

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3447

13 March 2023

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COLLYHURST VILLAGE, MANCHESTER – SOUTHERN SITE

SCHEME OF SOUND INSULATION MEASURES

ACOUSTIC CONSULTANCY REPORT ADT 3447/SSM2

Revision	Date	Issued By	Checked by	Revision Notes
-	13 March 2023	Leo Oikawa	Chris Middleton	first issue

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1.0 BASIS OF ASSESSMENT

1.1 Site Location

The site is located on Kingsfold Avenue, Manchester and is currently cleared for development. Kingsfold Avenue forms the north-western site boundary, with Whitley Road to the north-east and Winscombe Drive to the south-east. There is a children's play area to the south-west.

The surrounding area is mostly residential. The main noise source is the railway some 30 metres away from the southern corner of the site. The A664 Rochdale Road is located around 130 metres away to the north-west.

1.2 Development Details

Planning permission 130514/VO/2021 has been granted for 'the erection of 14 three storey dwellinghouses (Use Class C3a) and a four storey building comprising 16 residential apartments (Use Class C3a); highways improvements, including the formation of a new road, extension of Kingsfold Avenue including the formation of on-street car parking spaces, formation of new pavements and re-surfacing of existing roads; and associated car parking; cycle and refuse storage; landscaping; public realm; and infrastructure'.

1.3 Assessment Criteria

Planning condition 16 from 130514/VO/2021 reads as follows:

...prior to the first occupation 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, as Local Planning Authority.

The approved noise insulation scheme shall be completed before the first occupation of the development. Noise survey data must include measurements taken during a 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) 55 dB L Aeq

2.0 BASELINE NOISE DATA

2.1 Introduction

An environmental noise survey was undertaken by Sandy Brown Associates in February 2021, and the report 19514-R07-D dated 14 May 2021 was submitted in support of the planning application.

To check the currency of the noise levels in that report and to provide octave band noise data, a fully attended environmental noise survey was undertaken on Wednesday 8 March 2023, over a typical sample of day time road traffic and railway noise conditions, including a freight train. The railway noise levels can be directly applied to the night time period.

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. at the southern corner of the site, approximately 30 metres from the railway.
- ii. at the northern corner of the site, approximately 7 metres from the Whitley 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.

At position 1, measurements were taken over a 1 hour period using the 01dB Solo sound level meter set to octave band and A-weighted 100ms short-term L_{eq} for subsequent post processing.

At position 2, measurements were taken over a series of 10 minute sample periods using the Norsonic sound level meter set to store the octave band and A-weighted 100ms short-term L_{eq} levels for subsequent post processing.

2.4 Results

The octave band and A-weighted $L_{eq, T}$ for all measurements are listed in the attached table 3447/T1.

The 1 minute octave band and A-weighted $L_{max(F)}$ measured at position 1 nearest the railway 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 railway noise, with occasional local traffic and background noise from Rochdale Road. The rail traffic was frequent passenger trains in the main, but included a long freight train at 12:29.

During quieter periods the noise of traffic on the A62 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.

The noise levels measured at position 1 as set out in the attached table 3447/T1 are similar to those recorded during the previous Sandy Brown survey, and in a noise climate primarily controlled by railway traffic they can be considered representative of the day time or night time incident $L_{eq,T}$.

The survey data has been used in conjunction with Cadna/A 2023 environmental noise mapping software to derive incident $L_{eq,T}$ as follows:

Location	Incident $L_{eq,T}$ – day or night								$L_{Aeq,T}$ dB
	$L_{eq,T}$ (dB) at octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
South-east elevations	62	57	54	49	50	45	38	31	54
North-west elevations	57	51	46	41	45	44	31	14	49

In respect of the $L_{Amax,F}$, analysis indicates a typical level of 71 dB at the south-east elevations most exposed to the railway noise. 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 16 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 ≤ 55 dB $L_{Aeq, 16 \text{ hour}}$ for gardens, and as the measured levels set out in the attached table 3447/T1 are all within that range even without taking into account acoustic screening from garden fences, compliance would clearly be achieved in this case.

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.

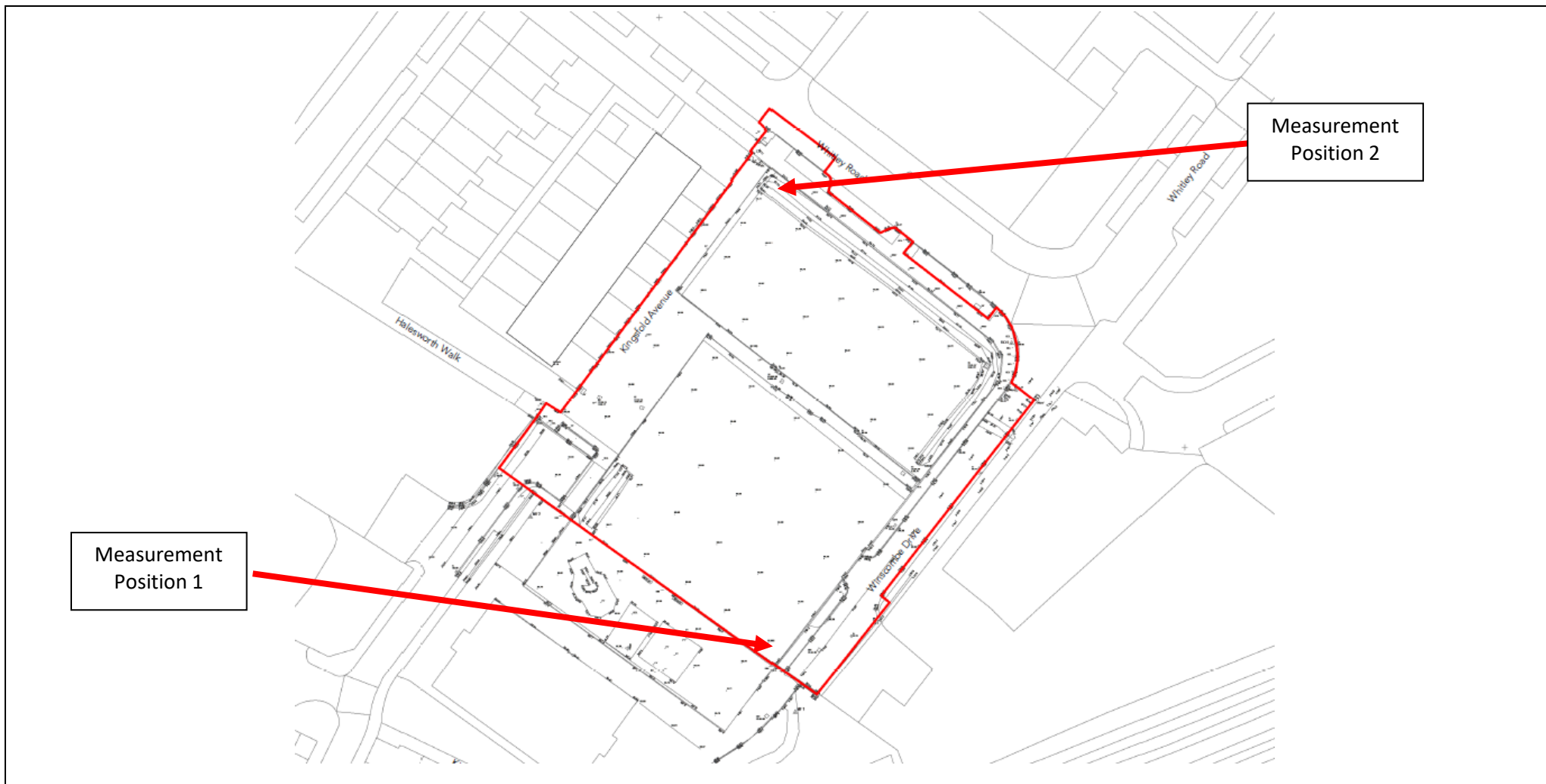
3.3.3 Glazing

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 plan. 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 – Southern site		
	<u>Survey Date</u> 08 March 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	12:06 – 13:06	1 hour	64	58	54	50	51	47	40	35	55
Position 2	08/02/2023	12:24 – 12:34	10 minutes	62	59	50	48	50	46	38	30	53
		12:46 – 12:56		59	54	52	47	48	43	34	28	52

Table 3447/T1

Measured 1 minute $L_{\max,F}$ for measurement position 1, (Black Solo)

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
12:06	74	76	70	63	63	64	58	49	70
12:07	67	67	69	58	60	57	50	45	65
12:08	69	60	57	52	51	43	42	45	56
12:09	66	57	60	52	56	56	53	47	62
12:10	64	56	51	49	48	44	44	45	54
12:11	71	72	69	62	66	64	57	46	70
12:12	67	60	56	52	52	50	46	46	57
12:13	69	58	59	60	48	43	42	45	59
12:14	73	65	66	58	51	46	42	45	61
12:15	70	63	69	57	64	56	46	45	67
12:16	63	56	55	50	49	50	42	45	56
12:17	63	57	49	55	53	49	47	45	57
12:18	93	77	69	63	66	60	54	46	72
12:19	68	65	65	59	64	59	53	46	67
12:20	63	54	63	68	65	64	55	50	70

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	
12:21	69	57	54	653	64	58	48	47	66
12:22	65	56	49	53	58	51	46	45	60
12:23	64	56	46	50	53	42	43	44	55
12:24	77	64	60	57	62	57	49	45	65
12:25	65	57	52	50	52	44	43	45	55
12:26	66	63	57	50	51	45	41	44	56
12:27	73	62	61	56	58	57	52	33	63
12:28	82	72	69	62	64	62	61	49	69
12:29	76	68	64	56	58	56	51	44	63
12:30	67	68	66	62	57	52	49	46	64
12:31	67	67	61	54	51	51	48	44	59
12:32	64	71	52	55	54	50	41	44	59
12:33	84	81	74	68	72	68	62	54	76
12:34	65	59	52	57	52	52	54	56	61
12:35	75	63	51	49	52	55	51	48	60

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	
12:36	63	57	51	51	52	47	43	45	56
12:37	73	64	54	48	58	51	43	45	61
12:38	80	82	79	67	70	68	62	50	76
12:39	63	54	46	52	49	43	41	40	53
12:40	64	58	60	25	50	45	42	44	56
12:41	65	60	60	56	60	49	43	45	62
12:42	79	64	65	59	65	50	52	45	68
12:43	78	71	56	49	49	49	48	45	59
12:44	73	77	73	65	69	66	59	51	73
12:45	72	59	59	62	57	49	46	47	63
12:46	74	61	64	54	53	49	43	45	60
12:47	78	68	66	59	63	60	58	48	67
12:48	66	62	70	50	57	59	48	46	64
12:49	67	63	64	57	55	54	47	45	62
12:50	65	65	64	55	52	48	42	45	59

TABLE 3447/T4

Measured 1 minute $L_{\max,F}$ for measurement position 1 (Black Solo)

Time	$L_{\max,F}$ (dB) at octave band centre frequency (Hz)								$L_{AF\max}$ dB
	63	125	250	500	1k	2k	4k	8k	
12:51	66	56	54	52	51	50	42	45	56
12:52	70	58	50	52	52	51	44	49	57
12:53	69	68	68	62	69	66	57	48	72
12:54	68	57	62	54	47	43	42	44	57
12:55	66	60	60	51	54	44	42	49	57
12:56	65	60	68	52	48	42	42	45	60
12:57	63	61	57	54	53	47	29	15	57
12:58	73	57	62	49	50	43	42	45	57
12:59	82	80	72	62	62	60	55	46	70
13:00	67	64	65	45	60	55	49	44	64
13:01	69	60	54	54	51	51	46	45	57
13:02	66	61	50	53	50	47	47	45	56
13:03	65	65	62	52	54	52	42	44	59
13:04	63	55	56	57	56	51	48	45	61
13:05	71	64	65	58	53	54	52	49	62

TABLE 3447/T5

ACOUSTIC SPECIFICATIONS FOR GLAZING SYSTEMS
(to achieve 35 dB $L_{Aeq,16\text{ hour}}$ during the day / 30 dB $L_{Aeq, 8\text{ hour}}$ / 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	
Zone 1		Bedrooms facing railway	19	21	28	37	45	48	54	54	Pilkington 6 / 16 / 6.8 'Optiphon'
Zone 2	not marked	All other rooms	17	20	18	28	38	34	38	38	Pilkington 6 / 16 / 6 thermal DGU

TABLE 3447/T6



Glazing Zones

	Zone 1
unmarked	Zone 2

Description

Acoustic glazing zones

Project

Collyhurst Village, Manchester – Southern site

Date

13/03/2023

Drawing No.

3447/SP2



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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	113.8
Norsonic	Nor140 Class 1 Sound Level Meter (SLM10)	1407647	February 2023		-0.2	113.8	113.8
Norsonic	Nor1251 Calibrator (Cal4)	33543	February 2022	113.99			

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.

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.

L_{10} L_{10} , 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.

L_{90} L_{90} 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:

$L_{eq,T}$ $L_{eq,T}$ 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 FACING RAILWAY

	Area	Octave Band Centre Frequency - Hz								dB(A)	NR
		63	125	250	500	1k	2k	4k	8k		
Incident noise level		62	57	54	49	50	45	38	31	54	50
Direct Field											
Composite SRI of structure (from below)		-23	-28	-35	-44	-54	-54	-58	-58		
Direct L_p		39	29	19	5	-4	-9	-20	-27	17	8
Reverberant Field											
Composite SRI of structure (from below)		-23	-28	-35	-44	-54	-54	-58	-58		
10 log (S / A)		1	1	1	0	-1	-3	-3	-3		
Constant (for line source)		1	1	1	1	1	1	1	1		
Reverberant L_p		41	31	21	6	-4	-11	-22	-29	19	10
Total L_p		43	33	23	9	-1	-7	-18	-25	21*	12
Composite SRI Calculation											
Zone 1 glazing	1.2	18	21	28	37	48	48	54	54		
External wall	5.3	26	43	47	55	60	60	60	60		

*Note:- compliance is determined by the L_{max} rather than the $L_{eq,T}$