

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3630

17 January 2024

Wythenshawe Community Housing Group
8 Poundswick Lane
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M22 9TA

GREENBROW SOCIAL CLUB
ENVIRONMENTAL NOISE IMPACT ASSESSMENT
ACOUSTIC CONSULTANCY REPORT ADT 3630/ENIA

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1.0 SUMMARY

Planning permission 137485/FO/2023 has been granted for the demolition of the existing building and the construction of 8 new two-storey houses and one three-storey block of 15 flats, with associated access and landscaping.

Condition 8 relates to the scheme of sound insulation measures. Part a) requires the submission and approval of a scheme of sound insulation measures prior to development commencing, while part b) requires verification of the performance prior to occupation. This report provides the information required in relation to part a) of the condition.

Acoustic Design Technology Limited have undertaken an environmental noise survey to determine the existing ambient noise levels on the site, in accordance with a method discussed in advance with Manchester City Council environmental protection department.

Based on the noise survey data, the noise levels incident on the proposed building have been calculated, and the sound insulation performance specifications have been determined for the building envelope each dwelling, for compliance with the noise criteria in Section 3.7.1.1 of the Manchester City Council publication 'Planning and Noise: Technical Guidance (October 2022).

In relation to the acoustic requirements of Approved Document O, as referenced in Section 5.3.1.6 of the same document, there would be an excess over the ADO prescribed night time L_{Amax} in the bedrooms facing Greenbrow Road and Newall Road with windows open. This would be unavoidable unless the houses had been situated at least 25 metres from the roadside boundaries.

For the development to be strictly in accordance with the requirements of Approved Document O it would be necessary to provide full mechanical ventilation and / or air conditioning to all of those bedrooms as an alternative to open windows. But in this particular context of a well established suburban housing estate, with all of the surrounding houses using open windows for the control of overheating, and site noise levels which would generally be considered low despite the stringent ADO requirement, a mechanical plant solution is considered unnecessary.

Noise levels in front gardens slightly exceed the MCC noise criteria, while the noise levels in rear gardens would be acceptable. That outcome is determined by the site layout and massing as shown on the approved drawings.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is located at the junction of Greenbrow Road and Newall Road in Wythenshawe, Manchester, M23 2TU, and was formerly a social club. The club building is derelict, and the roadside boundaries are formed by a low wall (approximately 600mm high) topped with open railings.

The surrounding area is primarily residential. There is Wythenshawe Hospital and an industrial estate approximately 700m to the north and agricultural fields approximately 140m to the west.

The closest main roads are Greenbrow Road, which passes along the eastern edge of the site, and Newall Road, which passes along the southern edge of the site and connects to Barnacre Avenue, which leads to Wythenshawe hospital. The M56 is located approximately 600m to the south-east. Manchester Airport is located approximately 1.1km away to the south at its closest boundary.

2.2 Proposed Development

Planning permission 137485/FO/2023 has been granted for the demolition of the existing buildings and the construction of eight new two-storey houses and one three-storey block of 15 flats, with associated access and landscaping.

2.3 Assessment Criteria

Section 3.7.1.1 of the Manchester City Council publication 'Planning and Noise: Technical Guidance (October 2022) provides the following acoustic design criteria for new dwellings:

Area	07:00 – 23:00	23:00 – 07:00
Living rooms	$\leq 35 \text{ dB } L_{Aeq, 16 \text{ hour}}$	-
Bedrooms	$\leq 35 \text{ dB } L_{Aeq, 16 \text{ hour}}$	$\leq 30 \text{ dB } L_{Aeq, 8 \text{ hour}}$ $\leq 45 \text{ dB } L_{Amax,F}^*$
Gardens	$\leq 55 \text{ dB } L_{Aeq, 16 \text{ hour}}$	-

*Note- the L_{Amax} requirement is to be not normally exceeded more than 10 times per night

In relation to ventilation, Section 5.3 of the same document states that the ventilation will need to meet the requirements of Part F of the Building Regulations, and Section 5.3.1.6 makes it clear that the noise criteria relate to the provision of whole dwelling (background) ventilation rather than purge ventilation.

It also a requirement that the ventilation system must also achieve the requirements of Part O of the Building Regulations, which states that external noise intrusion via open windows used to control overheating should not exceed the following levels:

Area	$L_{Aeq, 8 \text{ hour}}$	L_{Amax}
Bedrooms	$\leq 40 \text{ dB } L_{Aeq, 8 \text{ hour}}$	$\leq 55 \text{ dB } L_{Amax}$

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Introduction

An environmental noise survey was undertaken between 13:00 hours and 16:00 hours on Friday 12 January 2024 to determine the noise levels on the site over a period of typical road traffic conditions.

3.2 Instrumentation

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

3.3 Procedure

Four measurement positions were selected as described below and indicated on the attached site plan 3630/SP1:

- i. on the eastern boundary of the site, roughly 3m from the boundary fence and 12m north of the original club entrance path
- ii. on the eastern boundary of the site, again roughly 3m from the boundary fence at the closest point to the communications mast
- iii. at the mid point of the southern boundary of the site, roughly 3m from the boundary fence
- iv. to the rear of the site, behind the existing club building

At all 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 position using the Blue Solo sound level meter set to store the octave band and A-weighted 100ms short-term Leq levels over a 10 minute sample of each hour for subsequent post processing.

3.4 Results

The logged data has been post processed to determine $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$ and L_{Amax} levels for each 10 minute period, and these are listed along with the octave band $L_{eq,T}$ in the attached table 3630/T1.

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

3.5 Weather Conditions

For the duration of the survey the weather conditions were dry with wind speeds not exceeding 5m/s. It is therefore considered unlikely that the weather conditions had a significant effect on the measured levels.

3.6 Description of Existing Acoustic Environment

The noise climate at positions 1, 2, and 3 was controlled by local road traffic noise from Greenbrow Road and Newall Road with a general background hum of distant traffic noise from the M56. The noise climate at position 4 was almost entirely controlled by the traffic noise from the M56 with greatly reduced local traffic noise.

Position 2 did also feature a very slight buzz from the communications mast nearby, but this was only noticeable in the absence of local traffic, and at position 2 only. At all positions there was some occasional noise of jet engines from planes flying near Manchester Airport and noise from nearby activity, mainly birdsong and nearby residents.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

The following guidance is intended to demonstrate how suitable noise levels could be achieved inside dwellings and in outdoor living areas, for the purposes of the planning application. It is not intended provide definitive acoustic performance specifications for either the buildings or any other noise mitigation measures.

4.2 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 3.0 above.

4.2.1 Day time $L_{Aeq, 16 \text{ hour}}$

The noise levels were measured over a 3 hour sample of typical day time conditions, and the $L_{Aeq,T}$ averaged over the surveyed periods at each position can reasonably be considered representative of the $L_{Aeq, 16 \text{ hour}}$.

4.2.2 Night time $L_{Aeq, 8 \text{ hour}}$

The night time noise levels have been estimated using the formulae provided in the Transport Research Laboratory report PR/SE/451/02 (TRL Ltd for DEFRA, 2002), as follows:

For non-motorway roads:

$$L_{\text{night}} (L_{Aeq, 8 \text{ hour}}) = 0.9 * L_{A10, 18 \text{ hour}} - 3.77 \text{ dB}$$

For motorway roads:

$$L_{\text{night}} (L_{\text{Aeq}, 8 \text{ hour}}) = 0.87 * L_{\text{A10}, 18 \text{ hour}} + 4.24 \text{ dB}$$

In this case the noise levels are primarily controlled by local roads.

The $L_{\text{A10}, 18 \text{ hour}}$ can be calculated from the measured L_{A10} according to the formula in Calculation of Road Traffic Noise (Department of Transport / Welsh Office, 1988) as follows:

$$L_{\text{A10}, 18 \text{ hour}} = L_{\text{A10}, 3 \text{ hour}} - 1 \text{ dB(A)} \text{ (where the } L_{\text{A10}, 3 \text{ hour}} \text{ is the arithmetic average of the measured } L_{\text{A10}, 1 \text{ hour}} \text{).}$$

The calculated $L_{\text{Aeq}, 8 \text{ hour}}$ are therefore as follows:-

	Measurement position			
	1	2	3	4
$L_{\text{A10}, 3 \text{ hour}}$	61	61	60	47
$L_{\text{A10}, 18 \text{ hour}} = L_{\text{A10}, 3 \text{ hour}} - 1$	60	60	59	46
$L_{\text{Aeq}, 8 \text{ hour}} = 0.9 * L_{\text{A10}, 18 \text{ hour}} - 3.77 \text{ dB}$	50	51	50	38

4.2.3 Night time L_{Amax}

The measured L_{Amax} during the day were controlled by road traffic noise, and it is reasonable to assume that similar L_{Amax} will be typical of the early and late parts of the night when traffic is often similar to day time flows.

4.2.4 Summary of Measured Noise Levels

The resulting $L_{Aeq, 16 \text{ hour}}$ day time and $L_{Aeq, 8 \text{ hour}}$ night time levels, and the typical night time L_{Amax} at each measurement position are as follows:

Position	$L_{Aeq,T} \text{ dB}$		Typical night time $L_{Amax} \text{ dB}$
	Day (07:00 - 23:00)	Night (23:00 - 07:00)	
1	58	50	75
2	58	51	73
3	56	50	74
4	46	38	57

4.2.5 Noise Levels Incident on Proposed Building

The development features a three storey apartment block and some two storey houses, all set slightly back from the highway boundaries and therefore exposed to noise levels slightly lower than the measured levels tabulated in Section 4.2.4 above.

Analysis has been undertaken using Cadna/A 2023 environmental noise mapping software to calculate the noise levels incident on the proposed houses and apartments.

There are essentially two scenarios, the rooms facing onto Greenbrow Road and Newall Road, and the more sheltered rooms facing towards the rear of the site.

The predicted incident noise levels at these locations are tabulated as follows:

Incident noise levels			
Location	L _{Aeq,T} dB		Typical night time L _{Amax} dB
	Day (07:00 - 23:00)	Night (23:00 - 07:00)	
Greenbrow / Newall elevations	56	49	73
Rear elevations	46	38	57

4.2.6 Scheme of Sound Insulation Measures

Based on the incident noise levels set out in Section 4.2.5 above, the overall noise reductions required from the building envelope to achieve compliance with the Manchester City Council indoor ambient noise criteria in Section 2.3 above are as follows:

Overall noise reduction required from building envelope, by parameter			
Elevation	L _{Aeq,T} dB		Typical night time L _{Amax} dB
	Day (07:00 - 23:00)	Night (23:00 - 07:00)	
Greenbrow / Newall	21	19	28
Rear	11	8	12

The proposed dwellings will be constructed using cavity masonry walls, or a brick outer leaf with insulated SFS / timber frame internally, either of which would provide sound insulation well above the noise reductions tabulated above.

With regard to the windows, a typical thermal double glazed unit (e.g. 6 / 12 / 6) usually achieves around $R_w + C_{tr}$ 27 dB, and standard trickle vents (e.g. Titon XS13) are usually tested to around $D_{n,e,w} + C_{tr}$ 30 dB.

Those levels of performance would be more than enough to achieve compliance with the required $L_{Aeq,T}$ criteria in all areas, and the L_{Amax} requirements at the rear elevations, but the bedrooms facing Greenbrow Road and Newall Road would require an enhanced package of sound insulation measures in order to achieve compliance with the L_{Amax} requirement during the night. This is often the case in urban areas, even where the road traffic is relatively light.

Detailed calculations have been undertaken for a typical bedroom on those front elevations, as set out in the attached table 3630/T2, demonstrating that L_{Amax} 45 dB is achievable internally. The sound insulation performance specifications for the glazing and vents to those areas are set out in the attached tables 3630/T3 and 3630/T4, with the extents of the augmented sound insulation (i.e. Zone 1) shown on the attached site plan 3630/SP2.

All of the above guidance relates to the scenario where the windows are closed, and Approved Document F 'whole dwelling ventilation' is provided by trickle vents and intermittent extract fans, or an equivalent system. In terms of whether open windows can be used as means of controlling overheating, Approved Document O sets night time indoor ambient noise criteria of ≤ 40 dB $L_{Aeq, 8 \text{ hour}}$ and ≤ 55 dB L_{Amax} for the night time period. Assuming typically 13 dB overall noise reduction for a façade with windows open, the incident noise levels would have to be ≤ 53 dB $L_{Aeq, 8 \text{ hour}}$ and ≤ 68 dB L_{Amax} for compliance with the ADO requirements using open windows.

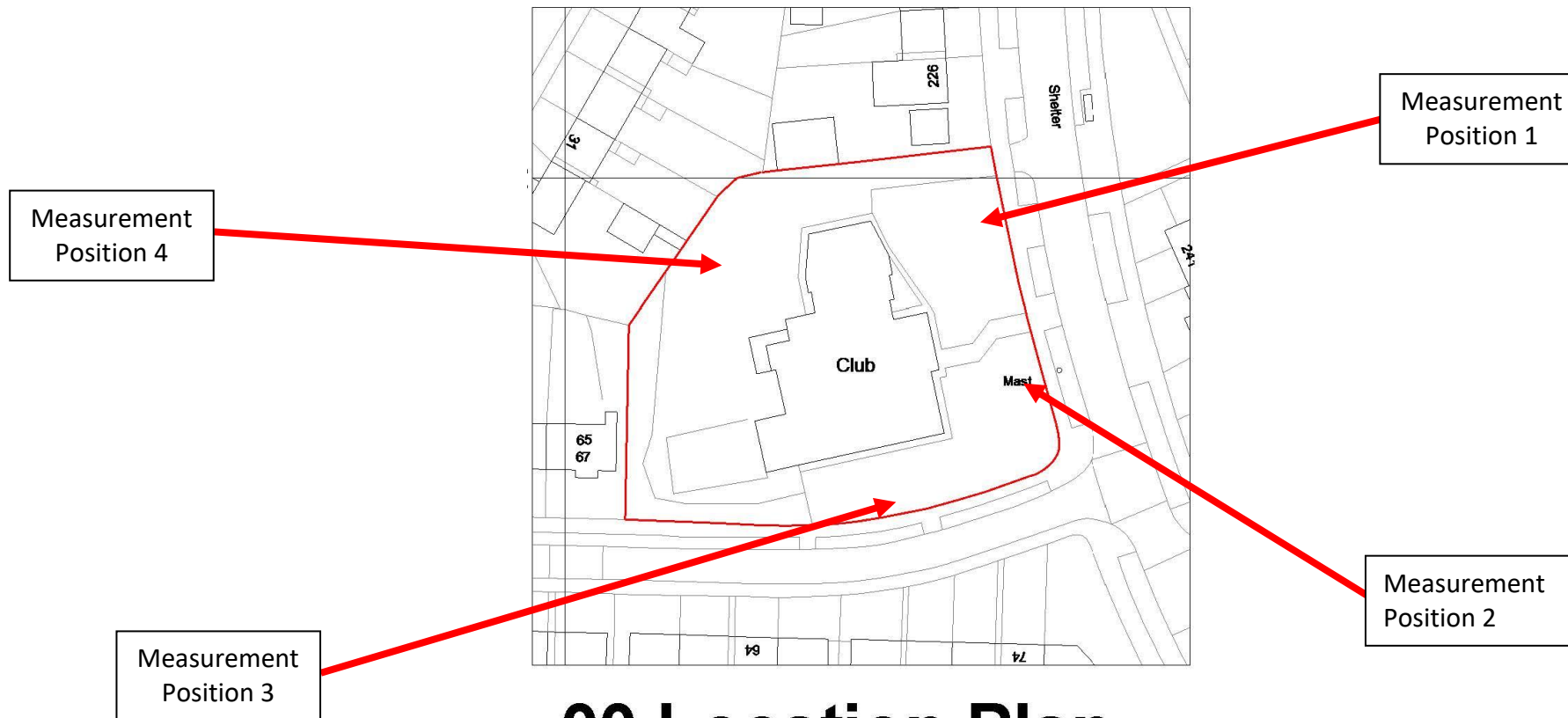
Reference to Section 4.2.5 above reveals that the incident noise levels would only be low enough for the control of overheating with windows open on the rear elevations. On the Greenbrow Road and Newall Road elevations there would be a + 5 dB excess over the L_{Amax} criterion in Approved Document O, as is the case for many suburban areas generally considered to be 'quiet'. In order to achieve compliance with the ADO L_{Amax} with windows open, the buildings would all have to be situated at least 25 metres away from any roadside boundary, which is clearly not viable on most housing development sites.

Full compliance with the ADO requirements would require some form of mechanical ventilation / cooling for the rooms on the front elevations, although given the site context of an established residential area with relatively low traffic, where all of the surrounding houses have open windows for controlling overheating, and in the general interests of sustainable development, it is suggested that the provision of cooling plant would be overkill in this specific context.

4.3 Noise Levels in Outdoor Amenity Areas

A comparison of the incident day time noise levels in Section 4.2.5 above with the noise criteria for external areas in Section 2.3 above reveals a slight excess in the front gardens, but compliance at the rear, which is considered a reasonable outcome and normal for most dwellings. As planning permission has been granted for the current layout, there would be no scope for acoustic screening of the front gardens anyway.

FOR ACOUSTIC DESIGN TECHNOLOGY



00 Location Plan
1 : 1250

<u>Notes</u>	<u>Description</u> Site Plan Showing Noise Monitoring Locations	
	<u>Project</u> Greenbrow Social Club	
	<u>Survey Date</u> 12 January 2024	<u>Drawing No.</u> 3630/SP1



Notes

Zone 1 sound insulation measures —

Description

Site plan showing extent of augmented sound insulation as referenced by Section 4.2.6

Project

Greenbrow Social Club

Survey Date

12 January 2024

Drawing No.

3630/SP2



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Summary of Daytime Measured Levels

Position	Date	Time	Duration	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	L _{eq,T} at Octave Band Centre Frequency (Hz)							
								63	125	250	500	1k	2k	4k	8k
Position 1	12 January 2024	13:04 – 13:14	10 minutes	57	72	44	61	63	53	50	51	53	51	44	36
	12 January 2024	14:00 – 14:10	10 minutes	57	75	44	60	64	53	52	52	53	50	43	35
	12 January 2024	15:00 – 15:10	10 minutes	59	75	44	63	66	55	56	55	55	53	46	38
Position 2	12 January 2024	13:45 – 13:55	10 minutes	59	78*	45	63	64	57	56	57	54	52	46	45
	12 January 2024	14:45 – 14:55	10 minutes	57	72	48	60	64	54	50	52	53	51	44	34
	12 January 2024	15:45 – 15:55	10 minutes	58	73	47	62	65	57	51	52	54	52	45	36
Position 3	12 January 2024	13:31 – 13:41	10 minutes	56	72	40	60	65	56	51	53	52	48	41	37
	12 January 2024	14:30 – 14:40	10 minutes	56	74	42	61	64	58	52	51	53	49	42	40
	12 January 2024	15:30 – 15:40	10 minutes	57	78*	47	60	64	56	52	52	53	49	46	42
Position 4	12 January 2024	13:18 – 13:28	10 minutes	43	55	37	46	57	46	41	39	40	35	27	19
	12 January 2024	14:15 – 14:25	10 minutes	48	70*	40	49	60	49	44	44	44	40	33	23
	12 January 2024	15:15 – 15:25	10 minutes	45	57	40	47	58	48	43	40	41	37	32	30

*Note:- the identified L_{Amax} are the result of conversations between the surveyor and local residents, and are therefore not typical

NOISE INTRUSION TO BEDROOM (LMAX)

	Area	Octave Band Centre Frequency - Hz								dB(A)
		63	125	250	500	1k	2k	4k	8k	
Incident L _{max}		85	70	71	70	68	65	61	56	73
Direct Field										
Composite SRI of structure (from below)		-22	-25	-31	-33	-35	-33	-33	-33	
Direct L _p		63	45	40	37	33	32	28	23	42
Reverberant Field										
Composite SRI of structure (from below)		-22	-25	-31	-33	-35	-33	-33	-33	
10 log (S / A)		2	1	-1	-3	-4	-4	-4	-4	
Constant (for line source)		1	1	1	1	1	1	1	1	
Reverberant L _p		66	47	40	35	30	29	25	20	42
Total L _p		68	49	43	39	35	34	30	25	45
Composite SRI Calculation										
External cavity wall	5.5	28	34	40	45	50	55	55	55	
Acoustic glazing to bedrooms	2.6	18	21	28	37	42	45	45	45	
Acoustic Trickle Vent	(10)	37	37	36	35	36	34	34	34	

Table 3630/C1

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

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

Zone	Rooms	Octave Band Centre Frequency - Hz								Possible Glazing Configuration
		63	125	250	500	1k	2k	4k	8k	
Zone 1	Bedrooms on Greenbrow Road and Newall Road	18	21	28	37	42	45	45	45	6 / 16 / 6.8 Pilkington 'Optiphon'
Zone 2	All other rooms	Standard thermal DGU – no specific								6 / 12 / 6 or similar

TABLE 3630/T3

Minimum Required Element Normalised Level Differences (D_{n,e}) for Acoustic Trickle Vents dB

Zone	Rooms	Octave Band Centre Frequency - Hz								Example vent
		63	125	250	500	1k	2k	4k	8k	
Zone 1	Bedrooms on Greenbrow Road and Newall Road	37	37	36	35	36	34	34	34	Titon SF Xtra Renson 'Sonoslot Max' Greenwood EAR42W
Zone 2	All other rooms	Standard trickle vents								Brookvent SM1200 Titon XS13

TABLE 3630/T4

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	(Blue) Solo Class 1 Sound Level Meter	60320					
01dB	PRE 21 S Pre-Amplifier	16866	March 2023		-0.10	113.9	114.1
01dB	MCE 212 ½ inch Microphone	90549					
Norsonic	Nor1251 Calibrator (Cal 4)	33453	March 2023	113.98			

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