

Co-operative Store Holyhead Road, Chirk

Environmental Noise Survey Report (For planning purposes only)

25263/ENS Rev1

15 May 2018

For:
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(South) Bank Chambers
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Document Control

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1	15/03/2018	Plant Details Added		
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1.0 Introduction

New items of building services plant are proposed to be installed at this store. Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey to provide a basis for assessment of the environmental plant noise emissions for planning purposes.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings and to identify a suitable accessible location for environmental noise measurements.

To undertake noise level measurements during the quietest daytime and night-time periods on a typical weekday in general accordance with BS 7445. To record the A-weighted (dBA) L_{eq} and L_{90} environmental noise levels.

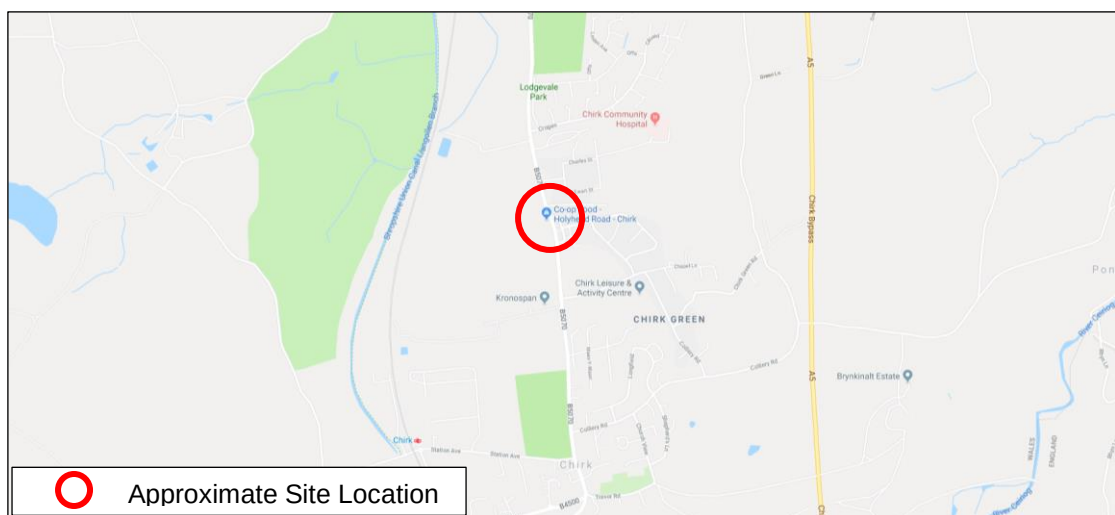
To recommend suitable plant noise emission criteria based on the requirements of the Local Authority and BS 4142:2014 so as to avoid causing a statutory noise nuisance.

N.B. This report is for planning purposes only.

3.0 Site Description

3.1 Location

The site is located on Holyhead Road (B5070) in Chirk, as shown on the Location Map below.



Location Map (Infoterra Ltd & Bluesky, Map Data © 2017 Google)



3.2 Description

The site is an existing Co-operative Store bounded by Holyhead Road to the east and a large industrial site to the west, there is open land both to the north and south. The nearest noise sensitive receptors are the residential houses to the east. See Site Plan below.



Location Map (Infoterra Ltd & Bluesky, Map Data © 2017 Google)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Acoustic Standards and Guidelines

5.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was published in March 2012 and replaced the previous national planning guidance document Planning Policy Guidance 24: *Planning and Noise* (PPG24).

The main reference to noise within the NPPF is at paragraph 123, reproduced below:

“123. Planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts²⁷ on health and quality of life as a result of new development;*
- Mitigate and reduce to a minimum other adverse impacts²⁷ 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;²⁸ 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 reference numbers 27 and 28 point respectively to the Explanatory Note to the NPSE and the provisions of the Environmental Protection Act 1990 “*and other relevant law*”.

The spirit of the Localism Act and the NPPF would suggest that of the guidelines cited, it is guidelines adopted as policy by the Local Planning Authority (if such exist) that should prevail, at least until the Government publishes relevant technical guidance under the NPPF.

5.2 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <http://planningguidance.planningportal.gov.uk/blog/guidance/>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	



Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

5.3 Local Authority Requirements

The site lies within the jurisdiction of Wrexham County Borough Council. We have requested their advice concerning their requirements for setting atmospheric noise emission criteria for building service plant, but have not received a reply at the time of writing.

5.4 BS 4142:2014

When setting plant noise emission criteria reference is commonly made to BS 4142: 2014 *"Methods for rating and assessing industrial and commercial sound"*.

BS 4142 states that: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

- *"Typically, the greater this difference, the greater the magnitude of the impact."*
- *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*
- *"A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."*
- *"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."

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England.

5.5 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance "*Guidelines on Community Noise*". A summary of the noise guidelines relevant to the proposed scheme is presented in the table below.

Residential Environment	Critical Health Effect(s)	L _{Aeq}	L _{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

5.6 British Standard BS8233: 2014

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled "Internal ambient noise levels for dwellings" states:

"In general for steady external noise sources, it is desirable that internal ambient noise levels



do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

5.7 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15minutes)}$ at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

6.0 Survey Methodology

The survey was undertaken by J. Murray BEng (Hons) AMIOA.

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 17:00 hours on Thursday 15 February 2018 to 11:00 hours on Friday 16 February 2018.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the weather conditions were calm and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were calm and dry. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{90} and L_{eq} sound pressure levels over 15 minute periods.

6.2 Measurement Position

The microphone was attached to a pole approximately 2 metres above ground level in free-field conditions.

The position is shown on the plan below.



Plan Showing Unmanned Measurement Position (Infoterra Ltd & Bluesky, Map Data © 2017 Google)

6.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Laboratory Calibration
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3443	Calibration on 30/08/2017
Type 1 Calibrator	Larson Davis	CAL200	3083	Calibration on 13/04/2017

The sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.1 dB).

The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a windshield.

7.0 Results

The free-field results have been plotted on Time History Graph 25263/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} and L_{eq} levels at the measurement position throughout the duration of the survey.



The lowest L_{A90} (15 min) measurements recorded during the survey are presented in the table below:

Lowest Measured L_{A90} (15 mins) (dB re 2×10^{-5} Pa)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
45 dBA	39 dBA

8.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise sources were noted to be intermittent road traffic on Holyhead Road and distant road traffic from the A5. Some noise from the industrial area to the west was audible but not dominant.

9.0 Plant Noise Emission Criteria

On the basis of the aforementioned acoustic standards and guidance, together with the results of the environmental noise survey, we propose that the following incident plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window with all plant operating simultaneously.

Plant Noise Emission Criteria (dB re 2×10^{-5} Pa)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
40 dBA	34 dBA

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

It should be noted that the above are subject to the final approval of the Local Authority.

10.0 Plant Noise Impact Assessment

We have undertaken an assessment of atmospheric plant noise emissions based upon the information we have currently received from CG Refrigeration Ltd, in line with the current CR3 plant drawing accompanying this report.



The proposed plant from which atmospheric plant noise emissions needs to be considered comprises:

Description	Manufacturer	Qty	Plant Model	Sound Pressure Level (dBA)	Plant Location
Shop Floor A/C units ACU1 & ACU2	Mitsubishi	2	PUZ-ZM140VKAR1	52@1m (equating to 36dBA @10m)	External
Refrigeration Pack	Hubbard	1	ZBD45KCE-TFD	35@10m	External
Refrigeration Condenser	Kelvion	1	RF-MC102L3H-091M480-AM	32@10m	External

For ease of comparison, where the manufacturer's noise data for the A/C units is quoted at 1m, the above table shows the equivalent noise level of the A/C units at a distance of 10m in brackets.

We understand that the plant is to be located at the rear of the store in two specific areas. ACU2 is to be located by the goods entrance while the remainder of the plant is to be by the back doors. For ease of calculations we have assessed the plant cumulatively as if it is all located at the nearest position.

The nearest noise sensitive receptor to the plant locations is the residential property to the east. This is at a distance of approximately 52m from the nearest plant.

The following table summarises our predictions of atmospheric noise emission from the proposed plant to the nearest noise sensitive residential window, for the daytime and night-time periods.

	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Shop Floor A/C unit ACU1	36	Not running
Shop Floor A/C unit ACU2	36	Not running
Refrigeration Pack	35	35



Refrigeration Condenser	32	32
Cumulative Noise Level	40	36
Radiation Mode Correction Hemispherical	+3	+3
Distance Correction 52m	-14	-14
Façade Reflection	+3	+3
Calculated Noise Level at Receptor	32	28

Our calculations therefore indicate that noise levels from the proposed plant should be capable of achieving the proposed plant noise emission criteria presented in Section 8.0.

11.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate.

Environmental plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the requirements of the Local Authority and BS 4142 so as to avoid causing statutory noise nuisance.

An assessment has been carried out to determine the likely plant noise emissions to the nearest noise sensitive residential window. Our assessment indicates the proposed building services plant should achieve the proposed environmental noise criteria.

Appendix A

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

Coop Holyhead Road, Chirk
A-weighted Sound Levels at Automated Position 1
Thursday 15 February - Friday 16 February 2018

25263/TH1

□ L_{Amax}, 15min
□ L_{Aeq}, 15min
■ L_{A90}, 15min

