Date: 24th September 2019

Ref: 19308/001/pw

AAD
applied
acoustic
design

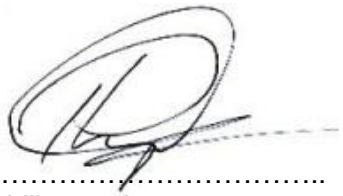
41 & 43 CHALTON STREET

LONDON

POST INSTALLATION

PLANT NOISE ASSESSMENT

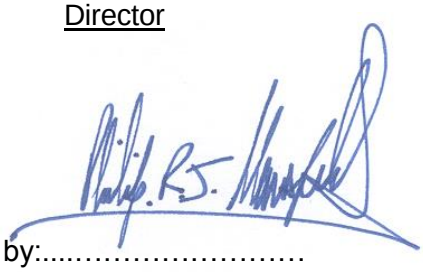
Client: Holloway Ceilings Ltd.



Report Author: ……..

Philip Wash

Director



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1.0 Introduction

1.1 This report provides a post-installation assessment of new items of fixed plant associated with the recently completed office fit-out at 41 & 43 Chalton Street, London.

1.2 The assessment has been requested by the London Borough of Camden in order to discharge Condition 4 of the planning permission associated with the wider development.

2.0 Site Description & Development Proposal

2.1 The site is located between Churchway and Charlton Street, and is surrounded by a mixture of commercial and residential buildings. The development proposal amounts to the refurbishment of an existing commercial building, with additional fixed plant in the form of condenser units located on the roof of the building facing onto Chalton Street. The condensers are surrounded by a close-boarded timber fence.

2.2 The nearest noise sensitive buildings have been identified as residential properties on Churchway, directly adjacent to the development site. Refer to Appendix 1 for a site plan, which identifies these locations.

2.3 It is understood that the plant is configured to operate during office hours of 08:00 to 18:00 hrs.

3.0 Site Noise Survey

3.1 Initial Background Noise Survey

3.1.1 A detailed background noise survey to inform appropriate noise limiting criteria was carried out and reported as part of the planning process (AAD report ref: 18124/002/Rev A/AWH, dated 3rd September 2018).

3.2 Post Installation Plant Noise Assessment

3.2.1 Details of this (post installation) plant noise assessment are summarised as follows:

Instrumentation: Norsonic 140 (Class 1) sound level meter (Serial No. 1406388) with associated microphone and pre-amplifier. The instrument was checked for calibration prior and subsequent to use with a Bruel & Kjaer 4231 calibrator whereupon no calibration drift was recorded. The instrument was used in accordance with manufacturer's instructions.

Location: Surveying was undertaken at roof level at a location 1m from the installed plant, in the direction of the nearest and most affected noise sensitive premises.

Period: Noise level monitoring was undertaken between 17:45 and 18:15 hrs on Monday 23rd September 2019.

Weather: The prevailing weather conditions over the survey period were calm with some light rain. The period of rain was deemed not to have affected the result of the survey. Wind speed was recorded to be less than 5 m/s throughout the survey period.

Site Noise Characteristics at Measurement Location: With the new plant switched off, the ambient and background noise levels were dominated by noise from local road traffic and distant plant. With the new plant switched on, the ambient and background noise levels were dominated by noise from the new plant. It is considered that no unusual events occurred during the survey period. The data used for the assessment includes a fair representation of the noise levels found in the area.

Surveyor: Philip Wash BSc (Hons) MSc MIOA

3.3 Refer to Appendix 2 for a glossary of terms

4.0 Plant Noise Criteria

4.1 Planning condition 4 states the following:

"Prior to use of the development, details shall be submitted to and approved in writing by the Council, of the external noise level emitted from plant/ machinery/ equipment and mitigation measures as appropriate. The measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA, by 15dBA where the source is tonal, as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity. The post installation noise assessment shall be carried out where required to confirm compliance with the noise criteria and additional steps to mitigate noise shall be taken, as necessary. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policies A1 and A4 of the London Borough of Camden Local Plan 2017."

4.2 BS4142: 2014

4.2.1 Guidance on noise from mechanical services plant is contained in British Standard 4142:2014 "*Method for rating and assessing industrial and commercial sound*". BS4142 sets out a method by which the likely magnitude of adverse impact of sound from a commercial or industrial use on residential uses can be determined.

4.2.2 The method is based upon establishing the existing background $L_{A90,\,t}$ sound levels at the residential properties against which the likely levels of noise from the proposed development is assessed. Noise from the proposed development is assessed over a 1-hour period during the day (07:00 hrs – 23:00 hrs) and over 15 minutes during the night (23:00 hrs – 07:00 hrs).

4.2.3 The $L_{Aeq,\,1hr}$ or $L_{Aeq,\,15min}$ sound level from the commercial/industrial use, as calculated to the residential properties, is the "*specific sound level*" of the development. If it is likely that sound from the commercial/industrial use will be tonal at the receiver locations, or will be intermittent enough to attract attention, acoustic penalties will be added to the specific sound level.

4.2.4 Taking a worst-case assumption of both a tonal component and intermittency of noise from a proposed development a 7 dB penalty could be applied to the specific sound level with the resultant value being the "*rating sound level*". If no acoustic penalties are applied, the rating sound level would equal the specific sound level.

4.2.5 The rating sound level is then referenced to the background sound level and the difference noted. The likelihood of adverse impact is determined from the BS4142 method as indicated below;

a) *Typically, the greater this difference, the greater the magnitude of the impact.*

b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

d) *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.*

4.2.6 BS4142 sets out, with respect of the above method of indicating likely adverse impact that;

"*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which sounds will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context*"

4.2.7 BS4142 also includes a commentary on the results of an assessment which states;

"*Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.*

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

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.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse."

4.3 Based on the above, and with reference to the noise survey data set out in AAD report ref: 18124/002/Rev A/AWH, dated 3rd September 2018, in order for the proposed plant to comply with Planning Condition 4, the appropriate limit is as follows:

Table 1: Plant Noise Limit Criterion to be achieved at 1m from the Nearest & Affected Noise Sensitive Premises

Period	Minimum Surveyed Background Noise Level	Maximum Plant Noise Rating Level
08:00 – 18:00 hrs	46 dB $L_{AF90,15min}$	36 dB $L_{Ar,Tr}$

4.4 It is worth noting that the initial noise assessment report issued to support the planning application set noise limits in relation to daytime and night time periods, but was not specific to the actual proposed plant operational hours (as these operational hours were unknown at the time of the initial assessment).

5.0 Plant Noise Assessment

5.1 The measured noise level 1m from the installed plant is summarised below. It is understood the plant was operating at maximum duty at the time of the survey:

Table 2: Measured Plant Noise Level

Plant Item	Sound Pressure Level at 1m, dB re 2 x 10^{-5} Pa
Rooftop Condensers	58 dB $L_{Aeq,5min}$

5.2 Calculations have been performed to determine noise levels arising from the plant at the nearest and most affected noise sensitive premises, which are shown in Appendix 1. Calculations use the measured noise data and corrections for screening, distance and façade reflections. The results are as follows:

Table 3: Plant Assessment to Residential Dwellings located to the North West of the Site

Description	A-weighted Calculation Summary, dB
Ambient Noise Level 1m from Condenser Plant (Plant On), $L_{Aeq,5min}$	58
Residual Noise Level 1m from Condenser Plant (Plant Off) $L_{Aeq,Tr,5min}$	50
Specific Noise Level of Plant at 1m, L_s	**57**
Distance Attenuation 31m (point source)	-30
Attenuation Provided by Building Edge Screening (δ = 0.02m) *	-9
Façade Reflection at Receiver	+3
Total Specific Plant Noise at 1m from Receiver, L_s	**21**
Acoustic Feature Correction (potential intermittent nature of operation)	+3
Plant Noise Rating Level, $L_{Ar,Tr}$	**24**
Background Noise Level, $L_{AF90,15min}$	46
Difference between Plant Noise Rating Level and Background Noise Level	**-22**

* A-weighted reduction based on actual effect of attenuation

5.3 The assessment shows that the noise rating level of the installed plant is expected to be no greater than 24 dB $L_{Ar,Tr}$ at the nearest and most affected noise sensitive premises, which is 22 dB below the lowest surveyed background noise level during the proposed hours of operation. This therefore complies with the requirements of Planning Condition 4 of the planning permission.

6.0 Conclusion

6.1 A post installation plant noise survey has been conducted at 41 & 43 Chalton Street, London in order to discharge the requirements of Planning Condition 4 of the planning permission associated with the development.

6.2 Calculations have been performed, based upon the information provided above, in order to determine the likely plant noise level at the nearest and most affected noise sensitive premises.

6.3 The assessment has found that noise arising from the newly installed plant should comfortably comply with the requirements of Planning Condition 4 during the proposed hours of operation.

Appendix 1: Site Plan & Measurement Locations

Source: Google Maps

Appendix 2: Glossary of Terms

Term	Description	Explanation
	Noise	Unwanted sound. In the explanation given below the words 'sound' and 'noise' can often be used interchangeably, depending on context.
dB	The decibel scale	The decibel (or dB) scale is the scale on which sound pressure levels are commonly measured. It is a logarithmic scale and is used for convenience to compress the audible range of sound pressures into a manageable range, from 0 dB to 140 dB. The zero of the scale, 0 dB, corresponds to the threshold of hearing, 0.00002 Pa, and the upper limit, 140 dB, corresponds to 20 Pa, the threshold of pain.
	Sound pressure	Sound is a disturbance or fluctuation in air pressure, and sound pressure, measured in pascals (Pa), is used as a measure of the magnitude of the sound. The human ear can detect sound pressures in the range from 0.00002 Pa to 20 Pa. This is an enormously wide range and so for convenience sound pressures are commonly measured on a decibel (dB) scale.
Lp	Sound pressure level	Instantaneous value of Sound Pressure Level (Lp).
	Sound power	The sound energy radiated per unit time by a sound source, measured in watts (W)
L_W	Sound power level	Sound power measured on a decibel scale: $L_W = 10\log(W/W_0)$, where W_0 is the reference value of sound power, 10^{-12} W.
f	Frequency	The frequency of a musical note is what gives it its pitch. It is the number of cycles of the fluctuating sound pressure which occur each second, and is measured in cycles per second, or Hertz (Hz). The human ear can detect frequencies in the range 20 to 20 000 Hz. Most sounds and noises are a mixture of all frequencies, called broad-band noise.
	Octave bands Octave band spectra	In order investigate the frequency content of broad band sounds, called its frequency spectrum, measurements of sound pressure are carried out over a range of frequency bands. The most common method is to split the audio frequency range into 8 or 9 octave bands. An octave is a frequency range from one particular frequency to double that frequency.
	Free-field	A free field sound level measurement is one which is unaffected by the presence of any sound reflecting surfaces. In an outdoor situation this is usually taken to mean with no sound reflecting surfaces within 3 m. of the source.
	Facade correction Factor	The difference between the façade level and the free field level (in the absence of the façade) is called the façade correction factor.
A	A-weighting	One of the three frequency weightings (A, C and Z) used in sound level meters, and defined in BS EN ISO 61672-1; a very widely used method of producing a single figure measure of a broad band noise which takes into account, in an approximate way at least, the frequency response of the human hearing system. The idea is that sound levels measured in this way should give an indication of the loudness of the sound.
L_A (dBA)	A- weighted sound pressure level	The value of the sound pressure level, in decibels, measured using an A-weighting electronic circuit built into the sound level meter. The vast majority of noise measurements are carried out in this way.
$L_{Aeq,T}$	Equivalent continuous sound level	It represents a measure of the 'average' sound level over the measurement period. It corresponds to the steady level of sound which, over the same period of time, T, would contain the same amount of (A-weighted) sound energy as the time varying noise. Also known as the Average sound level. This is the most common method of measuring time varying noise, and within certain limits gives the best correlation with human response to noise, for example with annoyance.

$L_{AN,T}$	Statistical percentile noise levels	$L_{AN,T}$ is the noise level, usually A-weighted, which is exceeded for N% of the measurement period, T. The most commonly used values are $L_{A10,T}$ used for the measurement and assessment of traffic noise, and $L_{A90,T}$, commonly used as a measure of background noise. $L_{A1,T}$ and $L_{A99,T}$ are also occasionally used to give an indication of the highest and lowest noise levels occurring during the measurement time interval.
	Background noise	Ambient noise which remains at a given site when occasional and transient bursts of higher level ambient noise levels have subsided to typically low levels; it is the noise normally present for most of the time at a given site. It is usually described by the L_{A90} value.
$L_{A90,T}$	Background noise level	Defined in BS 4142 as the value of the A-weighted residual noise at the assessment position that is exceeded for 90 % of a given time interval, T, (i.e. $L_{A90,T)}$ measured using time weighting, F, and quoted to the nearest whole number of decibels. (Also see under residual noise). Background noise itself often varies with time and so the $L_{A90,T}$ is almost universally used as the best measure of the 'more or less always present' noise level which underlies short term variations from other sources of noise.
	Specific Noise Source	The noise source under consideration when assessing the likelihood of adverse impact using BS4142:2014.
	Specific Noise Level	The value of $L_{Aeq,T}$ at the assessment position produced by the specific noise source, ref. BS4142:2014.
$L_{ar,Tr}$	Rating Level	The specific noise level, corrected to account for any characteristic features of the noise, by adding a rating penalty for any tonal, impulsive or irregular qualities, ref. BS4142:2014.
T_r	Reference time interval	Specified interval over which the specific sound level is determined, ref. BS4142:2014.
	Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound, ref. BS4142:2014.
$L_r = L_{Aeq,T}$	Residual Sound Level	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T, ref. BS4142:2014.