KIRKMAN HOUSE, 12 - 14 WHITFIELD STREET, W1T

Planning Stage Acoustic Report

Reference: 9326.RP01.EBF.0
Prepared: 16 May 2019
Revision Number: 0

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	16 May 2019	Toby Walton	Torben Andersen

Terms of contract:

RBA Acoustics Ltd has prepared this report in accordance with our Scope of Work 9326.SW01.0 dated 14 March 2019. 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.

The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed in to full working drawings by the lead designer to incorporate all other design disciplines.

In line with our Environmental Policy, up to two hard copies 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.

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Contents

1.0 INTRODUCTION

The conversion of existing office space to residential apartments and commercial space at Kirkman House, 12 – 14 Whitfield Street, W1T is proposed.

An assessment has been carried out in relation to the noise levels likely to be incident on the proposed residential façades and to provide acoustic performance specifications such that acceptable internal noise criteria can be achieved.

Sound insulation testing of the existing separating floor structure between ground and first floor levels has been undertaken, in order to assess the likely level of noise transfer between the proposed commercial and residential spaces and to provide recommendations for upgraded constructions.

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 Camden Council.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following 24 hour period:

16:30 hours Monday 29 April to 16:30 hours Tuesday 30 April 2019.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period, however the based on observations during the site visits, and weather reports for the area, it was generally considered suitable for obtaining representative noise measurements, it being predominantly 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 Location

To determine the existing noise climate around the site measurements were undertaken at the following locations.

Measurement Position 1
Long-term measurements were taken at first floor level overlooking Kirkman Place. The microphone was externally fixed to an a-frame at 1 meter from a window.

Measurement Position 2
A short-term measurement was taken at first floor level overlooking existing plant and residences to the rear of 53 Tottenham Court Road.

The measurement positions are also illustrated on the site plan attached in Figure 1, and the photographs in Figures 2 & 3.

The prevailing noise climate was noted to mainly consist of traffic and pedestrian noise arising from Tottenham Court Road. Noise from activities associated with the adjacent M&S, Itsu and other retailers was also noted to occur at all hours, such as waste disposal and stock intake. This has been included in our analysis.

2.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix C.

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

2.4 Results

Long-Term Monitoring

The noise levels measured are shown as time-histories on the attached Graphs 1-2.

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} noise levels measured are summarised in Table 1, along with typical L_{AFmax} levels measured during the night time.

Table 1 – Long-Term Measured Façade Corrected Noise Levels

Measurement Position	Measurement Period	Lowest $L_{90,15min}$ (dBA)	L_{eq} (dBA)	Typical $L_{max,5min}$ (dBA Fast)
Measurement Position 1	Daytime (07:00 – 23:00)	51	60	N/A
	Night-time (23:00 – 07:00)	48	57	81

Short-Term Monitoring

The period averaged L_{Aeq} noise levels measured are summarised in Table 2.

Table 2 – Short-Term Measured Noise Levels

Measurement Position	Measurement Period	L_{eq} (dBA)
Measurement Position 2	Daytime (07:00 – 23:00)	60
	Night-time (23:00 – 07:00)	-

3.0 EXTERNAL BUILDING FABRIC CRITERIA

In the absence of any specific requirements from the London Borough of Camden, this section outlines typical assessment criteria in terms of the relevant standards for the residential areas of the development. A brief explanation of the acoustic terminology used in this report is shown within Appendix A.

3.1 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 internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties as set out in Table 2. A brief explanation of the acoustic terminology used in this report is shown in Appendix A attached.

Table 2 – BS 8233:2014 Residential Criteria

Room	07:00 to 23:00	23:00 to 07:00
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.2 World Health Organisation: Environmental Noise Guidelines

This document sets out to define "recommended exposure levels for environmental noise in order to protect population health". The guidance documents relates specifically to external noise levels, and recommends that "all CNG (WHO Community Noise Guidelines, 1999) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid". We therefore make reference to the WHO Community Noise Guidelines for recommendations on internal noise levels.

The WHO document "Guidelines for Community Noise" 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 the Table 4.1: Guideline values for community noise in specific environments, as stated in the WHO document.

Table 3 – Guideline Values for Community Noise

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)	$L_{Amax,f}$ (dB)
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

With reference to maximum noise levels the following guidance is provided within the WHO guidance:

> *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991) and most studies show an increase in the percentage of awakenings at SEL values of 55-60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995). For intermittent events that approximate aircraft noise, with an effective duration of 10-30s, SEL values of 55-60 corresponds to a L_{Amax} value of 45dB. Ten to 15 of these events during an 8 hour night-time implies a $L_{Aeq, 8h}$ of 20-25dB. This is 10-15dB below the $L_{Aeq, 8h}$ or 30dB for continuous night-time noise exposure, and shows that intermittent character of noise must be taken into account when setting night-time noise limits for noise exposure. For example, this can be achieved by considering the number of noise events and the difference between the maximum sound pressure level and the background of these events."*

Therefore the frequency of occurrence of maximum noise events should not typically exceed 10-15 times in any night.

3.3 Summary

The project criteria adopted are therefore as follows;

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

4.0 EXTERNAL BUILDING FABRIC ASSESSMENT

4.1 Background

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.

4.2 Assumptions

Our external building fabric analyses have assumed the following:

(a) Drawings

The assessment has been based on the information provided in the following drawings:

Drawing Number	Description	Revision	Date
8491/08	Proposed Site Plan	-	September 2018
8491/09	Proposed Basement & Ground Floor Plans	P1	September 2018
8491/10	Proposed First & Second Floor Plans	P1	September 2018
8491/11	Proposed Third Floor & Fourth Floor Plans	P1	September 2018
8491/12	Proposed Fifth Floor Pan	P1	September 2018

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 2.4.

(c) Room Absorption

The bedrooms are assumed to be acoustically "soft" with carpets, curtains and other soft furnishings. For the purposes of our analyses we have assumed the absorption coefficients detailed in Tables 4 and 5.

Table 4 – 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

The living rooms are assumed 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 5 – 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

External non-glazed areas are to comprise the following:

- The external walls comprise of a Brick/Block cavity wall.

As such, we have assumed the following sound reduction indices (equating to an overall R_w of 52dB) for all non-glazed façade areas comprising the above construction:

Table 6 – Non-Glazed SRIs

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
36	41	45	45	54	58	58	58

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

We understand that MVHR is to be utilised throughout the development and no unducted trickle ventilators or through-the-wall ventilators will be required.

It should be noted that MVHR systems provide background trickle ventilation only and that windows are to generally be openable to provide rapid ventilation. During those periods where windows are opened for purge / rapid ventilation, noise levels will naturally be increased internally.

4.3 Specification & Guidance Constructions

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

The glazing performance specifications apply to the glazing package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the glazing 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 glazing configurations described in Table 7 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 7 – Glazing Guidance Constructions

Glazing Type	Room Type	R_w (dB)	Configuration
G1	Bedrooms	36	Medium specification thermal double glazing, e.g. 10mm glass / 12mm cavity / 6mm glass
G2	Living Rooms	33	Standard double glazing comprising panes of differing thicknesses, e.g. 6mm glass / 12mm airspace / 4mm glass

5.0 SOUND INSULATION TESTING

Sound insulation testing of the existing separating floor structure between ground and first floor levels was undertaken.

5.1 Testing Procedure

The site measurements and analyses were undertaken in general accordance with the following British Standards:

Airborne Sound: BS EN 140-4:1998 "Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms"

The results of the measurements have subsequently been analysed in accordance with the following:

Airborne Sound: BS EN ISO 717-1:1997 "Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation"

5.2 Test Results

The results of the airborne sound insulations measurements are presented as single figure $D_{nT,w} + C_{tr}$ in Table 8.

Table 8 – Airborne Sound Insulation

Source Room	Receive Room	$D_{nT,w} + C_{tr}$
Ground Floor Office	First Floor Circulation/Amenity areas	50 – 54

5.3 Discussion of Results

The measured sound insulation has been compared against noise levels outlined within the draft IOA Good Practice Guide "The Control of Noise from Places of Entertainment" 2013, for a busy restaurant. These are shown within Table 9.

Table 9 – Indicative Noise Level from Restaurants

L_{eq} Noise Levels (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
80	60	70	75	75	75	75	70

Based on the existing floor construction, we predict levels of internal noise transfer from the proposed restaurant to the residential area above will be approximately 25 dB L_{Aeq} whilst the restaurant is operating.

5.4 Target Criteria

In order to prevent disturbance from noise transfer from the proposed restaurant to the future occupants of the proposed residential areas, we would propose that it is appropriate to target a level of noise transfer that is 10 dB less than the L_{Aeq} criteria discussed within Section 3.3, and is therefore as follows.

Bedroom	20 dB L_{Aeq}
Living Room	25 dB L_{Aeq}

5.5 Proposed Upgrades

To ensure noise transfer is within the criteria outlined above, we would recommend that an initial allowance is made for an acoustic ceiling comprising:

- 150 mm void with 100 mm mineral wool (10-36 kg/m^3)
- 2 layers of 15 mm dense plasterboard (12.5 kg/m^2 per board) on an MF grid

We predict the inclusion of the acoustic ceiling would result in levels of internal noise transfer from the proposed restaurant to the residential area above will be approximately 15 – 20 dB L_{Aeq}.

This would apply to any ceiling area separating residential and restaurant areas. This should be developed further at design stage.

5.6 Dispersal of Restaurant Patrons

We understand that the proposed restaurant is to generally provide sit-down meals, and will have a generally relaxed atmosphere. We therefore expect that patrons will be leaving in a relatively quiet manner, and not in large groups. In addition, patrons will be dispersing onto an already busy thoroughfare for road traffic and pedestrians.

The above in consideration with the proposed upgraded glazing, we do not expect any disturbance to the future residential occupants with regards to the dispersal of restaurant patrons.

6.0 PLANT NOISE EMISSIONS CRITERIA

6.1 Local Authority Criteria

The typical requirements of Camden Council with regards to atmospheric plant noise emissions are understood to be the following:

> *"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (white, hiss, screech, him) and/or is there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A)."*

In line with the above and the results of the noise survey presented in Section 2.4, the relevant plant noise limits are as follows:

Period	*Plant Noise Emission Limit*
Daytime (07:00 – 23:00)	46 dBA
Night-time (23:00 – 07:00)	43 dBA

7.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at Kirkman House, 12 – 14 Whitfield Street, W1T. The measured noise levels are presented within this report. The resultant noise levels have been used in the assessment of the glazing requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to BS 8233 and WHO.

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.

The measured background noise levels have also been used to set plant noise limits in accordance with the expected Local Authority criteria.

In addition, sound insulation testing of the existing separating floor structure between ground and first floor levels has been undertaken, in order to assess the likely level of noise transfer between the proposed commercial and residential spaces. Recommendations for upgraded constructions have been given herein.

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

External facade constructions and components, such as brise soleil, grilles, ventilators, curtain walling systems or other architectural features, are not to give rise to intrusive whistling, creaking, rattling or other noises as a result of wind or other climatic effects.

The Contractor shall take reasonable precautions to avoid unwanted noise including creaking, rattling and whistling being generated by the Contractors works when subject to environmental conditions (including wind) and thermal expansion over the life of the façade.

1.0 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	21	25	22	33	40	43	44	44	36
G2	17	21	20	27	37	36	41	41	32

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.

Appendix C - Instrumentation

The following equipment was used for the measurements:

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406116	U30290	5 December 2020
Norsonic Pre Amplifier	1209	20295		
Norsonic ½" Microphone	1225	215486	30289	5 December 2020
Norsonic Type 1 Sound Level Meter	Nor140	1406258	U31229	13 March 2021
Norsonic Pre Amplifier	1209	20490		
Norsonic ½" Microphone	1225	225526	31228	13 March 2021
JBL Loudspeaker	515XT	VTP1124-18980	N/A	N/A
NTI Minirator	MR2	G2L-RAAAX-F2	N/A	N/A
Norsonic Tapping Machine	211A	31090	U29207	2 August 2020

Appendix D – CDM Considerations

The likelihood the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Remote (almost never)
2 – Unlikely (occurs rarely)
3 – Possible (could occur, but uncommon)
4 – Likely (recurrent but not frequent)
5 – Very likely (occurs frequently)

The severity of harm can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
2 – Minor (e.g. small cut, abrasion, basic first aid need)
3 – Moderate (e.g. strain, sprain, incapacitation > 3 days)
4 – Serious (e.g. fracture, hospitalisation > 24 hrs, incapacitation > 4 weeks)
5 – Fatal (single or multiple)

The rating value is obtained by multiply the two scores and is then used to determine the course of action.

Rating Bands (Severity x Likelihood)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Mineral wool within drywalls and linings	Skin and respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3
Attenuators/ Acoustic Lagging	Strain of neck, limbs or back.	Contractors	3	4	12	Provide sufficient manpower/ lifting gear	1	4	4
Attenuators/ Acoustic Lagging	Skin & respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3
Acoustic glazing - weight	Strain of neck, limbs or back. Fall from height.	Contractors	3	5	15	Provide sufficient manpower, lifting gear and structural support	1	5	5

L: Likelihood S: Severity R: Rating

Appendix E – Graphs and Site Plans

Kirkman House

L_{Aeq} Time History

Measurement Position 1 - Tottenham Court Road

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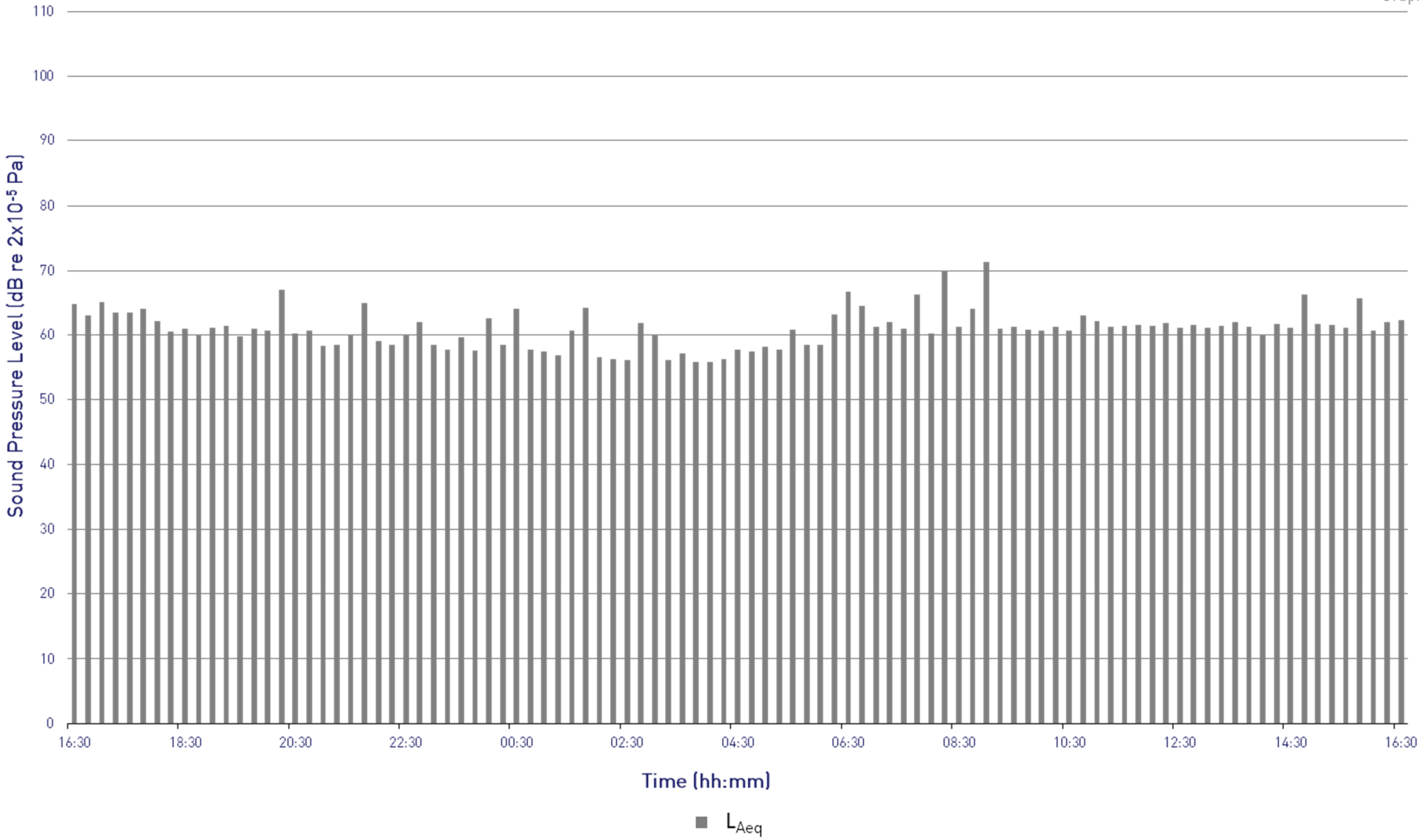
Graph 1



Kirkman House

$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1 - Tottenham Court Road

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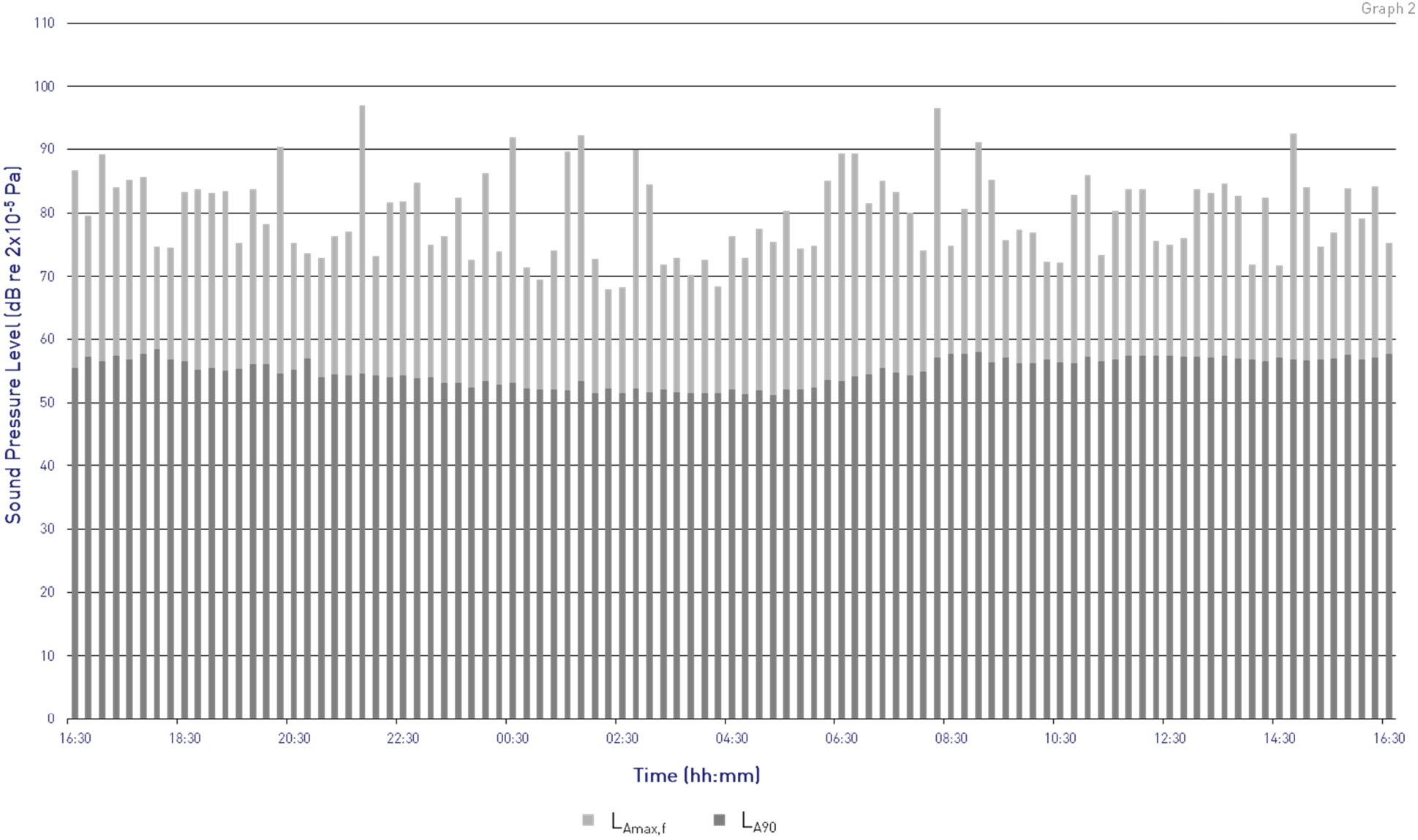
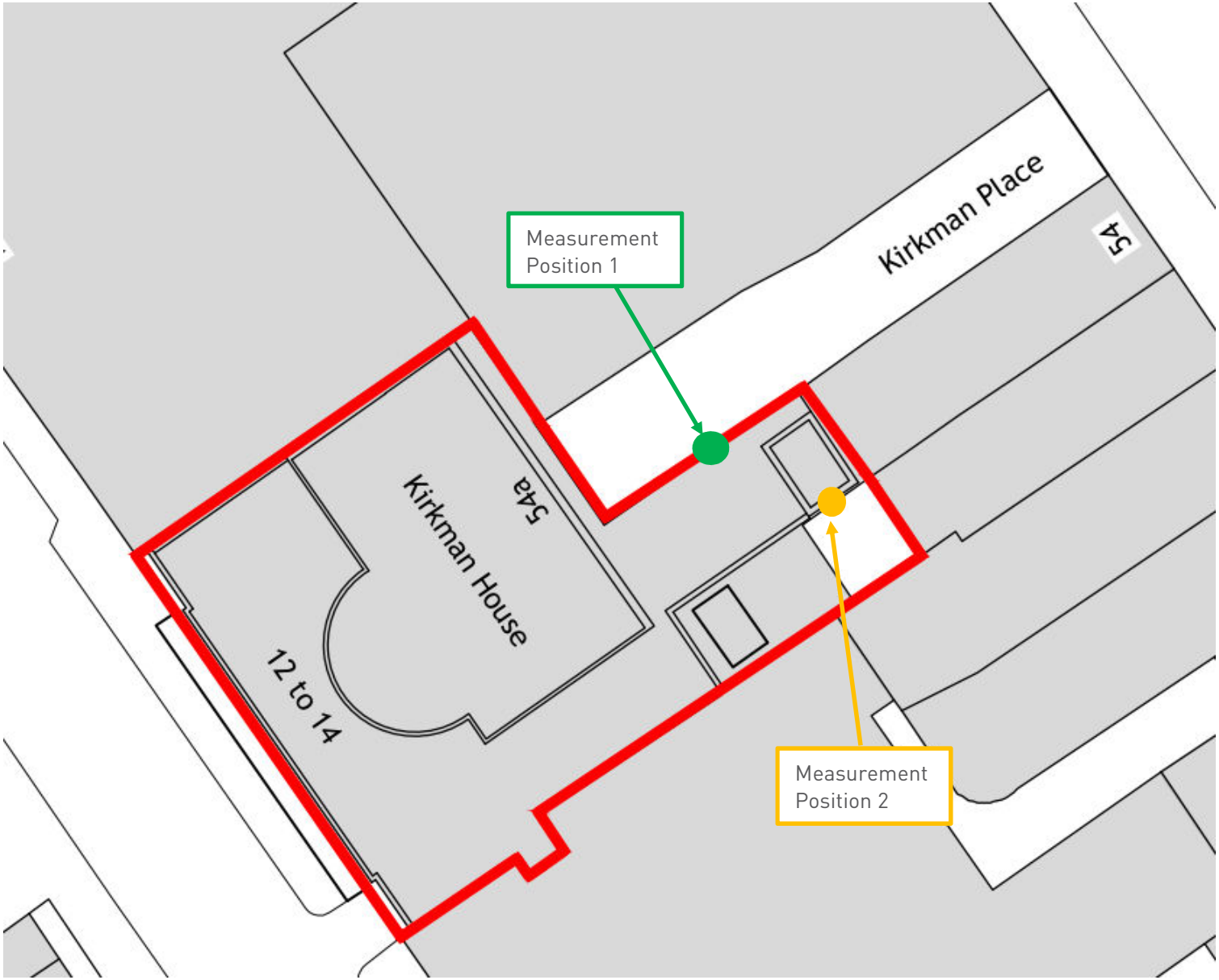
Graph 2





Kirkman House, 12 - 14 Whitfield Street, W1T
Site Plan Showing Measurement Positions
Project 9326

Figure 1
16 May 2019
Not to Scale

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Kirkman House, 12 - 14 Whitfield Street, W1T
Photo Showing Measurement Position 1
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Figure 2
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Not to Scale

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Kirkman House, 12 - 14 Whitfield Street, W1T
Photo Showing Measurement Position 2
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Figure 3
16 May 2019
Not to Scale

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