64 GOODGE STREET, LONDON, W1T 4NF

24 HOUR ENVIRONMENTAL NOISE ASSESSMENT

Our Ref: CPT/071220/001/Rev02

Written By:

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Date: 16th January 2021

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1.0 Brief

1.1 To carry out an Environmental Noise Assessment & Report in order to establish the prevailing environmental noise levels enjoyed by the site.

1.2 From these measurements we establish an acoustic design criterion (the Rating Level) 1.0 meters from the nearest acoustically critical location (the assessment point).

1.3 To analyse the measured specific noise levels 1 m from the flue discharge & plant room air inlet points in relation to the Rating Level in order to establish compliance or otherwise.

1.4 To offer suggested methods of mitigation if necessary.

1.5 We have excluded the following from our brief:

- Construction noise
- Any Building Regulations noise considerations
- Traffic noise/traffic count per se, though we have recorded LA10 percentiles.
- Health and safety acoustics.

2.0 Executive Summary

2.1 An Environmental Noise Assessment has been carried out at 64 Goodge Street, London, W1T 4NF.

2.2 A minimum background noise level of 48 (47.8) dB $LA_{90,\ 15mins}$ has been measured for 24 hours use which relates to the operation of the condenser serving fridges.

2.3 A minimum background noise level of 48 (48.3) dB $LA_{90,\ 15mins}$ has been measured for use between 07.00 hours and 00.00 hours which relates to the use of the condenser serving the fridges, the condensers serving the comfort cooling and the kitchen extract fan.

2.4 The London Borough of Camden's normal conditions are for the specific noise of the equipment to be not less than 10 dB-A below the minimum background noise level for the hours of use of the equipment at the closest potential point of complaint.

2.5 The maximum allowable specific noise level at the Assessment Position for use at any time is therefore 38 dB $LA_{eq,\ 15\ mins}$.

2.6 In order to achieve this significant acoustic mitigation measures will be required as outlined within this report.

2.7 After mitigation the calculated specific noise level at the Assessment Position relating to the extract fan discharge point is 32 dB-A, which is 6 dB-A below the maximum permissible Sound Pressure Level at the Assessment Position and the Local Authority's requirements in terms of noise will therefore be met.

2.8 After mitigation the calculated specific noise level at the Assessment Positions relating to the plant located on the 1st floor flat roof is 34 dB-A, which is 4 dB-A below the maximum permissible Sound Pressure Level at the Assessment Position and the Local Authority's requirements in terms of noise will therefore be met.

3.0 Location

3.1 64 Goodge Street is a large six storey (inc. basement) mixed use property in a street of similar properties within the London Borough of Camden.

3.2 It is bounded by 62 Goodge Street, a mixed use property, to the North East; Goodge Street with further mixed use property beyond to the South East; 66 Goodge Street, a mixed use property, to the South West; and the rear of the residential properties aligning Cleveland Street to the North West.

4.0 Instrumentation

4.1 The instrumentation employed was:

- Rion NL-32/NX-22RT Class 1 Environmental Noise Analyser
- Rion NC74 Class1 Acoustic Calibrator
- Rion 12 mm Condenser Microphone & Foam Windshield on 1,5 meter Extension Pole.
- Rion Weatherproof Security Box

4.2 The instruments carry current calibration certificates copies of which are available from our offices upon request.

5.0 Time, Date & Environmental Conditions

5.1 The survey was conducted between 10.43 on 2nd December 2020 through until 10.28 on 3rd December 2020.

5.2 The weather throughout the survey was overcast with light rain showers and only light winds.

5.3 The site engineer was Cliff Tucker and the results were analysed & reported by Cliff Tucker.

6.0 Methodology.

6.1 The survey and report generally follow the procedures, method and assessments as described in BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'.

6.2 The standard requires a comparison between the typical measured background noise level and the equivalent continuous A-weighted sound pressure level of the equipment at the Assessment Position.

6.3 BS4142: 2014 also requires uncertainty to be considered as part of the assessment.

- We have undertaken a 24 hour background noise survey and the data gathered has been analysed to ensure that any influences from the weather conditions have been accounted for in the assessment.
- The calibration of the sound level meter was checked before and after the survey period and no significant drift found.
- Standard acoustic theory has been applied in the noise propagation calculations.

It is therefore considered that the uncertainty associated with the assessment is minimal and the results, as stated, are therefore valid.

6.4 The Reference Time Interval used for the 24 hour survey period was 15 minutes.

6.5 The microphone position (the measurement position) was at the rear of the property at 4th floor level.

6.6 The background level as measured at the microphone position is considered to be representative of the levels enjoyed at the Assessment Positions.

6.7 The closest noise sensitive receptors (NSR) in relation to the exhaust air discharge point of the extract fan are the rear windows of the 4th floor level of the property.

6.8 The Assessment Position in relation to the exhaust air discharge point of the extract fan is therefore taken to be the rear windows of the 4th floor level of the property.

6.9 The closest NSR in relation to the plant located on the 1st floor flat roof are the rear windows of 4 Cleveland Street and the 1st floor rear windows of 64 Goodge Street. However, the latter of these is a commercial property currently occupied by a dental practice and is therefore only relevant during in relation to day-time operation of the equipment.

6.10 The next closest NSR in relation to this plant location are the rear windows of the 2nd floor of 64 Goodge Street. This is a residential property and is therefore relevant for 24 hour operation of the equipment.

6.12 The Assessment Positions in relation to the plant located on the 1st floor flat roof are therefore taken to be the rear windows of 4 Cleveland Street and the rear windows of the 2nd floor level of 64 Goodge Street because if the Local Authority's requirements can be satisfied at these positions then they will, be default, be satisfied at the remaining NSRs.

6.13 The Measurement Position; Assessment Position; and the other relevant points of interest are shown on the plan within Appendix 'A'.

6.14 The measured levels were the principle LA percentiles as prescribed in BS 4142.

6.15 The most significant of the measured percentiles for our purposes are as follows:

- LAeq, (the mean sound pressure level corresponding to a fluctuation level across time period 't'). Used for the measurement and assessment of the Ambient Noise Level; The Specific Noise Level; The Residual Level and the Rating Level
- LA10 ('A' weighted level exceeded for 10% of the time) is used for traffic noise assessment.
- LA90, ('A' weighted level exceeded for 90% of the time). Represents the Background Level and is often used as the target threshold against which the acoustic design criteria are set.

We also measured the maximum and minimum levels.

6.16 You will note the basic objective is to establish a Rating Level at the Assessment Point for the specific noise level from any new plant in order to predict the likelihood of noise complaint.

6.17 Camden Borough Councils requirements are for the specific noise from the equipment not to exceed a level 10 dB below the minimum external background noise level for the hours of operation for the plant.

6.18 The condenser serving the fridges has the propensity to operate 24 hours per day, 7 days per week. The condensers serving the comfort cooling and the kitchen extract fan have the propensity to operate from 07.00 hours to 00.00 hours 7 days per week.

7.0 Results Summary

7.1 The full set of measured levels are presented in Appendix ‘B’ of this report.

7.2 The minimum background noise level measured across the 24 hour period was 47.8 dB $LA_{90,\ 15\ mins}$ and the minimum background noise level measured from 07.00 hours to 00.00 hours was 48.3 dB $LA_{90,\ 15\ mins}$.

7.3 The Local Authority’s requirements are therefore for the maximum specific noise level not to exceed 38 dB $LA_{eq,\ 15\ mins}$ at the Assessment Position at any time during their operation.

8.0 Analysis

8.1 Equipment & Location

The proposed equipment is as follows:

- 1 no. Nuaire SQFA64 Kitchen Extract fan.
- 1 no. Tecumseh Wintsys WIN4519Z unit for fridge cooling.
- 2 no. Mitsubishi PUMY-P200YKM units for space heating and cooling.

The equipment is to be installed at the rear of the property on the 1st floor flat roof.

Exhaust air from the kitchen extract fan is to be ducted up the rear elevation of the building to discharge at roof top level.

The Nuaire' Sound Power Level data for the kitchen extract fan is as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Induct Outlet	83	102	83	76	77	76	72	70
Breakout	80	95	79	70	64	62	56	47

The calculated Sound Pressure Level at 3.5 m of the breakout noise contribution from the extract fan is as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
B/ Out Lp	62	77	61	52	46	44	38	29

Mitsubishi's Sound Pressure Level data at 1 m for the condensers is as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Lp	63	61	61	58	57	52	49	41

At the time of writing Tecumseh have been unable to provide the noise data for their unit is spectrum form. We have therefore based calculation below on a broadband noise spectrum that gives the same overall level in dB-A as the manufacturers rated Sound Pressure Level at 1 m which is 60 dB-A.

8.2 Acoustic Analysis

As the noise radiating directly from the equipment mounted on the 1st floor flat roof will need to meet the Local Authority's requirements at 2nd floor level their contribution to noise at the 4th floor level can be ignored.

Similarly, as noise from the termination point of the kitchen extract fan will need to meet the Local Authority's requirements at 4th floor level their contribution to noise at the 2nd floor level can be ignored.

8.2.1 Noise at 4th Floor Level

Duct borne noise from the kitchen extract should be controlled by the inclusion of a 40% free area attenuator not less than 2400 mm long. The attenuator should have a minimum insertion loss as follows:

	Octave Band Centre Frequency						
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
8	18	31	49	50	50	38	24

The attenuator should be located directly at the discharge of the extract fan.

If this is not possible then any ductwork from the discharge point of the extract fan to the inlet point of the exhaust attenuator should be acoustically clad to prevent noise breaking out through the exposed ductwork.

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Induct Outlet	83	102	83	76	77	76	72	70
Duct Loss	8	7	4	3	3	3	3	3
Bend Loss	0	1	3	4	4	3	3	3
Equip Loss	3	3	3	4	6	6	6	6
End Ref.	5	2	0	0	0	0	0	0
Dist. Loss	23	23	23	23	23	23	23	23
Att. D.I.L.	8	18	31	49	50	50	38	24
Lp Ass	36	48	19	-7	-9	-9	-1	11

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
A-Weight	26	16	9	3	0	-1	-1	1
Lp-A Ass	10	32	10	-10	-9	-8	0	10

This is equivalent to 32 dB-A which is 6 dB-A below the maximum permissible specific noise level and the Local Authority's requirements in terms of noise will therefore be met.

8.2.2 Noise at 1st Floor Level

8.2.2.1 Condensers

At the time of writing Tecumseh have been unable to provide the noise data for their unit is spectrum form. We have therefore based calculation below on a broadband noise spectrum that gives the same overall level in dB-A as the manufacturers rated Sound Pressure Level at 1 m (60 dB-A).

The condensers should be housed in a purpose built acoustic enclosure designed by Environ Technologies Ltd.

Environ Technologies published Transmission Loss data for their Environlite enclosure system is as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	14	16	23	30	37	39	38	39

The distance between the proposed condenser location and the Assessment Position should be not less than 3.0 m.

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
PUMY-P200	63	61	61	58	57	52	49	41
PUMY-P200	63	61	61	58	57	52	49	41
Tecumseh	76	67	60	55	52	49	47	46
Cum. Lp	77	69	66	62	61	56	53	48

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Dist. Loss	10	10	10	10	10	10	10	10
Trans. Loss	14	16	23	30	37	39	38	39
Lp Ass	53	43	33	22	14	7	5	-1
A-Weighting	26	16	9	3	0	-11	-1	1
Lp-A Ass	27	27	24	19	14	8	6	-2

This is equivalent to 32 dB-A.

8.2.2.2 Extract Fan Breakout Noise

The fan should be installed at the mid-point of the flat roof. This will ensure that fan set is not less than 3.5 m from the Assessment Position.

The fan set should be installed within an acoustic enclosure formed of 100 mm deep acoustic panelwork with a minimum sound insulation value as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	22	21	28	35	43	48	54	55

The resultant acoustic calculation is then as follows:

	Octave Band Centre Frequency							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
B/ Out Lp	62	77	61	52	46	44	38	29
Dist. Loss	11	11	11	11	11	11	11	11
Panel Loss	22	21	28	35	43	48	54	55
Lp Ass	29	47	22	6	-8	-15	-27	-37
A-Weighting	26	16	9	3	0	-1	-1	1
Lp-A Ass	3	29	13	3	-8	-14	-26	-38

This is equivalent to 30 dB-A.

8.2.2.3 1st Floor Cumulative Level

The 1st floor cumulative level is the logarithmic addition of the two calculated sound pressure level values for the condensers and the extract fan and equals 34 dB-A.

This is 4dB-A below the maximum permissible specific noise level and the Local Authority's requirements will therefore be met.

8.2.3 Vibration

As the proposed plant is to be located in close proximity to the neighbouring properties the units should be resiliently mounted such that a minimum isolation efficiency of 95% is achieved at normal operating duty.

The ductwork supports should also be resilient in order to prevent duct borne vibration passing up through the rear façade of the building.

Additionally, the associated gas and liquid lines should be secured using fixings over the top of the thermal insulation to prevent direct metal to metal support.

9.0 Conclusion

The new plant that is to be installed should be designed, selected, located and acoustically treated to ensure compliance with the above objectives.

Assuming this is achieved as outlined above then the Local Authority's requirements in terms of noise will be met.

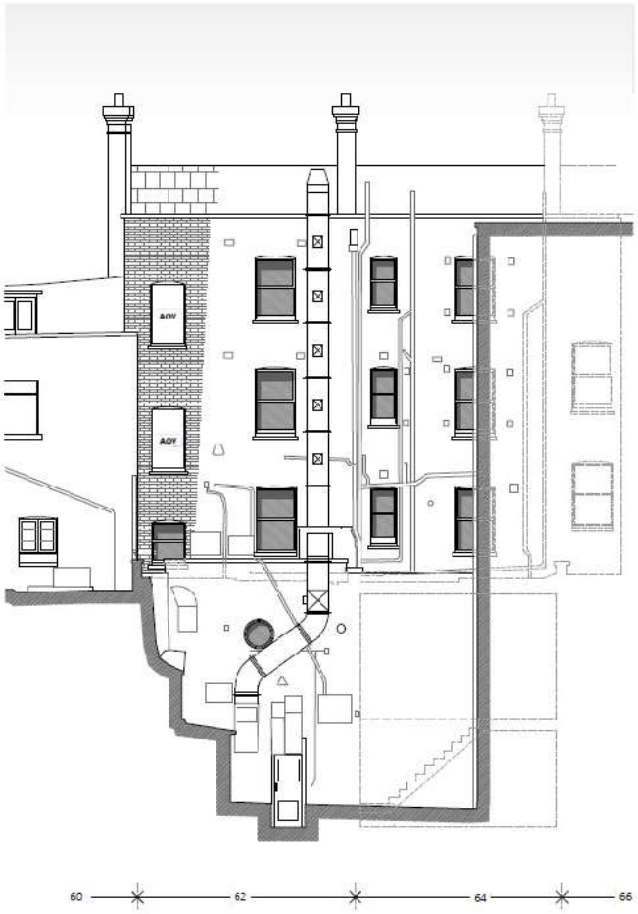
Report ends

Cliff Tucker AMIOA
Eurovib (Acoustic Products) Ltd

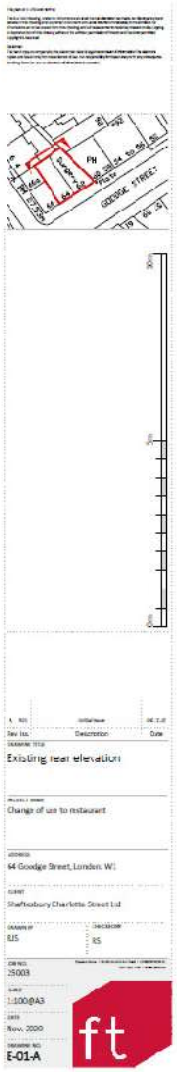
Appendix A – Positions, Distances, & Locations

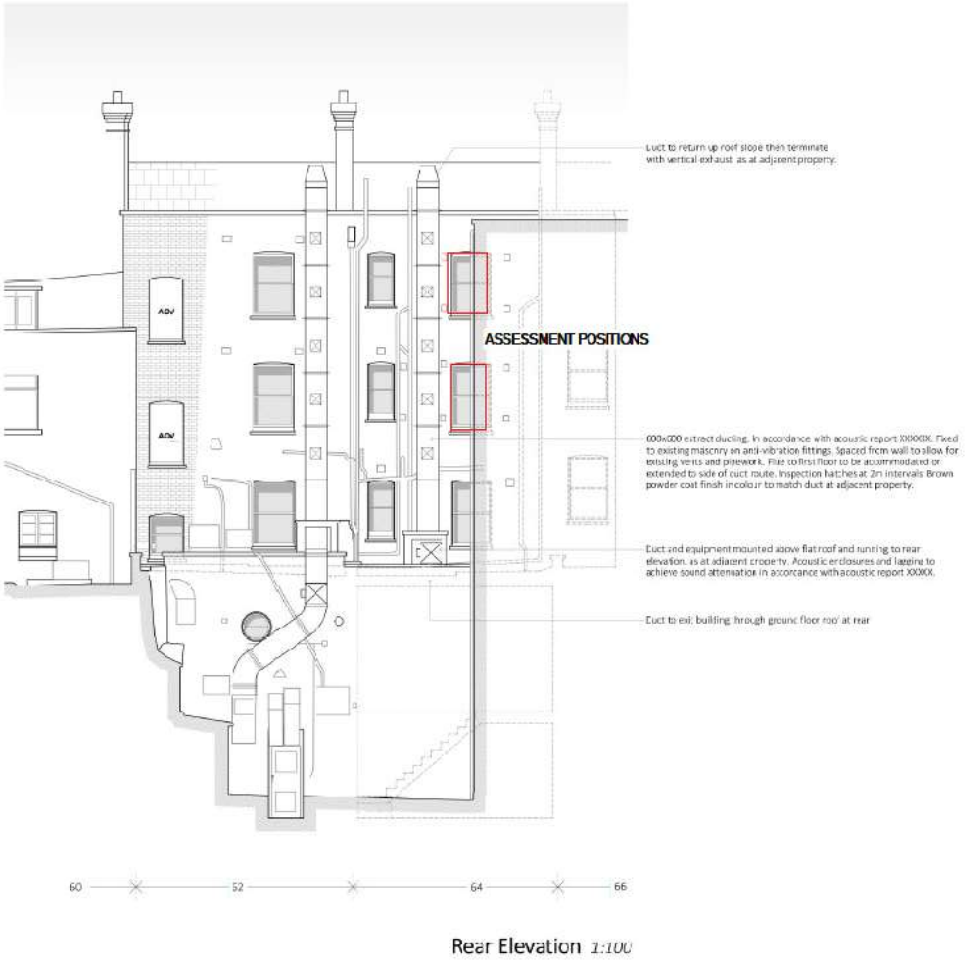

64 Goodge Street
Cleveland St
A5204
Charlotte Pl

Author: C.P. Tucker AMIOA



Rear Elevation *1:100*





Rear Elevation 1:100

Proposed rear elevation

Change of use to restaurant

6K George Street, London, W1

Shaftesbury Charlotte Street Ltd

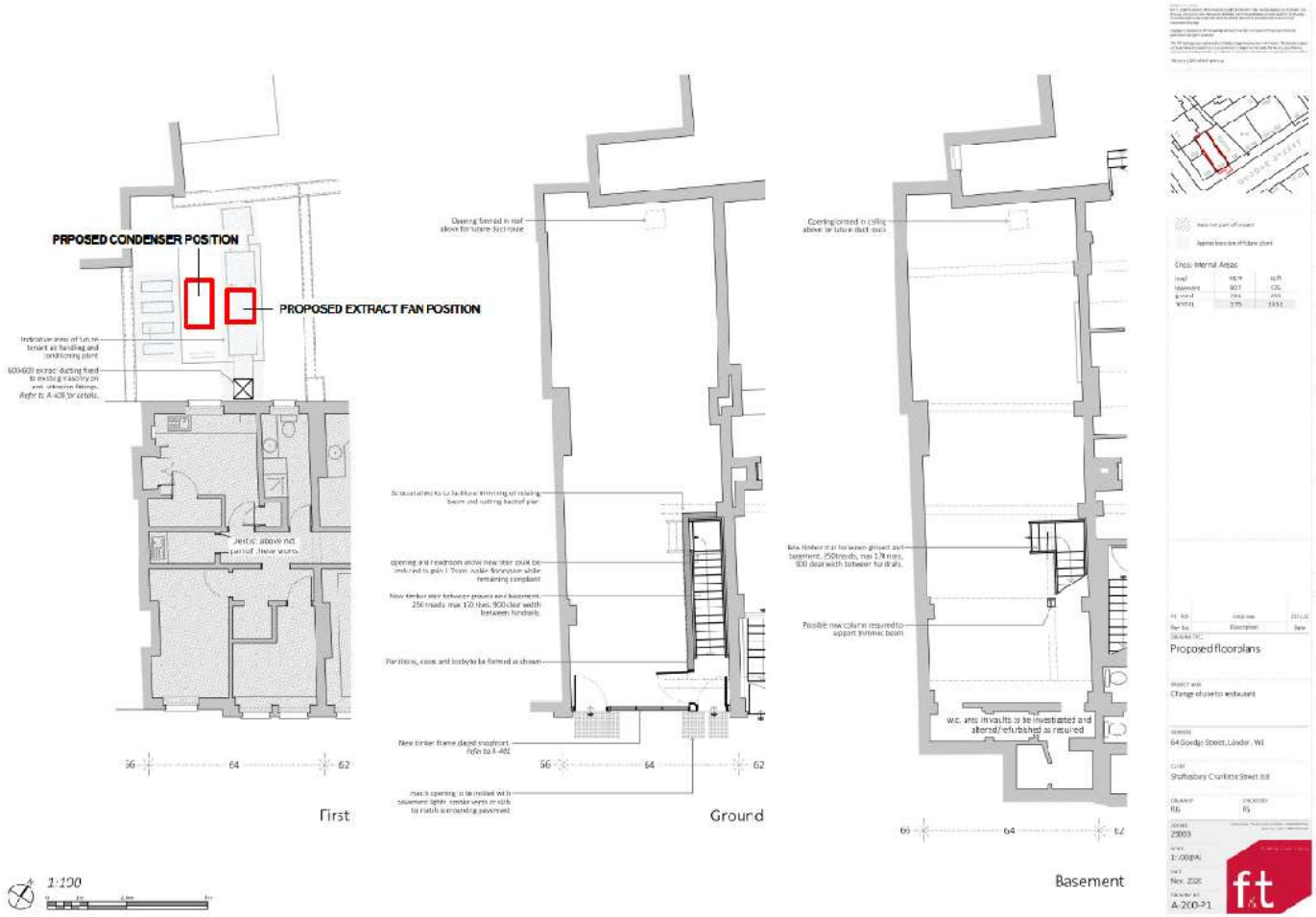
RB

2069

1:100@A3

Nov. 2020

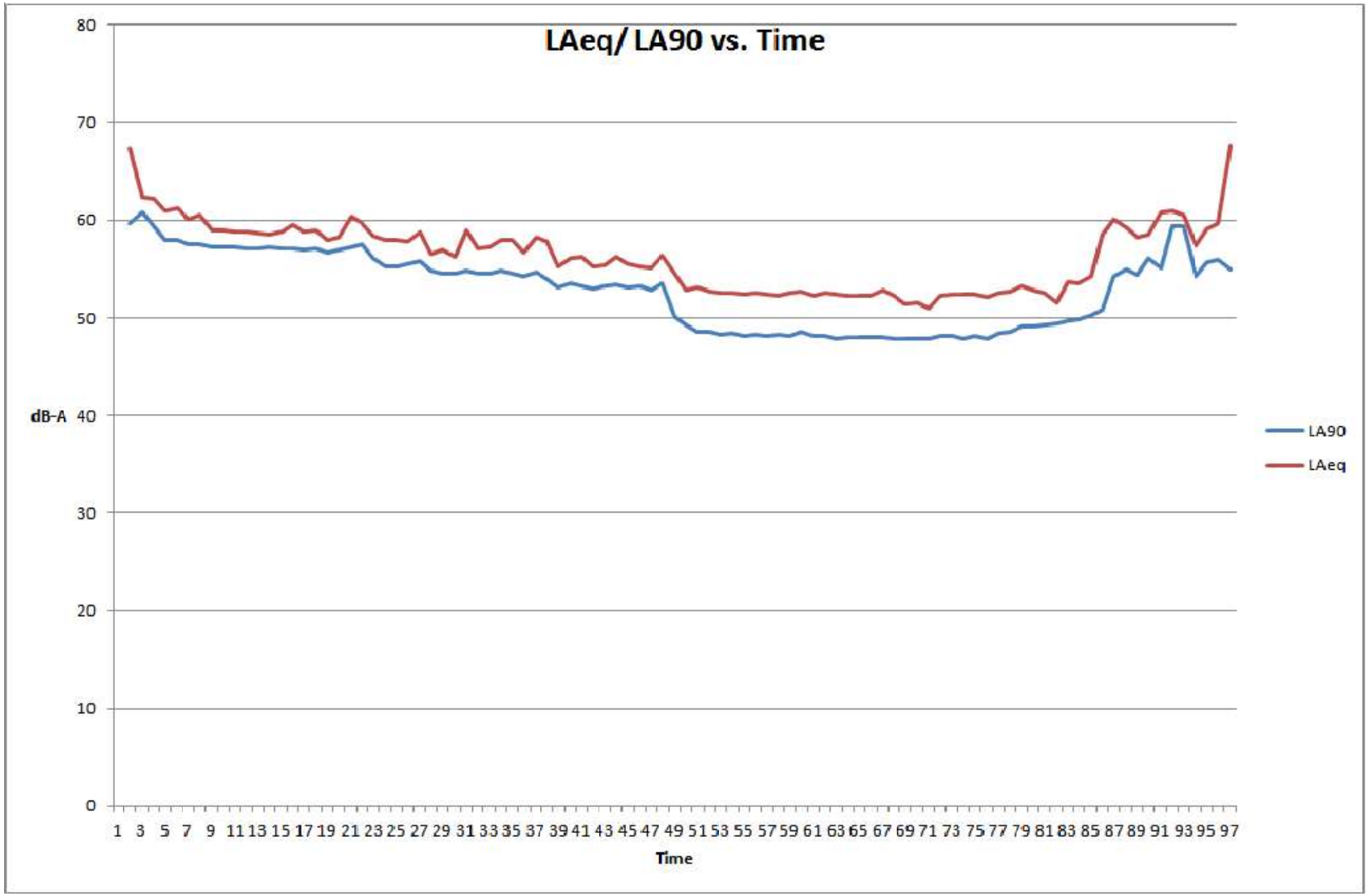
P-01-A


PROPOSED CONDENSER POSITION
PROPOSED EXTRACT FAN POSITION
First
Ground
Basement
1:100
Proposed floorplans
Change of use to restaurant
64 Goodge Street, London. W1
A-200-P1

Appendix B – Full Measured Levels

Ref	Time	Measurment Time	LAmax	LAmin	LA10	LA50	LA90	LAeq
1	02/12/2020 10:43	0:15:00	97.8	45.2	63.3	61.5	59.7	67.4
2	02/12/2020 10:58	0:15:00	67.8	59.3	63.4	62.6	60.8	62.4
3	02/12/2020 11:13	0:15:00	68.0	57.6	63.6	62.4	59.4	62.2
4	02/12/2020 11:28	0:15:00	80.4	56.6	63.2	60.6	57.9	61.0
5	02/12/2020 11:43	0:15:00	67.9	56.3	63.5	60.7	57.9	61.2
6	02/12/2020 11:58	0:15:00	73.6	56.5	62.6	58.8	57.6	60.1
7	02/12/2020 12:13	0:15:00	83.1	56.5	62.9	58.5	57.5	60.5
8	02/12/2020 12:28	0:15:00	77.7	56.4	60.8	58.0	57.3	58.9
9	02/12/2020 12:43	0:15:00	71.9	56.1	60.8	57.9	57.2	58.9
10	02/12/2020 12:58	0:15:00	71.5	56.1	60.9	57.9	57.2	58.8
11	02/12/2020 13:13	0:15:00	71.3	56.1	60.9	57.8	57.1	58.8
12	02/12/2020 13:28	0:15:00	69.0	56.0	60.7	57.8	57.1	58.7
13	02/12/2020 13:43	0:15:00	65.3	56.1	60.8	57.9	57.2	58.6
14	02/12/2020 13:58	0:15:00	75.2	55.8	60.7	57.9	57.1	58.8
15	02/12/2020 14:13	0:15:00	72.2	55.9	61.0	58.0	57.1	59.5
16	02/12/2020 14:28	0:15:00	72.5	55.9	60.8	57.7	56.9	58.8
17	02/12/2020 14:43	0:15:00	81.0	55.8	60.9	57.8	57.1	59.0
18	02/12/2020 14:58	0:15:00	61.8	55.8	60.4	57.4	56.7	58.0
19	02/12/2020 15:13	0:15:00	73.7	55.8	60.6	57.5	56.9	58.3
20	02/12/2020 15:28	0:15:00	71.9	55.9	63.7	58.6	57.2	60.4
21	02/12/2020 15:43	0:15:00	68.0	56.4	61.1	59.1	57.6	59.7
22	02/12/2020 15:58	0:15:00	63.7	54.7	60.1	57.9	56.1	58.4
23	02/12/2020 16:13	0:15:00	66.5	53.9	60.6	56.5	55.2	57.9
24	02/12/2020 16:28	0:15:00	64.6	53.8	60.8	56.3	55.3	57.9
25	02/12/2020 16:43	0:15:00	63.0	54.5	60.0	56.7	55.6	57.8
26	02/12/2020 16:58	0:15:00	67.8	54.1	61.2	57.2	55.8	58.8
27	02/12/2020 17:13	0:15:00	66.0	53.5	59.5	55.6	54.8	56.6
28	02/12/2020 17:28	0:15:00	79.2	53.1	59.6	55.6	54.6	56.9
29	02/12/2020 17:43	0:15:00	60.8	53.3	59.7	55.1	54.5	56.3
30	02/12/2020 17:58	0:15:00	66.2	53.4	61.0	59.4	54.8	59.0
31	02/12/2020 18:13	0:15:00	63.9	53.5	60.2	55.4	54.6	57.1
32	02/12/2020 18:28	0:15:00	73.1	53.4	60.3	55.7	54.6	57.2
33	02/12/2020 18:43	0:15:00	66.3	53.4	59.9	57.4	54.8	57.9
34	02/12/2020 18:58	0:15:00	63.7	53.3	61.0	56.3	54.5	57.9
35	02/12/2020 19:13	0:15:00	63.7	52.8	60.0	55.0	54.2	56.7
36	02/12/2020 19:28	0:15:00	63.7	53.6	61.3	56.3	54.7	58.2
37	02/12/2020 19:43	0:15:00	66.0	52.7	60.3	56.3	53.9	57.8
38	02/12/2020 19:58	0:15:00	67.8	51.9	58.9	53.8	53.1	55.2
39	02/12/2020 20:13	0:15:00	70.5	52.3	59.4	54.1	53.5	56.1
40	02/12/2020 20:28	0:15:00	63.8	52.2	59.4	53.9	53.2	56.3
41	02/12/2020 20:43	0:15:00	72.4	52.0	58.9	53.7	53.0	55.2
42	02/12/2020 20:58	0:15:00	61.2	52.2	59.2	53.9	53.3	55.4
43	02/12/2020 21:13	0:15:00	65.3	52.5	59.4	54.2	53.4	56.3
44	02/12/2020 21:28	0:15:00	61.6	51.9	59.1	53.8	53.1	55.5
45	02/12/2020 21:43	0:15:00	66.1	51.9	59.0	53.9	53.2	55.3
46	02/12/2020 21:58	0:15:00	61.3	51.6	59.2	53.5	52.9	55.1
47	02/12/2020 22:13	0:15:00	61.7	52.6	59.4	54.5	53.6	56.4
48	02/12/2020 22:28	0:15:00	60.2	48.6	58.4	53.8	50.1	54.5

Ref	Time	Measurment Time	LAmax	LAmin	LA10	LA50	LA90	LAeq
49	02/12/2020 22:43	0:15:00	60.4	48.2	58.3	50.2	49.3	52.9
50	02/12/2020 22:58	0:15:00	65.4	47.2	58.6	49.6	48.6	53.1
51	02/12/2020 23:13	0:15:00	59.5	47.5	58.3	49.6	48.6	52.7
52	02/12/2020 23:28	0:15:00	60.2	47.0	58.1	49.2	48.3	52.5
53	02/12/2020 23:43	0:15:00	60.4	47.0	58.2	49.4	48.4	52.6
54	02/12/2020 23:58	0:15:00	60.5	46.9	58.2	48.9	48.1	52.4
55	03/12/2020 00:13	0:15:00	61.0	47.0	58.2	49.3	48.3	52.6
56	03/12/2020 00:28	0:15:00	60.4	47.1	58.1	49.0	48.2	52.4
57	03/12/2020 00:43	0:15:00	59.6	47.2	58.2	48.9	48.3	52.3
58	03/12/2020 00:58	0:15:00	61.8	47.2	58.1	49.3	48.2	52.5
59	03/12/2020 01:13	0:15:00	60.6	47.1	58.2	49.7	48.5	52.7
60	03/12/2020 01:28	0:15:00	59.4	46.9	58.1	48.9	48.1	52.3
61	03/12/2020 01:43	0:15:00	60.3	47.2	58.3	49.0	48.2	52.5
62	03/12/2020 01:58	0:15:00	59.4	46.8	58.2	48.7	47.9	52.4
63	03/12/2020 02:13	0:15:00	60.3	46.9	58.0	48.7	48.0	52.2
64	03/12/2020 02:28	0:15:00	59.3	46.9	58.1	48.6	48.0	52.2
65	03/12/2020 02:43	0:15:00	59.5	46.6	58.0	48.8	48.0	52.3
66	03/12/2020 02:58	0:15:00	67.1	46.9	58.1	48.9	48.0	52.9
67	03/12/2020 03:13	0:15:00	59.3	46.8	58.0	48.8	47.9	52.2
68	03/12/2020 03:28	0:15:00	59.5	46.9	57.7	48.6	47.9	51.4
69	03/12/2020 03:43	0:15:00	60.4	46.6	57.8	48.4	47.8	51.5
70	03/12/2020 03:58	0:15:00	59.4	46.7	50.9	48.5	47.9	51.0
71	03/12/2020 04:13	0:15:00	59.4	46.7	58.1	48.9	48.1	52.2
72	03/12/2020 04:28	0:15:00	60.4	46.7	58.1	49.2	48.1	52.4
73	03/12/2020 04:43	0:15:00	66.8	46.7	58.1	48.7	47.9	52.4
74	03/12/2020 04:58	0:15:00	66.3	47.0	58.0	49.0	48.1	52.4
75	03/12/2020 05:13	0:15:00	62.4	46.7	58.0	48.5	47.9	52.1
76	03/12/2020 05:28	0:15:00	59.6	47.1	58.1	49.4	48.4	52.6
77	03/12/2020 05:43	0:15:00	59.2	47.4	58.1	50.0	48.6	52.7
78	03/12/2020 05:58	0:15:00	62.8	47.9	58.4	50.6	49.1	53.2
79	03/12/2020 06:13	0:15:00	59.9	47.8	58.2	50.1	49.1	52.9
80	03/12/2020 06:28	0:15:00	60.1	48.0	57.7	50.4	49.3	52.5
81	03/12/2020 06:43	0:15:00	59.5	48.2	52.1	50.3	49.4	51.5
82	03/12/2020 06:58	0:15:00	61.6	48.2	58.4	51.2	49.7	53.7
83	03/12/2020 07:13	0:15:00	60.5	48.5	58.4	51.2	49.9	53.5
84	03/12/2020 07:28	0:15:00	76.0	49.0	58.6	51.5	50.2	54.3
85	03/12/2020 07:43	0:15:00	72.1	49.1	61.1	58.6	50.8	58.6
86	03/12/2020 07:58	0:15:00	66.4	52.4	62.1	60.6	54.2	60.1
87	03/12/2020 08:13	0:15:00	66.7	52.4	62.5	57.4	55.0	59.2
88	03/12/2020 08:28	0:15:00	65.2	53.1	60.6	58.8	54.4	58.3
89	03/12/2020 08:43	0:15:00	73.3	55.1	60.7	57.0	56.1	58.5
90	03/12/2020 08:58	0:15:00	74.3	53.5	63.3	61.2	55.1	60.8
91	03/12/2020 09:13	0:15:00	70.0	57.7	62.7	60.5	59.4	61.0
92	03/12/2020 09:28	0:15:00	64.4	57.9	62.0	60.3	59.4	60.5
93	03/12/2020 09:43	0:15:00	64.3	52.6	60.2	56.2	54.3	57.4
94	03/12/2020 09:58	0:15:00	65.4	54.1	62.6	56.8	55.7	59.1
95	03/12/2020 10:13	0:15:00	67.3	54.5	62.6	59.4	55.9	59.6
96	03/12/2020 10:28	0:13:47	93.8	34.8	63.3	57.3	55.0	67.7


LAeq/ LA90 vs. Time
80
70
60
50
40
30
20
10
0
dB-A
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97
Time
LA90
LAeq

Appendix C – Environlite Acoustic Performance Data

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environlite ELV1.1.25ASHP Acoustic Performance Data (March 2010)

Noise Measurement Information:

Test: Environ Lite Acoustic Enclosure — W 1700mm x D 1000mm x H 1550mm

Test Standard:

BS EN ISO 140-3 Acoustics - Measurement of Sound Insulation in Buildings and of Building Elements - Part 1: Airborne Sound Insulation

Sound Level Measuring Equipment:

Norsonic 830 RTA Precision Sound Analyser Type 1
CEL 284/2 Acoustic Calibrator Type 1
JBL Loudspeaker driven by CEL Loudspeaker driven by 830 White Noise Source

Transmission Loss Data:

Transmission Loss — Environ ELV1.1.25AC Acoustic Enclosure							
Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascal's)							
63	125	250	500	1K	2K	4K	8K
14	16	23	30	37	39	38	39
Summary Transmission Loss Equates to an Overall Reduction of 26 dB(A)							

Support Information:

Monitoring was carried out using the BS3740 technique, insofar as measurements were taken in each quadrant and the results averaged. Internal Test Room: W 6m x D 16m x H 5m. Background noise in the semi-reverberant test room was such as not to interfere with the practical measurements

Environ acoustic enclosure designs are protected under patent

Standard construction is in zinc coated mild steel sheet. The system is normally self-joining and supporting using the Eurovib special connecting system but for very wide spans and extreme duties all welded construction and/or a separate steel frame maybe provided. Where double skin construction is used (MT 30 and MT 40) the inner face is perforated pre-galvanised mild steel and the infill is mineral wool or glass fibre.

Where required the infill can be protected by an inert membrane. Most enclosures are trial-erected before delivery in order to ensure correct assembly and can sometimes be delivered in one piece depending upon size and application. Joints can be secured by rivets; self tapping screws; or bolts. Again depending upon materials and application. Full material specification and performance data is available in the relevant Technical Data Sheets for the appropriate model copies of which are available on request: Doors can be furnished with heavy duty hinges and positive pressure catches and panic release and security locking features are also available.

PERFORMANCE

ABSORPTION CO-EFFICIENT
To B.S. 3638 and ASTM C-423-66

MODEL	PERFORMANCE								
	Octave Band Mid Frequency, Hz								
	63	125	250	500	1000	2000	4000	8000	Mean
MT 20	0.18	0.28	0.39	0.56	0.52	0.46	0.38	0.37	0.40
MT 30	0.22	0.35	0.69	1.00	0.95	0.88	0.77	0.74	0.70
MT 40	0.46	0.58	0.97	1.08	1.00	0.94	0.85	0.82	0.84

SOUND INSULATION VALUE
To B.S. 2750 and ASTM E90-75 and E413-73

MODEL	PERFORMANCE								
	Octave Band Mid Frequency, Hz								
	63	125	250	500	1000	2000	4000	8000	Mean
MT 20	18	16	25	30	36	37	39	36	30
MT 30	22	20	28	35	42	44	44	39	35
MT 40	22	21	28	35	43	48	54	55	40

AIR PRESSURE TIGHTNESS

MODEL	PERFORMANCE
MT 20	Designed for 2% by volume @ 750 N/m2
MT 30	Designed for 2% by volume @ 1000 N/m2
MT 40	Designed for 2% by volume @ 1000 N/m2
MT 40/HP	Rated and site tested to 2% by volume @ 2000 N/m2

Appendix D - Definitions

DECIBEL - The ratio of sound pressures that we can hear is a ratio of 106. A logarithmic measurement scale is therefore used for convenience. The resulting parameter is called the 'sound pressure level' (Lp) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

The threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain.

A change of 1 dB is only perceptible under controlled conditions.

dB(A) - The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). An 'A'-weighting network can be built into a sound level measuring instrument such that sound levels in dB(A) can be read directly from a meter. The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds to a subjective halving or doubling of the loudness of a sound.

EQUIVALENT CONTINUOUS SOUND LEVEL (LEQ) - An index often used for the assessment of overall noise exposure is the equivalent continuous sound level, (LEQ). This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

The 'A' weighted statistical sound level over a time period, T, is denoted LAEQ,T.

AMBIENT NOISE - The total encompassing sound in a given situation at a given time. Most often described in terms of the index LAEQ,.T.

SPECIFIC NOISE (LAEQ,T) - The equivalent continuous A-Weighted sound pressure level at the assessment position produced by the specific noise source over a time interval T.

STATISTICAL NOISE LEVELS - For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation.

- The L10, the level exceeded for ten per cent of the time period under consideration, has been adopted in this country for the assessment of road traffic noise.
- The L90, the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level.

'A' weighted statistical noise levels are generally used and are denoted LA10, LA90 etc. The reference time period (T) is normally included, e.g. LA10, 15 mins