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acoustic design

119 Shaftesbury Lane

Plant Noise Assessment

Report Reference: J0484_R01

6th March 2020

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Revision	Date	Description	Author
R0	06/03/2020	1st Issue	Arthur Lewis-Nunes

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CONTENTS

1 INTRODUCTION

ALN Acoustic Design has been appointed to carry out a noise assessment in relation to the proposed installation of kitchen extraction plant equipment at 119 Shaftesbury Avenue, London WC2H 8AE in the London Borough of Camden.

This report presents the results of a background noise survey at the site and assesses the noise generated by the proposed equipment with regard to the Camden Council plant noise criteria and BS4142:2014 guidance.

This report has been prepared by Arthur Lewis-Nunes MSc who is a full member of the Institute of Acoustics.

A glossary of technical terminology used in this report is provided in Appendix A.

2 THE SITE

119 Shaftesbury Avenue is in a 5-storey terrace with retail units on the ground floor and office space on the floors above. An aerial image of the site and surrounding area is provided in Figure 1.

It is proposed to change the use of the ground floor from retail to a restaurant which would require the installation of kitchen extract plant equipment (see Section 5.1).

There is a lightwell to the rear which is overlooked by several residential windows. The closest residential elevation is indicated in Figure 1, which is understood to be part of 90 Charing Cross Road. The other windows in the vicinity are offices which are generally less acoustically sensitive.

Figure 1: Aerial image of site and surrounding area

3 ASSESSMENT CRITERIA

The site is located within the London Borough of Camden. The Camden Council Local Plan (2017) sets out the criteria for noise and vibration used to determine applications for planning permission.

Policy A4: Noise and Vibration is reproduced below:

> The Council will seek to ensure that noise and vibration is controlled and managed.
>
> Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:
>
> a. development likely to generate unacceptable noise and vibration impacts; or
> b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.
>
> We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

Appendix 3 of the Local Plan sets out the thresholds that will be considered by the council when assessing applications. The relevant section which is applicable to the assessment of plant and machinery noise at dwellings is reproduced below:

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 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

The thresholds evaluate impact in terms of various 'effect levels' as described in the National Planning Policy Framework and Planning Practice Guidance. There are corresponding design criteria which guide applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The thresholds and design criteria are as set out below:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

Appendix 3 of the Local Plan indicates that it is expected that the BS4142:2014 assessment methodology will be used.

3.1 BS4142

BS4142:2014 'Methods for rating and assessing industrial and commercial sound' is the current British Standard which provides an established methodology for the assessment of the impact of noise from fixed mechanical and electrical plant and equipment.

The degree of adverse impact for a particular noise source is dependent upon factors including the extent by which it exceeds the background noise level, the character of the noise and its time of occurrence.

A 'Rating Level' for the specific source is established, which has been corrected to account for the characteristics of the sound, including having noticeable tonality, being intermittent / impulsive, or having any other distinct characteristics which would make it more noticeable.

Levels of impact are defined in terms of the Rating Level relative to the background noise level, as set out in Table 1 below.

Rating Level relative to background level	**Assessment**
0dB or less than background	'An indication of the specific sound source having a low impact, depending on context'
5dB or more than background	'Likely to be in indication of an adverse impact, depending on context'
10dB or more than background	'Likely to be in indication of a significant adverse impact, depending on context'

Table 1: BS4142 defined levels of impact

4 NOISE SURVEY

4.1 Methodology

A survey of background noise levels was carried out from 11:15 on Tuesday 25th February 2020 until 12:30 on the following day.

A weather-protected Class 1 sound level meter and tripod-mounted microphone were installed on the roof of 119 Shaftesbury Avenue in the position marked 'MP1' in Figure 1 (further details of the instrumentation used are provided in Appendix B).

The sound level meter was set up to record noise levels at consecutive 15-minute intervals throughout the survey period.

The measured noise levels are considered to be representative of those occurring at residential façade nearest the site.

It was observed at the start and end of the survey period that environmental noise levels were dominated by various items of plant equipment serving the adjacent buildings.

There were light winds and no precipitation throughout the survey period. The weather conditions are not considered to have had any significant effect on the survey results.

4.2 Survey Results

The time history plot of the noise survey data from MP1 is presented below in Figure 2. The background noise level was fairly constant throughout the survey period, ranging from 56 to 58dB $L_{AF90,15min}$.

Based on the results of the noise survey, **56dB $L_{AF90,15min}$** will be taken as the representative background noise level at the receptors considered in this assessment.

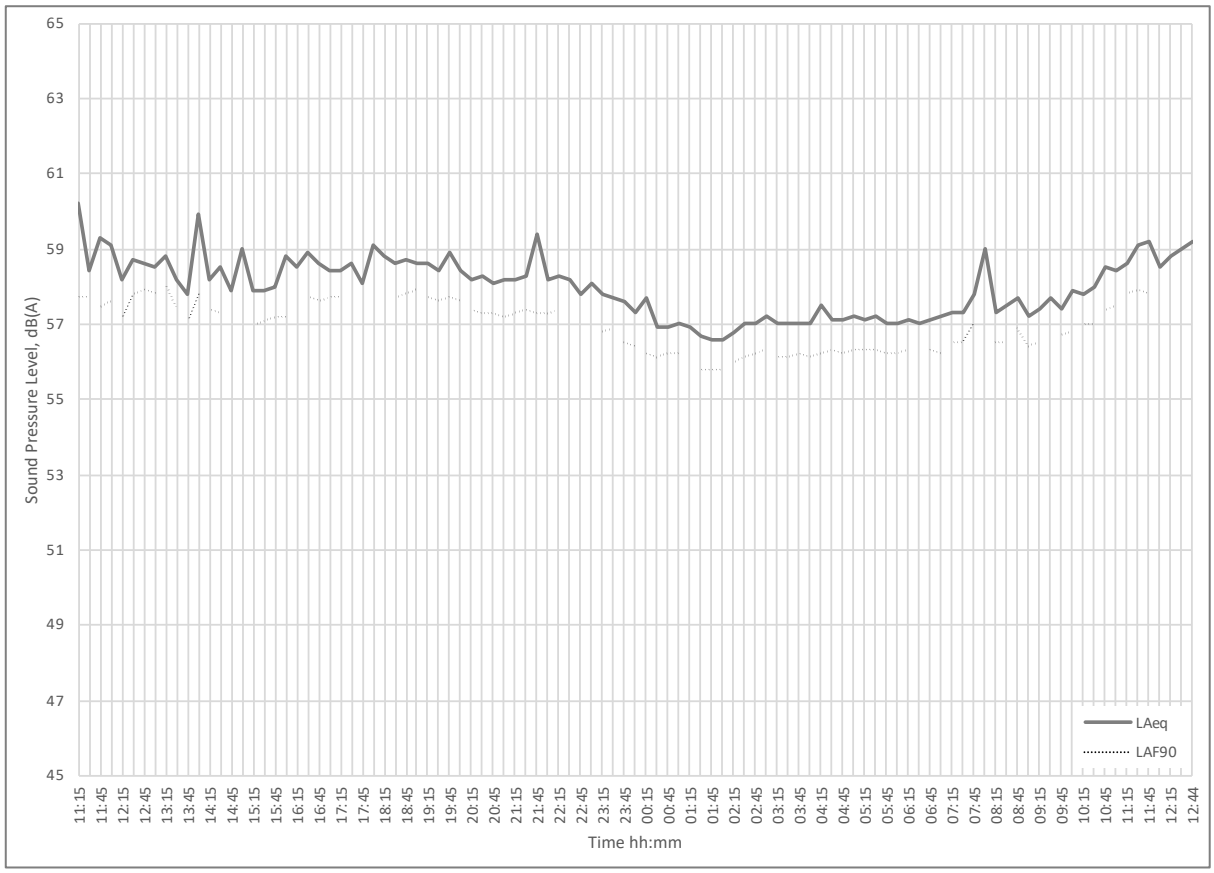

Figure 2: Noise survey data (MP1)

5 PLANT NOISE ASSESSMENT

5.1 Plant Noise Emission Limit

The Camden Council planning policy suggests that the Lowest Observable Effect Level (LOEL) occurs when the plant noise rating level is 10dB below the background noise level. The lowest measured noise level in the 24-hour background noise survey was 56dB $L_{AF90,15min}$. It is therefore proposed that plant equipment is specified to not to exceed **46dB(A)** at the nearest noise sensitive receptor in order that the plant noise is within the LOEL threshold.

5.2 Proposed Plant Equipment

We are advised that it is proposed to install a kitchen extract fan within the fabric of the building with an external exhaust air duct running up the rear elevation and terminating at roof level (see Figures 1 and 3). The exhaust duct will be at a horizonal distance of approximately 9m from the nearest residential façade.

The extract fan unit has not yet been specified therefore no details of the noise output are currently available.

From previous experience, commercial kitchen extract fans in similarly sized establishments typically have a sound power level rating of approximately 95dB L_{WA}. It is assumed that noise will mainly radiate from the duct termination. Accounting for distance attenuation from hemispherical radiation, the resultant noise level would be 68d(A) (95 - 20xlog(9m) - 8 = 68dB). Therefore, a further reduction of approximately 22dB(A) is required to meet the noise emission limit.

An adequate reduction in noise emissions can be achieved with an attenuator positioned within the exhaust ductwork. Once details of the kitchen extract fan are available, a detailed calculation should be carried out to determine the insertion loss requirements in order that a suitable attenuator for with a kitchen extraction system can be specified. The calculation should take into account any natural duct losses e.g. due to any bends and the duct terminal, plus any spectral or temporal features of the emitted noise.

A resilient connection should be provided between the extract fan and the exhaust ductwork to prevent vibration from the fan motor from being transmitted into the ductwork.

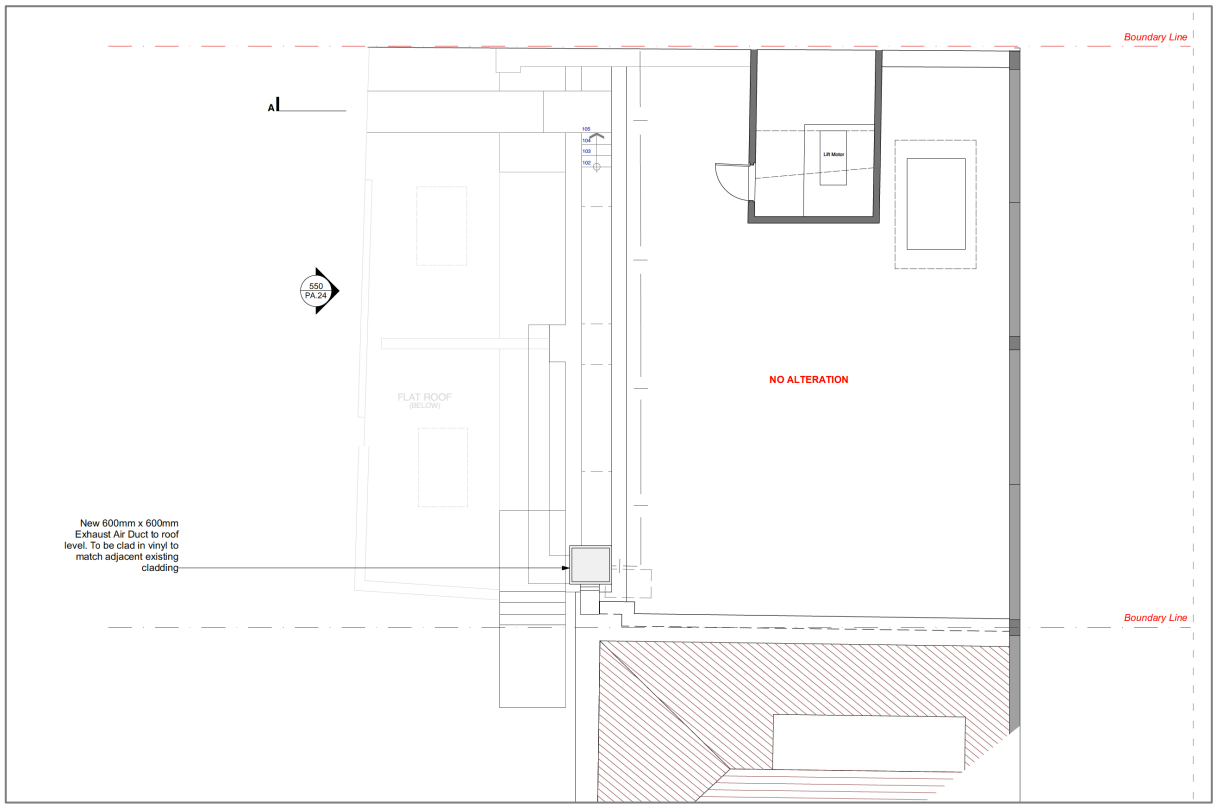

Figure 3: Proposed roof plan

6 SUMMARY

A noise survey has been carried out to establish existing background noise levels at noise sensitive receptors near to the application site.

The results of the noise survey have been used to determine a maximum operational noise emission level for plant equipment in accordance with the Camden Council Local Plan.

The kitchen extract fan has not yet been specified, but based on the noise output of a typical commercial extraction system it is expected that the proposed noise emission limit can be met by fitting a suitably specified attenuator to the exhaust duct.

APPENDIX A - GLOSSARY OF ACOUSTIC TERMINOLOGY

EQUIVALENT CONTINUOUS A-WEIGHTED, $L_{Aeq,T}$

The level of a notional continuous sound that would contain the same sound energy as the actual fluctuating sound over the time period, T. Weighted over frequencies to approximate the sensitivity curve of human hearing (A-weighted).

BACKGROUND NOISE LEVEL, $L_{AF90,T}$

The A-weighted sound pressure level of a fluctuating sound that is exceed for 90% of the time interval, T.

A-WEIGHTED MAXIMUM NOISE LEVEL, L_{AFmax}

The maximum A-weighted sound pressure level recorded over the period stated, measured using the “fast” time constant.

SOUND REDUCTION INDEX, R

The quantity which describes the level by which a material or building element reduces noise transmission at a given frequency, derived from laboratory measurement.

WEIGHTED SOUND REDUCTION INDEX, R_W

Single Integer number found by comparing the measured Sound Reduction Index spectrum with the 'standard' curves for airborne sound insulation, according to a weighting method described in BS EN ISO 717-1.

APPENDIX B - NOISE MONITORING EQUIPMENT DETAILS

The measurements were made with an NTi XL2 sound level analyser with a GRAS weather protection kit. This equipment complies with BS EN IEC 61672 class 1.

The calibration of the sound level meter was checked at the beginning and end of measurements with a Larson David CAL200 sound calibrator, complying with BS EN IEC 60942 class 1. No significant calibration deviation occurred.

The table below lists the serial numbers and last calibration dates of the equipment used.

Description	**Serial No.**	**Calibration Date**
NTi XL2 Sound Level Meter	A2A-16249-E0	02/07/2019
NTi MC230A Condenser Microphone	A17342	02/07/2019
NTi MA220 Pre-Amplifier	8450	02/07/2019
Larson David CAL200 Sound Calibrator	16795	02/07/2019