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**JAS DESIGN**

**3 KING HENRY'S  
ROAD NW3**

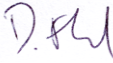

**PLANT NOISE  
ASSESSMENT**

**21 NOVEMBER  
2023**

**2019-AF-00001-01**

**JAS DESIGN  
3 KING HENRY'S ROAD NW3  
PLANT NOISE ASSESSMENT**

DOCUMENT REFERENCE: 2019-AF-00001-01

<b>REVIEW AND AUTHORISATION</b>			
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<b>CONTENTS</b>	<b>PAGE NO.</b>
<b>1. INTRODUCTION</b>	<b>1</b>
1.2 Brief and Scope	1
<b>2. SITE DESCRIPTION</b>	<b>1</b>
2.1 Location	1
<b>3. GUIDANCE</b>	<b>3</b>
3.1 British Standard 4142:2014	3
<b>4. NOISE SURVEY AND MEASUREMENTS</b>	<b>6</b>
4.1 Unattended Noise Survey	6
4.2 Measurement Weather Conditions	7
4.3 Results	7
<b>5. PLANT NOISE ASSESSMENT</b>	<b>8</b>
5.1 Operating Hours	8
5.2 Noise Rating Limit	8
5.3 Plant Noise Levels	8
5.4 Location of Nearest Sensitive Receptors	8
5.5 Calculated Noise Levels	9
<b>6. VIBRATION CONTROL</b>	<b>9</b>
<b>7. CONCLUSION</b>	<b>10</b>
<b>APPENDIX A – FIGURES</b>	
Figure A1 : Noise Measurement Results – 3 King Henry’s Road	
<b>APPENDIX B – TABLES</b>	
Table B1 : Calculations	
<b>APPENDIX C – TERMINOLOGY RELATING TO NOISE</b>	
<b>APPENDIX D – LIMITATIONS TO THE REPORT</b>	

## **1. INTRODUCTION**

1.1.1 JAS Design has commissioned AF Acoustics Ltd. to undertake a plant noise assessment for the proposed installation of one condenser unit to at 3 King Henry's Road, London NW3.

### **1.2 Brief and Scope**

1.2.1 The brief is to undertake a plant noise assessment for the proposed plant to be installed at the site. If atmospheric noise emissions from the plant do not meet the local authority guidance at the nearest noise sensitive receptors, recommendations will be provided to ensure the requirements of the Camden London Borough Council can be achieved.

## **2. SITE DESCRIPTION**

### **2.1 Location**

2.1.1 3 King Henry's Road is a semi-detached, four storey house located within the administrative district of the Camden London Borough Council.

2.1.2 The adjoining properties are residential in character. The London Northwestern Railway is located 25m to the north. Positioned to the south of the property are the rear of premises located on Regents Park Road.

2.1.3 It is planned to install one condenser unit on the roof of the building.

2.1.4 The closest residential receptors to the proposed installation are located at No.5 King Henry's Road.

2.1.5 The prevailing ambient noise environment was generally quiet due to being screened from the surrounding roads. The noise climate was determined by building services plant within the vicinity, train movements and traffic on the surrounding road network.

2.1.6 The site layout is shown in Figure 2.1



**FIGURE 2.1: SITE LOCATION**

### 3. GUIDANCE

#### 3.1 British Standard 4142:2014

3.1.1 BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' describes methods for rating and assessing sound from "fixed installations which comprise mechanical and electrical plant and equipment", amongst other sources of noise.

3.1.2 The methodology contained within BS 4142:2014 uses outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.1.3 A summary of the approach set out within BS 4142:2014 is set out below:

- establish the specific sound level of the source(s);
- measure the representative background sound level, typically by measurement close to the receptor location;
- rate the specific sound level to account for any distinguishing characteristics;
- estimate the impact by subtracting the background sound level from the rating level; and
- consider the initial estimate of impact, in the context of the noise and its environment.

3.1.4 An initial estimate of the impact of the specific sound is obtained by subtracting the background sound level from the rating level. Using this approach, BS 4142 states:

*"Typically, the greater this difference, the greater the magnitude of 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."*

3.1.5 Certain acoustic features can increase the significance of the impact over that expected from a basic comparison between specific sound level and the background sound level. These features include tonality and impulsivity, as well as additional characteristics and intermittency of the sound.

3.1.6 If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor.

3.1.7 The specific sound level is rated to account for distinguishing characteristics by using the penalties below:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible

3.1.8 Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor.

- 0 dB where the impulse is not perceptible
  - 3 dB where the impulse is just perceptible
  - 6 dB where the impulse is clearly perceptible
  - 9 dB where the impulse is highly perceptible
- 3.1.9 For noise which is equally both impulsive and tonal, then both features can be taken into account by linearly summing the corrections for both characteristics.
- 3.1.10 If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.
- 3.1.11 If a subjective assessment is not appropriate then an objective assessment can be made. A noise source is deemed to be tonal if the time averaged sound pressure level in a one-third octave band exceeds the level in adjacent one-third octave bands by the level differences given below:
- 15 dB in the low frequency one-third octave bands (25 Hz to 125 Hz)
  - 8 dB in the mid frequency one-third octave bands (160 Hz to 400 Hz)
  - 5 dB in the high frequency one-third octave bands (500 Hz to 10000 Hz)
- 3.1.12 If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.
- 3.1.13 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.
- 3.1.14 **Camden London Borough Council - Policy A4 Noise and Vibration**
- 3.1.15 The Camden Local Plan seeks to ensure that noise and vibration is controlled and managed. Noise and Vibration thresholds are provided, appended to the local plan documentation. The noise limits relating to industrial and commercial noise sources are reproduced below in Table 3.1.
- 3.1.16 The Local plan states that planning permission will not be granted 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.

3.1.17 It is also stated that Camden will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity.

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 57 dB $L_{Amax}$	'Rating level' between 9dB below and 5dB above background or noise events between 57 dB and 88dB $L_{Amax}$	'Rating level' greater than 5dB above background and/or events exceeding 88 dB $L_{Amax}$

**TABLE 3.1: CAMDEN LOCAL PLAN INDUSTRIAL AND COMMERCIAL NOISE THRESHOLDS**



## 4. NOISE SURVEY AND MEASUREMENTS

### 4.1 Unattended Noise Survey

4.1.1 An unattended noise survey was undertaken by Daniel Flood of AF Acoustics.

4.1.2 The duration of the survey was between 11:45 on Monday 13 November to 10:45 on Tuesday 14 November 2023.

4.1.3 Measurements were undertaken at the rear of the building, on a ground floor balcony area.

4.1.4 The microphone was mounted to the balcony balustrade at a height of 1.5m above ground-floor level. The monitoring position is considered representative of the noise environment at the windows of the closest residential receptors.

4.1.5 The prevailing ambient noise environment was generally quiet due to being screened from the surrounding roads. The noise climate was determined by building services plant within the vicinity, train movements and traffic on the surrounding road network

4.1.6 The measurement location is shown below in Figure 4.1.



**FIGURE 4.1: MEASUREMENT LOCATION**

4.1.7 The microphone was protected with a windshield during the noise survey. Measurements were carried out in accordance with the requirements of BS 7445-2:1991 and ISO 1996-2:1987.

4.1.8 The sound level meter was calibrated both before and on completion of the survey, with no calibration drift observed.

4.1.9 The equipment used is shown in Table 4.1.

Name	Serial Number	Last Calibrated
Norsonic 118 Class 1 Sound Level Meter	31382	March 2022
Norsonic 1206 Pre-amplifier	30416	March 2022
Gras 40AF Microphone	150690	March 2022
Larson Davis Calibrator	18295	June 2023

**TABLE 4.1: MEASUREMENT EQUIPMENT**

## 4.2 Measurement Weather Conditions

4.2.1 The weather during the survey was dry and clear. The temperature ranged from 9 to 16°C. Average wind speeds remained below 3 ms<sup>-1</sup>. The weather is deemed to have caused no significant effect during the measurement period.

## 4.3 Results

4.3.1 The results of the continuous noise monitoring survey are presented in graphical form in Figure A1 of Appendix A and summarised in Table 4.2.

4.3.2 The period averaged  $L_{Aeq}$  noise levels are presented below. The  $L_{A90}$  background noise level has been derived considering the most commonly occurring 15 minute period, whilst the  $L_{Amax,F}$  noise levels are the 90<sup>th</sup> percentile of the measured maximum noise levels.

Time period	Measured Noise Levels (dB re 2.0 x 10 <sup>-5</sup> Pa)		
	$L_{Amax,F}$	$L_{Aeq,T}$	Typical $L_{A90,T}$
Daytime (07:00 – 23:00)	79	54	43
Night-time (23:00 – 07:00)	65	43	38

**TABLE 4.2\*: SUMMARY OF UNATTENDED NOISE MEASUREMENTS**

## 5. PLANT NOISE ASSESSMENT

### 5.1 Operating Hours

5.1.1 It is understood the air-conditioning unit has the potential to operate 24 hours a day.

### 5.2 Noise Rating Limit

5.2.1 In accordance with the guidance of the Camden London Borough Council, as presented in Section 3.2, Table 5.1 presents the maximum noise rating level which must not be exceeded at the nearest noise sensitive receptors.

Measurement Period	Assessed Background Noise Level dB $L_{A90}$	Noise Rating Level Design Criteria	Plant Noise Rating Level Limit dB $L_{Ar,Tr}$
24 hours	38	10dB below the background noise level	28

**TABLE 5.1: TARGET BACKGROUND NOISE LEVEL**

### 5.3 Plant Noise Levels

5.3.1 It is proposed to install 1 No. Daikin 5MXM-A9 unit on the roof of the building. The manufacturer's noise levels are presented in Table 5.2.

Plant	Parameter	Sound Level at Octave band Centre Frequency, dB							
		63	125	250	500	1000	2000	4000	8000
Daikin 5MXM-A9	$L_p$ at 1m	56	55	55	51	46	42	34	26

**TABLE 5.2: PLANT NOISE LEVEL**

### 5.4 Location of Nearest Sensitive Receptors

#### Receptor 1

The closest windows with the potential to be affected by noise from the proposed plant installation have been identified as belonging to the rear elevation of No.5 King Henry's Road. These windows are located at fourth-floor level and will be screened from the condensing unit by the wall of No.5 King Henry Road.

The receptors to the rear of site are commercial in nature and will be screened from the proposed unit by the roof of No. 3 King Henry's Road.

**5.5 Calculated Noise Levels**

5.5.1 Based on the information above Table 5.3 provides a summary of the calculated plant noise at the nearest residential receptor. Our calculation method has included: 20LogR distance correction; reflections; and screening. The calculation sheets are presented in Appendix B.

Property	Assessment Period	Target Plant Noise Rating Level dB $L_{Ar,Tr}$	Plant Specific Sound Level dB $L_{Aeq,Tr}$
Receptor 1 - No.5 King Henry's Road	24 Hours	28	27

**TABLE 5.3: PREDICTED NOISE LEVELS AT NEAREST RECEPTORS**

5.5.2 No correction factors have been added in accordance with BS4142:2014. There are no tones or other acoustic characteristics present from the proposed plant.

5.5.3 The results of the assessment indicate that the atmospheric noise emissions from the proposed plant installation will achieve the requirements of the Camden London Borough Council, and should therefore be considered acceptable.

**6. VIBRATION CONTROL**

6.1.1 To limit the transfer of structure-borne noise we recommend that all plant is isolated from the supporting structure by either steel spring isolators or rubber footings. For particularly sensitive location, or when on lightweight structures, the mounts should ideally be caged and be of the restrained type.

6.1.2 It is important that the isolation is not “short-circuited” by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

## **7. CONCLUSION**

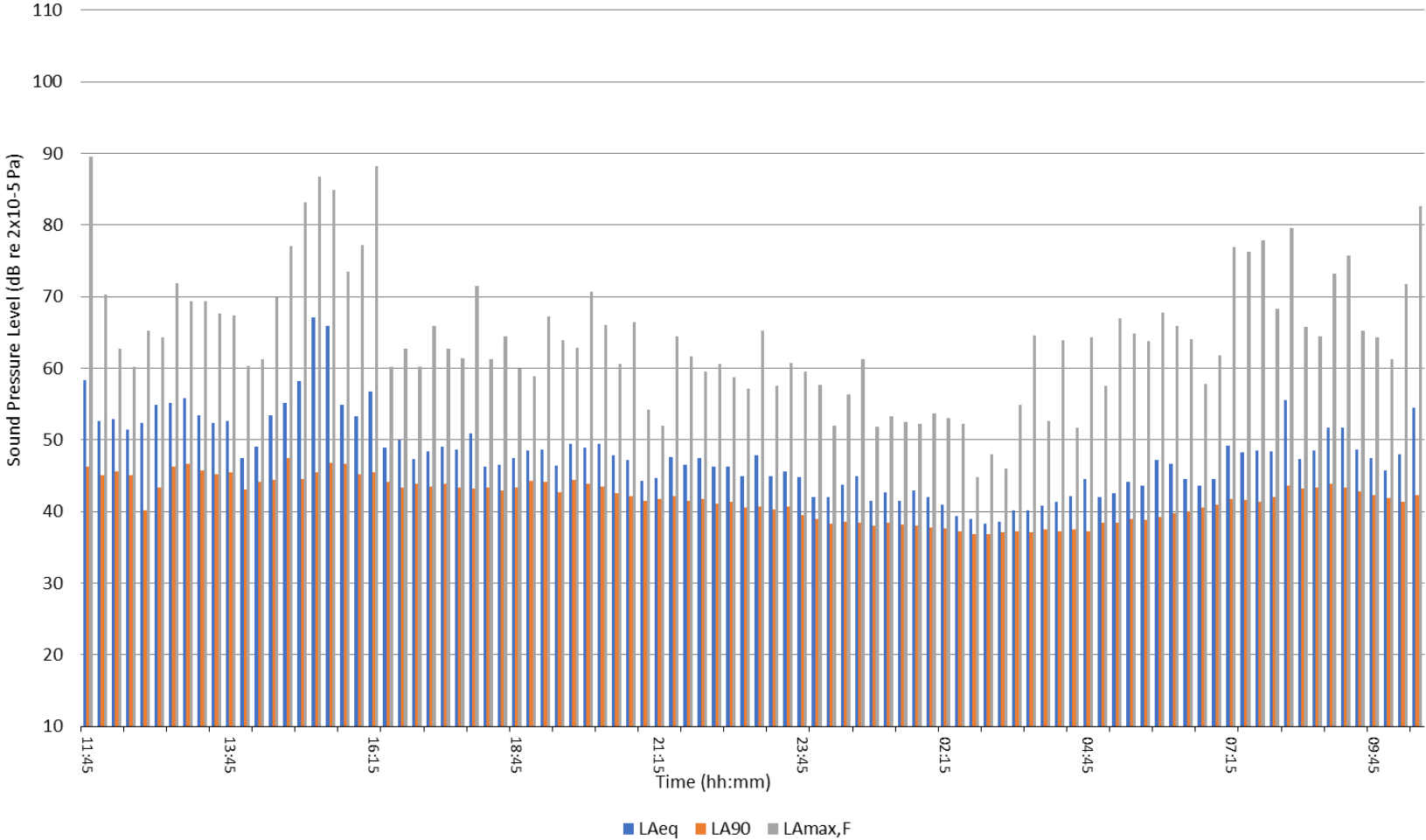
- 7.1.1 JAS Design has commissioned AF Acoustics Ltd. to undertake a plant noise assessment for the proposed installation of one condenser unit at 3 King Henry's Road, London NW3.
- 7.1.2 AF Acoustics have performed measurements of the prevailing ambient noise conditions on site and undertaken the plant noise assessment in accordance with BS4142 and the requirements of the Camden London Borough Council.
- 7.1.3 The results of the measurements have been used to determine the required criteria for atmospheric noise emissions from the proposed plant installation.
- 7.1.4 Noise calculations based on the plant data have been undertaken to the nearest noise-sensitive receptors.
- 7.1.5 The results of the assessment indicate that the atmospheric noise emissions from the proposed plant installation will achieve the requirements of the Camden London Borough Council, and should therefore be considered acceptable.

### **AF Acoustics**

**APPENDIX A: FIGURES**

2019 - 3 King Henry Road, NW3  
 Position 1 - Rear Ground Floor Balcony  
 Time History - 13 November to 14 November 2023

Graph 1



**FIGURE A1: NOISE MEASUREMENT RESULTS – 3 KING HENRY’S ROAD**

## APPENDIX B: TABLES



Job No.	Job Title			
2019	3 King Henry			
Date Created	By	Date Revised	Rev	Sheet
21 Nov 2023	DF	21 Nov 2023	0	1
Date Reviewed	By	Review Type	Review Status	

### Calculation to closest receptor

Item / Description	Rating/Broadband/Input	Octave Band Centre Frequency, Hz											
		Rating	dB	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Air-conditioning unit	1 No. Daikin 5MXM-A9 - Lp at 1m					56.0	55.0	55.0	51.0	46.0	42.0	34.0	26.0
Distance loss	7m					16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Reflection						3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Barrier Attenuation - Theory: Maekawa, Source Height: 1 m, Receiver Height: 6.8 m		7.0 m	7.0 m	0.5 m		-6.6	-7.9	-9.8	-12.3	-15.1	-18.1	-21.1	-24.1
Total at closest receptor	5 King Henry's Road			26.6 (A)		35.5	33.2	31.3	24.8	17.0	10.0	-1.0	-12.0

**TABLE B1: CALCULATIONS**

## APPENDIX C: TERMINOLOGY RELATING TO NOISE

<b>Sound Pressure</b>	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
<b>Sound Pressure Level</b>	The sound level is the sound pressure relative to a standard reference pressure of $20_{\mu}\text{Pa}$ ( $20 \times 10^{-6}$ Pascals) on a decibel scale.
<b>Sound Power Level (<math>L_w</math>)</b>	is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually $10^{-12}$ W).
<b>Decibel (dB)</b>	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10} (s_1 / s_2)$ . 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 $20_{\mu}\text{Pa}$ .
<b>A-weighting, dB(A)</b>	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
<b><math>L_{Aeq,T}</math></b>	Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound
<b><math>L_{90,T}</math></b>	$L_{90}$ is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
<b><math>L_{max,T}</math></b>	A noise level index defined as the maximum noise level during the 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.
<b>Specific Noise</b>	The noise source under investigation for assessing the likelihood of complaints.
<b>Rating Level</b>	The specific noise level plus any adjustment for the characteristic features of the noise.
<b>Free field</b>	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
<b>Façade</b>	At a distance of 1m in front of a large sound reflecting object such as a building façade.



## **APPENDIX D: LIMITATIONS TO THE REPORT**

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of AF Acoustics Ltd. AF Acoustics Ltd accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/or AF Acoustics Ltd and agree to indemnify AF Acoustics Ltd for any and all loss or damage resulting therefrom. AF Acoustics Ltd accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations AF Acoustics Ltd reserves the right to review the information, reassess any new potential concerns and modify our opinions accordingly.