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**PURBANI RESTAURANT
HIGH STREET, BOTLEY
PLANT NOISE ASSESSMENT**

Technical Report: R9434-1 Rev 0

Date: 31st March 2022

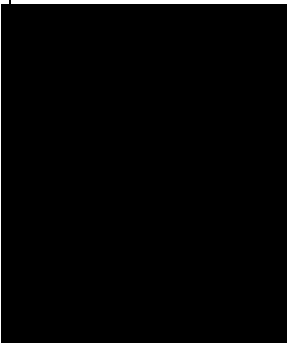
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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Purbani Botley Restaurants Ltd to undertake an assessment of noise from proposed kitchen extract plant at the Purbani Restaurant, 2 High Street, Botley.
- 1.2 This report presents the results of the assessment, following site visits and a background noise survey undertaken between 17th and 21st March 2022.
- 1.3 All sound pressure levels quoted in this report are in dB relative to 20 μ Pa. All sound power levels quoted in this report are in dB relative to 10^{-12} Watts. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 Planning permission is sought to install a new kitchen extract system, to be located at the rear of the property.
- 2.2 The nearest residential property to the proposed extract plant is the neighbouring building, 3 Winchester Street, with the nearest window located approximately 7m to the north, and is shown as Receptor 1 in Figure 1.
- 2.3 It is understood that the kitchen extract system will operate during daytime periods (07:00 to 23:00 hours) only. Therefore, this assessment will consider the specific noise level against measured daytime (07:00 to 23:00 hours) background noise levels.
- 2.4 An aerial view of the site and the measurement location is shown in Figure 1. The proposed plant location is shown in Figure 2.

3.0 RELEVANT CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

3.1 Paragraph 185 of the National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should:

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

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

3.4 The NPPF and NPSE documents do not refer to specific noise criteria. When considering the impact of noise from new plant 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142:2014 [Reference 3] are adopted.

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

- 3.5 BS 4142:2014+A1:2019 provides a method for rating the effects of industrial and commercial sound on residential receptors.
- 3.6 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.
- 3.7 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).
- 3.8 BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

Summary

- 3.9 Based on the above guidance, it is considered appropriate to target a BS 4142 plant noise rating level at least 5 dB below the typical background noise level at the nearest noise sensitive properties.

4.0 NOISE MEASUREMENTS

Background Noise Survey

- 4.1 A noise survey was undertaken between 17th and 21st March 2022 to assess the existing background noise levels. The following equipment was used:
- Rion precision sound level meter Type NL-31;
 - Brüel & Kjær acoustic calibrator Type 4231.

- 4.2 The noise monitoring equipment was located to the rear of the property at a height of 4m above local grade level. This location is considered representative of the noise climate at nearby residential properties and is shown in Figure 1.
- 4.3 Measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq} , L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 4].
- 4.4 The instrumentations' calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards.
- 4.5 The instrumentation was fitted with environmental weather shields during the surveys. Weather conditions during the surveys were fine and dry.
- 4.6 The results of the background noise surveys are shown graphically in Appendix B and are summarised in Table 1.

Date (March 2022)	Typical Background Noise Level	
	Daytime dB LA90, 1 hour (07:00 - 23:00)	Night-Time dB LA90,15 min (23:00 - 07:00)
Thursday 17th	47	34
Friday 18th	48	34
Saturday 19th	48	30
Sunday 20th	45	33
Monday 21st	48	-
Average	47	33

Table 1: Summary of Measured Noise Levels

- 4.7 24 Acoustics determines the typical background noise level to be the average minus one standard deviation.
- 4.8 The dominant noise sources in the area are local road traffic. Periods of plant noise were noted during the survey, comprising extract systems from a neighbouring public house and café.

5.0 PLANT NOISE ASSESSMENT

Plant Noise Data

- 5.1 It is proposed to install new kitchen supply and extract fans to the location shown in Figure 2 at first floor level. The proposed fans' make and model are described below:
- Flakt Woods extract fan model: ePowerBox 80-630-3-4 (7NA);
 - Flakt Woods supply fan model: ePowerBox 80-560-3-4 (6LA).
- 5.2 The nearest neighbouring habitable rooms are located to the north at 3 Winchester Road, shown as Receptor 1 in Figure 1. The first floor windows on this façade are considered the most affected.
- 5.3 The manufacturer's sound power level data for the proposed extract and supply units are shown in Table 2.

Component	Extract Fan: Flakt Woods ePowerBox 80-630-3-4 (7NA) Sound Power Level (dB) Octave Band Centre Frequency (Hz)							dBA
	125	250	500	1k	2k	4k	8k	
Inlet	79	73	70	66	65	62	58	73
Outlet	84	81	76	73	70	65	60	79
Breakout	75	67	51	47	44	40	36	62
Component	Supply Fan: Flakt Woods ePowerBox 80-560-3-4 (6LA) Sound Power Level (dB) Octave Band Centre Frequency (Hz)							dBA
	125	250	500	1k	2k	4k	8k	
Inlet	70	69	62	58	54	50	47	65
Outlet	78	73	67	64	57	52	48	70
Breakout	66	58	41	38	35	28	20	53

Table 2: Manufacturer's Sound Power Level Data.

- 5.4 Preliminary calculations identified the need for mitigation to the extract and supply atmospheric terminations in the form of in-line attenuators. Based on typical silencer performances, the minimum recommended insertion loss for each attenuator is shown in Table 3.

Unit	Octave Band Centre Frequency (Hz)						
	Minimum Silencer Insertion Loss (dB)						
	125	250	500	1k	2k	4k	8k
Extract: Atmospheric Outlet	10	19	29	22	17	15	14
Supply: Atmospheric Inlet	5	8	13	12	8	7	7

Table 3: Recommended Minimum Silencer Insertion Loss.

- 5.5 Calculations have been undertaken to determine the level of noise from the proposed plant at the nearest noise sensitive window including corrections for distance, reflections, directivity and the recommended silencer performance. Calculations indicate that noise from the proposed new plant will be in the order of 41 dB $L_{Aeq\ 1\ hour}$ during operational daytime periods at the receptor location.

BS 4142:2014 Assessment

- 5.6 A BS 4142 assessment for the proposed plant has been undertaken and is shown in Table 4. The proposed supply/extract fans are not considered to contain tonal or other distinctive characteristics.

BS:4142 Plant Noise Assessment	
	Receptor 1: 3 Winchester Road (07:00 to 23:00 hours)
Representative Background Noise Level	47 dB $L_{A90, 1\ hour}$
Specific Source Noise Level	41 dB $L_{Aeq\ 1\ hour}$
Rating Correction	0 dB
Rating Noise Level	41 dBA
BS 4142 Assessment Level	-6 dBA

Table 4: Receptor 1, 3 Winchester Road, BS 4142 Assessment.

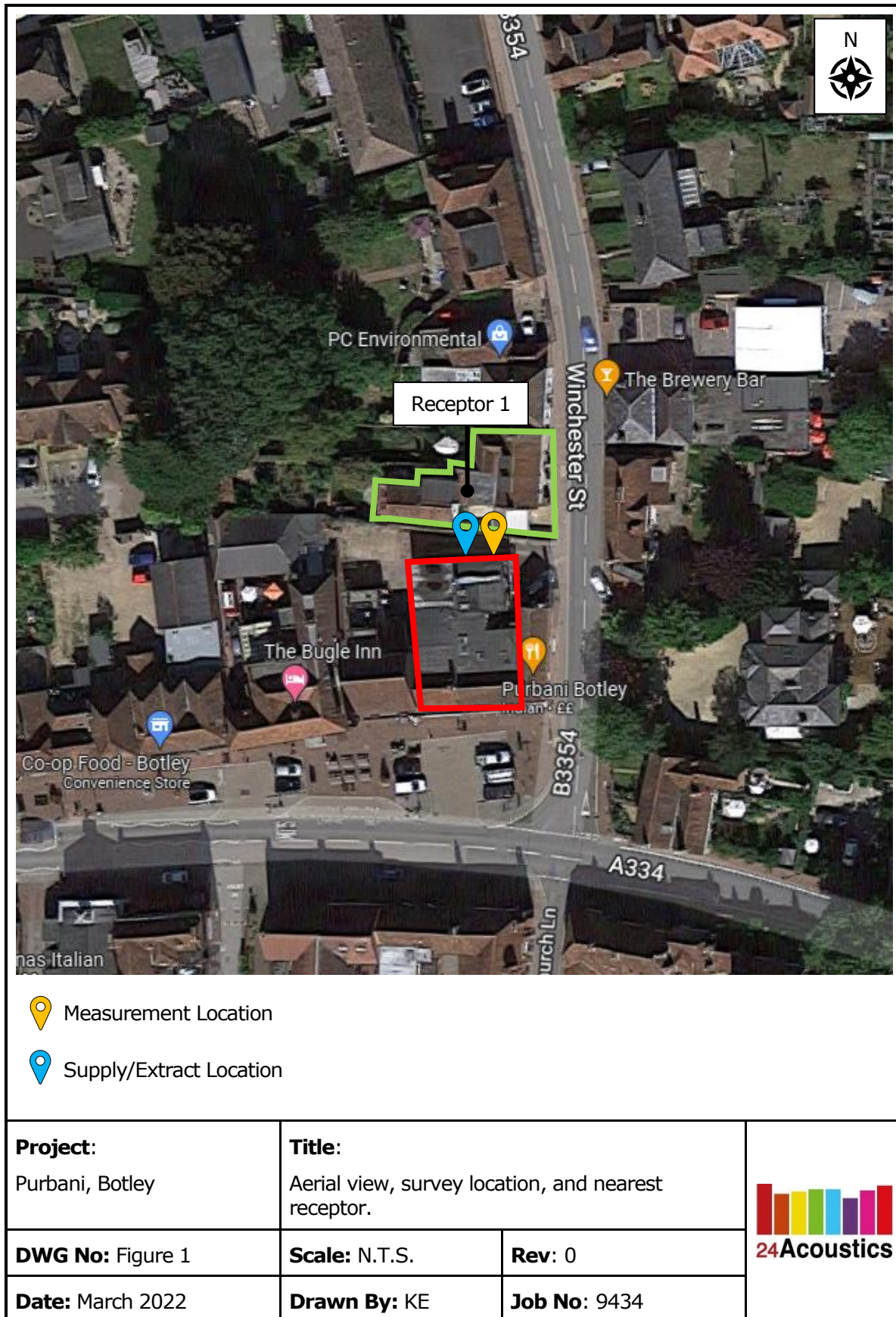
- 5.7 Table 4 shows that, with mitigation, the BS 4142 rating levels at the receptor location will be at least 5 dB lower than the background noise level during proposed plant operational periods. This indicates a 'low' impact and hence will be acceptable.

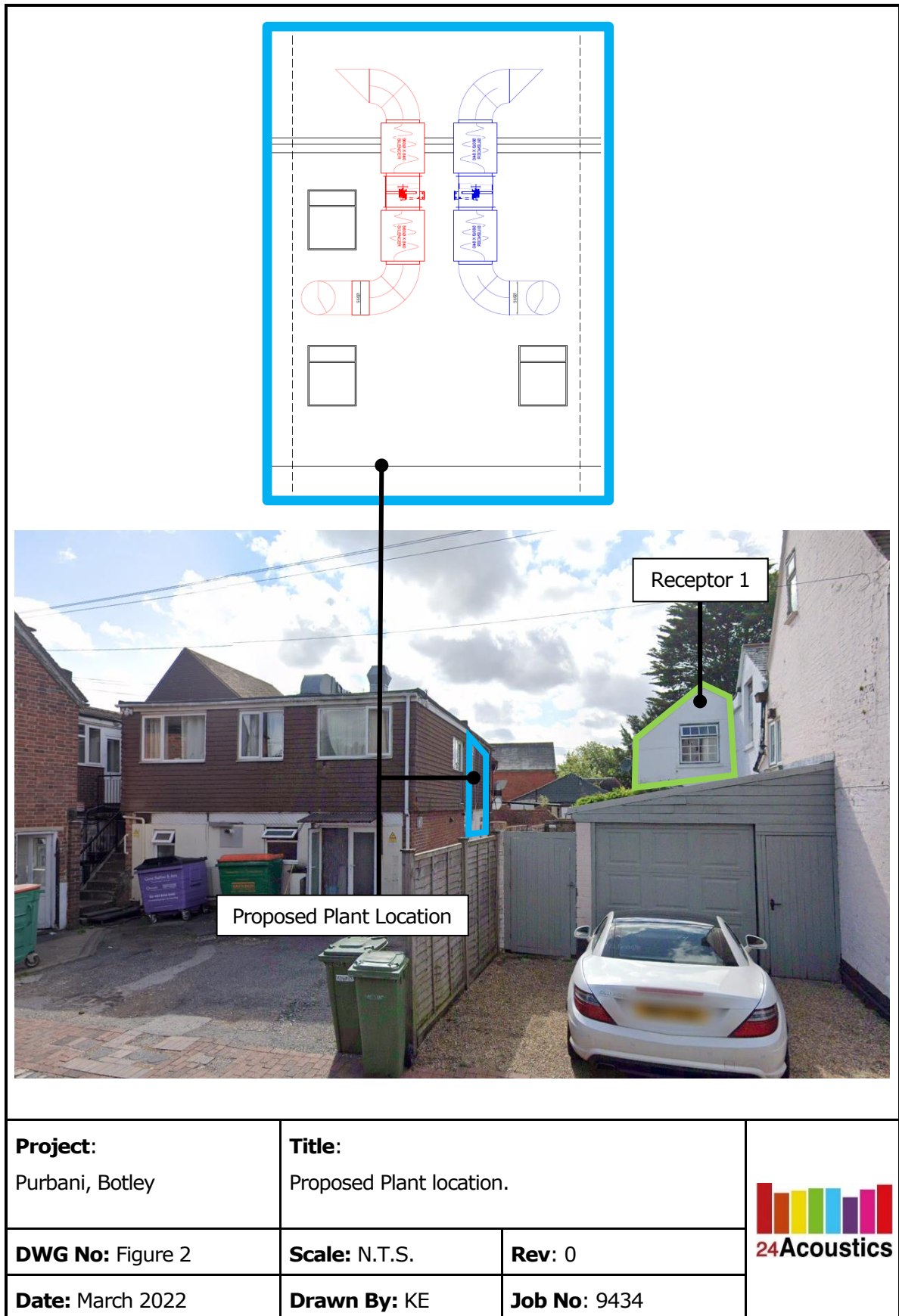
6.0 CONCLUSIONS

- 6.1 Purbani Botley Restaurants Ltd has instructed 24 Acoustics Ltd to undertake a noise impact assessment for new kitchen extract plant at the Purbani Restaurant in Botley.
- 6.2 An environmental noise survey has been undertaken to determine the existing background noise levels representative of nearby residential properties.
- 6.3 Recommendations for mitigation have been provided in the form of in-line attenuators to the supply and extract fan's atmospheric terminations.
- 6.4 Calculations have been undertaken, based on manufacturer's noise data, to determine the plant noise levels at the nearest noise sensitive windows.
- 6.5 The assessment demonstrates that, with the recommended mitigation, noise from proposed new plant at the most affected residential windows will be at least 5 dBA below the measured background noise levels and this indicates a 'low' impact when assessed in accordance with the guidance of BS 4142. Therefore, noise from the proposed new plant is acceptable.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, Revised July 2021.
2. DEFRA, Noise Policy Statement for England, March 2010.
3. British Standards Institution. British Standard 4142:2014+A1:2019. Methods for Rating Industrial and Commercial Sound, 2014.
4. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.





APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – AMBIENT NOISE SURVEY RESULTS

