

NOISE IMPACT ASSESSMENT REPORT

PROPOSED ALTERATIONS, PACK HORSE INN, BURY, BL9 7TU

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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APPENDIX A – DEFINITION OF ACOUSTIC TERMS



1.0 SUMMARY

At the request of J.W. Lees & Co (Brewers) Ltd a noise impact assessment has been undertaken for the proposed alterations to the existing Pack Horse Inn in Bury. The development proposes formation of a new raised patio/seating area and horse park enclosed with gabion walls to the south, and the installation of 2no. bi-folding windows to the dining area.

A noise survey has been conducted at a position representative of the nearest noise sensitive dwelling to the development. The results of the survey have been used to establish the existing ambient and background noise climates at the nearest noise sensitive receptors during the likely quietest periods of the proposed opening times of the pub/new patio.

Utilising measured data and library data of the likely noise levels generated by the proposed alterations we have calculated the expected noise levels at the nearest noise sensitive receivers. The results of our calculations have indicated that the noise level incident upon the nearest residential properties to be 40 dB L_{Aeq} during the opening hours of the pub. The assessment indicates that the overall noise egress from the likely noise sources associated with proposed development are below the existing ambient noise climate at the nearest noise sensitive receivers during both the day and night time periods. As such this is an indication that the proposed installation falls within the lowest observed adverse effect level and would have a low impact on the surrounding residential receivers, and is therefore in accordance with the National Planning Policy Framework.

In addition it is noted that the highest calculated absolute noise levels are below the BS8233:2014 and WHO Guidelines for Community Noise suggested external noise levels of 50 – 55 dB outside dwellings during the daytime and 45 dB during the night-time.

2.0 INTRODUCTION

The existing premises proposes formation of a new raised patio/seating area and horse park enclosed with gabion walls to the south, and the installation of 2no. bi-folding windows to the dining area. It is understood that the proposed opening hours for the development is understood to be between 11:30 hours to 23:30 hours 7 days a week.

The local area comprises residential dwellings in a semi-rural setting. The nearest residential receiver is identified as 2 Moulding Moss approximately 45m to the south of the Pack Horse inn development. It is noted that the pub has an existing beer gardens to the south.

A site plan showing the location of the site and the surrounding local area including the closest residential receivers is shown in Figure 1 below.

Figure 1. Proposed Site Location with Nearest Residential Receivers



3.0 NOISE ASSESSMENT CRITERIA

3.1 National Planning Policy Framework (NPPF)

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The terms 'significant adverse impact' and 'adverse impact' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'other adverse impacts' as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

It should be noted that no specific noise limits for LOAEL and SOAEL have yet been specifically defined; however guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

3.2 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL and is reproduced in the table below;

Table 1. Planning Practice Noise Level Guidance

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

It is notable from the above planning guidance that development should not normally be permitted above Significant Observed Adverse Effect Levels, and should aim to minimise Other Adverse Effect Levels (below SOAEL but above LOAEL). However, it is clear that noise is permitted to approach and/or exceed the Lowest Observed Adverse Effect Level, providing that noise is mitigated and reduced to a minimum

3.3 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 1. BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 L _{Aeq,16hour}	–
Dining	Dining room/area	40 L _{Aeq,16hour}	–
Sleeping (daytime resting)	Bedrooms	35 L _{Aeq,16hour}	30 L _{Aeq,8hour}

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.

3.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable to dwellings.

Table 2. WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L _{Aeq} dB	Time Base (hours)*
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16
Outside Bedrooms	Sleep disturbance, window open (outdoor values) night time	45	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours, and night time 23:00 – 07:00 hours.

WHO guidelines state, 'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.'

4.0 AMBIENT NOISE SURVEY DETAILS

4.1 Survey Times and Dates

The ambient noise measurements were conducted between 20:58 hours and 23:35 on Wednesday 3rd May 2023 capturing a worst-case operational evening period, with all measurements being made and attended by Mr J Meadows of PDA Ltd. The measurement periods were selected to capture the quietest evening and early night time period.

4.2 Equipment Used

Throughout the survey measurements were undertaken a Nti XL2 sound level meter. The meter is a precision grade Class 1 sound level meter (as per BS EN 61672-1: 2002) for which current calibration certificates are held. The meter was set to A-Weighted and fast response. The meter was calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

4.3 Weather

During the course of the survey the weather conditions were as follows:

Table 3. Summary of Weather Conditions

Date	Range of Temperature (°C)	Rainfall	Average Wind Speed (mph)	Wind Direction
Wednesday 3 rd May 2023	8 – 12	No	8 – 9	East

4.4 Measurement Positions & Procedure

Measurements were undertaken at one position at the site. The location was deemed representative of the closest residential locations to the site. A range of statistical noise indicators was measured, including L_{Aeq} and L_{A90} . Measurements were setup to log every 15 minutes.

The measurement location is highlighted within the following figure:

Figure 2. Measurement Location



5.0 MEASURED RESULTS

A summary of the noise level measurements is given below. The levels are presented in terms of L_{Aeq} and L_{A90} in the tables and have been rounded to the nearest decibel.



Table 4. Summary of environmental noise measurements – Evening opening hours 20:58 - 2300

Time Period	L _{Aeq,T} (dB)	L _{A90,15mins} (dB)
20:58	56	43
21:00	51	40
21:15	46	41
21:30	46	41
21:45	43	40
22:00	47	41
22:15	46	42
22:30	47	40
22:45	46	40
Average	49	N/A

Table 5. Summary of environmental noise measurements – Night time opening hours 2300 to 23:35

Time Period	L _{Aeq,T} (dB)	L _{A90,15mins} (dB)
23:00	48	41
23:15	46	39
23:30	44	38
Average	46	N/A

5.1 Description of Background Noise

Intermittent traffic noise on Birtle Road and vehicles entering the Pack Horse Inn carpark was the main noise source at this location during the survey.

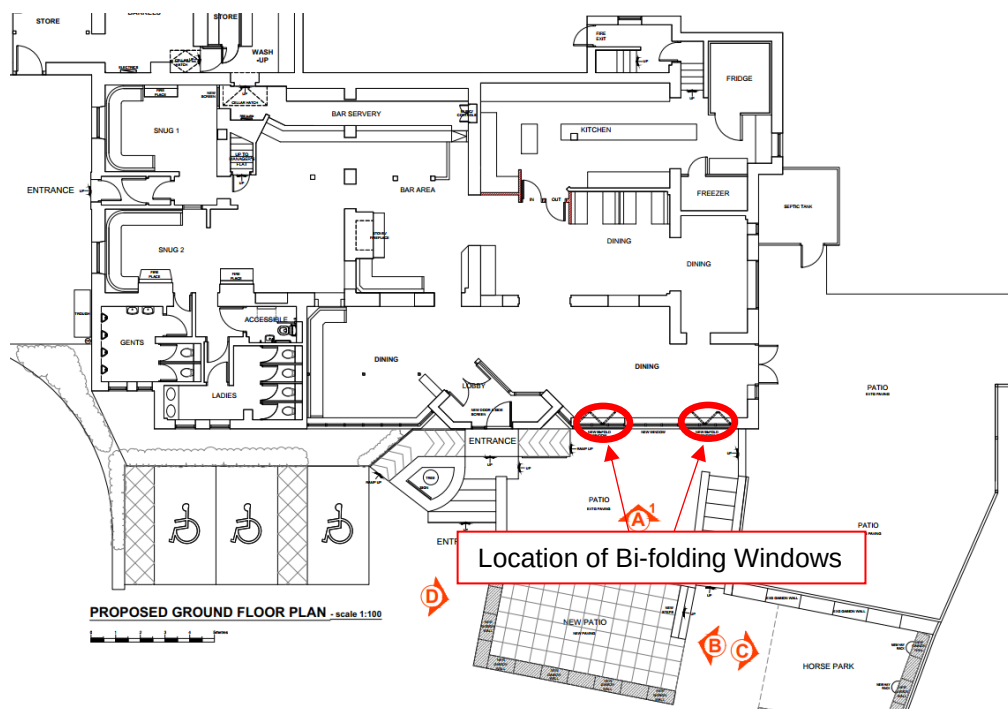
6.0 NOISE IMPACT ASSESSMENT

6.1 Break-out Through Bi-folding Windows

Drawings indicate that there will be newly installed bi-fold windows installed to the existing dining area to the south of the development.

The locations and elevations of the bi folding windows are taken from 4002 PL02 Planning – Proposed Site Plan & 4002 PL03 Planning – Elevations dated March 2023, with an extract below.

Figure 3. Locations of Bi-folding Doors



For assessing the break-out noise from the dining through the open bi-folding windows, PDA Ltd carried out internal measurements within the dining area. Measurements were carried between the 21:14 – 22:00 hours on the evening of Wednesday 3rd May 2023 using a NTi XL2 sound level meter. We have assumed that activities during the measurements were not considered representative of worst-case operations, as such through conservative estimate we have added 10 dB to the measured noise levels. The measured 1/1 octave band noise levels plus 10 dB are shown in Table 6 below.

Table 6. Measured Ambient Noise Level in Dining Area.

Location	A-Weighted Sound Power SPL (dB)	Sound Pressure Level dBA, Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Dining Area	70	61	71	71	68	65	61	56	48

As there 2no. bi-folding, the calculated break-out sound power level is based on an opening of 3m² for each window. Details of the external sound power level break-out from the dining area used within our calculations are summarised within the following table:

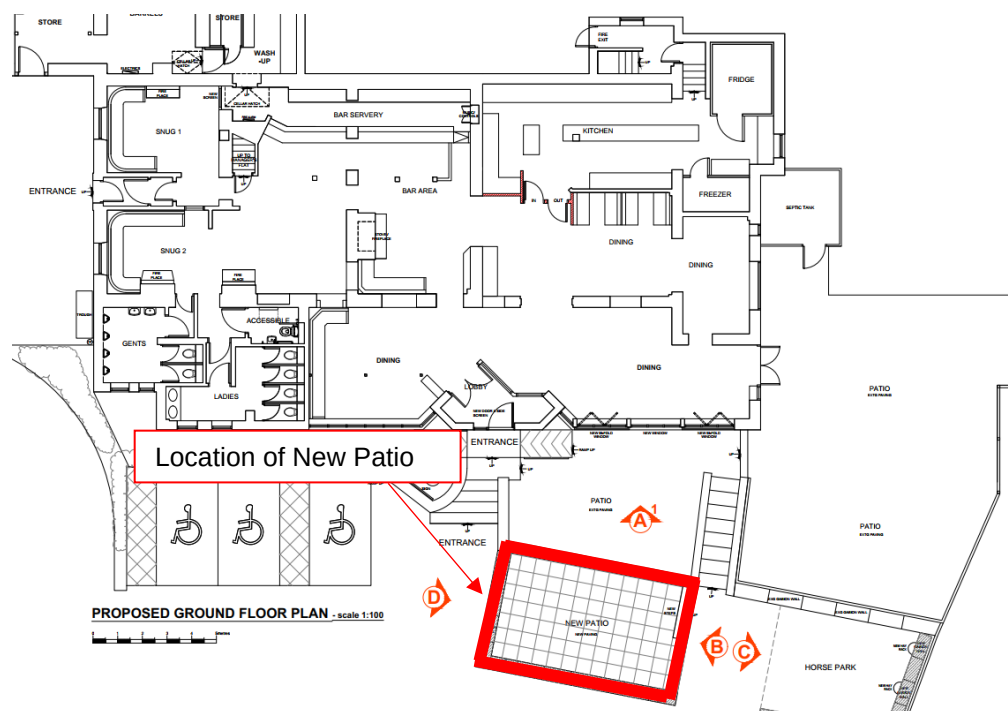
Table 7. External Break-out from Dining Area Through Open Bi-folding Window

Measured Sound pressure level in dining room (plus 10 dB), dBA	70
Correction for Diffuse – Free-field (dB)	-6
Sound pressure level, at exterior façade of dining area bi-folding windows, dBA	64
Window Opening (m ²)	3
Sound power of open bi-folding window, L _w (dBA)	69

6.2 Proposed Patio Noise Levels

Drawings indicate the new patio is located to the south of the existing patios. The location and elevation of the new patio is taken from 4002 PL02 Planning – Proposed Site Plan & 4002 PL03 Planning – Elevations dated March 2023, with an extract below.

Figure 3. Locations of New Patio



For assessing the proposed beer garden we have considered data using the Average Speech Levels and Spectra in Various Speaking/Listening Conditions: A Summary of the Pearson, Bennett, & Fidell (1977). We have assumed there will be 4 no. tables in total. Based upon this for each table we have assumed 2 no. persons to be speaking simultaneously, both with raised voices using data for a male and female. It is assumed the beer garden areas will be open during the existing opening hours of the pub between 11:30 to 23:30 7 days a week. There is also a proposed gabion wall bordering the patio which is understood to be at a height of approximately 0.75m.

Details of the following external sound power level used within our calculations are summarised within the following table:

Table 8. External Noise Break-out - Patrons in New Patio with Raised Voices

Activity / Plant	A-Weighted Sound Power SWL (dB)	Sound Power Level dBA Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Predicted noise level of patrons with raised voices (per table)	74	61	69	73	69	65	60	54	61

6.3 Noise Propagation Calculations

A 3-dimensional noise model has been created using Soundplan noise modelling software. The software uses the method of ISO 9613 'Acoustics – attenuation of sound during propagation outdoors – general method of calculation' and takes into account geometric spreading, ground effects, air attenuation, barrier attenuation and reflections.

The model is based upon aerial photographs and the supplied proposed site layout plan provided by the Client. A ground absorption coefficient of 0 has been used to correspond with the intervening ground from the site through to the receiver which is predominately hard surfaces (i.e. hard standing, car park, roads, buildings etc). An absorption coefficient of 1 has been used to correspond with the surrounding grass land.

It should be noted that within the model, the noise source of the patrons using the new patio are modelled as point sources. For the new patio we have assumed 4no. tables and as such have inserted 4 no. point sources (one for each table) which equates to 8no. persons speaking simultaneously based on Section 6.2 and have assumed a height of 1m above the floor level for the point sources within the model. There is a proposed gabion wall bordering the new patio, this has been modelled at a height of 0.75m. For noise break-out from the dining area we have inserted 2no. area sources both at 3m² in the locations of the openable bi-folding windows based on data in Section 6.1.

For the receivers noise levels are calculated at 1.5m at ground floor level and an additional 2.8m for each additional storey.

The Soundplan model would suggest the following noise levels calculated at the closest noise sensitive receivers. For other receivers further away a lower noise level would be experienced due to greater distance attenuation provided. Only the highest calculated noise level has been reported in the table below.

Table 9. Calculated noise levels at the closest receiver

Operational Period (hh:mm)	Calculated noise level at Closest NSR, dBA
Evening / Early night-time opening hours (21:00 – 23:30)	40

Figure 4. Calculated noise levels at residential receivers (operational hours)



6.4 Noise Impact Assessment – Discussion of Results

Utilising measured data and library data of the likely noise levels generated by the proposed alterations we have calculated the expected noise levels at the nearest noise sensitive receivers. The results of our calculations have indicated that the noise level incident upon the most noise sensitive residential property to be 40 dB L_{Aeq} during the opening hours of the pub. The assessment indicates that the overall noise egress from the likely noise sources associated with proposed development are below the existing ambient noise climate at the nearest noise sensitive receivers given in Tables 4 and 5 above. As such this is an indication that the proposed installations falls within the lowest observed adverse effect level and would have a low impact on the surrounding residential receivers, and is therefore in accordance with the National Planning Policy Framework. Additional receivers that are further away would experience lesser impacts.

If comparison is made with the predicted specific noise levels described within Section 5.3 and WHO guidance in Section 3.4 it can be seen that the predicted noise from the proposed scheme will be below the 50dB L_{Aeq} WHO guidance criteria for the onset of moderate annoyance during the daytime and below the 45 dB L_{Aeq} criterion for outside bedrooms during night time.

With regards to the existing evening opening hours the predicted noise level at the facade of the most noise sensitive dwelling was predicted to be 40 dB L_{Aeq} . Taking into account a 15dB reduction for an open window, the internal noise level is predicted to be 25 dB L_{Aeq} and as such is predicted to achieve the WHO and BS8233 recommended daytime internal noise level of 35 dBA.

With regards to the existing night-time opening hours the predicted noise level at the facade of the most noise sensitive dwelling was predicted to be 40 dB L_{Aeq} . Taking into account a 15dB reduction for an open window, the internal noise level is predicted to be 25 dB L_{Aeq} and as such is predicted to achieve the WHO and BS8233 recommended night-time internal noise level of 30 dBA.



With reference to context, it is noted that there is an existing patio associated with the existing pub and therefore the character of the noise sources associated with the proposed new patio will be similar to existing noise sources which are currently attributed with the existing pub. We would therefore consider that the context described above would also reduce the impact of the scheme.

It is noted that the NPPF requires that significant adverse impacts due to a new development should be avoided and other adverse impact should be mitigated and reduced to a minimum. Based upon the above assessment it is concluded that the sound levels arising from the activities of the proposed development will not result in an adverse impact and will therefore comply with the requirements of the NPPF.



7.0 CONCLUSION

At the request of J.W. Lees & Co (Brewers) Ltd a noise impact assessment has been undertaken for the proposed alterations to the existing Pack Horse Inn in Bury. The development proposes formation of a new raised patio/seating area and horse park enclosed with gabion walls to the south, and the installation of 2no. bi-folding windows to the dining area.

A noise survey has been conducted at a position representative of the nearest noise sensitive dwelling to the development. The results of the survey have been used to establish the existing ambient and background noise climates at the nearest noise sensitive receptors during the likely quietest periods of the proposed opening times of the pub/new patio.

Utilising measured data and library data of the likely noise levels generated by the proposed alterations we have calculated the expected noise levels at the nearest noise sensitive receivers. The results of our calculations have indicated that the noise level incident upon the nearest residential properties to be 40 dB L_{Aeq} during the opening hours of the pub. The assessment indicates that the overall noise egress from the likely noise sources associated with proposed development are below the existing ambient noise climate at the nearest noise sensitive receivers during both the day and night time periods. As such this is an indication that the proposed installation falls within the lowest observed adverse effect level and would have a low impact on the surrounding residential receivers, and is therefore in accordance with the National Planning Policy Framework.

In addition it is noted that the highest calculated absolute noise levels are below the BS8233:2014 and WHO Guidelines for Community Noise suggested external noise levels of 50 – 55 dB outside dwellings during the daytime and 45 dB during the night-time.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

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.



APPENDIX B – MEASURED LEVELS

Figure 5. Measured Ambient Noise Levels

