Farmer J

127-128 High Holborn
London
WC1V 6PQ

Plant Noise Impact Assessment

On behalf of

SAM HOPPER associates

Project Reference: 91973 | Revision: 00 | Date: 14th November 2023

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Document Information

Project Name : **Farmer J, High Holborn**
Project Reference : **91973**
Report Title : **Noise Impact Assessment**
Doc Reference : **91973/NIA**
Date : **14th November 2023**

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Revision	Date	Description	Prepared	Reviewed/ Approved

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Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Sam Hopper Associates to provide a Noise Impact Assessment for new plant serving a proposed Farmer J restaurant located along High Holborn in London.

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 Farmer J restaurant is to be located within an existing building at the junction between High Holborn and Southampton Place in London.

2.2. Air conditioning (AC) and refrigeration plant will be located externally on the roof. Ventilation plant will be installed internally with external vents. The ventilation plant will comprise a supply AHU, a kitchen extract fan and two smaller extract fans.

2.3. All plant will run during the operational period 06:00 hours to 21:30 hours Monday to Friday and 08:00 to 21:00 Saturdays, 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 mainly commercial in nature. The nearest noise sensitive property (Receptor R1) will be the residential flats at 131 High Holborn 30m to the east of the nearest plant item. There are also commercial windows close to the kitchen extract vent (Receptor R2), close to the coldroom condenser and small extract louvre (Receptor R3) and close to the AHU intake louvre (Receptor R4).

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

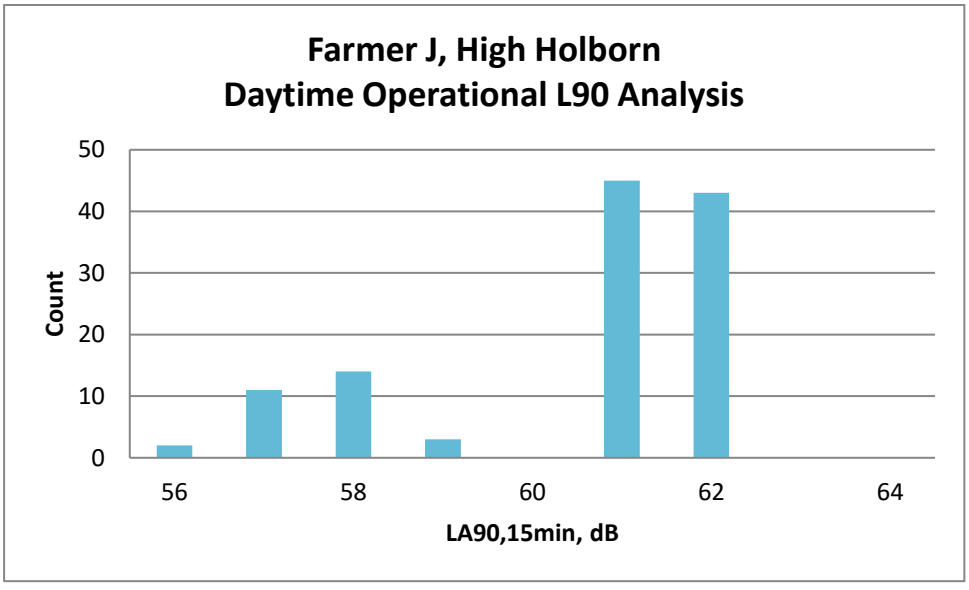
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

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 operational hours (07.00 – 21.30 hours)	60-76	66-96	62-75	56-62
Night-time operational hours (06.00 – 07.00 hours)	62-84	68-101	63-69	60-64
Night-time non-operational hours (23.00 – 06.00 hours)	61-69	65-88	63-71	56-62

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



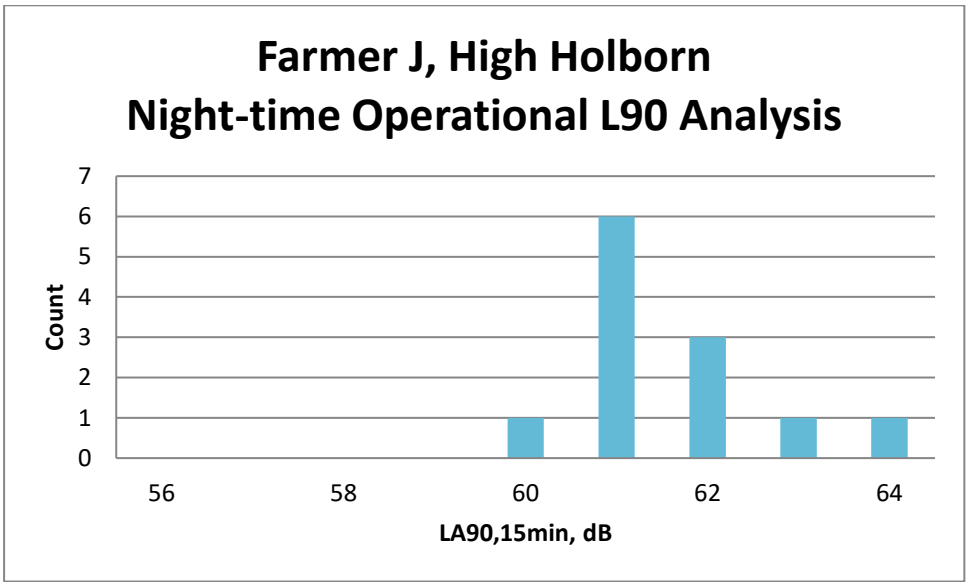
4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

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

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

4.4. From the histogram analysis, 58dB has been selected to be a robust representation of the background noise level during the daytime operational hours, at the survey location.

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



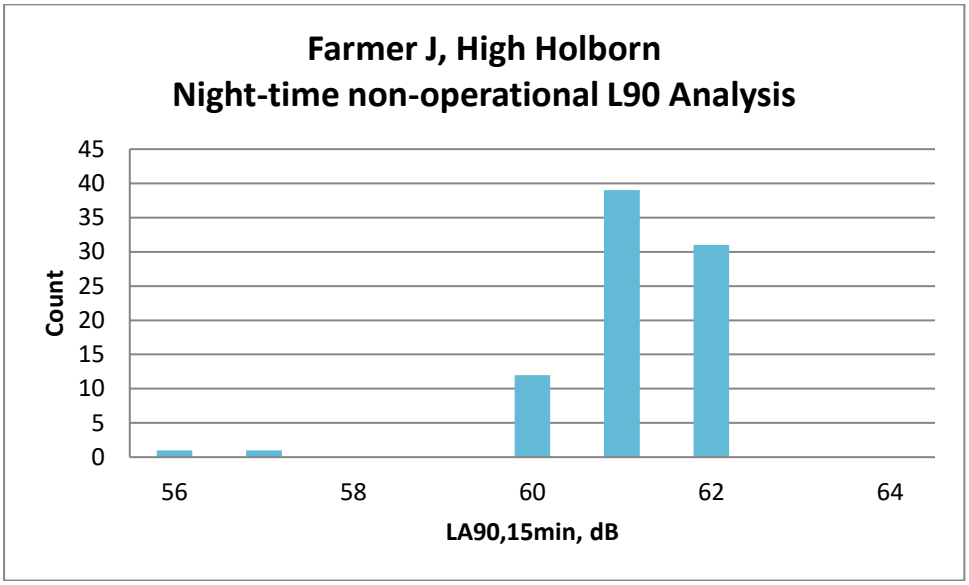
4.5. Further statistical analysis has been carried out on the data and the mean and median values are shown in Table 3 below.

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

dB, L_{A90} night-time operational period	
Mean	62
Mode	61
Median	61

4.6. Again, from the histogram analysis, 61dB has been chosen to be representative of the background sound level at the survey location, during the night-time operational hours.

Figure 3 Histogram of night-time non-operational hours L_{A90} background sound pressure levels



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

Table 4 Statistical analysis of $L_{A90,15min}$ levels during the night-time non-operational hours

dB, L_{A90} night-time non-operational period	
Mean	61
Mode	61
Median	61

4.8. Again, from the histogram analysis, 60dB has been chosen to be representative of the background sound level at the survey location, during the night-time non-operational hours.

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

- 58dB L_{A90} during the daytime operational hours; and
- 61dB L_{A90} during the night-time operational hours: and
- 60dB L_{A90} during the night-time non-operational hours.

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. A new edition of the NPPF was published in September 2023 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 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 (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."*

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
[2] 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".*

London Borough of Camden

5.8. Section 6 of the Camden Planning Guidance Amenity, published January 2021, gives guidance on noise and vibration .

5.9. Clause 6.8 refers to noise thresholds within Appendix 3 of the Local Plan and to the principles of No observed effect level (NOEL), Lowest observable adverse effect level (LOAEL) and Significant observed adverse effect level (SOAEL) and defines their meanings. Specifically, in the context of this report, LOAEL is defined as:

> *The level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.*

5.10. SOEAL is defined as:

> *The level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite.*

5.11. Clause 6.27 states that:

> *Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. "BS4142 Method for rating Industrial and Commercial Sound' contains guidance and standards which should also be considered within the acoustic report.*

5.12. Appendix 3 within the Camden Local Plan published 2017 states:

> *"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."*

5.13. Table C of the appendix states the criteria at which development related noise levels will be acceptable:

Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

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

5.14. 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"*.

5.15. 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.

5.16. 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.

5.17. 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."*

5.18. 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."*

5.19. 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.*

5.20. 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."*

5.21. 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."*

5.22. 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."

5.23. 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.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

5.24. This Standard provides recommended guideline values for internal noise levels within various types of building. Recommendations for commercial buildings are given in Table 6 of the Standard, and a design range of 30-35 dB $L_{Aeq,T}$ is recommended.

5.25. In addition, BS 8233 provides general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:

If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.

5.26. This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of much greater than 15dB is expected for non-openable standard double-glazed windows. However, in order to assess the worst-case scenario, this report assumes that windows may be opened if desired.

5.27. Assuming a sound reduction of 15dB for partially opened windows. It is therefore proposed that cumulative plant noise levels at the nearest office windows should not exceed 50-55dB dB L_{Aeq}, to give an internal sound below the guidance values in BS 8233:2014.

WHO Guidelines and BS 8233:2014

5.28. One of the tenets of the World Health Organisation (WHO) document *Guidelines for Community Noise, 1999* is the protection of the most vulnerable and sensitive of the population. The WHO guideline values for community noise are set at the level of the lowest adverse health effect below which the effects of environmental noise can be assumed to be negligible.

5.29. BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* builds on the guidance in the WHO document and recommends desirable internal noise levels within different room spaces, including residential dwellings.

5.30. The applicable internal noise criteria for residential properties given in BS 8233:2014 and the WHO guidelines are summarised in the following table:

Table 5 Summary of relevant guidance given in WHO documents and BS 8233:2014 with regard to internal noise levels affecting residential premises

Period	Space	Recommended Noise Level (dB)
Daytime (07.00 – 23.00 hours)	Living rooms and Bedrooms	< 35 $L_{Aeq, T}$
Night-time (23.00 – 07.00 hours)	Bedrooms	< 30 $L_{Aeq, T}$

5.31. BS 8233:2014 also suggests a typical façade sound reduction of 15dB for partially opened windows.

Proposed criteria

5.32. In accordance with The London Borough of Camden Council's usual requirements it is proposed that the plant rating noise level should be at least 10dB below the existing representative background sound level at the nearest residential receptor.

5.33. Since the L_{A90} background levels are exceptionally high, it is also recommended that noise emissions from fixed plant at the store should not exceed the BS 8233:2014 guidance levels inside the nearest residential dwelling.

5.34. For the nearby commercial receptors. The plant specific sound level should not exceed the guidance given in BS8233:2014.

5.35. The following plant noise limits are therefore proposed:

Table 6 Plant noise emissions limits at the receptor boundary

Receptor	Period	Cumulative plant rating level, dB(A)
Residential	Daytime operational hours (07.00 – 21.30 hours)	48
	Night-time operational hours (06.00 – 07.00 hours)	45
	Night-time non-operational hours (23.00 – 06.00 hours)	45
Commercial	Daytime operational hours (07.00 – 21.30 hours)	50 (specific level)

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. Predictions are inclusive of the following atmospheric-side attenuators fitted to the ventilation systems.

Table 7 Proposed atmospheric side attenuators to ventilation system

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
Kitchen Extract (EF1) – atmospheric	4	4	7	14	21	18	18	15
General Extract (EF2) – atmospheric	5	6	10	19	26	25	23	18
General Extract (EF3) – atmospheric	5	6	10	19	26	25	23	18
Supply (AHU1) – atmospheric	4	4	7	14	21	18	18	15

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.

6.3. Table 8, below, summarises the results of the assessment at the nearest receptors. 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 06.00 and 21.30 hours have been based on the proposed plant operating simultaneously at full capacity. The refrigeration plant only will operate between 21:30 and 06:00 hours.

Table 8 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 operational hours (07.00 – 21.30 hours)	36	48	-12
	Night-time operational hours (06.00 – 07.00 hours)	36	45	-9
	Night-time non-operational hours (23.00 – 06.00 hours)	9	45	-36
R2	Daytime operational hours (07.00 – 21.30 hours)	41 (specific level)	50	-9
R3	Daytime operational hours (07.00 – 21.30 hours)	50 (specific level)	50	-0
R4	Daytime operational hours (07.00 – 21.30 hours)	41 (specific level)	50	-9

6.4. 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

6.5. 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.

6.6. 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 Sam Hopper Associates to provide a Noise Impact Assessment for new plant serving a proposed Farmer J restaurant located along High Holborn in London.

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.

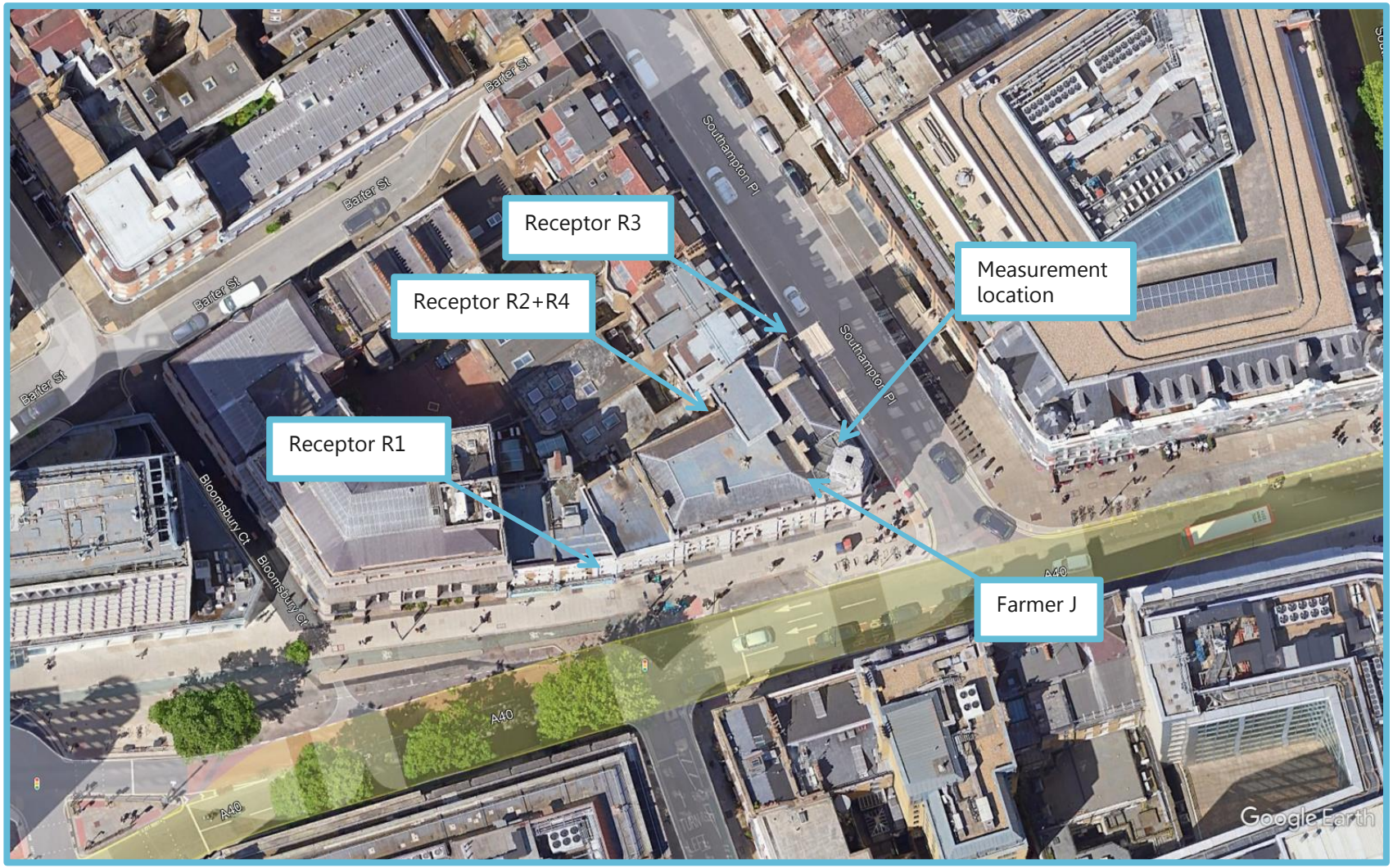
7.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed using the typical requirements of the London Borough of Camden Council.

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 2023

Appendix C Environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken between 14.40 hours on Thursday 9th November and 10.00 hours on Friday 10th November 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 five-minute sample periods for the duration of the survey.

Measurement position

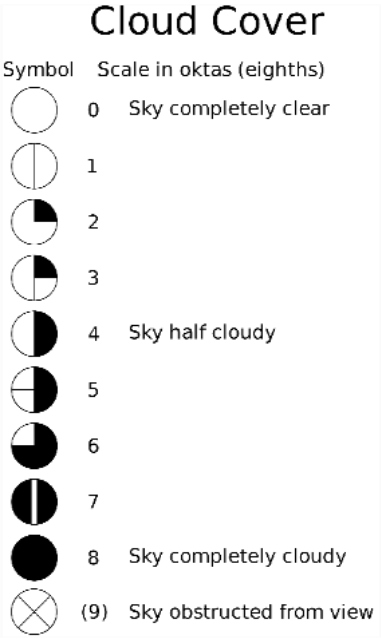
C.3 The sound level meter was positioned on the roof of the building, close to the nearest noise sensitive receptors. The approximate location of the microphone is indicated on the photograph in **Appendix B**. In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 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.

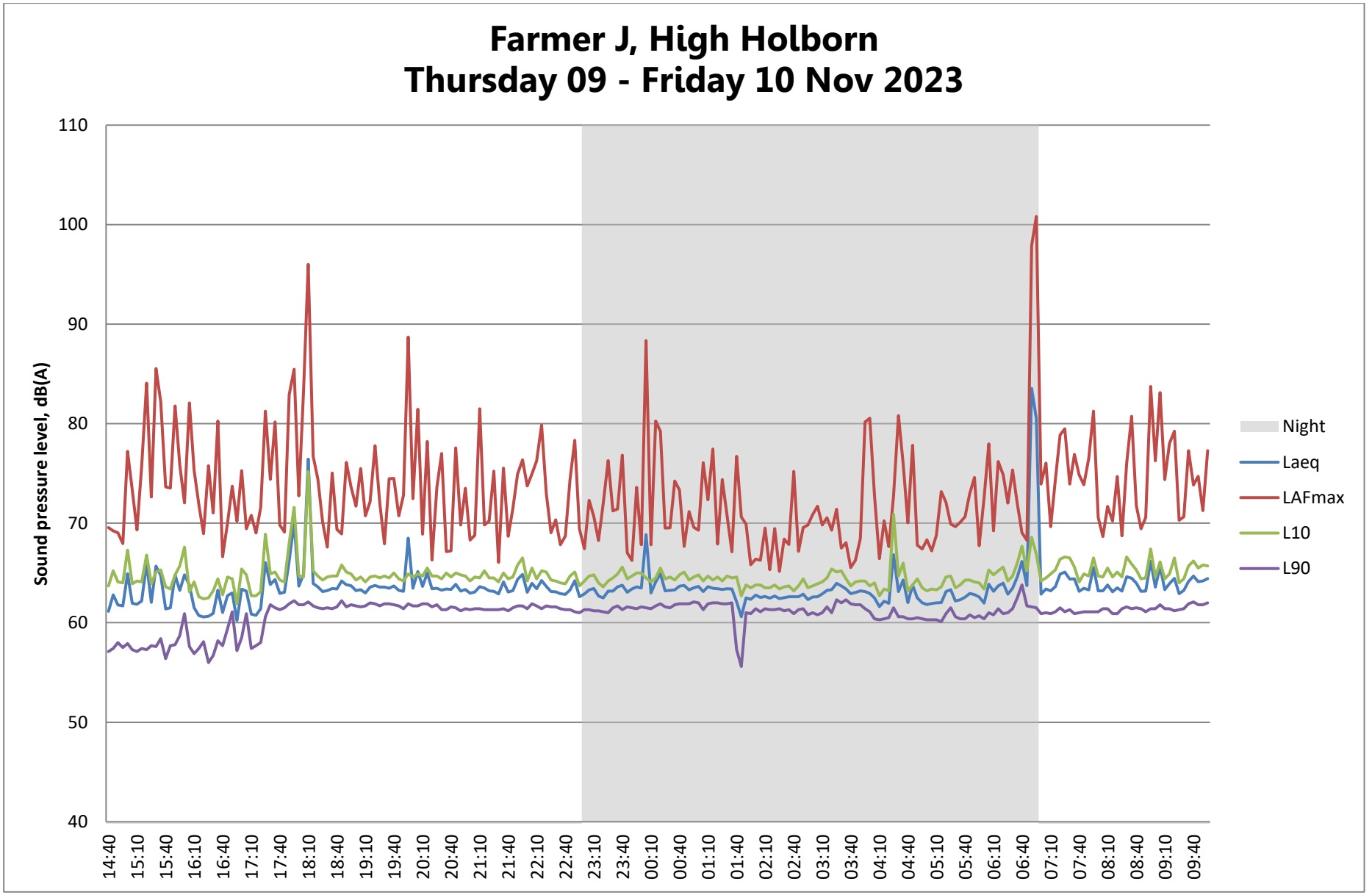
Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 97446	16/01/2023	1504305-1
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Svantek SV12L / 106487		
Calibrator	Svantek SV 30A / 10847	01/06/2023	1505421-1

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	14.40 9/11/23 - 10.00 10/11/23	Temperature (°C)	11	8
		Precipitation:	Yes	Yes
		Cloud cover (oktas – see guide)	7	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	6	2
		Wind Direction	South westerly	Northerly
		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 of the monitoring equipment was dominated by local road traffic. The noise climate at the measurement position during the collection of the monitoring equipment was dominated by nearby plant The results of the survey are presented in a time history graph overleaf.


Farmer J, High Holborn
Thursday 09 - Friday 10 Nov 2023
Sound pressure level, dB(A)
110
100
90
80
70
60
50
40
14:40
15:10
15:40
16:10
16:40
17:10
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09:40
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)
EF1	Fläkt Woods/Estoc Targe 102-630-3	1	Discharge L_w	92	74	80	84	87	87	83	71	92
EF2	Systemair/Prio 200 EC	1	Discharge L_w	71	71	66	71	68	64	60	57	73
EF3	Systemair/Prio 355 EC	1	Discharge L_w	84	89	89	83	81	76	69	61	86
AHU1	Fläkt Woods/ePowerbox EC 80-560-3-4	1	Inlet L_w	66	66	72	71	70	67	63	58	74
AC1-7	Toshiba/RAV1101ATPE	7	L_p at 1m									57 at 1 m
CC1	Coldroom condenser	1	L_p at 10m									33 at 10 m

Appendix E Predicted Noise Levels Calculation

EF1 vent

NSL Ref: **91973**
Project **Farmer J, High Holburn**

Compiled by: ACM 13/11/2023

Plant Ref **EF1**
Plant Description **Flakt Woods/Estoc Targe 102-630-3**

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	92	74	80	84	87	87	83	71	**92**
System losses		-29	-25	-11	-5	-5	-5	-5	-5	
Atmospheric side attenuator	I.L.	-4	-4	-7	-14	-21	-18	-18	-15	
Sound power level leaving terminal		**59**	**45**	**62**	**65**	**61**	**64**	**60**	**51**	**69**

Receptor R1	V angle	H angle									
Directivity correction	90	0	500 x 500 (90,0)		0	0	0	0	-4	-7	-7	-7	
Distance correction	32	m		32 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:	33	δ=	1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc													
Resultant at Receptor R1				L_p	**11**	**-5**	**9**	**9**	**-2**	**-5**	**-12**	**-24**	**8**

Receptor R2	V angle	H angle									
Directivity correction	180	0	500 x 500 (180,0)		-1	-2	-3	-7	-9	-8	-8	-8	
Distance correction	5	m		5 m	-22	-22	-22	-22	-22	-22	-22	-22	
Screening correction	Screened:		δ=	-5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc													
Resultant at Receptor R2				L_p	**36**	**21**	**37**	**36**	**30**	**34**	**30**	**21**	**39**

Receptor R3	V angle	H angle									
Directivity correction	180	0	500 x 500 (180,0)		-1	-2	-3	-7	-9	-8	-8	-8	
Distance correction	20	m		20 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	Screened:	21	δ=	1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc													
Resultant at Receptor R3				L_p	**14**	**-3**	**10**	**6**	**-3**	**-2**	**-9**	**-21**	**7**

Receptor R4	V angle	H angle									
Directivity correction	180	0	500 x 500 (180,0)		-1	-2	-3	-7	-9	-8	-8	-8	
Distance correction	20	m		20 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	Screened:		δ=	-20	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc													
Resultant at Receptor R4				L_p	**24**	**9**	**25**	**24**	**18**	**22**	**18**	**9**	**27**

EF2 vent

NSL Ref: **91973**
Project **Farmer J, High Holburn**

Plant Ref **EF2**
Plant Description **Systemair/Prio 200 EC**

Compiled by:	ACM	13/11/2023

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	71	71	66	71	68	64	60	57	**73**
System losses					-6	-2	0	0	0	0	0	0	
Atmospheric side attenuator				I.L.	-5	-6	-10	-19	-26	-25	-23	-18	
Sound power level leaving terminal					**60**	**63**	**56**	**52**	**42**	**39**	**37**	**39**	**53**
Receptor R1	V angle	H angle											
Directivity correction	0	180	1000 x 500 (0,180)		-1	-1	-3	-7	-8	-8	-8	-8	
Distance correction	42	m		42 m	-40	-40	-40	-40	-40	-40	-40	-40	
Screening correction	Screened:	43	δ=	1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc													
Resultant at Receptor R1				L_p	**9**	**10**	**-2**	**-13**	**-27**	**-33**	**-38**	**-39**	**-4**
Receptor R2	V angle	H angle											
Directivity correction	90	0	1000 x 500 (90,0)		0	0	-1	-5	-8	-7	-7	-7	
Distance correction	26	m		26 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening correction	Screened:	27	δ=	1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc													
Resultant at Receptor R2				L_p	**14**	**15**	**4**	**-7**	**-23**	**-28**	**-33**	**-34**	**1**
Receptor R3	V angle	H angle											
Directivity correction	90	0	1000 x 500 (90,0)		0	0	-1	-5	-8	-7	-7	-7	
Distance correction	5	m		5 m	-22	-22	-22	-22	-22	-22	-22	-22	
Screening correction	Screened:		δ=	-5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc													
Resultant at Receptor R3				L_p	**38**	**41**	**33**	**25**	**12**	**10**	**8**	**10**	**29**
Receptor R4	V angle	H angle											
Directivity correction	180	0	1000 x 500 (180,0)		-2	-4	-8	-9	-9	-8	-8	-8	
Distance correction	12	m		12 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening correction	Screened:	20	δ=	8	**-18**	**-21**	**-24**	**-27**	**-30**	**-33**	**-36**	**-39**	
Surface corrections etc													
Resultant at Receptor R4				L_p	**10**	**8**	**-6**	**-14**	**-27**	**-32**	**-37**	**-38**	**-6**

EF3 vent

NSL Ref: **91973**
Project **Farmer J, High Holburn**

Plant Ref **EF3**
Plant Description **Systemair/Prio 355 EC**

Compiled by:	ACM	13/11/2023

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	84	89	89	83	81	76	69	61	**86**
System losses		-6	-2	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-5	-6	-10	-19	-26	-25	-23	-18	
Sound power level leaving terminal		**73**	**81**	**79**	**64**	**55**	**51**	**46**	**43**	**72**

Receptor R1	V angle	H angle									
Directivity correction	0	180	1000 x 500 (0,180)	-1	-1	-3	-7	-8	-8	-8	-8	
Distance correction	42	m	42 m	-40	-40	-40	-40	-40	-40	-40	-40	
Screening correction	Screened:	43	δ= 1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc												
Resultant at Receptor R1			L_p	**22**	**28**	**21**	**-1**	**-14**	**-21**	**-29**	**-35**	**15**

Receptor R2	V angle	H angle									
Directivity correction	90	0	1000 x 500 (90,0)	0	0	-1	-5	-8	-7	-7	-7	
Distance correction	26	m	26 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening correction	Screened:	27	δ= 1	**-10**	**-12**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	
Surface corrections etc												
Resultant at Receptor R2			L_p	**27**	**33**	**27**	**5**	**-10**	**-16**	**-24**	**-30**	**21**

Receptor R3	V angle	H angle									
Directivity correction	90	0	1000 x 500 (90,0)	0	0	-1	-5	-8	-7	-7	-7	
Distance correction	5	m	5 m	-22	-22	-22	-22	-22	-22	-22	-22	
Screening correction	Screened:		δ= -5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc												
Resultant at Receptor R3			L_p	**51**	**59**	**56**	**37**	**25**	**22**	**17**	**14**	**49**

Receptor R4	V angle	H angle									
Directivity correction	180	0	1000 x 500 (180,0)	-2	-4	-8	-9	-9	-8	-8	-8	
Distance correction	12	m	12 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening correction	Screened:	20	δ= 8	**-18**	**-21**	**-24**	**-27**	**-30**	**-33**	**-36**	**-39**	
Surface corrections etc												
Resultant at Receptor R4			L_p	**23**	**26**	**17**	**-2**	**-14**	**-20**	**-28**	**-34**	**12**

AHU1 vent

NSL Ref: **91973**
Project **Farmer J, High Holburn**

Compiled by:	ACM	13/11/2023

Plant Ref **AHU1**
Plant Description **Flakt Woods/ePowerbox EC 80-560-3-4**

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	66	66	72	71	70	67	63	58	**74**
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-4	-4	-7	-14	-21	-18	-18	-15	
Sound power level leaving terminal		**58**	**61**	**65**	**57**	**49**	**49**	**45**	**43**	**60**

Receptor R1	V angle	H angle										
Directivity correction	0	180	1500 x 1500 (0,180)		-3	-7	-9	-8	-8	-8	-8	-8	
Distance correction	30	m		30 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:	32	δ=	2	**-13**	**-15**	**-18**	**-21**	**-24**	**-27**	**-30**	**-33**	
Surface corrections etc													
Resultant at Receptor R1				L_p	**4**	**1**	**0**	**-10**	**-21**	**-24**	**-31**	**-36**	**-6**

Receptor R2	V angle	H angle										
Directivity correction	90	0	1500 x 1500 (90,0)		0	0	-4	-7	-7	-7	-7	-7	
Distance correction	20	m		20 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	Screened:		δ=	-20	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc													
Resultant at Receptor R2				L_p	**24**	**27**	**27**	**16**	**8**	**8**	**4**	**2**	**21**

Receptor R3	V angle	H angle										
Directivity correction	0	0	1500 x 1500 (0,0)		3	4	5	6	6	6	6	6	
Distance correction	12	m		12 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening correction	Screened:	20	δ=	8	**-18**	**-21**	**-24**	**-27**	**-30**	**-33**	**-36**	**-39**	
Surface corrections etc													
Resultant at Receptor R3				L_p	**13**	**14**	**16**	**6**	**-5**	**-8**	**-15**	**-20**	**9**

Receptor R4	V angle	H angle										
Directivity correction	90	0	1500 x 1500 (90,0)		0	0	-4	-7	-7	-7	-7	-7	
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 R4				L_p	**44**	**47**	**47**	**36**	**28**	**28**	**24**	**22**	**41**

Condensers R1

Unit	Make / Model	L_{pA}	at / m	m	dB	Directivity	Screening	Attenuation	Result
AC 1	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 2	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 3	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 4	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 5	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 6	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
AC 7	Toshiba/RAV1101ATPE	57	1	30	-30	0	0	0	27
CC 1	Cold room condenser	33	10	40	-12	+3	-15	0	9

Condensers R2

Unit	Make / Model	L_{pA}	at / m	m	dB	Directivity	Screening	Attenuation	Result
AC 1	Toshiba/RAV1101ATPE	57	1	7	-17	0	-12	0	28
AC 2	Toshiba/RAV1101ATPE	57	1	6	-16	0	-12	0	29
AC 3	Toshiba/RAV1101ATPE	57	1	5	-14	0	-12	0	31
AC 4	Toshiba/RAV1101ATPE	57	1	6	-16	0	-12	0	29
AC 5	Toshiba/RAV1101ATPE	57	1	7	-17	0	-12	0	28
AC 6	Toshiba/RAV1101ATPE	57	1	8	-18	0	-12	0	27
AC 7	Toshiba/RAV1101ATPE	57	1	8	-18	0	-12	0	27
CC 1	Cold room condenser	33	10	25	-8	+3	-12	0	16

Condensers R3

Unit	Make / Model	L_{pA}	at / m	m	dB	Directivity	Screening	Attenuation	Result
AC 1	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 2	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 3	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 4	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 5	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 6	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 7	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
CC 1	Cold room condenser	33	10	6	4	+3	0	0	40

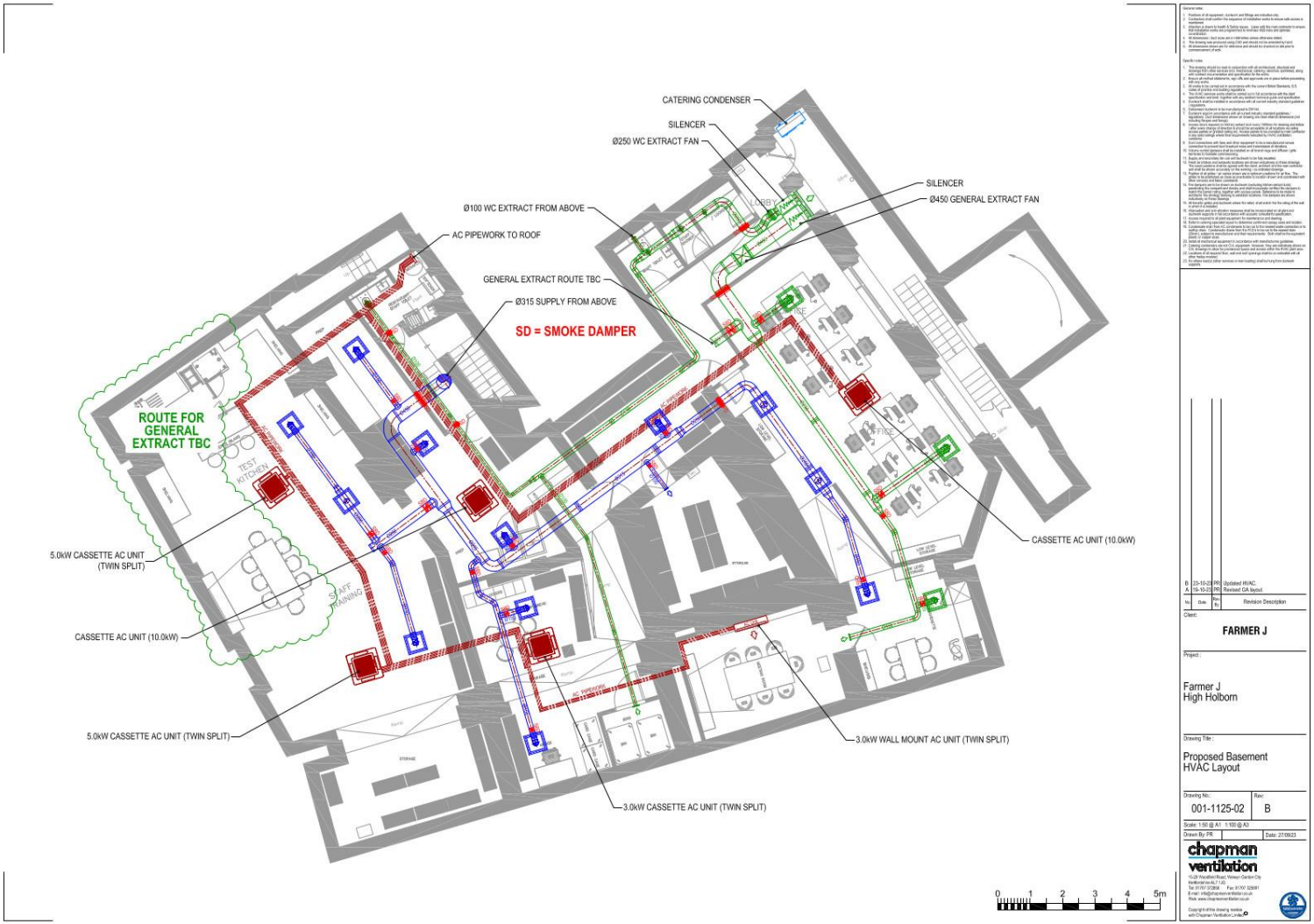
Condensers R4

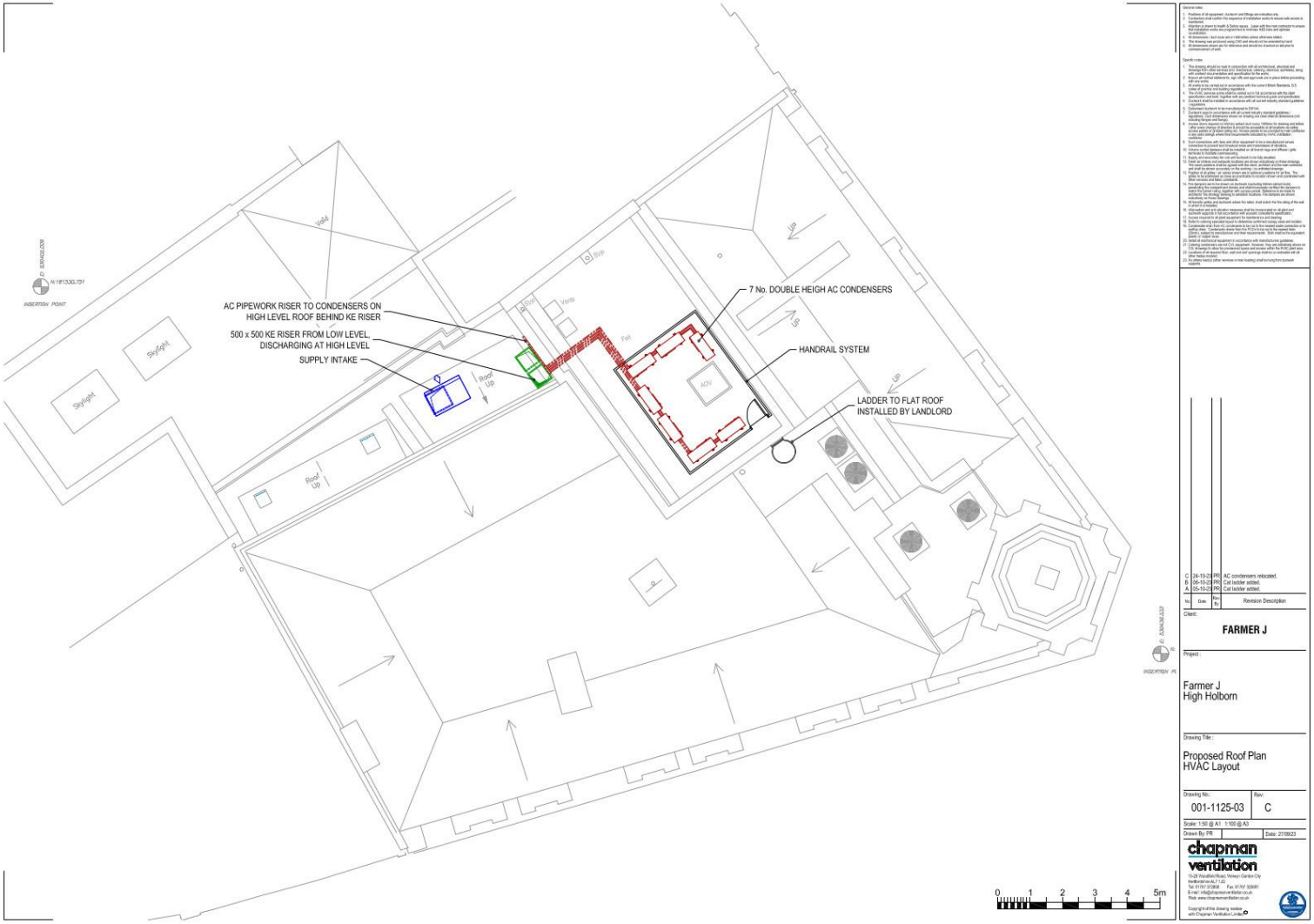
Unit	Make / Model	L_{pA}	at / m	m	dB	Directivity	Screening	Attenuation	Result
AC 1	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 2	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 3	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 4	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 5	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 6	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
AC 7	Toshiba/RAV1101ATPE	57	1	25	-28	0	-15	0	14
CC 1	Cold room condenser	33	10	12	-2	+3	-21	0	13

Cumulative plant noise levels at Receptor

	R1 dB(A)	R2 dB(A)	R3 dB(A)	R4 dB(A)
EF1	8	39	7	27
EF2	-4	1	29	-6
EF3	15	21	49	12
AHU1	-6	21	9	41
AC1	27	28	14	14
AC2	27	29	14	14
AC3	27	31	14	14
AC4	27	29	14	14
AC5	27	28	14	14
AC6	27	27	14	14
AC7	27	27	14	14
CCU1	9	16	40	13
Combined plant L_p (Operational hours) All plant running	**36**	**41**	**50**	**41**
Combined plant L_p (Night-time) refrigeration plant running	**9**	**16**	**40**	**13**

Appendix F Restaurant Plant Layout




AC PIPEWORK RISER TO CONDENSERS ON HIGH LEVEL ROOF BEHIND KE RISER
500 x 500 KE RISER FROM LOW LEVEL, DISCHARGING AT HIGH LEVEL
SUPPLY INTAKE
7 No. DOUBLE HEIGH AC CONDENSERS
HANDRAIL SYSTEM
LADDER TO FLAT ROOF INSTALLED BY LANDLORD
Skylight
Skylight
Void
Roof Up
Vents
Flat
AOV
Up
INSERTION POINT
0 1 2 3 4 5m
C 24-10-23 PR AC condensers relocated.
B 06-10-23 PR Cat ladder added.
A 05-10-23 PR Cat ladder added.
No. Date Rev. by Revision Description
Client:
FARMER J
Project :
Farmer J
High Holborn
Drawing Title :
Proposed Roof Plan
HVAC Layout
Drawing No.: 001-1125-03
Rev: C
Scale: 1:50 @ A1 1:100 @ A3
Drawn By: PR
Date: 27/09/23
chapman ventilation