RBA ACOUSTICS

29-30 FITZROY SQUARE, LONDON

Plant Noise Assessment

REPORT 6019/PNA
Prepared: 12 February 2014
Revision Number: 0

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29-30 FITZROY SQUARE
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Revision	Comment	Date	Prepared By	Approved By
Zero	First issue of report	12 February 2014	David Smitten	Robert Barlow

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1.0 INTRODUCTION

In order to support the planning application for the relocation of existing building services equipment at 29-30 Fitzroy Square, the London Borough of Camden requires consideration be given to atmospheric noise emissions from the 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:

11:00 hours Tuesday 21 January to 11:00 hours Wednesday 22 January 2014

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

Position 1

The microphone was positioned 1m outside a 2nd Floor window overlooking Fitzroy Square. This measurement position was considered to be representative of the noise climate as experienced at the closest receptors to any plant located to the front of the building.

Position 2

The microphone was positioned in free-field conditions on the flat roof area to the rear of the property. This measurement position was considered to be representative of the noise climate as experienced at the closest receptors to any plant located to the rear of the building (Fitzroy Mews).

The measurement positions are also illustrated on the attached Site Plan 6019/SP1.

The prevailing noise climate was predominantly affected by noise from nearby road traffic and existing building services noise from the surrounding area.

2.3 Instrumentation

The following equipment was used for the measurements:

Table 6019/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Calibration Date
Larson Davis Type 1 Sound Level Meter	SLM824	4307	2012-160400	13 June 2014
Larson Davis Pre Amplifier	PRM902	5029	2012-160197	5 June 2014
Larson Davis ½" Microphone	377B02	LW131167	1862.01	2 July 2014
Larson Davis Type 1 Sound Level Meter	SLM824	3153	U11517	27 June 2014
Larson Davis Pre Amplifier	PRM902	4467		
Larson Davis ½" Microphone	2541	8177		
Larson Davis Calibrator	Cal 200	3321	U11516	27 June 2014

The sound level meters were 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 6019/G1-4. These graphs are considered to be typical of an environment already affected by existing building services noise.

In order to ensure a worst case assessment, the lowest background L_{A90} noise levels measured have been used in our analyses. The lowest L_{A90} and the period averaged L_{Aeq} dB noise levels measured are summarised below.

Table 6019/T2 – Measured Sound Pressure Levels

Measurement Period	Position 1		Position 2	
	L_{90} (dBA)	L_{eq} (dBA)	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 23:00)	53	57	50	53
Night-time (23:00 – 07:00)	45	50	46	48

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 6019/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 facade	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 residential or office window would be appropriate (assuming the noise does not contain any of the characteristics detailed above):

		Position 1	Position 2
Daytime	(07:00 – 23:00)	48 dB	45 dB
Night-time	(23:00 – 07:00)	40 dB	41 dB

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Units and Locations

The following equipment is to be relocated at the site:

Table 6019/T4 – Proposed Plant and Locations

Proposed Plant	Description	Location
2No. Condensers	Daikin RXS35	Front Vaults

5.2 Noise Levels

Information regarding the noise levels of the plant has been provided by the manufacturers of the units. The octave band sound levels are detailed in the following Table 6019/T5.

Table 6019/T5 – Manufacturer's Noise Levels

Mode	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Cooling	SPL at 1m	43	44	46	42	38	32	27	19	44
Heating		40	45	43	41	38	32	27	19	43

Review of the octave band data concludes that there are no tonal characteristics associated with the plant.

5.3 Location of Nearest Noise Sensitive Windows

The closest windows to the plant are identified as being the ground / first floors of the adjacent property at 28 Fitzroy Square. These windows are, at closest, 6m from the pavement vault in which the proposed units are to be located.

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.

- SPL (cumulative)
- Distance Attenuation
- Reflections

The above method predicts a noise level of 37dBA at the nearest residential window. This is within the target criteria required by the Local Authority to allow 24 hour operation of the units (however given the commercial nature of the building, the units are likely to be in operation during office working hours only).

Calculation sheets are attached for further information in Appendix B.

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 condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7.0 CONCLUSION

Measurements of the existing background noise levels at 29-30 Fitzroy Square, London have been undertaken. The results of the measurements have been used in order to determine the required criteria for atmospheric noise emissions from 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 24 hour operation.

As such, the proposed plant application should be considered acceptable in terms of noise.

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_{An} (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	
Unit	43	44	46	42	38	32	27	19	44
Unit	43	44	46	42	38	32	27	19	44
Sub-total	*46*	*47*	*49*	*45*	*41*	*35*	*30*	*22*	*47*
Reflections	6	6	6	6	6	6	6	6	-
Distance Loss	-16	-16	-16	-16	-16	-16	-16	-16	-
Total	**36**	**37**	**39**	**35**	**31**	**25**	**20**	**12**	**37**

* Numbers in the tables have been rounded to the nearest dB whereas the actual calculations are not. This explains any discrepancy in the numbers in the 'Totals' above.

29-30 Fitzroy Square, London W1

L_{Aeq} Time History

Measurement Position 1, Tuesday 21st January 2014 to Wednesday 22nd January 2014

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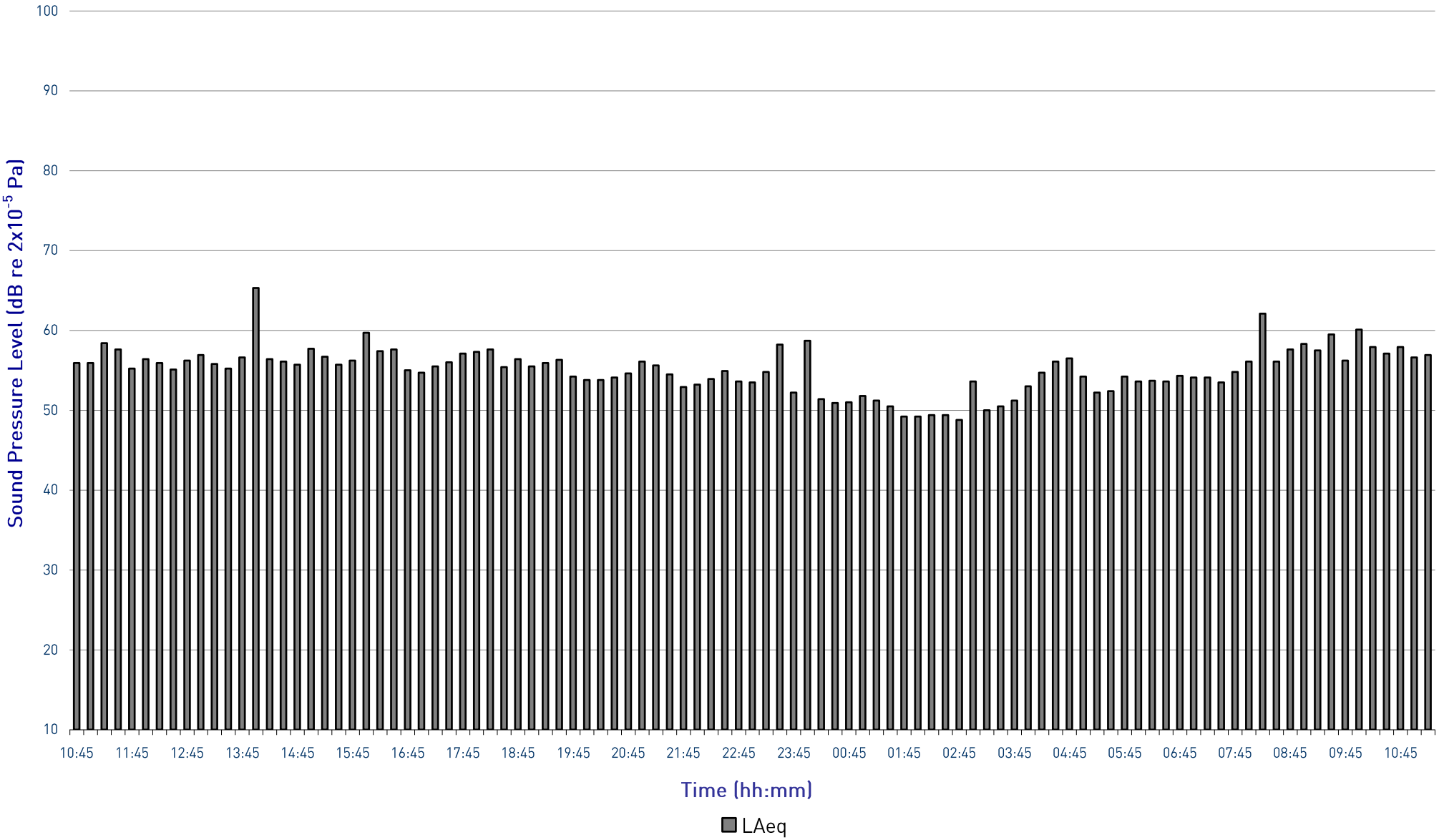
Graph 6019/G1



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L_{Amax} and L_{A90} Time History

Measurement Position 1, Tuesday 21st January 2014 to Wednesday 22nd January 2014

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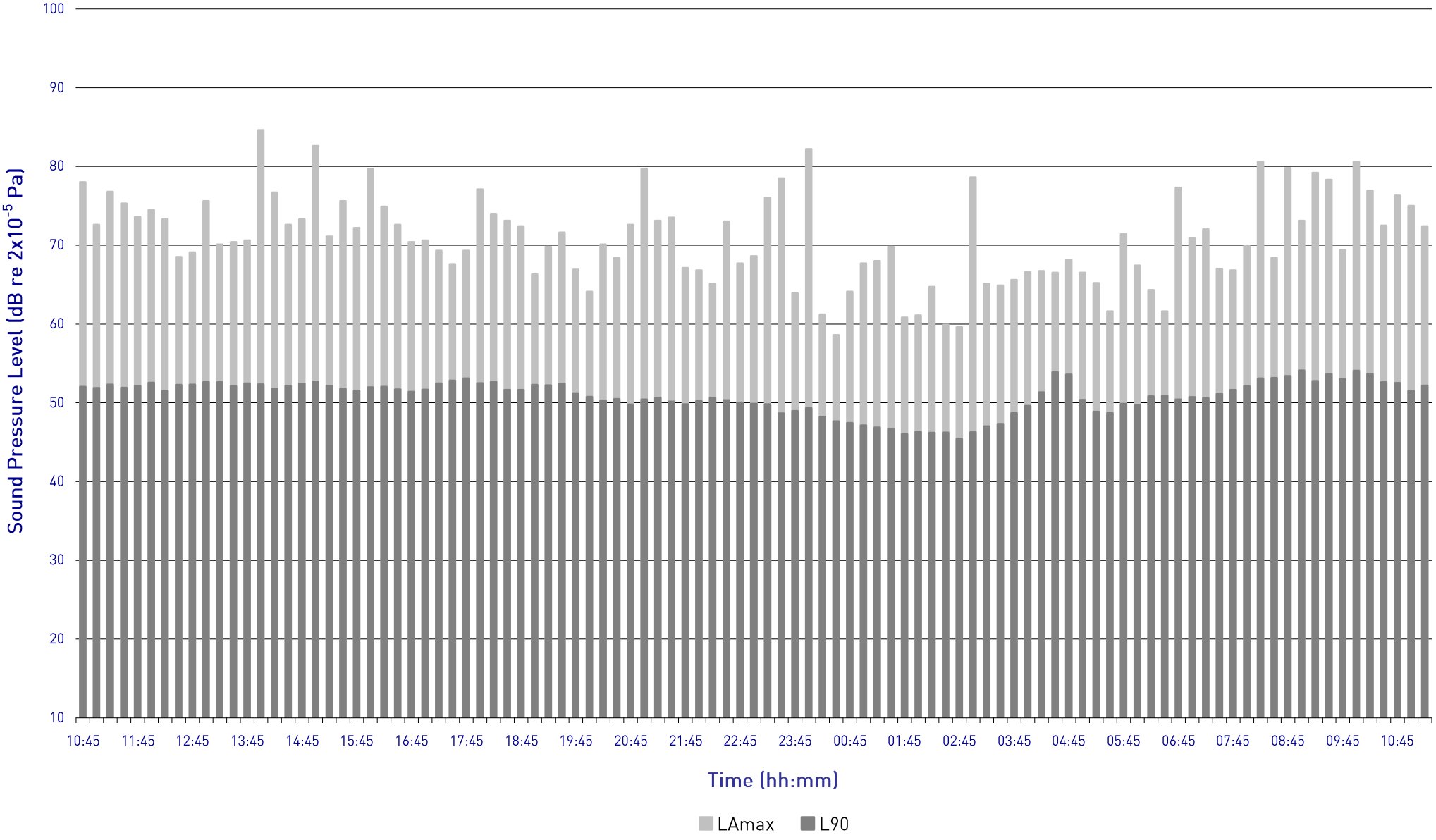
Graph 6019/G2



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L_{Aeq} Time History

Measurement Position 2, Tuesday 21st January 2014 to Wednesday 22nd January 2014

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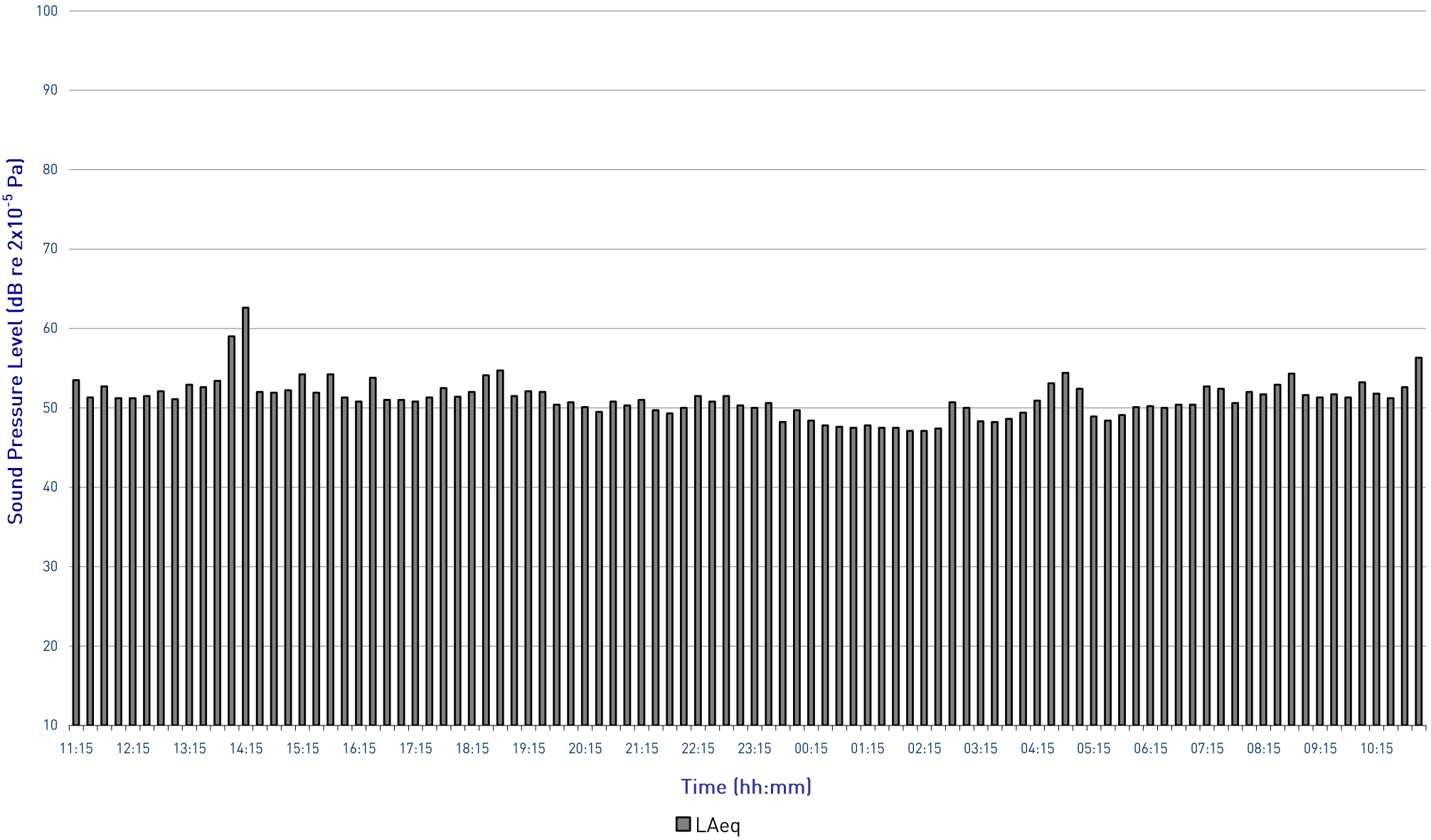
Graph 6019/G3



29-30 Fitzroy Square, London W1

L_{Amax} and L_{A90} Time History

Measurement Position 2, Tuesday 21st January 2014 to Wednesday 22nd January 2014

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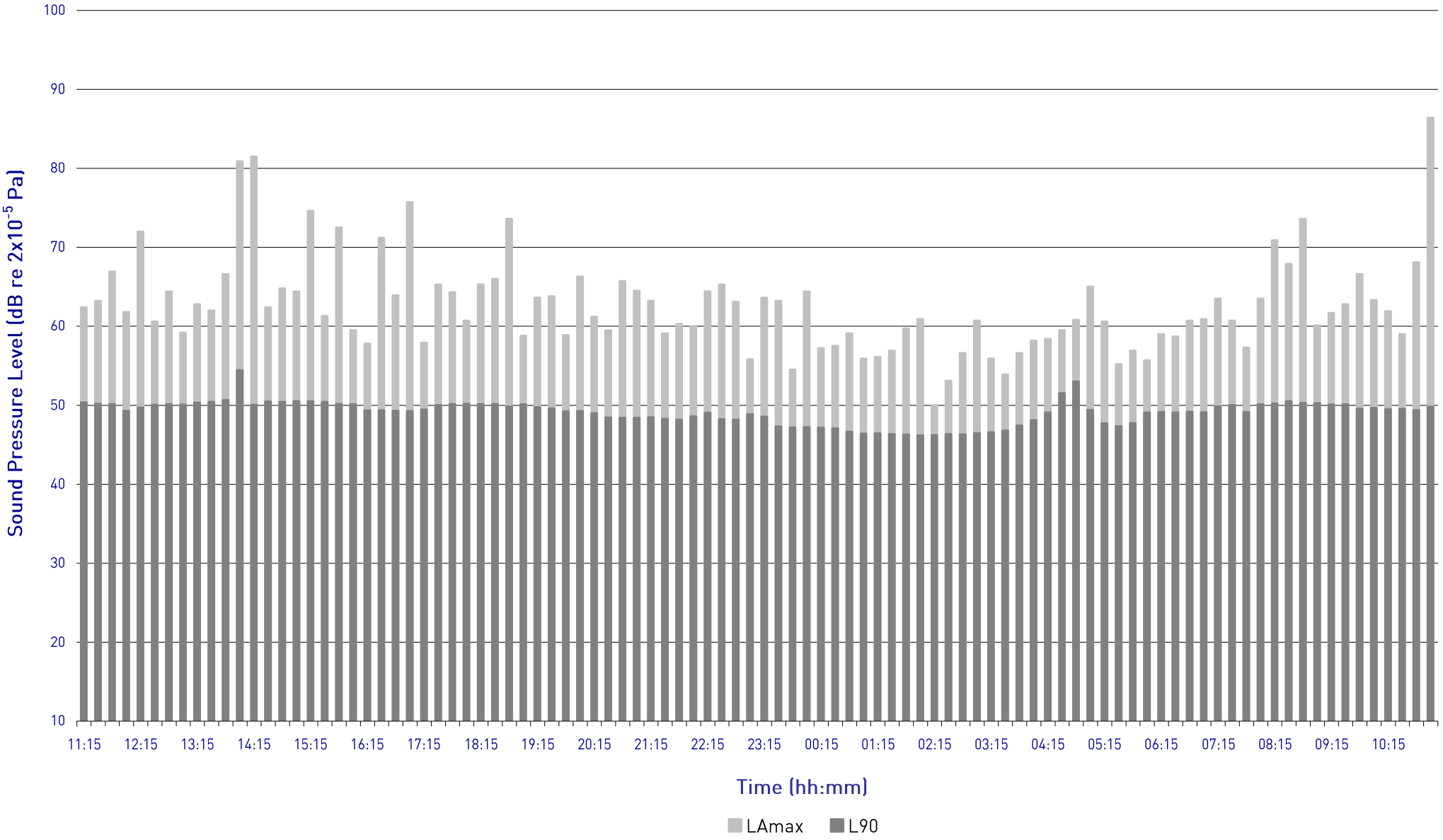
Graph 6019/G4



29-30 FITZROY SQUARE, LONDON W1

Photographs Showing Measurement Positions

Site Plan 6019/SP1

12 February 2014

Not to Scale

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