

The Co-operative Butcher's Arms

Chester Road
Rossett
Wrexham
LL12 0HW

Plant Noise Impact Assessment

On behalf of



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For and on behalf of Noise Solutions Ltd				

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1	20 January 2017	Change AC Location and include other nearby receptors	AM	JS
2	6 February 2017	Update plant location diagram	AM	TC

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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by the AB Group to provide a plant noise impact assessment for the plant which will serve a proposed Co-operative store which will replace the Butcher's Arms public house located on Chester Road in Rossett, Wrexham.
- 1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.
- 1.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed using guidance in BS4142: 2014.

2.0 Details of development proposals

- 2.1. The proposed Co-operative store is to occupy the former Butcher's Arms Public House on the south east side of Chester road in Rossett. Refrigeration plant serving the Co-operative store is to be located externally in a service yard to the rear (south east) of the proposed store, and air conditioning (AC) units will be located on a new flat roof at the rear of the store.
- 2.2. The proposed AC plant will only operate during store opening hours (07:00 hours to 23:00 hours), the proposed refrigeration plant will operate continuously but at a reduced setting outside of the store's opening hours.
- 2.3. **Appendix D** contains a table with the manufacturer published sound pressure levels for the proposed plant.

3.0 Nearest noise sensitive receptors

- 3.1. The area surrounding the site is a mixture of residential and commercial premises. The most affected residential premises to the plant noise emissions are the dwellings located to the south of the service yard (Reference R1) at around 20m away along Alyn Drive, to the west of the service yard (Reference R2) above the neighbouring Village Store and to the east of the service yard (Receptor R3) off of Rossett Road.
- 3.2. Residential premises are probably located above the ground floor commercial premises to the east of the store. However, the profile of the new extension will provide noise screening to these receptors which also experience higher background noise levels due to their proximity with Chester Road.
- 3.3. **Appendix B** contains an aerial photograph showing the site and surrounding area.

4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels at locations representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix C**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Aeq} (15mins)	L _{Amax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 - 23.00 hours)	47-68	57-95	54-81	38-56
Night-time (23.00 - 07.00 hours)	35-59	39-76	37-70	33-47

5.0 Plant noise design criteria

Planning Policy Wales and TAN 11

- 5.1. 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).
- 5.2. 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.

- 5.3. 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

BS4142:2014

- 5.4. BS4142: 2014 'Methods for rating and assessing industrial and commercial sound' is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS4142: 2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment". The standard has been referenced as appropriate for the assessment of noise from plant.
- 5.5. The procedure contained in BS4142: 2014 provides the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level". Specifically "Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."
- 5.6. The likely effects of sound on people are assessed by subtracting the background noise level from the rating level. BS4142: 2014 states the following:
- *Typically, the greater this difference, the greater the magnitude of the impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
 - *A difference of around +5 dB 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.*

- 5.7. BS4142: 2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.
- 5.8. 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".
- 5.1. It would be considered appropriate for noise from the plant, assessed as per the methodology of BS4142:2014 to be of less than 'low impact', ensuring that *'the amenity of nearby residential properties is appropriately protected'*. Plant noise rating levels at or below the existing background noise level would be deemed appropriate.
- 5.1. Based on the above criteria the cumulative noise rating level for the proposed plant at the nearest residential windows should not exceed the limits shown in the table below.

Table 2 Plant noise emissions limits at residences

Period	Cumulative plant noise rating level, dB(A)
Daytime (07.00 – 23.00 hours)	43
Night-time (23.00 – 07.00 hours)	34

6.0 Plant noise impact assessment

- 6.1. The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has considered the directivity of sound propagation, as well as screening and distance losses between the source and the receiver.
- 6.2. The predictions during the daytime period have been based on the proposed AC and refrigeration plant operating simultaneously at full capacity. The predictions during the night-time period have been based on the proposed refrigeration plant only, operating at a reduced capacity.

- 6.3. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3 dB feature correction has been applied to the noise level predictions as advised in BS4142: 2014.
- 6.4. Table 3, below, summarises the results of the assessment at the most affected residential properties to the south of the plant. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in **Appendix E**.

Table 3 Assessment of predicted noise levels at Receptors

Receptor	Period	Predicted rating level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
R1	Daytime (07.00 - 23.00 hours)	35	43	-8
	Night-time (23:00 – 07:00 hours)	27	34	-7
R2	Daytime (07.00 - 23.00 hours)	41	43	-2
	Night-time (23:00 – 07:00 hours)	29	34	-5
R2	Daytime (07.00 - 23.00 hours)	32	43	-11
	Night-time (23:00 – 07:00 hours)	24	34	-10

7.0 Summary

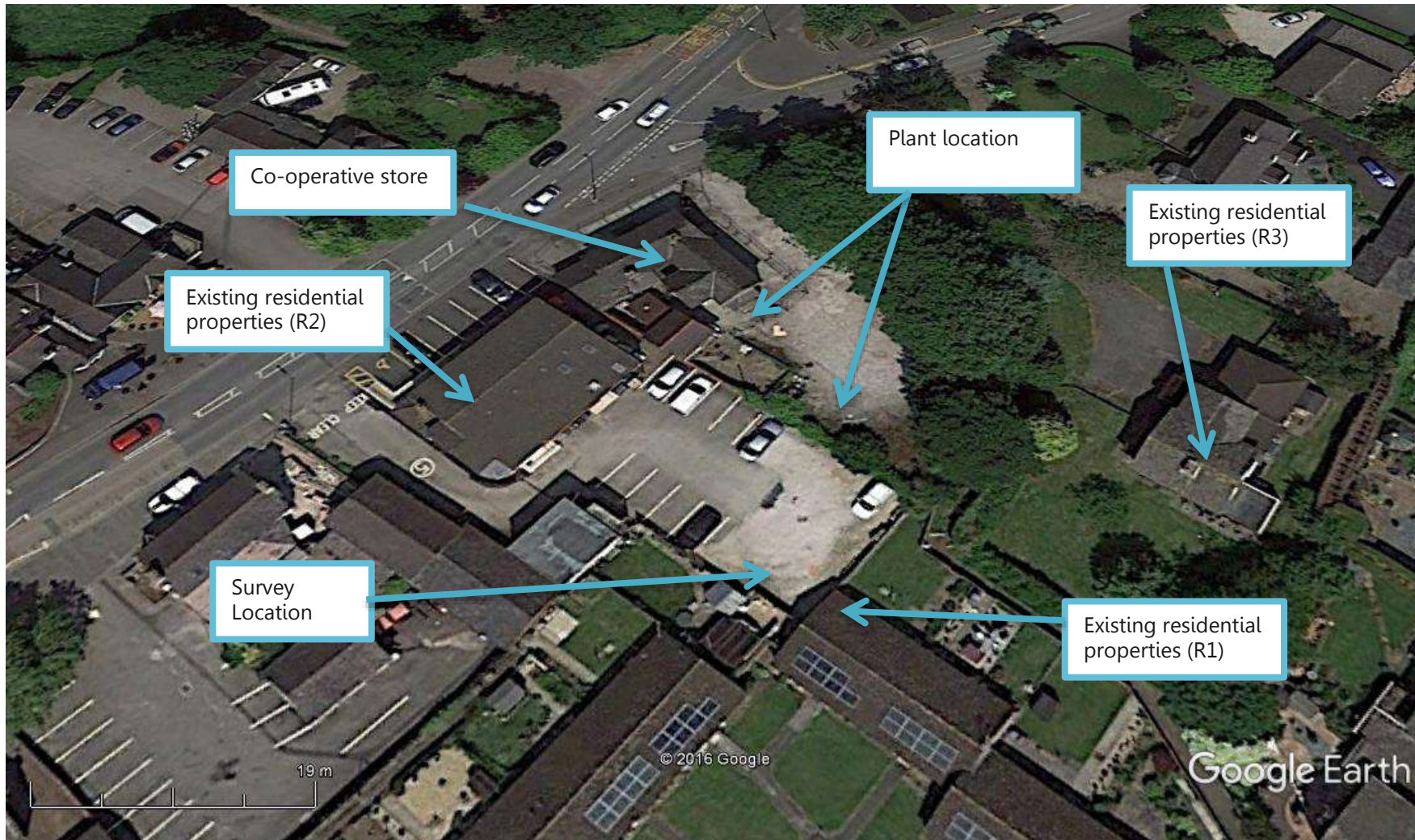
- 7.1. Noise Solutions Ltd has been commissioned by AB Group to undertake a plant noise emissions impact assessment for the new plant at the proposed Co-operative store located at Chester Road in Rossett, near Wrexham.
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the proposed site.
- 7.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor locations and assessed using guidance within BS4142: 2014.

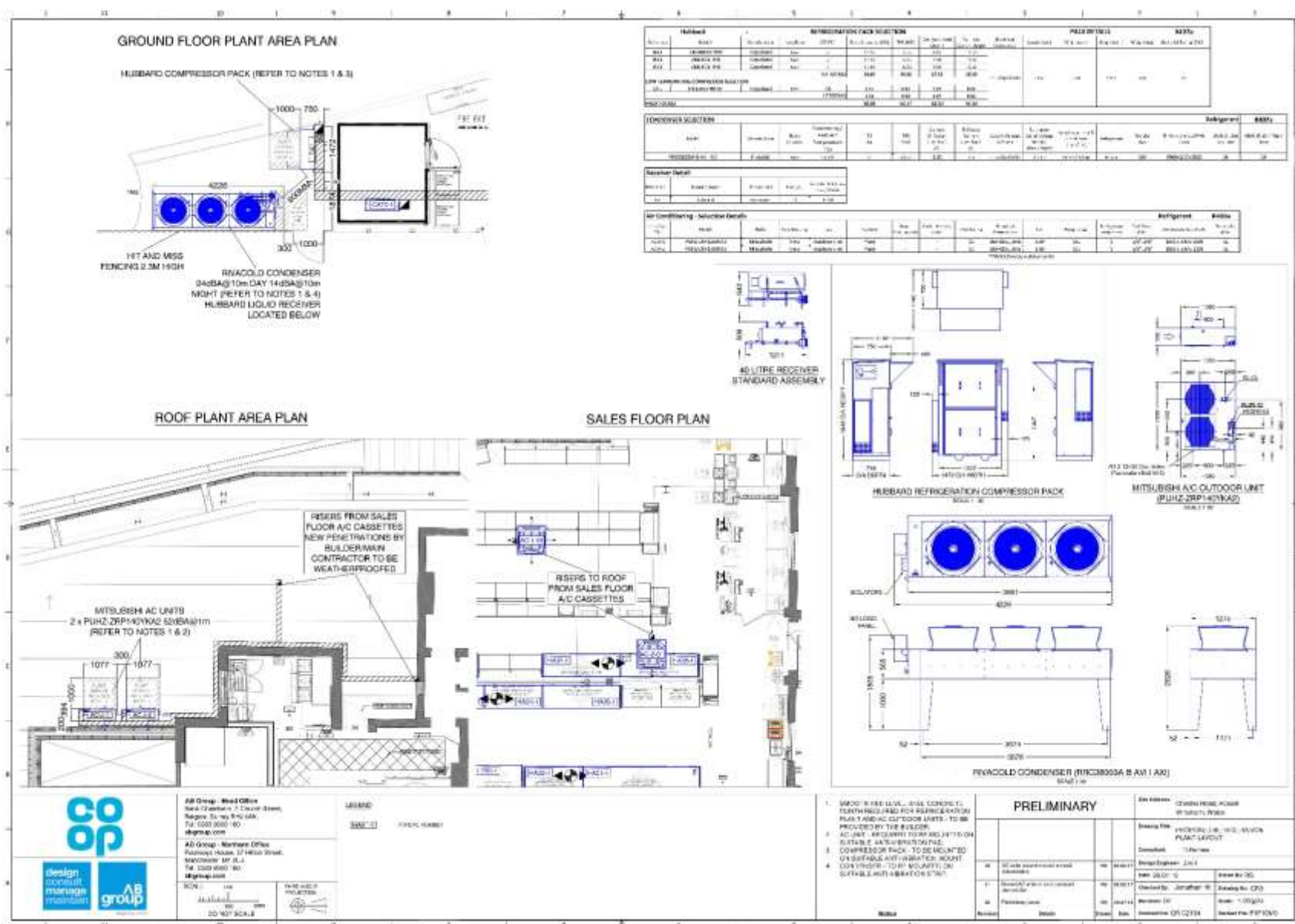
- 7.4. The results of the assessment demonstrate that cumulative plant noise emissions from the proposed external plant should be acceptable to Wrexham County Borough Council and the plant noise emissions should not be viewed as a planning constraint.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial Photograph of Site showing areas of interest







CHESTER ROAD

PUBLIC PARKING AREA

THE BUTCHERS ARMS
PH

SITE ACCESS

CAR PARK

SERVICE YARD

1.0-1.5M HIGH BUSH (TO BE
REMOVED TO IMPROVE
VISIBILITY DISPLAYS)

LIGHTING COLUMN
TOTAL 100W DETECT LUMEN
TO SEPARATE APPLICATION

REFER TO ARCHITECTURAL
REPORT FOR WORKS TO
EXISTING TREES

100W/100V WHITE LIGHTS TO
DENOTE CAR PARKING SPACES

STORAGE BUILDING AND
KITCHEN TO BE DEMOLISHED

LIGHTING COLUMN

2.0M HIGH TIMBER CLOSE BOARDED
FENCE AND GATE TO SERVICE YARD

2.2M HIGH SERVICE YARD GALLY
STEEL CANOPY WITH FARM AREA

3RD GALLY STEEL SHREDDER
CYCLEHOOPS

2.0M HIGH TIMBER FENCE TO
BOUNDARY

PROPOSED SITE PLAN
1:100 SCALE

0 1 2.5 5 10m

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LANGDALE TAVERNS		Planning Application - PROPOSED SITE PLAN	1100841	589	214
THE BUTCHERS ARMS PH, CHESTER RD, ROSETT, LL17 9HW			26/11/2014	architecture	
			54350903		C

Appendix C Environmental Sound Survey

Details of environmental sound surveys

- C.1 Measurements of the existing background sound levels were undertaken between 14:45 hours on Tuesday 24 May 2016 to 12:00 hours on Wednesday 25 May 2016.
- C.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the survey.

Measurement position

- C.3 The sound level meter was positioned on a lamp post at around 3m from ground level. The approximate location of the meter is shown on the aerial photograph in **Appendix B**.

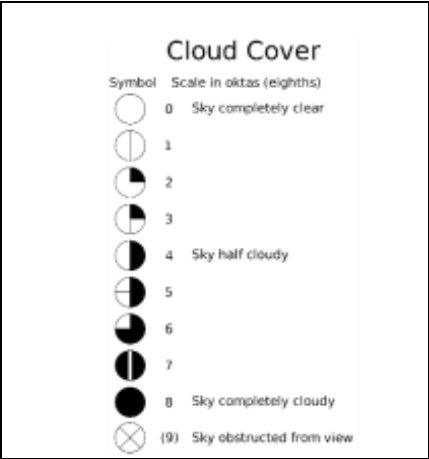
Equipment

- C.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (± 0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-31 / 00593603	18/052016	14990
Condenser microphone	Rion UC-53A / 316133		
Preamplifier	Rion NH-21 / 30367		
Calibrator	Rion NC-74 / 35094453	18/02/2016	14918

Weather Conditions

- C.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

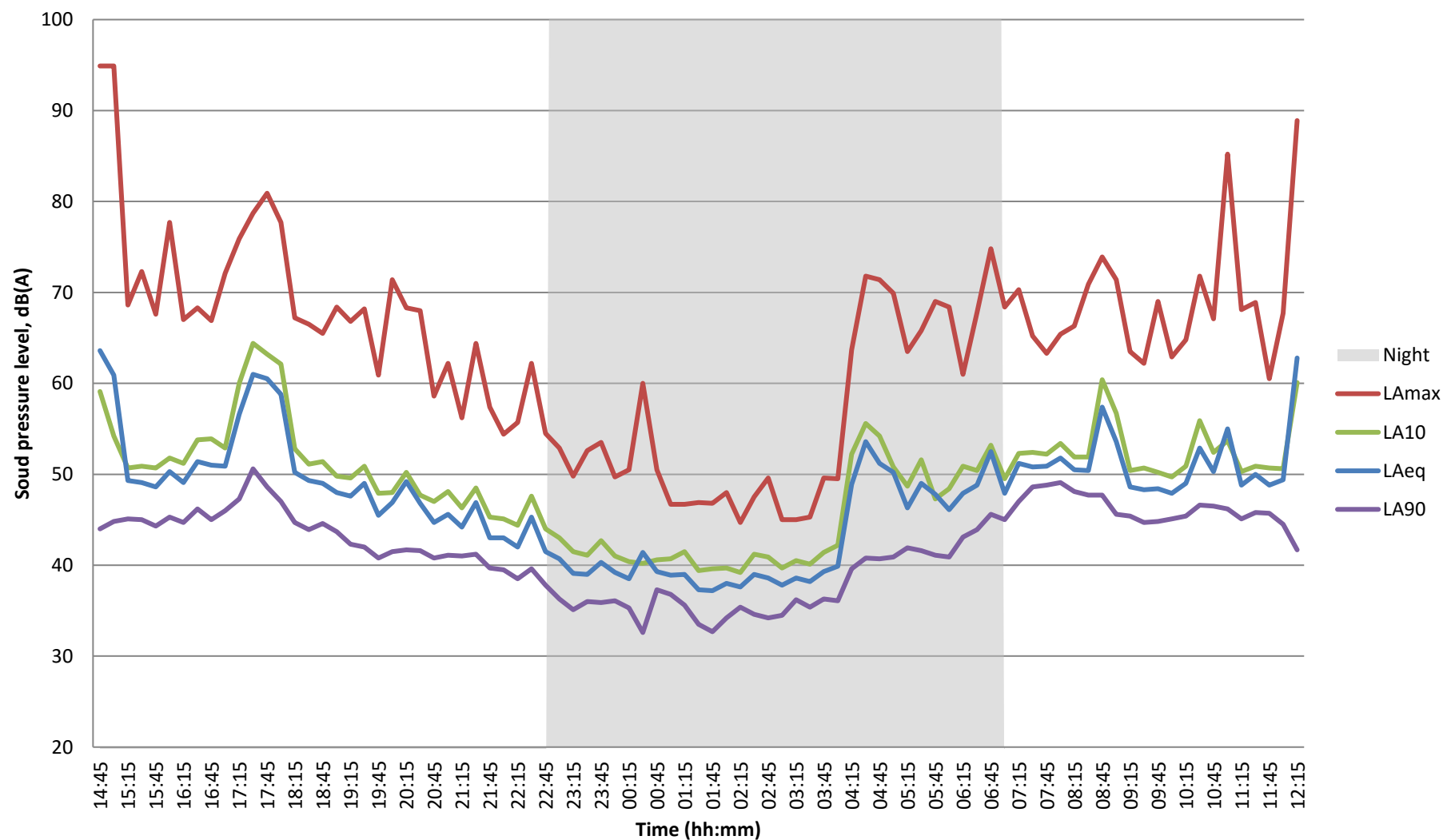
Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	14:45 24/5/2016- 12:00 25/5/2016	Temperature (°C)	22	14
		Precipitation:	Dry	Dry
		Cloud cover (oktas - see guide)	6	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	1.1	0
		Wind Direction	Easterly	Easterly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- 7.5. The results of the survey are considered to be representative of the background sound pressure levels at the façades of the most affected noise sensitive receptors to the plant area during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by road traffic movements and plant noise emissions from plant associated with the public house. The results of the survey are presented in a time history graph overleaf.

The Co-operative, Chester Road, Rossett

Sound pressure levels recorded from 24th May to 25th May 2016



Appendix D Plant information and manufacturer's published sound pressure levels

Plant Item	Make/Model	Quantity	Sound pressure level (dBA)
Air Conditioning	Mitsubishi PUHZ ZRP140YKA	2	52 @ 1m
Refrigeration Pack	Hubbard	1	25 @ 10m
Refrigeration Condenser	Rivacold RRC038003A	1	24 @ 10m (day)
			14 @ 10m (night)

Receptor R1 Daytime

Receptor R1 Night-time

Plant	Maximum plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 FEATURE		RESULTANT AT RECEPTOR (dB)
	Lp (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Applicable (Y/N)	Correction (dB)	
Rivacold RRC038003A	14	10	13	-2	3	0	y	3	18
Hubbard Pack	25	10	18	-5	3	0	y	3	26
Total Night-time									27

Plant	Maximum plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 FEATURE		RESULTANT AT RECEPTOR (dB)
	Lp (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Applicable (Y/N)	Correction (dB)	
Rivacold RRC038003A	24	10	16	-4	3	0	y	3	26
Hubbard Pack	25	10	13	-2	3	0	y	3	29
PUHZ ZRP140YKA	52	1	11	-21	3	0	y	3	37
PUHZ ZRP140VKA	52	1	11	-21	3	0	y	3	37
Total Daytime									41

Plant	Maximum plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 FEATURE		RESULTANT AT RECEPTOR (dB)
	Lp (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Applicable (Y/N)	Correction (dB)	
Rivacold RRC038003A	14	10	16	-4	3	0	y	3	16
Hubbard Pack	25	10	13	-2	3	0	y	3	29
Total Night-time									29

Plant	Maximum plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 FEATURE		RESULTANT AT RECEPTOR (dB)
	Lp (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Applicable (Y/N)	Correction (dB)	
Rivacold RRC038003A	24	10	20	-6	3	0	y	3	24
Hubbard Pack	25	10	25	-8	3	0	y	3	23
PUHZ ZRP140YKA	52	1	34	-31	3	0	y	3	27
PUHZ ZRP140VKA	52	1	34	-31	3	0	y	3	27
Total Daytime									32

Plant	Maximum plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 FEATURE		RESULTANT AT RECEPTOR (dB)
	Lp (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Applicable (Y/N)	Correction (dB)	
Rivacold RRC038003A	14	10	20	-6	3	0	y	3	14
Hubbard Pack	25	10	25	-8	3	0	y	3	23
Total Night-time									24