NSL
Noise Solutions Ltd

Co-op Petrol and Food

Lane Head Road
Huddersfield
West Yorkshire
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Plant Noise
Impact Assessment Report

On behalf of

central coop

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Document Information

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	Name	Qualifications	Initials	Date
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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved

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Contents

Appendices

Executive Summary

Noise Solutions Ltd (NSL) has been commissioned by Central England Co-operative to provide a noise impact assessment for new plant serving the existing Co-op petrol filling station located along Lane Head Road, Huddersfield.

Cumulative plant noise emission levels for the proposed plant have been predicted at the most potentially affected noise sensitive receptors and are determined to be in compliance with Kirklees Council's usual requirements. Therefore, the plant proposals should not be a reason for refusal of planning permission.

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Central England Co-operative to provide a noise impact assessment for new plant serving the existing Co-op petrol filling station located along Lane Head Road, Huddersfield.

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 potentially affected noise sensitive receptor and assessed following Kirklees Council's typical requirements.

1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

2.1. It is proposed to extend the existing Co-op petrol filling station with a café on the southern façade and a new 'back of house' area on the northern façade. The site location is shown in **Appendix B**.

2.2. Refrigeration plant is to be located within the plant area located on the building's northern façade. Air conditioning plant will be located along the building's eastern façade.

2.3. The plant will comprise An externally housed compressor pack (HAPACK) with associated condenser units (HBCU and LCCU) and four air conditioning (AC) units.

2.4. The AC units will operate only during the daytime; the refrigeration plant will operate at all times but may run at reduced duty at night when the petrol filling station is closed, and cooling demands are lower.

3.0 Nearest noise sensitive receptors

3.1. The Co-op petrol filling station is located on the junction of Barnsley Road and Lane Head Road in Shepley.

3.2. The nearest noise sensitive residential receptor to the air-conditioning plant is the bungalow on A629 Penistone Road, approximately 55m to the south, (Receptor R1). This has line of sight with the air conditioning plant.

3.3. The house next door to the petrol filling station (Receptor R2) is the closest noise sensitive receptor to the refrigeration plant, approximately 55m away to the west with direct line of sight.

3.4. The windows of the business adjacent to the east (Receptor R3) are 4m away from the proposed café air-conditioning unit.

3.5. **Appendix B** contains an aerial photograph showing the site and surrounding area, including the location of the receptors identified above.

4.0 Existing noise climate

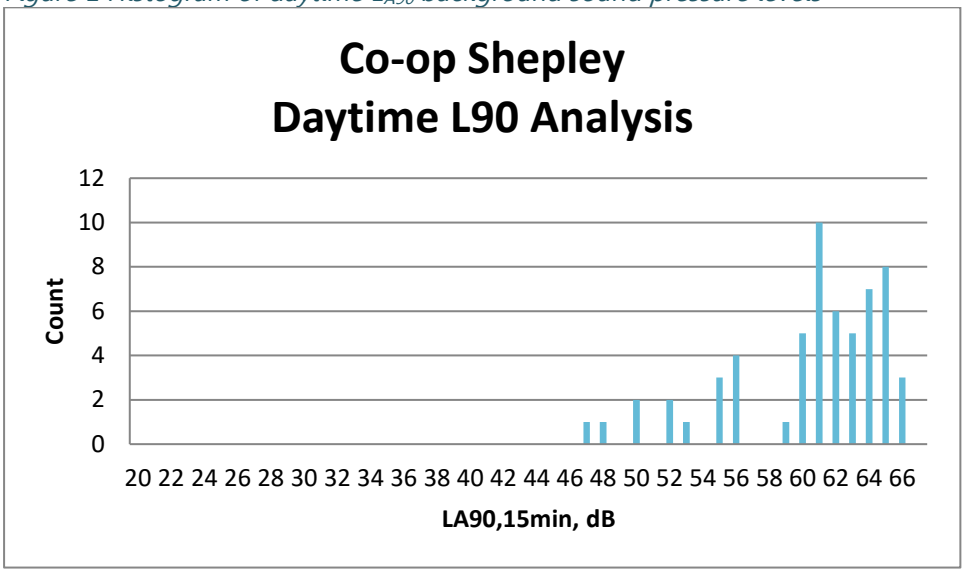
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area, during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1. 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)	63-74	78-100	67-76	47-66
Night-time (23.00 – 07.00 hours)	52-71	72-88	51-74	26-62

Figure 1 Histogram of daytime L_{A90} background sound pressure levels

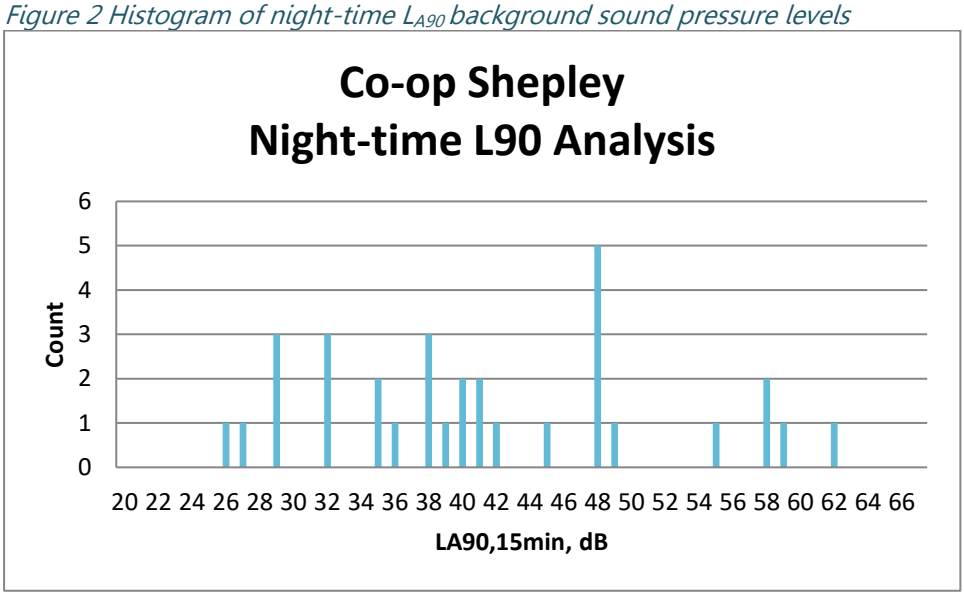


4.3. Additional statistical analysis has been undertaken. As shown in Table 2, the mean, median, and modal values have been calculated:

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
Mean	60
Mode	61
Median	61

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



4.4. Additional statistical analysis has been undertaken. As shown in Table 3, the mean, median, and modal values have been calculated:

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} night-time period	
Mean	41
Mode	48
Median	40

4.5. Based on the histogram analyses above, the following values have been considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 56dB L_{A90} during the daytime period; and
- 32dB L_{A90} during the night-time period.

5.0 Plant noise design criteria

Kirklees Council

5.1. Kirklees Noise Design advice document published in May of 2017 states the following in regards of noise emissions arising from new industrial or commercial uses near to residential premises:

> *This advice aims to protect the present and future occupiers of residential properties from your new industrial or commercial noise.*
>
> *Developers should carry out an assessment in accordance with BS4142 to determine the rating level of the new development. It is recommended that during normal daytime hours (0700 to 2300 hours), the BS4142 rating level, measured over 1 hour, should be 5dB below the background (L_{A90}). During the night-time period (2300 to 0700 hours), the BS4142 rating level, measured over 5 minutes should be 5dB below the background (L_{A90}).*
>
> *The assessment should be carried out at the site boundary or at the nearest noise sensitive premises depending on the circumstances. These noise levels are intended to ensure that existing noise sensitive premises and land which may be used for noise sensitive development in future does not become blighted by noise. It is also intended that the levels will not place too onerous a noise requirement on premises located in the middle of an industrial estate.*

To aid regeneration, in certain circumstances a higher rating level may be accepted provided the need is justified.

In addition, the levels specified in Appendix 1 should not be exceeded. These should be calculated assuming windows in noise sensitive premises are open for ventilation.

5.2. Kirklees Noise Design advice document also includes a table of the noise levels which should not be exceeded in different spaces within residential premises. The table is presented herein:

Table 4 Table of noise levels that should not be exceeded within different spaces in residential premises according to the advice document by Kirklees Council

Room/Area	$L_{Aeq,16h}$ (07:00-23:00	$L_{Aeq,\ 8h}$ (23:00-07:00)	$L_{A1,\ 15min}$ (23:00 – 07:00)	L_{Amax} (23:00 – 07:00)
Living rooms/studies	35dB	---	---	---
Gardens	55dB	---	---	---
Bedroom	---	30dB	45dB	55dB

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

5.3. BS 4142:2014 +A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014[1] includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

5.4. The procedure contained in BS 4142:2014 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.5. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.6. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

[1] For brevity, references to BS 4142 and BS 4142:2014 should be read as BS 4142:2014 + A1:2019

5.7. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*

5.8. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *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.*

5.9. The standard does state that "*adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

5.10. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.11. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

5.12. BS 4142:2014 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.

Low background noise levels

5.13. Due to the low prevailing environmental noise levels measured during the day and night-time period, it is proposed that the plant noise design criterion at the nearest residences should be capped at 30dBA at night. This proposed criterion is based on guidance found in Section 11 of BS 4142:2014+A1:2019 which states:

> *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.14. A plant noise level of 30dBA at the façade would result in an internal noise level of 15dBA, which is likely to be lower than self-generated noise internally (for example, from domestic refrigerators). This assumption is based on guidance found in BS 8233:2014, which states that approximately 15dB of insulation is provided by a partially open window.

Proposed criteria

5.15. The cumulative noise level for the proposed plant at the nearest noise sensitive windows should, therefore, not exceed the limits shown in the Table 5 below:

Table 5 Proposed plant noise emissions level limits at noise sensitive receptors

Period	Cumulative plant rating noise level, dB $L_{Ar,Tr}$
Residential Daytime (07.00 – 23.00 hours)	51
Residential Night-time (23.00 – 07.00 hours)	30
Commercial	50*

**Specific level, not a Rating level*

5.16. The above limits have not been approved by the local authority at this stage.

6.0 Plant noise guidance

6.1. The cumulative plant noise level at the most affected noise sensitive receptor has been predicted based on manufacturer's noise data for the proposed equipment. The assessment has taken into consideration distance attenuation, directivity and screening.

6.2. It should be noted that none of the proposed plant is anticipated to exhibit any tonal or impulsive characteristics providing it is well maintained. The new proposed plant is inverter driven and, therefore, will gently ramp up and down depending on the demands placed upon the system. However, a penalty of 3dB as described in BS 4142:2014 has been applied for the possible presence of *"...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...".*

6.3. Table 6 summarises the results of the assessment at the most affected property. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. Plant noise data can be found in **Appendix D** with the full set of calculations in **Appendix E.**

Table 6 Assessment of predicted rating level at the nearest noise sensitive receptors

Receptor	Period	Predicted rating level at receptor, $L_{Ar,Tr}$ (dB)	Criterion (dB)	Difference
R1	Daytime (07.00 - 23.00 hours)	39	51	-12
	Night-time (23.00 – 07.00)	21	30	-9
R2	Daytime (07.00 - 23.00 hours)	37	51	-14
	Night-time (23.00 – 07.00)	30	30	0
R3	Daytime (07.00 - 23.00 hours)	50*	50*	-
	Night-time (23.00 – 07.00)	29*	50*	-21

**Specific level, not a Rating level*

6.4. The noise level predictions demonstrate that cumulative noise emissions from the new, replacement plant, will comply with the proposed limits at the nearest noise sensitive properties.

6.5. Where possible, uncertainty in the above assessments has been minimised by taking the following steps:

- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.

- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement positions were representative of the noise climate outside the nearby residential dwellings and not in positions where higher noise levels were present.
- The above guidance is based on a minimum distance of 17m between the proposed plant to the nearest receptor.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Central England Co-operative to provide a noise impact assessment for new plant serving the existing Co-op petrol filling station located along Lane Head Road Huddersfield.

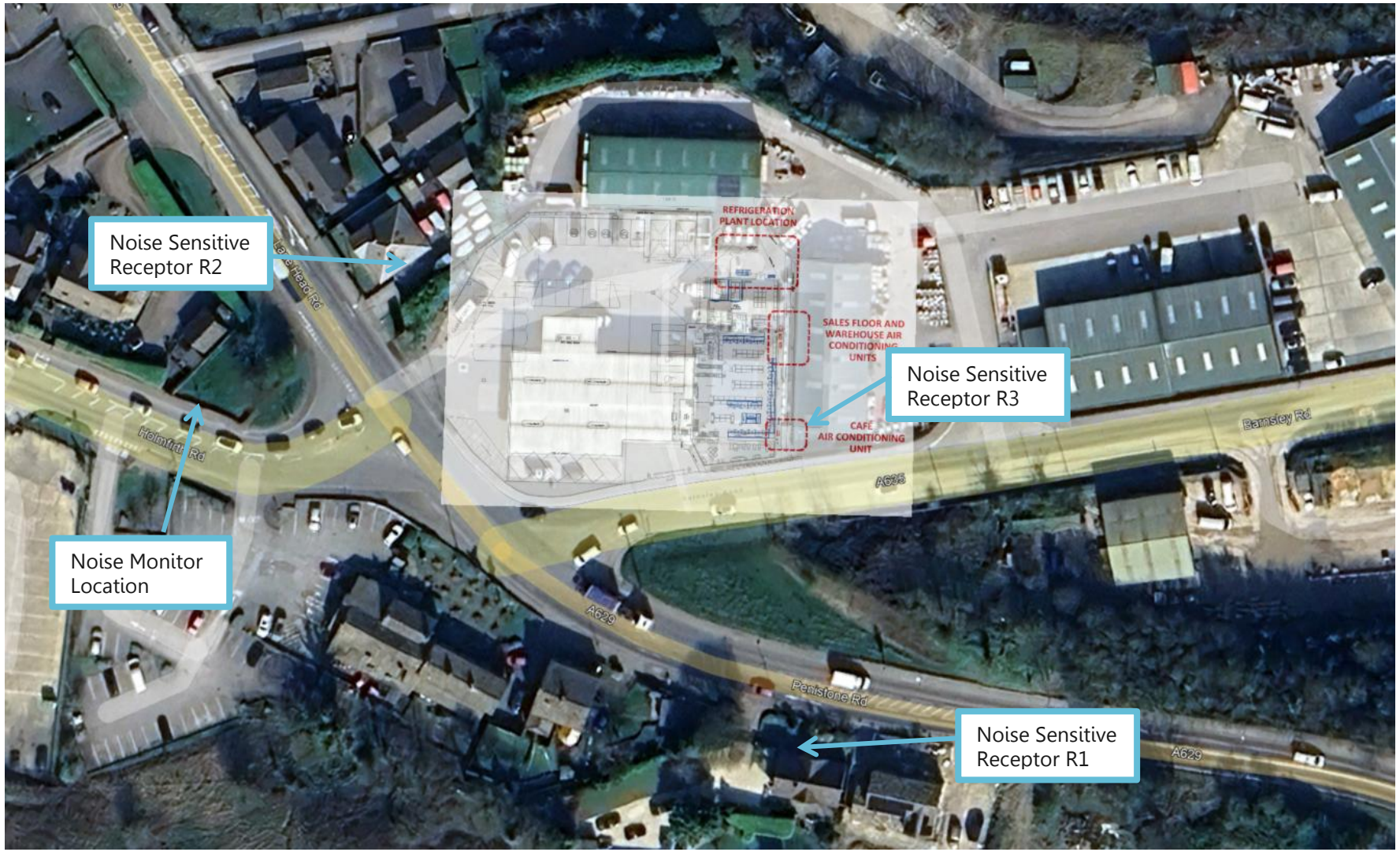
7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the plant area.

7.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor and determined to be in compliance with Kirklees Council's usual requirements. Therefore, the plant proposals should not be a reason for refusal of planning permission.

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 s1 and s2 is given by 20 $\log_{10}$ (s1/s2). 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 20μPa. 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 Photographs of site showing areas of interest



Appendix C Environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing environmental sound levels were undertaken between 10.45 hours on Thursday 5th June and 09.30 hours on Friday 6th June 2025.

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 fifteen-minute sample periods for the duration of the survey.

Measurement position

C.3 The sound level meter was positioned on a lamppost along Lane Head Road, Shepley. The approximate location of the microphone is indicated on the aerial photograph in **Appendix B**. In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

C.4 The survey location was chosen such that the background noise levels were similar to those at the nearest residential receptors but exclude any potential effect of noise from existing plant serving the store.

Equipment

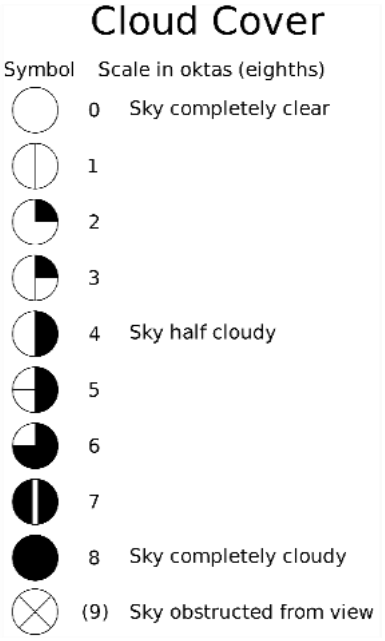
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 69747	05/08/2024	1509433-1
Condenser microphone	ACO Pacific 7052E / 70829		
Preamplifier	Svantek SV12L / 73687		
Calibrator	Svantek SV30A / 10843	01/11/2024	1510142-2

Weather conditions

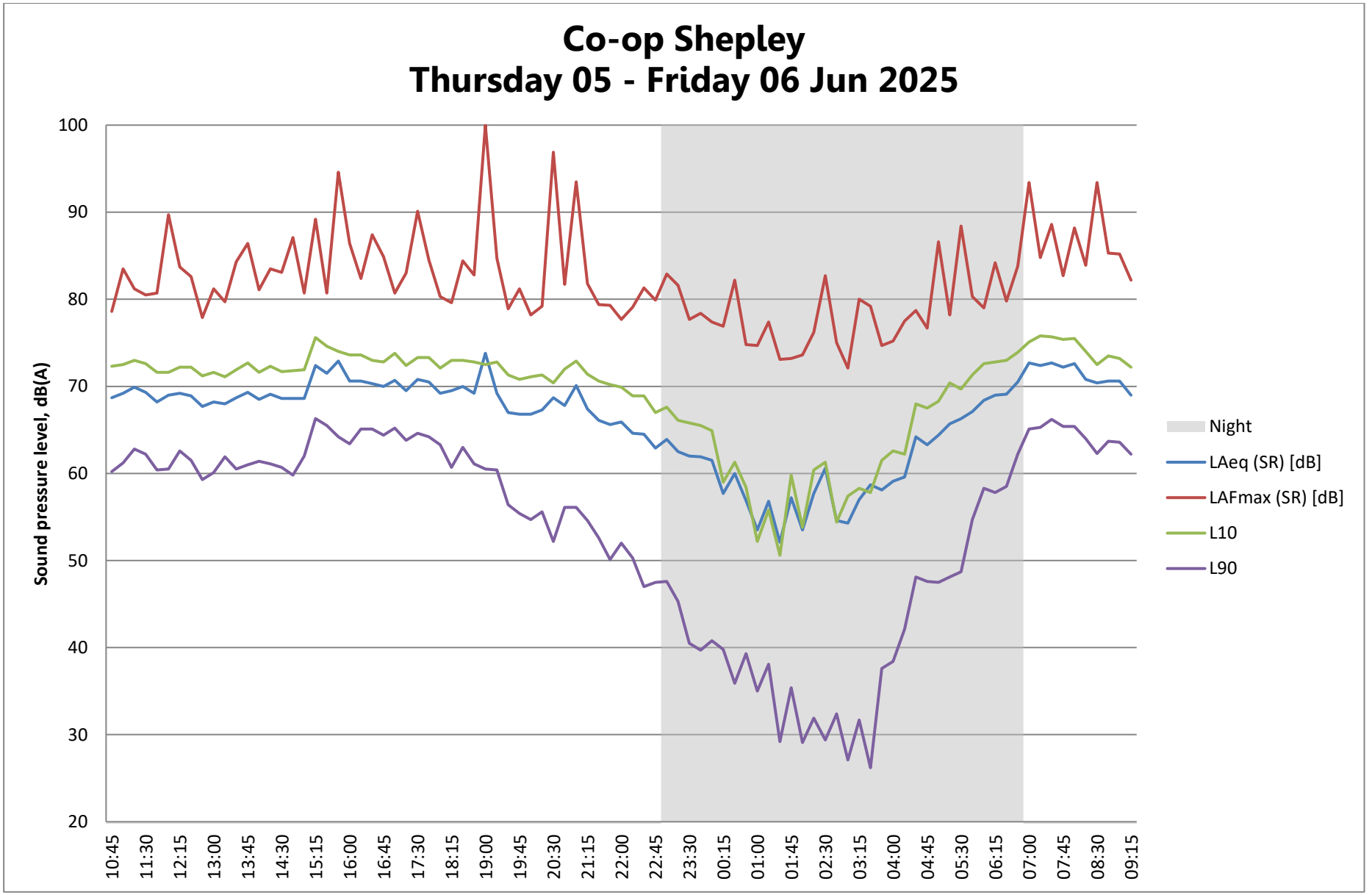
C.6 Weather conditions were determined both at the start and upon completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements.

C.7 The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Time/Date**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	10.45 5 June – 09.20 6 June 2025	Temperature (°C)	11	12
		Precipitation:	Y	Y
		Cloud cover (oktas – see guide)	8	7
		Presence of fog/snow/ice	N	N
		Presence of damp roads/wet ground	Y	N
		Wind Speed (m/s)	-	4
		Wind Direction	-	W
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	N	N

Results

C.8 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 at the measurement position during the set up and/ or collection of the meter was influenced by local traffic. The results of the survey are presented in a time history graph overleaf.


Co-op Shepley
Thursday 05 - Friday 06 Jun 2025
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
20
10:45
11:30
12:15
13:00
13:45
14:30
15:15
16:00
16:45
17:30
18:15
19:00
19:45
20:30
21:15
22:00
22:45
23:30
00:15
01:00
01:45
02:30
03:15
04:00
04:45
05:30
06:15
07:00
07:45
08:30
09:15
Night
LAeq (SR) [dB]
LAFmax (SR) [dB]
L10
L90

Appendix D Plant Noise Data

Plant Ref	Manufacturer	Operating Hours	Sound pressure level
HPACK Refrigeration Pack	Hubbard 17/0 External H2MT R454C	Day	42 dBA at 10m
		Night	35 dBA at 10m
HBCU Refrigeration Condenser	J&E Hall JEHR-0170-B2-M-1	Day	33 dBA at 10m
		Night	33 dBA at 10m
LCCU Refrigeration Condenser	J&E Hall JEHS-0400-B3-L-3	Day	37 dBA at 10m
		Night	37 dBA at 10m
AC01	Mitsubishi PUZ-ZM250YKA2	Day	62 dBA at 1m
AC02	Mitsubishi PUZ-ZM250YKA2	Day	62 dBA at 1m
AC03	Mitsubishi PUZ-ZM100VKA2	Day	51 dBA at 1m
AC04	Mitsubishi PUZ-ZM250YKA2	Day	62 dBA at 1m

Appendix E Plant Noise Calculations

Receptor R1 Bungalow on Penniston Rd

Daytime

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant rating level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	42 at 10m	87	-19	3	-6	3	23
HBCU	33 at 10m	86	-19	3	-6	3	14
LCCU	37 at 10m	86	-19	3	-6	3	18
AC01	62 at 1m	75	-38	6	0	3	33
AC02	62 at 1m	75	-38	6	0	3	33
AC03	51 at 1m	75	-38	6	0	3	22
AC04	62 at 1m	57	-35	6	0	3	36
						Total plant rating level, day	**39**

Night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant rating level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	35 at 10m	87	-19	3	-6	3	16
HBCU	33 at 10m	86	-19	3	-6	3	14
LCCU	37 at 10m	86	-19	3	-6	3	18
						Total plant rating level, night	**21**

Receptor R2 Bungalow on Lane Head Rd

Daytime

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant rating level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	42 at 10m	57	-15	3	0	3	33
HBCU	33 at 10m	62	-16	3	0	3	23
LCCU	37 at 10m	62	-16	3	0	3	27
AC01	62 at 1m	66	-36	6	-6	3	29
AC02	62 at 1m	66	-36	6	-6	3	29
AC03	51 at 1m	66	-36	6	-6	3	18
AC04	62 at 1m	72	-37	6	-6	3	28
						Total plant rating level, day	**37**

Night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant rating level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	35 at 10m	57	-15	3	0	3	26
HBCU	33 at 10m	62	-16	3	0	3	23
LCCU	37 at 10m	62	-16	3	0	3	27
						Total plant rating level, night	**30**

Receptor R3 Business on Barnsley Rd.

Day-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant sound level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	42 at 10m	31	-10	3	-5	n/a	30
HBCU	33 at 10m	28	-9	3	-5	n/a	22
LCCU	37 at 10m	28	-9	3	-5	n/a	26
AC01	62 at 1m	15	-24	6	-5	n/a	39
AC02	62 at 1m	15	-24	6	-5	n/a	39
AC03	51 at 1m	15	-24	6	-5	n/a	28
AC04	62 at 1m	3.5	-11	6	-8	n/a	49
						Total plant specific level, day	**50**

Night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142 feature correction (dB)	Plant sound level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
HPACK	35 at 10m	31	-10	3	-5	n/a	23
HBCU	33 at 10m	28	-9	3	-5	n/a	22
LCCU	37 at 10m	28	-9	3	-5	n/a	26
						Total plant specific level, night	**29**