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ZIPBAB LTD

51 RED LION STREET, LONDON

PLANT NOISE ASSESSMENT

13 SEPTEMBER 2018

1057-AF-00001-01

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REVIEW AND AUTHORISATION			
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AMENDMENT HISTORY			
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CONTENTS **PAGE NO.**

1. INTRODUCTION

1.1.1 Zipbab Ltd. has commissioned AF Acoustics Ltd. to undertake a plant noise assessment for a new kitchen extract vent to discharge a planning condition from Camden Council.

1.1.2 Section 2 of this report presents the site description and location map. Technical guidance and Local Authority criteria that have been used to assess plant noise are presented in section 3. Details of the noise surveys and measurements undertaken on site are presented under Section 4. The plant noise assessment is addressed in Section 5. The conclusions of this study are summarised in Section 6.

2. SITE DESCRIPTION

2.1 Location

2.1.1 The site is located at 51 Red Lion St, London, in the London Borough of Camden. The kitchen extract, extracts to the roof level from the kitchen, based in the basement via the rear of the property. The ventilation layout is shown in Figure A2 of Appendix A.

2.1.2 The site is in a mixed commercial and residential area.

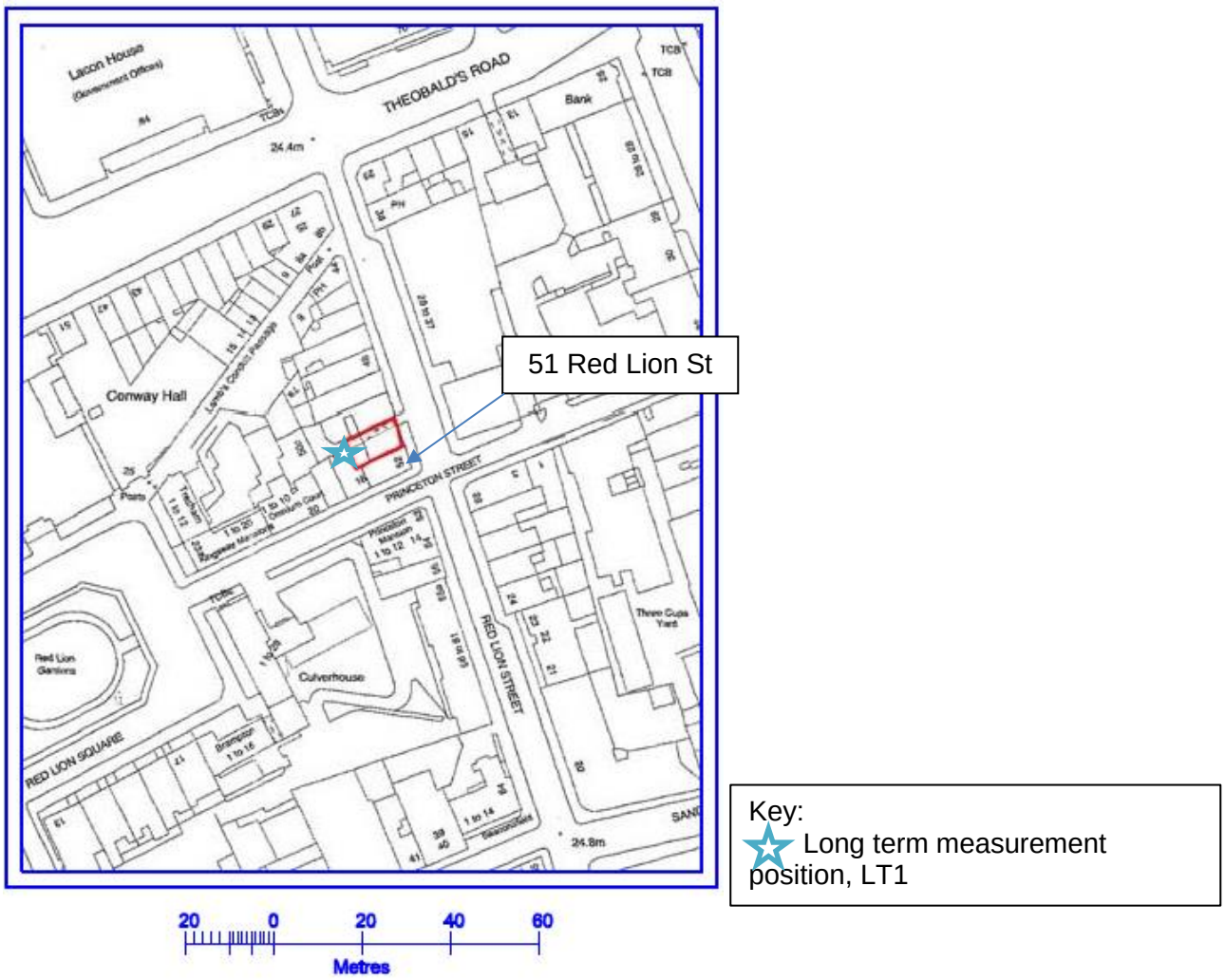

FIGURE 2.1: LOCATION MAP

3. GUIDANCE

3.1 Camden Council Guidance

3.1.1 As part of the planning conditions for the change of use for Zibab restaurant, Camden Council has stated the following:

> *'Prior to use of the development plant equipment, details shall be submitted to and approved in writing by the Council, of the external noise level emitted from plant equipment. The measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with machinery operating at maximum capacity. The noise assessment shall be carried out to confirm compliance with the noise criteria and additional steps to mitigate noise shall be taken, as necessary. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.'*
>
> And
>
> *'Prior to use, plant equipment and associated ducting at the development shall be mounted with proprietary anti-vibration isolators and fan motors shall be vibration isolated from the casing and adequately silenced and maintained as such.'*

3.2 British Standard 4142:2014

3.2.1 BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' describes methods for rating and assessing sound from "fixed installations which comprise mechanical and electrical plant and equipment", amongst other sources of noise.

3.2.2 The methodology contained within BS 4142:2014 uses outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.2.3 A summary of the approach set out within BS 4142:2014 is set out below:

- establish the specific sound level of the source(s);
- measure the representative background sound level, typically by measurement close to the receptor location;
- rate the specific sound level to account for any distinguishing characteristics;
- estimate the impact by subtracting the background sound level from the rating level; and
- consider the initial estimate of impact, in the context of the noise and its environment.

3.2.4 An initial estimate of the impact of the specific sound is obtained by subtracting the background sound level from the rating level. Using this approach, BS 4142 states:

> "Typically, the greater this difference, the greater the magnitude of impact
> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
> A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context
> The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a

significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

3.2.5 Certain acoustic features can increase the significance of the impact over that expected from a basic comparison between specific sound level and the background sound level. These features include tonality and impulsivity, as well as additional characteristics and intermittency of the sound.

3.2.6 If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor.

3.2.7 The specific sound level is rated to account for distinguishing characteristics by using the penalties below:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible

3.2.8 Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor.

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible

3.2.9 For noise which is equally both impulsive and tonal, then both features can be taken into account by linearly summing the corrections for both characteristics.

3.2.10 If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

3.2.11 If a subjective assessment is not appropriate then an objective assessment can be made. A noise source is deemed to be tonal if the time averaged sound pressure level in a one-third octave band exceeds the level in adjacent one-third octave bands by the level differences given below:

- 15 dB in the low frequency one-third octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency one-third octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency one-third octave bands (500 Hz to 10000 Hz)

3.2.12 If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

4. NOISE SURVEY AND MEASUREMENTS

4.1 Unattended Noise Survey

4.1.1 A noise survey was undertaken by Gerard Finn of AF Acoustics at the rear of the Zipbab restaurant, on the ground floor at 51 Red Lion St, London.

4.1.2 The duration of the survey was between 11:30 on 4 September and 11:30 on 5 September 2018. This measurement location is labelled as LT1 on Figure 2.1. The measured noise levels are considered façade levels. Measurements were undertaken in façade conditions (i.e. 1m from a vertical reflecting wall) and the microphone was protected with a windshield during the noise survey.

4.1.3 Initial inspection of the site revealed that the noise profile at the monitoring location consisted of noise from local roads, and other plant extract systems from other commercial and residential units.

4.1.4 The sound level meter had calibration checks before and after the measurement surveys to generate a calibration level of 114 dB at 1 kHz. The equipment calibration was verified before and after the survey and no calibration drift was observed. The microphone was fitted with a windshield.

4.1.5 The equipment used is shown in Table 4.1.

Location	Name	Serial Number	Last Calibrated
LT1	Norsonic 118 Class 1 Sound Level Meter	31382	February 2018
LT1	Norsonic 1206 Pre-amplifier	30416	February 2018
LT1	Gras 40AF Microphone	150690	February 2018
LT1	Norsonic 1251 Sound Calibrator	30900	February 2018

TABLE 4.1: MEASUREMENT EQUIPMENT

4.2 Measurement Weather Conditions

4.2.1 The weather during the measurements was mainly dry and clear. The temperature ranged from 14 to 20°C. Average wind speeds remained below 3 ms^{-1}. The measured periods are deemed to have caused no significant effect during the measurement period.

4.3 Results

4.3.1 The results of the continuous noise monitoring survey are presented in graphical form in Figure A1 of Appendix A and summarised in Table 4.2.

Time period	Measured Noise Levels (dB re 2.0 x 10^{-5} Pa)		
	$L_{Amax,F}$	$L_{Aeq,T}$	Minimum $L_{A90,T}$
Daytime (07:00-23:00hrs)	84	62	53
Night time (23:00-07:00hrs)	78	56	53
Opening Hours (12:00 – 15:00 & 18:00 – 23:00)	71	63	54

TABLE 4.2: SUMMARY OF UNATTENDED NOISE MEASUREMENTS, LT1

5. PLANT NOISE ASSESSMENT

5.1 Condenser Noise Emissions

5.1.1 Table 5.1 shows the noise data for the kitchen extract fans.

Fan	Function	Sound Power Level, dB						
		Octave band mid-frequency, Hz						
		125	250	500	1000	2000	4000	8000
DIEC 270	Kitchen exract	86	81	76	71	67	66	61

TABLE 5.1: OCTAVE BAND PLANT NOISE EMISSIONS

5.1.2 The plant does not contain the noise characteristics set out in section 3.2 and as in accordance to BS4142:2014 no correction has been applied. A worse case scenario of the plant working throughout the opening time of Zipbab restaurant of 12:00 to 15:00 and 18:00 to 23:00, has been taken into consideration.

5.1.3 The kitchen extract fan and associated ducting at the development is mounted with anti-vibration isolators and the fan motor is vibration isolated from the casing.

5.1.4 The kitchen extract fan has a 600mm silencer on the ducting as part of the system. The attenuation of the silencers is shown in Table 5.2.

Attenuator	Function	Attenuation dB						
		Octave band mid-frequency, Hz						
		125	250	500	1000	2000	4000	8000
600mm Silencer 50% free area	Kitchen	2	7	10	11	9	8	7

TABLE 5.2: INSETION LOSS OF ATTENUATORS

Nearest sensitive receptor – flats above the shop

5.1.5 The nearest receptor to the fan outlet is considered to be the top floor flats above the Zipbab restaurant at 51 Red Lion Street, the windows to the top floor flats are approximately 4m from the extract outlet. This is shown in Figure A2 of Appendix A.

5.1.6 The calculated rating level from the proposed plant is calculated to be 43 dB $L_{Ar,Tr}$ at 1m from the nearest receptor. The calculation sheets are shown in Appendix B, Table B1.

5.1.7 Table 5.3, shows that the comparison between the lowest background noise level and the calculated rating level at the nearest receptor, and whether it meets the local authority's requirements.

Minimum Background Noise Level dB $L_{A90, 1\ hour}$	Local Authority Criterion	Total Noise Level at receptor dB $L_{Ar,Tr}$	Local Authority Criterion Met?
54	Background – 10dB 44dB(A)	43	Yes

TABLE 5.3: PLANT NOISE EMISSION CRITERIA

5.1.8 The kitchen extract meets Camden Council's guidance '*The measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with machinery operating at maximum capacity.*'

6. CONCLUSION

6.1.1 A noise survey was undertaken at Zipbab restaurant, 51 Red Lion Street, London. The representative noise levels measured at this location was used to establish the prevailing environmental noise climate.

6.1.2 Plant noise emission criteria have been set at the nearest receptor based on the results of the noise survey and in conjunction with of Camden Council's guidance.

6.1.3 Noise calculations based on plant data was undertaken of the noise emissions from the kitchen extract units at the rear of the building to the nearest residential receptor.

6.1.4 The plant noise assessment indicates that kitchen extract fan will meet the local authority's requirements that, '*The measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with machinery operating at maximum capacity.*'

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APPENDIX A: FIGURES

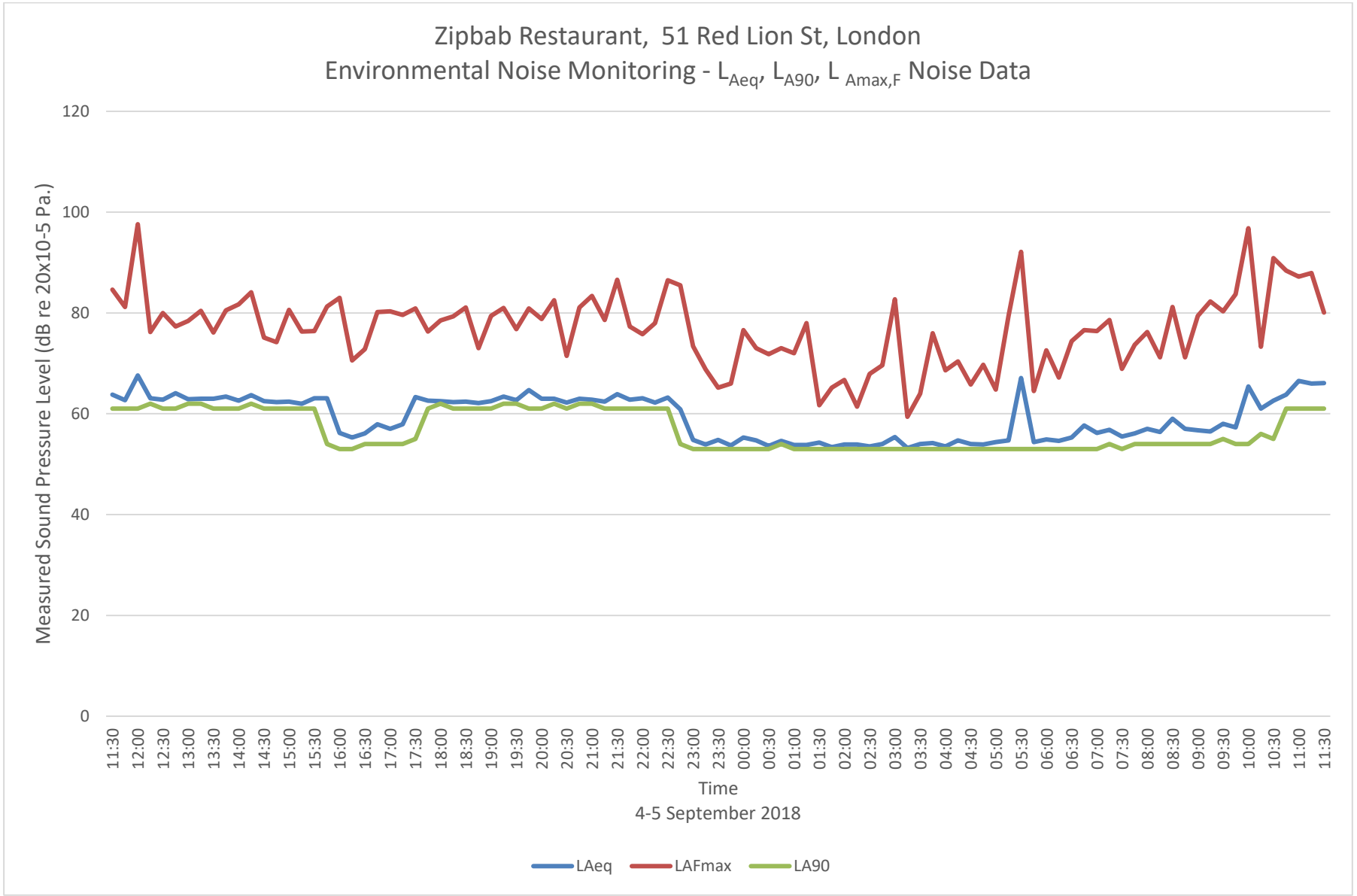

FIGURE A1: NOISE MEASUREMENT RESULTS

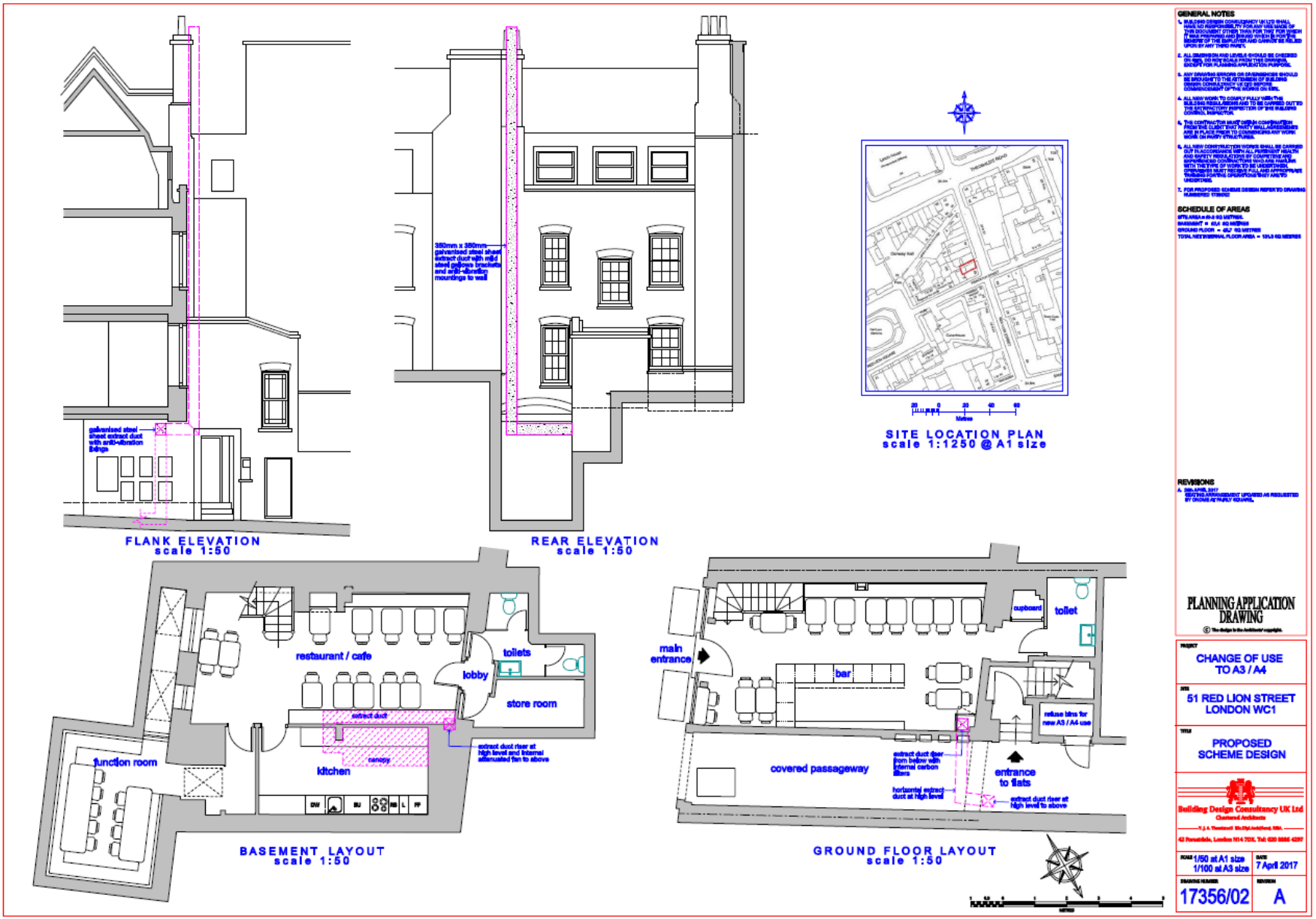

FIGURE A2: VENTILATION PLAN

APPENDIX B: TABLES

Ductborne Fan Noise Calculation																	
								AHU/Fan:	DIEC 270			Job no:	1057			
								Path:	Kitchen extract			Date:	12-Sep-18			
Project:	Zipbab restaurant							Space Served:	Outside			By:	AF			
Data:	Empirical					Reset Data		Octave Band Centre Frequency, Hz								
Type:	Fw d Ctrf	Pres:	600Pa	Vol:	0.6m³/s			63	125	250	500	1000	2000	4000	8000
Edit fan data				In duct sound pow er levels from fan:				91	86	81	76	71	67	66	61
Attenuator	600mm 50%	Standard						1	2	7	10	11	9	8	7
Duct	Circular	0.5	350					0	0	0	0	0	0	0	0
Bend	Mitred	350mm						0	0	2	8	5	3	3	3
Duct	Circular	2.8	350					0	0	0	0	0	0	0	0
Bend	Mitred	350mm						0	0	2	8	5	3	3	3
Duct	Circular	1	350					0	0	0	0	0	0	0	0
Bend	Mitred	350mm						0	0	2	8	5	3	3	3
Duct	Circular	12.75	350					1	1	1	1	1	1	1	1
No Elemen															
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No Elemen															
Grille	350	350						10	6	3	0	0	0	0	0
Grille:	350 x 350	mm	Calc. Type:	Atmosphere side				79	77	64	41	44	48	48	44
Break-out		After Element:	1	Duct				90	84	74	66	60	58	58	54
Duct w idth:	700mm	Rectangula	Standard guage ductwo					7	10	15	20	28	32	35	35
Roomside	Room:	3.0m	5.0m	2.7m	None										
	Direct	1	Distance	1.5m	Flush			11	10	9	8	7	6	6	6
	Reverb	10	Hard room					-10	-10	-8	-8	-8	-7	-7	-7
Atmosphere	Directivity	30°	15°	Distance	3.2m			10.1	9.3	8.6	7.6	7.1	6.4	5.6	5.6
		Spherical						11	11	11	11	11	11	11	11
		NR 40	43dB(A)	Lp				**58**	**57**	**44**	**22**	**26**	**31**	**31**	**27**
				NR	42			69	59	51	46	42	39	37	35
Print				Excess:				-	-	-	-	-	-	-	-

TABLE B1: DUCTBORNE FAN NOISE CALCULATIONS – KITCHEN FAN

APPENDIX C: TERMINOLOGY RELATING TO NOISE

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20_{μ}Pa ($20x10^{-6}$ Pascals) on a decibel scale.
Sound Power Level (Lw)	is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by 20 $\log_{10}$ (s_1 / s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20_{μ}Pa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Specific Noise	The noise source under investigation for assessing the likelihood of complaints.
Rating Level	The specific noise level plus any adjustment for the characteristic features of the noise.
Free field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX D: LIMITATIONS TO THE REPORT

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