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Planning and Building Envelope Assessment At Plymouth Grove Manchester

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PLANNING
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RECD - 6 MAY 2008

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1.0 SUMMARY

PDA Limited were commissioned by Land & Development Limited to carry out an ambient noise survey and planning assessment for the proposed new build student accommodation at Plymouth Grove, Longsight, Manchester.

The survey and assessment has been used to assess compliance with the guidance contained within Planning Policy Guidance Note 24: "Planning and Noise" (PPG 24). Furthermore the sound insulation properties of the building envelope for the residential premises were used to evaluate the internal noise levels with reference to BS 8233:1999 "Sound insulation and noise reduction for buildings".

BS8233 Assessment

The assessment has demonstrated that, utilising the recommended products and materials outlined in this report, the internal ambient noise levels largely comply with the design criterion adopted from BS8233:1999. For the proposed student accommodation as set out in section 7.0, the following requirements have been determined:

- Provision of acoustically acceptable glazing and ventilation to meet minimum requirements as set out in section 7.1. The exception to this are rooms located to the north eastern end of site where internal levels of up to 2dB(A) are predicted over the required L_{max} value, however it should be noted that this is a stringent criterion particularly in relation to urban developments. It should also be noted that glazing requirements are for habitable rooms only.

- Provision of other external envelope elements to meet minimum requirements as set out in section 7.2.

Prepared By

Paul Ryan
Acoustic Consultant

Approved By

R.D. Cookson

Richard Cookson
Consultant

2.0 BRIEF FOR CONSULTANCY

PDA were commissioned by Land & Development Limited to carry out the following for the proposed student accommodation at Plymouth Grove, Longsight, Manchester.

A) We will travel to site in Manchester and carry out a noise survey. The survey will be conducted between 0600 and 1100 hours to examine early morning rush hour noise levels and between 2300 and 0200 to examine early night-time noise levels. All measurements will be fully manned and taken in accordance with the appropriate legislation.

B) The results of the survey will be assessed in accordance with PPG 24 'Planning and Noise' and the result of the assessment will be used to place the site into the appropriate Noise Exposure Category (NEC).

C) The results of the noise survey will also be used to predict internal noise levels in habitable areas in the development. These calculations will then be used to specify a scheme of appropriate acoustic works to ensure the internal noise levels requirements of BS 8233 'Sound insulation and noise reduction – Code of Practice' and that of the local authority are met.

D) We will produce a report detailing all measurement procedures, results, conclusions and recommendations in a format suitable for submission to the Local Authority.

3.0 SITE DESCRIPTION

The site is located on the corner of Plymouth Grove and Birch Lane, Manchester. The North Eastern corner of premises is located approximately 20 metres from Stockport Road. To the rear of the site are existing residential properties.

The current planning application includes for a new build of 9 apartments each containing a number of rooms for residential purposes.

4.0 NOISE ASSESSMENT CRITERIA

4.1 PPG24

Planning Policy Guidance note 24 (PPG24) :- Planning and Noise, determines whether noise should be a major factor when granting planning permission for development of residential accommodation.

The method used to assess whether noise dominates a development site is through the use of Noise Exposure Categories (NEC's).

There are four NEC's that the site could fall into, all of these are shown in the table below.

Table 1. Noise exposure categories for dwellings.

NEC	Description of NEC Level
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

The NEC level is selected by it's noise level and source category, as shown in the table below.

Table 2. Noise Exposure Category Levels

Noise Source		A	B	C	D
Road traffic:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66
Rail traffic:	0700-2300	<55	55-66	66-74	>74
	2300-0700	<45	45-59	59-66	>66
Air traffic:	0700-2300	<57	57-66	66-72	>72
	2300-0700	<48	48-57	57-66	>66
Mixed sources:	0700-2300	<55	55-63	63-72	>72
		<45	45-57	57-66	>66

Furthermore, when individual night-time noise events regularly exceed 82dB(A) $L_{s,max,}$ the site should be classified as NEC level C.

4.2 BS8233:1999

The accommodation building envelope will be assessed with reference to the previously obtained L_{eq} levels from the survey, to ensure that the internal noise environment will comply with the criterion overleaf:

Table 3. BS8233 recommended indoor ambient noise levels

Criterion	Typical Situation	Design range $L_{Aeq,T}$	
		Good	Reasonable
Reasonable Resting/Sleeping Conditions	Living rooms	30	40
	Bedrooms	30	35

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

Noise within the apartments from external activities will be assessed to not exceed the reasonable standard for both living rooms and bedrooms.

In addition BS 8233 also mentions a separate 'reasonable' standard in bedrooms at night from individual noise events. This is expressed in terms of a L_{Amax} and to achieve this 'reasonable' standard the individual noise events should not exceed 45 dB L_{Amax}. It should however be stressed that this 45 dB L_{Amax} is a stringent criterion, particularly with reference to what is essentially an urban development, and as such it is very possible that it will be exceeded at certain times.

In support of the above the World Health Organisation (WHO) document "Community Noise" recommends that a 45 dB L_{Amax}, criterion should be exceeded no more than 15 times during a typical night time period. It should be noted however that some local authorities do not require this condition.

5.0 SURVEY DETAILS

A noise survey was undertaken over several periods to capture the 'worst case scenarios' of early morning rush hour and late night activities. The survey was undertaken between Tuesday 21st August between 0600 hours to 1100 hours and between 2315 and 2330. This shortened night time measurement was due to safety reasons at the site at this time. However the night time measurements taken between 0600 and 0700 capture the highest levels.

5.1 Noise Survey Details

Equipment used for all site surveys were CEL 573 and 593 Sound Analysers. These are precision grade sound level meters which hold current calibration certificates and which were field-calibrated as required. Daytime measurements were taken between 0700 and 2300 as detailed above and logarithmically averaged to produce an equivalent continuous A-weighted sound pressure level or $L_{Aeq,T}$

Night time measurements were taken between 2300 and 0700 as detailed above and logarithmically averaged to produce an equivalent continuous A-weighted

sound pressure level or $L_{Aeq,T}$ For night time measurements the highest A-weighted noise levels or LA_{max} were also taken and arithmetically averaged. The time weighting used was 'fast'.

Measurements were undertaken at 1 position as detailed in Figure 1.

Measurements at position 1 were taken to determine levels from the dominant noise source on the site, that being road traffic on Stockport Road. Measurements were taken approximately 20m from the middle of the road.

At night time the main noise sources were as per the daytime.

Table 4 below summarises the measurement results (full data is available at the back of this report):

Table 4. Summary of Noise Measurements

Position	Day		Night	
	L_{eq} dB(A)	L_{max} dB(A)	L_{Aeq} dB(A)	L_{max} dB(A)
1	67.2	-	64.6	79.6

6.0 PPG 24 ASSESSMENT

Table 4 above shows daytime and night time L_{Aeq} noise levels averaged from L_{Aeq} measurements over continuous daytime and night time periods as detailed and night time L_{Amax} ranges for comparison with PPG24 assessment criteria. Table 5 below shows which noise exposure categories the site falls into.

Table 5. Noise Exposure Categories

Position	Day	Night
1	C	C

As can be seen from the table above the site falls into NEC C.

With respect to proposed developments placed in NEC C PPG24 states:

'Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.'

Modern mitigation measures can be employed to provide adequate protection to the interior spaces for such sites to reach desirable internal levels. This is detailed in the assessment set out in section 7.

7.0 NOISE MITIGATION MEASURES

As previously noted, the dominant contributor to noise climate at the measurement locations was road traffic noise.

Attenuation from noise impinging on facades to the interior of residences would be achieved by correct design of the building fabric as described in the following sections.

The sound insulation provided by the building envelope is a combination of the sound reduction indices of the individual façade elements and the area of the façade they cover. The result is a composite sound insulation value for the whole façade. However, it is likely that the acoustically weak areas that will dominate the sound insulation performance of the building envelope will be the windows and ventilation requirements.

7.1 Glazing and Ventilation Attenuation Requirements

Noise levels impinging on the various residential facades have been determined based on the measured noise levels in section 5.0. The dominant paths for subsequent noise transfer to the interior are generally the glazing and ventilation elements of the façade constructions. Internal noise levels have been calculated throughout the proposed development. During the calculations the following assumptions have been made:

1) Averaged noise levels have been used in all calculations at the measurement position closest to dwelling being assessed.
2) Averaged nightly 'maximum' noise level for a regular event used in all calculations where appropriate.
3) Reverberation time of 0.5 second has been assumed in all spaces.
4) Random 'traffic' noise incidence and appropriate +3 dB correction has been assumed.
5) All room and façade dimensions taken from drawings provided by Johnstone Godfrey and Associates.

Based on this premise, to achieve the required internal noise levels from BS8233, would require the following glazing and ventilation specifications:

Table 6 Recommended Glazing and Ventilator Schedule

Room Type	Internal Noise Criteria L_{Amax} / L_{Aeq}	Required Glazing Sound Insulation R_w	Typical Glazing (Ventilator Type)
Rooms 1,2,3,10,11,12,19,20,21 ,22,23,26,27,28,35,36,3 7,38,39,42 & 43 (Plymouth Road Façade)	Bed 45* / 30	40	10mm- 12mm cavity – 6.4mm pvb (V1)
Rooms 4,5,6,7,13,14,15,16, 29,30,31,32,44 & 45 (Birch Lane Façade)	Bed 45 / 30	40	10mm- 12mm cavity – 6.4mm pvb (V1)
Rooms 8,9,17,18,24,25,33, 34,40 & 41	Bed 45 / 30	36	10mm-12mm cavity-4mm (V1)
Living Areas	Living - / 40	31	4mm-12mm cavity-4mm (V2)

- Rooms 1,2,3,10,11,12,26,27,28,42 and 43 will exceed the L_{Amax} value by up to 2dB. However as is stated in section 4.2 this is a stringent criterion particularly in relation to urban developments.

Notes on Table Above:

(V1) Passive trickle ventilator achieving an acoustic rating of D_{new} 52 or greater to be installed in the façade e.g. NIR compliant such as Greenwood MA2051 Acoustic Wall Vent (2 off at 55dB$D_{n,e,w}$) or equivalent. Mechanical extract ventilation may be required to meet requirements of Building Regulations. Windows can be openable for rapid ventilation.

(V2) Passive trickle ventilator achieving an acoustic rating of D_{new} 39 or greater to be installed in the façade e.g. Greenwood AWV39 Acoustic Wall Ventilator (2 off at $42dBD_{n,e,w}$) or equivalent. Mechanical extract ventilation may be required to meet requirements of Building Regulations. Windows can be openable for rapid ventilation.

Notes on Glazing Installation

It is noted that all sound insulation values quoted in the tables above must be achieved by the overall **combination of frame and glazing**, and not just by the glazing alone. PDA Ltd would be happy to look over manufacturers tender submissions for glazing systems to assess suitability.

Glazing framing systems must be fully sealed with any small gaps (<10mm nominal) around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic, with additional weathering protection to be applied externally to this. No gaps should be left unsealed, and in no instance should lightweight foams be used as a sealant behind weathering protection.

7.2 Other External Envelope Elements

In general we would expect the following constructions to be utilised to uphold the acoustic integrity of residences:

7.2.1 External Walls

To achieve the required internal noise levels from BS8233, would require a standard brick/block cavity wall system giving $50dBR_w$ and $45dBR_w$-C_{tr} in conjunction with glazing and ventilation specifications given in section 7.1.

7.2.2 Roof

The roof system should be of minimum of slates or tiles on felt on truss construction with ceiling below of two layers 12.5mm sound resistant plasterboard (no unsealed penetrations). Minimum 100mm mineral wool (minimum $10kg/m^3$) in the loft space.

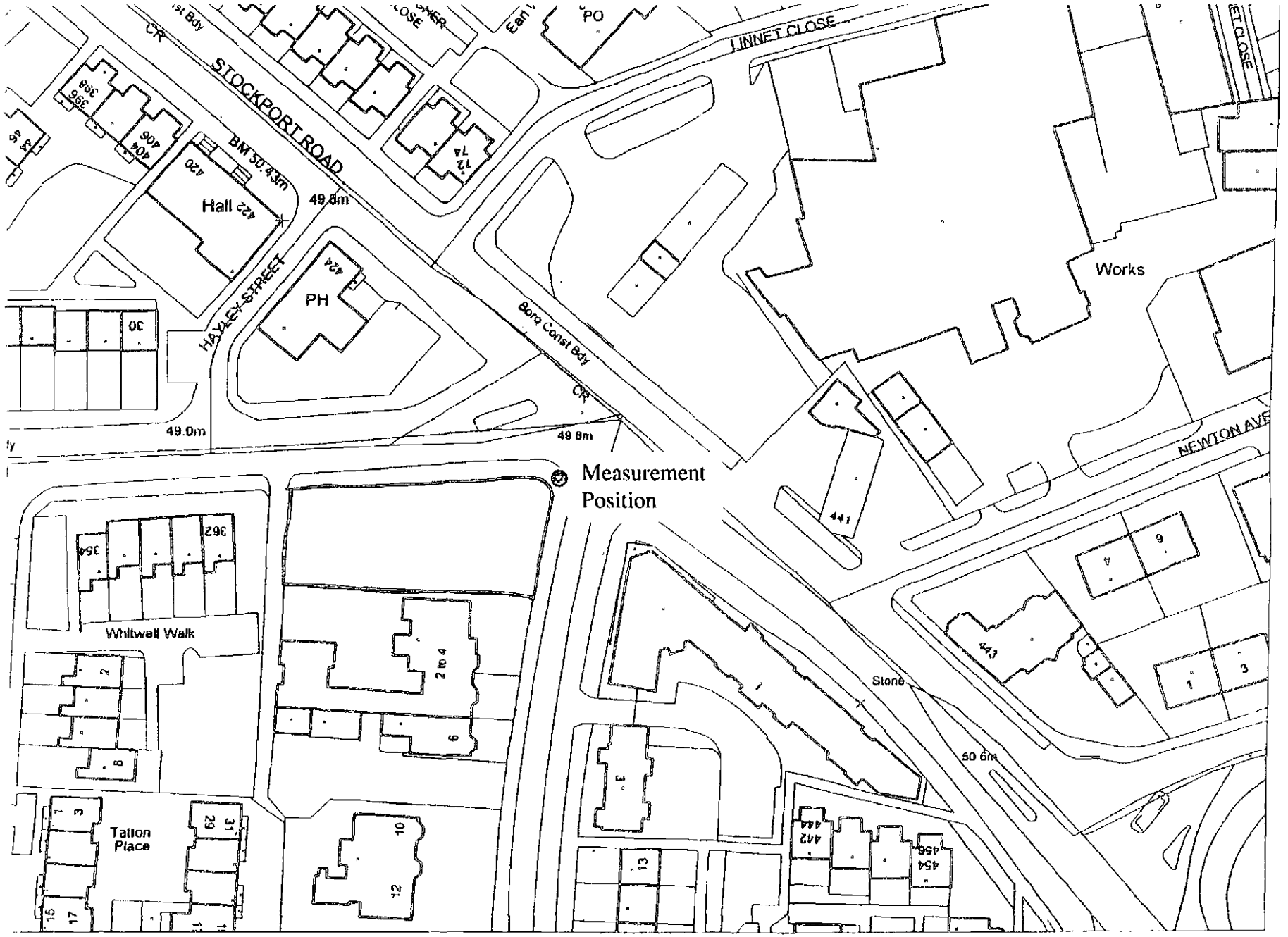
8.0 CONCLUSION

PDA Limited were commissioned by Land & Development Limited to carry out an ambient noise survey and planning assessment for the proposed new build student accommodation at Plymouth Grove, Longsight, Manchester.

The survey and assessment has been used to assess compliance with the guidance contained within Planning Policy Guidance Note 24: "Planning and Noise" (PPG 24). Furthermore the sound insulation properties of the building

envelope for the accommodation were used to evaluate the internal noise levels with reference to BS 8233:1999 "Sound insulation and noise reduction for buildings".

Figure 1



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Tables A & B

Table A: Octave Band Frequency Measurements - Daytime

Position	Time	Overall Leq dB(A)	Octave Band Frequency Measurements (Hz)							
			63	125	250	500	1K	2K	4K	8K
1	07:00 to 07:15	67.0	75.0	68.9	65.0	62.6	63.3	59.0	52.0	43.6
1	07:15 to 07:30	66.3	75.2	68.4	64.9	61.9	62.7	58.1	50.4	42.5
1	07:30 to 07:45	68.3	75.7	69.4	65.9	64.6	64.4	60.2	53.9	48.9
1	07:45 to 08:00	66.9	75.7	69.2	64.7	62.2	63.3	59.0	51.7	43.9
1	08:00 to 08:15	67.2	76.2	70.7	66.5	63.0	63.2	59.0	51.4	44.0
1	08:15 to 08:30	68.1	75.8	69.5	66.0	62.6	63.8	60.5	57.6	49.0
1	08:30 to 08:45	66.9	76.8	70.3	65.3	62.4	62.7	59.3	52.8	44.7
1	08:45 to 09:00	65.7	75.5	68.1	64.8	62.2	61.5	57.3	49.9	43.1
1	09:00 to 09:15	65.9	74.7	67.6	64.2	61.6	62.1	57.9	50.8	45.8
1	09:15 to 09:30	65.4	74.7	67.8	63.9	60.9	61.4	57.7	50.6	43.4
1	09:30 to 09:45	66.4	76.7	69.1	65.6	61.7	62.1	58.8	52.8	44.5
1	09:45 to 10:00	68.2	76.9	70.4	65.8	63.3	63.4	61.5	56.1	47.7
1	10:00 to 10:15	69.1	77.2	68.6	65.0	63.6	65.6	62.6	53.4	46.7
1	10:15 to 10:30	68.9	75.7	69.0	64.7	62.9	65.2	62.8	52.6	45.6
1	10:30 to 10:45	67.6	78.5	70.7	65.3	62.9	62.7	60.1	55.9	53.6
1	10:45 to 11:00	65.5	75.9	68.6	64.1	61.0	61.3	57.6	51.0	45.7

Table B: Octave Band Frequency Measurements – Night time

Position	Time	Overall Leq dB(A)	Octave Band Frequency Measurements (Hz)							
			63	125	250	500	1K	2K	4K	8K
1	23:15 to 23:30	61.4	70.6	62.7	59.2	56.5	57.9	53.7	46.2	40.7
1	06:00 to 06:15	63.7	71.6	65.2	62.6	59.5	59.8	55.8	47.8	39.3
1	06:15 to 06:30	65.0	72.0	66.8	62.9	60.8	61.4	57.2	49.3	40.4
1	06:30 to 06:45	65.5	73.3	67.1	63.2	61.3	62.0	57.5	49.9	41.2
1	06:45 to 07:00	66.0	74.2	68.0	63.9	61.5	62.5	57.9	49.7	72.5

Appendix A
Definition of Acoustic Terms
(Environmental)

Definition of Acoustic Terms (Environmental)

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max}, dB L_{Amax}, etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

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PaulRyan@pdaltd.com

09/05/2007 04:36 PM

To: p.mcmillan@manchester.gov.uk
cc:
Subject: PPG 24 Assessment, Plymouth, Grove Manchester

Dear Mr McMillan

My name is Paul Ryan of Philip Dunbavin Acoustics (PDA) based in Warrington. We have been commissioned by Land & Development Limited to carry out a PPG 24 Assessment for a new student housing development at Plymouth Grove in Longsight, Manchester. We have currently carried out the survey, however, we have not been able to take the full measurements (agreed in our methodology with yourselves) due to safety concerns for our staff at night.

Unfortunately the level of concern is high enough for us not to return to the site at night even with a security guard (which might be a normal course of action). However we have measured 06:00 to 11:00, which includes an hour (4x15mins) of the night time period (23:00 to 07:00 as defined in PPG 24 "Planning and Noise") and also have a 15 minute period at night (23:15 to 23:30). The results show that the levels taken in the morning period dominate that obtained at night and consequently dominate the logarithmic average. I would expect the night time measurements to decrease towards 02:00 which was the originally agreed end of the measurement period and thus I am confident that the data we have represents the worst case.

Please could you confirm (by e-mail if possible) that we may continue with the report based on the above. Alternatively please feel free to call me on 01925 759380 to discuss further.

Regards

Paul Ryan
Acoustic Consultant

****
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Clare Stratford
<c.stratford@manchester.gov.uk>

26/09/2007 09:52

To paulryan@pdaltd.com
cc
bcc
Subject Re: PPG 24 Assessment, Plymouth, Grove Manchester

Paul,

I have been passed your query regarding the acoustic assessment for Plymouth grove. I have had a look at what you have proposed and the issues with security and I have no problems with you continuing with the report in the way you have described in the email

Regards,

Clare Stratford
Public Protection Officer
Environmental Health
Neighbourhood Services
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----- Forwarded by Clare Stratford/Environmental.Health/MCC on 26/09/2007 09:33 -----

Peter McMillan

11/09/2007 11:41

To: Clare Stratford/Environmental.Health/MCC@mcc
cc:
Subject: Re: PPG 24 Assessment, Plymouth, Grove Manchester

please see below from an ac consultant for a development which appears to be on your district

Peter McMillan
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Please note that from 25 January 2007 calls will be to Environment On Call, our new contact centre

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