

SHARPS REDMORE

ACOUSTIC CONSULTANTS



Report

Langdale Capital

Butchers Arms, Chester
Road, Rossett

Environmental noise
assessment: setting fixed
plant equipment noise limits

Prepared by

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Project No 1415020



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1.0 Introduction

- 1.1 Sharps Redmore (SR) has been instructed by Langdale Capital to undertake a noise assessment to establish appropriate noise limits for fixed plant equipment associated with a proposed extension to the Butchers Arms public house in Chester Road, Rossett. A site location plan is presented at Appendix A.
- 1.2 The proposal is for the erection of a single storey extension to the rear of the existing pub building with associated plant equipment; the closest residential properties to the proposed extension and likely plant area are to the east off Holt Road.
- 1.3 Section 2 of this report contains a discussion of the appropriate assessment criteria for fixed plant equipment.
- 1.4 Section 3 of this report sets out the findings of an environmental noise survey, undertaken to establish the existing background noise climate.
- 1.5 Suitable plant noise criteria are discussed in section 4.
- 1.6 The assessment findings are present in the conclusion at section 5. A guide to the acoustic terminology used in this report is shown in Appendix C.

2.0 Assessment criteria

- 2.1 The Planning Policy Wales (PPW) national planning policy objective is to “*seek to ensure that development does not produce irreversible harmful effects on the natural environment*” (ref. Planning Policy Wales, 6 February 2014, paragraph 4.4.3).
- 2.2 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:
- i) The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation “Guidelines for Community Noise” contain such guidelines.
 - ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
 - iii) Another method is to compare the resultant sound level against the background sound level (L_{A90}) of the area. This is the method employed by BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the new standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.
- 2.3 Since this assessment is concerned with the establishment of appropriate noise limits for future fixed plant equipment it is necessary to consider the guidance presented in BS 4142:2014.

Assessment using BS 4142:2014

- 2.4 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:
- i) Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
 - ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level ($T = 1$ hour for day or 15 minutes for night), at the receptor location of interest.
 - iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
 - iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.

- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.
- vi) The general intent of the Welsh planning system is to ensure that a development does not result in *“irreversible harmful effects” (as presented in PPW)*. It is interpreted that seeking to avoid *“irreversible harmful effects”* is materially the same in intent as seeking to avoid significant adverse impact (which is the test under the English planning system, as outlined in paragraph 123 of the NPPF. BS 4142:2014 considers that the threshold of significant adverse impact is “a difference around +10 dB or more ... depending upon the context”).

2.5 Plant rating sound level limits are set in section 4 of this report in accordance with the guidance contained in BS 4142:2014.

3.0 Environmental noise survey

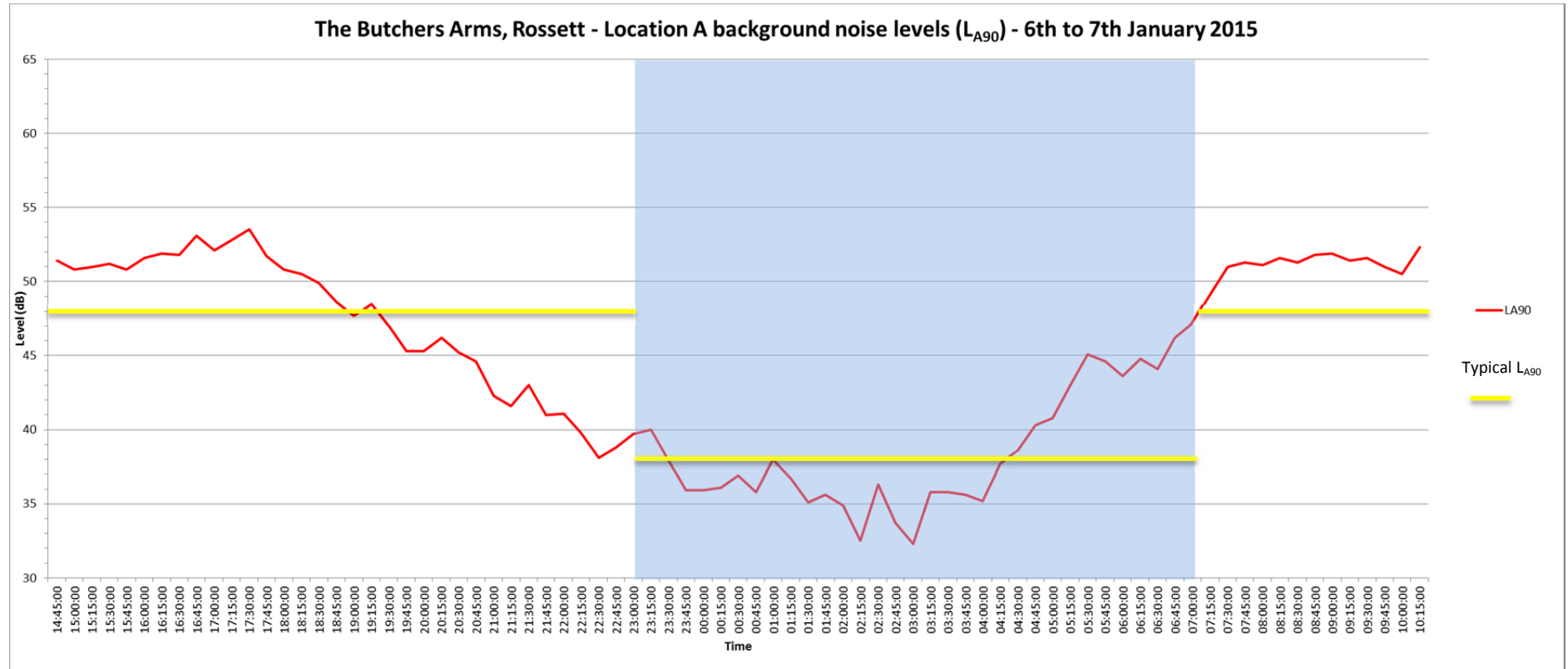
- 3.1 A noise survey was undertaken between 6th January 2015 and 7th January 2015. The noise measurements were taken at a single location, to the rear of the pub at the boundary with the closest residential property in Holt Road, as indicated in Appendix A.
- 3.2 Unattended noise measurements were carried using a Norsonic 118 sound level meter fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the survey and no variation in level noted. Specifications of the noise monitoring equipment used are shown at Appendix B3.
- 3.3 The sound level meter microphone was positioned approximately 1.5 metres above the ground in free field conditions; noise measurements were collected over 15 minute sample periods.
- 3.4 Noise measurements were taken between 1445 and 1030 hours. Sporadic site observations during this period indicated that the existing noise climate was dominated by local road traffic sources. The weather was dry during the bulk of the survey, with rain only observed during the last 15 minutes of the measurements. Weather conditions were generally dry, with partly cloudy conditions (approximately 40% cover) at the start of the survey; conditions were generally clear over night with cloudy conditions observed at the end of the measurements. The wind was light in speed (<5m/s) and varied between a westerly direction at the start of the survey, changing to a mostly southerly direction from mid evening on the 6th January. Temperature varied between +8°C and 0°C. Meteorological conditions are not considered to have affected the measured noise levels.
- 3.5 The range of measured noise levels are summarised below and presented in full in Appendix B.

TABLE 1: Summary of measured noise levels

Location	Measured noise levels dB			
	Daytime		Night time	
	L _{A90}	L _{Aeq T}	L _{A90}	L _{Aeq T}
A	38.1-53.5	45.8-67.2	32.3-46.2	38.0-55.9

- 3.6 The guidance in BS 4142:2014 requires the determination of typical daytime and night time background (L_{A90}) noise levels. The graph in Figure 1 is presented to determine the typical background noise levels.

FIGURE 1: Identification of typical background noise level (dB L_{A90})



4.0 Plant noise criteria

- 4.1 The noise survey established the following typical background noise levels during the daytime and night time periods:

TABLE 2: Measured typical background noise levels

Time period	
Daytime (0700-2300 hours)	Night time (2300 to 0700 hours)
48 dB L _{A90} 16 hours	38 dB L _{A90} 8 hours

- 4.2 With regard to the difference between the rating level and the background noise level, section 11 of BS4142:2014 advises:

- a) *Typically, the greater this difference, the greater the magnitude of the impact.*
- b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

- 4.3 Therefore in the context of the measured background noise levels it is considered appropriate that plant rating levels should not exceed the existing daytime and night time background noise levels at the closest residential property.

- 4.4 The following plant (rating) noise limits are therefore recommended.

TABLE 3: Plant rating noise level limits

Time period	
Daytime (0700-2300 hours)	Night time (2300 to 0700 hours)
48 dB	38 dB

- 4.5 It is recommended that the following planning condition is imposed to secure the proposed plant noise limits in Table 3:

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 48 dB between 0700 and 2300 hours and 38 dB at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessment shall be made according to BS 4142:2014."

5.0 Conclusions

- 5.1 A noise survey has been undertaken to establish the existing typical background noise levels.
- 5.2 Based on this noise survey the following plant (rating) noise limits are recommended.

TABLE 3: Plant rating noise level limits

Time period	
Daytime (0700-2300 hours)	Night time (2300 to 0700 hours)
48 dB	38 dB

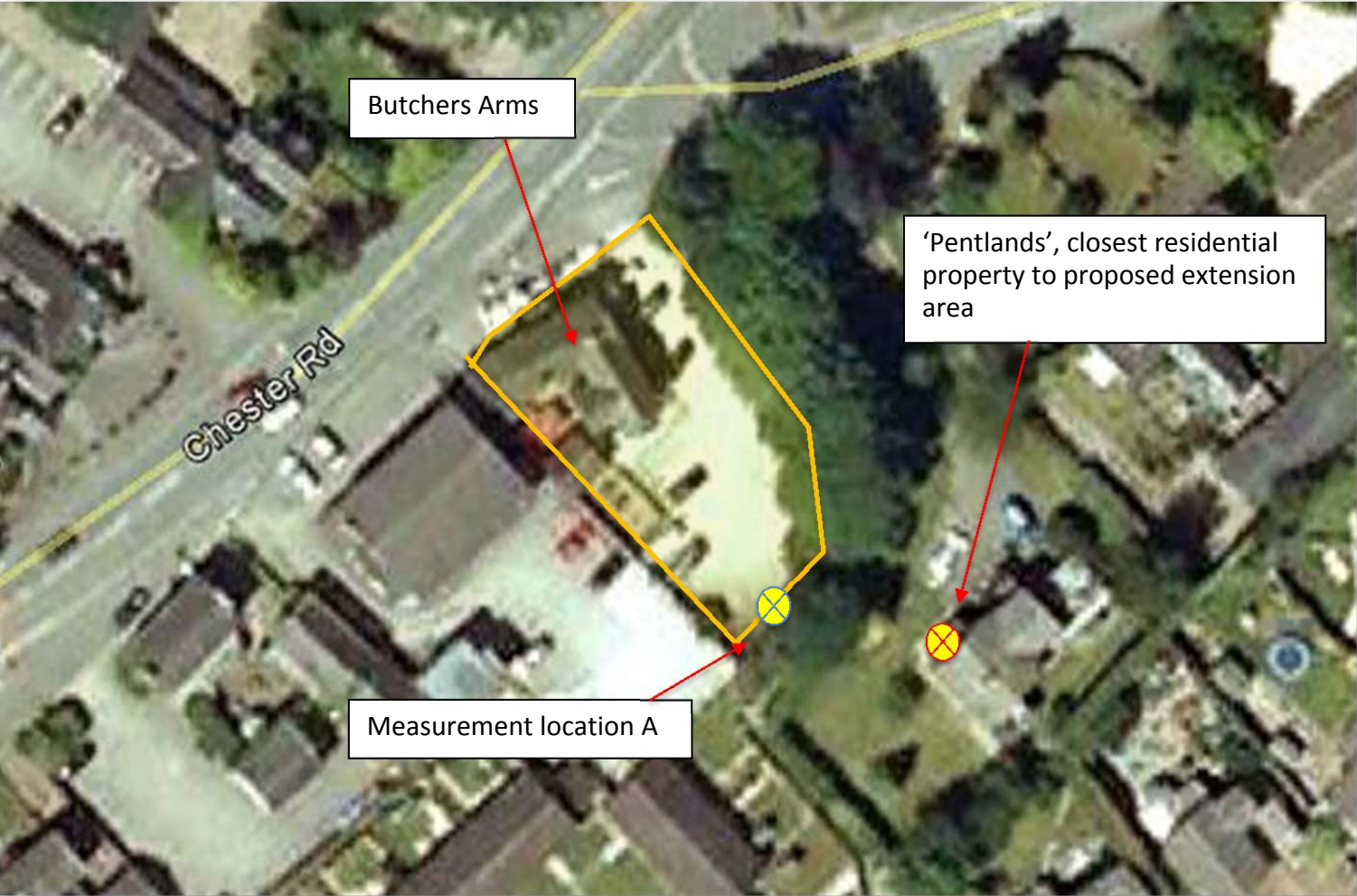
- 5.3 It is recommended that the following planning condition is imposed to secure the suggested plant noise limits:

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 48 dB between 0700 and 2300 hours and 38 dB at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessment shall be made according to BS 4142:2014."

APPENDIX A

SITE LOCATION PLAN

Appendix A: Site location plan



APPENDIX B

NOISE SURVEY RESULTS

Appendix B: Noise survey results

Appendix B1		Title: Noise survey results				
Measurement location A - Rear boundary of Butcher Arms						
Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AFmax}	L _{AFmin}
6.1.15	14:45:00	56.5	51.4	56.2	79.1	34.6
	15:00:00	55.8	50.8	53.8	68.4	48.7
	15:15:00	55.3	51.0	53.6	66.1	48.2
	15:30:00	55.8	51.2	53.8	67.7	48.4
	15:45:00	57.6	50.8	55.4	74.6	47.9
	16:00:00	56.4	51.6	54.7	74.5	48.2
	16:15:00	56.6	51.9	55.0	73.4	49.5
	16:30:00	56.6	51.8	55.7	76.8	48.8
	16:45:00	58.3	53.1	58.1	81.9	49.8
	17:00:00	56.0	52.1	54.3	61.6	48.9
	17:15:00	56.4	52.8	54.9	65.4	50.8
	17:30:00	57.0	53.5	55.4	63.7	51.4
	17:45:00	56.4	51.7	54.6	66.6	48.8
	18:00:00	54.9	50.8	53.1	61.8	47.5
	18:15:00	55.0	50.5	53.1	63.2	47.5
	18:30:00	53.9	49.9	52.6	75.9	46.6
	18:45:00	54.6	48.6	52.3	64.1	46.0
	19:00:00	53.3	47.7	51.3	65.3	45.3
	19:15:00	53.0	48.5	51.0	59.0	46.8
	19:30:00	52.8	47.0	50.4	60.8	44.7
	19:45:00	51.0	45.3	48.7	62.8	42.8
	20:00:00	51.6	45.3	49.1	65.2	42.2
	20:15:00	51.6	46.2	49.5	62.4	43.6
	20:30:00	51.4	45.2	49.2	65.7	42.6
	20:45:00	51.6	44.6	48.9	65.1	41.7
	21:00:00	50.6	42.3	48.0	66.2	38.5
	21:15:00	50.9	41.6	47.8	58.7	38.7
	21:30:00	51.7	43.0	48.5	65.1	40.2
	21:45:00	50.0	41.0	46.7	63.8	37.6
	22:00:00	50.6	41.1	47.3	62.1	37.9
	22:15:00	49.4	39.8	45.8	59.1	35.5
	22:30:00	50.2	38.1	46.2	60.4	34.9
	22:45:00	49.8	38.8	46.0	61.9	35.6
	23:00:00	50.3	39.7	47.0	63.6	35.5
	23:15:00	50.5	40.0	48.2	73.2	36.5
	23:30:00	50.3	38.0	47.5	66.9	33.0
	23:45:00	49.3	35.9	46.0	62.5	31.4
7.1.15	00:00:00	46.8	35.9	44.1	64.3	34.3
	00:15:00	47.8	36.1	44.5	62.6	30.5
	00:30:00	46.5	36.9	44.2	60.6	32.7
	00:45:00	43.3	35.8	41.8	64.1	33.2
	01:00:00	45.0	38.0	44.1	63.6	32.7
	01:15:00	42.5	36.7	41.3	59.6	35.2
	01:30:00	42.3	35.1	42.0	61.3	31.8
	01:45:00	41.2	35.6	40.3	61.2	32.0
	02:00:00	42.7	34.9	41.8	60.6	31.3
	02:15:00	40.5	32.5	38.0	53.0	30.1
	02:30:00	42.9	36.3	40.8	56.8	32.9

Appendix B: Noise survey results

Appendix B2		Title: Noise survey results				
Measurement location A - Rear boundary of Butcher Arms						
Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AFmax}	L _{AFmin}
7.1.15	02:45:00	42.7	33.7	42.3	61.3	29.3
	03:00:00	42.3	32.3	42.3	64.3	29.7
	03:15:00	41.7	35.8	42.5	63.8	30.9
	03:30:00	41.0	35.8	40.8	61.4	32.8
	03:45:00	40.9	35.6	39.2	55.2	30.9
	04:00:00	45.7	35.2	43.8	68.1	31.1
	04:15:00	53.8	37.7	49.2	64.2	32.5
	04:30:00	54.2	38.6	49.2	63.6	35.7
	04:45:00	47.3	40.3	45.3	62.9	37.5
	05:00:00	50.4	40.8	47.2	60.8	36.2
	05:15:00	55.5	43.0	50.8	63.0	38.6
	05:30:00	54.4	45.1	50.9	65.0	41.0
	05:45:00	50.0	44.6	48.3	64.8	41.9
	06:00:00	49.7	43.6	50.7	77.7	41.2
	06:15:00	56.3	44.8	55.9	77.1	42.9
	06:30:00	50.1	44.1	47.6	60.5	42.6
	06:45:00	51.5	46.2	49.3	60.0	43.9
	07:00:00	52.6	47.2	50.4	61.7	44.7
	07:15:00	55.8	49.1	54.8	77.8	46.0
	07:30:00	57.1	51.0	54.6	63.7	48.3
	07:45:00	59.7	51.3	58.3	76.0	49.1
	08:00:00	57.6	51.1	55.6	74.3	48.9
	08:15:00	57.5	51.6	58.4	80.8	48.7
	08:30:00	56.5	51.3	54.3	68.4	49.2
	08:45:00	56.6	51.8	54.9	70.1	49.1
	09:00:00	56.9	51.9	60.7	82.4	50.0
	09:15:00	57.5	51.4	56.0	78.8	48.8
	09:30:00	57.5	51.6	55.1	66.0	49.1
	09:45:00	57.4	51.0	54.8	70.4	47.8
	10:00:00	57.4	50.5	55.3	72.7	47.8
	10:15:00	66.5	52.3	67.2	86.2	49.4



APPENDIX B3: DETAILS OF INSTRUMENTS USED FOR MEASUREMENTS

Project Name	The Butchers Arms, Rossett	Project Number	1415020
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Site Location	Rossett	Measurement Date(s)	Tuesday 6th Jan 2015 to Wednesday 7th Jan 2015
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Measurement position(s)	Location A: at the rear site boundary of the pub car park		Sharps Redmore Kit ID
			118F
Item	Type	Serial No.	Calibration Date:
Instrument	NOR118	31795	October 2016
Microphone	1225	79523	
Pre-Amplifier	1206	36058	
Calibrator	1251	31332	October 2015

APPENDIX C

ACOUSTIC TERMINOLOGY

C1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. $50 \text{ dB} + 50 \text{ dB} = 53 \text{ dB}$. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

C2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

C3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

C4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .

C5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

C6 The main noise indices in use in the UK are:

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

- L_{A10} : The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.
- L_{AMAX} : The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.
- C7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- C8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = $20 \log$ (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB.}$$