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Ricky Dougall
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Dear Ricky

AS13540 NISA FARRINGDON

Discharge of Conditions 28 and 45 (2013/3807/P)

As part of the proposed fit out for the units 2 and 3 of 10 & 12 Pheonix Place, Postmark, WC1X 0BU (the Site), the installation of refrigeration plant is required to serve the commercial premises.

The Site is to comply with planning conditions 28 and 45 of the consent, the requirements for which are reproduced below.

> 28. "*Noise (before plant installation)*
>
> *Condition: Prior to the installation of any plant and ventilation equipment hereby approved, full details of a scheme for acoustic isolation and anti-vibration measure,* [sic.] *including manufacturers specifications, noise levels and attenuation, shall be submitted to and approved by the Local Planning Authority in writing. Installation shall not proceed other than in complete accordance with such scheme as has been approved. All such measures shall be retained and maintained in accordance with the manufacturers' recommendations.*
>
> *This condition can be discharged on a Section by Section basis.*
>
> *Reason: to ensure an acceptable level of residential amenity in accordance with policy 7.15 of the London Plan (Consolidated with Alterations since 2011), and policies DP26 and DP28 of the London Borough of Camden Development Policies 2010.*"
>
> 45. "*Noise (from plant)*
>
> *Noise levels at a point 1 metre external to sensitive façades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that is distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise level from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A).*
>
> *Reason: To ensure that the development does not have an undue adverse impact on nearby residential amenity or business operations in accordance with policy 7.15 of the London Plan (Consolidated with Alterations since 2011), policy of CS5 of the London Borough of Camden Core Strategy 2010 and policies DP26 and DP28 of the London Borough of Camden Development Policies 2010.*"

Clarke Saunders Acoustics has been commissioned by the Dougall Group to undertake a noise impact assessment of the proposed plant in order to address the planning conditions. A glossary of acoustic terminology used throughout this report is provided in Appendix A.

Survey & Plant Noise Limits

The Site is located at ground floor level of 10 & 12 Pheonix Place, a residential led, multi-use development. The nearest noise sensitive receptors are residential dwellings located directly above the Site in 10 & 12 Pheonix Place.

A survey of noise levels was undertaken by others in 2017 over 4 days in the vicinity of the Site location (report reference RP01-17506), for the discharge of condition 8 of the same consent and is available on the Camden Council planning portal. This survey comprised two monitoring positions, of which "L2" was located within the vicinity of the Site. Following consultation with Camilo Castro-Llach, Noise and Pollution Officer at Camden Council, it was agreed that, subject to validation of the 2017 data, the data would be sufficient to inform a subsequent assessment.

A short-term attended survey of existing noise levels was, therefore, undertaken between 03:00hrs and 04:00hrs of 19 July 2024. The survey location is indicated in Figure 1, along with location "L2" of the 2017 survey.

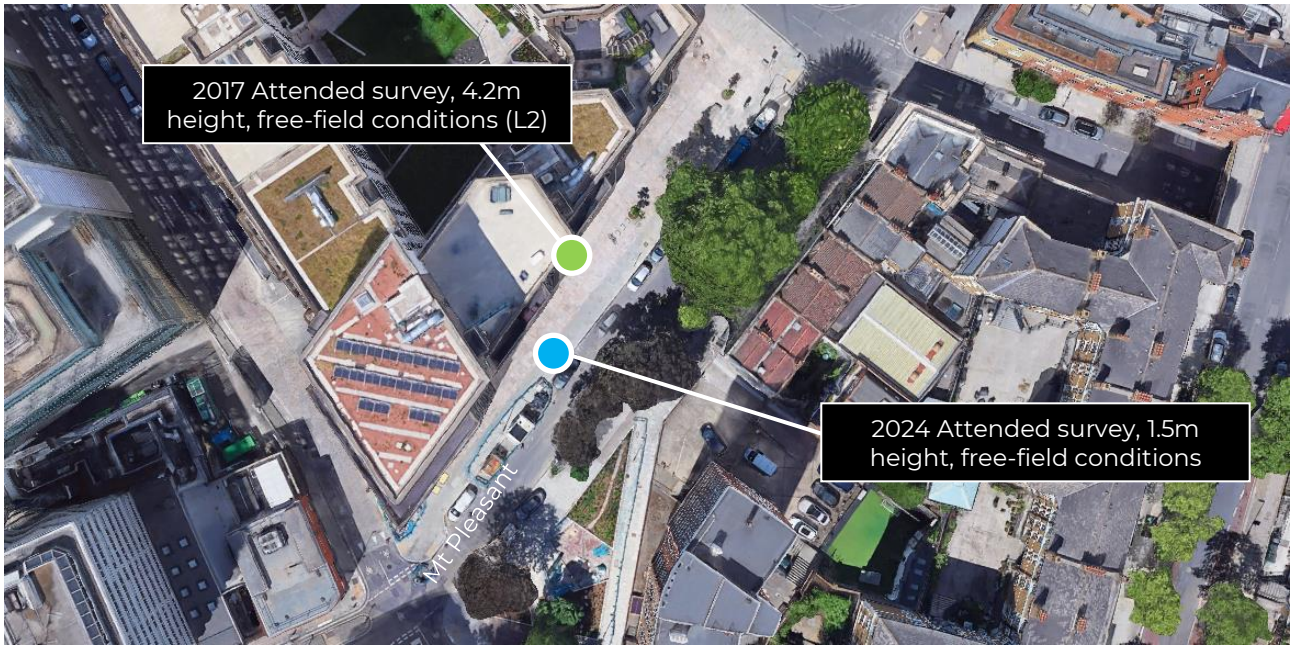

Figure 1: Indicative site plan

The results of the 2024 survey, based on 5-minute sampling periods, are presented in Table 1. The representative average sound pressure level is derived from an average of the L_{Aeq} dataset, and the representative background sound pressure is derived from the lowest 10th percentile of the L_{A90} dataset.

DATE & TIME	AVERAGE SOUND PRESSURE LEVEL (L_{Aeq})	BACKGROUND SOUND PRESSURE LEVEL (L_{A90})
19/07/2024 03:10	47 dB	42 dB
19/07/2024 03:15	45 dB	42 dB
19/07/2024 03:20	43 dB	41 dB
19/07/2024 03:32	46 dB	41 dB
19/07/2024 03:37	48 dB	42 dB
19/07/2024 03:42	48 dB	42 dB
19/07/2024 03:47	45 dB	41 dB
19/07/2024 03:52	48 dB	41 dB
Representative	**46 dB**	**41 dB**

Table 1: Results of 2024 survey

The results of the 2017 survey are reproduced in Figure 2.

Unattended Noise Monitoring Results Appendix 2, Table 4):

Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB[1]	LAeq,8hr, dB	LA90,5mins, dB[1]	LAmax, dB[2]
06.10.17 to 10.10.17	L1	61	49	53	44	74
06.10.17 to 10.10.17	L2	60	49	53	46	72

Note 1: Typical lowest measured during the period shown.

Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Figure 2: Results of 2017 survey as presented in associated report

When compared to the results of monitoring position L2 of the 2017 survey, the 2024 survey suggests a notable reduction in existing ambient conditions. Although there is some uncertainty in this conclusion, owing to the limited 2024 monitoring period, the results of the 2024 survey have been used for this exercise as these will present a more robust assessment. The difference between night-time data sets is also applied linearly to daytime levels to derive daytime level limits.

Noise from the plant is not expected to have distinctive characteristics such as tonality, impulsivity, or intermittency and, as such, the plant noise level limits that have been adopted are presented in Table 2.

DAYTIME (07:00 TO 23:00HRS)	NIGHT-TIME (23:00 TO 07:00 HRS)
L_{Aeq} 39 dB	L_{Aeq} 36 dB

Table 2: Plant noise level limits

Proposed Plant & Assessment

The plant room serving the Site will house 1no. Daikin ZEAS LREQ8BY1. The sound emissions of the plant operating at its maximum duty at 1 metre have been confirmed by the manufacturer and are presented in Table 3. The unit will be installed on appropriate anti-vibration mounts to control vibration transfer into the structure.

PLANT ITEM	FREQUENCY (Hz)								dBA
	63	125	250	500	1K	2K	4K	8K	
Daikin ZEAS LREQ8BY1	57	58	55	47	41	41	43	36	51

Table 3: Daikin ZEAS LREQ8BY1 sound pressure level at 1m

It is understood that the plant will typically operate at up to 35% of its potential duty during the daytime, and up to 25% of its duty during the night-time. Specific sound emissions under these duty points are not available from the manufacturer, however a conservative correction has been applied to the spectrum based on the following relationship:

$$\textit{Operating Noise Level Correction} = 10 \times \log_{10} (\textit{Operating Duty} / \textit{Maximum Duty})$$

In reality, it is expected that noise levels may be lower still under these low duties. In the absence of test data from the manufacturer, however, this assumption is expected to be suitably robust for the purposes of this assessment.

The plant area will be located along the frontage of the Site, with an external facing louvred area. The soffit of the plant room will be lined entirely with a mid-range Class C absorber, the absorption coefficients per octave band for which are presented in Table 4.

	FREQUENCY (Hz)						
	125	250	500	1K	2K	4K	8K
Mid-range Class C Absorber	0.25	0.50	0.70	0.70	0.70	0.60	0.30

Table 4: Minimum sound absorption performance of absorber in terms,

Calculations have been undertaken accounting for direct and reverberant effects of the plant room, distance propagation to the receptors directly above, screening effects from the shelf façade feature just below first floor level, and directivity effects. The results of the calculations are presented in Table 5 with calculations presented in Appendix B.

ASSESSMENT PERIOD	PREDICTED SOUND PRESSURE LEVEL	PLANT NOISE LEVEL LIMIT
Daytime (07:00 to 23:00hrs)	L_{Aeq} 36 dB	L_{Aeq} 39 dB
Night-time (23:00 to 07:00hrs)	L_{Aeq} 35 dB	L_{Aeq} 36 dB

Table 5: Noise emissions assessment

With the incorporation of acoustic treatment across an area equivalent to that of the ceiling in the plant room, and installation of appropriate anti-vibration mounts under the plant item, compliance with planning conditions has been demonstrated and no further mitigation is required.

Yours sincerely
for CLARKE SAUNDERS ACOUSTICS

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APPENDIX A

Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.

Noise Sound that is unwanted by or disturbing to the perceiver.

Frequency The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.

dB(A): Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.

L_{eq}: A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).

The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction.

Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.

L_{10} & L_{90}: Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise.

It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.

Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band.

In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

APPENDIX A

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B

PLANT ROOM BREAKOUT DAYTIME		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Refrigeration										
Daikin LREQ8BY1	Lp @ 1m	57	58	55	47	41	41	43	36	51
Duty correction (35%)		-4	-4	-4	-4	-4	-4	-4	-4	
Lp to Lw		8	8	8	8	8	8	8	8	
Daikin Unit Sound Power	Lw	61	62	59	51	45	45	47	40	55
Louvre										
Direct Contribution at Frontage	Lp	59	60	57	49	43	43	45	38	54
Reverberent Contribution	Lp	66	60	55	47	42	42	44	40	53
Combined SPL at Frontage	Lp	67	63	59	51	46	46	48	42	56
Façade shelf screening loss		**-6**	**-8**	**-9**	**-11**	**-14**	**-17**	**-18**	**-18**	
Directivity		**0**	**-1**	**-5**	**-8**	**-7**	**-7**	**-7**	**-7**	
Distance propagation (m)	2	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	
Total Lp at receptor		**54**	**49**	**39**	**26**	**19**	**16**	**17**	**11**	**36**
Daytime background										**44**
Daytime criterion										**39**

PLANT ROOM BREAKOUT NIGHT-TIME		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Refrigeration										
Daikin LREQ8BY1	Lp @ 1m	57	58	55	47	41	41	43	36	51
Duty correction (25%)		-5	-5	-5	-5	-5	-5	-5	-5	
Lp to Lw		8	8	8	8	8	8	8	8	
Daikin Unit Sound Power	Lw	60	61	58	50	44	44	46	39	54
Louvre										
Direct Contribution at Frontage	Lp	58	59	56	48	42	42	44	37	52
Reverberent Contribution	Lp	65	58	53	46	41	41	43	39	51
Combined SPL at Frontage	Lp	66	62	58	50	44	44	46	41	55
Façade shelf screening loss		**-6**	**-8**	**-9**	**-11**	**-14**	**-17**	**-18**	**-18**	
Directivity		**0**	**-1**	**-5**	**-8**	**-7**	**-7**	**-7**	**-7**	
Distance propagation (m)	2	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	**-6**	
Total Lp at receptor		**53**	**48**	**38**	**25**	**17**	**15**	**15**	**10**	**35**
Night-time background										**41**
Night-time criterion										**36**