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**147 Wardour Street
London**

Plant Noise Assessment Report

4 December 2023

For
Kanpai (London) Food & Beverage Management Co., Ltd

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SUMMARY

New items of external plant are proposed at 147 Wardour Street in London.

Westminster City Council has external noise requirements for new items of plant, requiring a background noise survey and plant noise assessment to be undertaken.

A noise survey has been undertaken to determine background noise levels at the nearest noise sensitive receptors, and an assessment of plant noise emissions has been carried out.

Results of the assessment show that the predicted noise level at the nearest noise sensitive properties does not exceed the proposed noise limit.

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Report Produced by	Nicholas Jones BEng(Hons) CEng MIOA	T: 07739 715411 E: njones@auricl.com	
auricl Limited www.auricl.com hello@auricl.com	107 Cheapside London EC2V 6DN	9 Greyfriars Road Reading RG1 1NU	

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1.0 Introduction

New items of external plant are proposed at 147 Wardour Street in London.

Westminster City Council has external noise requirements for new items of plant, requiring a background noise survey and plant noise assessment to be undertaken.

The following report presents the methodology and results of an environmental noise survey, and subsequently an assessment of external plant noise emissions to address the Westminster City Council requirements.

This report is technical by nature, therefore a glossary of acoustic terms is included in Appendix A.

2.0 Description of Site and Surroundings

The site is occupied by a commercial property on the south-western side of Wardour Street, in a predominantly commercial area. It is proposed to install new condenser units and supply fans at ground floor level to the rear/south-west of the property, with additional condenser units on the roof.

The nearest noise sensitive property to the proposed plant is noted to be the residential property to the north-west at 14 Wardour Mews.

Figure 2.1 indicates the approximate existing site extent in **red**, the approximate proposed locations of the plant items in **green** and the location of the nearest noise sensitive property in **orange**.

Figure 2.1 Site Extent and Surroundings



3.0 Westminster City Council Requirements

Westminster City Council's document 'Standard Conditions & Reasons' (City Plan 2019 – 2040 Version) contains condition C46 AC which specifies the following:

"For areas above WHO Guideline, where the existing external ambient noise level exceeds WHO Guideline levels of either $L_{Aeq, 16hrs}$ 55 dB daytime (07.00 – 23.00 hrs) or $L_{Aeq, 8hrs}$ 45 dB night-time (23.00 – 07.00 hrs)

(1) Where noise emitted from the proposed plant and machinery will not contain tones or will not be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved in writing by the City Council. The background level should be expressed in terms of the lowest $L_{A90, 15 mins}$ during the proposed hours of operation. The plant-specific noise level should be expressed as L_{AeqTm} , and shall be representative of the plant operating at its maximum.

(2) Where noise emitted from the proposed plant and machinery will contain tones or will be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 15 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved in writing by the City Council. The background level should be expressed in terms of the lowest $L_{A90, 15 mins}$ during the proposed hours of operation. The plant-specific noise level should be expressed as L_{AeqTm} , and shall be representative of the plant operating at its maximum."

In addition, condition C46BC specifies then following:

"For areas below WHO Guideline, where the existing external ambient noise level does not exceed WHO Guideline levels of either $L_{Aeq, 16hrs}$ 55 dB daytime (07.00 – 23.00 hrs) or $L_{Aeq, 8hrs}$ 45 dB night-time (23.00 – 07.00 hrs)

(1) Where noise emitted from the proposed plant and machinery will not contain tones or will not be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 5 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved in writing by the City Council. The background level should be expressed in terms of the lowest $L_{A90, 15 mins}$ during the proposed hours of operation. The plant-specific noise level should be expressed as L_{AeqTm} , and shall be representative of the plant operating at its maximum.

(2) Where noise emitted from the proposed plant and machinery will contain tones or will be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved in writing by the City Council. The background level should be expressed in terms of the lowest $L_{A90, 15 mins}$ during the proposed hours of operation. The plant-specific

noise level should be expressed as L_{AeqTm} , and shall be representative of the plant operating at its maximum.”

In addition, where the existing external noise level is found to be less than 30 dB $L_{A90(15\text{ min})}$ at the nearest noise sensitive receptors during daytime (07:00 – 23:00 hours) and night-time (23:00 – 07:00 hours) periods, site specific standards can be proposed that avoid noise disturbance.

Table 3 of Westminster City Council’s Draft Technical Guidance Note (September 2020) reiterates the above requirements.

We will therefore base our survey methodology and assessment on the above criteria.

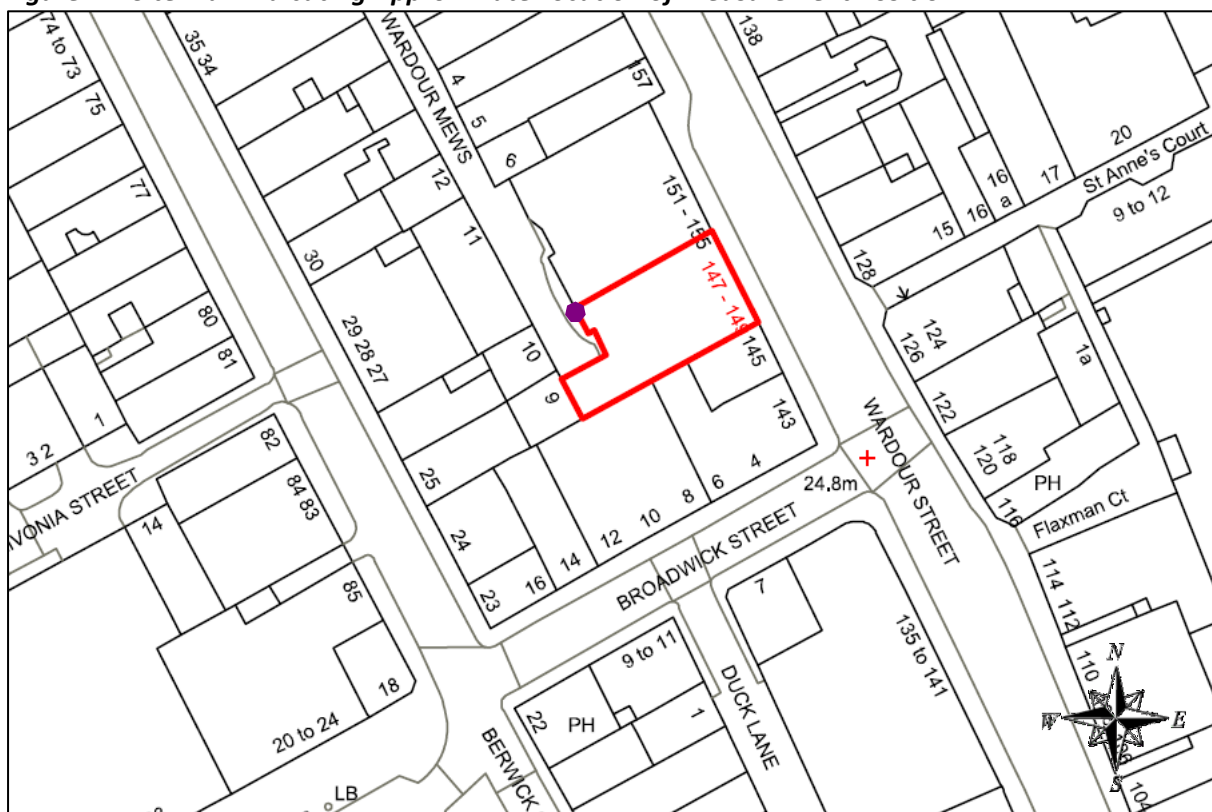
4.0 Noise Survey

4.1 Methodology

An unmanned noise survey was carried out over a 24-hour period between Wednesday 22 November 2023 and Thursday 23 November 2023 to determine existing background noise levels.

The measurement microphone was located at third floor level at the north-western corner of the building over Wardour Mews as indicated approximately in purple on Figure 4.1.

Figure 4.1 Site Plan Indicating Approximate Location of Measurement Position



The measurement position was considered to be representative of noise levels along Wardour Mews and therefore representative of the nearest noise sensitive (residential) property to the north-west of the site at 14 Wardour Mews.

The equipment used for the noise survey is summarised in Table 4.1.

Table 4.1 Description of Equipment used for Noise Survey

Item	Make & Model	Serial Number
Type 1 automated logging sound level meter	01dB FUSION	14157
Type 1 ½" microphone	GRAS 40CD	466804
Calibrator	Cirrus CR:515	96164

L_{Aeq} and L_{A90} sound pressure levels were measured throughout the noise survey over contiguous 1-second intervals.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found to have occurred. Laboratory equipment calibration certificates can be provided upon request.

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the exact weather conditions throughout the entire noise survey period, however at the beginning and end of the survey period there was noted to be dry conditions with partial cloud coverage and only light wind. Conditions throughout the survey period were considered to be appropriate for undertaking environmental noise measurements.

4.2 Noise Survey Results

The results of the environmental noise survey are presented in the time history graph in Appendix B (shown as 15-minute periods).

We would consider the levels measured to be reasonable, taking into account the location of the measurement position and dominant nearby noise sources.

The measurement daytime and night-time ambient $L_{Aeq, T}$ noise levels are presented in Table 4.2.

Table 4.2 Measured Ambient Noise Levels

Measured $L_{Aeq, T}$ (dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
58	55

The lowest measured $L_{A90 (15 \text{ min})}$ background noise levels are presented in Table 4.3.

Table 4.3 Lowest Measured Background Noise Levels

Lowest Measured L_{A90} (15 min) (dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
51	46

Due to the nature of the unmanned noise survey, we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period, the daytime noise climate at the measurement position was affected by road traffic noise from surrounding roads.

5.0 Plant Noise Assessment

This section presents our assessment and calculations of noise emissions associated with the proposed plant in relation to the Westminster City Council requirements.

5.1 Proposed Plant

It is proposed to install three condenser units and two supply fans at ground floor level, as well as two condenser units at roof level.

The condenser units and their noise levels are as follows:

Ground Floor	Danfoss MSTM026DSW05G	39 dB L_{pA} at 10m
	Danfoss MSYM024AJW05G	32 dB L_{pA} at 10m
	Danfoss LSQM048NTW05G	42 dB L_{pA} at 10m
Roof	Toshiba RAV-GP1401AT8-E	63 dB L_{WA}
	Toshiba RAV-GP801ATW-E	65 dB L_{WA}

Note: L_{pA} = A-weighted sound pressure level, L_{WA} = A-weighted sound power level

The proposed supply fans are Systemair MUB/T 355EV ECO (SF 03) and Systemair MUB 062 630D4 IEX Multibox-20 (SF 04). The manufacturer's in-duct sound power levels are presented in Table 5.1.

Table 5.1 Supply Fan Sound Power Levels

Fan	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
SF 03	60	73	65	65	65	61	57	53
SF 04	84	94	90	87	85	81	78	72

** Note: The manufacturer's datasheet presents the above data with an A-weighting applied. We have removed the weighting for our calculations (standard practice) and presented the unweighted (linear) sound power levels above.*

Supply fan SF 04 is to be fitted with a 1500mm long atmospheric in-duct attenuator to control noise emissions, the insertion loss performance for which is presented in Table 5.2.

Table 5.2 SF 04 Atmospheric Attenuator Insertion Losses

Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
5	11	24	33	37	36	27	18

Noise from the plant is not expected to contain any tones or any impulsive characteristics.

The plant is proposed to operate during daytime periods (07:00 – 23:00 hours).

5.2 Nearest Noise Sensitive Receptors and Plant Noise Limits

We have considered the nearest noise sensitive property to be the residential property to the north-west of the site at 14 Wardour Mews, at a distance of approximately 30m from the plant.

Based on the lowest measured background noise levels and the Westminster City Council requirements, the daytime noise limit at the nearest noise sensitive property is **41 dB L_{Ar, Tr}**.

The noise limit applies at a distance of 1m from the nearest noise sensitive window.

5.3 Assessment

Our calculations to predict the plant noise level at the nearest noise sensitive property are presented in Tables 5.3 to 5.6 and summarised in Table 5.7.

Table 5.3 Plant Noise Calculations – Condenser Units

Element	Level (dB)				
	Ground Floor			Roof	
	Danfoss MSTM026DSW05G	Danfoss MSYM024AJW05G	Danfoss LSQM048NTW05G	Toshiba RAV- GP1401AT8-E	Toshiba RAV- GP801ATW-E
Unit Sound Level	39	32	42	63	35
Acoustic Reflections	+3	+3	+3	0	0
Distance Attenuation	-10	-10	-10	-38	-38
Calculated Sound Pressure Level at Nearest Noise Sensitive Property	32	25	35	31	27
Total	39				

Table 5.4 Plant Noise Calculations – Supply Fan Casings

Element	Level (dB)	
	SF 03	SF 04
Unit Sound Level	21	45
Acoustic Reflections	+3	+3
Distance Attenuation	-20	-20
Calculated Sound Pressure Level at Nearest Noise Sensitive Property	4	28
Total	28	

Table 5.5 Plant Noise Calculations – SF 03 Inlet

Element	Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
In-Duct Fan Sound Power Level	60	73	65	65	65	61	57	53
Grille End Reflection	-11	-6	-3	-1	0	0	0	0
Distance Attenuation	-36	-36	-36	-36	-36	-36	-36	-36
Directivity	+1.5	+1.5	+1.5	+2	+2	+3	+3	+3
Predicted Noise Level at Receptor	14	32	27	30	31	28	24	20
	34 dB L_{pA}							

Table 5.6 Plant Noise Calculations – SF 04 Inlet

Element	Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
In-Duct Fan Sound Power Level	84	94	90	87	85	81	78	72
Attenuator Insertion Loss	5	11	21	33	37	36	27	18
Grille End Reflection	-4	-2	-1	0	0	0	0	0
Distance Attenuation	-36	-36	-36	-36	-36	-36	-36	-36
Directivity	+1.5	+2	+2	+2	+3	+3	+3	+3
Predicted Noise Level at Receptor	40	47	34	20	185	12	18	21
	32 dB L_{pA}							

Table 5.7 Plant Noise Calculation Summary

Plant Item	Predicted Sound Pressure Level at Nearest Noise Sensitive Property (dB)
Condenser Units	39
Supply Fan Casings	28
SF 03 Inlet	34
SF 04 Inlet	32
TOTAL Predicted Sound Pressure Level at Nearest Noise Sensitive Property	41
Noise Limit during Daytime Operating Period (07:00 – 23:00 hours)	41

It can be seen that the total predicted plant noise level at the nearest noise properties does not exceed the plant noise limit during the proposed daytime operating hours.

Appendix A – Acoustic Terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T This is the sound level that is equivalent to the average energy of noise recorded over a given period.
L_{Amax}	The A-weighted maximum noise level during a measurement period or a noise event.
L_{A90} (15 min)	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15-minute period
$L_{Ar,Tr}$	The rating sound level as described in BS 4142:2014+A1:2019. This is the specific sound level including corrections for acoustic features such as tonality, impulsivity, or intermittency, used in the assessment of industrial and commercial applications.

Appendix B – Time History Graph

