

The Co-operative
The Heath
Hatfield Heath
Essex
CM22 7EB

**Plant Noise
Impact Assessment**

On behalf of

Hutton
CONSTRUCTION

Project Reference: 91495 | Revision: 1 | Date: 16th June 2023
Revised: 27th November 2023

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Document Information

Project Name : The Co-operative, The Heath, Hatfield Heath
Project Reference : 91495
Report Title : Plant Noise Impact Assessment
Doc Reference : 91495/NIA
Date : 16th June 2023

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Revision	Date	Description	Prepared	Reviewed/ Approved
1	27 Nov 2023	Plant selection revised	JS	NAC

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Executive summary

Noise Solutions Limited has been appointed to provide a noise impact assessment of replacement plant to be installed at The Co-operative store on The Heath, Hatfield Heath.

The assessment shows that noise from the plant will comply with the local authority's typical requirements and should therefore be acceptable.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by Hutton Construction to provide a noise assessment of new plant serving the Co-operative store, located on The Heath, Hatfield Heath, Essex.
- 1.2. Noise levels resulting from the proposed plant have been predicted at the nearest residential property and assessed against the local authority's typical requirements.
- 1.3. 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. The Co-operative store is located within a row of commercial properties facing The Heath, a green open area within Hatfield Heath. The White Horse public house is to the west of the store, while a beauty salon, a baker and a printer are in a building to the east.
- 2.2. The store occupies the ground floor of a one- to two-storey building with residential premises above.
- 2.3. The proposed replacement plant is to be located within an existing plant compound to the north of the store building and will comprise two external refrigeration gas coolers. The proposed plant may run at any time of the day or night.
- 2.4. Two existing external air conditioning units are to be retained and are not included in this assessment.

3.0 Nearest noise sensitive receptors

- 3.1. The Co- noise sensitive properties are first floor flats above the store and residential properties to the north of the site. The following receptors have been assessed:
 - Receptor R1: house to the north of the store, with windows potentially around 5m from the plant area.
 - Receptor R2: first floor flats above the Co-op store with windows facing north. These windows are around 8m from the existing plant, with potential screening from the building envelope.
- 3.2. A site plan and photographs showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in [Appendix B](#).

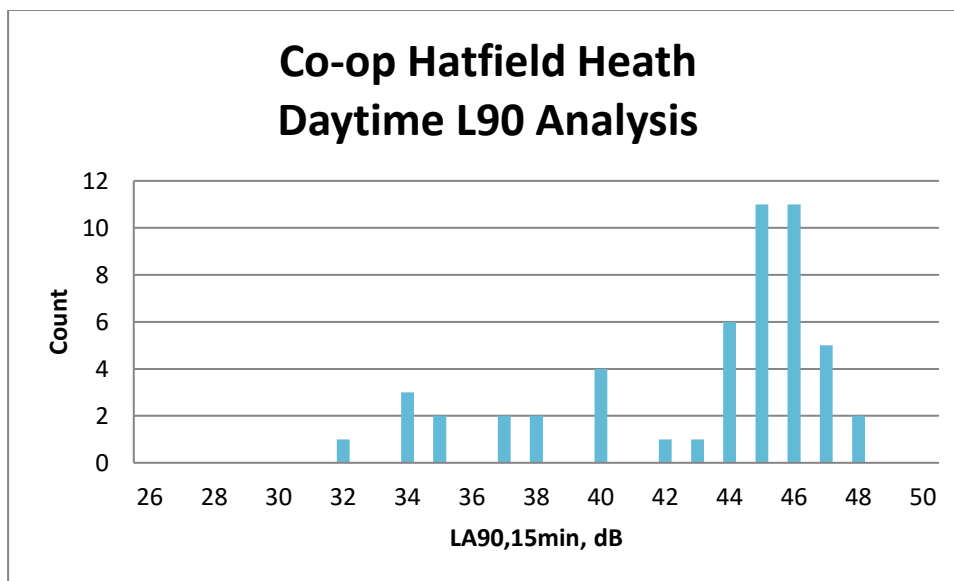
4.0 Existing noise climate

- 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 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 _{AFmax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 – 23.00 hours)	53-70	73-103	48-67	32-48
Night-time (23.00 – 07.00 hours)	31-59	46-79	33-64	27-46

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

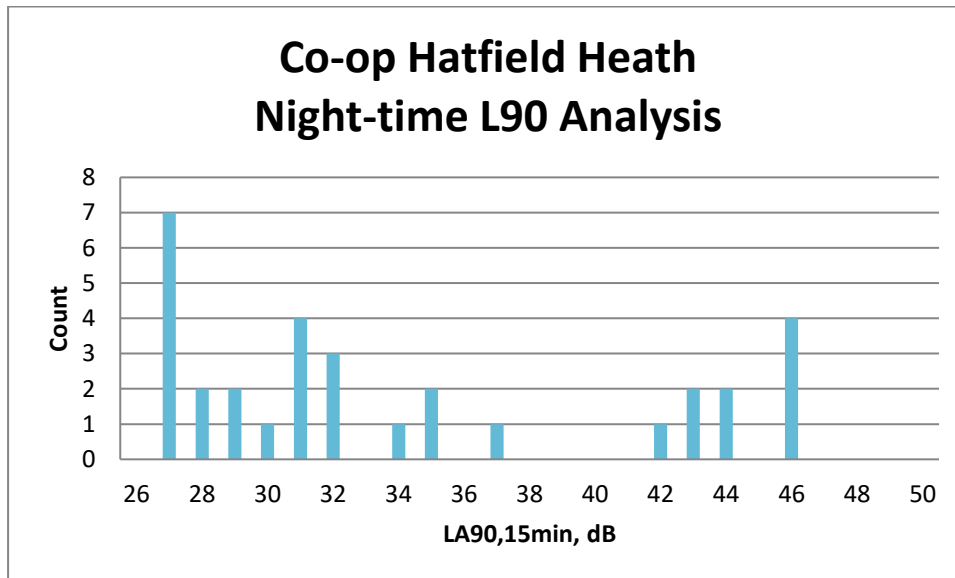


- 4.3. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 2 below.

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

dB, L_{A90} daytime period	
mean	43
modal	46
median	45

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



- 4.4. Further statistical analysis has been carried out on the data and the mean, modal and median values are shown in Table 3 below.

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

dB, L_{A90} night-time period	
mean	34
modal	27
median	31

- 4.5. The following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:
- 40dB L_{A90} during the daytime period; and
 - 27dB L_{A90} during the night-time period.

5.0 Plant noise design criteria

National Planning Policy Framework

- 5.1. A new edition of NPPF was published in September 2023 and came into effect immediately. The original National Planning Policy Framework (NPPF¹) was published in March 2012, with subsequent revisions made periodically - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2023 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the September 2023 edition.
- 5.2. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land instability."*
- 5.3. The NPPF goes on to state in Paragraph 185:
- "planning policies and decisions should ...*
- a) *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;*
 - b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...*
- 5.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE³).
- 5.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*
- 5.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed"*.

¹ National Planning Policy Framework, DCLG, March 2012

³ Noise Policy Statement for England, DEFRA, March 2010

- 5.7. Paragraph 119 states that *“Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land”.*

Uttlesford District Council

- 5.8. Based on a review of planning conditions for similar applications, Uttlesford District Council typically attaches a condition along the following lines to any consent granted for plant installations:

Noise resulting from the operation of the external condenser units hereby consented shall not exceed the existing background noise level inclusive of any penalty for tonal, impulsive or other distinctive acoustic characteristics when measured or calculated according to the provisions of BS 4142:2014.

BS 4142:2014 Methods for rating and assessing industrial and commercial sound

- 5.9. BS 4142:2014 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes “sound from fixed plant installations which comprise mechanical and electrical plant and equipment”.
- 5.10. 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.
- 5.11. 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.
- 5.12. 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.”
- 5.13. 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.”

- 5.14. 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.*
- 5.15. 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.”
- 5.16. 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.”
- 5.17. 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.”*
- 5.18. 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

- 5.19. Due to the exceptionally low prevailing environmental noise levels measured during the survey for the night-time period, it is suggested that the plant noise design criteria at the nearest residences should be capped at 30dBA. This proposed criterion is based on guidance found in Section 11 of BS 4142:2014 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.

- 5.20. 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

- 5.21. In accordance with the local authority's usual requirements, the rating noise level of the plant, at the nearest residential windows, must be no higher than the existing representative background sound level, subject to a lower limit of 30dBA. The plant noise must therefore not exceed the levels shown in Table 4.

Table 4 Plant noise emissions limits at the nearest noise sensitive receptor

Period	Cumulative plant noise rating level, dB(A)
Daytime (07.00 – 23.00 hours)	40
Night-time (23.00 – 07.00 hours)	30

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

6.0 Plant noise impact assessment

- 6.1. The plant noise levels at the nearest noise sensitive receptor have been predicted. The assessment has considered distance losses and surface acoustic reflections and, where appropriate, acoustic screening provided by buildings between the source and receptor.
- 6.2. 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 plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. 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 5 summarises the results of the assessment at the most affected residential properties. Acoustic wall lining will be installed behind the equipment, to reduce reflections toward the noise sensitive receptors. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in [Appendix E](#).

Table 5 Plant noise assessment

Receptor	Period	Plant noise level at receptor, dB $L_{Ar,Tr}$	Plant noise limit at receptor, dB $L_{Ar,Tr}$	Excess, dB
R1	Daytime (07.00 – 23.00 hours)	30	40	-10
	Night-time (23.00 – 07.00 hours)	30	30	0
R2	Daytime (07.00 – 23.00 hours)	19	40	-21
	Night-time (23.00 – 07.00 hours)	19	30	-11

6.4. The assessment shows that noise from the proposed plant will comply with the local authority's typical criteria, summarised in Table 4.

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 position was representative of the noise climate outside the nearby residential dwellings and not in positions where higher noise levels were present.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Hutton Construction to provide a noise assessment for new plant serving the Co-operative store, located on The Heath, Hatfield Heath.

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

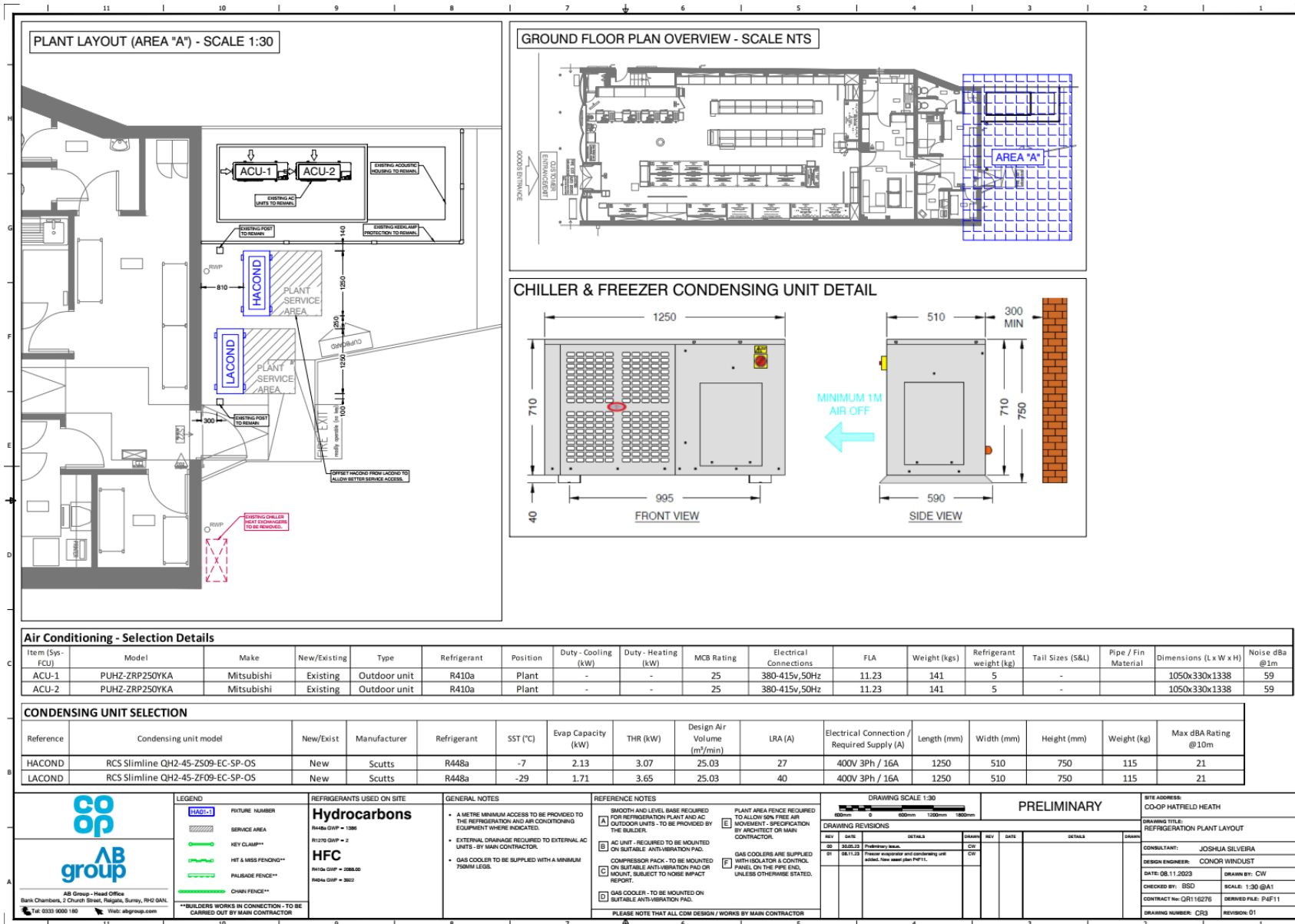
7.3. Plant noise levels have been predicted at the most affected residential properties and assessed against the local authority's typical criteria. The assessment shows that, with acoustic wall lining installed behind the equipment, plant noise will comply with the criteria and noise should therefore 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 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 site showing areas of interest





Appendix C Environmental sound survey

Details of sound surveys

- C.1 Measurements of the existing background sound levels were undertaken between 15.15 hours on Wednesday 26th April and 12.00 hours on Thursday 27th April 2023.
- 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 noise survey.

Measurement position

- C.3 The representative measurement position was located on a lamppost on Broomfields, to the west of the Co-operative, to avoid existing plant (location indicated on the site plan in [Appendix B](#)).
- C.4 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.

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.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00654035	30/08/2022	TCRT22/1544
Condenser microphone	Rion UC-59 / 14826		
Preamplifier	Rion NH-25 / 87474		
Calibrator	Rion NC-74 /34235932	04/10/2022	1503480-1

Weather conditions

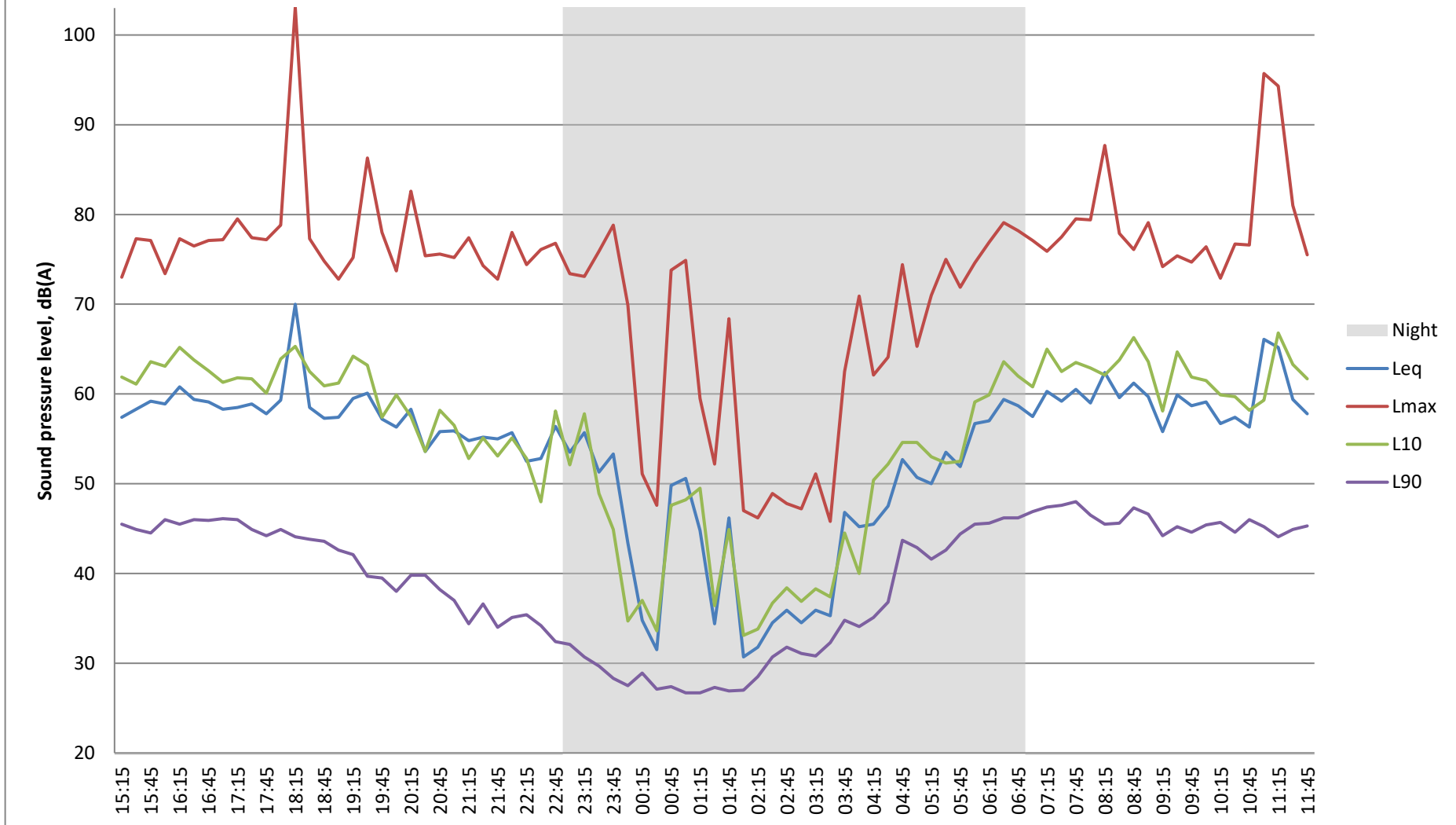
- C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were generally appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions																										
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey																						
As indicated on Appendix B	15.15 26 Apr - 12.00 27 Apr 2023	Temperature (°C)	10	12																						
<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Cloud Cover</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; font-size: small;">Symbol</th> <th style="text-align: left; font-size: small;">Scale in oktas (eighths)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">○</td> <td>0 Sky completely clear</td> </tr> <tr> <td style="text-align: center;">◐</td> <td>1</td> </tr> <tr> <td style="text-align: center;">◑</td> <td>2</td> </tr> <tr> <td style="text-align: center;">◒</td> <td>3</td> </tr> <tr> <td style="text-align: center;">◓</td> <td>4 Sky half cloudy</td> </tr> <tr> <td style="text-align: center;">◔</td> <td>5</td> </tr> <tr> <td style="text-align: center;">◕</td> <td>6</td> </tr> <tr> <td style="text-align: center;">◖</td> <td>7</td> </tr> <tr> <td style="text-align: center;">◗</td> <td>8 Sky completely cloudy</td> </tr> <tr> <td style="text-align: center;">⊗</td> <td>(9) Sky obstructed from view</td> </tr> </tbody> </table> </div>		Symbol	Scale in oktas (eighths)	○	0 Sky completely clear	◐	1	◑	2	◒	3	◓	4 Sky half cloudy	◔	5	◕	6	◖	7	◗	8 Sky completely cloudy	⊗	(9) Sky obstructed from view	Precipitation:	No	No
		Symbol	Scale in oktas (eighths)																							
		○	0 Sky completely clear																							
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		◒	3																							
		◓	4 Sky half cloudy																							
		◔	5																							
◕	6																									
◖	7																									
◗	8 Sky completely cloudy																									
⊗	(9) Sky obstructed from view																									
Cloud cover (oktas - see guide)	7	8																								
Presence of fog/snow/ice	No	No																								
Presence of damp roads/wet ground	No	No																								
Wind Speed (m/s)	2	3																								
Wind Direction	From north	From east																								
Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No																								

Results

- C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. Upon the setup and collection of the noise level meter, the noise climate was dominated by local and distant road traffic, with occasional noise from aircraft and birdsong. The results of the survey are presented in a time history graph overleaf.

Co-op Hatfield Heath Wednesday 26 - Thursday 27 Apr 2023



Appendix D Plant noise data

Plant Ref	Manufacturer / model	Operating Hours	Sound pressure level
HACOND	RCS Slimline QH2-45-ZS09-EC-SP-OS	24hr	21 dB(A) at 10m
LACOND	RCS Slimline QH2-45-ZS09-EC-SP-OS	24hr	21dB(A) at 10m

Appendix E Calculations

Receptor R1

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS4142 feature correction (dB)	Plant rating level at receptor $L_{A_r,Tr}$ (dB)
		Distance to Receptor (m)	Correction (dB)				
HACOND	21 at 10m	7	+3	0	0	3	27
LACOND	21 at 10m	7	+3	0	0	3	27
Total plant sound pressure level (daytime)							30
Total plant sound pressure level (night)							30

Receptor R2

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS4142 feature correction (dB)	Plant rating level at receptor $L_{A_r,Tr}$ (dB)
		Distance to Receptor (m)	Correction (dB)				
HACOND	21 at 10m	8	+2	0	-10	3	16
LACOND	21 at 10m	8	+2	0	-10	3	16
Total plant sound pressure level (daytime)							19
Total plant sound pressure level (night)							19