DOUGHTY STREET CHAMBERS

10 & 11 CONDENESER PLANNING APPLICATION

fletcher priest architects
london + köln + riga

28.02.2018

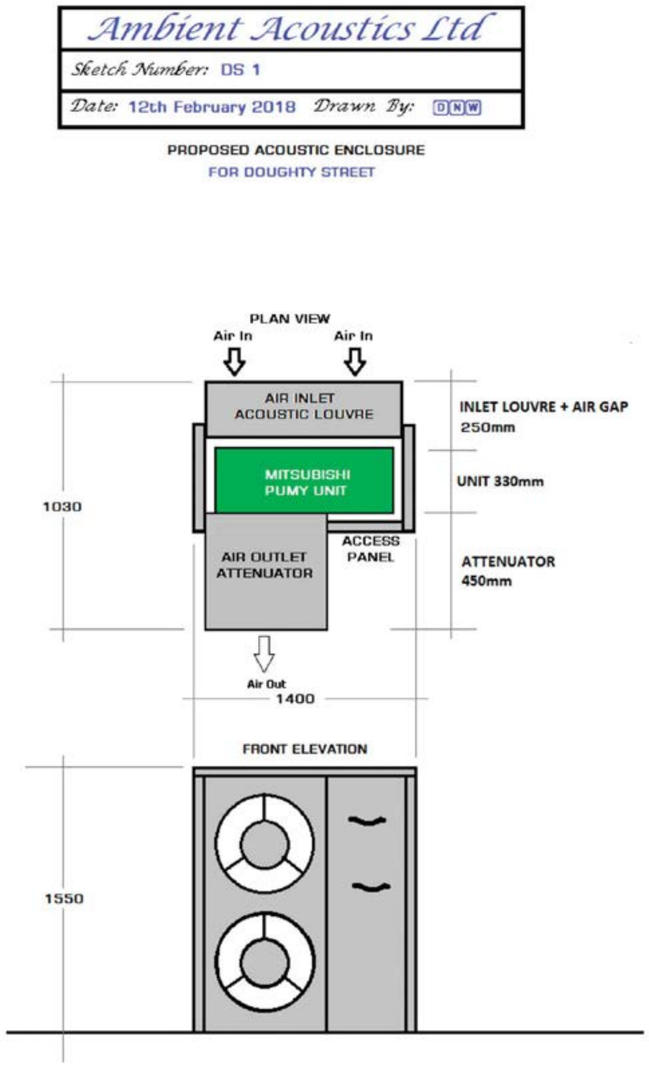
PROPOSAL :

WE ARE PROPOSING TO REPLACE THE EXISTING EXTERNAL CONDENSERS WITH NEW ACOUSTICALLY APPROVED CONDENSERS.

MEASUREMENTS OF THE EXISTING BACKGROUND NOISE LEVELS AT THE REAR OF 10&11 DOUGHTY STREET HAVE BEEN UNDERTAKEN. THE RESULTS OF THE MEASUREMENTS HAVE BEEN USED IN ORDER 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 PLANT ARE WITHIN THE CRITERION REQUIRED BY THE LONDON BOROUGH OF CAMDEN, PROVIDED THE PROPOSED ACOUSTIC MITIGATION IS INCLUDED IN THE DESIGN

WITHOUT THE NEED FOR ADDITIONAL NOISE MITIGATION. AS SUCH, THE PROPOSED PLANT INSTALLATION SHOULD BE CONSIDERED ACCEPTABLE.



THE ENCLOSURE WILL ACHIEVE THE 4DBA NOISE

PROPOSED CONDENSER

10-11 DOUGHTY STREET, LONDON, WC1

Plant Noise Assessment

REPORT 8398/PNA
Prepared: 4 December 2017
Revision Number: 0

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Plant Noise Assessment

10-11 DOUGHTY STREET, LONDON, WC1

REPORT 8398/PNA
Prepared: 4 December 2017

Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	4 Dec 2017	James Stokes	Robert Barlow

Terms of contract:

RBA Acoustics Ltd has prepared this report in accordance with our Scope of Work 8398/ACB7 dated 10 November 2017. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

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 again will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

In line with our Environmental Policy, up to two hard copies of the report will be provided upon request. Additional copies of the report, or further hard copies of revised reports, would be subject to an administrative cost of £20.00 (+VAT) per copy.

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1.0 INTRODUCTION

It is proposed to redevelop the site at 10-11 Doughty Street, London with a refurbishment of the existing building to be used as office space. We understand that plant has been proposed at the rear of the development on the rooftop.

As part of the planning application, The London Borough of Camden (LBC) requires consideration be given to atmospheric noise emissions from the proposed equipment at the nearest noise-sensitive properties. RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emissions in accordance with LBC's requirements. This report presents the results of the noise measurements, associated criteria and provides the required noise assessment.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 General

In accordance with the requirements of the Local Authority, monitoring of the prevailing background noise was undertaken from Wednesday 29 November to Friday 1 December 2017. During the survey periods the weather conditions were generally appropriate for the noise measurement exercise, it being predominantly dry with light winds. Measurements were made of the L_{eq}, L_{A90} and L_{A1} noise levels over sample periods of 15 minutes duration.

2.2 Measurement Location

Measurements were undertaken with unattended noise monitoring equipment installed in two locations:

Measurement Position - Rear Rooftop (at first floor level)

The microphone was installed 4m above rooftop level at a distance of 3m from the rear of 10-11 Doughty Street. The measured noise levels are deemed to be representative of those experienced at the residential receptor at 12 Doughty Street. Noise levels at this location were dominated by distant road traffic noise and local existing plant associated with the surrounding developments.

The above measurement position is shown on the attached Site Plan 8398/SP1.

2.3 Instrumentation

The following equipment was used for the measurements.

Table 8398/T1 – Equipment Details

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406969	47135222484	11 September 2019
Norsonic Pre Amplifier	1209	21204		
Norsonic ½" Microphone	1225	285599	47135222484	11 September 2019
Norsonic Sound Calibrator	1251	34966	U26567	11 September 2019

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

3.0 RESULTS

The noise levels at the measurement position are shown as time-histories on the attached chart 8398/S1.

In order to ensure a worst case assessment the lowest background L_{A90} noise levels measured have been used in our analyses. The lowest L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised below.

Table 8398/T2 – Measured Levels

Measurement Period	Measurement Position (Rear rooftop)	
	L_{A90} dB(A)	L_{Aeq} dB(A)
Working day (06:00 - 18:00)	45	57

4.0 CRITERIA

The following is taken from the London Borough of Camden Local Development Plan (issued in June 2017).

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document 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)

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

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}

**10dB should be increased to 15dB if the noise contains audible tonal elements (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The periods in Table C correspond to 0799 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

In accordance with the above we therefore propose that criteria of 10dB below the minimum background L_{A90} should be applied, as measured at 1m from the nearest noise-sensitive receptor, assuming there are no tonal characteristics.

In line with the above requirements we would propose items of mechanical services be designed so that cumulative atmospheric noise emissions from the plant do not exceed the following levels when assessed at the nearest noise-sensitive location:

- Working Daytime Hours (08:00 - 18:00) L_{Aeq} 35 dB

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Proposed Unit

The following unit is proposed:

Rear rooftop

- 1No. Condenser (Mitsubishi PUMY-P200YKM1)

5.2 Position of Unit

The condenser unit is proposed to be installed centrally on the rear rooftop, approximately 2m from the side of the rooftop and 7m from the rear façade of the building. The unit will be 10m from the nearest residential receptor window. The location of the proposed condenser and the nearest receptor are indicated on the attached site plan 8398/GA1.

5.3 Noise Levels

The following plant noise levels have been obtained from the manufacturer for the different modes of operation:

Table 8398/T3 – Plant Noise Data

Unit	Parameter	Sound Level, (dB), at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
PUMY P200YKM1 (Heating)	Lp @ 1m	63	61	61	58	57	52	49	41
PUMY P200YKM1 (Cooling)	Lp @ 1m	64	59	54	53	52	47	41	35

5.4 Location of Nearest Receptors

Residential

The closest residential receptor is at the rear of 17 Doughty Street. The window is located at second floor level, at the same level as the proposed condenser unit. Noise levels at this location are expected to be the same as those measured at our measurement position.

This location is shown on the attached site plan 8398/SP1.

5.5 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed air conditioning units at the nearest resident al window, based on the information stated above, is summarised below.

- Source Term SPL
- 20LogR Distance Attenuation (Divergence)
- Screening
- Directivity

The plant noise calculation sheet is attached in Appendix B.

The following worst-case noise level has been predicted at the nearest affected receptor window with no mitigation:

Table 8398/T4 – Predicted Plant Noise Levels with no acoustic mitigation

Operating Period	Plant Noise Level, L_{Aeq}, dB(A) at Residential Receptor	
	Prediction	Criterion
Working day (08:00 - 18:00)	39	35

Therefore, with no acoustic mitigation, predicted noise from the proposed unit marginally exceeds the target criterion in this location.

We have therefore recommended the following acoustic mitigation.

5.6 Mitigation

In order to meet the proposed noise level criterion at the adjacent residential receptor, we recommend that an acoustic screen is included in the design such that there is no line-of-sight between the window and the unit. Such a screen should be imperforate (i.e. no holes or gaps at junction with floor) and have a minimum density of 12.5kg/m². With the proposed screen, the following plant noise levels are predicted at the receptor which meet the plant noise criterion:

Table 8398/T4 – Predicted Plant Noise Levels with Acoustic Screen mitigation

Operating Period	Plant Noise Level, L_{Aeq}, dB(A) at Residential Receptor	
	Prediction	Criterion
Working day (08:00 - 18:00)	34	35

6.0 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 condenser units located above occupied spaces be isolated from the supporting structure by means of either steel spring isolators or rubber footings. We understand that rubber footings have been proposed, which is in line with our guidance.

7.0 CONCLUSION

Measurements of the existing background noise levels at the rear of 10-11 Doughty Street have been undertaken. The results of the measurements have been used in order 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 plant are within the criteria required by the London Borough of Camden, provided the proposed acoustic mitigation is included in the design. As such, the proposed plant installation should be considered acceptable.

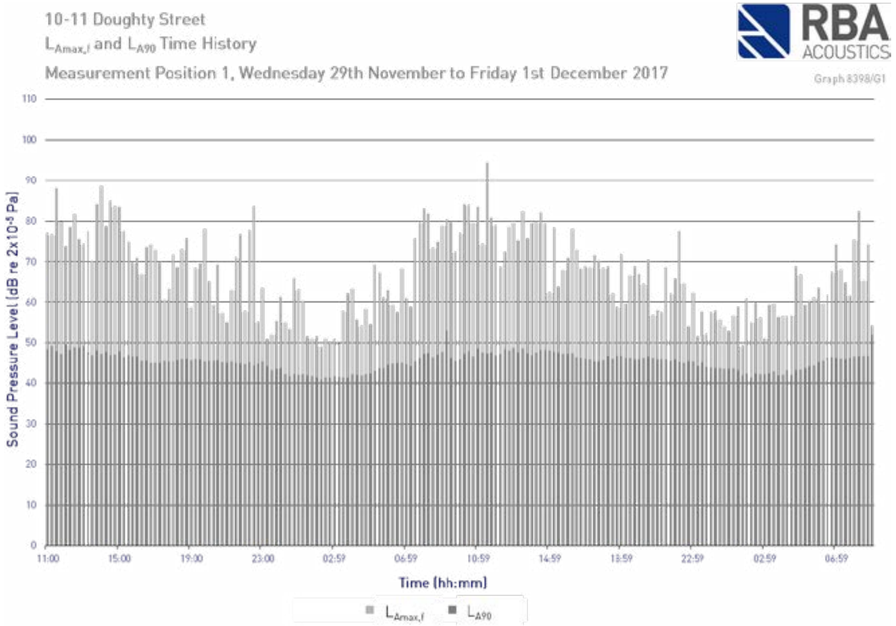
Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as 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 (1 hour).
L_{eq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_n (e.g. L_{10}, L_{90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and 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 the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
L_{max}	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B – Example Plant Calculation

Table B1 Plant Noise Calculation Condenser to Resident at Receptor

Unit	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Pressure Level, Lp @ 1m	63	67	67	58	57	52	49	47	61
Divergence	-20	-20	-20	-20	-20	-20	-20	-20	
	43	47	47	38	37	32	29	27	41
Directivity	0	0	0	0	-4	-7	-7	-7	
	43	47	47	38	33	25	22	14	39
Acoustic Screen	-5	-5	-5	-5	-5	-5	-5	-5	
	38	36	36	33	28	20	17	9	34



10 - 11 Doughty Street, London
Site Plan

Figure 8398/SP1
4 December 2017
Not to Scale

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