

GYMBOX,
120 HOLBORN,
LONDON EC1

Plant Noise Assessment

REPORT 6838/PNA
Prepared: 9 June 2015
Revision Number: 1

Gymbox
c/o Jackson Taylor & Co

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1.0 INTRODUCTION

In order to support the planning application for the location of new building services equipment serving the proposed Gymbox premises and additional landlord plant at 120 Holborn, the London Borough of Camden requires consideration be given to atmospheric noise emissions from the proposed equipment at the nearest noise sensitive properties.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emissions in accordance with the Local Authority's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 General

In accordance with the requirements of the Local Authority, monitoring of the prevailing background noise was undertaken over the following period:

- 11:30 hours Thursday 21 May to 11:30 hours Friday 22 May 2015

During the survey period the weather conditions were appropriate for the noise measurement exercise, it being dry with little wind.

Measurements were made of the L_{A90} , L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes duration.

2.2 Measurement Locations

Measurements were undertaken at the following location:

The microphone was positioned in free-field conditions in the courtyard of 120 Holborn / 100 Hatton Gardens, Holborn. This measurement position was considered as being representative of the noise climate as experienced at the nearest noise sensitive receptors as there are flats overlooking the enclosed courtyard. The measurement position is also illustrated on the attached Site Plans 6838/SP1.

The measurement position was predominantly affected by noise from the existing plant surrounding the area. The area is sheltered from road traffic noise by the existing buildings.

2.3 Instrumentation

The following equipment was used for the measurements:

Table 6838/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Larson Davis Type 1 Sound Level Meter	SLM824	3153	01913/1	2 July 2016
Larson Davis Pre Amplifier	PRM902	4467		
Larson Davis ½" Microphone	2541	8177		
01dB-Stell Calibrator	Cal 21	50442073	01797/3	30 April 2016

The sound level meter was calibrated both prior to and on completion of the survey with no calibration drift observed.

3.0 RESULTS

The noise levels at the measurement position are shown as time-histories on the attached Graphs 6838/G1-2. The lowest background LA90 noise levels measured have been used in our analyses. The lowest LA90 and the period averaged LAeq dB noise levels measured are summarised below.

Table 6838/T2 – Measured Sound Pressure Levels

Measurement Period	L90 (dBA)	Leq (dBA)
Daytime (07:00 – 23:00)	59	63
Night-time (23:00 – 07:00)	58	60
Gymbox Opening Hours (06:00 – 23:00)	59	63

With reference to the above measured levels and the attached graphs, it can be clearly seen that the existing plant dominates the noise climate at all times.

4.0 CRITERIA

The requirements of the London Borough of Camden for noise levels from new plant and machinery are detailed in Development Policy 28 (DP28) of the Core Strategies document. These requirements are repeated below.

Table 6838/T3 – London Borough of Camden Plant Noise Criteria

Noise Description and Location of Measurement	Period	Time	Noise Level
Noise at 1 metre external to a sensitive façade	Day, evening and night	00:00 - 24:00	5dB < L _{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day, evening and night	00:00 - 24:00	10dB < L _{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	00:00 - 24:00	10dB < L _{A90}
Noise at 1 metre external to sensitive façade where L _{A90} > 60dB	Day, evening and night	00:00 - 24:00	55dB L _{Aeq}

Based upon the above, the following noise emission limits at the nearest noise sensitive window would be appropriate (assuming the noise does not contain any of the characteristics detailed above):

Opening Hours (06:00 – 23:00) 54 dB

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Proposed Units and Locations

The following equipment is proposed at the site:

Table 6838/T4 – Proposed Plant and Locations

Location	Model
Courtyard (Gymbox Plant Area)	9No. Daikin REYQ20T
Courtyard (Landlord Plant Area)	4No. Fujitsu FDCA615HKXE4BR

The equipment positions are indicated on the attached Site Plan 6838/SP1.

5.2 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturers of the units. The octave band sound levels are detailed in the following Table 6838/T5.

Table 6838/T5 – Manufacturer’s Noise Levels

System	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Daikin	Lp at 1m	64	64	66	65	60	57	52	40	66
Fujitsu	Lp at 1m	70	74	58	59	57	52	50	45	63

5.3 Location of Nearest Noise Sensitive Window

The closest windows to the plant were identified as belonging to the flats overlooking the enclosed courtyard along Hatton Garden and Greville Street. The windows were approximated as being 15m from the centre of the Gymbox plant compound and 5.5m from the centre of the Landlord plant compound with clear line of sight in both instances.

5.4 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed plant at the nearest residential window, based on the information stated above, is summarised below.

- Sound Pressure Level of units (cumulative)
- Distance attenuation (centre of plant zone to receiver)
- Reflections within enclosed courtyard

The results of the calculations (detailed in Appendix B) predict the following noise levels at the nearest noise sensitive windows:

- Gymbox Plant 57dBA
- Landlord Plant 59dBA

5.5 Mitigation

The predicted noise levels for operation of both the Gymbox equipment and the new Landlord equipment are above the required criterion. As such mitigation measures should be included in the design.

Both sets of equipment have fans that discharge vertically and as such we recommend that attenuators are fitted to reduce noise transfer to the residential receivers overlooking the plant. A reduction in noise of $\geq 5\text{dB}$ is required which should be easily achievable.

We recommend a supplier / manufacturer of acoustic mitigation be approached to provide details of suitable mitigation. The attenuation should be selected in conjunction with the services engineer to ensure correct airflow and therefore operation of the units.

6.0 VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that equipment is isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures, the mounts should ideally have greater static deflection than the standard manufacturers' recommendations.

It is important the isolation is not "short-circuited" by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condensers and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7.0 CONCLUSION

Measurements of the existing background noise levels at the site of the proposed Gymbox located at 120 Holborn, London WC1 have been undertaken. The results of the measurements have been used in order to determine the required criteria for atmospheric noise emissions from the future plant installations.

The results of the assessment indicate atmospheric noise emissions from the plant are within the criteria required by the London Borough of Camden (DP28) to allow operation over the required hours of 06:00 – 23:00 provided that suitable mitigation measures are developed and adopted.

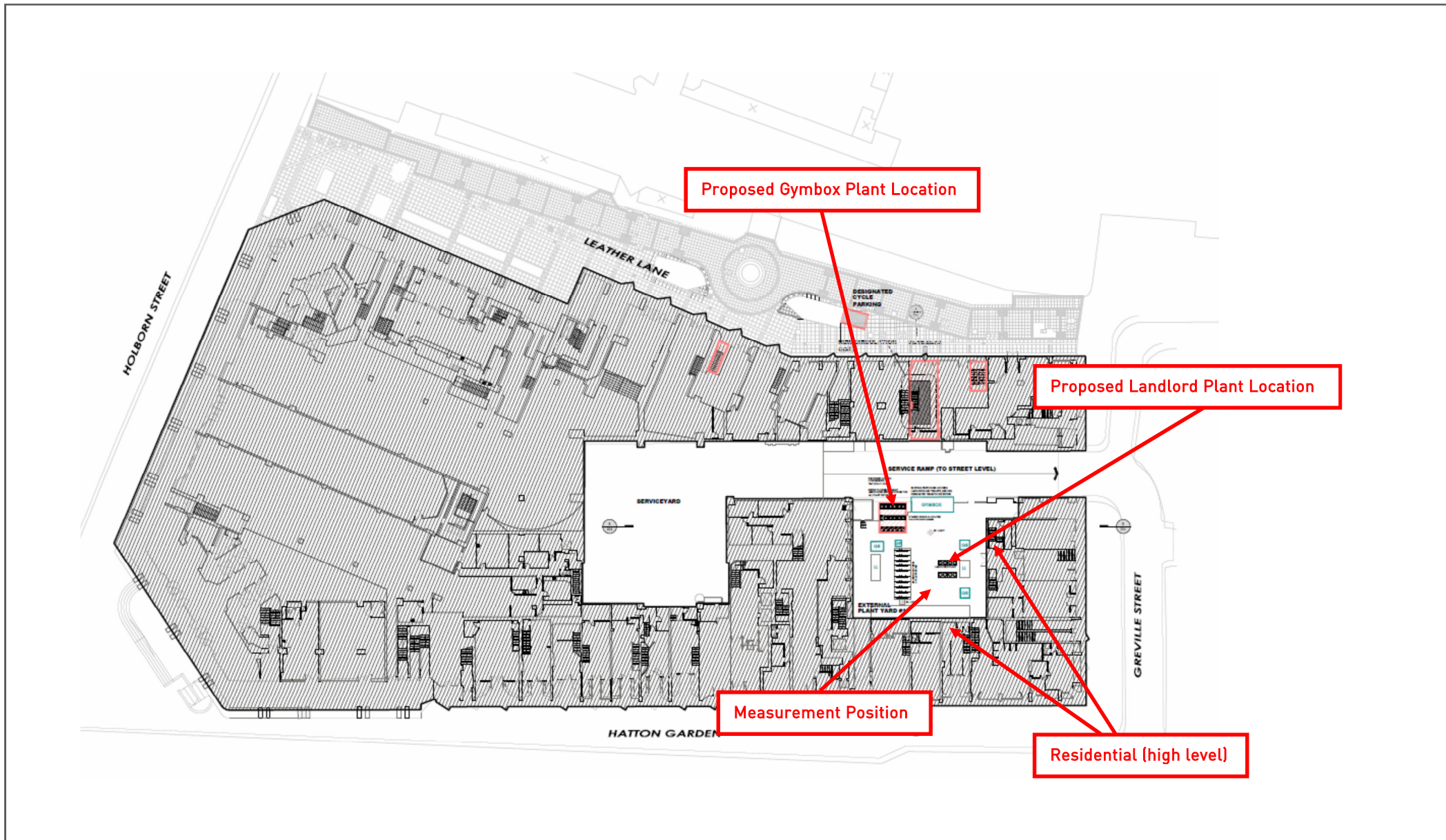
Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as 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 (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_n (e.g. L_{A10} , L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and 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 the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B – Calculation Sheet

Detail	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
REYQ20T	64	64	66	65	60	57	52	40	66
9No.	10	10	10	10	10	10	10	10	-
Distance Loss	-24	-24	-24	-24	-24	-24	-24	-24	-
Reflections	5	5	5	5	5	5	5	5	-
Total	55	55	57	56	51	48	43	31	57

Detail	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
FDCA615HKXE4BR	70	74	58	59	57	52	50	45	63
4No.	6	6	6	6	6	6	6	6	-
Distance Loss	-15	-15	-15	-15	-15	-15	-15	-15	-
Reflections	5	5	5	5	5	5	5	5	-
Total	66	70	54	55	53	48	46	41	59



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Site Plan detailing Measurement, Plant and Receiver Locations

Site Plan 6838/SP1

9 June 2015

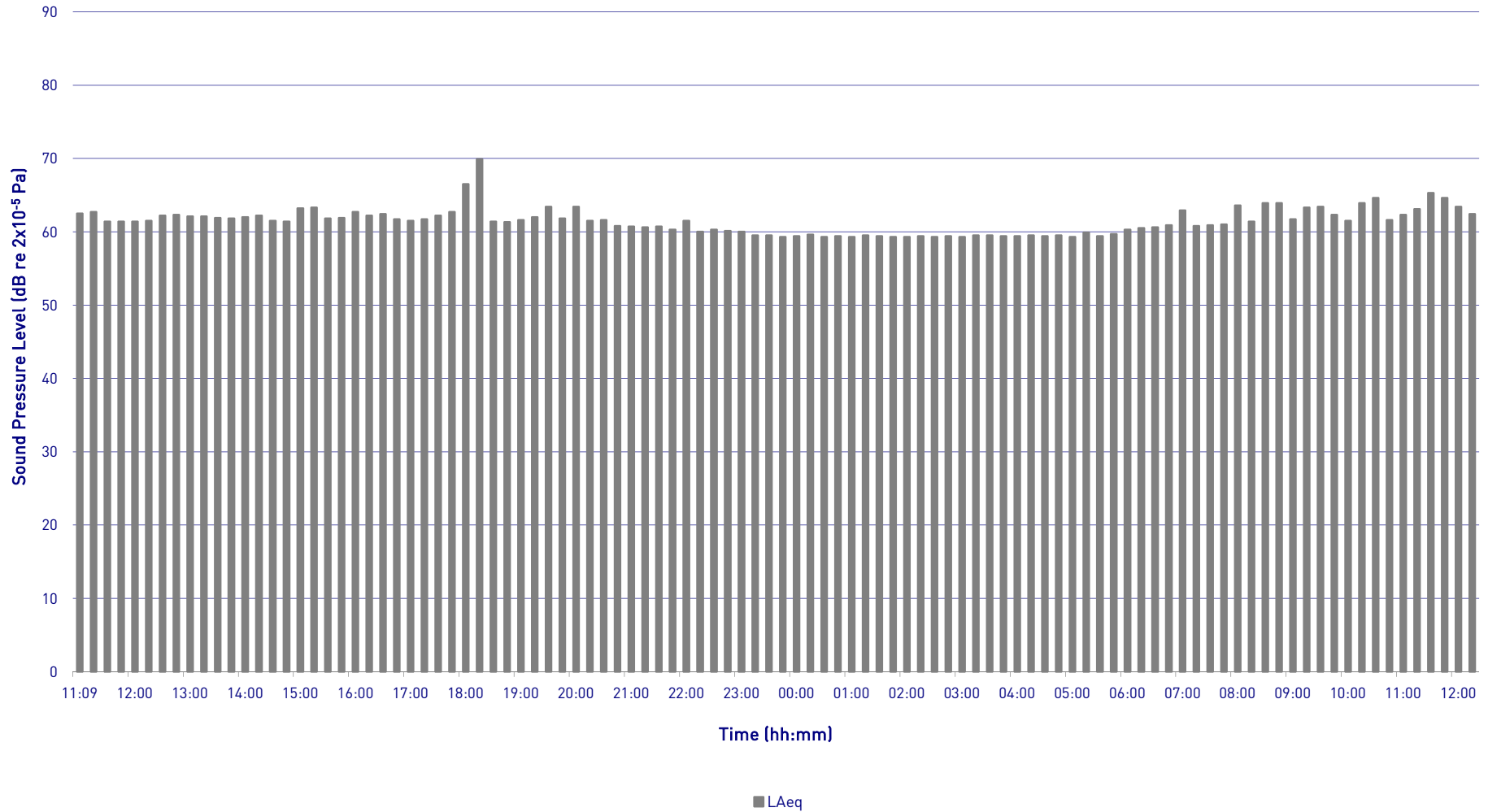
Not to Scale



Gymbox, Hatton Gardens Holborn
L_{Aeq} Time History
Thursday 21 May to Friday 22 May 2015



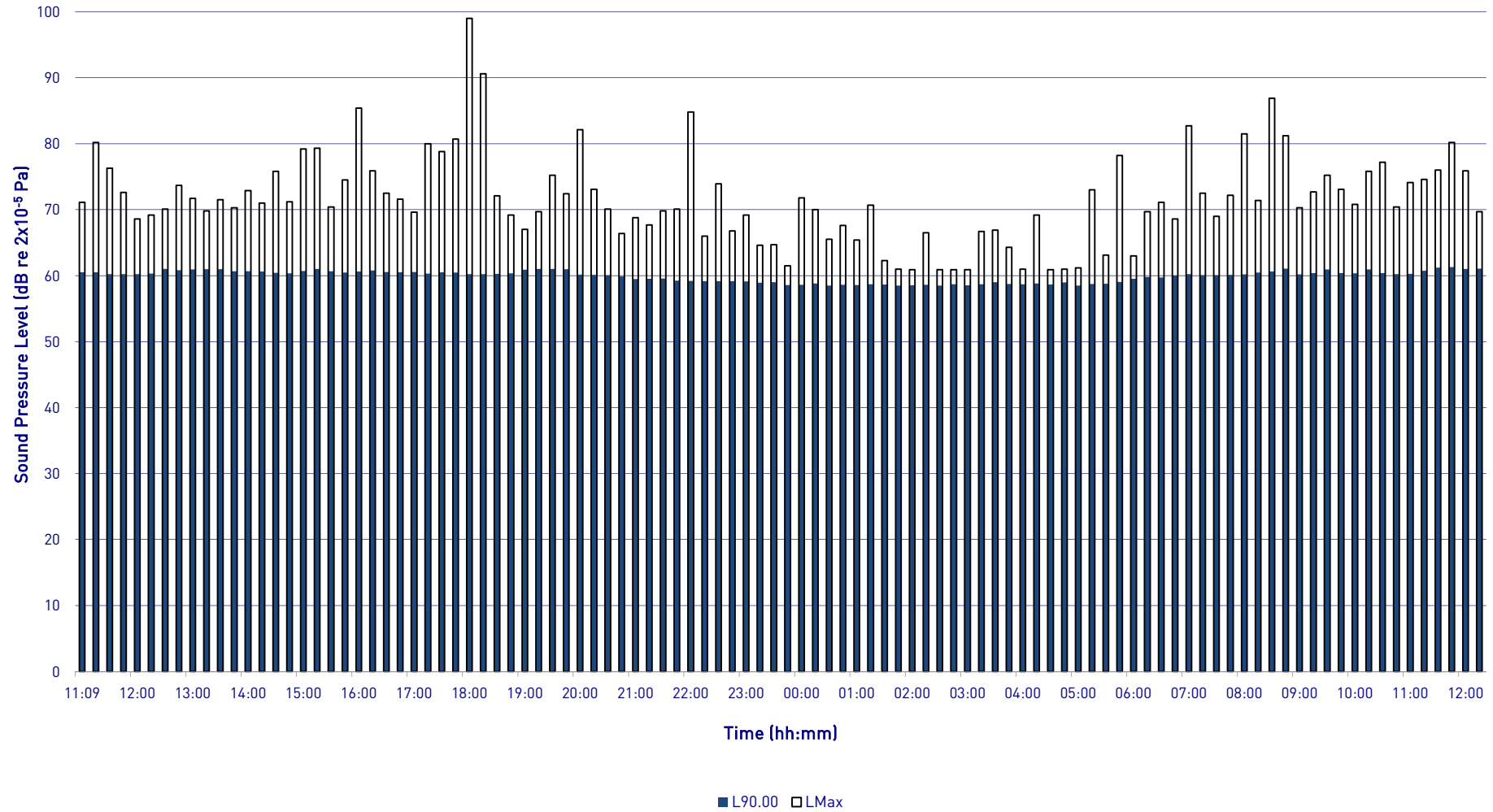
Graph 6838/G1



Gymbox Hatton Gardens, Holborn
L_{MAX} and L_{A90} Time History
Thursday 21 May to Friday 22 May 2015



Graph 6838/G2



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