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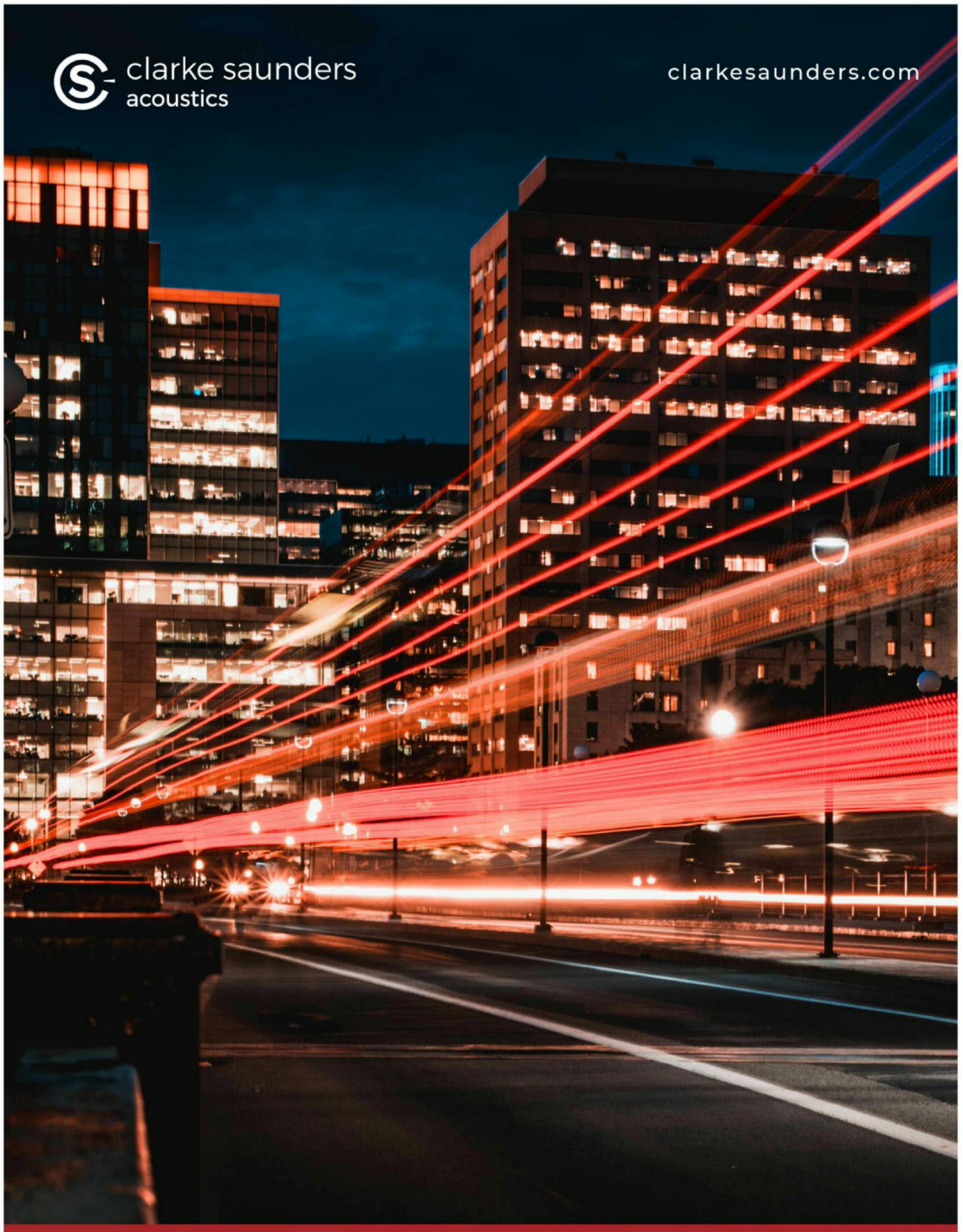

PREPARED: Friday, 07 June 2024

HIGHGATE LIBRARY, CAMDEN
PLANT NOISE IMPACT ASSESSMENT

CONTENTS

LIST OF ATTACHMENTS

Project Ref:	AS13490	**Title:**	Highgate Library, Camden
Report Ref:	AS13490.240318.NIA	**Title:**	Plant Noise Impact Assessment
Client Name:	London Borough of Camden		
Project Manager:	Alex Brooker		
Report Author:	Ravee Long		

Clarke Saunders Acoustics
Winchester SO22 5BE

1.0 EXECUTIVE SUMMARY

1.1 Clarke Saunders Acoustics have been commissioned by the London Borough of Camden to conduct a plant noise impact assessment of proposed building services plant to be installed as part of the refurbishment project at Highgate Library, Camden.

1.2 A scheme of noise mitigation measures has been developed with the building services consultant for incorporation in to the design. The resulting predicted noise levels are towards the lower range of values in the "amber" risk level following the assessment methodologies outlined in the LBC Local Plan 2017, indicating that it may be considered acceptable when assessed in the context of other merits of the development.

1.3 The results have been discussed with the Noise and Pollution officer at LBC. Taking in to account the low levels of noise predicted, it was agreed, in principle, that the plant noise levels are unlikely to result in loss of amenity to neighbouring noise sensitive receptors and would therefore likely be considered acceptable, given the context.

1.4 No further mitigation is considered necessary.

2.0 INTRODUCTION

2.1 Planning approval is sought for the installation of new air sourced heat pumps at Highgate Library, Chester Road, London, as part of a wider refurbishment of the property.

2.2 Clarke Saunders Acoustics (CSA) has been commissioned by the London Borough of Camden (LBC) to undertake an independent noise impact assessment, in accordance with the planning requirements of LBC.

2.3 The report describes the assessment undertaken, including acoustic calculations, and its findings.

2.4 A glossary relevant to the terminology used in this report is presented in Appendix A.

3.0 SITE DESCRIPTION

3.1 Highgate Library, Camden is in a residential area on Chester Road, London N19 5DH. It is bound by Chester Road to the north and Croftdown Road to the east. West of the site is Chester House, a residential building of 12 flats. South of the site is Brookfield Primary School.

4.0 LOCAL AUTHORITY REQUIREMENTS

4.1 The LBC *'Local Plan 2017'* refers to the *'National Planning Policy Framework'* and *'Planning Practice Guidance'* on the matter of noise impact assessment., stating the following:

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).

4.2 The document also provides targeted numerical values broadly corresponding to the LOAEL and SOAEL effect levels, as shown in Table 4.1.

NOISE SIGNIFICANCE RISK	GREEN LOAEL	AMBER LOAEL TO SOAEL	RED SOAEL
Camden Local Plan	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

Table 4.1: Excerpt from LBC Local Plan 2017 [dB re. 20µPa]

4.3 The following description is also provided with regard to acceptability of the green, amber and red designations:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

5.0 ENVIRONMENTAL NOISE SURVEY & EQUIPMENT

5.1 A survey of existing noise levels was undertaken at approximately 1st floor levels at the rear of the site at the location presented in the attached indicative site plan AS13490/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 14:25 hours Friday, 15th March and 09:55 hours Tuesday 19th March 2024.

5.2 The following equipment was used during the course of the survey:

- 1 no. Svantek data logging sound level meter type 971; and
- 1 no. Rion sound level calibrator type NC74.

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

5.4 The weather during the survey was noted on site at installation and retrieval of the meter. There were short periods of light showers and rain reported during the survey period. However, overall conditions were suitable to determine the background levels during the survey period, from which the external plant sound criteria are set.

5.5 Measurements were made following procedures in BS 7445-2:1991 (ISO1996-2:1987) *Description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use* and BS 4142:2014 + A.1:2019 *Methods for rating and assessing industrial and commercial sound.*

6.0 RESULTS

6.1 Figures AS13490/TH1-TH4 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

6.2 Table 6.1 provides a summary of the measured average noise levels and the typical background noise levels (derived as the 10th percentile of the L_{A90} dataset) at the monitoring location during the survey.

MONITORING PERIOD	TYPICAL BACKGROUND $L_{A90,5MINS}$	AVERAGE $L_{Aeq,T}$
Daytime 07:00 to 23:00 hours	34 dB	52 dB
Night-time 23:00 to 07:00 hours	27 dB	46 dB
Typical Operational Hours 07:00 to 20:00	36 dB	53 dB

Table 6.1: Summary of environmental noise survey results [dB re. 20µPa]

6.3 PROPOSED PLANT

6.3.1 The selected plant has been confirmed as:

- 3 no. Panasonic WH-MDC16H6ES air source heat pumps.

6.3.2 The proposed location of these units is within a courtyard to the rear of site as presented in the indicative site plan AS13490/SP1.

6.3.3 Manufacturer data only confirms the sound power levels generated by the selected air sourced heat pump in the single figure value of L_{wA} 65 dB. However, manufacturer confirmed sound power levels in octave bands has been provided for the Panasonic WH-MXC12J6E5 unit. This unit has been confirmed to have similar construction and components as the proposed unit to be installed and is therefore likely to generate noise with similar characteristics. Applying appropriate scaling of the Panasonic WH-MXC12J6E5 sound power level data to meet the overall sound power levels quoted for the Panasonic WH-MDC16H6ES unit, result in the following values.

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K	dB(A)
Panasonic WH-MXC12J6E5	-[1]	75	61	60	56	52	50	42	63
Panasonic WH-MDC16H6ES[2]	-[1]	77	63	62	58	54	52	44	65

Table 6.2: Manufacturer confirmed sound power levels [dB re. 20µPa]
[1]Manufacturer data does not include the 63Hz octave band.
[2]Octave band data scaled from similar unit to match quoted single figure sound power level data.

6.3.4 It has been confirmed that the air source heat pumps will benefit from a partially louvred acoustic enclosure. The enclosure is understood to be solid on the sides (north and south facing) with a louvred roof partially covering the courtyard. The solid sides will be formed by a suitable material with minimum mass per unit area of 13kg/m^2. It will be open at the front (east side) facing away from the receptor location to facilitate airflow. It is also confirmed that the walls within the plant area will be acoustically lined to control reflections within the plant space. The louvred roof of the enclosure will be acoustically specified with the following minimum insertion loss.

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K
Insertion Losses	6	6	8	10	14	18	16	15

Table 6.3: Acoustic louvre minimum insertion losses [dB re. 20µPa]

6.4 PREDICTED NOISE LEVELS

6.4.1 Noise emission levels have been calculated to the most affected receptors considering attenuation, screening and propagation losses. These are compared against the associated risk level set out in Section 4.0.

6.4.2 It has been confirmed that, in general, the plant will be switched off outside of the proposed operational hours of 07:00 – 20:00. On occasion, the plant may operate outside of these hours, for example if an evening event is being held at the library, however, this is not expected to be required frequently. In these cases, although ambient noise levels are slightly lower after 20:00, the plant noise would still be comfortably within the Amber category. A summary of the results from acoustic calculations is presented in Table 6.4.

RECEPTOR	TYPICAL BACKGROUND $L_{A90,5MINS}$	PLANT NOISE LEVEL $L_{Aeq,T}$	LBC RISK LEVEL	RISK LEVEL RANGE $L_{Aeq,T}$
Chester House	36 dB	32 dB	Amber	26 dB – 41 dB

Table 6.4: Summary of predicted noise levels against LBC Risk Levels [dB re. 20µPa]

6.4.3 The calculations assume operations of the plant at full capacity, however, the mechanical services consultant has confirmed that the plant has been selected such that it will operate at lower duties for the majority of the time.

6.4.4 Following the plant noise calculations, CSA approached Camilo Castro-Llach, Noise & Pollution Officer for LBC, to discuss the proposals and resulting noise levels.

6.4.5 The following was agreed, in principle:

- Mr. Castro-Llach is happy to consider a plant noise scheme within the Amber risk level category in this case, due to the low background noise levels in the local area."
- A plant noise level of $L_{Aeq,T}$ of 32 dB at the receptor windows would generally be considered sufficient in this case to protect the amenity of neighbouring residential uses as mitigation measures have already been provisioned.

6.4.6 A summary of the calculations is shown in Appendix B of this report.

7.0 CONCLUSIONS

7.1 Clarke Saunders Acoustics have been commissioned by the London Borough of Camden to conduct a plant noise impact assessment of proposed building services plant to be installed at Highgate Library, Camden.

7.2 An environmental noise survey has been completed to establish the existing background noise level in the area which has been used to compare against the predicted plant noise

levels at the receptor locations. The results have been assessed against the risk levels outlined within the LBC Local Plan.

7.3 A scheme of mitigation measures has been developed with the design team, including a partial enclosure, acoustically specified louvres and acoustic lining of the plant space. With these measures in place, the assessment has indicated that the plant noise at the closest, most affected noise sensitive receptors is expected to be towards the lower end of the "amber" risk level.

7.4 CSA has engaged with a Noise and Pollution officer for LBC for further comment who agreed, in principle, that the plant noise levels would typically be considered acceptable to protect the amenity of nearby noise sensitive receptors.

7.5 No further mitigation is required.

[redacted]

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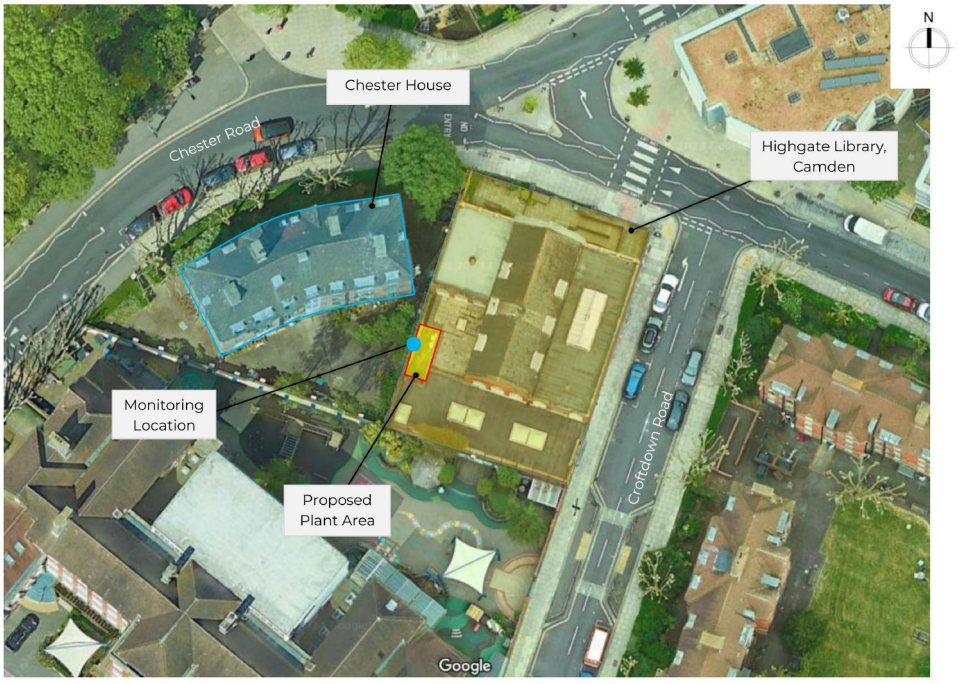
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Chester House
Chester Road
Highgate Library, Camden
Monitoring Location
Proposed Plant Area
Croftdown Road
Google

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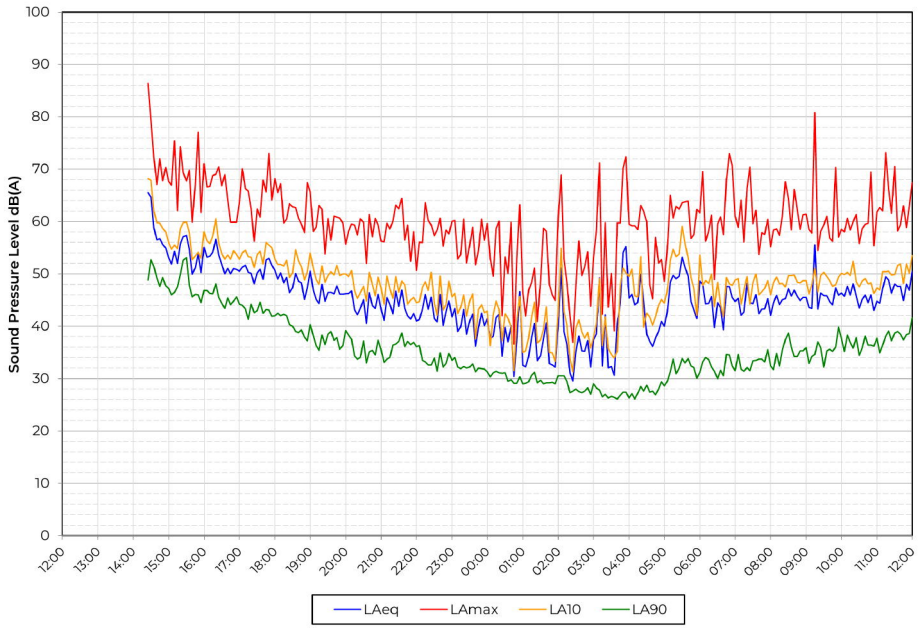
Highgate Library, Camden

Position LT1



Fri 15 Mar to Sat 16 Mar

Figure AS13490/TH1

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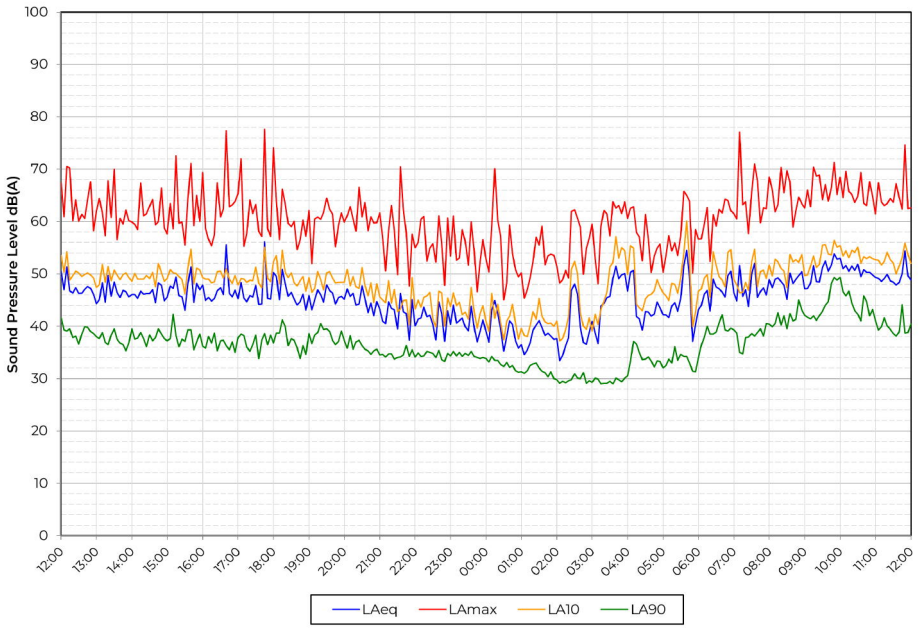
Highgate Library, Camden

Position LT1



Sat 16 Mar to Sun 17 Mar

Figure AS13490/TH2

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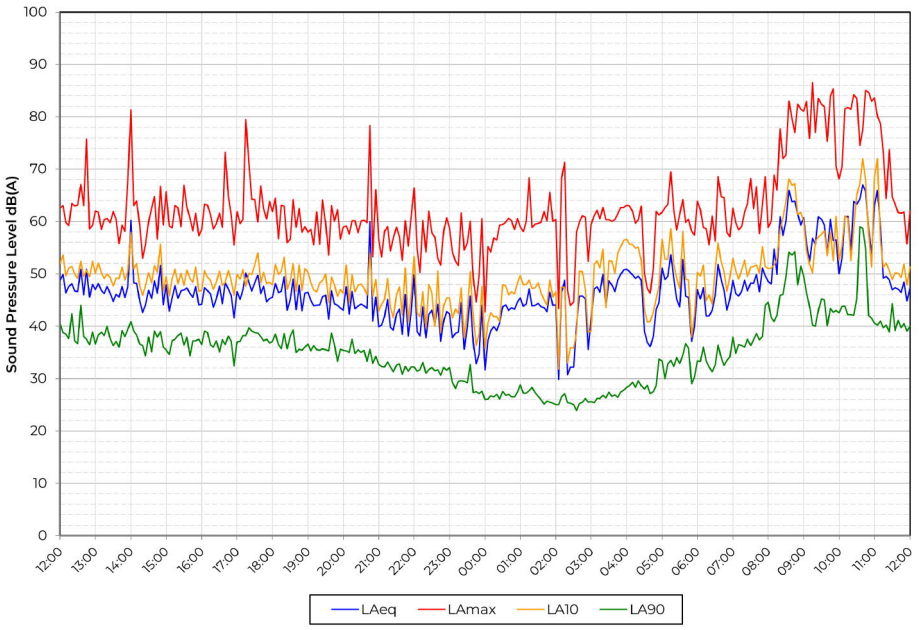
Highgate Library, Camden

Position LT1



Sun 17 Mar to Mon 18 Mar

Figure AS13490/TH3

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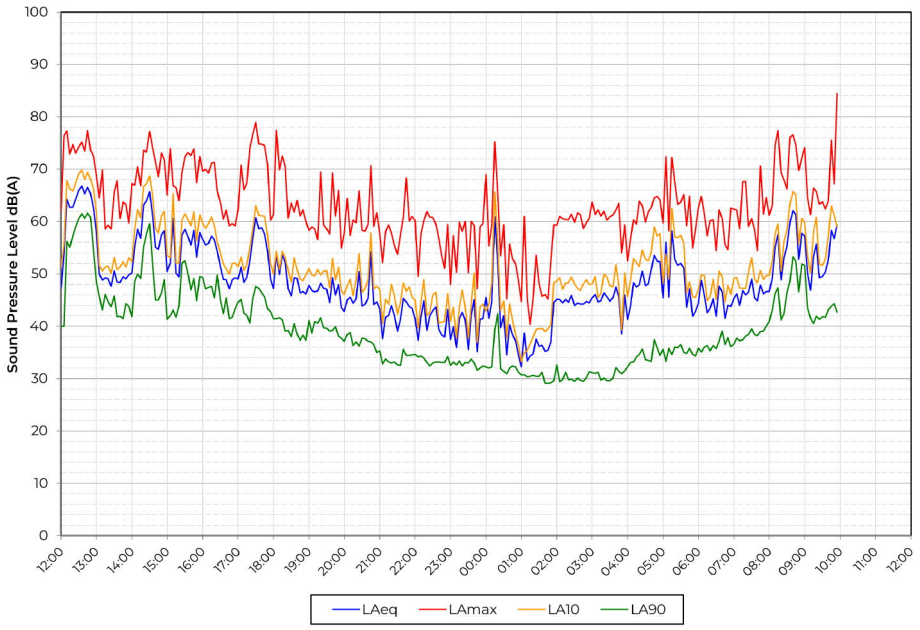
Highgate Library, Camden

Position LT1



Mon 18 Mar to Tue 19 Mar

Figure AS13490/TH4

APPENDIX A

ACOUSTIC TERMINOLOGY AND HUMAN RESPONSE TO BROADBAND SOUND

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.

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

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

APPENDIX B

AS13490 HIGHGATE LIBRARY, CAMDEN
SUMMARY OF PLANT SOUND CALCULATIONS

PLANT SOUND TO CHESTER HOUSE		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Plant Area Through Louvre										
Panasonic WH-MDC16H6ES scaled N	Lw	0	77	63	62	58	54	52	44	65
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation Loss		-6	-6	-8	-10	-14	-18	-16	-15	
Number of	3no	5	5	5	5	5	5	5	5	
Distance Loss	13m	-22	-22	-22	-22	-22	-22	-22	-22	
	Subtotal	**0**	**46**	**30**	**26**	**19**	**10**	**11**	**4**	**31**
Plant Area Around Louvre										
Panasonic WH-MDC16H6ES scaled N	Lw	0	77	63	62	58	54	52	44	65
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Number of	3no	5	5	5	5	5	5	5	5	
Screening Loss		-10	-12	-14	-17	-18	-18	-18	-18	
Distance Loss	13m	-22	-22	-22	-22	-22	-22	-22	-22	
	Subtotal	**0**	**40**	**23**	**19**	**15**	**10**	**9**	**1**	**26**
Specific sound level at receptor	**$L_{eq\ 1hr}$**	**0**	**47**	**31**	**27**	**20**	**13**	**13**	**6**	**32**

Daytime typical minimum LA90	34
Night time typical minimum LA90	27
Opening hours (07:00-22:00) typical minimum LA90	36