

FLAT 14, 25 SHELTON STREET, SOHO

Plant Noise Assessment

Reference: 11148.RP01.PNA.0 Prepared: 13 August 2021 Revision Number: 0

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0	First issue of report	13 August 2021	David Johnston	James Stokes

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.



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1. INTRODUCTION

It is proposed to locate new items of plant on the roof of 25 Shelton Street, Soho. The plant is to serve Flat 14. As part of the planning application, the London Borough of Camden (LBC) requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emission limits in accordance with LBC's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

A summary of acoustic terminology is included in Appendix A.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix E).

The plant is proposed to be installed to the rear of the building at roof level. Although Shelton Street itself is a busy shopping street, the rear of the property overlooks an internal courtyard. The noise environment for the uppermost windows overlooking the courtyard (both on Shelton Street and neighbouring Earlham Street) is dominated by the surrounding road network as well as existing plant installations to the rear of 40 Earlham Street, and significant plant installations on the roofs of 44 and 32 Earlham Street.

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following period:

15:00 4 August to 09:30 5 Aggust 2021.

Due to access arrangements, it was not possible to obtain a full 24-hour period, however the setting of plant noise limits is invariably dictated by the noise levels measured during the quieter times of the day and night, which have been captured in our survey. We therefore believe the survey still to be fit for purpose.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period. However, based on observations during the site visits and weather reports for the area, conditions were generally considered suitable for obtaining representative noise measurements, being predominantly dry with little wind.

Measurements were made of the LA90, LAmax and LAeq noise levels over sample periods of 15 minutes.

3.2 Measurement Location

To determine the existing noise climate at the nearest noise-sensitive receptor to the future plant measurements were undertaken with the microphone mounted on a tripod to the rear of 25 Shelton Street at 6^{th} floor level, overlooking the rear lightwell.

The measurement position is also illustrated on the site plan attached in Figure 2 (Appendix E).

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B.

The sound level meter was calibrated both prior to and on completion of the survey with no significant calibration drift observed.

3.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-2 (Appendix E). Additionally, a statistical overview of the most frequently occurring LA90,15minutes noise levels are provided on the attached histogram Graph 3.

The lowest *L*_{A90} and the period averaged *L*_{Aeq} noise levels measured are summarised in Table 1.

Table 1 – Measured Levels

	Measured Levels				
Measurement Period	Lowest Lago, 15min (dB)	L _{Aeq} (dB)			
Daytime (07:00 – 23:00)	43	48			
Night-time (23:00 – 07:00)	40	44			

4. PLANT NOISE CRITERIA

The requirements of Camden Council Environmental Health Department regarding new building services plant are outlined in the Camden Local Plan (2017) as follows:

"[...] it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases, a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

Based on the measured noise levels provided in Section 3.0 the following noise limits are therefore proposed at the nearest noise-sensitive receptors to the proposed plant:

•	Daytime	(07:00 to	23:00)	33 dBA
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Night-time (23:00 to 07:00) 30 dBA

In line with the Camden Local Plan, should the proposed plant be identified as having intermittent or tonal characteristics, a further 5dB penalty should be subtracted from any of the above proposed noise emission limits.

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by Theme2Architects and is described in the following sections.

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Manufacturer/Model/Duty	Table 2 – Plant Types Plant Type
Mitsubishi Mini VRF PUMY-P200YKM2	Air Source Heat Pump

A selection has not yet been made for the wine cellar heat pump, however from experience these units run at very low duties and are generally rated at a sound pressure level of less than 50 dBA. 50dBA will therefore be the limiting level for this item of plant when it is selected.

5.2 Plant Locations

2No. of the condensers are to be mounted between the staircase pavilion leading to the roof terrace and the pitched roof, facing the roof. The smaller heat pump is to be positioned against the boundary wall with the neighbouring office also facing the pitched roof. The equipment positions are indicated on the site plan in Figure 1 and Figure 2 in Appendix E.

5.3 Plant Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The associated plant noise levels are detailed as follows:

							Table 3 –	Plant Noi	ise Levels
11-14	Demonster	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
Unit	Parameter	63	125	250	500	1k	2k	4k	8k
PUMY-P200YKM2	L _P at 1m (Heating)	63	61	61	58	57	52	48	41
	L _P at 1m (Cooling)	65	59	54	53	52	46	41	35
	L _P at 1m (Cooling Silent Mode)	61	56	52	50	49	44	38	32

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

5.4 Location of the Nearest Noise-Sensitive Receptors

Based on observations made on site and discussions with the design team we understand the nearest noisesensitive receptors to the proposed plant to belong to the rear windows of the flats at 40 Earlham Street, overlooking the internal courtyard, at a distance of approximately 14m from the plant and screened from view by the roof edge. The receptors are shown in the site plan in Figure 1 in Appendix E.

5.5 Calculation of Noise Levels at Nearest Noise-Sensitive Receptors

Our calculation method for predicting noise levels from the proposed plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term SPL / SWL
- Distance Attenuation
- Directivity
- Screening

Calculation sheets are attached for further information in Appendix C.

The results of the calculations indicate the following noise levels at the nearest affected residential windows when assessed in heating mode (worst-case):

	T	Table 4 – Predicted Noise Levels		
On anothing Design	Noise Level (dB) at Receptor 1 – 40 Earlham Street			
Operating Period	Prediction	Criterion		
Daytime (07:00 – 23:00)	29	33		
Night-time (23:00 – 07:00)	29	30		

Noise from the proposed plant installations is within the criteria required by the London Borough of Camden.

6. VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that condensing units be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

It is important 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

RBA Acoustics have undertaken noise monitoring at Flat 14, 25 Shelton Street, Soho. The measured noise levels are presented within this report. The resultant noise levels have been used to determine the required criteria for atmospheric noise emissions from the proposed plant installations.

The results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by London Borough of Camden. As such, the proposed plant installations should be considered acceptable in terms of noise.

Appendix A – Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
Leq	The level of a notional steady sound which, over a stated period of time, <i>T</i> , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
LAeq, T	The A-weighted level of a notional steady sound which, over a stated period of time, <i>T</i> , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
Lan (e.g. La10, La90)	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
NR	Noise Rating – A single figure term to describe a measured noise level which considers the frequency content of the noise, generally used for internal noise level measurements (particularly mechanical services plant).

Appendix B – Instrumentation

The following equipment was used for the measurements.

Table B1– Equipment Calibration Details

Manufasturas	Madal Tura	Coriol No.	Calibration			
Manufacturer	моает туре	Serial No.	Certificate No.	Expiry Date		
Norsonic Type 1 Sound Level Meter	Nor140 1406971		U32753	2 Sentember 2021		
Norsonic Pre Amplifier	orsonic Pre Amplifier 1209 21571		002700			
GRAS ½" Microphone	40AF	207393	36111	22 October 2022		
Norsonic Sound Calibrator	1251	35016	U32751	2 September 2021		

Appendix C – Plant Calculations

Table C1 – Example Calculation

Deservator	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								
Parameter	63	125	250	500	1000	2000	4000	8000	UDA
L_P at 1m (Heating)	63	61	61	58	57	52	48	41	61
Second Unit	+3	+3	+3	+3	+3	+3	+3	+3	
Directivity losses	0	0	-2	-2	-4	-4	-6	-6	
Distance losses @ 14m	-23	-23	-23	-23	-23	-23	-23	-23	
Screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise level at receiver	33	31	29	26	23	18	12	5	28

Table C2 – Summary Noise Levels

Unit	Received noise level (dB) at 1m from Receptor 1
Mitsubishi	28
Wine Cooler	23
Total Received Level	29

Appendix D – CDM Considerations

The likelihood the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 Remote (almost never)
- 2 Unlikely (occurs rarely)
- 3 Possible (could occur, but uncommon)
- 4 Likely (recurrent but not frequent)
- 5 Very likely (occurs frequently)

The severity of harm can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 Trivial (e.g. discomfort, slight bruising, self-help recovery)
- 2 Minor (e.g. small cut, abrasion, basic first aid need)
- 3 Moderate (e.g. strain, sprain, incapacitation for more than 3 days)
- 4 Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
- 5 Fatal (single or multiple)

The rating value is obtained by multiplying the two scores and is then used to determine the course of action.

Table D1 – Risk Ratings

Rating Bands (Severity x Likelihood)						
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)				
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level				

The following hazards pertinent to our design input have been identified and control measures suggested:

Hazard	Risk Of	At Risk	Rating			Control Managuras	Controlled		
			L	S	R		L	S	R
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3
Attenuators/ Acoustic Screening	Strain of neck, limbs or back.	Contractors	3	4	12	Provide sufficient manpower/ lifting gear	1	4	4

L: Likelihood S: Severity R: Rating

Table D2 – Risk Assessment

Appendix E – Graphs and Site Plans

Flat 14, 25 Shelton Street, Soho

L_{Aeq} Time History

Rear Terrace, Wednesday 4 August to Thursday 5 August 2021



RBA ACOUSTICS Project: 11148 Graph 1

■ L_{Aeq}

Flat 14, 25 Shelton Street, Soho

 $L_{Amax,f} \, and \, L_{A90} \, Time \, History$

Rear Terrace, Wednesday 4 August to Thursday 5 August 2021



■ L_{Amax,f} ■ L_{A90}

Flat 14, 25 Shelton Street, Soho

L_{A90,15 minutes} Histogram

Rear Terrace, Wednesday 4 August to Thursday 5 August 2021



Graph 3







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