SANDY BROWN

Consultants in Acoustics, Noise & Vibration

18035-R02-A

10 August 2020

22 Bedford Row

Planning noise report

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Version	Date	Comments	Author	Reviewer
A	10 Aug 20	Initial issue	Ben Southgate	Robert Burrell

Summary

Sandy Brown has been commissioned by Tuffin Ferraby Taylor LLP to provide acoustic advice in relation to the proposed installation of two new external condenser units at 22 Bedford Row, London.

An environmental noise survey has previously been carried out to determine the existing background sound levels in the area and to set appropriate plant noise limits in line with the requirements of the London Borough of Camden.

The noise survey was performed between 1 February 2018 and 5 February 2018.

The representative background sound levels were $L_{A90,15min}$ 44 dB during the day, and $L_{A90,15min}$ 42 dB during the night.

On the basis of the requirements of the London Borough of Camden, the relevant plant noise limits at the worst affected existing noise sensitive premises would be L_{Aeq} 37 dB during the day, and L_{Aeq} 35 dB during the night. These limits include a +3 dB correction compared to the free-field measurements, to allow for facade reflections.

The plant noise limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be 5 dB more onerous.

An assessment of the proposed condenser unit associated with the development has been carried out. The proposed condenser unit is expected to comply with the relevant noise limits.

Contents

1 Introduction

Sandy Brown has been commissioned by Tuffin Ferraby Taylor LLP to provide acoustic advice in relation to the proposed office fit-out at 22 Bedford Row, London. As part of the office fitout two new external condenser units are proposed to be installed.

An environmental noise survey has previously been undertaken at the site the purpose of which was to establish the existing background sound levels in the vicinity of nearby noise sensitive premises. Appropriate limits for noise egress from building services plant have been set based on the results of the noise survey and the local authority criteria.

An assessment of the new plant has been undertaken to demonstrate compliance with the local authority criteria, with attenuation measures where required. This is further to previous assessments for similar units installed.

This report presents the survey method, results of the environmental noise survey, and a discussion of acceptable limits for noise emission from building services plant.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in blue in Figure 1. The site is located in a predominantly commercial area, with Bedford Row running to the west of the site and Theobald's Road running to the north.

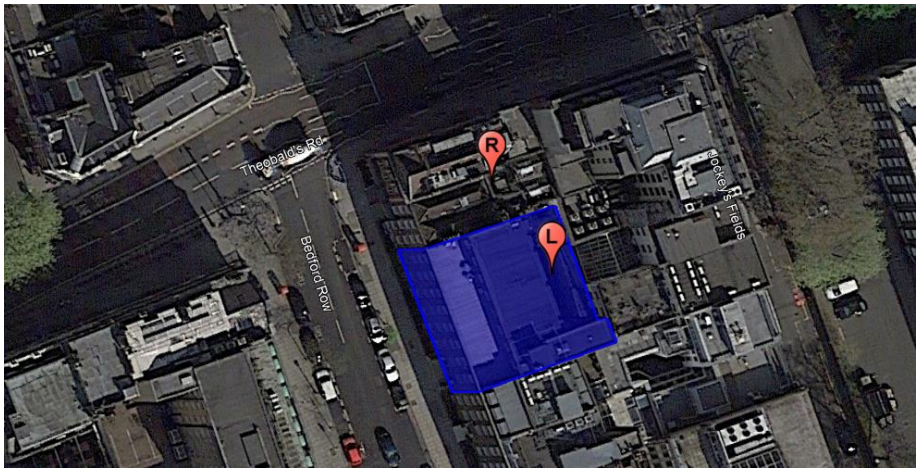


Figure 1 Site map (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is bounded by office buildings to the north, east and south, with an external courtyard at the rear backing onto these. The nearest residential premises is considered to be the upper floor flat at 24 Bedford Row, marked with the letter 'R' in Figure 1.

3 Method

Details of the equipment used, the noise indices and the weather conditions during the survey are provided in Appendix A. Further information on the specific survey method is provided in this section.

Unattended noise monitoring was previously undertaken at the site over 5 days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 15 minute periods between 10:45 on 1 February 2018 and 10:00 on 5 February 2018 The equipment was installed by and collected by Ben Southgate.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2.

The equipment was set up within the rear courtyard of 22 Bedford Row with the microphone situated approximately 1.5 m above ground level and at least 2-3 m from any other reflective surfaces. The measurements are therefore considered to be free field.

Although the measurements were affected by some noise levels from existing plant located within the courtyard, this location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises. This is due to the number of other plant items in the nearby vicinity of the nearest residential receiver.

Figure 2 Photograph of unattended measurement position, 'L'

4 Measurement results

4.1 Observations

The dominant noise sources observed at the site during the survey consisted of existing plant items from 22 Bedford Row as well as the surrounding sites. Aircraft noise was also clearly audible.

Less significant noise sources included road traffic noise from Theobald's Road and some distant construction noise.

4.2 Measurement results

The results of the unattended noise measurements are summarised in the following tables. A graph showing the results of the unattended measurements is provided in Appendix B.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

These levels are considered to be free field levels.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 1 February 2018	-	50
Friday 2 February 2018	53	47
Saturday 3 February 2018	53	54
Sunday 4 February 2018	55	53
Average	54	51

The minimum background sound levels measured during the unattended survey are given in Table 2.

Table 2 Minimum background sound levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{A90,15min}$ (dB)	Night (23:00 – 07:00) $L_{A90,15min}$ (dB)
Thursday 1 February 2018	43 *	42
Friday 2 February 2018	42	41
Saturday 3 February 2018	43	43
Sunday 4 February 2018	44	43
Monday 5 February 2018	49 *	-

* Measurement not made over full period due to monitoring start and end time

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels, day and night time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night time statistical analysis of representative values for the site are given in Appendix B.

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 44 dB during the daytime and $L_{A90,15min}$ 42 dB at night.

5 Building services noise egress limits

5.1 Standard guidance

Guidance for noise emission from proposed new items of building services plant is given in BS 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'.

BS 4142 provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

5.2 Local Authority criteria

The requirements of Camden Borough Council are set out in Table 3 below, which are based on the Lowest Observable Adverse Effect Level (LOAEL) and the Significant Observable Adverse Effect Level (SOAEL). These are taken from the Camden Local Plan.

Table 3 External plant noise limits for Camden Council Borough

Period	LOAEL	LOAEL to SOAEL	SOAEL
Day	'Rating level' 10 dB [1] below background	'Rating level' between 9 dB below and 5 dB above background	'Rating level' greater than 5 dB above background
Night	'Rating level' 10 dB [1] below background	'Rating level' between 9 dB below and 5 dB above background	'Rating level' greater than 5 dB above background

[1] 10 dB should be increased to 15 dB if plant contains audible tonal elements

On the basis of the above, all external plant installed at the site will be designed such that the cumulative level at the nearest noise sensitive receiver is not less than 10 dB below the representative measured background noise level ($L_{A90,15min}$), unless it contains tones or impulsive sound.

5.3 Limits

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the worst affected windows of the nearest noise sensitive premises should not exceed the limits set out in Table 4. These limits include a +3 dB correction compared to the free-field measurements, to allow for facade reflections.

Table 4 Plant noise limits at 1 m from the nearest noise sensitive premises

Time	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	37
Night time (23:00-07:00)	35

The limits set out in Table 4 do not include any allowance for attention catching features. Should plant contain attention catching features, then the limits will be 5 dB more onerous.

6 Plant noise assessment

It is proposed that as part of the fit-out works, two external condenser units will be installed within the rear courtyard of 22 Bedford Row, replacing old units. The locations of the units are shown highlighted in red in Appendix C. An assessment has been undertaken for the units to be located within the courtyard and is based on the noise spectrum of the selected units.

The spectral sound pressure levels used as a basis of the calculations are shown in Table 5.

Table 5 Sound pressure levels used as a basis for the assessment, re. 2×10^{-5} Pa (dB)

	Octave-band centre frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
Condenser noise level at 1 m	65	64	63	59	56	48	46	37	61

It is predicted that the noise level due to the proposed condensers at the nearest noise sensitive premises (24 Bedford Row) will be L_{Aeq} 33 dB. This is less than and complies with the plant noise criteria at night of L_{Aeq} 35 dB.

A breakdown of the calculation is given in Appendix D.

7 Conclusion

A noise survey has been carried out to determine the existing background sound levels in the vicinity of the site and surrounding noise sensitive premises. The representative background sound levels were $L_{A90,15min}$ 44 dB during the day, and $L_{A90,15min}$ 42 dB during the night.

On the basis of the requirements of the London Borough of Camden, the relevant plant noise limits at the worst affected existing noise sensitive premises would be L_{Aeq} 37 dB during the day, and L_{Aeq} 35 dB during the night. These limits include a +3 dB correction compared to the free-field measurements, to allow for facade reflections.

The plant noise limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be 5 dB more onerous.

An assessment of the proposed condenser units associated with the development has been carried out. The proposed condenser unit is expected to comply with the relevant noise limits.

Appendix A

Survey details

Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00320633	Rion	11 May 18	1605234
Microphone	UC-59/03382	Rion	11 May 18	1605234
Pre-amp	NH-25/10641	Rion	11 May 18	1605234
Calibrator	N7-74/34125430	Rion	3 May 18	1605223

Calibration of the sound level meter used for the tests is traceable to national standards. The calibration certificates for the sound level meter used in this survey are available upon request.

The sound level meter and microphone was calibrated at the beginning and end of the measurements using its respective sound level calibrator. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

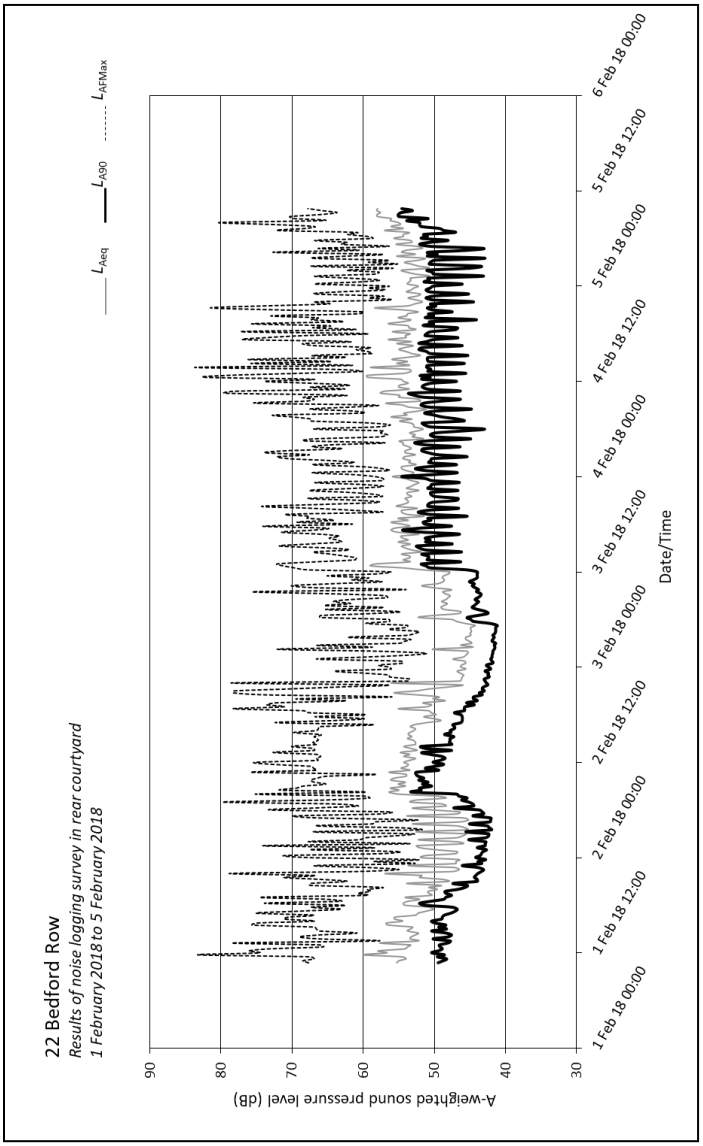
Weather conditions

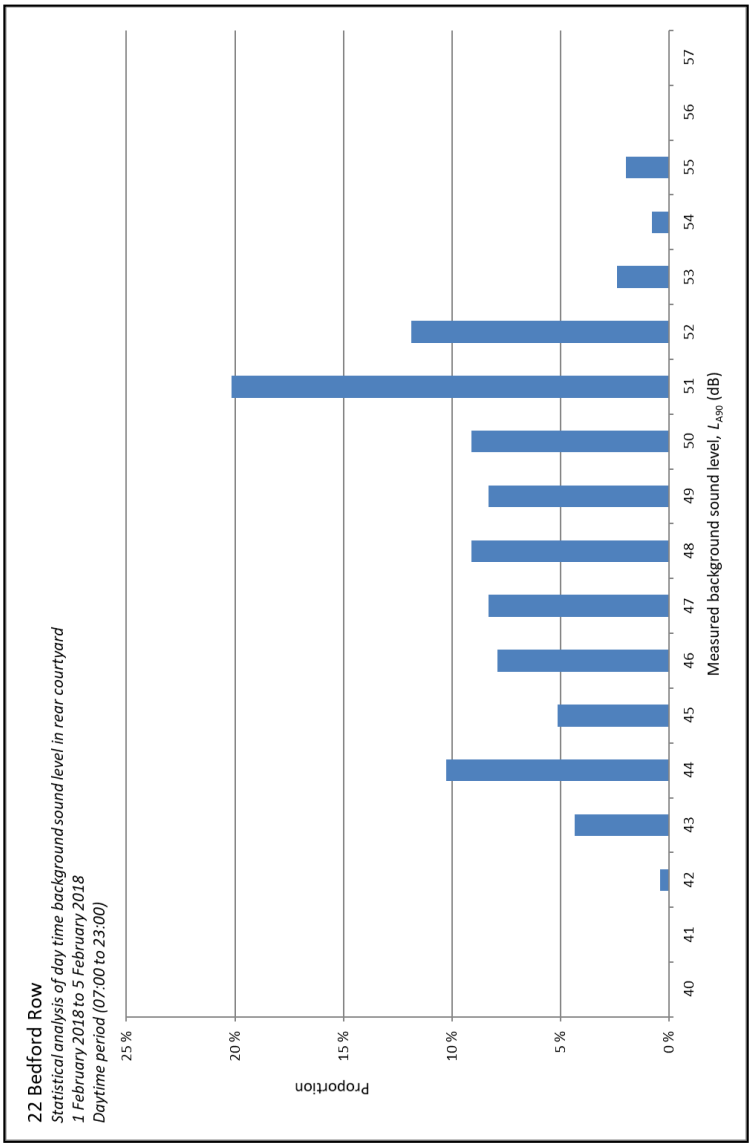
During the unattended noise measurements between 1 February 2018 and 5 February 2018, weather reports for the area indicated that temperatures varied between 2°C at night and 8°C during the day, and the wind speed was less than 5 m/s.

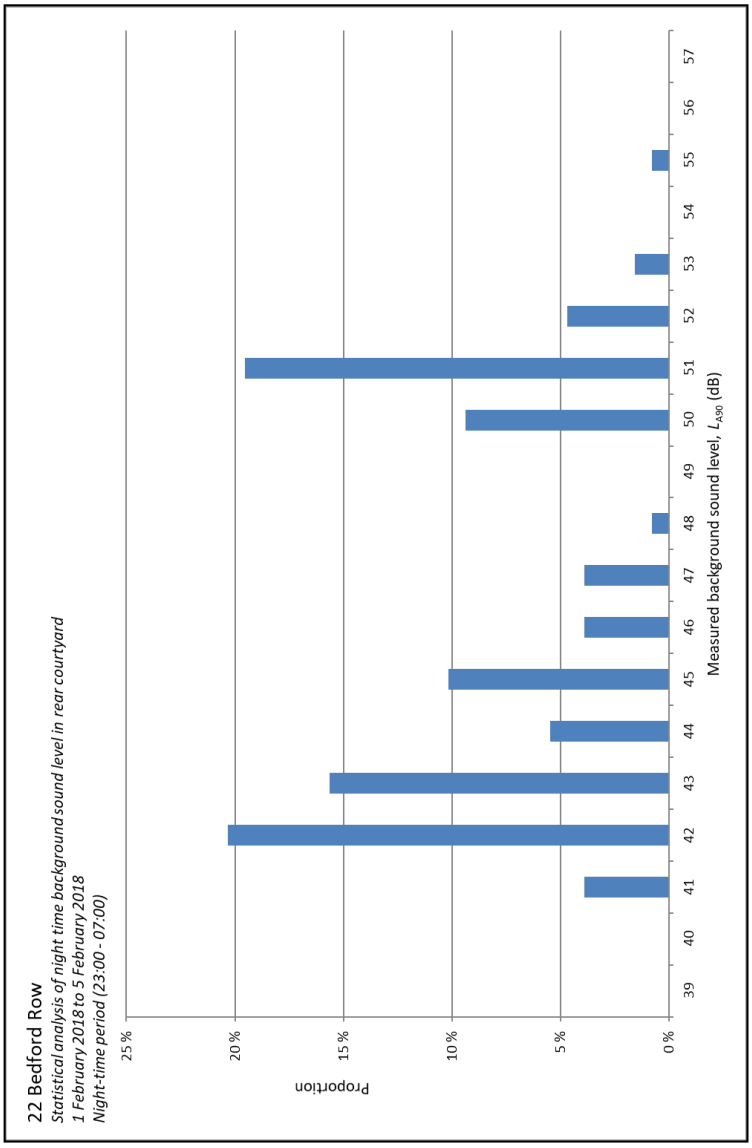
These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L

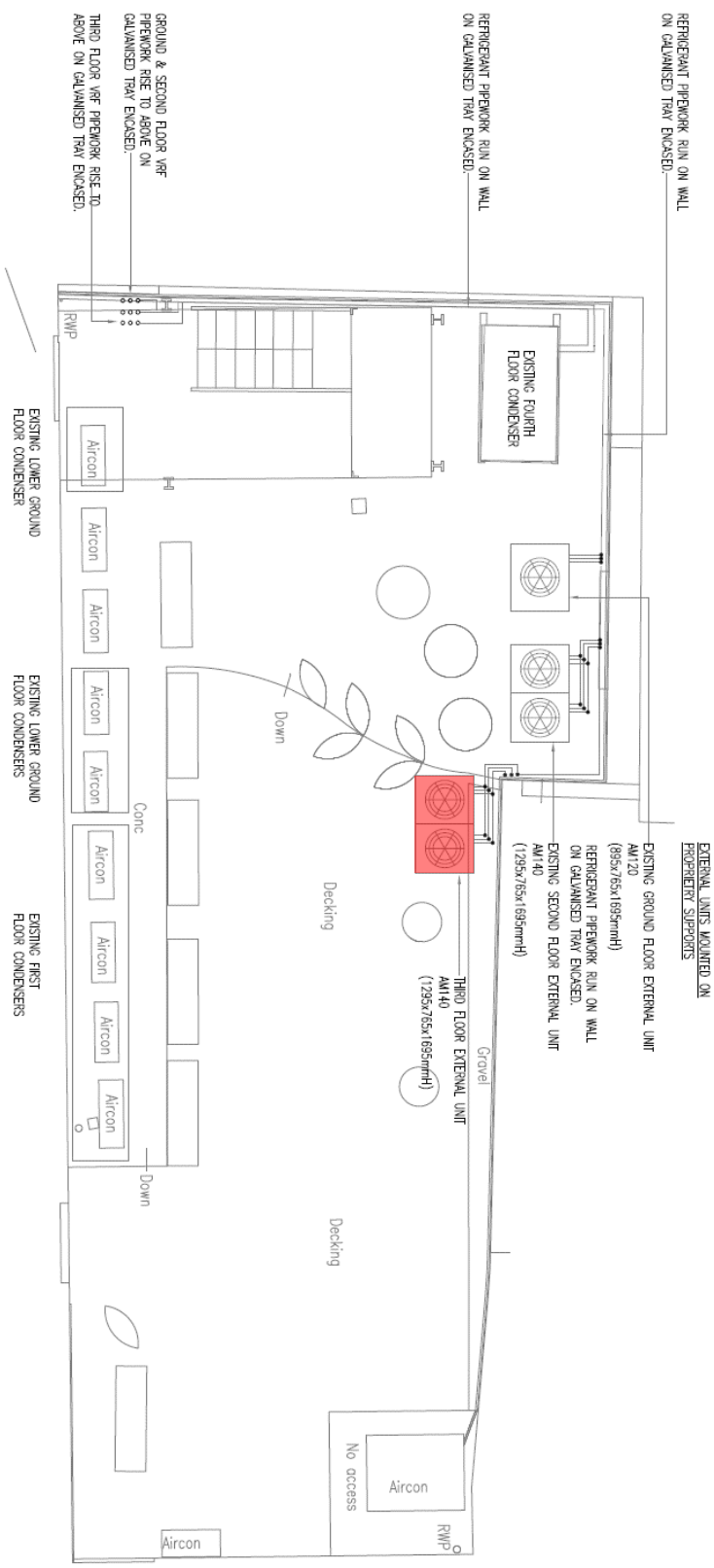

22 Bedford Row
Results of noise logging survey in rear courtyard
1 February 2018 to 5 February 2018
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
90
80
70
60
50
40
30
Date/Time
1 Feb 18 00:00
1 Feb 18 12:00
2 Feb 18 00:00
2 Feb 18 12:00
3 Feb 18 00:00
3 Feb 18 12:00
4 Feb 18 00:00
4 Feb 18 12:00
5 Feb 18 00:00
5 Feb 18 12:00
6 Feb 18 00:00


22 Bedford Row
Statistical analysis of day time background sound level in rear courtyard
1 February 2018 to 5 February 2018
Daytime period (07:00 to 23:00)
Proportion
25 %
20 %
15 %
10 %
5 %
0 %
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
Measured background sound level, L_{A90} (dB)


22 Bedford Row
Statistical analysis of night time background sound level in rear courtyard
1 February 2018 to 5 February 2018
Night-time period (23:00 - 07:00)
Proportion
25 %
20 %
15 %
10 %
5 %
0 %
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
Measured background sound level, L_{A90} (dB)

Appendix C

Location of plant


REFRIGERANT PIPEWORK RUN ON WALL ON GALVANISED TRAY ENCASED.
REFRIGERANT PIPEWORK RUN ON WALL ON GALVANISED TRAY ENCASED.
GROUND & SECOND FLOOR VRF PIPEWORK RISE TO ABOVE ON GALVANISED TRAY ENCASED.
THIRD FLOOR VRF PIPEWORK RISE TO ABOVE ON GALVANISED TRAY ENCASED.
EXISTING FOURTH FLOOR CONDENSER
EXTERNAL UNITS MOUNTED ON PROPRIETRY SUPPORTS
EXISTING GROUND FLOOR EXTERNAL UNIT AM120 (895x765x1695mmH)
REFRIGERANT PIPEWORK RUN ON WALL ON GALVANISED TRAY ENCASED.
EXISTING SECOND FLOOR EXTERNAL UNIT AM140 (1295x765x1695mmH)
THIRD FLOOR EXTERNAL UNIT AM140 (1295x765x1695mmH)
EXISTING LOWER GROUND FLOOR CONDENSER
EXISTING LOWER GROUND FLOOR CONDENSERS
EXISTING FIRST FLOOR CONDENSERS
RWP
Aircon
Down
Conc
Decking
Gravel
No access
RWP

Appendix D

Calculation stages

Comments	Octave band centre frequency (Hz)								Rating 1	
	63	125	250	500	1k	2k	4k	8k		
18035 - 22 Bedford Row										
Plant noise calculations to 24 Bedford Row										
For report 18035-R02-A										
Criteria (night)									L_A=	35
Using Lp2 = Lp1 - 20log(r2/r1) - Abar + 10log(N) + FC										
Where:										
Lp2 is the sound presure level at the nearest noise sensitive reciever										
Lp1 is the sound presure level at distance r1 from the source										
r1 is the measurement distance from the source										
r2 is the distance from the source to the nearest noise senitive reciever										
Abar is the attenuation provided by barriers and screening										
N is the number of units										
FC is the facade correction										
Lp1 of condenser at 1 m	65.0	64.0	63.0	59.0	56.0	48.0	46.0	37.0	L_A=	61
- 20log(r2/r1); r1 = 1 m, r2 = 16 m	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1		
- Abar; Path difference = 0.126 m	-5.8	-6.5	-7.7	-9.5	-11.9	-14.7	-17.7	-20.7		
+ 10log(N); N = 2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
+ FC	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lp2	41.1	39.5	37.3	31.5	26.0	15.2	10.3	-1.7	L_A=	33
Criterion (night)									L_A=	35