Capital Noise
Acoustic Consultants

Noise Assessment

Report

3-Space UK Limited

A report giving an assessment of the noise impact of two proposed condenser units at 21 Farringdon Road, London, EC1M 3HA

Assessment dates: 5-6 September 2018

Prepared for 3-Space UK Ltd.

This report is issue number 2 dated: 28 November 2018

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1 Introduction

It is proposed to install two air conditioning condenser units on the roof of 21 Farringdon Road, London, EC1M 3HA. This report assesses the noise impact of the units.

2 Specification of the condenser units

There would be two units:

Daikin RXYSQ5T8V mini-VRB condensing unit. This would run for 24 hours a day and would emit a sound pressure level of 51 dB $L_{Aeq,T}$ at 1.0 m. When the unit is in operation the sound emitted is constant and so it is assumed that it would emit a sound pressure level of 51 dB $L_{Aeq,T}$ at 1.0 m.

Daikin RZQSG71L3V1 split condensing unit. This would run for during office hours only and would emit a sound pressure level of 49 dB $L_{Aeq,T}$ at 1.0 m. When the unit is in operation the sound emitted is constant and so it is assumed that it would emit a sound pressure level of 49 dB $L_{Aeq,T}$ at 1.0 m.

3 Measurement of the existing sound levels

The existing sound levels were measured on the roof of the building as close as possible to the façade of the nearest residents over a 24 hour period.

The background sound level during the day was 59 dB $L_{A90,(16\ hours)}$.

The background sound level during the night was 51 dB $L_{A90,(8\ hours)}$.

See Appendix I on page 2.

4 Assessment of the future sound levels

4.1 Assessment Criterion

The noise predicted to emanate from the condensing units will be assessed in accordance with LBC Policy for “Industrial and Commercial Noise Sources” (Appendix 3 of the Camden Local Plan 2017), which states that “levels of plant noise at the nearest noise sensitive façade complies with the Council’s plant noise criterion of 10dBA or more below background noise”.

4.2 Assessment of the sound levels

	During the day	During the night
Predicted sound pressure level	29 dB $L_{Aeq,(16\ hours)}$	27 dB $L_{Aeq,(8\ hours)}$
Measured background sound level	59 dB $L_{A90,(16\ hours)}$	51 dB $L_{A90,(8\ hours)}$
Difference	-30 dB	-24 dB

5 Conclusion

The predicted sound pressure levels, both during the day and at night comply with the council’s plant noise criterion of 10 dB or more below background sound.

Appendix I: 24 hour sound monitoring survey results

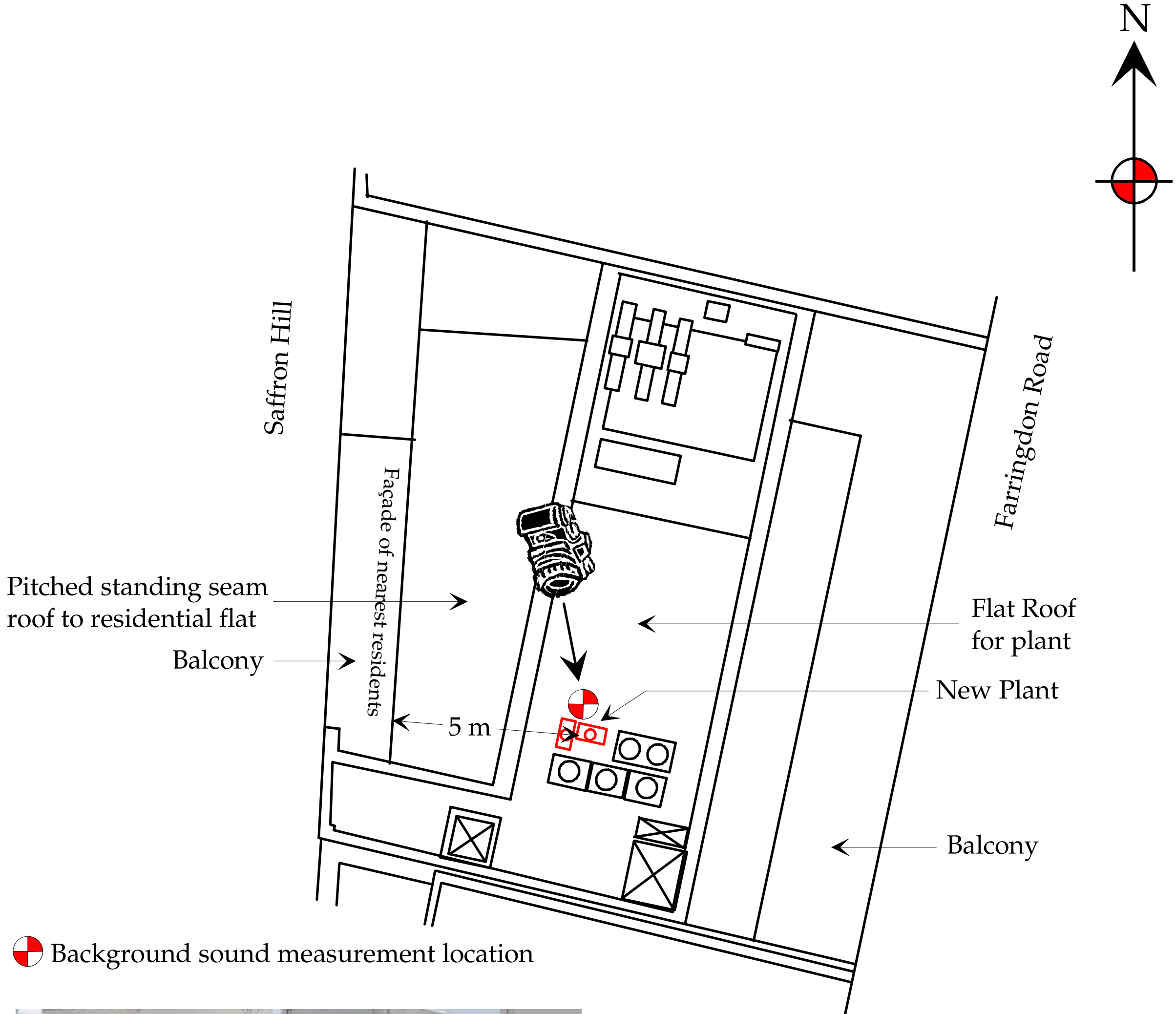
The following results were obtained over a 24 hour period Wednesday 5 September 2018 - Thursday 6 September 2018:

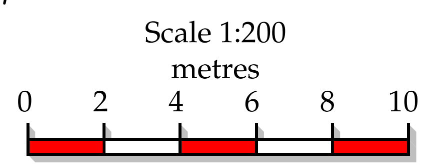
Time	Measured sound pressure levels	
	Ambient sound levels $L_{Aeq\ (1\ hour)}$	Background sound levels $L_{A90,(1\ hour)}$
	dB	dB
2:00 pm - 3:00 pm	61	58
3:00 pm - 4:00 pm	60	58
4:00 pm - 5:00 pm	63	60
5:00 pm - 6:00 pm	62	59
6:00 pm - 7:00 pm	61	58
7:00 pm - 8:00 pm	61	57
8:00 pm - 9:00 pm	60	57
9:00 pm - 10:00 pm	60	56
10:00 pm - 11:00 pm	59	54
11:00 pm - 12:00 am	55	48
12:00 am - 1:00 am	52	45
1:00 am - 2:00 am	52	44
2:00 am - 3:00 am	50	44
3:00 am - 4:00 am	51	44
4:00 am - 5:00 am	56	44
5:00 am - 6:00 am	57	51
6:00 am - 7:00 am	67	59
7:00 am - 8:00 am	66	57
8:00 am - 9:00 am	67	60
9:00 am - 10:00 am	67	61
10:00 am - 11:00 am	64	59
11:00 am - 12:00 pm	62	59
12:00 pm - 1:00 pm	64	61
1:00 pm- 2:00 pm .	63	60

The ambient level during the day was 63 dB $L_{Aeq\ (16\ hours)}$ and the background sound level during the day was 59 dB $L_{A90,(16\ hours)}$.

The ambient level during the night was 59 dB $L_{Aeq\ (8\ hours)}$ and the background sound level during the night was 51 dB $L_{A90,(8\ hours)}$.

Figure: Plan of the environs





Appendix II: Calculation of predicted sound pressure levels

Distance to nearest residents' façade r_m = 5 m
Measurement distance: r_a = 1.0 m
Reduction due to distance (see Appendix III on page 5): 20 log r_a/r_m = 20 log 5/1 = 14 dB
Reduction due to screening (see Appendix IV on page 5): 10 dB

	Sound level during the day	Sound level during the night
Daikin RXYSQ5T8V mini-VRB condensing unit's sound at 1.0 m	51 dB $L_{Aeq\ (16\ hours)}$	51 dB $L_{Aeq\ (8\ hours)}$
Daikin RZQSG71L3V1 split condensing unit's sound at 1.0 m . . .	49 dB $L_{Aeq\ (16\ hours)}$	Not in operation
Total sound at 1.0 m	53 dB $L_{Aeq\ (16\ hours)}$	51 dB $L_{Aeq\ (8\ hours)}$
Less reduction for distance	14 dB	14 dB
Less reduction for screening	10 dB	10 dB
Total sound at nearest residents' façade	29 dB $L_{Aeq\ (16\ hours)}$	27 dB $L_{Aeq\ (8\ hours)}$

Appendix III: Derivation of the equation predicting the reduction of sound with distance

Consider the case of sound radiating spherically. The sound intensity decreases with the square of the distance from the source.

I is proportional to $\frac{1}{r^2}$

where I is sound intensity &
r is the distance from source to receiver.

$$\frac{I_r}{I_R} = \frac{R^2}{r^2}$$

where I_r = intensity at a distance r from the source & I_R = intensity at a distance R from the source.

If L_r = sound pressure level in decibels at distance r from the source, then, for spherical radiation:

$$L_r - L_R = 10 \log_{10} \frac{I_r}{I_R}$$
$$= 10 \log_{10} \frac{R^2}{r^2}$$
$$= 20 \log_{10} \frac{R}{r} \text{ dB}$$

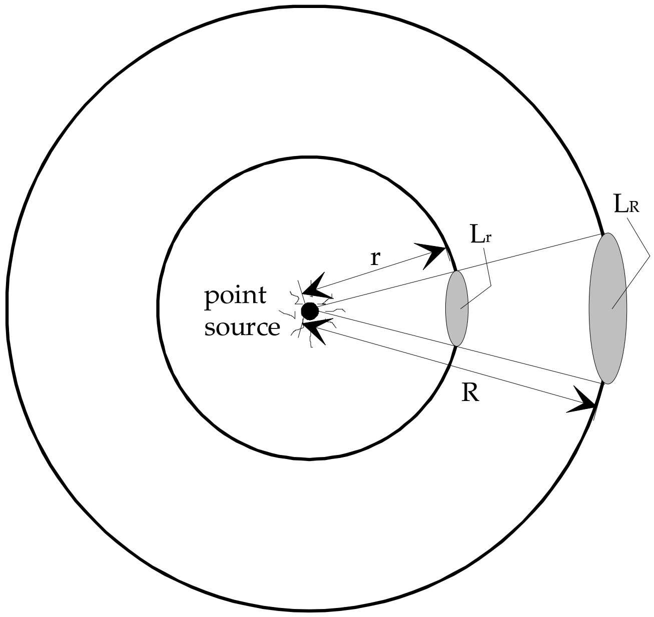
From the above equation, to calculate the reduction of sound from the measurement location to the assessment location, or, in other words, the noise correction to be deducted from the value measured at the measurement location:

$= 20 \log r_a/r_m$ dB

where

r_a is the distance from the noise source to the assessment location (m)

r_m is the distance from the noise source to the measurement location, a distance sufficiently close to the source for the effect of residual noise on the measurement to be taken into account or discounted, yet far enough away for the source to be considered to be a point source (m)



Appendix IV Reduction in sound by screening

Reference to the BS 5228-1:2009 paragraph F.2.2.2.1 (page 129) gives guidance stating *In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and 10 dB when the noise screen completely hides the source from the receiver.*

As the condensers would be completely hidden from view from the receiver a sound reduction of 10 dB will be assumed.

Appendix V: Measurement equipment

Sound Level Meter

The background and ambient sound levels were measured using a Norsonic Nor-116 (conforming to class 1 of BS EN 61672-1:2003 *Electroacoustics. Sound Level Meters. Specifications* & type 1 of the former standard BS EN 60804) real time sound analyser, with a GRAS-41AL-S weather protected microphone.

The meter was calibrated before & after usage using a type 1 Norsonic Nor-1251 Acoustic calibrator.

All levels are measured by the meter accurate to one decimal place of a decibel, however, they have been reported to the nearest decibel.

Item	Date of calibration
Meter	30 January 2018
Preamplifier	26 January 2018
Microphone	26 January 2018
Calibrator	26 January 2018

Appendix VI: The author and acoustic consultant

John Waring, Acoustic Consultant

Qualifications of the Acoustic Consultant

B.Sc. in Civil Engineering.
M.Sc. in Acoustics, Vibration and Noise Control.
MIOA full member of the Institute of Acoustics.

Brief Curriculum Vitae of the Acoustic Consultant

The acoustic consultant has been practising since 1989 following a career in the building industry. John Waring was a civil engineer with Gallifords, a technical adviser at Torvale Woodcemair Ltd., and was the technical manager at Kingspan Insulation Ltd.

He currently is, or has been, the acoustic consultant for Hugo Boss, the Wahaca chain of restaurants, Jaguar LandRover, Gala Coral Group bingo halls and casinos, Westons Cider, Hobsons Brewery, Tyrrells Potato Chips, Bentley Motor Cars, Dixons Stores Group, West Midlands Safari Park, GlaxoSmithKline, Ladbrokes, A.D.A.S., Hyder Industrial Limited (now United Green Energy), ThyssenKrupp GmbH, Wiggin Special Metals (Hereford), Interserve, Beacon Radio, Harper Builders, South Shropshire District Council, South Shropshire Housing Association, Wrekin Construction, Somerfield stores, Mowlem Midlands, Costains, Pubmaster, Marston plc brewers, Kendrick Construction, Ladbrokes, Perkins Engines and William Hill bookmakers amongst others.

He has made television appearances as a consultant for both BBC and ITV. He operates from Ludlow, covering the entire country.

Appendix VII: Revision history

Issue No.	Date	Details
1	20 September 2018	First issue
2	28 November 2018	Revised to assess noise to the Council's plant noise criterion.

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