RBA ACOUSTICS

81 BAYHAM STREET, CAMDEN NW1

EXTERNAL BUILDING FABRIC ASSESSMENT

REPORT 6871/EBF
Prepared: 5 June 2015
Revision Number: 0

Sprunt
First Floor,
20 Northdown Street,
London N1 9BG

External Building Fabric Assessment

81 BAYHAM STREET, CAMDEN NW1

REPORT 6871/EBF

Prepared: 5 June 2015

Revision	Comment	Date	Prepared By	Approved By
0	First Issue	5 June 2015	Andreas Valiantis	Richard Keeble

Terms of contract:

RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

In line with our Environmental Policy, one hard copy of the report will be provided, upon request. Additional copies of the report, or further hard copies of revised reports, would be subject to an administrative cost of £20.00 (+VAT) per copy.

RBA ACOUSTICS

Contents

1.0 INTRODUCTION

The demolition of existing buildings and re-development of the site at 81 Bayham Street in Camden is proposed. The proposed new building will comprise a restaurant (A3 use) at ground floor level and residential properties from first to fourth floor level.

The site is located with Bayham Street running to the North-east. To the North-west is Camden Town Station approximately 250m distance. Please also see attached Site Plan 6871/SP1.

An assessment has been carried out in relation to the noise levels likely to be incident on the proposed building façades to demonstrate that noise will not unduly affect the future occupants of the re-development.

RBA Acoustics have been commissioned by Sprunt Architects to undertake this assessment for the proposed re-development.

This report details the results of the noise survey and sets out the acoustic performance requirements of the external building fabric elements. In addition, suitable plant noise emission criteria have also been developed based upon the survey results and the likely requirements of the Local Authority.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Survey Methodology

General

Continuous noise monitoring was undertaken at the re-development site between Tuesday 2nd June and Wednesday 3rd June 2015 in order to determine the corresponding noise levels over typical day and night-time periods. Weather conditions over the monitoring period were generally dry with only light wind speeds and were considered suitable for noise monitoring. Measurements were undertaken in full accordance with the guidance within BS7445.

Instrumentation

The following instrumentation was used for the survey:

Table 6871/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
01dB A&V Type 1 Sound Level Meter	Blue Solo 01	60611	02003/2	26 September 2016
01dB A&V Pre Amplifier	PRE 21 S	13678		
01dB A&V ½" Microphone	MCE 212	84967		
01dB-Stell Calibrator	Cal 21	50441920	02003/1	26 September 2016
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 meters were calibrated both prior to and on completion of the survey with no calibration drifts observed.

Measurement Positions

Position 1 – Bayham Street

A microphone was positioned 1m from the north-eastern façade of the building at first floor level, overlooking Bayham Street. The results at this measurement location are considered to be subject to façade reflection effects.

Position 2 – Rear

A microphone was positioned 1m from south-eastern façade of the building at first floor level, overlooking the rear of the existing building.

The measurement positions are also shown on the attached Site Plan 6871/SP1 and Photograph 6871/P1

The measurement positions are considered to be representative of worst-case noise levels incident on the proposed residential aspects of the re-development. However, position 2 is also considered representative of lowest background noise levels experienced at properties to the rear, for future plant installation design.

2.2 Site Conditions

Since the measurements were mainly unattended it is not possible to comment upon the noise climate at each measurement position over the entire monitoring period with absolute certainty. However, triggers were set to record audio at certain thresholds throughout the night, and some daytime measurements were attended. During our time on site it was noted that noise levels at Measurement Position 1 were dominated by road traffic movements along Bayham Street running the length of the north-eastern boundary of the site. Bayham Street was noted to be busy with traffic movements of moderate speed and accelerating and braking noise due to the sets of traffic lights along the road.

The traffic was noted to consist of all types of vehicle. Large vehicles are likely to provide the maximum noise levels to the general noise climate to the north of the site.

At Measurement Position 2 it was noted that noise levels were affected predominantly by road traffic movements along Bayham Street and, to a lesser extent, the wider surrounding road networks. It is considered that road traffic movements along Bayham Street are likely to provide the maximum noise levels of the site.

2.3 Results

The measured L_{Aeq}, L_{A90} and L_{Amax} 15 minute period levels are shown as time-histories on the attached Graphs 6871/G1-4. The averaged (façade reflection corrected) daytime and night-time L_{Aeq} noise levels are summarised in the following Table 6871/T2 below.

Table 6871/T2 – Façade Incident L_{Aeq} Noise Levels

Measurement Position	Average (façade reflection corrected) $L_{Aeq, period}$ Noise Level (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Bayham Street	70	65
Position 2 – Rear	57	55

The minimum background noise levels ($L_{A90, 15mins}$) at each measurement position are summarised in the following Table 6871/T3 below. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development.

Table 6871/T3 – Measured Minimum $L_{A90, 15mins}$ Noise Levels

Measurement Position	Minimum $L_{A90, 15mins}$ Noise Level during period (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Bayham Street	53	44
Position 2 – Rear	51	46

Averaged spectral noise levels are graphically represented on the attached Graphs 6871/G5-6.

3.0 PLANNING CRITERIA

This section outlines the assessment criteria we anticipate the Local Authority will require in terms of the relevant standards. A brief explanation of the acoustic terminology used in this report is shown within Appendix A.

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF), March 2012, sets out the Government's planning policies for England. In respect of noise, Paragraph 123 of the NPPF states the following:

Planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The above presents no quantitative guidance on a site's suitability for residential development and we have therefore, for the purposes of this assessment, made reference to the following documents.

3.2 Noise Policy Statement for England

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

NOEL – No Observed Effect Level
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur."

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:
"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

This aim (the third aim), seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

4.0 PLANT NOISE EMISSION CRITERIA

Given the prevailing noise climate we propose a noise level limit of 5dB below the background L_{A90} for all operating plant at 1m from the nearest noise sensitive façade may be considered appropriate by the Local Authority, but this should be discussed at the time of plant selection, within the context of the development. In line with this we would propose items of mechanical services are designed, such that noise emissions from the plant do not exceed the following levels when assessed at the nearest noise sensitive location:

Table 6871/T4 – Plant Noise Emission Limits

Measurement Position	L_{Aeq} Noise Level limit of all operating plant (dB) at 1m from the nearest noise sensitive façade	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Bayham Street	48	39
Position 2 – Rear	46	41

In line with BS 4142:2014, should the proposed plant be identified as having intermittent or tonal characteristics, a further correction should be subtracted, as appropriate, from any of the above proposed noise emission limits in Table 6871/T4.

5.0 EXTERNAL BUILDING FABRIC CRITERIA

This section outlines the assessment criteria we anticipate the Local Authority will require in terms of the relevant standards. A brief explanation of the acoustic terminology used in this report is shown within Appendix A.

5.1 British Standard 8233:2014

BS 8233:2014 "Guidance on *Sound insulation and noise reduction for buildings*" draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions.

The noise level values given are in terms of an average (L_{Aeq}) level.

The standard advises the following internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties, as well as commercial uses. A brief explanation of the acoustic terminology used in this report is shown in Appendix A attached.

Table 6871/T5 – BS 8233:2014 Criteria

Room	Daytime (07:00 to 23:00hours)	Night-time (23:00 to 07:00hours)
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$
Restaurant	40 - 55dBA*	--

*The design range presented can be considered as providing both upper and lower noise level limits due to potential privacy issues.

As the final use of these spaces has yet to be decided, we would propose the following design range criterion:

Commercial Units - 40-45dBA L_{Aeq} (day)

Such a level would prove acceptable for the majority of commercial spaces, although please note that the level is higher than advised for high specification office space (executive offices, etc).

In terms of the NPSE, internal noise levels that meet the BS8233 standards could be considered as being below the LOAEL and therefore equivalent to the NOEL. There is no value in BS8233 that could be equated to the SOAEL, i.e. an internal noise level at which significant adverse effects occur.

5.2 World Health Organisation: Guidelines for Community Noise

The document describes guideline levels that are *"essentially values for the onset of health effects from noise exposure"*.

A table of guideline values is included, relating to adverse health effects, referred to as any temporary or long term deterioration in physical, psychological, or social functioning that is associated with noise exposure.

The following is an extract from *Table 4.1: Guideline values for community noise in specific environments*, as stated in the document.

Table 6871/T6 – Guideline Values for Community Noise

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)	$L_{Amax,f}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-times	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

5.3 Summary

The project criteria adopted are therefore as follows;

Bedroom	Daytime (07:00-23:00 hours)	35dB L_{Aeq}
	Night-time (23:00-07:00 hours)	30dB L_{Aeq}
		45dB $L_{Amax,f}$
Living Rooms	Daytime (07:00-23:00 hours)	35dB L_{Aeq}

In light of the Local Authority's requirements, ensuring that the above internal noise levels are met should therefore meet the NOEL, with regard to the NPPF.

6.0 EXTERNAL BUILDING FABRIC ASSESSMENT

6.1 Background

Appropriate internal noise levels can be achieved providing suitable building envelope constructions are employed. Analyses of the external building fabric have been undertaken in order to ascertain the required acoustic performance of the glazing and other external fabric elements to achieve the project criteria.

6.2 Assumptions

Our external building fabric analyses have assumed the following:

a) Drawings

Our assessment has been based on the following Sprunt Architect's proposed drawings.

Drawing Number	Description	Revision	Date
12456_F_15_00- 3-5	Proposed Ground Floor Level	1	27.05.15
12456_F_15_01- 3-7	Proposed First to Forth Floor Level	1	27.05.15
12456_F_30_01- 3-6	Proposed Elevations and Sections	1	27.05.15

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 2.3.

(c) Room Absorption

We have assumed the bedrooms to be acoustically "soft" with carpets, curtains and other soft furnishings. For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6871/T7 – Bedroom Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.25	0.27	0.31	0.32	0.32	0.32

We have assumed the living rooms to be less acoustically absorptive (with a hard floor finish, although with furnishings). For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6871/T8 – Living Room Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.20	0.22	0.22	0.22	0.23	0.27

(d) External Wall

We understand that external non-glazed areas are to comprise the following:

- Brickwork
- Thermal insulation and cavity
- Pyrok cement broad fixed to steel framing system
- Thermal insulation and cavity
- 2 x layers 15mm dense plasterboard

As such, we have assumed the following sound reduction indices (equating to an overall R_W of 58dB) for all non-glazed façade areas comprising the above construction:

Table 6871/T9 – Non-Glazed SRIs

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
35	42	48	53	63	70	74	74

Should the proposals for non-glazed areas change, it is critical we are informed at the earliest opportunity as this could have a significant impact on the sound insulation performance requirements of the glazing systems.

(e) Ventilation

It is understood that due to issues of air quality, the chosen strategy is via a filtered air mechanical ventilation system which will intake and exhaust to the rear. Therefore no trickle vents are proposed. During the periods where the windows are opened for purge/rapid ventilation, noise levels will naturally be increased internally.

It should be noted that a change of ventilation strategy could have a significant impact on the specification of the glazing.

6.3 Specification & Guidance Constructions

Appendix B (attached) details the sound reduction performance specification for the ventilators and glazed elements of the external building fabric.

The glazing performance specifications apply to the window package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the window system will depend on many factors such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc.

For guidance purposes we would typically expect the following glazing configurations detailed below to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix B.

Please note – *The guidance constructions described in Table 6871/T10 are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix B, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a window configuration will meet the performance specification.*

Table 6871/T10 – Glazing Guidance Constructions

Glazing Type	Nominal Glazing Configuration
G1	High specification double glazing comprising 10mm glass / 12mm cavity / 6.4mm acoustically laminated (PVB) glass
G2	Standard thermal double glazing with differing pane thicknesses, e.g. 4mm glass/12mm cavity/6mm glass

6.4 Applicable Zoning

Due to the differences in the prevailing noise climate around the site and the types of rooms at each floor level, two primary glazing zones have been defined, as indicated on the attached Façade Zoning Plans 6871/FZPG & 6871/FZP1.

Table 6871/T11 – Applicable Zoning

Zone Facade	Room Type	Glazing Type
1	Bedroom	G1
	Living room	G2
2	Bedroom	G2
	Living room	G2

7.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at 81 Bayham Street, Camden NW1. The measured noise levels are presented herein. The resultant noise levels have been used in our assessment of the glazing requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to BS 8233, WHO, the NPPF and NPSE.

We do not consider planning approval should be rejected on the basis of noise and can confirm internal noise levels can be effectively controlled by fairly simple glazing configurations on the whole.

General guidance configurations have been suggested for the glazing constructions that should be capable of achieving the required specifications detailed within Appendix B. A worst case configuration of 10/12/6.4 double glazing is required in the worst affected bedrooms at the front facade to protect the residences from any potential noise impact arising from Bayham Street. However, other areas only require more standard double glazing.

The data has also been used to set plant noise emission criteria for future assessment of any proposed plant at the development to ensure the adjacent neighbour's amenity spaces are protected from plant noise emissions in line with the Local Authority requirements.

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 – External Building Fabric Acoustic Specification

Window Sound Insulation Performance

Glazed units (inclusive of glazing, louvres, timber panels, spandrel panels, infill panels, framing, opening lights, balcony/terrace doors, seals, etc. as appropriate) should achieve the following minimum sound reduction indices as tested in general accordance with BS EN ISO 10140-2:2010:

Type	Minimum Recommended Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
G1	23	27	29	36	41	42	52	52	39
G2	19	23	22	27	38	40	41	41	33

Note: R_w is the "overall weighted sound reduction index" tested in a laboratory.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for representative samples of all glazing systems shall be submitted to RBA Acoustics for approval to demonstrate compliance with the above performance specifications.

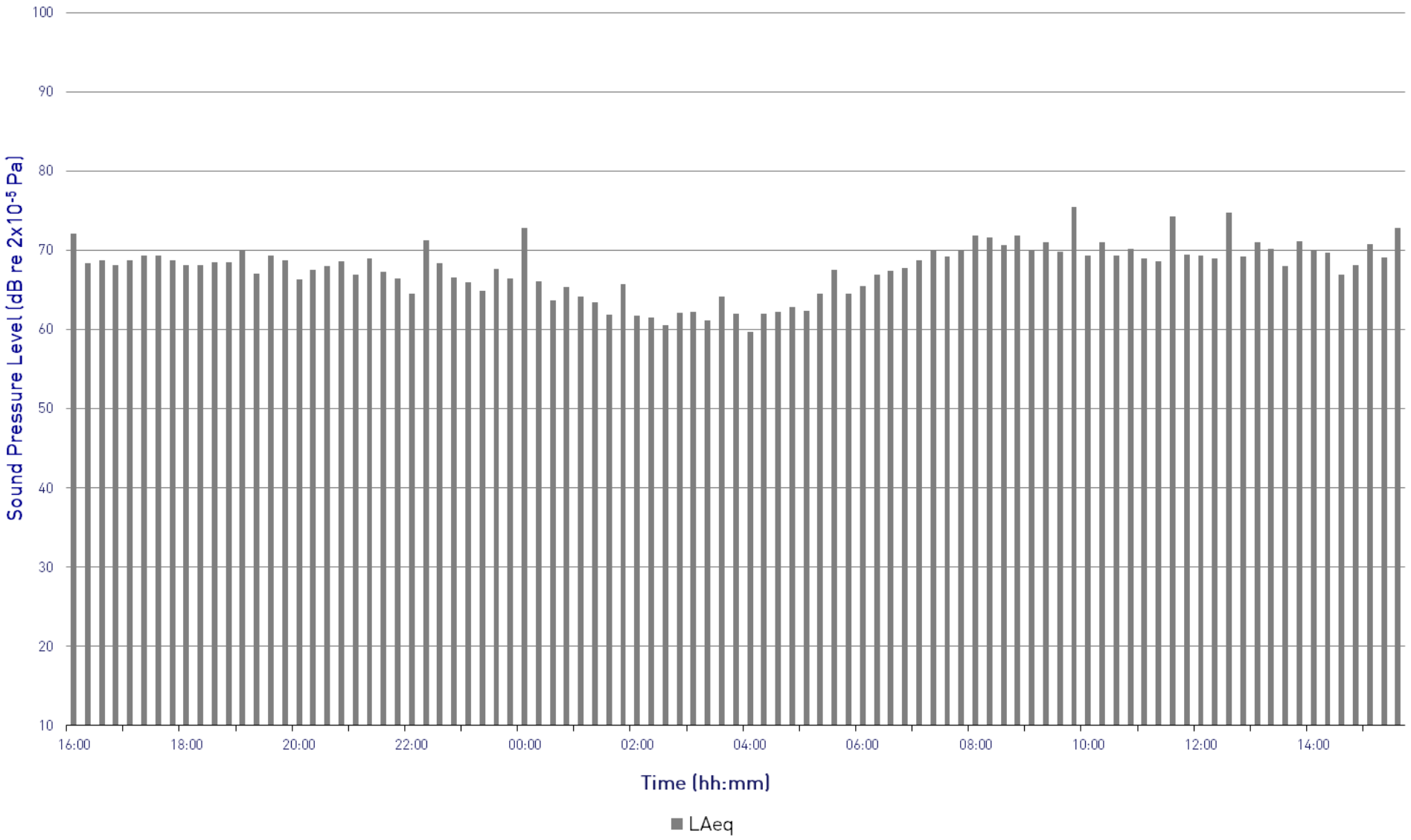
81 Bayham Street

L_{Aeq} Time History

Measurement Position 1, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G1



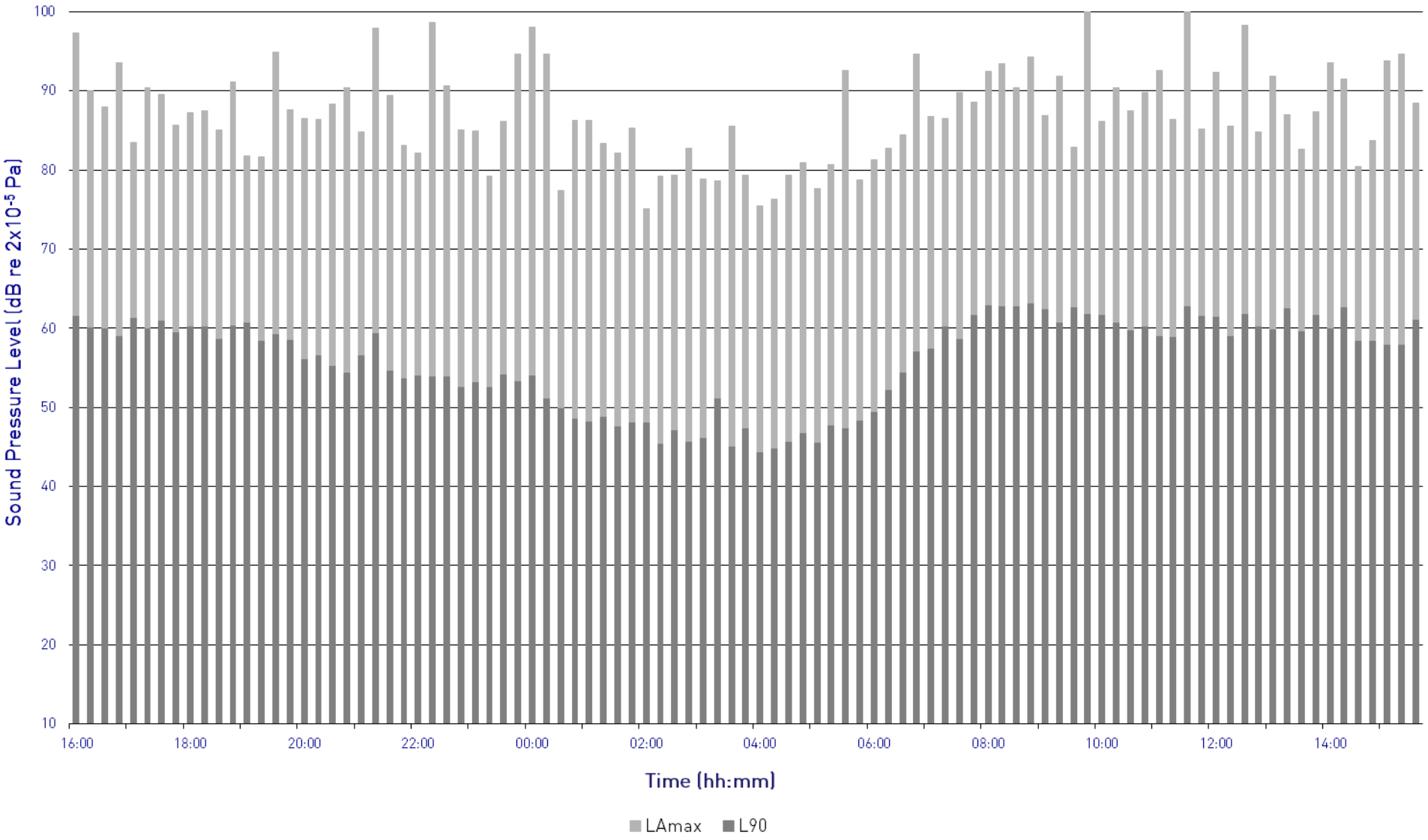
81 Bayham Street

L_{Amax} and L_{A90} Time History

Measurement Position 1, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G2



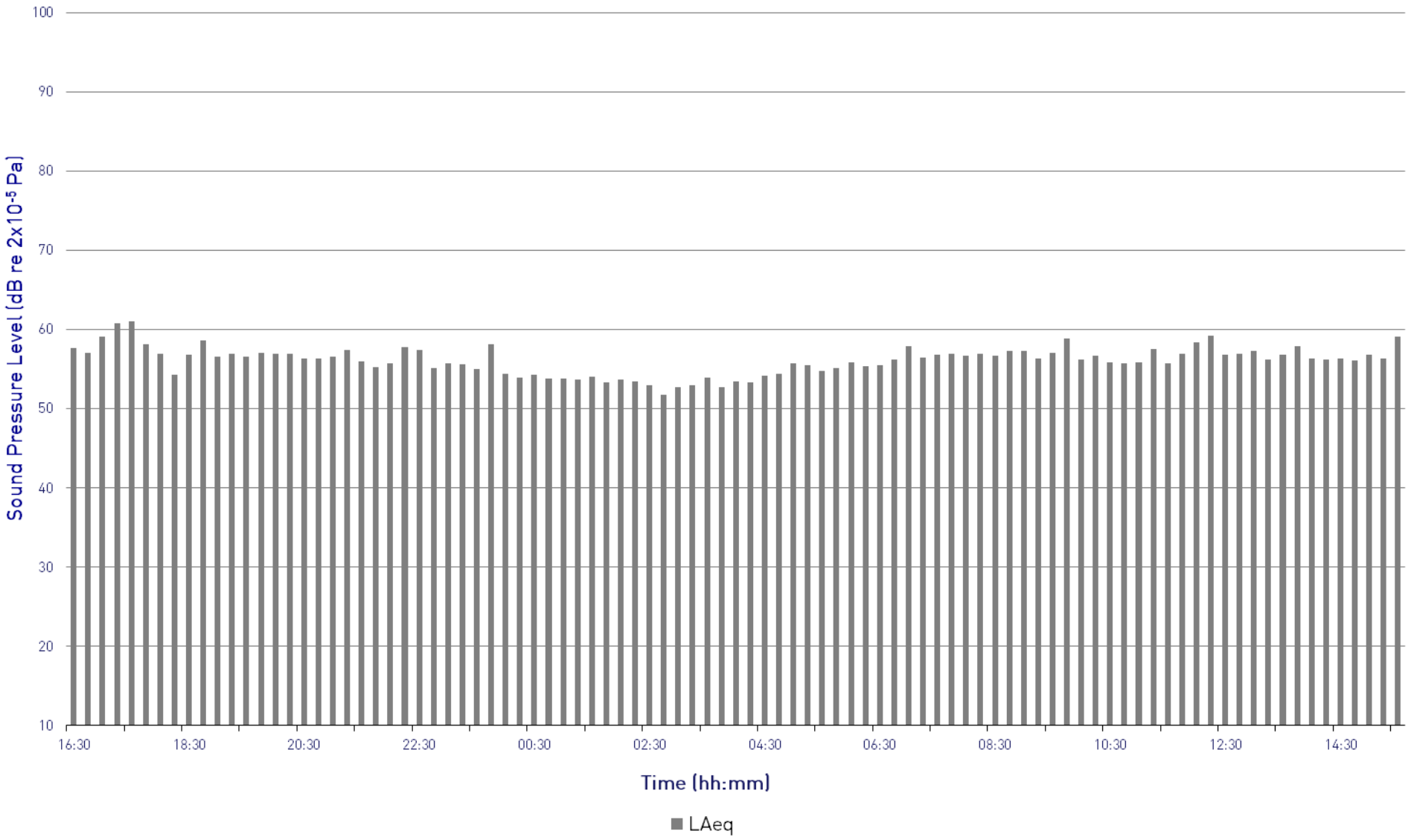
81 Bayham Street

L_{Aeq} Time History

Measurement Position 2, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G3



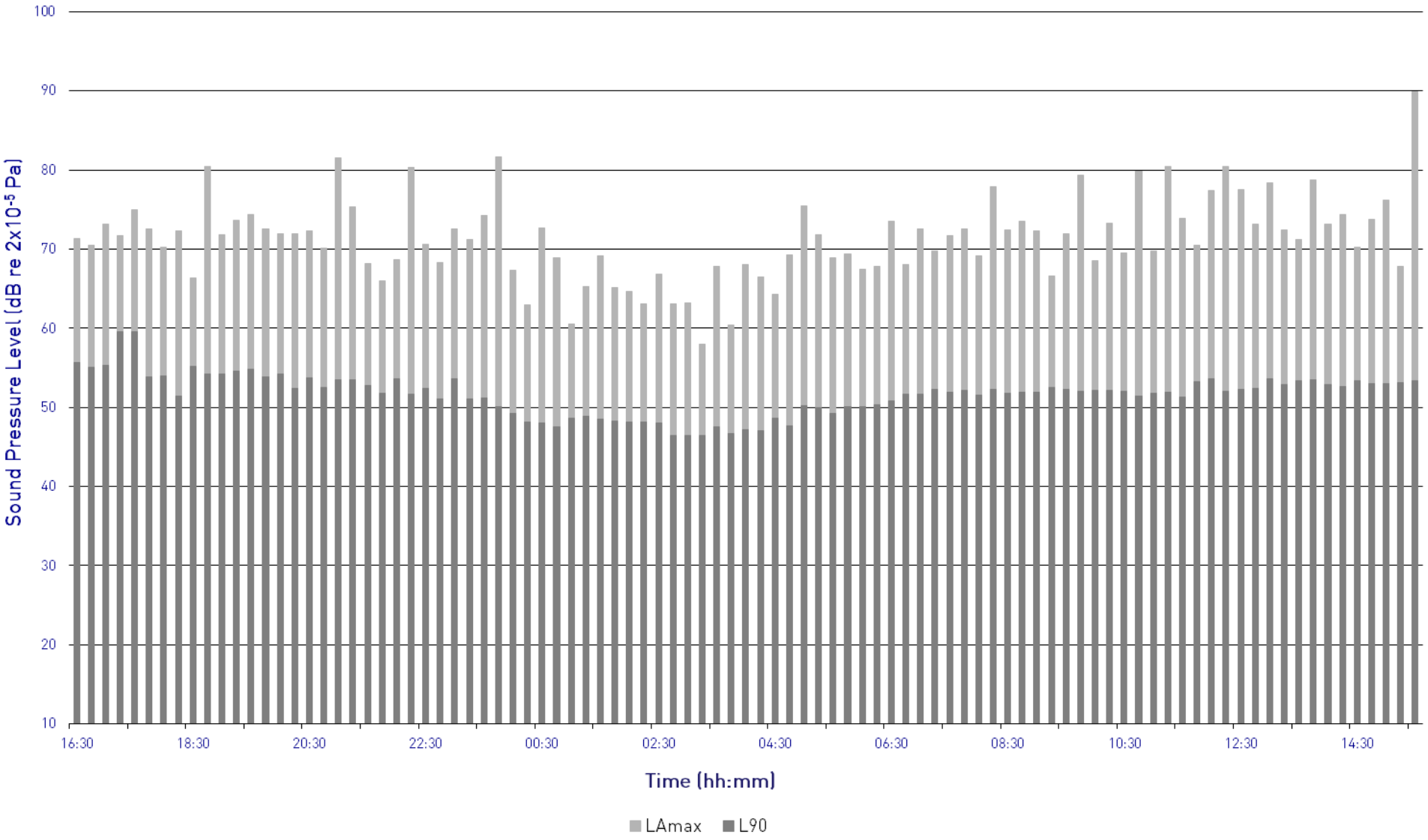
81 Bayham Street

L_{Amax} and L_{A90} Time History

Measurement Position 2, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G4



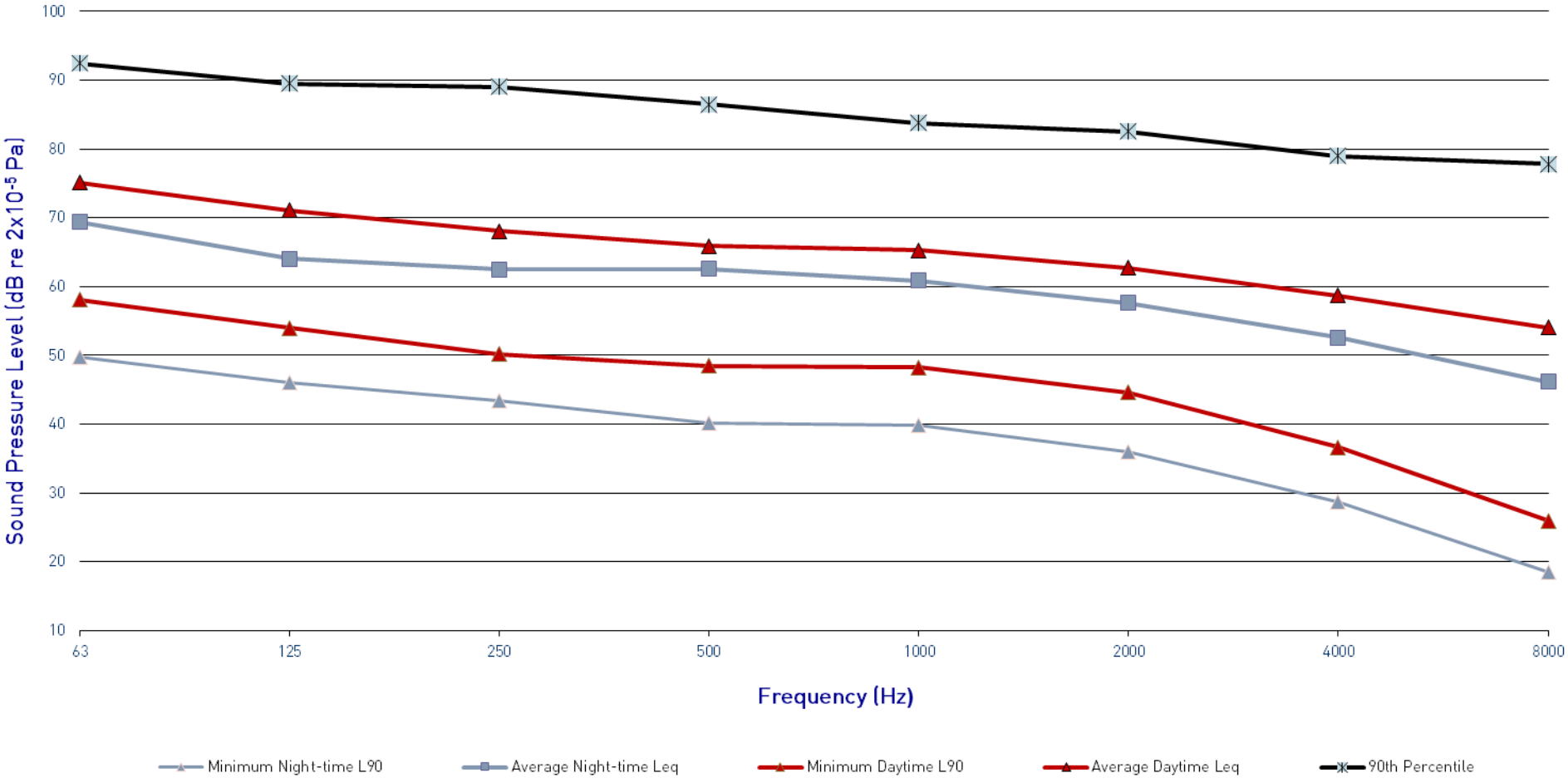
81 Bayham Street

Measured Noise Levels

Measurement Position 1, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G5



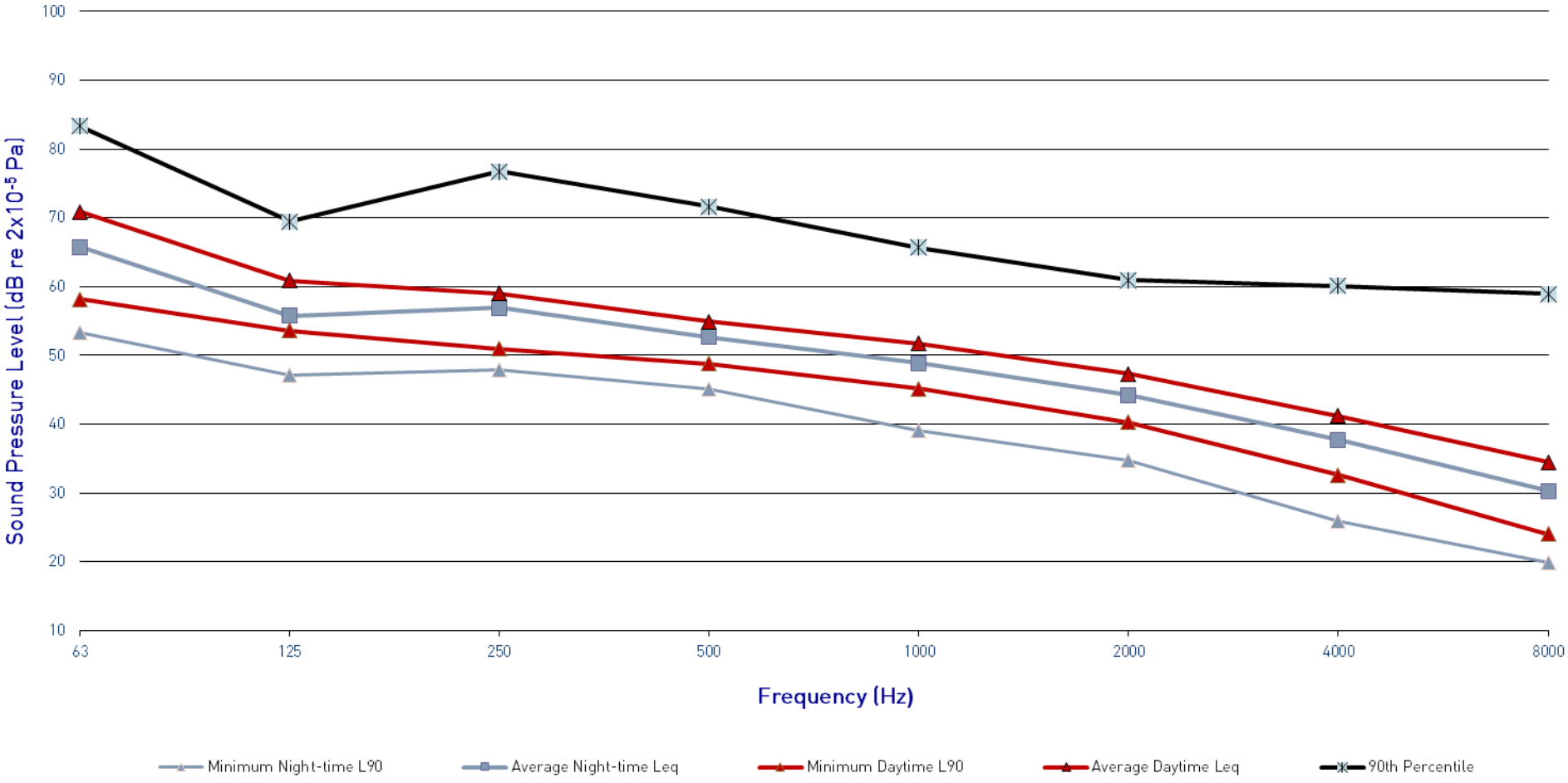
81 Bayham Street

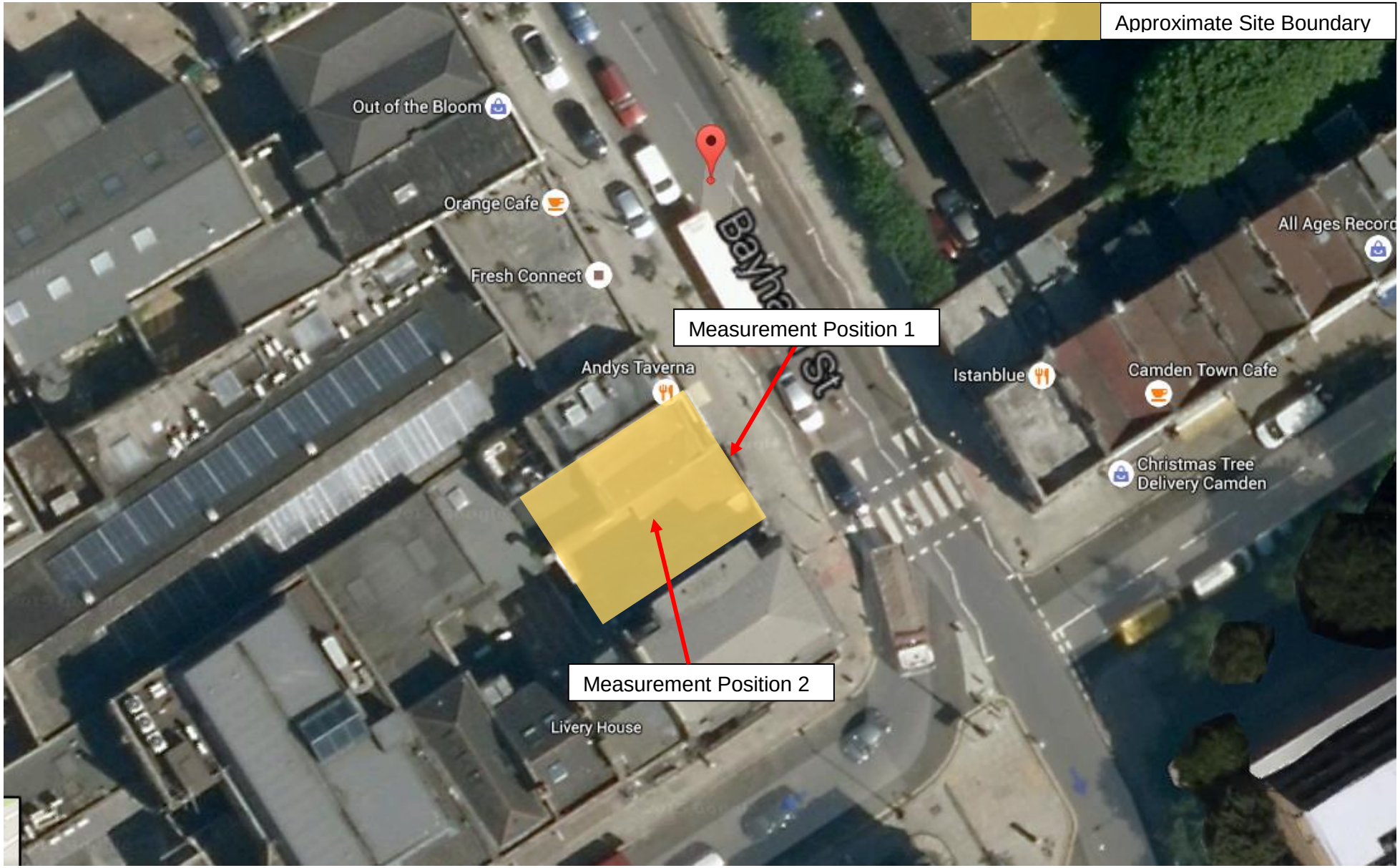
Measured Noise Levels

Measurement Position 2, Tuesday 2nd June to Wednesday 3rd June 2015

RBA ACOUSTICS

Graph 6871/G6





81 BAYHAM STREET, CAMDEN NW1

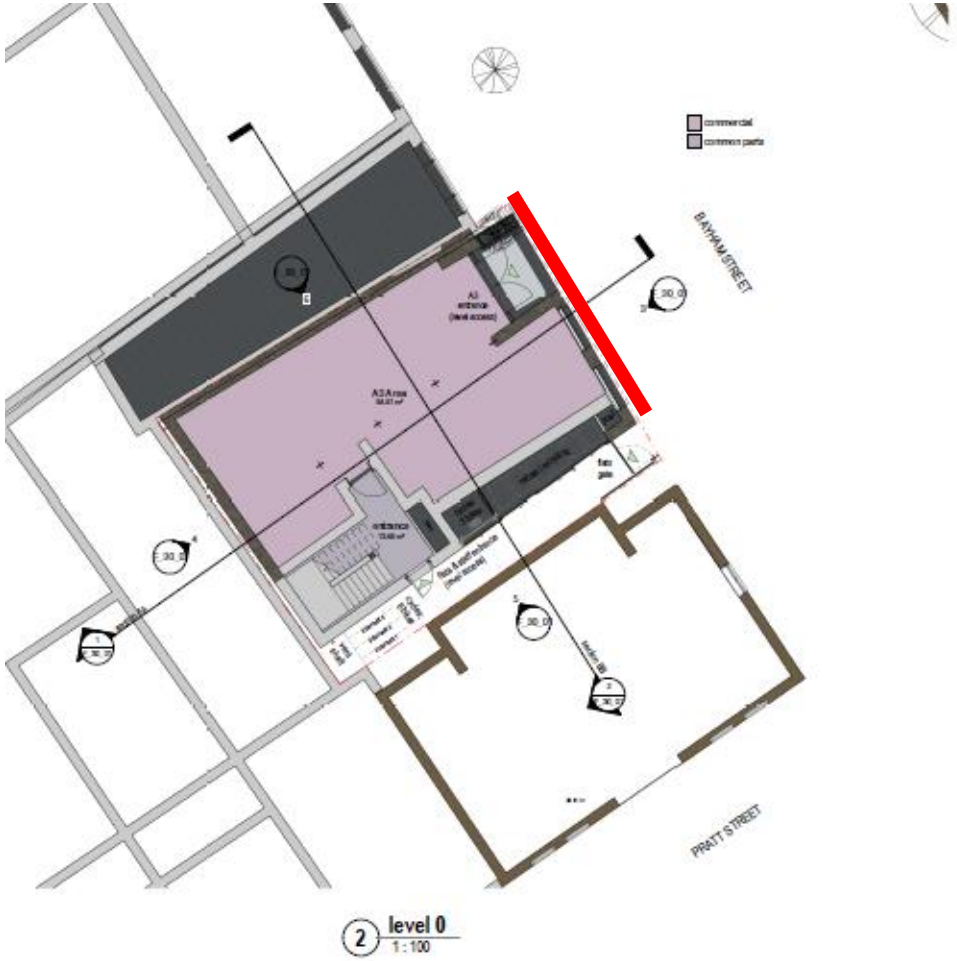
Site Plan Showing Measurement Positions at first floor level

Site Plan 6871/SP1

5 June 2015

Not to Scale

RBA ACOUSTICS



Key	
Zone 1:	
Zone 2:	

81 BAYHAM STREET, CAMDEN NW1

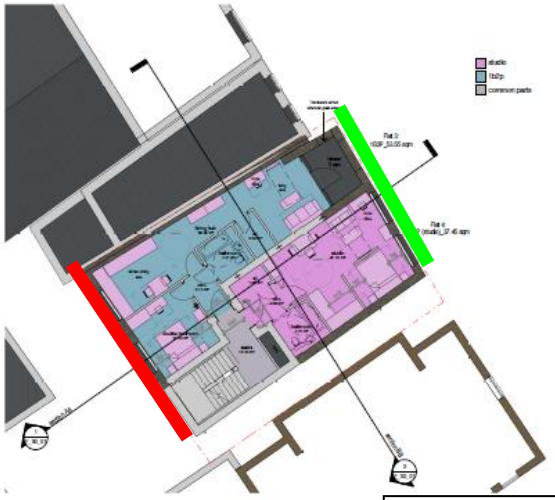
Façade Zoning Plan – Ground Floor

6871/FZPG

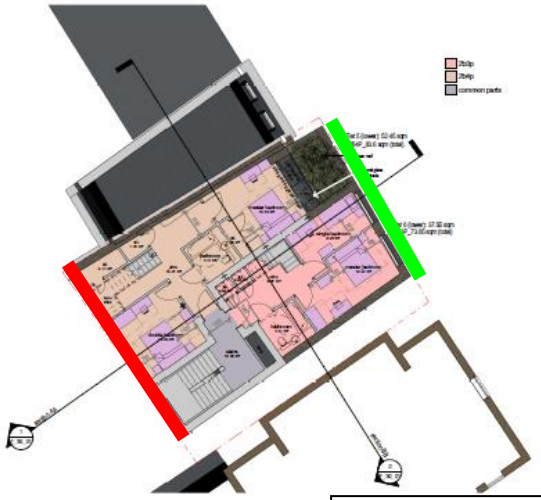
5 June 2015

Not to Scale

RBA ACOUSTICS

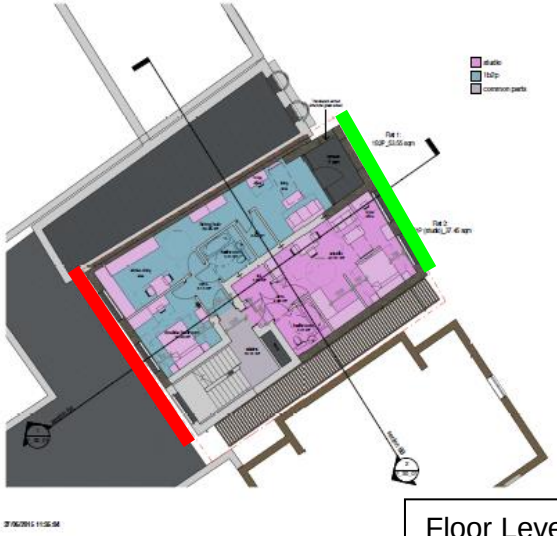


Floor Level 2



Floor Level 3

Key	
Zone 1:	
Zone 2:	



Floor Level 1

Floor Level 4

81 BAYHAM STREET, CAMDEN NW1

Façade Zoning Plan – First to Forth Floor

6871/FZP1

5 June 2015

Not to Scale

RBA ACOUSTICS

81 BAYHAM STREET, CAMDEN NW1

Bayham Street

Photograph detailing measurement position 1

Measurement Position 1

6871/P1

5 June 2015

RBA ACOUSTICS

RBA ACOUSTICS
44 Borough Road
London SE1 0AJ

T. +44 (0) 20 7620 1950
W. www.rba-acoustics.co.uk