# Popeyes

**163 High Street**
**Uxbridge**
**UB8 1JZ**

## Plant Noise Impact Assessment

On behalf of

chapman ventilation

Project Reference: 92935 | Revision: 00 | Date: 6th January 2025

T: 01252 519881
W: noisesolutions.co.uk
E: hello@noisesolutions.co.uk
Noise Solutions Ltd, Unit 5, Oriel Court, Omega Park, Alton, GU34 2YT Reg no. 3483481

## Document Information

| | | |
|---|---|---|
| **Project Name** | : | **Popeyes, 163 High Street, Uxbridge** |
| **Project Reference** | : | **92935** |
| **Report Title** | : | **Noise Impact Assessment** |
| **Doc Reference** | : | **92935/NIA** |
| **Date** | : | **6th January 2025** |

| | Name | Qualifications | Initials | Date |
|---|---|---|---|---|
| **Prepared by:** | Adam Meakins | AMIOA | ACM | 6th January 2025 |
| **Reviewed and approved by:** | Jon Stump | BSc(Hons), MIOA | JS | 6th January 2025 |
| **For and on behalf of Noise Solutions Ltd** | | | | |

| Revision | Date | Description | Prepared | Reviewed/ Approved |
|---|---|---|---|---|
| | | | | |
| | | | | |

Noise Solutions Ltd (NSL) disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and generally in accordance with the appropriate ACE Agreement and taking account of the manpower, resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and NSL (Noise Solutions Ltd) accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

© Noise Solutions Ltd (NSL) 2025

Reg no. 3483481 Trading office Unit 5, Oriel Court, Omega Park, Alton, Hampshire, GU34 2YT

# Contents



## Appendices

# 1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to provide a Noise Impact Assessment for new plant serving a proposed Popeyes restaurant located along the High Street in Uxbridge.

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. The cumulative plant noise level has been predicted at the nearest noise-sensitive receptors and assessed against recognised standards.

1.4. A glossary of acoustic terminology is given 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 Popeyes restaurant is to be located in an existing building along the High Street in Uxbridge.

2.2. New ventilation plant comprising a supply AHU, a kitchen extract fan and a several small extract and supply fans fan will be located internally with external louvres. Refrigeration plant will be located externally on the yard to the south of the building

2.3. All plant will run during the operational period 07.00 hours to 23.00 hours, with the exception of the catering condensing units which will run constantly.

# 3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is mixed residential and commercial in nature. The nearest noise sensitive properties are:

- The Premier Inn across Bakers Road to the north (Receptor R1) will have no direct exposure to the proposed plant.
- The flat above commercial premises across Bakers Yard (Receptor R2) will have direct exposure to the supply extract fan louvre.

3.2. **Appendix B** contains an aerial photograph showing the site and surrounding area, including the locations of the potential receptor identified above.

# 4.0 Existing noise climate

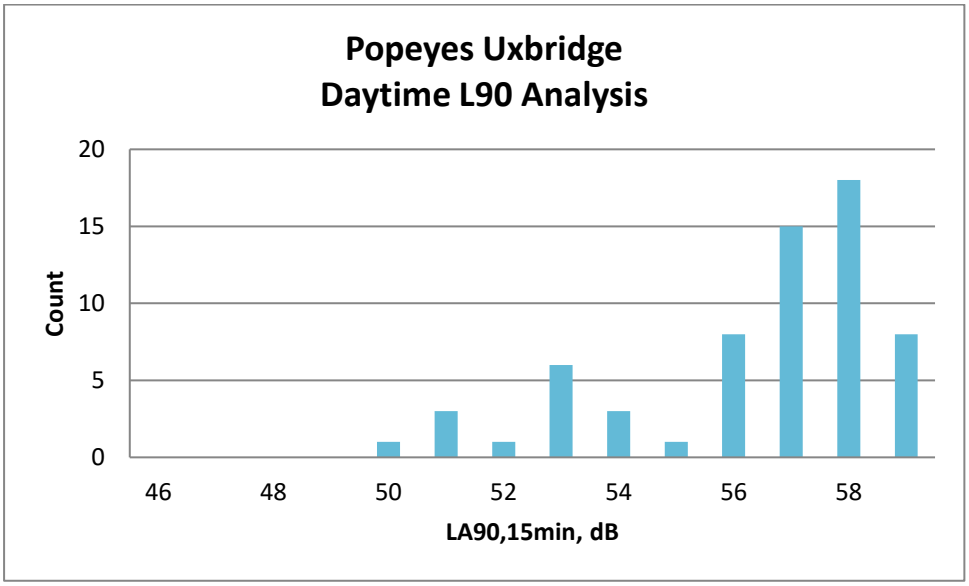
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 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 hours (07.00 – 23.00 hours) | 54-65 | 72-97 | 56-67 | 50-59 |
| Night-time hours (23.00 – 07.00 hours) | 50-71 | 65-93 | 50-75 | 46-54 |

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



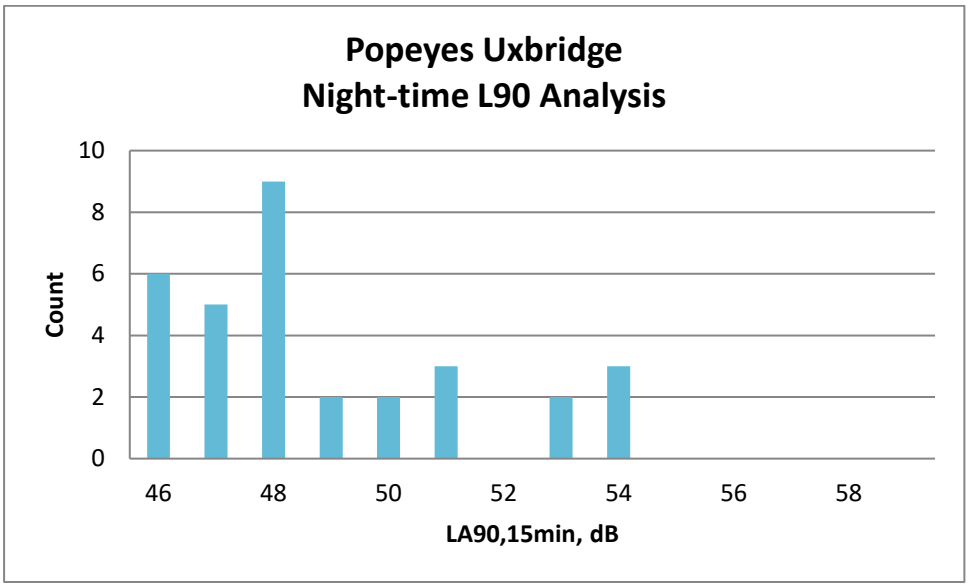

4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

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

| dB, $L_{A90}$ daytime period | |
|---|---|
| **Mean** | 56 |
| **Mode** | 58 |
| **Median** | 57 |

4.4. From the histogram analysis, 52dB has been selected to be a robust representation of the background noise level during the daytime hours, at the survey location.

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




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

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

| dB, $L_{A90}$ night-time period | |
|---|---|
| **Mean** | 49 |
| **Mode** | 48 |
| **Median** | 48 |

4.6. Again, from the histogram analysis, 48dB has been chosen to be representative of the background sound level at the survey location, during the night-time hours.

4.7. The following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 52dB $L_{A90}$ during the daytime hours; and
- 48dB $L_{A90}$ during the night-time hours.

# 5.0 Plant noise design criteria

## National Planning Policy Framework

5.1. A new edition of the NPPF was published in December 2024 and came into effect immediately. The original National Planning Policy Framework (NPPF[1]) 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 December 2024 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the December 2024 edition.

5.2. Paragraph 187 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 198:

*"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 (NPSE[2]).

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."*

[1] National Planning Policy Framework, DCLG, March 2012
[2] Noise Policy Statement for England, DEFRA, March 2010

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"*.

5.7. Paragraph 124 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"*.

## London Borough of Hillingdon

5.8. The London Borough of Hillingdon Council Supplementary Planning Document Noise (dated April 2006) contains the following:

> *Key Point 6: Industrial Uses*
>
> *Industrial uses will require particular attention as they can often cause severe noise problems due to both the character of industrial noise and its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration.*
>
> *In considering new industrial development, the Council will apply policies OE1 and OE3 of the UDP and will have regard to, amongst other considerations, the British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas", and internal and external noise criteria. Specific consideration will also be given to the features and characteristics of the noise.*
>
> *British Standard 4142:1997 gives advice on measuring and assessing the noise from machinery or plant and is relevant if surrounding residential areas might be affected. Developments with a BS4142 assessment of marginal significance or above would not ordinarily be permitted. Consequently, the development should be controlled such that the rating level of the noise from the proposed development determined according to BS4142 is at least 5 dB below the background noise level $L_{A90,T}$. Ideally, the assessment of noise should give a positive indication that complaints are unlikely…*

*Before the proposed use commences, the local planning authority may require that a noise control scheme is agreed. This will need to have regard to the British Standard 4142:1997 and internal noise criteria.*

*To ensure that the proposed use does not have an unacceptable impact, conditions may be required.*

5.9. It should be noted that BS 4142:1997 has been superseded by the 2014 version with 2019 updates. The latest version of the standard has been adopted for this assessment

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

5.10. 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+A1:2019 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

5.11. The procedure contained in BS 4142:2014+A1:2019 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.

5.12. 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.

5.13. 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."*

5.14. 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."*

5.15. 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.*

5.16. 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.*"

5.17. 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."*

5.18. 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."*

5.19. BS 4142:2014+A1:2019 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.

## Proposed criteria

5.20. Based on London Borough of Hillingdon's typical requirements, it is considered appropriate that the cumulative plant noise rating level of proposed plant should be controlled to a level that does not exceed 5dB below the representative $L_{A90}$ background sound level at the nearest residential property. Noise from the new plant should therefore not exceed the limits shown in the table below:

*Table 4 Proposed plant noise emissions level limits at noise sensitive residential receptors*

| Receptor | Period | Cumulative plant rating level, dB(A) |
|---|---|---|
| Residential | Daytime hours (07.00 – 23.00 hours) | 47 |
| | Night-time hours (23.00 – 07.00 hours) | 43 |

## 6.0 External plant noise assessment

6.1. The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has taken into consideration distance attenuation and directivity corrections.

6.2. It should be noted that the proposed ventilation plant will operate during operational hours only and 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. To provide a robust assessment, a 3dB acoustic feature correction as described in BS 4142:2014+A1:2019 for the possible presence of *"...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment..."*.

6.3. Predictions are inclusive of the following atmospheric attenuators fitted to the ventilation louvres:

*Table 5 Proposed attenuators to ventilation louvres*

| Attenuator | Insertion loss (dB) at octave band centre frequencies (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| SF1 - Supply | 5 | 10 | 19 | 31 | 39 | 37 | 33 | 26 |
| EF1 - KE | 4 | 5 | 8 | 15 | 21 | 20 | 17 | 14 |
| EF2 - General Extract | 2 | 3 | 5 | 12 | 16 | 12 | 11 | 9 |
| EF3 - Toilet Extract | 2 | 2 | 4 | 15 | 26 | 19 | 19 | 13 |
| EF4 - bin store extract | 2 | 2 | 4 | 15 | 26 | 19 | 19 | 13 |
| SF2 bin store supply | 2 | 2 | 4 | 15 | 26 | 19 | 19 | 13 |

6.4. Table 6, below, summarises the results of the assessment at the nearest receptor. All other receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in **Appendix E**. The predictions between 07.00 and 23.00 hours have been based on the proposed plant operating simultaneously at full capacity. The refrigeration plant only will operate between 23.00 and 07.00 hours.

*Table 6 Assessment of predicted noise levels at nearest receptors*

| Receptor | Period | Predicted rating level at receptor, $L_{Ar,Tr}$ (dB) | Proposed design criterion (dB) | Difference (dB) |
|---|---|---|---|---|
| R1 | Daytime hours (07.00 – 23.00 hours) | 29 | 47 | -18 |
| | Night-time hours (10.00 – 23.00 hours) | 18 | 43 | -25 |
| R2 | Daytime hours (07.00 – 23.00 hours) | 46 | 47 | -1 |
| | Night-time hours (10.00 – 23.00 hours) | 27 | 43 | -16 |

6.5. The above assessment demonstrates that noise from the proposed plant will result in noise levels below the proposed limits and should therefore be acceptable to the local authority.

## Context and uncertainties

6.6. As BS 4142:2014+A1:2019 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
- It is to be appreciated that the BS 4142:2014+A1:2019 assessment relates to external noise levels only.

6.7. 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.

## 7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to provide a Noise Impact Assessment for new plant serving a proposed Popeyes restaurant located along the High Street in Uxbridge.

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 plant area.

7.3. Cumulative plant noise emission levels for the proposed plant have been predicted, inclusive of the specified mitigation measures, at the most affected noise sensitive receptors and assessed using the typical requirements of London Borough of Hillingdon Council.

7.4. Therefore, noise from the 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 Aerial photograph of site showing areas of interest


Aerial image © Google 2024

# Appendix C Environmental sound survey

## Details of environmental sound survey

C.1 Measurements of the existing environmental sound levels were undertaken between 11.30 hours on Thursday 19th December and 11.30 hours on Friday 20th December 2024.

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

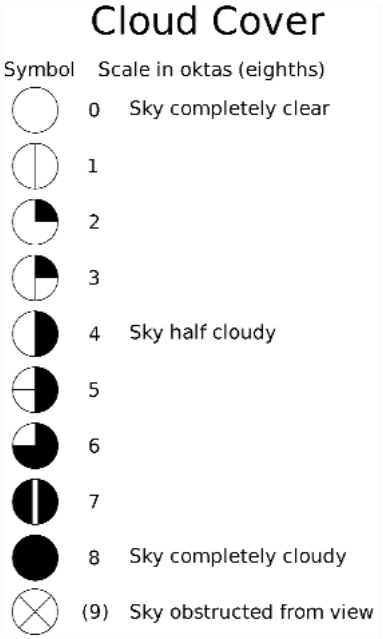
C.3 The sound level meter was positioned along the High Street close to the nearest noise sensitive receptors. The approximate location of the microphone is indicated on the photograph in **Appendix B**. In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: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

## 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.

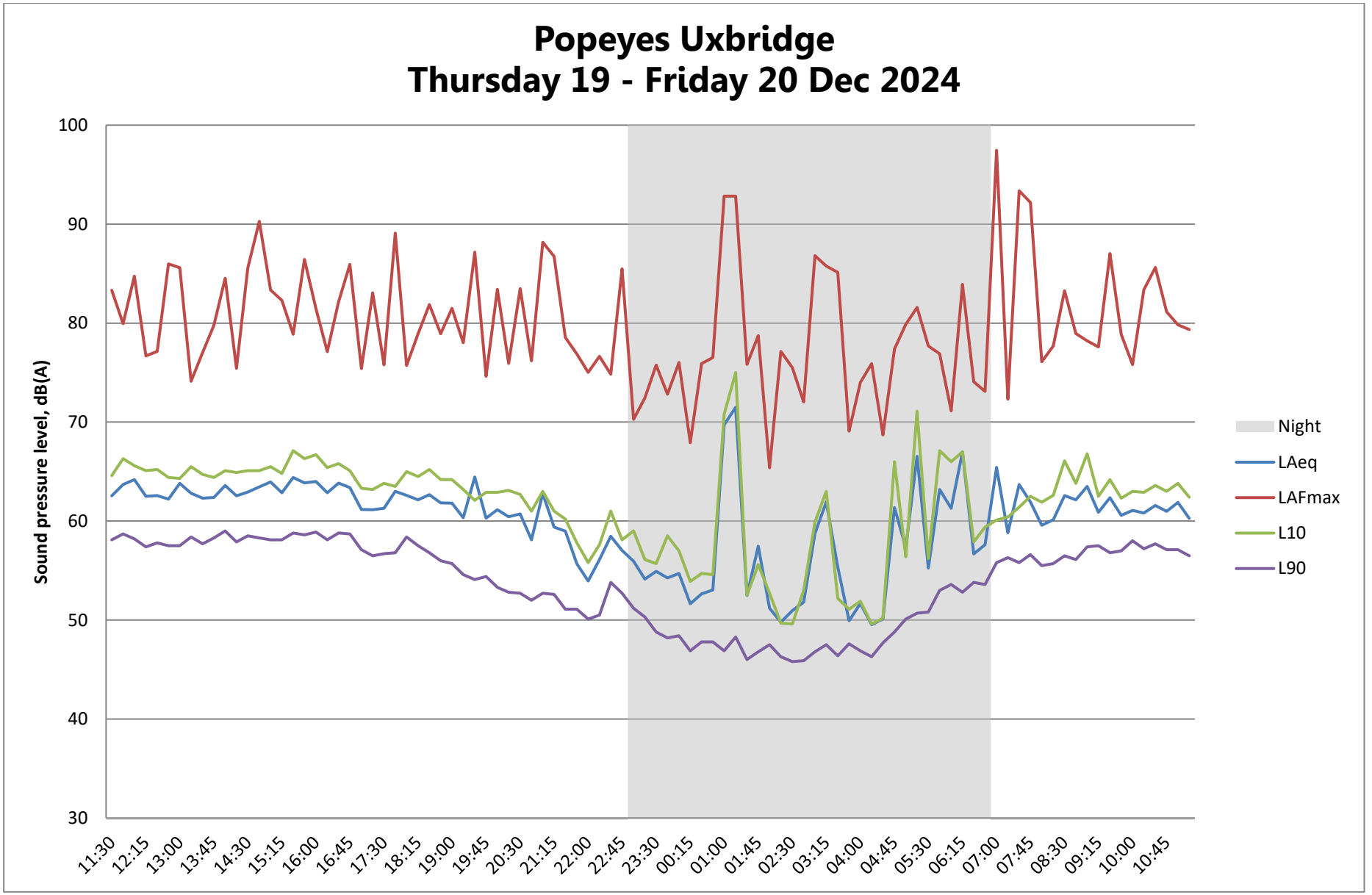
| Description | Model / serial no. | Calibration date | Calibration certificate no. |
|---|---|---|---|
| Class 1 Sound level meter | Svantek 971A / 124660 | 01/06/2023 | 1505421-1 |
| Condenser microphone | ACO Pacific 7052E / 81197 | | |
| Preamplifier | Svantek SV18A / 130661 | | |
| Calibrator | Svantek SV33B / 125546 | 04/06/2024 | 1508883-1 |

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** | **Time/Date** | **Description** | **Beginning of Survey** | **End of Survey** |
| As indicated on Appendix B | 11.30 19/12/24 - 11.30 20/12/24 | Temperature (°C) | 5 | 7 |
|  | | Precipitation: | No | No |
| | | Cloud cover (oktas – see guide) | 1 | 8 |
| | | Presence of fog/snow/ice | No | No |
| | | Presence of damp roads/wet ground | Yes | No |
| | | Wind Speed (m/s) | 1 | 1 |
| | | Wind Direction | Westerly | South westerly |
| | | Conditions that may cause temperature inversion (i.e. calm nights with no cloud) | No | No |

## Results

C.6 The results of the survey are considered to be representative of the background sound pressure levels at the façade of the most affected noise sensitive receptor to the plant area during the quietest times at which the plant will operate. The noise climate at the measurement position during the installation and collection of the monitoring equipment was dominated by local road traffic. The results of the survey are presented in a time history graph overleaf.


Popeyes Uxbridge
Thursday 19 - Friday 20 Dec 2024
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
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
10:00
10:45
Night
LAeq
LAFmax
L10
L90

# Appendix D Equipment Manufacturer's Noise Data

| Reference | Make / Model | No. units | Notes | Sound levels, dB, at octave band frequencies (Hz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | $L_{Aeq}$ (dB) |
| SF1 | Systemair/MUB 062 560 D4 Multibox | 1 | Inlet $L_w$ | 75 | 84 | 81 | 79 | 77 | 74 | 72 | 66 | 82 |
| SF2 | Systemair/K200L Sileo | 1 | Inlet $L_w$ | 80 | 77 | 75 | 67 | 64 | 62 | 54 | 49 | 71 |
| EF1 | Systmair/MUB/T 062 630 D4 Multibox | 1 | Discharge $L_w$ | 82 | 97 | 88 | 87 | 85 | 79 | 77 | 70 | 90 |
| EF2 | Systemair/Prio 355 EC | 1 | Discharge $L_w$ | 85 | 90 | 89 | 84 | 82 | 77 | 70 | 62 | 87 |
| EF3 | Systemair/K200L Sileo | 1 | Discharge $L_w$ | 85 | 80 | 68 | 66 | 63 | 62 | 55 | 49 | 70 |
| EF4 | Systemair/K200L Sileo | 1 | Discharge $L_w$ | 85 | 80 | 68 | 66 | 63 | 62 | 55 | 49 | 70 |
| CC1 | Foster/DUET+ 1-1L STD | 1 | $L_p$ at 10m | | | | | | | | | 42 |
| CC2 | Foster/DUET+ 2-1H STD | 1 | $L_p$ at 10m | | | | | | | | | 34 |

# Appendix E Predicted Noise Levels Calculation

*SF1 vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **SF1 - Supply**
Plant Description **Systemair/MUB 062 560 D4 Multibox**

| Description | | | | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | | | | In-duct $L_w$ | 75 | 84 | 81 | 79 | 77 | 74 | 72 | 66 | **82** |
| System losses | | | | | -15 | -10 | -4 | -2 | -3 | -4 | -5 | -5 | |
| Atmospheric side attenuator | | | | I.L. | -5 | -10 | -19 | -31 | -39 | -37 | -33 | -26 | |
| **Sound power level leaving terminal** | | | | | **55** | **64** | **58** | **46** | **35** | **33** | **34** | **35** | **53** |
| Receptor R1 | V angle | H angle | | | | | | | | | | | |
| Directivity correction | 0 | 90 | | 600 x 600 (0,90) | 0 | 0 | 0 | 0 | -4 | -7 | -7 | -7 | |
| Distance correction | 60 | m | | 60 m | -44 | -44 | -44 | -44 | -44 | -44 | -44 | -44 | |
| Screening correction | Screened: | 60.1 | δ= | 0.1 | **-6** | **-7** | **-8** | **-9** | **-12** | **-14** | **-17** | **-20** | |
| Surface corrections etc | | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | | $L_p$ | **5** | **13** | **6** | **-7** | **-25** | **-32** | **-34** | **-36** | **1** |
| Receptor R2 | V angle | H angle | | | | | | | | | | | |
| Directivity correction | 0 | 0 | | 600 x 600 (0,0) | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 6 | |
| Distance correction | 2 | m | | 2 m | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Screening correction | Screened: | | δ= | -2 | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | |
| Surface corrections etc | | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | | $L_p$ | **42** | **52** | **47** | **36** | **26** | **25** | **26** | **27** | **42** |

*EF1 vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **EF1 - KE**
Plant Description **Systmair/MUB/T 062 630 D4 Multibox**

| Description | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | In-duct $L_w$ | 82 | 97 | 88 | 87 | 85 | 79 | 77 | 70 | **90** |
| System losses | | -27 | -23 | -10 | -4 | -6 | -8 | -10 | -10 | |
| Atmospheric side attenuator | I.L. | -4 | -5 | -8 | -15 | -21 | -20 | -17 | -14 | |
| **Sound power level leaving terminal** | | **51** | **69** | **70** | **68** | **58** | **51** | **50** | **46** | **67** |

| Receptor R1 | V angle | H angle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 90 | 0 | 400 x 400 (90,0) | 0 | 0 | 0 | 0 | -4 | -7 | -7 | -7 | |
| Distance correction | 58 | m | 58 m | -43 | -43 | -43 | -43 | -43 | -43 | -43 | -43 | |
| Screening correction | Screened: | | δ= -58 | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | $L_p$ | **8** | **26** | **27** | **25** | **11** | **1** | **0** | **-4** | **24** |

| Receptor R2 | V angle | H angle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 135 | 0 | 400 x 400 (135,0) | -1 | -1 | -3 | -6 | -9 | -8 | -8 | -8 | |
| Distance correction | 12 | m | 12 m | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | |
| Screening correction | Screened: | 12.5 | δ= 0.5 | **-8** | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | $L_p$ | **12** | **28** | **25** | **17** | **1** | **-8** | **-12** | **-19** | **19** |

*EF2 Vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **EF2 - General Extract**
Plant Description **Systemair/Prio 355 EC**

| Description | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | In-duct $L_w$ | 85 | 90 | 89 | 84 | 82 | 77 | 70 | 62 | **87** |
| System losses | | -11 | -7 | -3 | -1 | 0 | 0 | 0 | 0 | |
| Atmospheric side attenuator | I.L. | -2 | -3 | -5 | -12 | -16 | -12 | -11 | -9 | |
| **Sound power level leaving terminal** | | **72** | **80** | **81** | **71** | **66** | **65** | **59** | **53** | **75** |

| Receptor R1 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 45 | 355 x 355 (0,45) | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | |
| Distance correction | 56 | m | 56 m | -43 | -43 | -43 | -43 | -43 | -43 | -43 | -43 | |
| Screening correction | Screened: | 57 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | **$L_p$** | **20** | **27** | **25** | **13** | **5** | **2** | **-7** | **-16** | **19** |

| Receptor R2 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 45 | 355 x 355 (0,45) | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | |
| Distance correction | 8 | m | 8 m | -26 | -26 | -26 | -26 | -26 | -26 | -26 | -26 | |
| Screening correction | Screened: | 9 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | **$L_p$** | **37** | **44** | **42** | **30** | **22** | **19** | **10** | **1** | **36** |

*EF3 Vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **EF3 - Toilet Extract**
Plant Description **Systemair/K200L Sileo**

| Description | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | In-duct $L_w$ | 85 | 80 | 68 | 66 | 63 | 62 | 55 | 49 | **70** |
| System losses | | -14 | -10 | -5 | -2 | 0 | 0 | 0 | 0 | |
| Atmospheric side attenuator | I.L. | -2 | -2 | -4 | -15 | -26 | -19 | -19 | -13 | |
| **Sound power level leaving terminal** | | **69** | **68** | **59** | **49** | **37** | **43** | **36** | **36** | **56** |

| Receptor R1 | V angle | H angle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 45 | 200 x 200 (0,45) | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | |
| Distance correction | 56 | m | 56 m | -43 | -43 | -43 | -43 | -43 | -43 | -43 | -43 | |
| Screening correction | Screened: | 57 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | **$L_p$** | **17** | **15** | **3** | **-9** | **-24** | **-20** | **-30** | **-33** | **1** |

| Receptor R2 | V angle | H angle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 45 | 200 x 200 (0,45) | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | |
| Distance correction | 8 | m | 8 m | -26 | -26 | -26 | -26 | -26 | -26 | -26 | -26 | |
| Screening correction | Screened: | 9 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | **$L_p$** | **34** | **32** | **20** | **8** | **-7** | **-3** | **-13** | **-16** | **18** |

*EF4 Vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **EF4 - bin store extract**
Plant Description **Systemair/K200L Sileo**

| Description | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | In-duct $L_w$ | 85 | 80 | 68 | 66 | 63 | 62 | 55 | 49 | **70** |
| System losses | | -9 | -5 | -1 | 0 | 0 | 0 | 0 | 0 | |
| Atmospheric side attenuator | I.L. | -2 | -2 | -4 | -15 | -26 | -19 | -19 | -13 | |
| **Sound power level leaving terminal** | | **74** | **73** | **63** | **51** | **37** | **43** | **36** | **36** | **60** |

| Receptor R1 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 135 | 500 x 500 (0,135) | -1 | -1 | -3 | -6 | -9 | -8 | -8 | -8 | |
| Distance correction | 67 | m | 67 m | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | |
| Screening correction | Screened: | 68 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | **$L_p$** | **18** | **15** | **0** | **-18** | **-38** | **-34** | **-44** | **-47** | **0** |

| Receptor R2 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 180 | 500 x 500 (0,180) | -1 | -2 | -3 | -7 | -9 | -8 | -8 | -8 | |
| Distance correction | 22 | m | 22 m | -35 | -35 | -35 | -35 | -35 | -35 | -35 | -35 | |
| Screening correction | Screened: | 23 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | **$L_p$** | **28** | **24** | **10** | **-9** | **-28** | **-24** | **-34** | **-37** | **10** |

*SF2 Vent*

NSL Ref: **92935**
Project **Popeyes Uxbridge**

| Compiled by: | ACM | 03/01/2025 |
|---|---|---|

Plant Ref **SF2 bin store supply**
Plant Description **Systemair/K200L Sileo**

| Description | Notes. | Sound level (dB) at octave band centre frequencies (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Source noise level (unattenuated) | In-duct $L_w$ | 80 | 77 | 75 | 67 | 64 | 62 | 54 | 49 | **71** |
| System losses | | -9 | -5 | -1 | 0 | 0 | 0 | 0 | 0 | |
| Atmospheric side attenuator | I.L. | -2 | -2 | -4 | -15 | -26 | -19 | -19 | -13 | |
| **Sound power level leaving terminal** | | **69** | **70** | **70** | **52** | **38** | **43** | **35** | **36** | **62** |

| Receptor R1 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 135 | 500 x 500 (0,135) | -1 | -1 | -3 | -6 | -9 | -8 | -8 | -8 | |
| Distance correction | 67 | m | 67 m | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | |
| Screening correction | Screened: | 68 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R1** | | | **$L_p$** | **13** | **12** | **7** | **-17** | **-37** | **-34** | **-45** | **-47** | **1** |

| Receptor R2 | V angle | H angle | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directivity correction | 0 | 180 | 500 x 500 (0,180) | -1 | -2 | -3 | -7 | -9 | -8 | -8 | -8 | |
| Distance correction | 22 | m | 22 m | -35 | -35 | -35 | -35 | -35 | -35 | -35 | -35 | |
| Screening correction | Screened: | 23 | δ= 1 | **-10** | **-12** | **-15** | **-18** | **-21** | **-24** | **-27** | **-30** | |
| Surface corrections etc | | | | | | | | | | | | |
| **Resultant at Receptor R2** | | | **$L_p$** | **23** | **21** | **17** | **-8** | **-27** | **-24** | **-35** | **-37** | **10** |

*Condensers R1*

| Unit | Make / Model | $L_{pA}$ | at / m | m | dB | Directivity | Screening | Attenuation | Result |
|---|---|---|---|---|---|---|---|---|---|
| CC1 | Foster/DUET+ 1-1L STD | 42 | 10 | 65 | -16 | 0 | -12 | 0 | 14 |
| CC2 | Foster/DUET+ 2-1H STD | 34 | 10 | 65 | -16 | 0 | -12 | 0 | 6 |

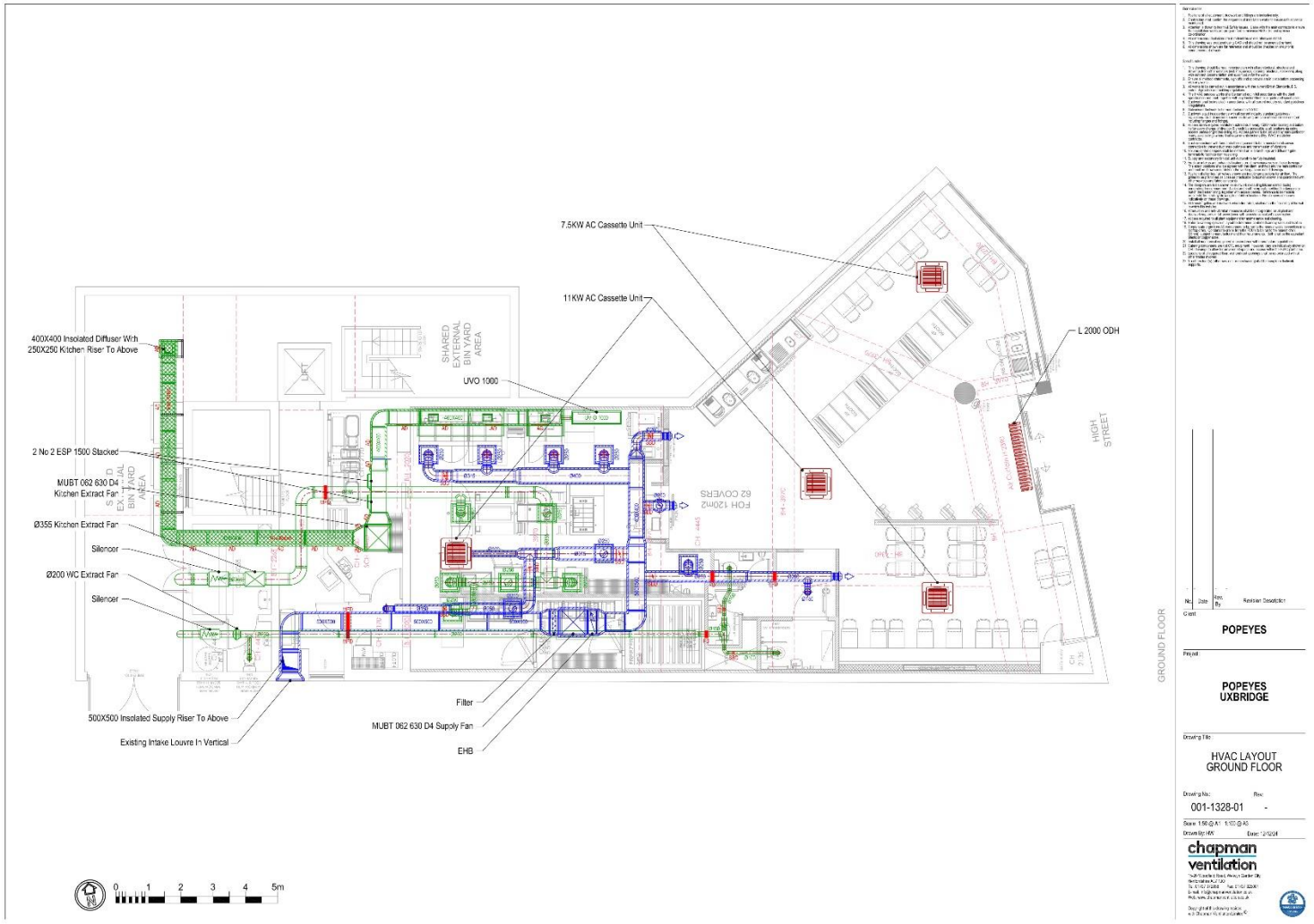
*Condensers R2*

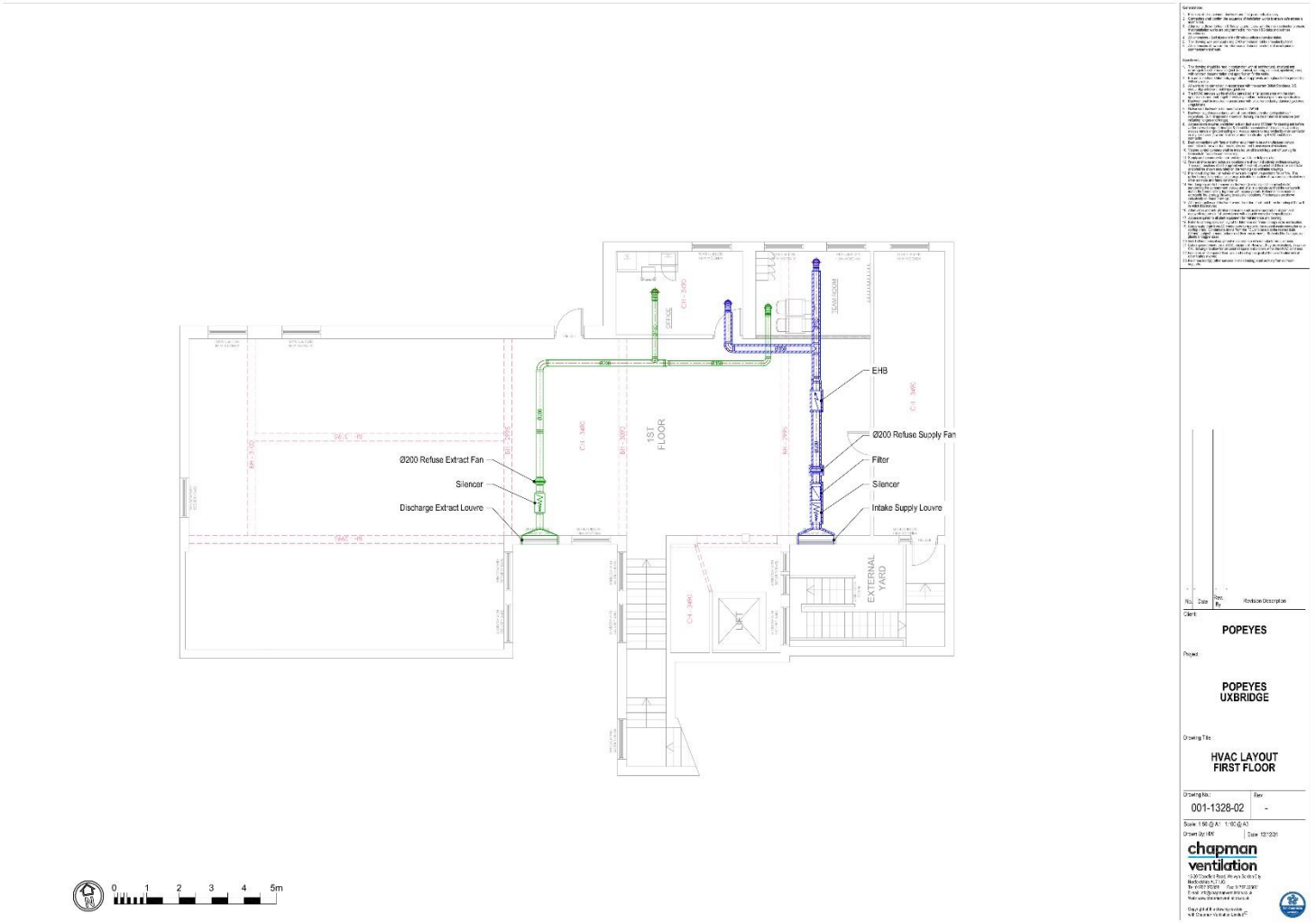
| Unit | Make / Model | $L_{pA}$ | at / m | m | dB | Directivity | Screening | Attenuation | Result |
|---|---|---|---|---|---|---|---|---|---|
| CC1 | Foster/DUET+ 1-1L STD | 42 | 10 | 22 | -7 | 0 | -12 | 0 | 23 |
| CC2 | Foster/DUET+ 2-1H STD | 34 | 10 | 22 | -7 | 0 | -12 | 0 | 15 |

*Cumulative plant noise levels at Receptor*

| | R1 dB(A) | R2 dB(A) |
|---|---|---|
| SF1 | 1 | 42 |
| EF1 | 24 | 19 |
| EF2 | 19 | 36 |
| EF3 | 1 | 18 |
| EF4 | 0 | 10 |
| SF2 | 1 | 10 |
| CCU1 | 14 | 23 |
| CCU2 | 6 | 15 |
| **Combined plant $L_p$ (Daytime)** All plant running | **26** | **43** |
| **Combined plant $L_r$ (Daytime)** including 3dB rating penalty | **29** | **46** |
| **Combined plant $L_p$ (Night-time)** refrigeration plant running | **15** | **24** |
| **Combined plant $L_r$ (Night-time)** including 3dB rating penalty | **18** | **27** |

# Appendix F Restaurant Plant Layout




EHB
Ø200 Refuse Supply Fan
Filter
Silencer
Intake Supply Louvre
Ø200 Refuse Extract Fan
Silencer
Discharge Extract Louvre
1ST FLOOR
EXTERNAL YARD
0 1 2 3 4 5m
POPEYES
POPEYES UXBRIDGE
HVAC LAYOUT FIRST FLOOR
001-1328-02
chapman ventilation