



CLARENDON ROAD,
HARINGEY, LONDON

Acoustic Assessment Report

Reference: 10635.RP01.AAR.1

Prepared: 5 October 2022

Revision Number: 0

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	17 December 2020	Stuart Heather	Robert Barlow
1	Updated to reflect various changes in the proposed scheme	5 October 2022	Matt Wildman	Torben Andersen

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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.

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1.0 INTRODUCTION

A new development is proposed at Clarendon Road in the London Borough of Haringey. The proposed development consists of 51 residential apartments over nine floor levels, with commercial units at ground floor level.

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

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

Outline guidance has been provided for the control of noise between commercial/leisure usage at the ground floor of the development and residential units above, though it is recommended that these elements are reviewed in further detail during the design stage to ensure suitable acoustic conditions are upheld.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Survey Methodology

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

13:00 hours Thursday 3 December to 12:00 hours Monday 7 December 2020.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period, however, 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. It was observed during the survey installation and from weather reports that there were some periods of heavy rain during the survey. Affected periods have been excluded from the dataset where analysis has shown that they may have affected measured noise levels.

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

To determine the existing noise climate around the site measurements were undertaken at the following locations. The measurement positions are also illustrated on the site plan attached in Figure 1.

Measurement Position 1 – Turnpike Lane

Measurements were taken on the roof of the existing West Indian Cultural Centre (WICC). The measurement was taken towards the southern site boundary, overlooking Turnpike Lane (A504) and the junction with Turnpike Lane and Wightman Road/Hornsey Park Road (B138). The microphone was mounted to an existing railing on the roof. The measured noise levels here are considered to be representative of the noise levels experienced on the northern side of the Turnpike Lane, and have been distance corrected in our analysis to reflect the noise levels incident on the southern façade line of the development some 45m to the north.

Measurement Position 2 – Clarendon Road

Measurements were taken on the roof of the WICC. The measurement was taken towards the north west of the existing building, overlooking Clarendon Road, with a direct line of sight to the quieter façades of existing residential properties (Hornsey Park Road and Westpoint Apartments) and the London Alevi Cultural Centre and Cemevi. The microphone was mounted to an existing railing on the roof. The measured noise levels are considered to be representative of the noise levels at all facades of the proposed development.

The prevailing noise climate was noted to mainly consist of road traffic noise from vehicles using the roads mentioned above and overhead aircraft. There was noted to be some noise from minor roadworks on Clarendon Road. Trains using the nearby railway, which is understood to serve fast and slow services on the East Coast Mainline, were audible but were not dominant above the other sources mentioned.

2.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B. The sound level meters were calibrated both prior to and on completion of the survey with no significant calibration drifts observed.

2.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-6 (note that the graphs include the entire dataset including the periods during bad weather affected the measurements, however the results in the following table do not).

In order to ensure a worst case assessment the typical minimum background L_{A90} noise levels measured have been used in our analyses. The typical minimum 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 – Measured Levels

Measurement Period	Lowest $L_{90,15min}$ (dBA)	L_{eq} (dBA)	Typical $L_{max,15min}$ (dBA Fast)
Position 1 – Turnpike Lane			
Daytime (07:00 – 23:00)	49	63	n/a
Night-time (23:00 – 07:00)	38	58	79
Position 2 – Clarendon Road			
Daytime (07:00 – 23:00)	47	60	n/a
Night-time (23:00 – 07:00)	39	54	76

3.0 EXTERNAL BUILDING FABRIC CRITERIA

The sections below outline the assessment criteria required by the London Borough of Haringey and with reference to good acoustic practice.

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;

Bedrooms	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 Drawing Package 3572_SK from Stockwool as the project design lead.

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 2.

(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 understood to be based on a principle of brickwork walling. The following typical buildup has therefore been assumed in calculations:

- Brickwork
- Thermal insulation and cavity
- Metsec type frame with mineral wool in void
- 2 layers 15mm dense plasterboard (min 12.5kg/m² per board)

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 6 – 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

(e) Ventilation

It is understood that the development will use mechanical ventilation with heat recovery (MVHR) throughout.

4.3 Specification & Guidance Constructions

The glazing performance specifications below 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 configurations detailed below to prove commensurate with achieving the required sound insulation performance to ensure acceptable internal noise levels are capable of being achieved across the development.

Table 7 – Glazing Guidance Constructions

Sound Reduction Indices (dB)	Example Glazing Configuration
R _w 33	Standard thermal double glazing, e.g. 4mm glass/12mm cavity/6mm glass

5.0 APPROVED DOCUMENT O – INITIAL COMMENTS

5.1 Overview of noise requirements of Approved Document O (AD-O)

Building Regulations Approved Document O (2021 edition) provides guidance for mitigating overheating within residential developments. The document states that the building should be constructed to meet the requirement using passive means as far as reasonably practicable.

With regards to removing excess heat, the first choice is therefore to use openable windows to mitigate overheating. In terms of noise, Approved Document O considers internal noise levels within bedrooms and provides internal noise level limits for bedrooms at night-time, above which it says that windows are likely to be closed. In areas where the internal noise levels are predicted to exceed the recommended limits, the document highlights that the overheating mitigation strategy should take account of the likelihood that windows will be closed during the night-time.

Approved Document O specifies the following internal noise level limits within bedrooms at night-time:

“Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB L_{Aeq,T}, averaged over 8 hours (between 11pm and 7am)

b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)”

5.2 High-level AD-O Noise Assessment

From correspondence with the Design Team, we understand the current architectural proposals incorporate comfort cooling and acoustic ventilation panels as the primary overheating strategy. Nevertheless, a high-level assessment of the Approved Document O requirements based on partially open windows during night-time periods has been carried out.

Based on the measured noise levels, the predicted internal noise levels within bedrooms on all facades across the development are likely to be non-compliant with the requirements of Approved Document O with windows partially open, therefore comfort cooling would be the preferred overheating strategy when considering noise.

An example calculation demonstrating the predicted internal noise levels within bedrooms on the south façade of the development is shown in Table 9 below. We have assumed a partially open window will provide a 15dB reduction to external noise levels.

Table 6 – ADO Summary

Parameter	dBA
<i>L_{Amax} Analysis</i>	
10 th Percentile L _{Amax} event (23:00-07:00) 1m from residential window	76
Assumed noise level reduction for partially open window	15
Resultant internal L_{Amax} event noise level	61
<i>L_{Aeq} Analysis</i>	
L _{Aeq,8hr} noise level (23:00-07:00) at 1m from residential window	54
Assumed noise level reduction for partially open window	15
Resultant internal L_{Aeq,8hr} noise level	39

It is predicted that an L_{Amax} event noise level of 61dBA within bedrooms – 6dBA above the recommended ADO limit - will occur at least 10 times a night on the south façade of the development, therefore, it is not recommended that open windows are relied on for the purpose of purge ventilation.

6.0 PLANT NOISE LIMITS

Noise generating plant items associated with the development will be required to meet noise emission limits in line with the anticipated requirements of the London Borough Haringey.

Details of any proposed plant are not yet known.

Note that these requirements have been based on previous projects undertaken by RBA Acoustics in the London Borough of Haringey and from correspondence with officers from the Borough. It is understood that there are no written policies for requirements of plant noise, and that they are ultimately decided through planning condition by planning officers. The criterion advised previously to RBA Acoustics is that the plant noise level should not exceed a level of 10 dB below the lowest measured L_{A90} noise level on site.

In line with the above requirements, total noise from the combined operation of future items of building services mechanical services should be designed so that 'Specific' sound level emissions from the plant, as defined by BS 4142, do not exceed the following limits when assessed at the nearest noise sensitive residential window:

Table 8 – Plant Noise Emission Limits

Period	Plant Noise Emission Limit
Daytime (07:00 – 23:00)	37
Night-time (23:00 – 07:00)	29

Should the plant have tonal, impulsive or intermittent qualities, then appropriate penalties should be applied (again following the guidance of BS 4142) to determine its 'Rating' level. The 'Rating' levels shall not exceed the L_{90} values given in Table 1 at the nearest noise sensitive receptors.

7.0 COMMERCIAL TO RESIDENTIAL INTERNAL SOUND INSULATION

The proposed development includes some commercial/leisure usage at ground and first floor levels. The possibility of noise transfer from these spaces to the residential units above must be considered in order to ensure that undue noise impacts do not arise within the proposed residential rooms.

Prevention of disturbance will require the implementation of constructions providing an appropriate level of sound insulation.

The floor constructions should typically achieve airborne sound insulation levels of approximately 5-10dB in excess of the minimum numerical performance requirements stated within Approved Document E of the Building Regulations for noise levels generated within the commercial/leisure spaces.

8.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at Clarendon Road in the London Borough of Haringey. 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.

General guidance configurations have been suggested for the glazing constructions that should be capable of achieving the sound insulation performance requirements. A performance of at least R_w 33 dB is required achieve desired internal noise levels across the development

Limits are provided for noise emissions from fixed external plant associated with the development, following the anticipated requirements of the Local Authority, London Borough of Haringey.

Based on the above we do not considered that planning permission should be withheld on the basis 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 – Instrumentation

The following equipment was used for the measurements

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1403127	30803	30 January 2021
Norsonic Pre Amplifier	1209A	12071	30816	31 January 2021
Norsonic ½" Microphone	1225	41473		
Norsonic Sound Calibrator	1251	31986	30801	30 January 2021
Norsonic Type 1 Sound Level Meter	Nor140	1407477	473910908	10 October 2021
Norsonic Pre Amplifier	1209	22341		
Norsonic ½" Microphone	1225	358196		
Norsonic Sound Calibrator	1255	125525259	Cal 022-2019-11496	27 September 2021

Appendix C – 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
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 D – Graphs and Site Plans

Clarendon Road, Haringey

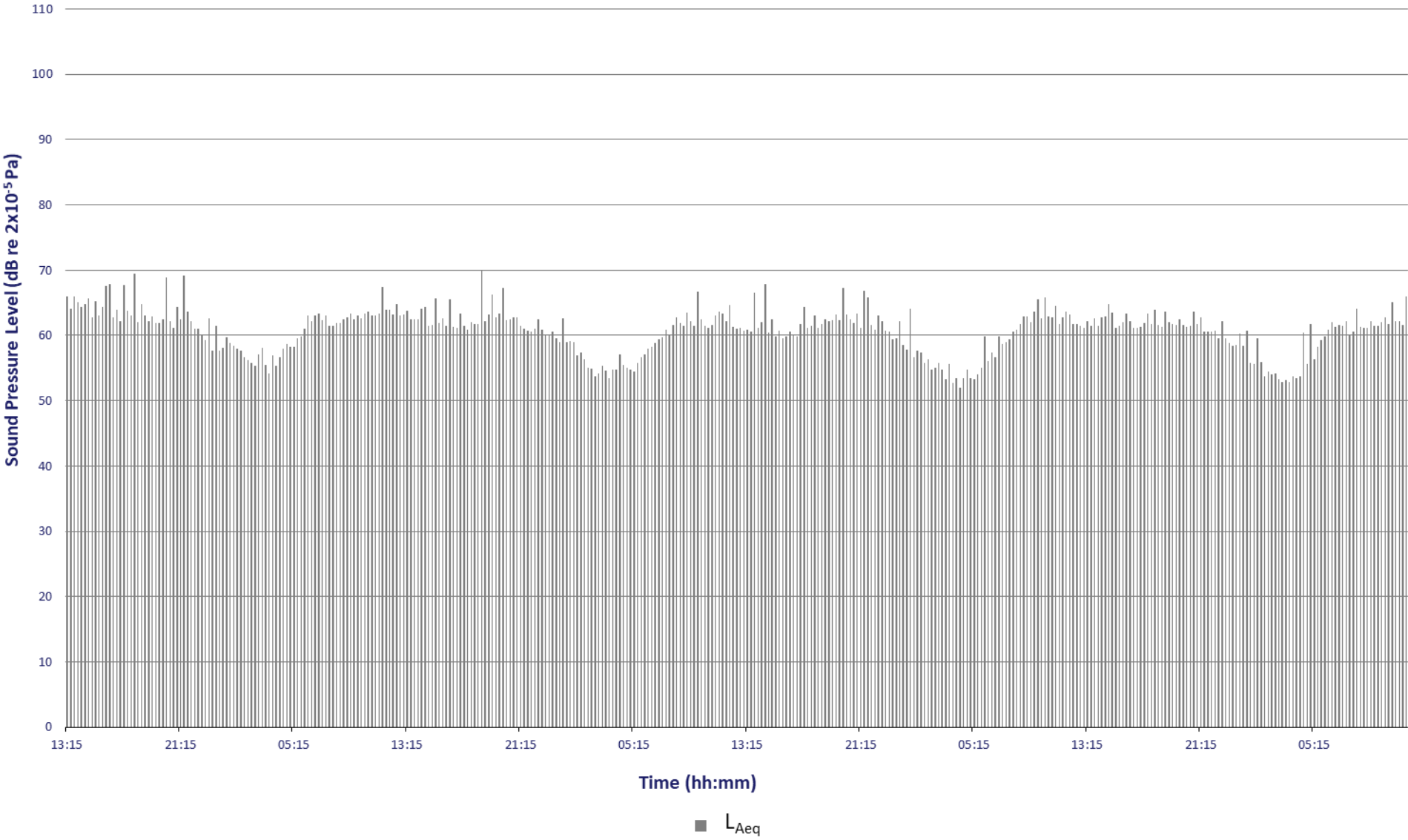
L_{Aeq} Time History

Location 1 - Turnpike Lane/Clarendon Road



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Graph 1



Clarendon Road, Haringey

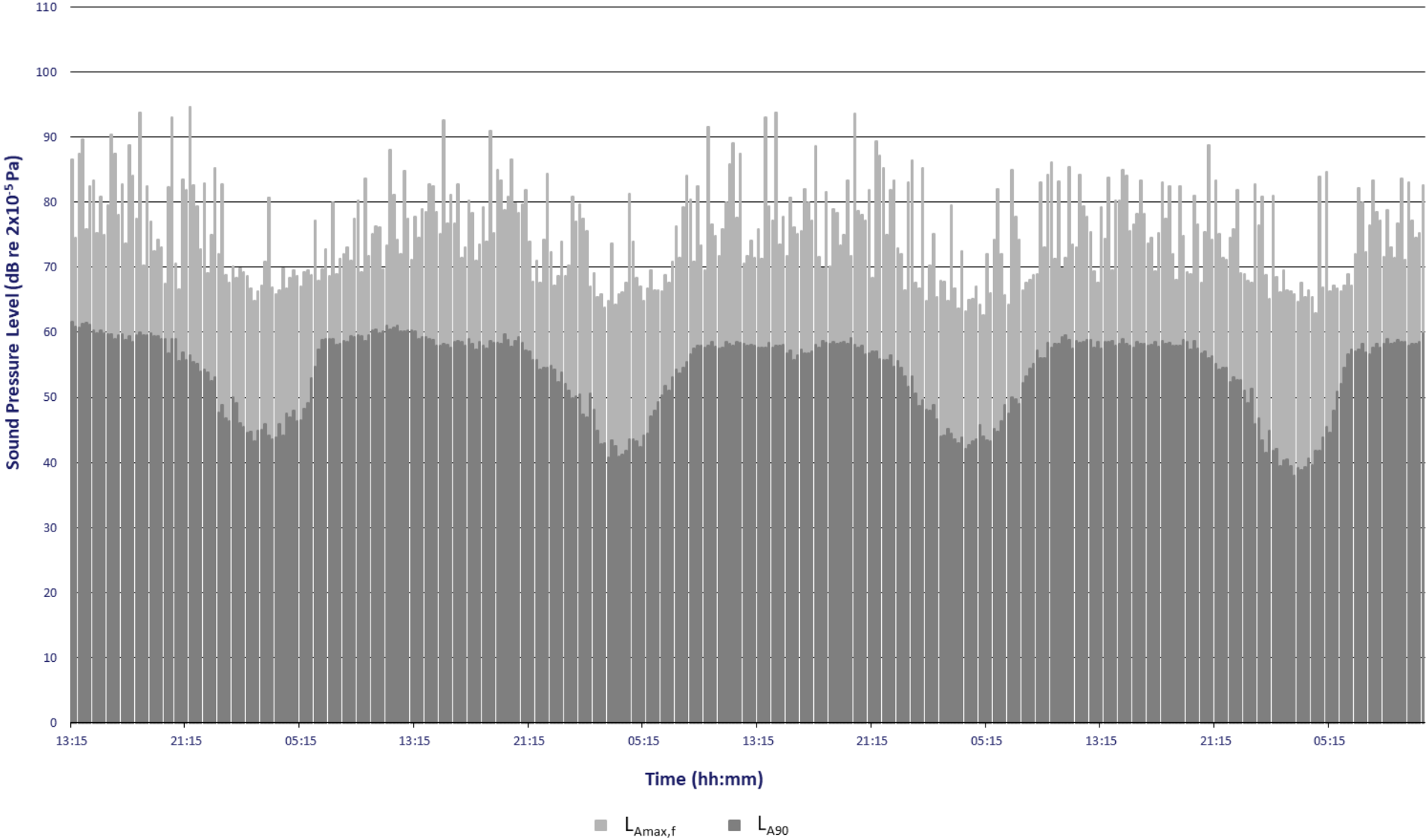
$L_{Amax,f}$ and L_{A90} Time History

Location 1 - Turnpike Lane/Clarendon Road



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Graph 2



Clarendon Road, Haringey

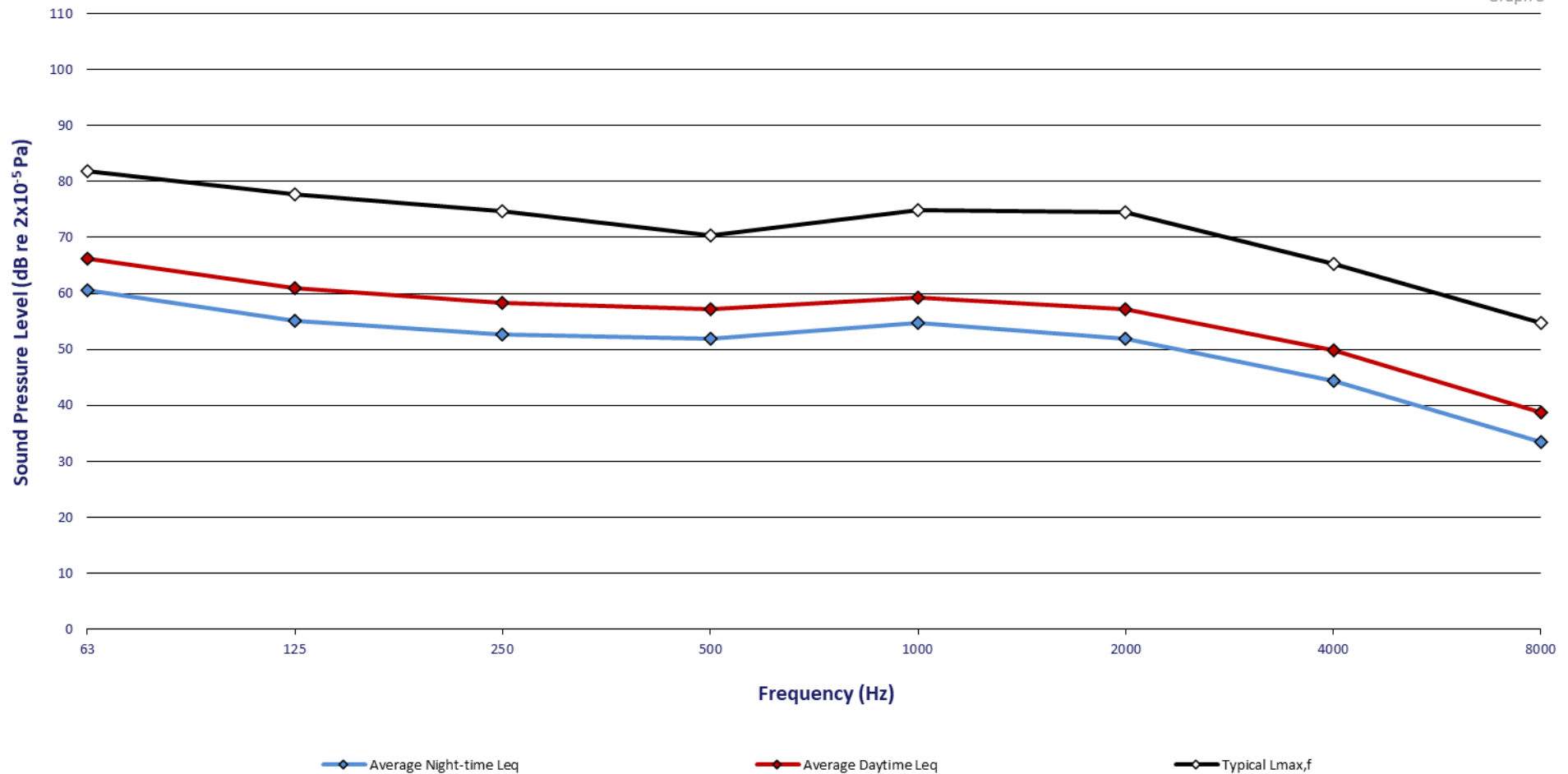
Spectral Noise Levels

Location 1 - Turnpike Lane/Clarendon Road



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Graph 3



Clarendon Road, Haringey

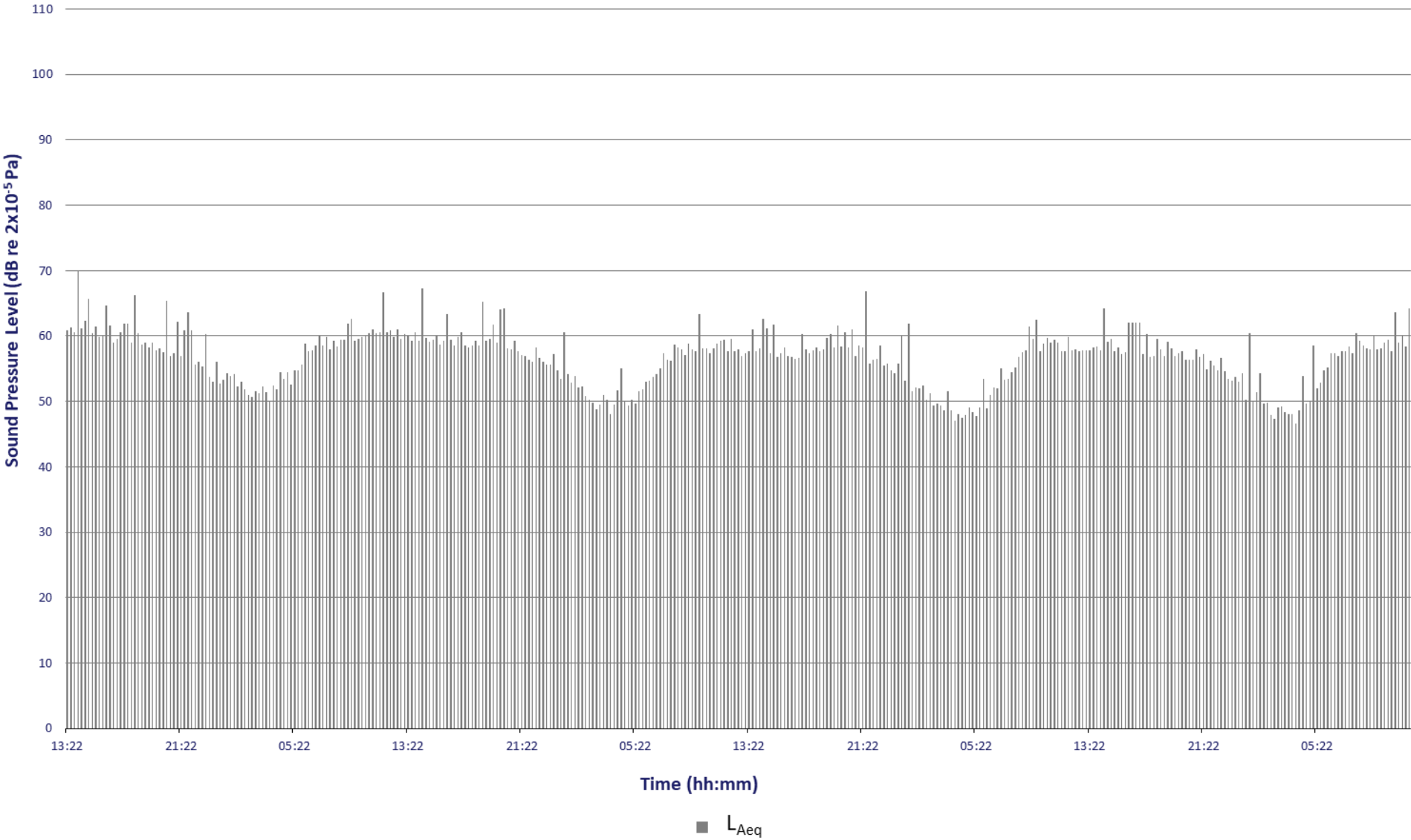
L_{Aeq} Time History

Position 2 - Clarendon Road (Rear)



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Graph 4



Clarendon Road, Haringey

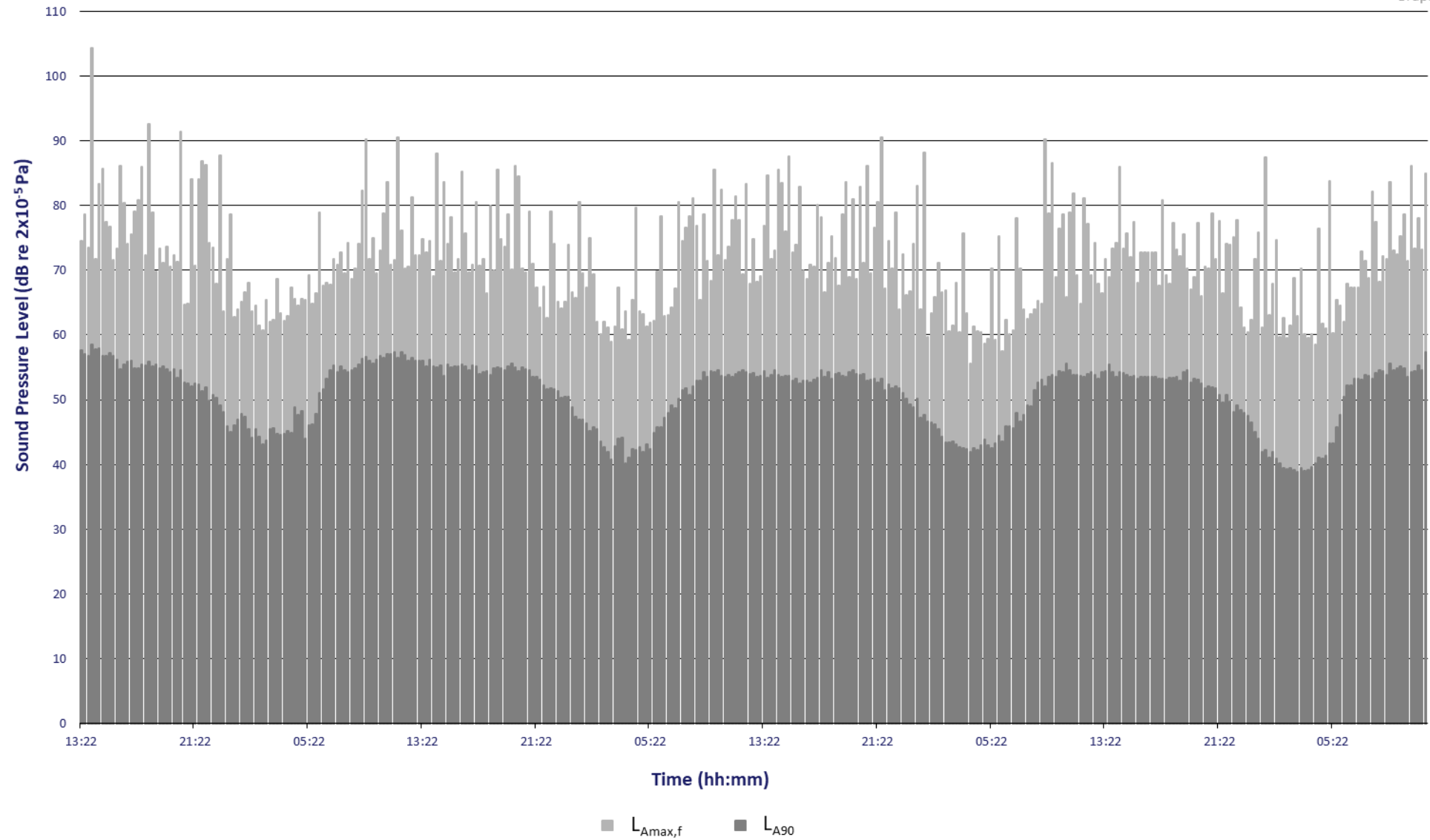
$L_{Amax,f}$ and L_{A90} Time History

Position 2 - Clarendon Road (Rear)



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Graph 5



Clarendon Road, Haringey

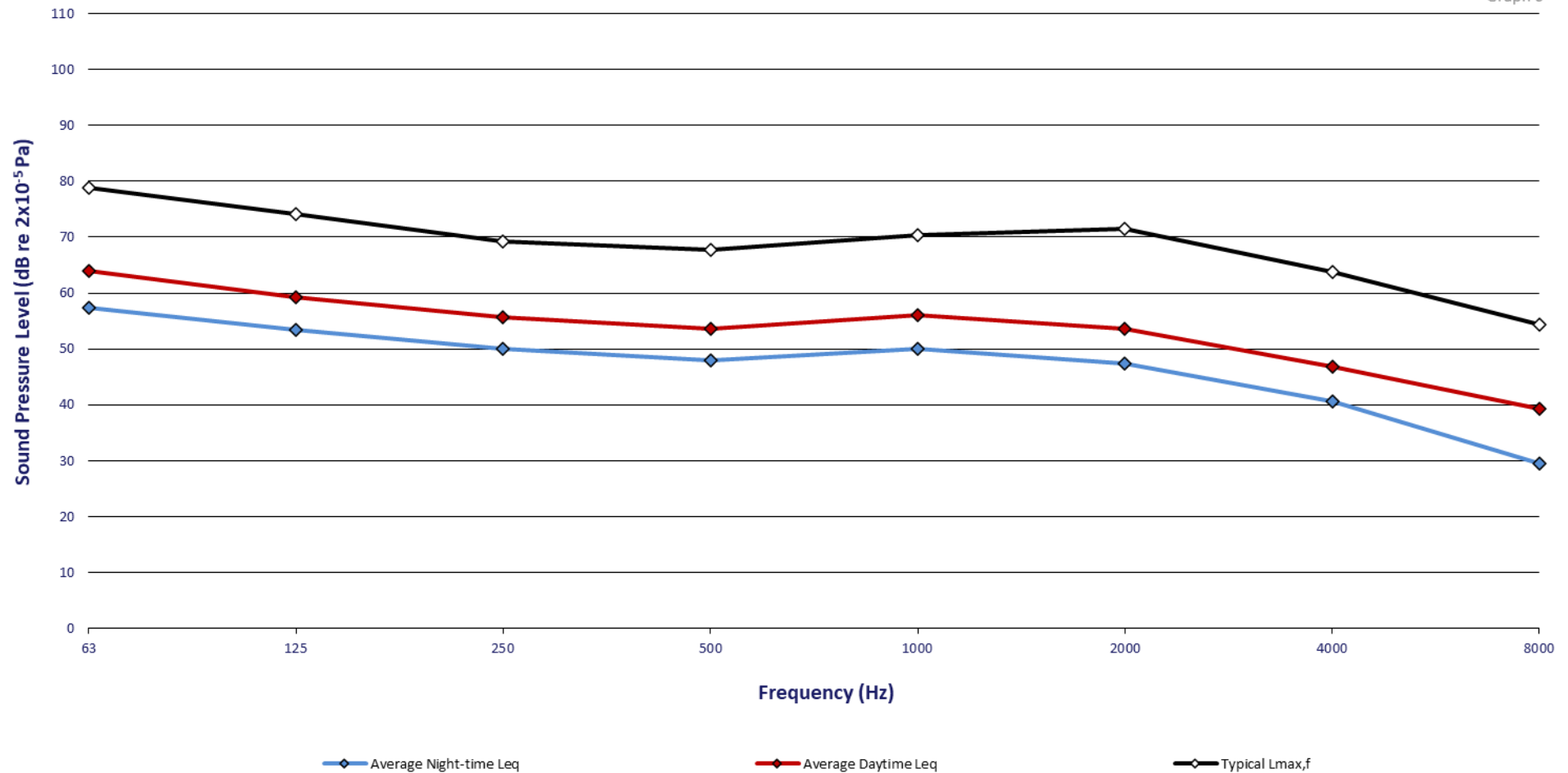
Spectral Noise Levels

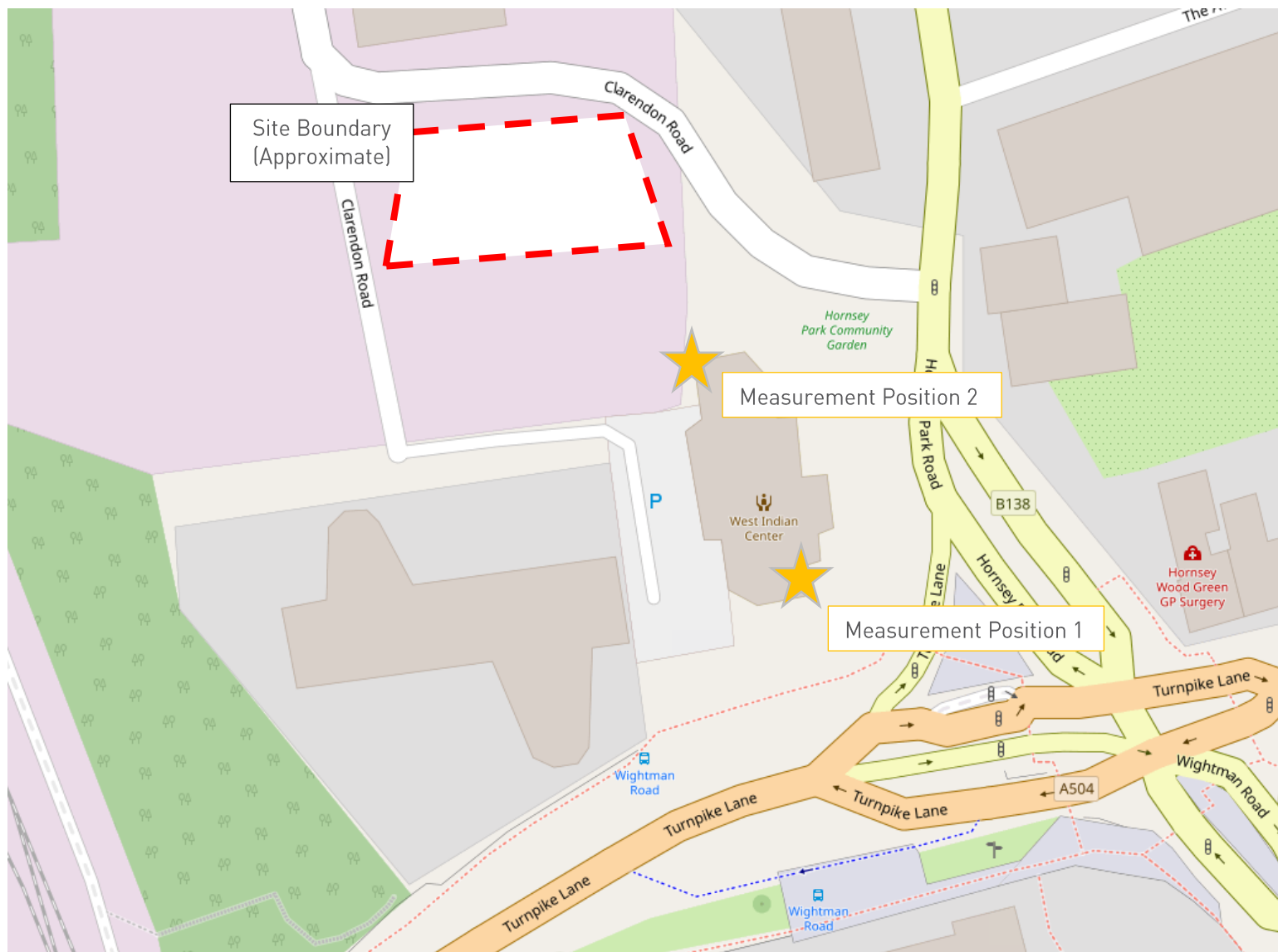
Position 2 - Clarendon Road (Rear)



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Graph 6





Clarendon Road, Haringey, London
Wider Site Plan with Overlaid Measurement Positions
Project 10635

Figure 1
5 October 2022
Not to Scale





Clarendon Road, Haringey, London
 GA With Measurement Position Overlaid – First Floor
 Project 10635

Figure 1
 5 October 2022
 Not to Scale

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