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BS4142 Noise Assessment

Report No: 3172-R1 – CO-OP, Camden Parkway, London, NW1 7AH – 20/10/2014

For: Wellsfield Associates

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Report Revisions	*Date*		
3172-R1	20/10/2014	Initial Report	
	Produced by:	*Checked by:*	*Authorised by:*
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1. Introduction

Clover Acoustics has been appointed by Wellsfield Associates to carry out a BS4142 noise assessment on air conditioning and refrigeration equipment at the Co-operative store located at Camden Parkway, London, NW1 7AH. The equipment will service the store area. It is understood that the store units may be operational at night to preserve the required ambient temperature to ensure there is no stock spoilage. It is further understood that this is a new installation for a new store, and that the survey is in support of a retrospective planning application.

A baseline noise survey has been carried out over a representative period during night time in order to establish the existing background levels. As the equipment is in service background noise levels were recorded at a position deemed to be representative of the background condition to the rear of store. The survey background noise survey was conducted at one monitoring location covering typical night period on Thursday 16th October 2014. The specific noise source was measured in operation on Wednesday 15th October 2014.

The purpose of this report is to demonstrate that due consideration for noise affecting neighboring residential properties has been made and to assess the significance of any noise impact from the operation of the units.

2. Assessment Methodology

BS4142:1997 Method for Rating industrial noise affecting mixed residential and industrial areas.
BS4142 gives a method for rating noise from industrial sources affecting residential properties. The rating level (this is the specific noise level of the source with any corrections or penalties for distinctive acoustic events) of the noise source is compared to the existing background noise level at the property. The greater the difference between the two, the greater the likelihood for complaints.

- a difference of +10dB indicates that complaints are likely;
- a difference of +5dB is of marginal significance;
- if the rating level is more than 10dB below the measured background noise level, this is a positive indication that complaints are unlikely.

3. Site Description

The Co-operative store is located on Camden Parkway, London on the ground floor of a mixed commercial and residential environment. The equipment has been installed on a flat roof outrigger of the building with the nearest sensitive receiver approximately 8 meters from the installation on the 1st floor of the same building. This is identified on the location plan in figure 1.

Figure 1 shows the site location. More pictures can be seen in the Appendix.

Figure 1 – Site Location

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 118	30559	U16612
Acoustic Calibrator	Norsonic 1251	32856	U16611

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 118	30559	113.9	-26.1	113.9	-26.1

Measurements & Timescales

During the survey 5-minute measurements were made over a typical night time period on Thursday 16th October 2014 at a location deemed to be representative of the background level evident prior to installation, namely on Gloucester Crescent. Specific noise measurements of the equipment in operation were made on Wednesday 15th October 2014. The measurements were subsequently analysed into hourly periods.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$, $L_{Amax,T}$

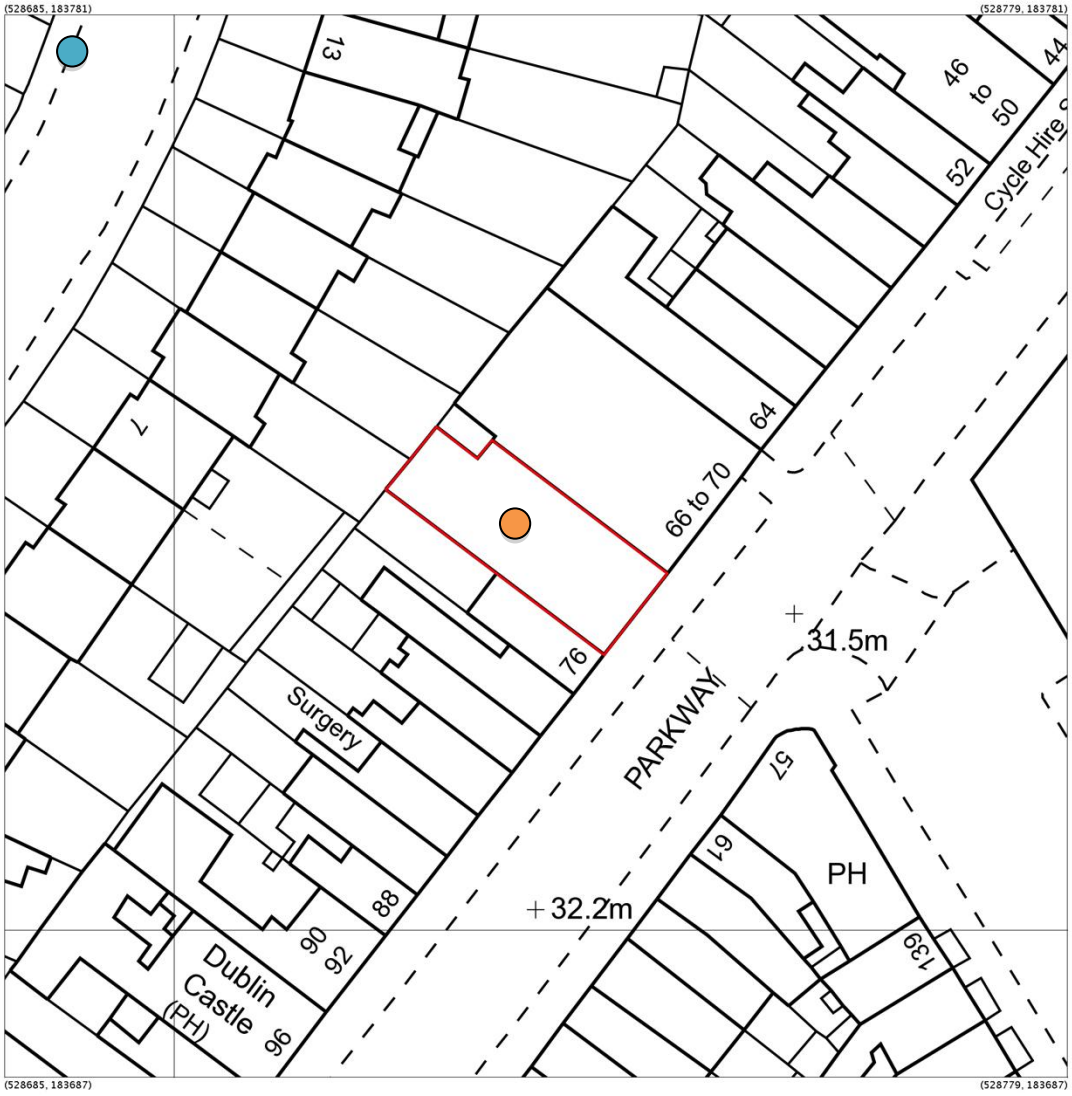
The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20µPa).

Meteorology

During the survey the weather was considered to be dry and mild with no discernible wind speed.

Position of Monitoring Equipment

The equipment was mounted free field 1.5m from the ground at a location representative of the nearest receivers. Figure 2 shows the site location plan with the location of the proposed unit and background monitoring location.



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Co-Operative Retail Servic
72-74 Parkway, London
NW1 7AH

Supplied by: Stanfords 20 Oct 2014
Stanfords Ordnance Survey Partner Licence: 100035409
Reference: OI771842
Centre coordinates: 528732 183734

Figure 2 - Site Location Plan

External AC Equipment

Background Monitoring

5. Survey Results

Background Noise Summary

The following tables show the summary of the background noise levels monitored.

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Site: Co-operative , Camden Parkway, London.
Table 1: Background Summary 16th October 2014
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Hourly Summary

Run ID	LAeq,5min	LA90,5min	LA10,5min	LAMax,5min	Comments
0001	46.1	42.0	48.5	51.5	
0002	46.5	43.0	49.5	53.3	
0003	46.6	43.0	48.5	52.0	
0004	47.5	44.5	49.5	56.8	
0005	45.8	41.5	48.5	52.0	
0008	47.9	43.0	50.0	58.8	
0010	44.3	42.0	46.5	54.3	
0011	48.1	44.5	50.5	57.8	
0012	45.9	42.5	48.0	51.2	
0013	45.9	42.5	48.5	54.1	
0011	46.5	42.0	49.0	52.5	
0012	47.4	43.5	49.5	55.1	
	LAeq,1hour	Lowest LA90,5min	Highest LA10,5min	LAMax,1hour	
	46.7	41.5	50.5	58.8	

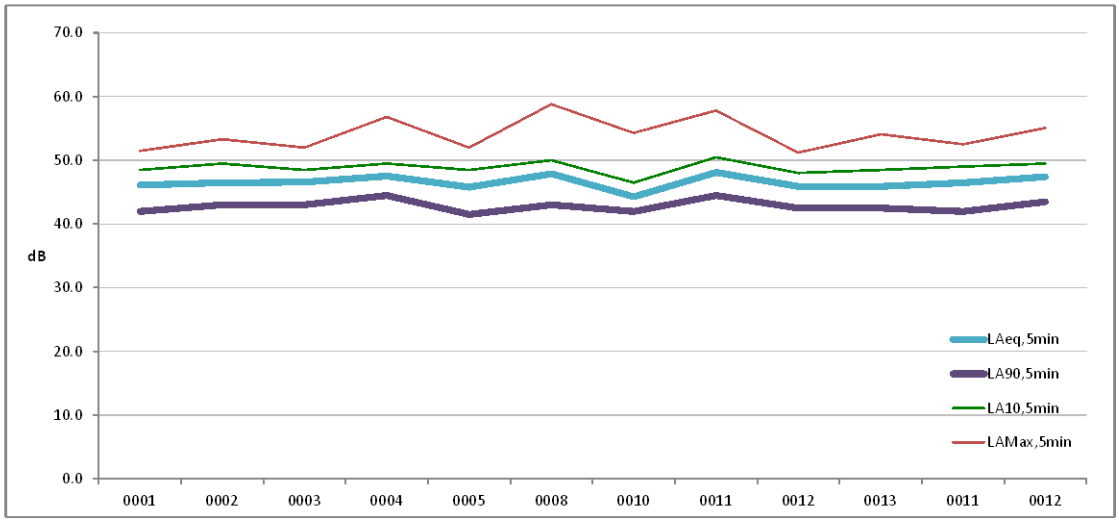

Table 1 – Night Time Background 01:30-02:30

Monitoring Position 1 – Night Time Summary			
dB $L_{Aeq,1hour}$	Lowest dB $L_{A90,5min}$	Highest dB $L_{A10,5min}$	dB $L_{AMax,1hour}$
47	42	51	59

6. Noise Assessment

BS4142:1997 Method for Rating industrial noise affecting mixed residential and industrial areas. Assessment of Air Handling Operation

Specific Noise Source

The installation consists of refrigeration fans, ventilation fans and air conditioning units. Pictures of the installation are available in the Appendix. Measurements were taken of the units in operation and the following levels were recorded at the nearest sensitive receiver.

Comment	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
Camden - Vent & AC at 1m	66.4	70.8	68.2	65.3

The lowest background noise level monitored during the night time period was 42dB $L_{A90,5min}$.

Distinctive Characteristic Penalty

As it is likely the operation of the units will have distinctive acoustic characteristics a +5dB acoustic correction should be applied to the specific level of the proposed unit.

Distance Attenuation

The nearest sensitive receivers identified to the south-east approximately 8m from the installation; distance attenuation can be calculated using the following formula which would predict a distance attenuation of -18dB:

$$L_{P2} = L_{P1} + 20\log\left(\frac{r_1}{r_2}\right)$$

Barrier Attenuation

Screening of the unit to prevent line of sight to the source would reduce noise levels at the receiver. This could be achieved by either natural features such as screening from existing buildings or through a purpose built acoustic barrier. It is understood that the site should have had a suitable a barrier installed and as this is to be retrospectively fitted 12dB attenuation through screening has been calculated and is presented in the Appendix.

BS4142 Assessment – Night Time

Taking the specific noise level of 66dB(A) and applying the factors discussed above would predict a noise rating level of 41dB(A) at the receiver. This would give an assessment level of -1dB below the measured existing background noise level which according to BS4142 is of marginal significance.

BS4142 Assessment – Night Time Pre Mitigation	dB(A)
Specific Noise Source	66
Distinctive Characteristic Penalty	5
Distance Attenuation	-18
Barrier Attenuation	-12
Rating Level	41
Lowest Night time Level L_{A90}	42
Rating *Below* Background	-1

7. Recommendations

A 2.2 meter barrier with a minimum superficial mass of 15Kg/m^2 will ensure the barrier attenuation is not compromised by sound passing through the barrier. The barrier should be of solid construction with timber thickness of at least 20mm in all places. 25mm timber boards mass is around 16Kg/m2. The timber boards should continue across fence posts and with large overlaps to prevent gaps appearing over time.

8. Conclusion

A BS4142 noise assessment has been carried out at the Co-Operative store located at Camden Parkway, London to assess the impact of conditioning and refrigeration units installed externally on the flat roof section to the rear of the building. An attended background noise survey was conducted during a typical night-time period at a location representative of the nearest sensitive receivers.

An assessment has been made in accordance with BS4142 which has shown that the installation is unlikely to have significant impact on the nearest sensitive receiver with a rating level 1dB below the below the *lowest* measured representative background for night time. According to BS4142 this is of "marginal significance"

Steve Clow MIOA
Acoustic Consultant

9. Appendix

Glossary of Terms

Specific Noise Source
The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$
The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$
The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$
The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise
The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise
Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T
The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$
The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$
The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}
The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting
The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band
A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band
A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Photo Appendix

Figure 3 – View of Newly Installed Equipment

Figure 4 – View of Nearest Sensitive Receivers

Site: Co-operative , Camden Parkway, London.
Barrier Attenuation
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Barrier Attenuation

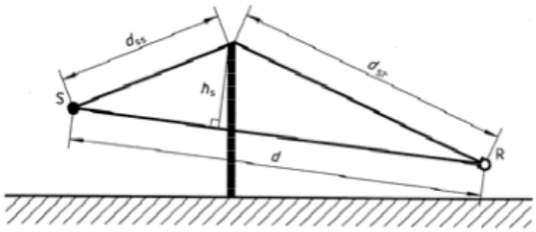

Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

from ISO 9613-2:1996

Noise Source				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Description: External Air Conditioning Units				Source Octave Spectrum	dB(A)	38.1	40.6	45.1	48.6	48.1	45.6	40.1	30.6
				Source Level	dB(A)	53.7							

Barrier Attenuation				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Source to Barrier	0.5	Receiver to Barrier	8	Barrier Attenuation	dB	6.5	7.7	9.5	11.7	14.2	17.0	19.8	22.8
Source Height	1.5	Receiver Height	4	Effective Attenuation	dB	6.5	7.7	9.5	11.7	14.2	17.0	19.8	20.0
Barrier Height	2.2			Resultant Noise Level	dB(A)	31.6	32.9	35.6	36.9	33.9	28.6	20.3	10.6
Path Difference	0.200			**Resultant Level**	**dB(A)**	**41.8**				**Barrier Attenuation dB**			**-11.9**

Table 2 – Barrier Calculation