SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Mansfield Bowling Club

Acoustic planning report

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A	3 Dec 2014		Robert Burrell	Richard Muir
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Summary

Sandy Brown Associates LLP (SBA) carried out an unattended environmental noise survey at Mansfield Bowling Club, Camden, between 16 November 2012 and 20 November 2012. Additional attended noise measurements were undertaken on 1 December 2014 to confirm that the 2012 data was still valid.

The average ambient noise levels measured during the survey were $L_{Aeq,16h}$ 50 dB during the daytime and $L_{Aeq,8h}$ 43 dB at night. These levels are lower than the WHO *Guidelines for Community Noise* limits for external noise.

An initial facade sound insulation assessment has been carried out to determine the required acoustic performance of the facade, and provide guidance on the ventilation strategy.

External daytime and night time noise levels at the development are lower than the limits set by Camden Council for noise mitigation to be required.

Based on the internal noise level criteria and the results of the noise monitoring, the minimum facade sound insulation performance will need to be R_w+C_{tr} ≥15 dB. This performance will be achieved using any standard glazing specification.

The use of open windows is acceptable for providing purge ventilation and summer time cooling. However, using open windows for background ventilation would exceed the recommended internal noise level criteria. For the purposes of background ventilation, it is recommended that attenuated passive ventilation (eg, trickle vents) or mechanical ventilation (eg, MVHR) be employed.

The lowest background noise levels measured during the survey were $L_{A90,15min}$ 32 dB during the daytime and $L_{A90,15min}$ 33 dB at night.

The noise policy adopted by Camden Council requires that the combined level from all new operational plant must not exceed 5 dB below the background noise level at the nearest residential premises. Therefore, all plant will be designed such that the cumulative noise level 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 27 dB during the daytime and L_{Aeq} 28 dB during the night.

Contents

1 Introduction

The application site comprises a vacant indoor bowling facility which consisted of a six rink indoor bowling green, part 2/part 3 storey clubhouse with associated changing rooms and function room (Class D2). Two ancillary residential flats (Class C3) are also accommodated in the building. The remainder of the site is made up of associated car parking and hardstanding for the aforementioned vacant building, areas of open space, an outdoor bowling green, two tennis courts and associated clubhouse, and a small allotment area.

Due to the changes to the proposed scheme and the updates to the relevant British Standard documentation, it is considered that assessment provided in report *'12196-R01-B - Environmental noise survey report'* is no longer valid. This report provides a new acoustic planning assessment based on the updated scheme.

Sandy Brown Associates LLP (SBA) has been commissioned by Iceni Projects to undertake a noise survey at Mansfield Bowling Club.The purpose of the survey was to establish the existing ambient noise levels at the site and background noise levels in the vicinity of nearby noise sensitive premise.

Background noise level measurements enable noise limits to be set from proposed building services plant to meet Local Authority requirements.

Ambient noise level measurements the building envelope sound insulation performance requirements to be set.

This report presents the survey method, results of the environmental noise survey, limits for noise emission from building services plant at the closest sensitive buildings to the development and the building envelope sound insulation performance requirements.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1. The approximate site boundary is indicated by the dashed red line. The approximate unattended noise monitoring location is indicated by 'L' in Figure 1. The approximate attended noise monitoring locations are indicated by '1-5' in Figure 1.

Figure 1 Site and measurement location (source, Google Earth)

The site has an area of approximately 0.8 hectares with a two storey indoor bowling green and club house, an outdoor bowling green and a tennis court on it. The site is accessed via Croftdown Road to the west.

2.2 Proposed development

Creation of a new publicly accessible open space; enhanced tennis facilities including the reconfiguration and extension of the courts to provide an additional court and increased playing area to accord with LTA requirements; the provision of a new ancillary pavilion (Class D2) to replace existing ancillary buildings and structures; a new community garden; and the demolition and replacement of the existing bowling club building with a new part three storey, part 2 storey building providing 21 residential dwellings (Class C3) with associated access, parking and landscaping.

2.3 Adjacent premises

The surrounding area consists of primarily residential dwellings which are well screened by established landscaping and shrubbery. Specifically, the boundaries of the site sit adjacent to the rear gardens of properties on Croftdown Road, Regency Lawn, Dartmouth Park Avenue, Laurier Road and York Rise.

3 Noise survey method

3.1 Unattended measurements

A four day continuous noise logging survey was undertaken at the site to determine the existing background noise levels at the site and in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed continuously over 15 minute periods between 16:24 on 16 November 2012 and 14:39 on 20 November 2012.

The microphone was located approximately 2 metres above the ground. A photograph showing the measurement location is provided in Figure 2.

The measurement location is considered representative of the ambient noise climate outside all adjacent residential premises. Its location is shown in Figure 1 denoted by the letter L.

3.2 Attended measurements

Attended sample measurements were performed at a number of different locations around the site. These are indicated in Figure 1 as positions 1 to 5. The attended measurements were carried out on 1 December 2014, over 15 minute periods, with the purpose of determining the existing ambient and background noise levels from road traffic.

The locations of the measurements are indicated in Figure 1. In each case, the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 2 m from any other reflective surface.

Figure 2 Photograph showing the microphone at the unattended measurement location

3.3 Equipment

A Svantek type 948 sound level meter was used to undertake the unattended noise measurements.

A Bruel & Kjaer type 2250 sound level meter was used to undertake the attended noise measurements.

The calibration data for the equipment used during the survey are provided in Appendix A to this report. The measurement systems were calibrated at the beginning and end of the measurements using their dedicated sound level calibrators. No significant deviation in calibration occurred.

3.4 Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast (L_{AFmax}) or slow (L_{ASmax}) time weightings.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

The L_{A90} is considered most representative of the background noise level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

3.5 Weather Conditions

During the unattended noise monitoring between 16 November 2012 and 20 November 2012, weather reports for the area indicate that temperatures varied between 1°C and 18°C, the highest wind speed reported for the period is ≈ 1 m/s. There was no significant rainfall over the period.

During the attended noise monitoring on 1 December 2014 the weather reports for the area indicate that temperatures varied between 6°C and 10°C, the highest wind speed reported for the period is ≈ 2 to 3 m/s. There was no rainfall over the period of the measurements.

These weather conditions are considered suitable for representative measurements.

4 Measurement results

4.1 Observations

The subjective impression of the site was that noise levels were low. The only significant noise at the measurement location appeared to be from distant traffic. It is considered that traffic on Dartmouth Park Avenue was the main source of the noise.

4.2 Unattended noise measurement results

The results of the unattended noise measurements performed at the site are summarised in Table 1 and Table 2. The measured daytime, evening and night time noise levels are given in Table 1. Table 2 gives the minimum measured background noise levels measured during the survey. A graph showing the results of the unattended measurements is provided in Appendix B of this report.

Table 1 Measured ambient noise levels

Date	Daytime (07:00-19:00) $L_{Aeq,12hour}$ (dB)	Evening (19:00-23:00) $L_{Aeq,4hour}$ (dB)	Night (23:00-07:00) $L_{Aeq,8hour}$ (dB)
Friday 16 November 2012	-	50	44
Saturday 17 November 2012	48	51	43
Sunday 18 November 2012	48	44	43
Monday 19 November 2012	50	45	40

Table 2 Measured minimum background noise levels

Date	Daytime (07:00-19:00) $L_{A90,15min}$ (dB)	Evening (19:00-23:00) $L_{A90,15min}$ (dB)	Night (23:00-07:00) $L_{A90,15min}$ (dB)
Friday 16 November 2012	34*	35	33
Saturday 17 November 2012	34	32	33
Sunday 18 November 2012	33	36	34
Monday 19 November 2012	42	39	33
Tuesday 20 November 2012	42*	-	-

* Measurement not made over full period due to monitoring start and end time

The lowest background noise levels measured during the survey were $L_{A90,15min}$ 32 dB during the daytime period (07:00 to 23:00) and $L_{A90,15min}$ 33 dB at night.

4.3 Attended noise measurement results

The results of the attended noise measurements performed at the site on 1 December 2014 are summarised in Table 3.

The results of the ambient and background noise level measurements undertaken in December 2014 are similar to those measured in November 2012. Therefore, it is considered that the background noise level measurements from the 2012 unattended noise survey are still representative of current noise levels.

Table 3 Results of the attended noise measurements

Location	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	15:21	43	63	37	Road, pedestrians and school children shouting, minor roadwork's in distance with intermittent banging and aircraft noise
1	15:36	43	67	36	Equal to measurement 1 with barking dog, cars in car park and louder school children
2	15:59	47	66	37	More dominant road noise, cars in car park closer to microphone, sirens and overhead helicopter
2	16:15	40	59	35	Equal to measurement 3 with screeching noise and aircraft
3	16:33	45	66	36	More dominant road and pedestrian noise and aircraft
3	16:49	42	54	38	Equal to measurement 5 with car doors shutting and sirens
4	17:10	54	76	35	Intermittent barking dog, sirens and helicopter overhead. Very low level road and pedestrian
4	17:27	38	52	35	Low level road and pedestrian
5	17:46	43	66	35	Minor road noise, sirens, aircraft and rustling of plants
5	18:02	40	60	36	Equal to measurement 9 with car horn, banging in distance and voices from neighbouring house

The results of the attended noise measurements confirm the validity of the results from the four day unattended noise survey conducted in 2012. Therefore the plant noise limits set from this survey are still true.

5 Assessment criteria

5.1 NPPF and NPSE

The National Planning Policy Framework (NPPF) sets out the government planning requirements, and supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

'Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

The NPSE states that its aims are as follows:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.'*

As such, although neither of these documents sets out specific acoustic criteria for new residential development, the requirement to control both the effect of existing noise on the new development and the effect of noise from the development on the surroundings needs to be considered.

5.2 External noise levels – noise ingress

Camden Council planning policy DP28 requires noise sensitive schemes provide noise mitigation where the external noise levels exceed certain limits. These limits are set out in Table 4.

Table 4 Camden Council's limits above which mitigation is noise required

Noise description and location of measurement	Period	Time	Sites adjoining roads
Noise at 1m external to a sensitive facade	Day	07:00-19:00	$L_{Aeq,12hour}$ 62 dB
Noise at 1m external to a sensitive facade	Evening	19:00-23:00	$L_{Aeq,4hour}$ 57 dB

Noise at 1m external to a sensitive facade	Night	23:00-07:00	$L_{Aeq,8hour}$ 52 dB
Individual noise events several times an hour	Night	23:00-07:00	$L_{ASmax,8hour}$ 82 dB

Comparing the measurement data with the values in Table 4 indicates that noise mitigation is not required as part of the development.

5.3 Internal noise levels – noise ingress

5.3.1 Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS8233 *Sound insulation and noise reduction for buildings*, and is also provided by the World Health Organisation. The guidance given by BS8233 and WHO is shown in Table 5.

Table 5 Internal noise criteria for sleeping/resting

Internal space	Indoor ambient noise level L_{Aeq} (dB)		
	BS8233 (07:00 to 23:00)	BS8233 (23:00 to 07:00)	WHO
Living rooms	35	-	30/35[1]
Dining room	40	-	-
Bedrooms	35	30[2]	30[2]

[1] WHO does not differentiate between different types of living spaces, but recommends L_{Aeq} 30 dB in relation to sleep disturbance and L_{Aeq} 35 dB in relation to speech intelligibility. WHO provides a 16 hour time base when referring to speech intelligibility and an 8 hour time base when referring to sleep disturbance.

[2] BS8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. Section 3.4 of the WHO guidelines suggests that good sleep will not generally be affected if internal levels of L_{Amax} 45 dB are not exceeded more than 10-15 times per night.

5.3.2 Local Authority requirements

No guidance in indoor noise levels was found in Camden Council's Unitary Development Plan (UDP) on required indoor ambient noise levels in new dwellings.

6 Environmental building services noise criteria

6.1 Standard guidance

Standard guidance for noise emission from proposed new items of building services plant is given in BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'.

BS4142 provides a method for assessing noise from items such as building services plant against the existing background noise levels at the nearest noise sensitive receptors to assess the risk of complaints occurring.

6.2 Local Authority criteria

Camden Council planning policy DP28 requires that the combined level from all new operational plant must not exceed 5 dB below the background noise level at the nearest residential premises. Assessment will be conducted in line with BS 4142.

6.3 Plant noise limits

Based on the above criteria and the measurement results, the total cumulative plant noise limits 1 m from any residential window are set out in Table 6.

Table 6 Plant noise limits at the nearest noise sensitive premises

Time of day	Maximum A-weighted sound pressure level at noise sensitive premises (dB)
Daytime (07:00-23:00)	27
Night time (23:00-07:00)	28

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), it should be designed to achieve a limit 5 dB lower than the values in Table 6.

6.4 Assessment

At this stage, no information is available in relation to the proposed installation of building services plant, and this will need to be assessed in detail as the design progresses. However, all plant items will be designed to achieve the plant noise limits set out above.

The required attenuation measures will depend on the type and location of the plant items, but typical measures include in-duct attenuation, acoustic screens or acoustic louvres.

7 Facade sound insulation – noise ingress

This section discusses internal noise level criteria and assesses the required facade sound insulation performance. In principle, the required facade specification depends on two factors – the external noise levels at the site, and the internal noise criteria.

The following assessment is based on achieving the internal noise levels recommended in BS8233 and Section 5.3 of this report.

7.1 External noise levels

The external noise levels incident on the facade are given in Table 3. The variation in the noise level during the daytime and night time are given in Table 1.

These levels are below the WHO *Guidelines for Community Noise* limits of $L_{Aeq,16hour}$ 50 dB external noise criteria for moderate annoyance, daytime and evening use of outdoor living areas, and the $L_{Aeq,8hour}$ 45 dB external noise criteria for sleep disturbance in bedrooms at night, where window are open.

7.2 Facade sound insulation

Based on the internal noise level criteria and the results of the noise monitoring, the minimum facade sound insulation performance will need to be R_w+C_{tr} ≥15 dB. This performance will be achieved using any standard glazing specification.

The use of open windows is acceptable for providing purge ventilation and summer time cooling. However, using open windows for background ventilation would exceed the recommended internal noise level criteria.

For the purposes of background ventilation, it is recommended that attenuated passive ventilation (eg, trickle vents) or mechanical ventilation (eg, MVHR) be employed.

8 Conclusion

The minimum measured background noise levels at the site were $L_{A90,15min}$ 32 dB during the day, and $L_{A90,15min}$ 33 dB during the night.

The noise limit (the noise rating level) from all plant generating external noise at the development at the most affected sensitive premises is L_{Aeq} 27 dB during the day and L_{Aeq} 28 dB during the night. All plant will need to be specified to comply with these limits.

External daytime and night time noise levels at the development are lower than the limits set by Camden Council for noise mitigation to be required.

Using standard double glazed windows and other glazed façade element in the new houses will enable the recommended internal noise level criteria to be met.

Appendix A

Equipment calibration information

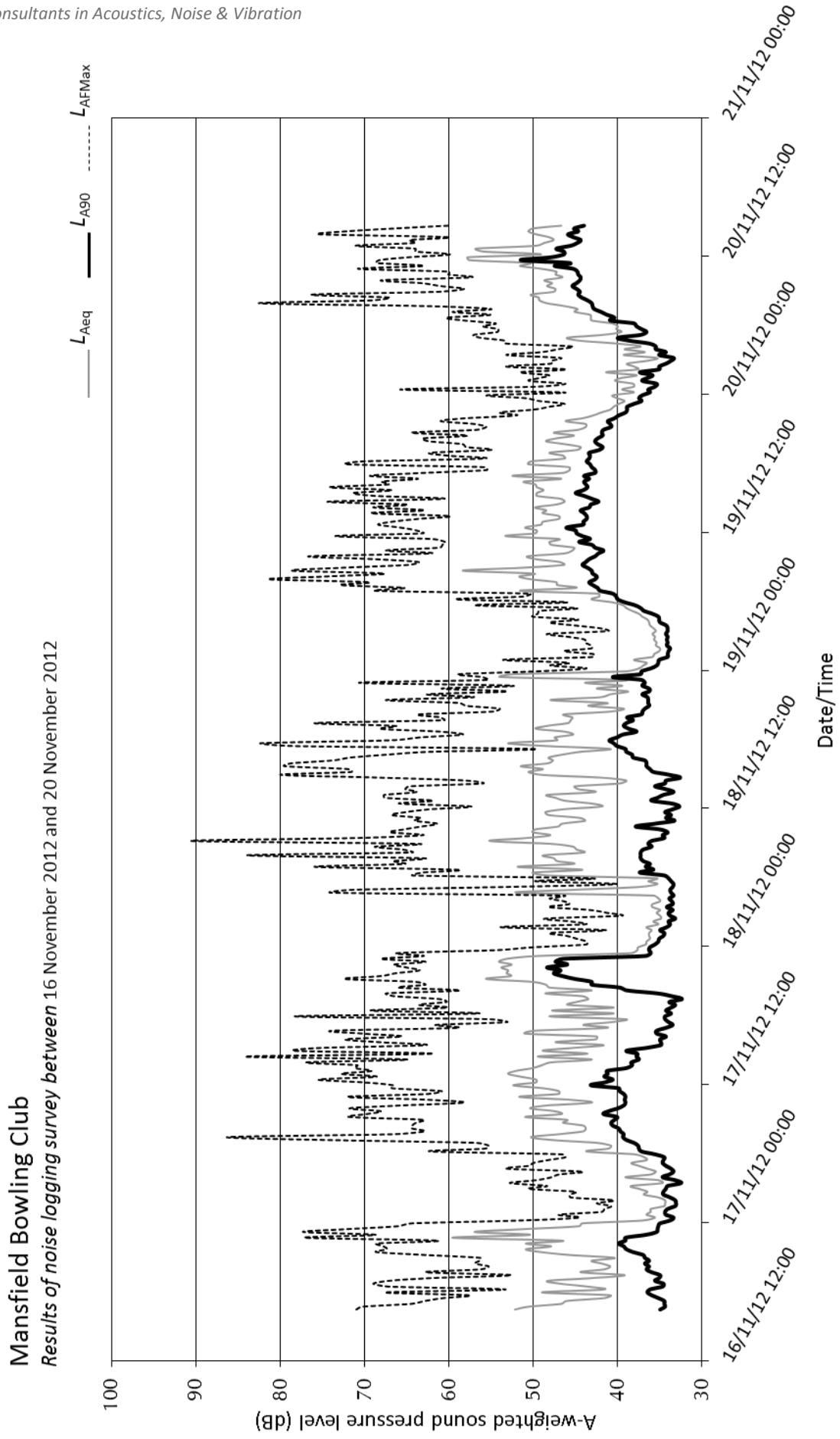
Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	948/9363	Svantek	22/08/2014	1210417
Microphone	4189/1940030	Brüel & Kjær	22/08/2014	1210417
Pre-amplifier	SV121/10669	Svantek	22/08/2014	1210417
Calibrator	SV30A/10558	Svantek	22/08/2014	1210416
Sound level meter	2550/2693829	Bruel & Kjaer	30 Jan 16	07524/07525
Microphone	4189/2689268	Bruel & Kjaer	30 Jan 16	07524/07525
Pre-amp	ZC0032/12061	Bruel & Kjaer	30 Jan 16	07524/07525
Calibrator	4231/3001923	Bruel & Kjaer	30 Jan 16	07518

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meters used in this survey are available on request.

Appendix B

Results of unattended measurements


Mansfield Bowling Club
Results of noise logging survey between 16 November 2012 and 20 November 2012
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
100
90
80
70
60
50
40
30
16/11/12 12:00
17/11/12 00:00
17/11/12 12:00
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