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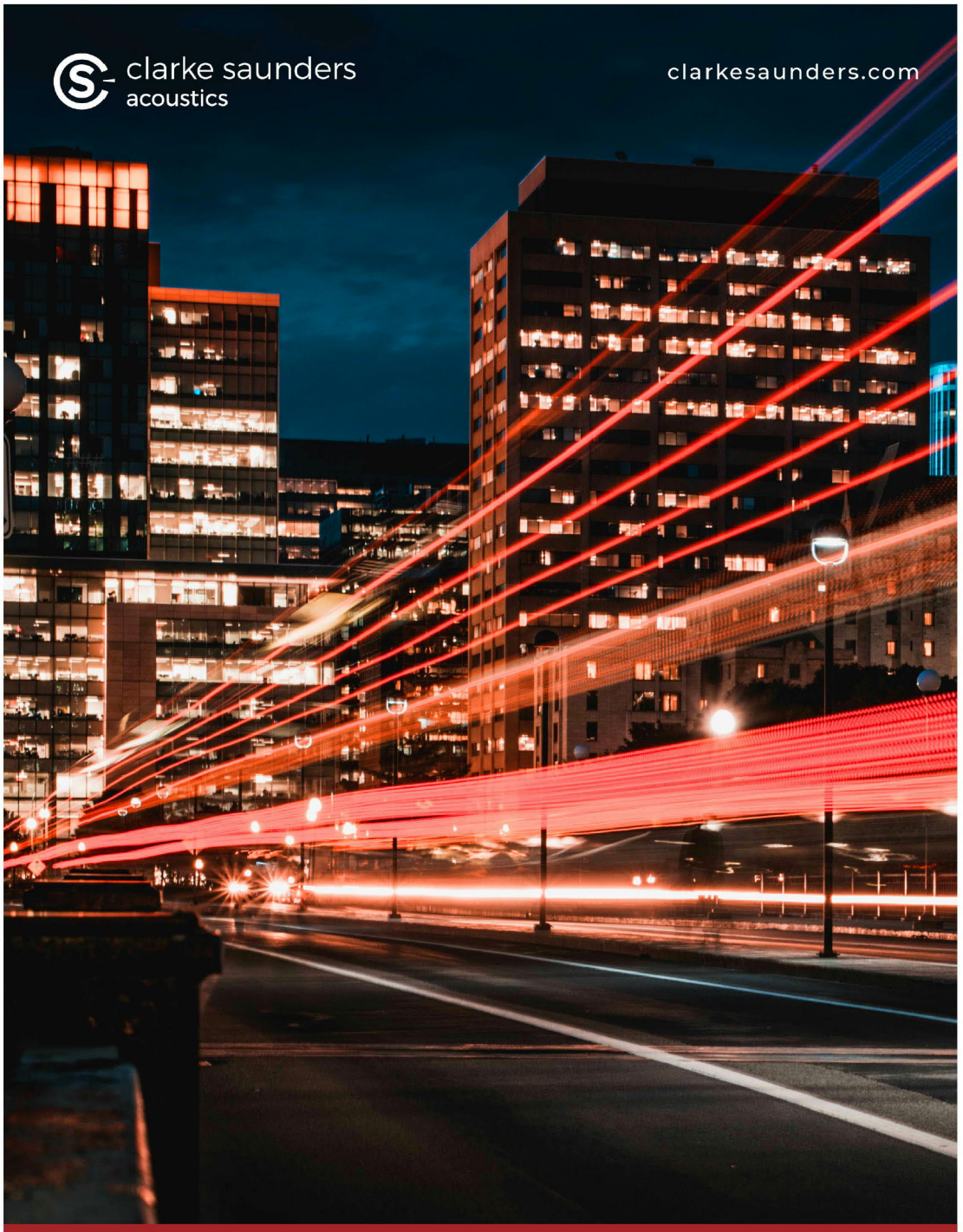

PREPARED: Monday, 22 February 2021

4 Oak Hill Park Mews; Noise Impact Assesment

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AS11891/SP1	Indicative Site Plan
AS11891/TH1-TH3	Environmental Noise Time Histories
APPENDIX A	Acoustic Terminology
APPENDIX B	Plant Noise Assessment Calculations

Project Ref:	AS11891	**Title:**	4 Oak Hill Park Mews
Report Ref:	AS11891.210212	**Title:**	Noise Impact Assessment
Client Name:	Varshika Manji		
Project Manager:	Daniel Saunders		
Report Author:	Daniel Saunders		

Clarke Saunders Acoustics
Winchester SO22 5BE

1.0 EXECUTIVE SUMMARY

1.1 Clarke Saunders Associates has been commissioned by Ipa Architects on behalf of the Applicant to undertake a noise impact assessment for new roof mounted plant to be installed at roof level of 4 Oak Hill Park Mews.

1.2 Calculations based on the proposed plant location and noise data for the proposed unit show that the Local Authority's noise emission criteria can be met with no additional mitigation required.

2.0 INTRODUCTION

2.1 It is proposed to install a new air source heat pump to the rooftop of 4 Oak Hill Park Mews, London to serve the residential property.

2.2 Environmental noise survey data has been recorded to determine the existing daytime and night-time noise levels experienced at the nearby residential windows. These noise levels will be used to set noise emission limits for the new building services plant, in accordance with the planning requirements of the Local Authority, Camden Council. Suitable noise control measures will be specified, if necessary.

2.3 Please refer to Appendix A for details of the acoustic terminology used throughout this report.

3.0 SURVEY PROCEDURE & EQUIPMENT

3.1 A survey of the ambient and background noise levels was undertaken at roof level, at the location shown on AS11891/SP1. This position is representative of noise levels at the nearest noise sensitive receptors.

3.2 Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 12:00 hours on Friday 12th February and 10:00 hours on Monday 15th February 2021.

3.3 The following equipment was used during the CSA survey:

- Rion Sound Level Meter type NA28;
- Rion Sound Level Calibrator type NC-74.

3.4 The calibration of the sound level meter was verified before and after use. No significant calibration drift was detected.

3.5 The weather during the survey was dry with generally light winds, which made the conditions for the measurement of environmental noise.

3.6 Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use, and* BS4142:2014 *Methods for rating and assessing industrial and commercial sound.*

4.0 RESULTS

4.1 Figures AS11691/TH1-TH3 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the monitoring position.

4.2 The background noise climate at the property is currently determined by road traffic noise from the surrounding roads. Daytime construction works were being carried out in the property and neighbouring properties during Friday 12th and Monday 15th February. These periods have been excluded from the analysis.

4.3 The measured typical background and average noise levels from them monitoring positions are presented below.

MONITORING PERIOD	MINIMUM $L_{A90,5MIN}$	AVERAGE $L_{AEQ,T}$
Daytime 07:00-23:00 Hours	39 dB	50 dB
Night-time 23:00-07:00 hours	33 dB	44 dB

Table 4.1- Minimum measured background and average noise levels [dB ref. 20 µPa]

5.0 DESIGN CRITERIA

5.1 LOCAL AUTHORITY REQUIREMENTS

5.1.1 Camden Council adopted the new Local Plan on 3 July 2017 which describes 'noise thresholds' in Appendix 3.

5.1.2 Survey measurement procedures for fixed plant noise assessments and determination of the typical background noise level should follow the methodology set out in BS4142:2014 *Methods for rating and assessing industrial and commercial sound*. The subsequent assessment of fixed plant noise emissions does not need to be in accordance with BS4142:2014 where character penalties could be imposed. Instead, the policy requires the plant noise emissions at the nearest residential receptor to be 10 dB below the typical background ($L_{A90,15min}$) during the proposed operational period or if tonal, 15 dB below the typical background ($L_{A90,15min}$) during the proposed operational period.

5.1.3 Noise generated by the proposed plant is not expected to have tonal content. The noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should, therefore, be set to the levels detailed in the table below.

DAYTIME 07:00-23:00 HOURS	NIGHT-TIME 23:00-07:00 HOURS
29 dB	23 dB

Table 5.1 - Proposed design noise criteria [dB ref. 20 µPa]

6.0 PREDICTED NOISE IMPACT

6.1 PROPOSED PLANT

6.1.1 The selected plant has been confirmed as:

- 1no. Pack2-12 Nibe Air source heat pump pack F2040-12.

6.1.2 The sound power level generated by the air source heat pump has been confirmed by the manufacturer to be L_w 57dB(A). No spectral data has been provided by the manufacturer. Representative spectral content for a similar unit has been applied for the purposes of this assessment.

6.2 PREDICTED NOISE LEVELS

6.2.1 Following an inspection of the site, Receptor A and Receptor B have been determined as being approximately 9m and 26m from the plant location respectively.

6.2.2 The plant noise level at the nearest noise sensitive receiver has been calculated on the basis of manufacturer's data and drawings available at the time of writing.

6.2.3 Screening losses afforded by the plant location have been included in the prediction of the cumulative plant noise level at the receivers. This screening is due to the roof parapet and proposed glass balustrade around the roof edge.

6.2.4 A summary of the calculation is shown in Appendix B, with results shown below.

RECEPTOR	PREDICTED NOISE LEVEL	24 HOUR NOISE CRITERION
Receptor A	L_{Aeq} 23 dB	L_{Aeq} 23 dB
Receptor B	L_{Aeq} 12 dB	L_{Aeq} 23 dB

Table 6.1- Proposed design noise criteria [dB ref. 20 µPa]

6.2.5 Further calculations to the façade of the adjacent attached dwelling (no. 5) show lower noise levels than Receptor A.

6.2.6 The predicted noise level at all receptors shows compliance with Camden Council's requirements.

7.0 CONCLUSION

7.1 An environmental noise survey has been undertaken at 4 Oak Hill Park Mews, London by Clarke Saunders Associates between Friday 12th February and Monday 15th February 2021.

7.2 The environmental noise survey data collected has been used to set design criteria for the control of plant noise emissions to noise sensitive properties, in accordance the London Borough of Camden's requirements.

7.3 Data for the proposed Nibe air source heat pump have been used to predict the noise impact of the new plant on neighbouring residential properties in two locations.

7.4 Compliance with the noise emission design criteria has been demonstrated. No further mitigation measures are, therefore, required for external noise emissions.

Daniel Saunders MIOA
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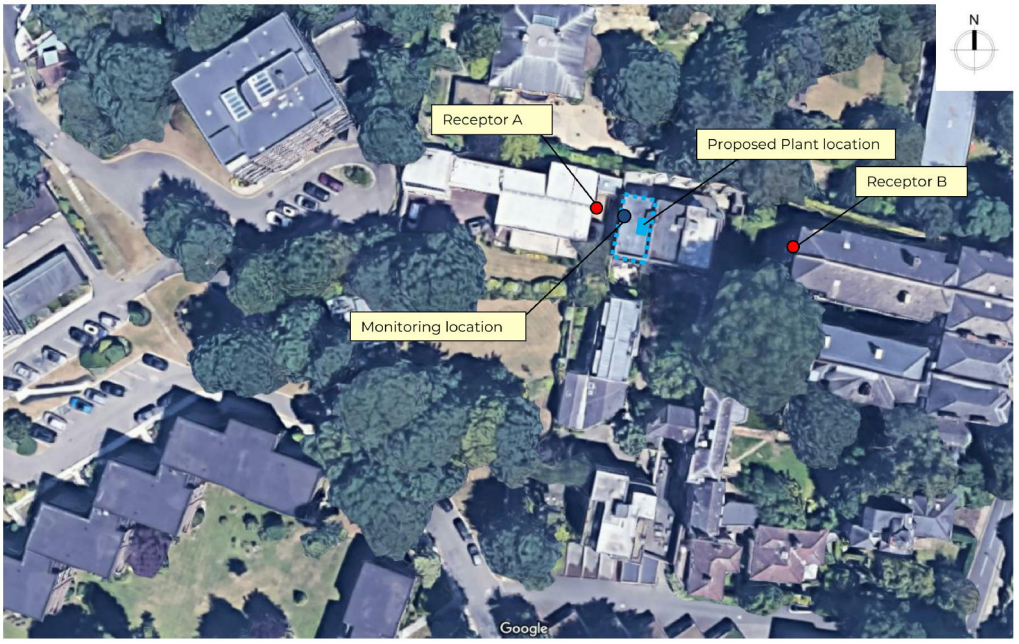

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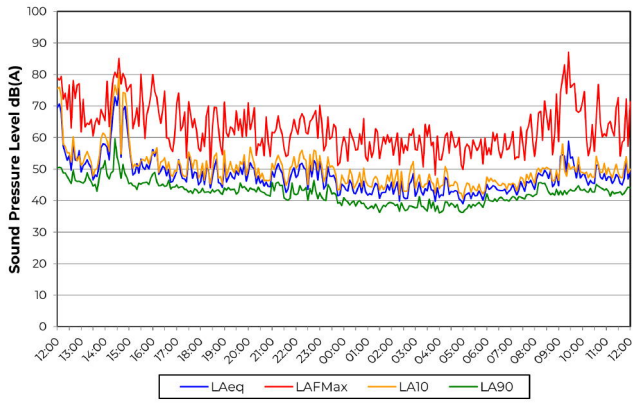
Figure AS11891/SP1

4 Oak Hill Park Mews

Environmental Noise Time History

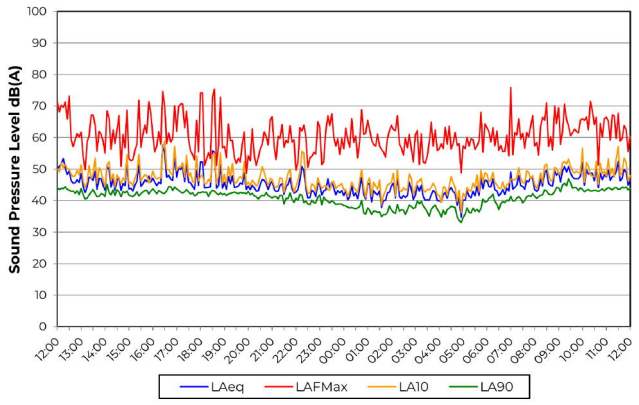


Friday 12 February to Saturday 13 February 2021

Figure AS11891/TH1

4 Oak Hill Park Mews

Environmental Noise Time History

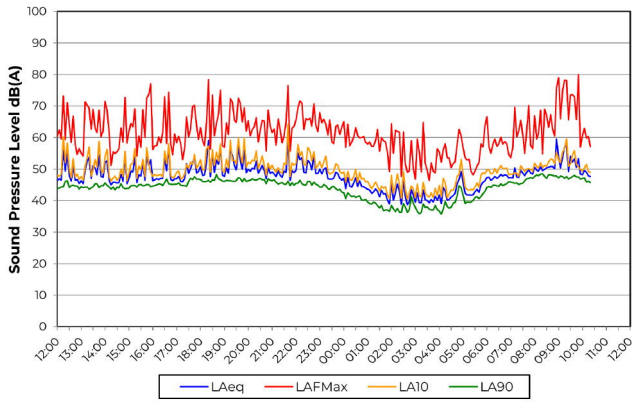


Saturday 13 February to Sunday 14 February 2021

Figure AS11891/TH2

4 Oak Hill Park Mews

Environmental Noise Time History



Sunday 14 February to Monday 15 February 2021

Figure AS11891/TH3

APPENDIX A

ACOUSTIC TERMINOLOGY AND HUMAN RESPONSE TO BROADBAND SOUND

1.1 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.

L_{max}: The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 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:

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

1.3 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

1.4 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.

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APPENDIX B
AS11891 4 Oak Hill Park Mews
Plant Noise Assessment

Receptor A		Frequency, Hz								
		63	125	250	500	1000	2000	4000	8000	dB(A)
Nibe F2040-12Kw	*L_w	65	59	60	56	51	46	39	25	57
Number of units	1	0	0	0	0	0	0	0	0	
Lw to Lp		-5	-5	-5	-5	-5	-5	-5	-5	
Directivity		1	2	2	3	3	4	4	4	
Screening^		-7	-9	-11	-13	-16	-18	-18	-18	
Distance loss	9 m	-19	-19	-19	-19	-19	-19	-19	-19	
Total L_p at the receptor, dB		35	28	27	22	15	8	1	-13	23

Receptor B		Frequency, Hz								
		63	125	250	500	1000	2000	4000	8000	dB(A)
Nibe F2040-12Kw	*L_w	65	59	60	56	51	46	39	25	57
Number of units	1	0	0	0	0	0	0	0	0	
Lw to Lp		-5	-5	-5	-5	-5	-5	-5	-5	
Directivity		-1	-2	-3	-7	-9	-8	-8	-8	
Screening^		-5	-5	-6	-6	-7	-9	-11	-14	
Distance loss	26 m	-28	-28	-28	-28	-28	-28	-28	-28	
Total L_p at the receptor, dB		26	19	18	9	2	-4	-14	-30	12

24 hour Design Criterion 23 dB(A)

*assumed spectrum for similar unit.

^ screening limited to 18dB loss