 100ms short-term L_{eq} levels over a 15 minute sample of each hour for subsequent post processing.

2.4 Results

The octave band and A-weighted $L_{eq, 15 \text{ mins}}$ for each measurement are listed in the attached table 3447/T1.

The 1 minute octave band and A-weighted $L_{max(F)}$ measured at position 1 nearest Rochdale Road are listed in the attached tables 3447/T2 – T5.

Please refer to Appendix B for explanation of the noise units and the A-weighting term used in this report.

2.5 Weather Conditions

For the duration of each survey period the weather conditions were dry with no more than a light breeze, and had no significant effect on the measured levels.

2.6 Description of Existing Acoustic Environment

The noise levels at both positions were generally controlled by the steady traffic on Rochdale Road. Noise from buses idling and constant buses passing was also noticeable.

During quieter periods the noise of traffic on the A6010 was also audible.

3.0 SCHEME OF SOUND INSULATION MEASURES

3.1 Site Noise Levels

When assessing external noise intrusion into new dwellings and noise levels in gardens it must be borne in mind that the noise climate may change in the future. The following discussion is by necessity based on the results of the environmental noise survey described in Section 2.0 above.

Based on the survey results, the noise levels across the proposed development site have been calculated using Cadna/A 2023 environmental noise mapping software. The day time incident $L_{eq, 16 \text{ hour}}$ are summarised in the following table:

Location	Day time incident $L_{eq, 16 \text{ hour}}$ (07:00 - 23:00)								
	Average $L_{eq,T}$ (dB) at octave band centre frequency (Hz)								$L_{Aeq,T}$ dB
	63	125	250	500	1k	2k	4k	8k	
Rochdale Road - Front Elevations	71	67	65	64	65	63	53	46	69
Rochdale Road - Side Elevations	68	64	62	61	62	60	50	43	66
Rear blocks on Thornton Street	57	53	51	49	51	48	37	26	54

The night time $L_{eq, 8 \text{ hour}}$ are presented in the same way in the following table:

Location	Night time incident $L_{eq,8 \text{ hour}}$ (23:00 - 07:00)								
	Average $L_{eq,T}$ (dB) at octave band centre frequency (Hz)								$L_{Aeq,T}$ dB
	63	125	250	500	1k	2k	4k	8k	
Rochdale Road - Front Elevations	65	61	60	58	62	59	49	41	65
Rochdale Road - Side Elevations	62	58	57	55	58	55	46	38	62
Rear blocks on Thornton Street	50	44	44	43	46	43	32	18	49

In respect of the L_{max} levels, in the context of the requirement to ensure L_{Amax} levels do not exceed 45 dB more than 15 times over a night, as the survey periods covered a 4 hour sample of the whole night time period, it is reasonable to assume that the 8th highest measured 1 minute L_{Amax} would be the typical level excluding extraneous events.

Analysis indicates typical levels of 76 dB L_{Amax} at the Rochdale Road elevations, 73 dB L_{Amax} on the most exposed side elevations and 60 dB L_{Amax} at the rear blocks. However, it is not practical to derive a definitive octave band incident L_{max} spectrum, as the frequency spectra of the measured L_{max} levels varies significantly.

The scheme of sound insulation measures has therefore been designed for compliance with the $L_{eq,T}$ criteria, and the resulting level differences have then been applied to the full set of measured octave band L_{max} in order to check compliance with the L_{Amax} requirement.

3.2 Noise Criteria

Planning Condition 19 requires a scheme of sound insulation measures sufficient to achieve ≤ 35 dB $L_{Aeq, 16 \text{ hour}}$ in living rooms, ≤ 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms and L_{Amax} in bedrooms not exceeding 45 dB more than 15 times a night.

There is also a noise limit of $\leq 55 \text{ dB } L_{\text{Aeq, 16 hour}}$ for gardens, although as compliance with that requirement is entirely dictated by the site layout and massing on the approved drawings with no scope for further sound insulation measures, it has not been assessed in detail in this report. For the town houses, it is reasonable to assume that the acoustic screening provided by buildings and solid fences should generally yield compliance with the required limit.

3.3 Scheme of Sound Insulation Measures

The main elements of the building envelope are the external walls, glazing systems and ventilation systems. These are described separately in the following sections.

3.3.1 External Walls

The majority of the external walls are formed using 102.5mm outer brickwork with a clear cavity, insulation and plasterboard linings on a timber frame. The calculated sound insulation performance of this construction is $R_w 62$, by virtue of the mass of the brickwork and the additional benefit of the lining, which should be more than enough for all locations.

Certain elevations will have lightweight cladding on 18mm plywood on 70mm PIR insulation on 9mm OSB on 95mm timber frame with another 70mm PIR insulation board and 15mm plasterboard lining internally. The calculated sound insulation of this construction is $R_w 45$. This is substantially lower than the brickwork wall, but should be sufficient for the less critical locations where it occurs, which include ground floor hallways to townhouses and 2nd floor home offices overlooking top floor terraces.

3.3.2 Ventilation Openings

The proposed ventilation strategy features MVHR units to every dwelling, eliminating the need for direct ventilation openings such as trickle vents or air bricks which are often the weakest element of a building envelope. With the accumulated system losses through the ducts, the MVHR unit, the various bends and roomside attenuators external noise intrusion via this route should be negligible.

3.3.3 Glazing

With reasonably high performance from the external walls and with no ventilation grilles it will be the glazing will primarily determines the acoustic performance of the facade as a whole, and therefore the degree of external noise intrusion.

The sound insulation performance requirements for compliance with the indoor ambient noise criteria in Section 1.3 above are provided in the attached table 3447/T6 and associated mark up plans. A sample calculation is provided in Appendix C.

These sound insulation performance requirements are for complete systems, including the frame and glass. Where laboratory test data is only available for the glass unit, the frame manufacturer will need to ensure that their systems are capable of matching the sound insulation performance of the glass unit.

FOR ACOUSTIC DESIGN TECHNOLOGY



<u>Notes</u>	<u>Description</u> Site Plan Showing Noise Monitoring Locations		 ACOUSTIC DESIGN TECHNOLOGY Noise and Vibration Consultants
	<u>Project</u> Collyhurst Village, Manchester		
	<u>Survey Date</u> 08, 09 and 13 February 2023	<u>Drawing No.</u> 3447/SP1	

Summary of Measured $L_{eq,T}$

Position	Date	Time	Duration	Average $L_{eq,T}$ (dB) at octave band centre frequency (Hz)								$L_{Aeq,T}$ dB
				63	125	250	500	1k	2k	4k	8k	
Position 1	08/02/2023	14:15 – 14:30	15 minutes	68	67	65	65	63	61	51	44	68
		15:15 – 15:30		70	63	61	59	63	61	51	44	67
		16:15 – 17:30		70	65	62	60	64	62	51	43	67
Position 2	08/02/2023	14:40 – 14:55	15 minutes	67	60	56	52	55	49	39	33	58
		15:35 – 16:50		66	61	59	53	56	50	41	32	59
		16:35 – 17:50		67	62	58	55	56	50	41	46	59
Position 1	09/02/2023	05:05 – 05:20	15 minutes	61	57	54	52	57	54	46	37	60
		06:05 – 06:20		66	59	58	56	61	59	49	41	64
Position 2	09/02/2023	05:25 – 05:40	15 minutes	60	55	51	46	52	47	39	29	55
		06:25 – 06:40		64	59	55	51	56	52	42	32	59
Position 1	13/02/2023	23:01 – 23:16	15 minutes	62	58	56	55	59	56	46	38	62
		00:01 – 00:16		63	57	54	53	58	55	45	35	61
Position 2	13/02/2023	23:20 – 23:35	15 minutes	62	55	51	48	52	47	36	24	54
		00:20 – 00:35		59	53	50	47	51	45	35	23	51

Table 3447/T1

Measured 1 minute $L_{\max,F}$ for measurement position 1, 23:01 to 23:16, 13 February 2023

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
23:01	70	64	64	64	69	68	57	45	72
23:02	64	60	58	51	59	56	40	26	62
23:03	75	69	67	67	68	69	65	62	74
23:04	78	74	78	77	73	68	59	51	78
23:05	79	73	74	69	67	67	64	64	74
23:06	81	75	78	73	70	66	66	61	76
23:07	70	65	64	63	66	65	59	56	70
23:08	68	65	58	57	63	59	50	39	66
23:09	74	66	66	67	70	69	61	50	74
23:10	69	64	63	63	69	67	58	46	72
23:11	71	63	63	63	67	64	54	40	70
23:12	77	66	67	65	67	66	55	50	71
23:13	62	59	59	61	66	65	53	41	70
23:14	75	72	72	70	68	65	60	52	73
23:15	70	68	65	65	69	65	56	43	71

TABLE 3447/T2

Measured 1 minute $L_{\max,F}$ for measurement position 1, 00:01 to 00:16, 14 February 2023

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
23:01	69	66	63	59	65	62	52	42	68
23:02	73	66	64	62	67	65	56	45	70
23:03	77	67	65	69	69	67	61	55	73
23:04	68	59	63	60	67	65	54	43	70
23:05	76	67	66	57	62	59	48	37	66
23:06	78	69	63	66	64	59	49	41	68
23:07	74	69	63	61	65	65	52	44	69
23:08	75	70	67	67	66	62	57	48	70
23:09	83	74	69	69	68	67	62	55	73
23:10	75	71	61	60	62	59	48	39	66
23:11	73	64	65	63	69	65	55	45	71
23:12	67	63	60	60	66	64	55	44	69
23:13	78	73	69	69	67	63	58	51	72
23:14	72	60	63	63	67	67	56	42	71
23:15	79	69	63	63	71	68	59	47	73

TABLE 3447/T3

Measured 1 minute $L_{\max,F}$ for measurement position 1, 05:05 to 05:20, 9 February 2023

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
05:05	70	76	67	67	69	66	59	54	73
05:06	73	72	65	64	71	68	59	47	74
05:07	69	66	64	64	72	69	59	48	74
05:08	61	50	46	57	50	44	47	40	57
05:09	71	75	74	73	74	75	68	61	79
05:10	59	56	54	50	57	56	46	42	61
05:11	68	61	63	61	61	60	51	44	65
05:12	71	65	63	63	70	69	59	48	74
05:13	71	65	63	63	68	67	59	50	72
05:14	78	73	74	69	69	66	62	57	74
05:15	73	69	64	66	70	67	58	53	73
05:16	63	54	46	45	56	48	53	42	59
05:17	81	77	72	65	67	66	59	49	72
05:18	72	66	66	65	73	69	60	50	75
05:19	73	61	64	60	63	61	52	48	67

TABLE 3447/T4

Measured 1 minute $L_{\max,F}$ for measurement position 1, 06:05 to 06:20, 9 February 2023

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
06:05	74	67	64	65	64	63	57	52	69
06:06	72	64	65	62	69	66	56	51	72
06:07	69	65	64	61	67	65	54	52	70
06:08	76	66	64	66	68	66	57	50	72
06:09	74	67	64	62	68	65	55	49	71
06:10	75	69	66	65	70	67	59	47	73
06:11	74	72	70	70	69	68	59	51	74
06:12	72	72	67	67	71	66	61	51	73
06:13	77	73	72	69	69	66	63	68	74
06:14	74	64	65	63	68	67	56	47	72
06:15	79	66	66	59	62	60	52	47	66
06:16	79	75	79	73	70	67	62	54	76
06:17	78	74	71	67	69	67	58	58	73
06:18	86	67	68	66	68	65	55	46	72
06:19	78	72	67	67	69	66	57	49	72

TABLE 3447/T5

ACOUSTIC SPECIFICATIONS FOR GLAZING SYSTEMS
(to achieve 35 dB L_{Aeq,16 hour} during the day / 30 dB L_{Aeq, 8 hour} / 45 dB L_{Amax} during the night)

Minimum Required Sound Reduction Indices (R) for Glazing Systems dB

Zone	Mark up colour	Rooms	Octave Band Centre Frequency - Hz								Possible Glazing Configuration
			63	125	250	500	1k	2k	4k	8k	
Bedroom glazing zones											
Zone 1		Bedrooms on Collyhurst Road and near bus stop	25	28	31	42	45	50	55	55	Pilkington 10 / 16 / 8.8 ‘Optiphon’
Zone 2		Bedrooms on side elevations near Collyhurst Road	22	25	27	38	45	47	55	55	Pilkington 6 / 16 / 8.8 ‘Optiphon’
Zone 3		Bedrooms – set back from Collyhurst Road and on Thornton Street North	19	21	28	37	45	48	54	54	Pilkington 6 / 16 / 6.8 ‘Optiphon’
Living room glazing zones											
Zone 1		Living rooms on Collyhurst Road and near bus stop	22	25	27	38	45	47	55	55	Pilkington 6 / 16 / 8.8 ‘Optiphon’
Zone 2		Living rooms on side elevations near Collyhurst Road	19	21	28	37	45	48	54	54	Pilkington 6 / 16 / 6.8 ‘Optiphon’
Zone 3		Living rooms – set back from Collyhurst Road and on Thornton Street North	17	20	18	28	38	34	38	38	Pilkington 6 / 16 / 6 thermal DGU
Other locations											
Zone 4	not marked	Low incident noise locations	17	20	18	28	38	34	38	38	Pilkington 6 / 16 / 6 thermal DGU

TABLE 3447/T6



Glazing Zones

	Zone 1
	Zone 2
	Zone 3
unmarked	Zone 4

Description

Acoustic glazing zones – Plot A

Project

Collyhurst Village, Manchester

Date

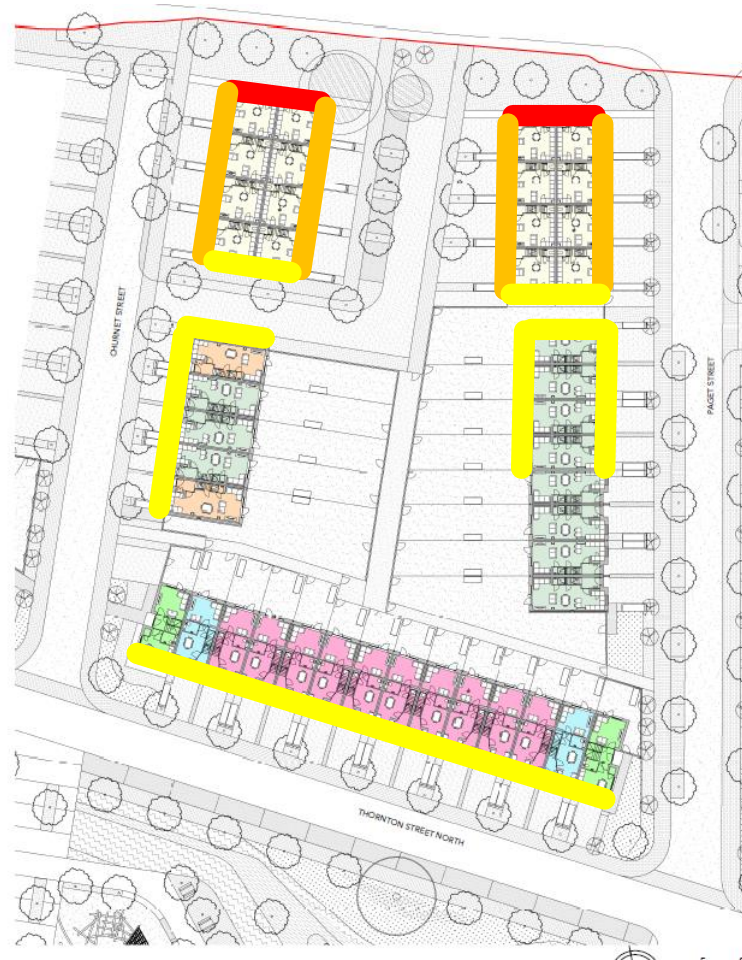
27/02/2023

Drawing No.

3447/SP3



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Glazing Zones

	Zone 1
	Zone 2
	Zone 3
unmarked	Zone 4

Description

Acoustic glazing zones – Plot B

Project

Collyhurst Village, Manchester

Date

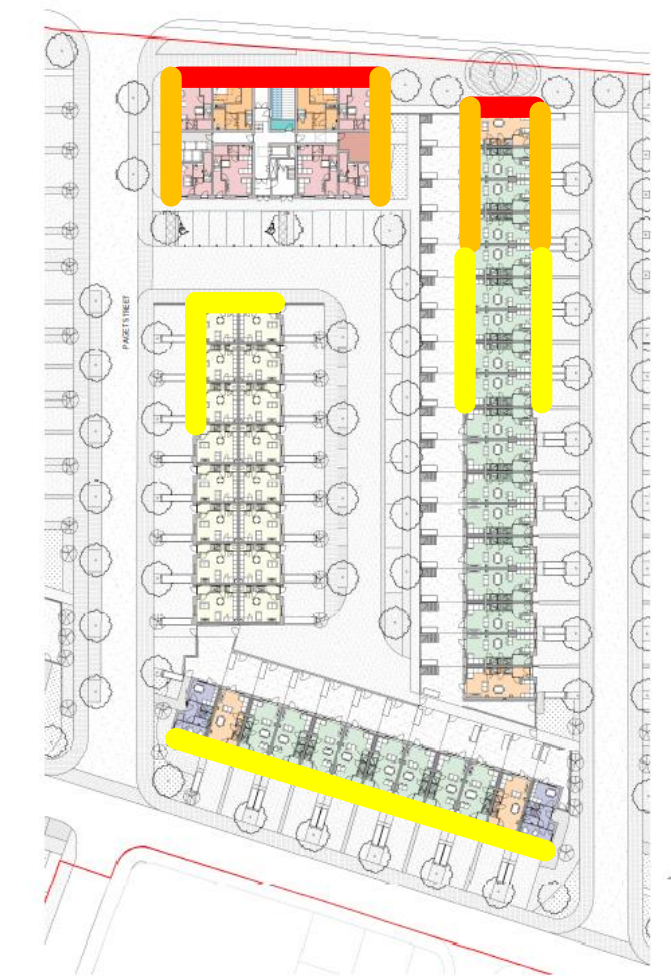
27/02/2023

Drawing No.

3447/SP4



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Glazing Zones

	Zone 1
	Zone 2
	Zone 3
unmarked	Zone 4

Description

Acoustic glazing zones – Plot C

Project

Collyhurst Village, Manchester

Date

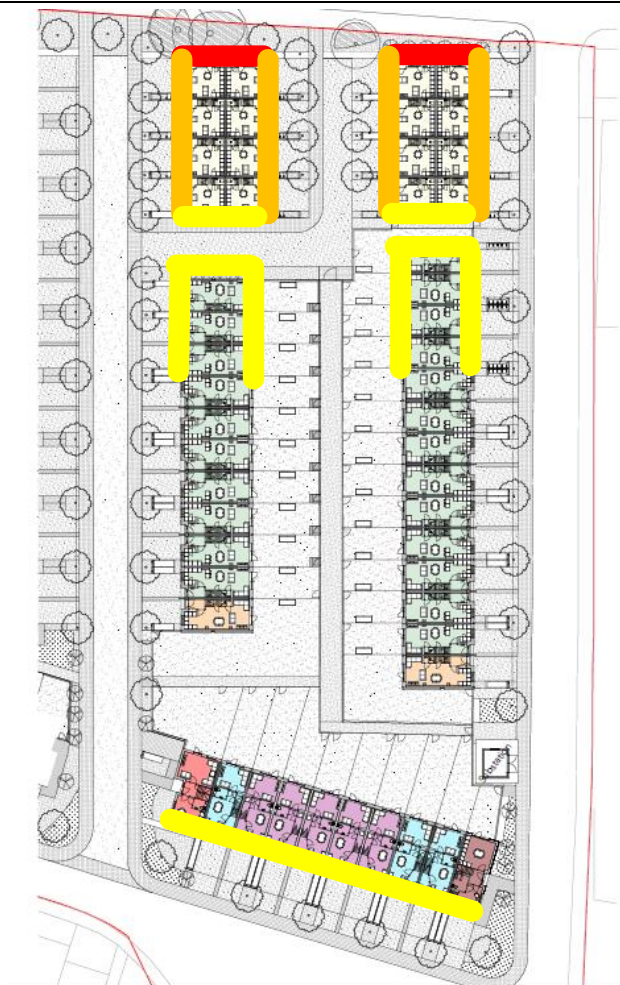
27/02/2023

Drawing No.

3447/SP5



ACOUSTIC DESIGN TECHNOLOGY
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Glazing Zones

	Zone 1
	Zone 2
	Zone 3
unmarked	Zone 4

Description

Acoustic glazing zones – Plot D

Project

Collyhurst Village, Manchester

Date

27/02/2023

Drawing No.

3447/SP6



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APPENDIX A
INSTRUMENTATION

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration	Calibrator Output (dB)	Free Field Correction (dB)	Initial Reading (dB)	Final Reading (dB)
01dB	(Black) Solo Class 1 Sound Level Meter	65201	November 2021		-0.1	113.9	113.9
Norsonic	Nor140 Class 1 Sound Level Meter (SLM6)	1404515	March 2021		-0.2	113.8	113.9
Norsonic	Nor1251 Calibrator (Cal 4)	33453	February 2022	113.99			
Norsonic	Nor1251 Calibrator (Cal 5)	34220	February 2022	114.00			

APPENDIX B

Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

A-weighting	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the A-weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average person. It is also possible to calculate the A-weighted noise level by applying certain corrections to an un-weighted spectrum.
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When the noise being measured has variable amplitude, such as traffic noise, it is necessary to qualify the basic dB unit. This may be done using a statistical index L_n dB, where n is any value between 0 and 100, and is the percentage of the sample time for which the stated level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L₁₀, being the level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L₉₀ is the level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

$L_{eq,T}$ is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period. In other words, it is a measure of the "average" noise level

$L_{\max}$ $L_{\max}$ is the maximum time-weighted sound pressure level recorded over the stated time period

APPENDIX C

SAMPLE FAÇADE CALCULATION – BEDROOM, COLLYHURST ROAD ELEVATION

	Area	Octave Band Centre Frequency - Hz								dB(A)	NR
		63	125	250	500	1k	2k	4k	8k		
Incident noise level $L_{eq, 8 \text{ hour}}$		65	61	60	58	62	59	49	41	65	62
Direct Field											
Composite SRI of structure (from below)		-26	-32	-35	-46	-49	-54	-57	-57		
Direct L_p		39	29	25	12	13	5	-8	-16	20	14
Reverberant Field											
Composite SRI of structure (from below)		-26	-32	-35	-46	-49	-54	-57	-57		
10 log (S / A)		2	2	2	1	-1	-2	-2	-2		
Constant (for line source)		1	1	1	1	1	1	1	1		
Reverberant L_p		42	32	28	14	13	4	-9	-17	23	17
Total L_p		44	34	30	16	16	8	-5	-13	25	19
Composite SRI Calculation											
Zone 1 glazing (Pilkington 10 / 16 / 8.8)	2.4	25	28	31	42	45	50	55	55		
Brick wall	4.1	26	43	47	55	60	60	60	60		