

Co-operative Store – Cuffley, Hertfordshire

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Plant Noise Impact Assessment Report

Doc No: P2003048/SPC036/(REP)U001
Issue: Final
Rev: -
Date: 02 February 2009

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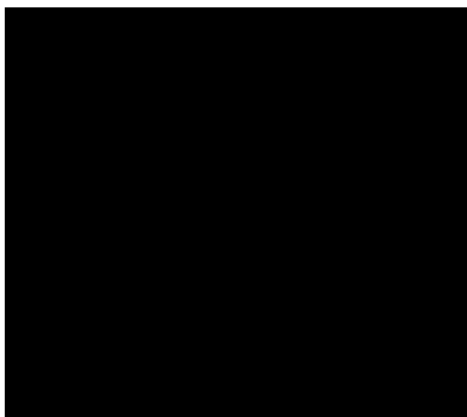


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Introduction

BDP Acoustics has been commissioned by BJA Refrigeration Consulting Engineers Ltd to assess the night time background noise levels at the existing Cuffley Co-operative store, 22 Station Road, Cuffley, Hertfordshire, EN6 4HX.

It is understood that it is proposed to install new plant in the existing plant location.

In summary this report addresses the following issues:

- The current noise climate at the premises;
- Recommendations for suitable noise level limits based on relevant guidance from BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' and World Health Organisation (WHO) guidelines.

Noise measurements

Site and Local Area Description

The Co-operative store is located on Station Road in Cuffley. The local area mainly comprises small commercial premises and residential properties.

Above the store is a first floor residential flat. Other residential buildings are located to the east, south and west of the store.

Survey Details

Manned noise level measurements were undertaken between 01:13 and 02:37 hours on Tuesday 20 January 2009 by Alex Krasnic and Huw Myles. These noise levels are assumed to be representative of the quietest night time noise levels at the above location.

The weather conditions during the survey were clear with a light breeze. The road surface was dry.

The readings were taken at a height of approximately 1.5m above ground floor level in a free field position.

The noise monitoring locations were as follows:

Position 1 – Front of store

Position 2 – To rear of store

Position 3 – To rear of flats adjacent to service yard

Position 4 – Adjacent to apartments to side of store

A site plan detailing the measurement positions is shown below.

Survey Procedure

The instrumentation used during the survey was 1 no. Rion NA-28 Class 1 Sound Level Meter. The sound level meter was calibrated before and after the survey using a Brüel & Kjær Type 4231 calibrator, no drift in level was observed.

A-weighted fast response levels were measured throughout. Continuous five minute sample measurements were taken at the measurement positions over a cumulative duration of 15 minutes at each Position.

Description of Noise Climate

The background noise level, L_{Aeq} dB, at all Positions was controlled by an air extraction unit at the front of the Co-operative store and a water feature opposite the front of the store.

The ambient noise level, L_{Aeq} dB, at all Positions was controlled by intermittent traffic movements along Station Road.

Site Plan and Measurement Positions



- Key**
- Co-operative store
 - Nearest residential receptors
 - Commercial premises
 - Measurement position
 - Assumed location of plant
 - X Location of closest glazed facade

Survey Results

Table 1 summarises the results of the spot measurements carried out 01:13 and 02:37 hours on Tuesday 20 January 2009. The full noise level data measured during the survey can be found in Appendix II.

Table 1: Summary of A-weighted statistical noise levels measured on 20 January 2009

Location	Measurement Duration	$L_{A90, 5 mins}$ dB	$L_{Aeq, 5 mins}$ dB	$L_{Amax, 5 mins}$ dB
Position 1	15 Minutes	43 – 44	54 – 57	73 – 76
Position 2	15 Minutes	36 – 37	40 – 42	56 – 64
Position 3	15 Minutes	33 – 35	40 – 44	55 – 59
Position 4	15 Minutes	40 – 41	41 – 50	56 – 68

Noise Assessment Criteria

BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'

This code of practice describes a method of determining the level of noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from noise sensitive premises.

Section 9 of the code of practice, 'Assessment Method', assesses the likelihood of complaints by subtracting the measured background noise level (L_{Aeq}) from the rating level (L_{Aeq}).

It states the following guidance:

- A difference of around + 10 dB or more indicates that complaints are likely.
- A difference of + 5 dB is of marginal significance.
- If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

It is the Local Planning Authority that will set the required criterion, which should be based on the above guidance. The actual level set could be the values above, or any value in-between depending on numerous factors.

World Health Organisation 'Guidelines for Community Noise'

The following table is an excerpt from the WHO document entitled 'Guidelines for Community Noise'. This document suggests guideline values for community noise in specific environments.

Table 2: Excerpt from 2000 WHO 'Guidelines for Community Noise'

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hrs)	L_{Amax} fast (dB)
Outdoor Living Area	Serious annoyance, daytime & evening Moderate annoyance, daytime & evening	55 50	16 16	- -
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night – time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Noise criteria used for this assessment

L_{Aeq} noise levels are typically used to evaluate the background noise level; they are representative of the noise level exceeded for 90% of the time in the absence of any higher level short duration events that occur during the period.

The background noise level measured at Position 3 (33 – 35 dB) is representative of the background noise level at the nearest noise sensitive receptor. The background noise level at this position was not controlled by existing plant noise.

Designing to the lowest measured background noise level in the absence of existing plant, 33 dB would result in what we believe to be an unnecessarily stringent noise target. In accordance with BS4142 we therefore propose that the design target be based on the new plant not exceeding the background noise level by more than 5 dB at the nearest noise sensitive receptor with the plant operating, 38 dB.

- * Designing to this criterion should result in plant noise levels being approximately 2 dB below the WHO guidelines suggested level of 30 dB within bedrooms at night, assuming a 10 dB reduction through an open window for adequate ventilation, and 7 dB below the recommended noise limit outside bedrooms, 45 dB.

Proposed Plant Noise Level Limits

The table below summarises the calculated noise level limit for the installed plant based on a target of 38 dB at the worst case noise sensitive receiver.

Table 3: Proposed plant noise level limits

Noise Level @ noise sensitive receiver, dBA	Plant noise level @ 10m, dBA
38	33

The calculated plant noise levels @10m are based on the following assumptions:

- It is assumed that new plant will be located at the existing plant position. The assumed location can be found on page 4.
- The nearest noise sensitive receiver is the residential premises above the store, assumed to be located 3m from the plant. The measured background noise level is representative of that at the receiver.
- The plant noise level limits above assume that the selected plant is measured in a semi-anechoic environment, i.e. with the plant sitting on the floor.
- The plant noise level design criteria should ensure that noise from the proposed plant will not exceed the existing background level (Leq dB) by more than 5 dB at the nearest noise sensitive receptor. It is recommended that the requirements of LPA are checked to clarify the appropriate criteria for new fixed plant installations.

The table above gives the cumulative rating for all items of plant. If multiple units of plant are installed each individual item must be designed as follows.

Table 4: Noise level limits at 10 metres for individual plant items, where multiple plant items are installed

	No. of items of Plant, individual noise level @ 10m dBA					
	1	2	3	4	5	6
To achieve noise level target in Table 3	33	30	28	27	26	25

The noise level limits stated above may be difficult to achieve due to the close proximity of the proposed plant location to the nearest noise sensitive receiver. The plant may therefore need to be screened / enclosed or located internally in order to achieve the noise level limits.

In addition to the above, BS 4142 states that if the installed plant has one or more of the following features, then a further correction of -5 dB will be required. Therefore the plant noise level limits proposed in Tables 3 and 4 will need to be reduced by 5 dB if any of the following occur:

- The (plant) noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.);
- The noise contains distinct impulses (bangs, clicks, rattlers, or thumps);
- The noise is irregular enough to attract attention.

It is recommended that the requirements of LPA are checked to clarify the appropriate criteria for new fixed plant installations.

Conclusions

A noise impact assessment has been undertaken at the existing Cuffley Co-operative store, 22 Station Road, Cuffley, Hertfordshire, EN6 4HX.

This report summarises the results of a baseline noise assessment of the site and surrounding area and proposes plant noise level limits at the nearest noise sensitive receptors based on guidance given in BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' and World Health Organisation (WHO) guidelines.

It is recommended that the requirements of the Local Planning Authority are checked to clarify the appropriate criteria for new fixed plant installations.



Appendix I – Glossary of Acoustic Terms

Decibel, dB

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). An increase of 10dB in sound pressure level subjectively corresponds to a doubling in the perceived loudness of sound.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20 Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For finer analysis, each octave band may be split into three one-third octave bands.

A-Weighting

Normal hearing covers the frequency range from about 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Equivalent Continuous Sound Level, L_{eq}

The continuous equivalent sound level, L_{eq} is a notional sound level. It is the sound level which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to

measure any environmental noise which varies considerably with time and is denoted as the L_{eq} .

Statistical Level: L_{90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

Statistical Level: L_{max}

This is the maximum RMS sound pressure level measured during the measurement period.

Appendix II – Noise Survey Results

Summary of noise measurements, 20 January 2009

Position	Time (h:mm)	L _{max} dB	L _{eq} dB, Octave Band Centre Frequency (Hz)								L _{eq} dB, Octave Band Centre Frequency (Hz)									
			63	125	250	500	1k	2k	4k	8k	dBa	63	125	250	500	1k	2k	4k	8k	dBa
1 – Front of store	01:13 – 01:18	73.9	67.3	53.7	50.4	50.5	53.7	48.8	41.1	29.4	56.5	51.0	49.0	41.7	42.5	39.9	28.1	21.9	14.9	43.9
	01:21 – 01:26	73.4	55.3	55.3	51.7	49.9	50.7	45.2	36.4	27.0	53.8	50.8	49.5	42.0	41.9	39.0	27.3	20.5	14.4	43.4
	01:29 – 01:34	75.8	59.5	52.3	49.1	50.5	53.4	49.2	38.2	28.9	56.1	50.0	49.2	41.5	41.7	38.5	28.3	19.8	14.2	43.2
2 – To rear of store	01:37 – 01:42	64.4	48.9	44.7	42.0	39.6	38.7	32.4	25.4	19.8	42.4	44.6	38.3	37.2	35.3	32.4	21.9	19.2	14.3	36.9
	01:44 – 01:49	57.7	48.7	41.8	39.1	36.6	36.9	30.5	23.8	18.6	40.1	43.0	37.3	36.6	34.1	31.1	20.5	18.1	13.2	35.8
	01:50 – 01:55	56.4	49.3	44.2	40.5	38.9	38.4	33.1	24.8	17.9	42.0	42.7	37.1	36.7	34.4	31.2	20.1	17.8	12.8	35.8
3 – To rear of flats adjacent to service yard	01:57 – 02:02	59.2	48.6	47.4	43.0	40.8	39.9	33.3	26.6	24.5	43.6	41.2	37.9	32.6	32.2	30.2	22.2	20.7	22.3	35.3
	02:03 – 02:08	57.9	52.9	43.7	40.8	38.4	36.8	33.2	27.3	22.6	41.5	39.1	35.8	30.6	30.9	28.6	22.5	16.2	14.7	32.9
	02:08 – 02:13	54.7	45.7	41.6	42.3	35.9	35.2	29.0	23.6	20.7	39.8	39.0	35.7	31.7	31.5	28.9	22.5	17.6	15.9	33.6
4 – Adjacent to apartments to side of store	02:20 – 02:25	56.0	45.8	43.7	42.2	39.8	34.1	32.3	31.3	25.6	41.3	42.7	41.2	40.5	38.4	32.4	30.4	29.4	23.7	40.1
	02:26 – 02:31	65.4	58.7	48.2	46.1	43.8	42.7	39.4	34.9	27.8	47.3	42.4	42.4	40.7	38.3	32.4	29.8	29.6	23.9	40.1
	02:32 – 02:37	68.3	55.9	48.1	46.1	44.5	46.9	43.6	34.3	26.4	50.2	42.9	41.9	40.7	38.7	33.1	30.6	29.5	23.8	40.5