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PREPARED: 04/06/2020

83 CLERKENWELL ROAD, LONDON; NOISE IMPACT ASSESSMENT

CONTENTS

LIST OF ATTACHMENTS

Project Ref:	AS11693	**Title:**	83 Clerkenwell Road, London
Report Ref:	AS11693.200529.NIA	**Title:**	Noise Impact Assessment
Client Name:	Dorset County Pension Fund c/o CBRE Global Investors		
Project Manager:	Daniel Saunders		
Report Author:	Daniel Saunders		

Clarke Saunders Acoustics
Winchester SO22 5BE

This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.

1.0 EXECUTIVE SUMMARY

1.1 Planning approval is being sought for the installation of new roof mounted building services plant at 83 Clerkenwell Road, London as part of its refurbishment scheme.

1.2 Predicted plant noise emissions with mitigation are demonstrated as being compliant with the established criteria set by the London Borough of Camden.

2.0 INTRODUCTION

2.1 Clarke Saunders Associates (CSA) has been commissioned by Dorset County Pension Fund to determine daytime and night-time noise emissions limits for the new building services plant located at the western part of 83 Clerkenwell Road's rooftop, and to assess compliance of the proposed scheme in accordance with the planning requirements of Camden Council.

2.2 Please refer to Appendix A for details of the acoustic terminology used throughout this report.

3.0 SITE DESCRIPTION

3.1 The building is located between Hatton Garden and Clerkenwell Road. The buildings near the site alongside Clerkenwell Road are predominantly used as offices with commercial/retail activities on the ground floor. The nearest hotels are approximately 60m away from the demise.

3.2 The block in which the building is located is mainly used as offices, with commercial activity on the ground floor, such as restaurants and retail. The nearest residential uses are believed to be located to the south, on the upper floors of Black Bull Yard, 18-26 Hatton Wall.

3.3 The new plant is proposed to replace the existing condensing plant on the building's rooftop, as per the architect's drawing.

4.0 LOCAL AUTHORITY REQUIREMENTS

4.1 CAMDEN COUNCIL

4.1.1 Camden Council adopted the new Local Plan on 3 July 2017, which describes "noise thresholds" in Appendix 3.

4.1.2 Following liaison with Camden Council, it is understood that survey measurement procedures for fixed plant noise assessments and determination of the typical background noise level should follow the methodology set out in BS4142:2014 *Methods for rating and assessing industrial and commercial sound*. The subsequent assessment of fixed plant noise emissions does not need to be in accordance with BS4142:2014, where penalties could be imposed. Instead, the policy requires the plant noise emission at the nearest residential receptor to be 10 dB below the typical background ($L_{A90,\,15min}$) during the proposed operational period or, if tonal, 15 dB below the typical background ($L_{A90,\,15min}$) during the proposed operational period.

5.0 ENVIRONMENTAL NOISE SURVEY PROCEDURE AND EQUIPMENT

5.1 A survey of the ambient and background noise levels was undertaken at the rooftop of 83 Clerkenwell Road at the "Monitoring position" location shown in indicative site plan AS11693/SP1.

5.2 Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 14:00 on Thursday 28th May and 12:00 on Monday 1st June 2020.

5.3 The following equipment was used during CSA attended survey:

- Rion Sound level meter NL-52;
- Rion sound level calibrator NC-74.

5.4 The calibration of the sound level meter was verified before and after use. No significant calibration drift was detected.

5.5 The weather during the survey was generally dry with light winds, which made the conditions suitable for the measurement of environmental noise.

5.6 Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use*.

6.0 RESULTS

6.1 Figures AS11693/TH1-4 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the monitoring position.

6.2 The background noise climate at the property is currently determined by road traffic noise from the surrounding roads and rooftop plant in the vicinity, with a contribution of construction work at Clerkenwell Road during weekdays.

6.3 The aggregate measured typical background and average noise levels from the monitoring positions are shown below:

MONITORING PERIOD	TYPICAL BACKGROUND $L_{A90,\ 5MINS}$	AVERAGE $L_{AEQ,\ T}$
07:00 - 23:00 hours	43 dB	53 dB
23:00 - 07:00 hours	42 dB	46 dB
06:00 – 20:00 hours	44 dB	53 dB

Table 6.1 – Typical measured background and average noise levels *[dB ref. 20 µPa]*

7.0 COVID-19 PANDEMIC

7.1 Due to the exceptional circumstances currently being experienced in London and the UK with regards to the COVID-19 pandemic, the usual approach for environmental noise assessments may not be appropriate on its own. An alternative approach following guidance issued by the Associated of Noise Consultants/Institute of Acoustics has been applied.

7.2 It is noted that for the purposes of an assessment of building services noise levels, current background noise levels may be lower than prior to the pandemic. It is noted therefore that assessment to the noise levels in this survey represents a robust assessment.

7.3 CSA has referred to a 2014 acoustic report entitled "Acoustic report in support of planning application for external mechanical services equipment at roof level of 18-26 Hatton Wall, London EC1N 8JH." The monitoring position used is not entirely clear from the report, however, and hence a new survey was instructed. Background noise levels are relatively consistent over the two surveys although it should be noted that Camden's policy has changed and BS4142 revised since this previous report was prepared.

8.0 DESIGN CRITERIA

8.1 The selected plant for 83 Clerkenwell Road development is not expected to exhibit tonal characteristics that might be discernible by the receptor. Plant noise emissions criteria would be set at 10dB below to the typical L_{A90} values measured at 83 Clerkenwell Road.

8.2 The noise emissions criteria determined from each set of operational hours are shown in the table below:

DAYTIME (07:00 - 23:00 HOURS)	NIGHT-TIME (23:00 - 07:00 HOURS)	OPERATING HOURS (06:00 – 20:00 HOURS)
L_{Aeq} ≤ 33 dB	L_{Aeq} ≤ 32 dB	L_{Aeq} ≤ 34 dB

Table 8.1 – Comparison between plant noise criteria set against the council's requirements

8.3 The plant operational hours has been confirmed to be from 06:00 to 20:00 hours which will be controlled by a timer switch. The exception being the cooling units associated with comms rooms which could operate 24-hours. The assessment below considers these variations in operating scenarios.

9.0 PREDICTED NOISE IMPACT

9.1 PROPOSED PLANT

9.1.1 The selected plant to be installed has been confirmed as;

- 1 no. Samsung condenser unit type AM140KXMDGH/EU; (06:00-20:00h)
- 1 no. Samsung condenser unit type AM080JXVHGR/EU; (06:00-20:00h)
- 2 no. Samsung condenser units type AM140JXVHGR/ET; (06:00-20:00h)
- 3 no. Samsung condenser units type AM180JXVHGR/ET; (06:00-20:00h)
- 6 no. Mitsubishi condenser units type PUZ-ZM50VKA.(Comms plant – 24 hour)

9.1.2 The approximate location of the plant items is shown in site plan AS11693/SP1.

9.1.3 Maximum noise levels generated by the plant items have been confirmed by the manufacturer as follows:

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K	dB(A)
AM140KXMDGH/EU L_p@1m	62.5	64	64.5	60	59	55	51.5	42	64
AM080JXVHGR/EU L_p@1m	70.5	65	62.5	58	49.5	46.5	45	36	59
AM140JXVHGR/ET L_p@1m	66	65.5	64	61	57.5	49.5	47.5	39	63
AM180JXVHGR/ET L_p@1m	69.5	69.5	68	65	62	54	49	44	67
PUZ-ZM50VKA L_p @ 1m	58	51	45	44	40	37	32	31	46

Table 9.1 - Manufacturer supplied sound pressure level data (heating) *[dB ref. 20µPa]*

9.1.4 Unit noise levels on cooling are lower but the heating noise levels have been used to provide a robust assessment.

9.2 PREDICTED NOISE LEVELS

9.2.1 As discussed above, the nearest noise sensitive receptors are considered to be the residential dwellings on the upper floors of Black Bull Yard, 18-26 Hatton Wall, as shown in indicative site plan AS11693/SP1. The closest windows of these dwellings are approximately 14-16 metres away from the proposed plant items.

9.2.2 The cumulative noise impact from the new plant at these receivers has been assessed using the noise data shown above. The prediction is shown in Table 9.2.

9.2.3 An initial calculation of the likely plant noise levels at the nearest noise sensitive receptors indicated that mitigation would be required to control noise emission levels. Screening losses afforded by a plant screen 1.25m higher than the highest condensing unit surrounding the southern part of the plant area have been included in the calculations. The plant screen location is shown in AS11693/SP2. This screen should be solid and imperforate and constructed of a suitable material of minimum mass per unit area 10kg/m^2.

UNITS AND TIME PERIOD	PREDICTED CUMULATIVE PLANT NOISE LEVEL	RESPECTIVE DESIGN CRITERION
All units: operating hours (06:00 to 20:00)	L_{Aeq} 34 dB	≤ L_{Aeq} 34 dB
6 Mitsubishi units: 24hours	L_{Aeq} 16 dB	≤ L_{Aeq} 32 dB

Table 9.2 - Predicted noise levels at nearest noise sensitive receptor *[dB ref. 20µPa]*

9.2.4 A summary of the plant propagation calculations is shown in Appendix B.

9.2.5 Any other air handling and extract plant would be fitted with atmospheric side silencers in order that cumulative noise emissions criteria are achieved at the nearest receptor.

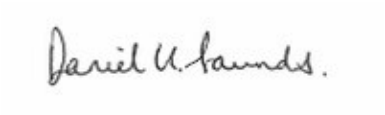
10.0 CONCLUSION

10.1 Clarke Saunders Associates (CSA) has been commissioned to assess the noise impact of the installation of new plant at 83 Clerkenwell Road, London.

10.2 The measurement of background noise levels, and reference to historical data, have enabled appropriate design criteria to be set for the control of plant noise emissions to noise sensitive properties, in accordance with the requirement of Camden Council.

10.3 Data for the new plant item has been used to predict the potential noise impact on neighbouring residential properties.

10.4 Based on the proposed plant layout drawings and plant selections, compliance with the noise emission design criteria has been demonstrated using a solid imperforate plant screen installed 1.25m higher than the tallest condensing unit. The screen must be constructed using a suitable material of minimum mass per unit area 10kg/m^2.



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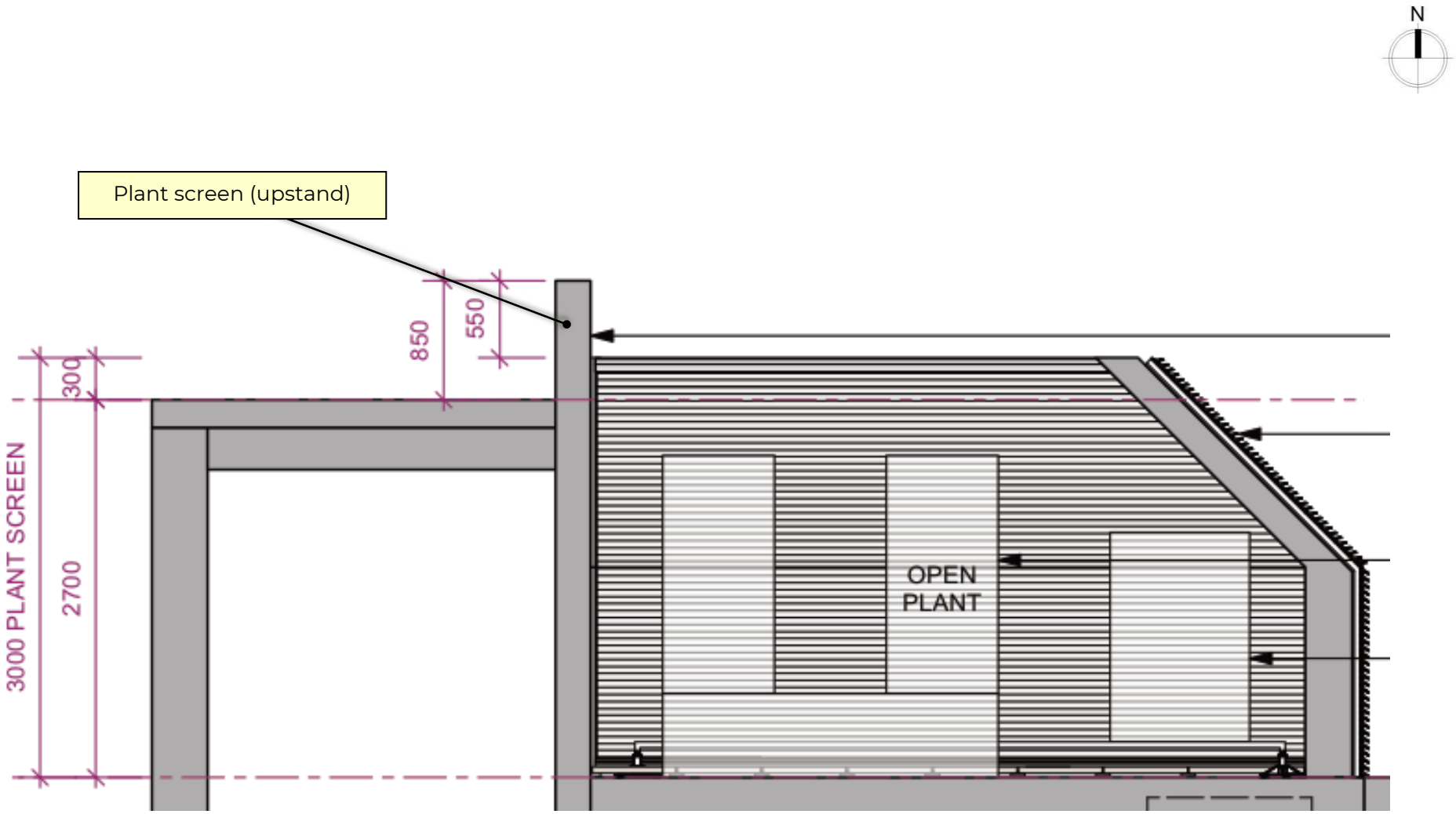
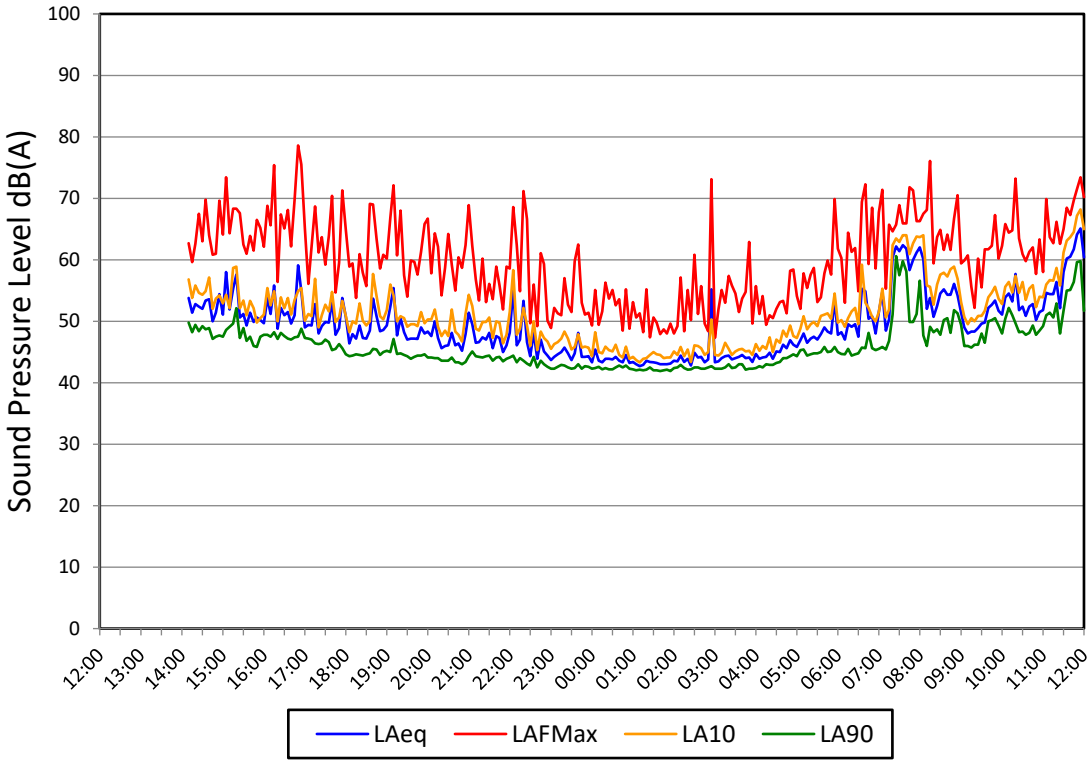
N
83 Clerkenwell Rd
Proposed plant location
Receptor 1
Monitoring position
Google


N
Plant screen (upstand)
850
550
300
3000 PLANT SCREEN
2700
OPEN
PLANT

83 Clerkenwell Road, London

Environmental Noise Time History

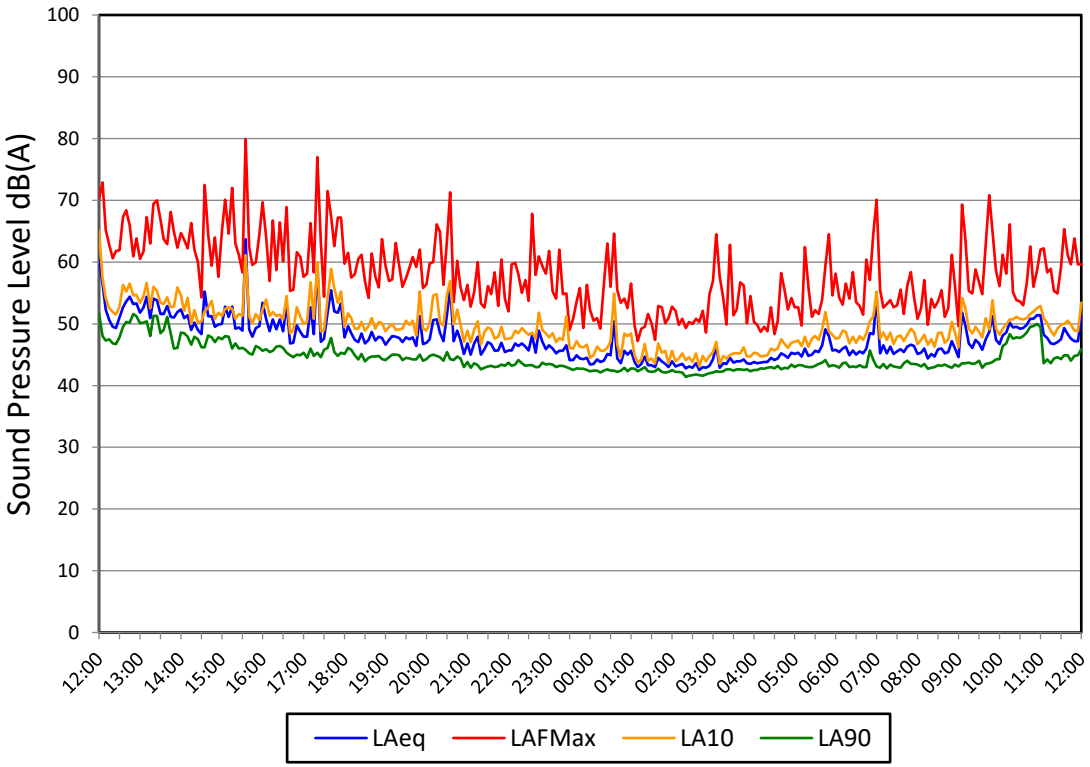


Thursday 28 May to Friday 29 May 2020

Figure AS11693/TH1

83 Clerkenwell Road, London

Environmental Noise Time History

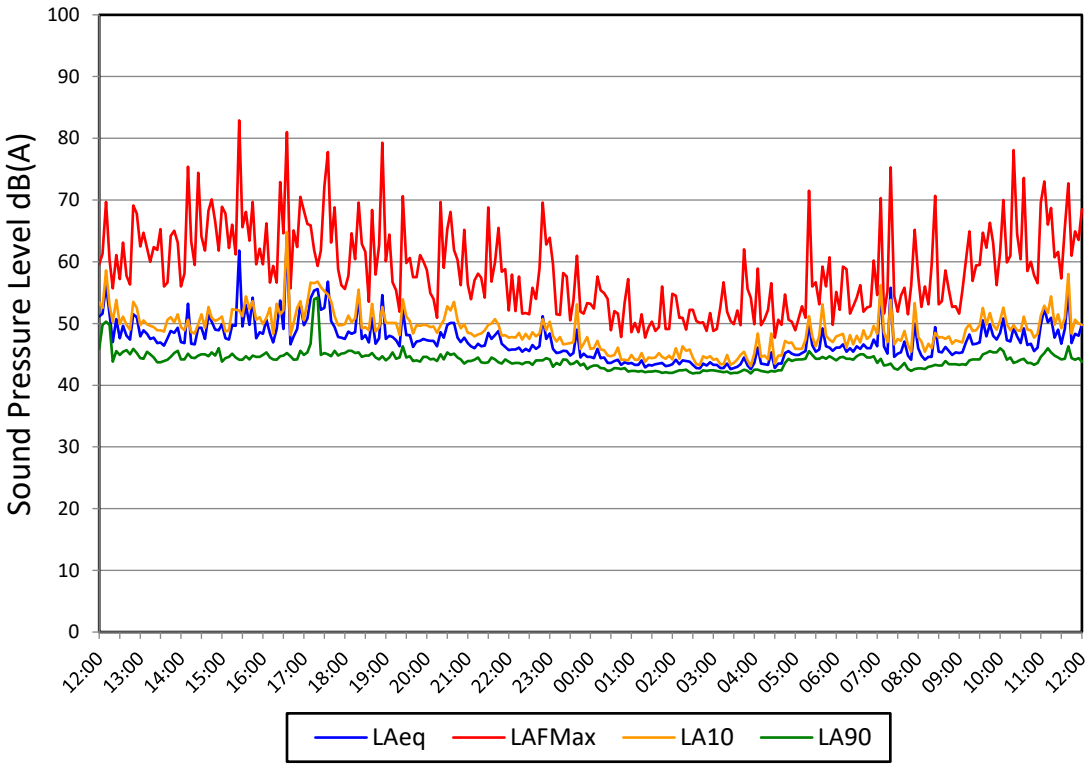


Friday 29 May to Saturday 30 May 2020

Figure AS11693/TH2

83 Clerkenwell Road, London

Environmental Noise Time History

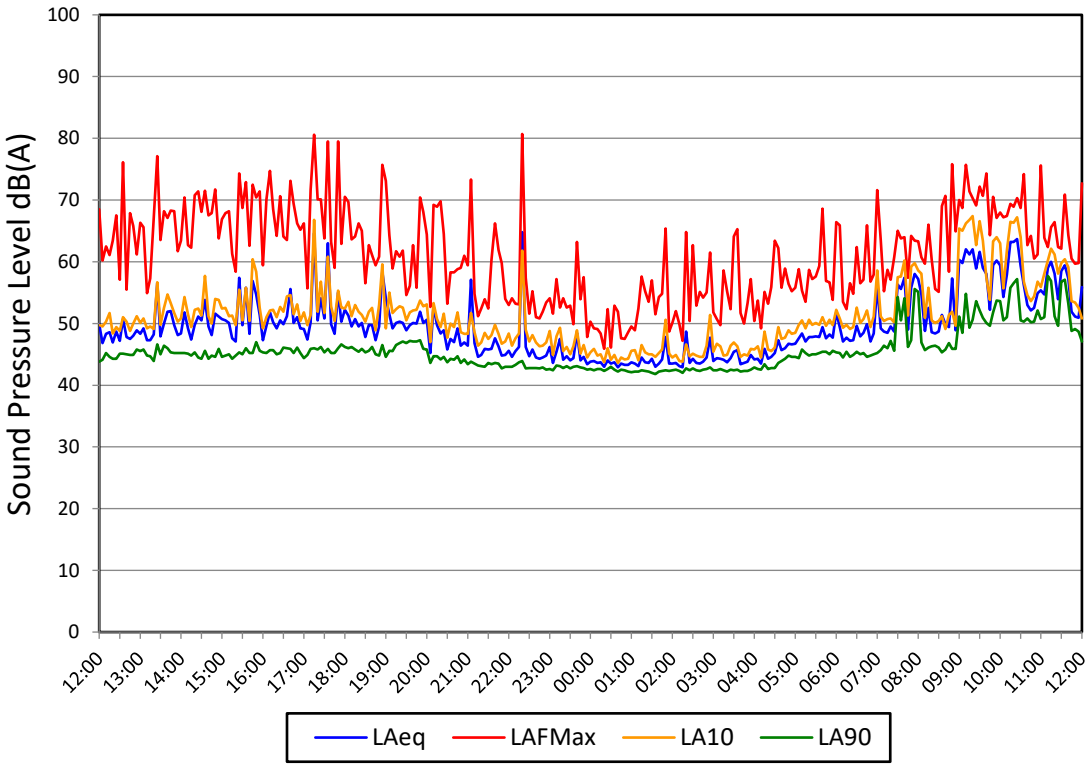


Saturday 30 May to Sunday 31 May 2020

Figure AS11693/TH3

83 Clerkenwell Road, London

Environmental Noise Time History



Sunday 31 May to Monday 01 June 2020

Figure AS11693/TH4

APPENDIX A

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.

Noise Sound that is unwanted by or disturbing to the perceiver.

Frequency The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.

dB(A): Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.

L_{eq}: 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 (e.g. 8 hour, 1 hour, etc).

The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction.

Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.

L_{10} & L_{90}: Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. 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 a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise.

It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.

L_{max}: The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean)

of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

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APPENDIX B
AS11693 - 83 Clerkenwell Street
Plant Noise Assessment
Operational Hours (06:00-20:00)

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
AM180JXVHGR/ET (Lp) Heating	Lp @ 1m	70	70	68	65	62	54	49	44	**67**
Number of:	3	5	5	5	5	5	5	5	5	
Building screening		-10	-13	-15	-18	-20	-20	-20	-20	
Distance loss	14m	-23	-23	-23	-23	-23	-23	-23	-23	
Level At Receptor	Leq	41	39	35	29	24	16	11	6	**31**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
AM140JXVHGR/ET (Lp) Heating	Lp @ 1m	66	66	64	61	58	50	48	39	**63**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-7	-9	-11	-14	-16	-19	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	38	36	32	27	21	10	7	-2	**28**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
AM080JXVHGR/EU (Lp) Heating	Lp @ 1m	66	65	63	58	50	47	45	36	**59**
Number of:	1	3	3	3	3	3	3	3	3	
Building screening		-7	-9	-11	-14	-16	-19	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	38	35	31	24	13	7	4	-5	**26**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
AM140KXMDGH/EU Heating	Lp @ 1m	63	64	65	60	59	55	52	42	**64**
Number of:	1	3	3	3	3	3	3	3	3	
Building screening		-9	-11	-14	-16	-19	-20	-20	-20	
Distance loss	14m	-23	-23	-23	-23	-23	-23	-23	-23	
Level At Receptor	Leq	34	33	31	24	20	15	12	2	**27**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-7	-8	-10	-12	-15	-18	-20	-20	
Distance loss	16m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	30	22	14	11	4	-2	-9	-10	**13**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-10	-12	-15	-17	-20	-20	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	28	18	10	6	-1	-4	-9	-10	**9**

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4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-8	-10	-12	-15	-17	-20	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	29	21	12	9	2	-4	-9	-10	**11**

Total level at receptor (06:00-20:00)	**Leq**	**45**	**42**	**38**	**32**	**27**	**19**	**15**	**8**	**34**

Operational Period Criterion (06:00-20:00) (dBA) **34**

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APPENDIX B
AS11693 - 83 Clerkenwell Street
Plant Noise Assessment
24h service

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-7	-8	-10	-12	-15	-18	-20	-20	
Distance loss	16m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	30	22	14	11	4	-2	-9	-10	**13**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-10	-12	-15	-17	-20	-20	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	28	18	10	6	-1	-4	-9	-10	**9**

4th floor Hatton Wall		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM50VKA (Lp) heating	Lp @ 1m	58	51	45	44	40	37	32	31	**46**
Number of:	2	3	3	3	3	3	3	3	3	
Building screening		-8	-10	-12	-15	-17	-20	-20	-20	
Distance loss	15m	-24	-24	-24	-24	-24	-24	-24	-24	
Level At Receptor	Leq	29	21	12	9	2	-4	-9	-10	**11**

Total level at receptor	**Leq**	**34**	**25**	**17**	**14**	**7**	**2**	**-4**	**-5**	**16**

24-hours criterion (Comms room only) (dBA) **32**