100 Avenue Road

Noise and Vibration Assessment

February 2025

REGAL

100 AVENUE ROAD, LONDON NW3

Planning Stage Noise & Vibration Assessment Report

Reference: 13308.RP01.AAR.2
Prepared: 6 February 2025
Revision Number: 0

Regal London
4 – 5 Coleridge Gardens
London
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Revision	Comment	Date	Prepared By	Approved By
0	Draft issue of report	6 December 2024	Struan Carmichael	Torben Andersen
1	Report revised following comments from Client	31 January 2025	Struan Carmichael	Torben Andersen
2	Updated to include latest project drawings	6 February 2025	Struan Carmichael	Torben Andersen

Terms of contract:

RBA Acoustics Ltd have prepared this report in accordance with our Acoustic Consultancy Brief 13308.ACB01.0 dated 22 December 2023. 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 will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

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1. INTRODUCTION

This report relates to the redevelopment of the Site at 100 Avenue Road, London. The Implemented Permission (ref. 2014/2617/P) was granted via Appeal (ref. APP/X5210/W/14/3001616) on 18 February 2016.

It has been subject to further scheme amendments facilitated under Section 96a of the Town & Country Planning Act (1990) (As Amended) and has been lawfully implemented, which was confirmed with a certificate of lawfulness issued on 8 February 2018 (ref: 2017/6884/P).

Whilst demolition works and basement construction works have undertaken by the previous owner (Essential Living (Swiss Cottage) Limited), above ground construction works in respect of the Implemented Permission have stalled.

Regal Avenue Road Limited acquired the Site in 2024 and intend to bring forward the scheme as soon as practicable, subject to securing some amendments to the Implemented Permission to ensure its deliverability and compliance with the latest standards / Building Regulations.

The Implemented Permission ref. 2014/1617/P (as amended under 2016/2048/P, 2018/4239/P, 2019/1405/P and 2022/0022/P) is outlined as follows:

> *"Demolition of the existing building and redevelopment with a 24 storey building and a part 7 part 5 storey building comprising a total of 184 residential units (Class C3) and up to 1,041sqm of flexible retail/financial or professional or café/restaurant floorspace (Classes A1/A2/A3) inclusive of part sui generis floorspace or potential new London Underground station access fronting Avenue Road and up to 1,350sqm for community use (Class D1) with associated works including enlargement of the existing basement level to contain disabled car parking spaces and cycle parking, landscaping and access improvements"*

The proposed s.73 Amendment Application is outlined as follows:

> *"Demolition of the existing building and redevelopment comprising residential units (Class C3) and flexible commercial, business and service use (Class E) and community use (Class F2(b)) with associated works including enlargement of the existing basement level to contain disabled car parking spaces and cycle parking, landscaping and access improvements."*

This report provides a summary proposed design for the site in support of the s. 73 planning application as above, including initial acoustic advice for environmental noise limits, external building fabric and vibration control. This report occasionally employs technical acoustic terminology. A glossary of acoustic terminology is presented in Appendix A.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix D).

The application site is bounded on its western side by Avenue Road and the Swiss Cottage/Finchley Road junction and gyratory. Ye Olde Swiss Cottage pub is located directly opposite on the western side of Avenue Road, facing on to the junction. On the northern side the site is bounded by the western end of Eton Avenue which is pedestrianised. To the east of the site is Swiss Cottage Open Space and to the south of the site is Swiss Cottage Library. The London Underground Jubilee line lies in close proximity to the site and runs along the western boundary.

The noise climate was noted to be dominated by road-traffic movements along Avenue Road, Finchley Road and College Crescent, in addition to other wider surrounding road networks. Vibration levels at the site are controlled by train movements associated with the London Underground services.

3. HISTORIC WORKS

The relevant acoustic Conditions attached to the Implemented Permission are as follows:

Condition 6

Prior to the installation of any mechanical plant, an acoustic report demonstrating how any mechanical plant to be installed will accord with the noise and vibration standards as set out in the Local Development Framework and Camden Planning Guidance shall be submitted to and approved in writing by the Local Planning Authority. The report shall include such manufacturer's specifications and details of noise and vibration mitigation measures as necessary. The plant shall not be operated other than in complete accordance with such measures approved.

Condition 7

At 1 metre outside the windows of any neighbouring habitable room the level of noise from all plant and machinery shall be at all times at least 5 decibels below the existing background noise levels, expressed in dB(A) at such locations. Where the noise from the plant and machinery is tonal in character the differences in these levels shall be at least 10 dB(A).

Condition 10

The acoustic isolation shall thereafter be maintained in effective order. In the event of no satisfactory ventilation being provided, no primary cooking shall take place on the premises.

The technical report submitted (by Hann Tucker) as part of the previous planning application contains the following information:

- Noise & vibration surveys.
- Assessment of existing environmental noise and recommendations made with regards to achieving acceptable future living conditions.
- Assessment of vibration.
- Specification of building services noise emission limits.
- Reference to internal building fabric (internal acoustic separation). This includes noise transfer between commercial and residential areas.

A previous Stage 4 assessment was undertaken by Hann Tucker Associates for the proposed development in 2019. Both noise and vibration measurement were previously undertaken, however, as this data is over 5 years old, additional noise and vibration surveys have been undertaken to capture the current noise climate on site.

The following report incorporates the data from these surveys and the main design elements for the proposed development.

4. ENVIRONMENTAL NOISE SURVEY

4.1 Survey Methodology

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

17:00 Thursday 16 May to 20:00 Monday 20 May 2024.

The unattended survey was also supplemented by attended measurements on site during the evening of Thursday 16th May. During our time on site general observation were made with regards to nearby noise sources which impact the proposed development. Whilst on site, noise from Avenue Road and the junction to the west of site was noted to dominated the general noise climate.

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, conditions were generally considered suitable for obtaining representative noise measurements, 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.

4.2 Measurement Locations

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

Measurement Position 1

The measurements were taken at the south west boundary of the development. The microphone was fixed to a pole upon the edge of the site 1m above the site border overlooking the A41. This position was directly next Swiss Cottage Station bus stop. The noise climate was noted to consist mostly of road traffic noise from the A41 and buses arrival and departure.

Measurement Position 2

The measurements were taken at the north west boundary of the development The microphone was fixed to a pole upon the edge of the site 1m above the site border overlooking a set of traffic lights. The noise climate was noted to consist mostly of road traffic noise from the A41.

Measurement Position 3

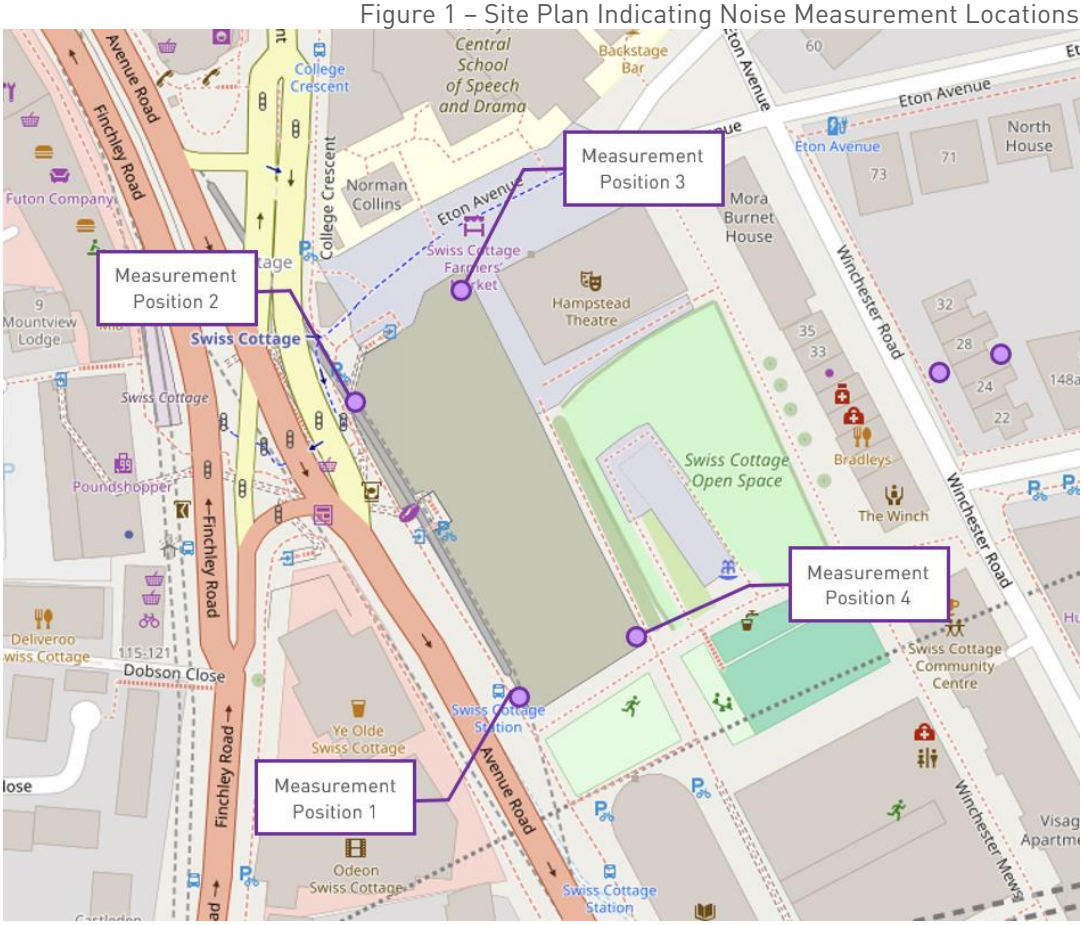
The measurements were taken at the north east boundary of the development. The microphone was fixed to a pole upon the edge of the site 1m above the site border. At the north east corner is next to the entrance of the Hampstead Theatre. The noise climate was noted to consist mostly of foot traffic from Swiss Cottage tube station and the Hampstead Theatre.

Measurement Position 4

The measurements were taken at the north east boundary of the development. The microphone was fixed to a pole upon the edge of the site 1m above the site border. This was overlooking a footpath junction. The noise climate was noted to consist mostly of road traffic noise from the A41 and people traffic from the nearby park and green areas.

The measurement positions are also illustrated below, on the site plan attached in Figure 1 and photos in Figures 2-5 (Appendix D).

Figure 1 – Site Plan Indicating Noise Measurement Locations



The measurement positions were selected to determine the worst-case noise levels at the main facades of the site. These locations are generally consistent with the previous noise survey undertaken for the Implemented Permission.

4.3 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.

4.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-8 (Appendix D). 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 – Measured Levels

Measurement Position	Measurement Period	L_{A90} (dB)	L_{Aeq} (dB)	Typical L_{AFmax} (dB)
MP1 – South-West of Site	Daytime (07:00 – 23:00)	48	70	N/A
	Night-time (23:00 – 07:00)	44	66	89
MP2 – North-West of Site	Daytime (07:00 – 23:00)	52	68	N/A
	Night-time (23:00 – 07:00)	46	65	90
MP3 – North-East of Site	Daytime (07:00 – 23:00)	46	60	N/A
	Night-time (23:00 – 07:00)	40	55	79
MP4 – South-East of Site	Daytime (07:00 – 23:00)	47	61	N/A
	Night-time (23:00 – 07:00)	45	57	78

5. PROJECT CRITERIA AND RELEVANT GUIDANCE

5.1 General Planning Policy

5.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF), December 2024, sets out the Government's planning policies for England. In respect of noise, Paragraph 198 of the NPPF states the following:

Planning policies and decisions should ensure that new development us appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas 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.

5.1.2 ProPG

ProPG: Planning & Noise provides guidance on a recommended approach to the management of noise within the planning system in England and was published by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health in May 2017.

It encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise. In light of the recent publication of ProPG, it was considered appropriate to make use of this document for this report, containing the results of our noise survey and provides advice for the pre-planning stage of development conditions.

ProPG provides the following Noise Risk Assessment scale:

Table 2 – ProPG Noise Risk Assessment

Noise Risk	Indicative $L_{Aeq,\ period}$ Noise Levels (dB)		Comments
	Daytime $L_{Aeq,\ 16\ hr}$ (07:00 – 23:00)	Night-time $L_{Aeq,\ 8\ hr}$ (23:00 – 07:00)	
Negligible	<50 dB	<40 dB	These noise levels indicate that the development site is likely to be acceptable, and the application need not normally be delayed on noise grounds.
Low	50 dB < L < 60 dB	40 dB < L < 50 dB	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

Noise Risk	Indicative $L_{Aeq,\ period}$ Noise Levels (dB)		Comments
	Daytime $L_{Aeq,\ 16\ hr}$ (07:00 – 23:00)	Night-time $L_{Aeq,\ 8\ hr}$ (23:00 – 07:00)	
Medium	60 dB < L <70 dB	50 dB < L <60 dB	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
High	>70 dB	>60 dB	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

It should be noted that a site in the High noise risk category should not necessarily be refused planning permission on grounds of noise, but rather that the site will present more acoustic challenges and the importance of applying the principles of good acoustic design will increase. A site identified as in the negligible risk category are likely to be acceptable in terms of noise; sites in low, medium and high risk categories will require a further Stage 2 assessment to establish a recommendation.

Stage 2 of the ProPG approach considers four elements:

- Good acoustic design process: minimising unreasonable acoustic conditions and preventing unacceptable acoustic conditions
- Internal noise level guidelines: in line with guidance within BS 8233:2014 (or justified alternative.
- External Amenity Area Noise Assessment: in line with guidance within BS 8233:2014 (or justified alternative)
- Assessment of other relevant issues: assessment of outcomes in accordance with national and local planning policy to form part of a recommendation.

5.1.3 London Plan

The Greater London Authority (2021) *The London Plan* policies D13 Agent of Change and D14 Noise provide outline guidance for the assessment and approach to noise within London Boroughs.

Policy D13 of the London Plan makes reference to the Agent of Change Principles (which are also covered in other National Guidelines). The Policy Notes:

A *The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance-generating uses in a sensitive manner when new development is proposed nearby.*

B *Development should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.*

C *New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and managed any noise impacts for neighbouring residents and businesses.*

Policy D14 of the London Plan states the following:

A *In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

1) avoiding significant adverse noise impacts on health and quality of life

2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change

3) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses

4) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)

5) separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation

6) where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles

7) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receive

The Plan does not provide criteria to be achieved but does reference the guidance provided in BS 8233:2014 and BS 4142:2014+A1 2019.

Important to note is that the London Plan is increasingly being adopted by Local Authorities as a benchmark for good acoustic design.

5.1.4 The Camden Local Plan 2017

The current Local Plan for LBC includes general guidance in regards to noise – it states:

Policy A4 Noise and vibration
The Council will seek to ensure that noise and vibration is controlled and managed. Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or
b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

5.1.5 The Camden draft Local Plan January 2024

We set out below the relevant policies from LBC's emerging Draft New Local Plan. We have referred to the policy text as proposed in the Regulation 18 Consultation Version (January 2024), published for consultation which concluded in March 2024, at this stage, in advance of independent Examination in Public, the policies in the draft New Local Plan carry very limited weight.

The following references are made to the AoC principle in regards to noise – it states:

13.82 In accordance with the London Plan, the agent of change principle places the responsibility for mitigating impacts from existing noise and other nuisance generating activities or uses on the proposed new sensitive development.

13.83 The Council will apply the agent of change principle to all established noise generating activities, especially when new developments are proposed nearby. Development should be designed to ensure that established noise generating uses rem

5.1.6 Summary of Criteria

The above documents (with the exception of ProPG) do not contain any specific/numerical guidance. However, the intent and expectations of these documents have been included in our relevant assessments as appropriate.

Section 6.0 of this document contains the specific ProPG assessment.

5.2 Atmospheric Noise Emissions

5.2.1 Local Authority Criteria

The latest requirements of LBC's Environmental Health Department regarding new building services plant are outlined in *Appendix 3: Noise Thresholds* of *The Camden Local Plan 2017* (also retained in *The Draft Camden Local Plan January 2024*), and are understood to be as follows:

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

In line with these requirements, we would propose items of mechanical services be designed so that noise emissions from the plant do not exceed the following levels when assessed at the nearest noise sensitive location:

Table 3 – Atmospheric Plant Noise Limits

Position / Receptors	Measurement Period	Upper Noise Limit (dBA)
MP 1 – South-West of Site	Daytime (07:00 – 23:00)	38
	Night-time (23:00 – 07:00)	34
MP 2 – North-West of Site	Daytime (07:00 – 23:00)	42
	Night-time (23:00 – 07:00)	36
MP 3 – North-East of Site	Daytime (07:00 – 23:00)	36
	Night-time (23:00 – 07:00)	30
MP 4 – South-East of Site	Daytime (07:00 – 23:00)	37
	Night-time (23:00 – 07:00)	35

In their guidance, LBC do not specify whether these criteria should be achieved at residential receptors external to the new development only, or if these criteria are also applicable to new residential receptors created within the new development itself. The following interpretation is recommended:

a) For noise levels from new items of plant installed as part of the new development serving residential spaces:
   i. The criteria in Table 2 should be achieved at residential receptors external to the new development.
   ii. A relaxation of 5dB should be applied to the criteria in Table 2 at residential receptors within the new development.

b) For noise levels from new items of plant installed as part of the new development serving the commercial unit:
   i. The criteria in Table 2 should be achieved at both residential receptors external to the new development, and to new residential receptors created within the development.

It should be noted that the above requirements are applied at the nearest residential adjacencies and alternative criteria should be incorporated if there are also commercial properties affected by the proposed plant installations. Based on our experience working on other similar projects, items of emergency plant should be designed so that they do not exceed 10dB above the prevailing background noise levels. As such, the following criteria is recommended:

Table 4 - Plant Noise Emissions Limits for Emergency Items of Plant

Position / Receptors	Measurement Period	Upper Noise Limit (dBA)
MP 1 – South-West of Site	Daytime (07:00 – 23:00)	48
MP 2 – North-West of Site	Daytime (07:00 – 23:00)	52
MP 3 – North-East of Site	Daytime (07:00 – 23:00)	46
MP 4 – South-East of Site	Daytime (07:00 – 23:00)	47

5.3 Roomside Plant Noise Limits

Noise transferred from plant to internal areas via ducts or due to the operation of MEV / extract fans / ventilation systems, etc. should not exceed the internal noise levels detailed in Table 5.

Table 5 - Internal Noise Levels due to Plant Noise

Area	Internal Noise Criterion (NR)
Bedrooms	20-25
Living Rooms	25-30
Bathrooms	35-40
Corridor (Normal AOV / Plant Duty)	40
Corridor (Emergency & Testing AOV / Plant Duty)	60
Plant / Cycle Store / Other Ancillary Areas	55
General Resident Amenity Areas	40
Noise Sensitive Amenity Areas	25-30

5.4 External Noise Intrusion – Residential Areas

The sections below outline relevant standards for the design and assessment of eternal building fabric elements.

5.4.1 British Standard 8233:2014

British Standards Institution (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 6.

Table 6 - 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	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

5.4.2 World Health Organisation Guidelines

WHO (2018) *Environmental Noise Guidelines for the European Region* sets out to define "*recommended exposure levels for environmental noise in order to protect population health*". The guidance document relates specifically to external noise levels, and recommends that "*all CNG* [WHO (1999) *Guidelines for Community Noise*] *indoor guideline values and any values not covered by the current guidelines (such as industrial noise*

and shopping areas) should remain valid". RBA therefore make reference to Guidelines for Community Noise for recommendations on internal noise levels.

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, defined 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 WHO document.

Table 7 - 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.

5.4.3 Summary – Residential Areas

The project criteria adopted are therefore as follows:

Table 8 - Criteria Summary

Room	Period	Criteria
Bedrooms	07:00 – 23:00	35 dB $L_{Aeq,16hour}$
	23:00 – 07:00	30 dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,f}$ (not normally exceeded)
Living Rooms	07:00 – 23:00	35 dB $L_{Aeq,16hour}$

5.5 External Building Fabric – Non-Residential Criteria

5.5.1 British Standard 8233:2014

We understand the non-residential uses are proposed which are to be for community areas and retail uses. Hence, we have outlined criteria for these areas based on the guidance within BS 8233:2014. The standard advises the following internal ambient noise levels (L_{Aeq}) for the given activity and conditions for work requiring concentration.

Table 9 – BS 8233:2014 Non-Residential Criteria

Activity	Location	Design Range $L_{Aeq,T}$ (dB)
Speech or Telephone Communications	Department Store	50-55
	Corridor, Circulation Space	45-55
Study and Work Requiring Concentration	Staff/Meeting Room, Training Room	35-45
	Executive Office	35-40

5.5.2 British Council for Offices 2014

Within the community spaces, there are various office areas proposed. BCO 2014 provides guidance on external noise intrusion levels (whether from road, rail or aircraft sources) should, after attenuation by the composite building envelope, not exceed the following design criteria:

Table 10 – BCO 2014 Design Criteria

Criterion	Environment	Design Range
External noise intrusion levels	Open plan offices	NR40 (≈45dBA)
	Speculative Offices*	NR38 (≈43dBA)
	Cellular Offices	NR35 (≈40dBA)

*Please note, the speculative office criterion is a compromise between the ideal for open plan and cellular offices.

In addition, $L_{Amax\ (fast)}$ noise intrusion levels should not normally exceed 55dBA in open plan/speculative offices or 50dBA in cellular offices.

5.5.3 Summary – Non-Residential Areas

Although some of the above standard guidance does not specifically outline the time periods over which these criteria should be considered suitable, in the case of BS 8233:2014, it does note the time period should be appropriate for the activity involved. Currently proposed hours of operation are not known for the commercial units and the relevant time period has therefore been assumed.

Based on guidance from BS8233:2014 and BCO 2014, we consider it appropriate to design to the following criteria:

Study Area (incl. Libraries)	Daytime (07:00 – 23:00)	40dB L_{Aeq}
Community Spaces / Amenity	Daytime (07:00 – 23:00)	40-45dB L_{Aeq}
Office / Meeting Room	Daytime (07:00 – 23:00)	40-45dB L_{Aeq}

5.6 Internal Building Fabric Requirements and Target Criteria (New Builds)

The following section describes the various requirements for internal building fabric elements of the development in terms of Approved Document E (2003) of the Building Regulations, as well as recommended enhanced criteria (also needed to meet BREEAM or HQM certification).

5.6.1 Local Authority Guidance

In their document, *Camden Planning Guidance: Amenity*, LBC state:

> ***Internal noise levels***
>
> *6.22 The requirements of the Building Regulations are usually adequate for the sound insulation between floors and walls of adjoining dwellings, making planning conditions unnecessary.*
>
> *6.23 The requirements of the Building Regulations are however likely to be inadequate in instances where:*
> - *a new commercial use likely to generate noise adjoins an existing residential building (and vice versa); and/or*
> - *a change of use will result in a residential development being sited in a noisy environment.*
>
> *6.24 Where such development is proposed, the Council is likely to use planning conditions requiring substantially enhanced sound insulation of relevant walls, floors and ceilings compared to the minimum specifications of the Building Regulations. In proposing conditions, the Council will consider guidance available within BS8233:2014 Guidance on sound insulation and noise reduction for buildings, Guidelines for Community Noise (1999) and Night Noise Guidelines for Europe (2009) published by the World Health Organisation.*

5.6.2 Approved Document E (2003)

Building Regulations Approved Document E (2003) provides guidance for levels of sound insulation within 'Room for Residential Purposes' and residential developments. These criteria are applicable to separating walls and floors between individual studio rooms / demises and also between studio rooms / demises and common parts. The sound insulation criteria to be achieved are set out below.

Separating Floors

For new residential developments:

- Minimum airborne sound insulation of 45dB $D_{nT,w+}C_{tr}$. This is an on-site performance rating.
- Maximum impact sound pressure level of 62dB $L'_{nT,w}$. This is an on-site performance rating.

Separating Walls

For new residential developments:

- Minimum airborne sound insulation of 45dB $D_{nT,w+Ctr}$. This is an on-site performance rating.

5.7 Vibration Assessment Criteria

It is necessary to consider two sets of criteria when assessing train-induced vibration and its potential impact on dwellings. Not only will the disturbance be perceived as tactile vibration, but the vibration may also result in structure-borne re-radiated noise.

When assessing vibration and re-radiated noise levels generated by either surface or underground train movements, reference should be made to the following guidelines.

5.7.1 BS 6472 Vibration Criteria

BS 6472-1:2008 "Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration sources other than blasting" provides guidance on predicting human response to vibration in buildings over the frequency range 0.5Hz to 80Hz.

BS 6472 is based on the evaluation of vibration measurements with regards to adverse comment from occupants, rather than criteria relating to health and safety or structural damage.

In terms of assessing what impact the perceptibility of structure-borne vibration has on a person the standard promotes the use of the vibration dose value (VDV). The VDV determines an overall dose value accounting for intermittent, impulsive or continuous vibration experienced by a person and rates the level in terms of subjective response. Table 11 details the relationship between vibration dose and human annoyance:

Table 11 – VDV Values – BS 6472

Place and Time	Low probability of adverse comment ($m/s^{1.75}$)	Adverse comment possible ($m/s^{1.75}$)	Adverse comment probable ($m/s^{1.75}$)
Residential Buildings 16h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential Buildings 8h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

The above values can be used for both vertical and horizontal vibration, provided that they are calculated according to the appropriate frequency weightings.

5.7.2 Camden Local Plan Vibration Criteria

The Camden Local Plan outlined vibration levels from uses such as railways, roads, leisure and entertainment purposes and/or plant or machinery at which planning permission will not normally be granted. These levels are summarised below:

Table 12 – VDV Values – Camden Local Plan

Vibration description and location of measurement	Time Period	Vibration Levels (Vibration Dose Values)
Vibration inside dwellings	Day and evening (07:00 – 23:00)	0.2 to 0.4 $m/s^{1.75}$
Vibration inside dwellings	Night (23:00 – 07:00)	0.13 $m/s^{1.75}$
Vibration inside offices	Day, evening and night (00:00 – 24:00)	0.4 $m/s^{1.75}$

5.7.3 Re-Radiated Noise

There are no specific UK or international standards that define when ground borne noise becomes significant. As a result there are no formal criteria against which assessment of ground borne noise inside residential buildings can readily be made.

It is commonly accepted that vibration levels resulting in re-radiated noise levels of up to 35dBA $L_{max(s)}$ should not result in nuisance or complaints, whilst levels above 40dBA $L_{max(s)}$ will make complaints likely. $L_{max(s)}$ re-radiated noise levels between 35dBA and 40dBA are considered perceptible but not a cause of complaint.

In addition, rail transit systems (Jubilee Line Extension, Crossrail and Channel Tunnel Rail Link) have adopted a re-radiated noise criterion of 40dBA $L_{max(s)}$ for residential buildings potentially affected by train induced vibration in order to ensure a low degree of impact.

Considering the above, we have carried out an assessment with the target of achieving a level not exceeding 35dBA $L_{max(s)}$ in our assessment.

6. PROPG EXTERNAL NOISE ASSESSMENT

With reference to Section 5.1.2, noise levels at the four measurement position have been compared to the Noise Risk Categories as defined in ProPG for both daytime and night-time periods.

Table 13 – Noise Risk Categories

Measurement Position	Noise Exposure Category	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Measurement Position 1	High	High
Measurement Position 2	Medium	High
Measurement Position 3	Medium	Medium
Measurement Position 4	Medium	Medium

As shown in the table above, the majority of façade zones are classed as high risk for adverse effect in terms of noise for both the daytime and night-time.

ProPG states that as noise levels increase, a good acoustic design process should be followed and demonstrated. A further Stage 2 assessment is required to be undertaken which will consider the four elements outlined below.

- Good acoustic design process: minimising unreasonable acoustic conditions and preventing unacceptable acoustic conditions
- Internal noise level guidelines: in line with guidance within BS 8233:2014 (or justified alternative)
- External Amenity Area Noise Assessment: in line with guidance within BS 8233:2014 (or justified alternative)
- Assessment of other relevant issues: assessment of outcomes in accordance with national and local planning policy to form part of a recommendation.

These assessments have been undertaken as part of the planning stage works and the outcomes presented in the Sections below.

7. EXTERNAL BUILDING FABRIC

7.1 Assumptions

Our external building fabric analyses have assumed the following:

7.1.1 Drawings

Calculations have assumed massing and block names as indicated in the following drawings from Cartwright Pickard, the project architects:

Drawing/Document Number	Revision	Description	Date
1016-CPA-ZZ-00-DR-A-0200	P21	Ground Floor Plan	31 January 2025
1016-CPA-ZZ-01-DR-A-0201	P12	First Floor Plan	31 January 2025
1016-CPA-ZZ-04-DR-A-0204	P05	Fourth Floor Plan	31 January 2025
1016-CPA-ZZ-05-DR-A-0205	P08	Fifth Floor Plan	31 January 2025
1016-CPA-ZZ-06-DR-A-0206	P14	Sixth Floor Plan	31 January 2025
1016-CPA-ZZ-07-DR-A-0207	P08	Seventh Floor Plan	31 January 2025
1016-CPA-ZZ-08-DR-A-0208	P04	Eight Floor Plan	31 January 2025
1016-CPA-ZZ-13-DR-A-0213	P09	Thirteenth Floor Plan	31 January 2025
1016-CPA-ZZ-21-DR-A-0221	P06	Twenty-First Floor Plan	31 January 2025
1016-CPA-ZZ-25-DR-A-0225	P05	Twenty-Fifth Floor Plan	31 January 2025
1016-CPA-ZZ-ZZ-DR-A-0600	P10	South-West Elevation – Avenue Road	31 January 2025
1016-CPA-ZZ-ZZ-DR-A-0601	P07	North-East Elevation – Open Space	31 January 2025
1016-CPA-ZZ-ZZ-DR-A-0602	P08	North-West Elevation – Eton Avenue	31 January 2025
1016-CPA-ZZ-ZZ-DR-A-0603	P08	South-East Elevation – Park Walkway	31 January 2025

7.1.2 Noise Levels

This assessment has been based on the measured noise levels as detailed in Section 4.4 above. In order to predict the noise levels at the different façades with varying heights, an acoustic model of the proposed site, including all proposed buildings and existing surrounding buildings has been generated using the CadnaA platform.

The model allows the various sound sources, which are the main surrounding roads, to be calibrated according to on-site measurements. The proposed buildings are subsequently built into the model and calculations using the methodology outlined in ISO9613 are undertaken to predict façade incident noise levels at all floor heights and to produce noise contours for the site and surrounding area.

7.1.3 Room Absorption

The calculations assume that bedrooms are acoustically 'soft' with carpets, curtains and other soft furnishings. The living rooms are assumed to be less acoustically absorptive (with a hard floor finish, although with furnishings).

Details of the absorption coefficients assumed in the calculations are provided in Appendix C.

7.1.4 External Wall

It is understood that external non-glazed areas are to comprise the following:

- 102.5mm brickwork
- 50mm open cavity
- 150mm external mineral wool insulation
- 12.5mm sheeting board
- 100mm mineral wool insulation
- 30mm stud
- 2No. 12.5mm standard density plasterboard

As such, RBA have assumed the following sound reduction indices (equating to an overall Rw of 57 dB) for all non-glazed façade areas:

Table 14 – Sound Reduction Indices of Non-Glazed Elements

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
34	40	47	53	62	69	71	71

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

7.1.5 Ventilation

The chosen ventilation strategy will be MVHR whole house ventilation. As such there are no direct openings into habitable rooms for ventilation. Such systems are highly beneficial when considering the noise ingress as they provide a high degree of noise attenuation. Environmental noise break-in to rooms via the ductwork of the whole house system is not anticipated to be an issue, as such systems have significant inherent attenuation (environmental noise will need to travel through the ductwork system and through the heat recovery exchange unit). Acoustic treatment in relation to this issue is therefore not anticipated.

We understand windows are to be openable to provide purge ventilation. During those periods where windows are opened for purge/rapid ventilation, noise levels will naturally be increased internally.

7.2 Glazing Acoustic Specifications

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 10140-2:2021:

Table 15 – Window Sound Insulation Performance Specification

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	23	23	23	30	38	36	43	43	35
G3	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 overall 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.

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.

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.

It should be noted that due to the non-acoustic reasons (security, thermal or structural purposes), the specifications may exceed those stated above in some locations.

For guidance purposes we would typically expect the following glazing configurations to prove commensurate with achieving the sound insulation performance specifications detailed within Table 16.

Table 16 – Guidance on Glazing Constructions

Glazing Type	Example Glazing Configuration
G1	High-performance laminate double glazing with differing pane thicknesses comprising 10mm glass/12mm cavity/6.4mm glass
G2	Medium-performance double glazing with differing pane thicknesses comprising 6mm glass/12mm cavity/8mm glass
G3	Standard thermal double glazing with differing pane thicknesses comprising 4mm glass/12mm cavity/6mm glass

7.3 Applicable Zoning

Due to the differences in the prevailing noise climate around the site and the types of rooms at each floor level, three primary glazing zones have been defined, as indicated on the façade zoning plans provided in 8-33 in Appendix D.

Table 17 – Glazing Zones

Façade Zone	Room Type	Glazing Type
Zone 1	Bedroom	G1
	Living Room / Kitchen	G2
Zone 2	Bedroom	G2
	Living Room / Kitchen	G3

Façade Zone	Room Type	Glazing Type
	Office / Meeting / Library / Art + Craft / Lounge / Dance	G2
Zone 3	Bedroom	G3
	Living Room / Kitchen	G3
	Amenity / Retail / Lobby	G3

7.4 Flanking Specification

Should there be a proposal for any curtain walling or continuous glazing systems it is important that the control of flanking sound transmission via these elements is fully controlled.

Between residential uses a minimum flanking level difference of 62dB $D_{n,f,w}$ should be targeted. Between non-residential areas (e.g. commercial to commercial, office etc.) it is standard practice to relax the specification to a value of 50dB $D_{n,f,w}$. It is likely insulated double/split mullions and transoms will be required in order to achieve the flanking specification for the residential units. For example, a unitised system would be expected more comfortably to achieve compliance with our specification. This obviously has a large impact on the design and style of any curtain walling system and should be investigated at the earliest opportunity to ensure the specification is achieved.

8. VIBRATION ASSESSMENT

8.1 Introduction

The development borders Swiss Cottage tube station at the northwestern corner of the site and borders the A41 along the western edge of the site. The London Underground Jubilee line lies in close proximity to the site.

RBA Acoustics has been commissioned to undertake a vibration survey in order to ascertain whether the proposed dwellings are likely to be affected by train induced vibration, either in the form of tactile vibration or re-radiated noise.

The following sections presents the results of the vibration survey undertaken at the site and associated BS 6472 assessment with reference to the Camden Local Policy guidance and conclusions.

8.2 Vibration Measurements

8.2.1 Train Movements

Regular underground train movements were measured across the site. The London Underground Jubilee Line and Metropolitan Lines operate every 3-5 minutes in both directions past the site. This equates to approximately 50-80 train movements per hour (although only a small proportion of these give rise to discernible vibration levels at the site).

8.2.2 Instrumentation

Full details of the equipment used are provided in Appendix B. The accelerometer was calibrated both prior to and on completion of the survey with no calibration drifts observed.

8.2.3 Methodology

Site-wide vibration measurements were undertaken for a number of passenger train movements at eleven measurement positions on 28 June, 2 July and 8 July 2024. The positions are described in detail below:

Position P1: Basement Slab, west of Tower Block
Position P2: Basement Slab, east of Tower Block
Position P3: Basement Slab, west of Lower Block
Position P4: Basement Slab, east of Lower Block
Position P5: Ground Floor Slab, west side of Tower
Position P6: Ground Floor Slab, north-east side of Tower
Position P7: Ground Floor Slab, south-east side of Tower
Position P8: Ground Floor Slab, north-east of Lower Block
Position P9: Ground Floor Slab, east of Lower Block cores
Position P10: Ground Floor Slab, west of Lower Block cores
Position P11: Ground Floor Slab, south-east of Lower Block

The approximate locations of the vibration measurement positions are shown on the Site Plans in Figure 6 and Figure 7 in Appendix D. Vertical and horizontal axis measurements were undertaken at all positions. Horizontal axis measurements were undertaken perpendicular to the railway tracks.

8.2.4 Results

The ground-borne vibration levels for a number of passenger train pass-bys have been analysed into third-octave bands and the data summarised on the attached graphs. Graphs P1 – P11 present the maximum (rms) vertical vibration levels measured at each position for the individual train passbys.

8.3 Prediction Assumptions

Vibration levels presented in Graphs P1 - P11 are as measured within the existing slabs. In order to estimate the resultant vibration levels and re-radiated noise levels within the building we have made the following assumptions:

8.3.1 Prediction Procedures

Our calculations have been based on the following:

(i) Empirical prediction procedures as detailed within the following references:

- "A Prediction Procedure for Rail Transportation Ground-borne Noise and Vibration" – Nelson and Saurenman : Transportation Research Record 1143.
- "Handbook of Urban Rail Noise and Vibration Control" – Nelson, Saurenman, Wilson : US Department of Commerce – National Technical Information Services – February 1982.

(ii) Previous research undertaken by RBA Acoustics on building response to ground-borne vibration within a variety of different building frame types.

8.3.2 Proposed Building Structures

We have based our assessment on the following information received from the design team:

Substructure

Foundations are piled.

Superstructure

Superstructure will be formed from in-situ concrete.

Should this information change during the course of the design RBA Acoustics should be notified.

8.4 Predicted Levels of Vibration & Re-Radiate Noise

8.4.1 Tactile Vibration Dose Values (VDVs)

Table 15 details the predicted Vibration Dose Values (VDVs) for both the daytime and night-time periods. Levels have been predicted within the first suspended residential floor slabs, which are generally acknowledged as having the highest levels of vibration.

Table 18 – Predicted $VDV_{b,Day}$ And $VDV_{b,Night}$

Assessment Location	Period	Vertical VDV ($m/s^{1.75}$)	BS 6472	Camden Local Policy Guidelines
			Low Probability of Adverse Comment ($m/s^{1.75}$)	Vibration Levels (Vibration Dose Values)
Tower Block	Day	0.03	0.2 – 0.4	0.2 to 0.4 $m/s^{1.75}$
	Night	0.025	0.1 – 0.2	0.13 $m/s^{1.75}$
Lower Block	Day	0.11	0.2 – 0.4	0.2 to 0.4 $m/s^{1.75}$
	Night	0.095	0.1 – 0.2	0.13 $m/s^{1.75}$

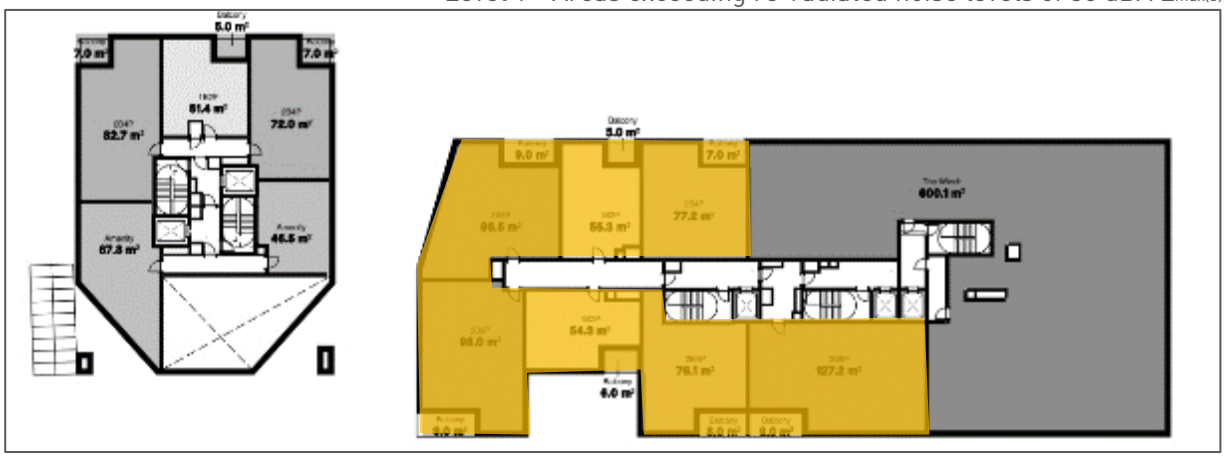
Please note that vibration levels would typically decrease as one moves up through the building.

Our calculations indicate that the Vibration Dose Values associated with train movements during both the day and night-time periods are likely to result in a level below the threshold of "low probability of adverse comment".

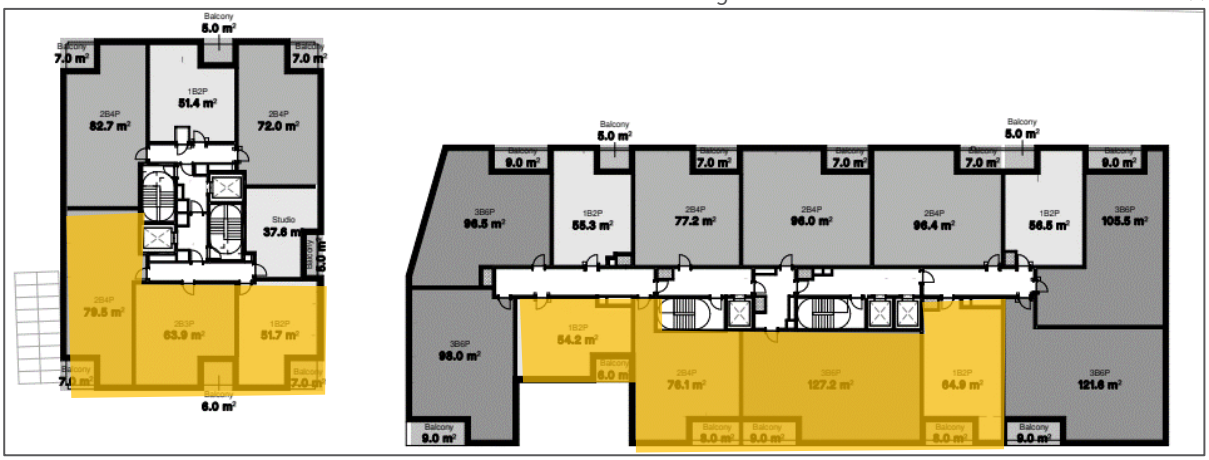
8.4.2 Re-Radiated Noise Levels

Re-radiated noise levels are predicted to be below 40 dBA $L_{max(s)}$ in all residential areas. Considering the target of not exceeding 35 dBA $L_{max(s)}$ as proposed in Section 5.7.2., the areas that are predicted to exceed 35 dBA $L_{max(s)}$are highlighted in orange on the plans below.

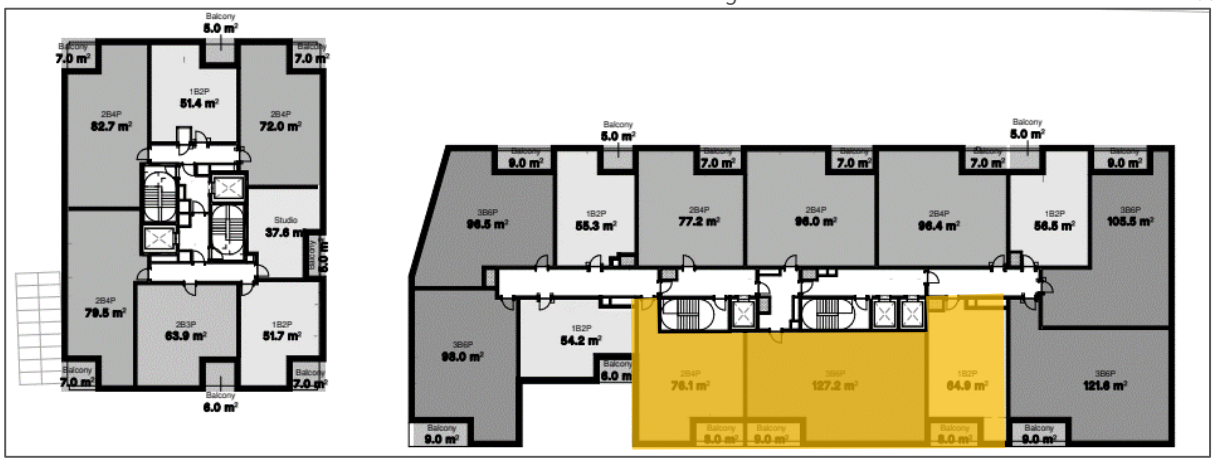
Level 1 - Areas exceeding re-radiated noise levels of 35 dBA $L_{max(s)}$



Level 2 - Areas exceeding re-radiated noise levels of 35 dBA $L_{max(s)}$



Level 3 - Areas exceeding re-radiated noise levels of 35 dBA $L_{max(s)}$



To achieve the target level of 35 dBA $L_{max(s)}$, mitigation of the vibration within these locations will be required.

8.5 Outline Remedial Measures

Reduction of worst-case noise levels of up to 5dB would be required to achieve the lower target criteria for re-radiated noise intrusion. A suitable lightweight box-in-box solution is proposed below.

Floating Floor

A lightweight floating floor will be introduced formed of 4No. board system. This is supported from the "live" structural slab via discrete isolation bearings or spring mounts creating a void of 25mm depth.

- 18mm Plywood
- 2No. layers 10mm cement particle board (min. 13 kg/m^2 each)
- 18mm Plywood
- 25mm elastomer bearing *(achieving 11Hz natural frequency under load)*
- 25mm mineral wool in void
- Live structural slab
  (Overall 80mm buildup from RC slab)

Independent Wall Lining

It is also necessary to introduce independent linings to structural columns and shear walls. These would typically be formed of a lightweight construction and would be formed of a 3-board layer system fixed approximately 50-100mm from the face of the "live" structural walls – these can either be supported directly from the floating floor or from the "live" structural slab via isolation pads. The head of the channels would be fixed into the slab via isolation pads.

These wall linings should be made completely independent of the "live" retaining walls and as such consideration will need to be given to the stability of the studwork used. A detail for these junctions will be developed in due course with the Architect.

- Minimum 10mm clearance gap between existing "live" wall and metal studwork
- 48mm metal I stud.
- 50mm mineral wool within void (10-36 kg/m^3 density)
- 1No. layer 12mm cement particle board (min. 15.6 kg/m^2)
- 2No. layers 15mm dense plasterboard (min. 12.6 kg/m^2 each)
  (Overall 100mm buildup from RC liner wall)

Acoustic Ceiling

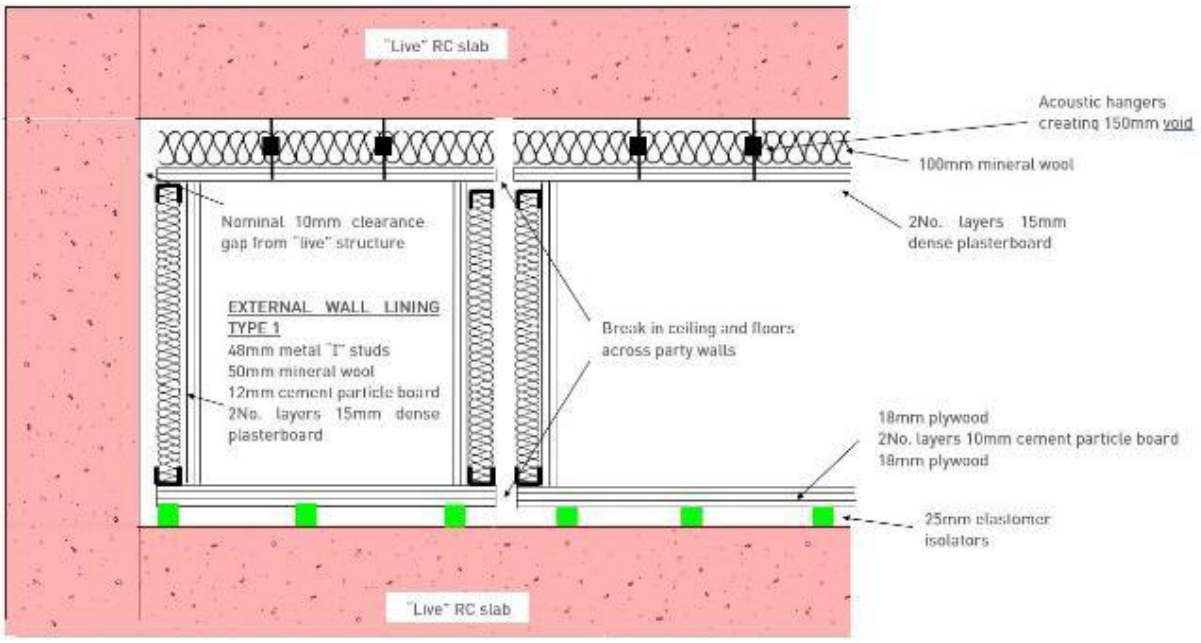
A ceiling / lid is also required for the proposed lightweight box-in-box solution, and this would be formed of an acoustic hanger system creating a minimum 150mm void filled with 100mm mineral wool with 2 layers of dense plasterboard.

Particular care should be made during construction to not to fix directly to the "live" structures and a cost allowance should be made to resiliently fix all building services to the structure. The ceiling and floorboards should also be broken across separating (party) walls

- Live structural slab
- Acoustic hangers creating min. 150mm void *(achieving 10Hz natural frequency under load)*
- 100mm mineral wool within void (10-36 kg/m^3 density)
- 2No. layers 15mm dense plasterboard (min. 12.6 kg/m^2 each)
  (Overall minimum 180mm buildup from RC slab)

8.5.1 Indicative Sketch Layout of Box-in-Box Proposals

The following figure shows a sketch detail of the box-in-box design principles that would be required in the flats highlighted in Section 8.4.2.



8.6 Summary of Vibration Assessment

RBA Acoustics has undertaken a vibration assessment of the proposed residential development at 100 Avenue Road, London.

Tactile vibration is considered suitable in all areas.

The assessment indicates that the re-radiated noise levels will be up to 40dBA $L_{max(s)}$ in the worst affected areas of the development.

We understand a re-radiated noise criteria of 35dBA $L_{max(s)}$ is to be adopted, therefore, additional vibration isolation measures are recommended and proposals for a "box-in-box" isolation strategy has been outlined.

9. SOUND TRANSFER BETWEEN NON-RESIDENTIAL AND RESIDENTIAL SPACES

9.1 The Winch Community Centre Spaces

Within the 100 Avenue Road development, a mixed-use community centre (The Winch) is proposed to be located at basement, fifth, sixth and seventh floor levels. We understand this will be used for meetings, offices, dance, art exhibitions etc. The Winch also includes spaces at basement level.

The following sections outlines our proposed sound insulation criteria and outline guidance on acceptable floor and ceiling constructions are also provided.

Proposed Target Criteria

To prevent residents being overly disturbed from noise arising within the areas below, we suggest the following standard to be achieved for separating floors:

- Minimum airborne sound insulation of 50dB $D_{nT,w+}C_{tr}$. This is an on-site performance rating.
- Maximum impact sound pressure level of 57dB $L'_{nT,w}$. This is an on-site performance rating.

Sound Insulation – Floors/Ceiling

We understand the following constructions are proposed:

Lower Block

- 10mm floor finish zone (to include a resilient layer i.e. 5mm Regupol 4515 / similar or acoustically backed vinyl)
- 50mm self-levelling screed
- 150mm thermal insulation
- 250mm PT slab
- MF ceiling with 400mm void
- 1No. 12.5mm standard density plasterboard (assumed)

The above floor constructions would be considered acoustically acceptable considering noise levels below 80-85dBA L_{eq} within the commercial / Winch areas. If higher noise levels are expected (i.e. 90-95dBA L_{eq}), we would recommend upgrading the standard plasterboard MF ceiling to the below acoustic ceiling:

- 250mm PT slab
- MF ceiling with 200mm void with 50mm Rockwool in void
- 2No. 15mm dense plasterboard (min. 12.6kg/m^2 e.g. Soundbloc) fixed via acoustic hangers

9.2 Residential Amenity / Commercial Spaces

Within the 100 Avenue Road development, there are various residential amenity spaces located at basement, 1st floor and 25th floor level. A commercial unit also proposed at Ground Floor level.

The following sections outlines our proposed sound insulation criteria and outline guidance on acceptable floor and ceiling constructions are also provided.

Proposed Target Criteria

Between commercial/amenity areas and residential areas, an airborne sound insulation level approximately 5dB higher than the minimum Building Regulations standards, i.e. 50dB $D_{nT,w}+C_{tr}$. This would be acceptable for typical uses which are not classed as noisy/loud (i.e. below 80-85dBA L_{eq}).

Sound Insulation – Floors/Ceiling

We understand the following constructions are proposed:

Tower Block

- 50mm floor finish zone (to include a resilient layer i.e. 5mm Regupol 4515 / similar or acoustically backed vinyl)
- 50mm self-levelling screed
- 150mm thermal insulation
- 200mm PT slab
- MF ceiling with 400mm void
- 1No. 12.5mm standard density plasterboard (assumed)

Lower Block

- 10mm floor finish zone (to include a resilient layer i.e. 5mm Regupol 4515 / similar or acoustically backed vinyl)
- 50mm self-levelling screed
- 150mm thermal insulation
- 250mm PT slab
- MF ceiling with 400mm void
- 1No. 12.5mm standard density plasterboard (assumed)

The above floor constructions would be considered acoustically acceptable considering noise levels below 80-85dBA L_{eq} within the amenity / commercial areas. If higher noise levels are expected due to loud amplified music or other high noise level generating activities (i.e. 90-95dBA L_{eq}), additional mitigation will be required.

Additionally, resilient layers / isolation products may need to be implemented within the commercial unit should the structure be subject to structure-borne sound sources. The Agreement for Lease should also cover any potential structure-borne noise transfer from the ground floor unit to above. Such structure-borne noise transfer could occur, for example, with shop deliveries and associated trolley movements.

10. RESIDENTIAL EXTERNAL AMENITY AREAS / BALCONYS

10.1 Introduction

Within the development site, there is an external amenity area proposed at sixth floor level of the lower block. Additionally, there are residential balconies proposed on both the lower block and tower block at most floor levels.

The following sections provides an outlined assessment of noise impact on these external spaces. We have proposed roof floor options which could be used in areas where impact sound insulation is critical to noise sensitive areas below.

10.2 Criteria

British Standard 8233:2014

With reference to noise levels in external amenity areas the following guidance is provided in BS 8233:2014:

> "For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The following relates specifically to balconies and terraces:

> "Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

World Health Organisation Guidelines

WHO *Guidelines for Community Noise* (1999) 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, defined 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 WHO document.

Table 19 – 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	-

The document uses a time base of 16 hours and refers to daytime and evening, which suggests that the $L_{Aeq,16hour}$ value from 07:00–23:00 hours should be used as to assess suitability.

10.3 Private Balconies

For the balcony areas which overlook the main road network to the West, the noise levels are predicted to exceed the upper guideline limit of 55dB target. However, noise levels within balconies in other areas which do not directly overlook Avenue Road are all predicted to be below the lower guideline limit of $L_{Aeq,16hour}$ 50 dBA.

It would be very difficult to provide lower external noise levels on private balconies without significant re-design (i.e., winter gardens), which would have significant implications on the overall character of the space.

In light of the BS 8233:2014 guidance, the marginal non-compliance exceedance in some areas may be considered acceptable based on the additional provision of the communal external amenity area at sixth floor level, where noise levels are lower.

10.4 External Amenity Area Assessment

Given the additional elevation and screening offered by the roof edge and the building itself, noise levels in this area are predicted to be lower than some of the worst-affected balconies.

The $L_{Aeq,16hour}$ noise levels predicted in the sixth floor level communal external amenity area are below 55 dBA, with the vast majority of the space being below the lower guideline limit of $L_{Aeq,16hour}$ 50 dBA, which indicates desirable conditions.

11. PLANT NOISE ASSESSMENT

The selections for plant servicing the site are currently being developed. As such, general considerations for the assessment of new items of plant are outlined below.

11.1 Proposed Mitigation

It is understood that a screen will be installed around future items of plant located at rooftop levels. This will provide some attenuation to atmospheric noise levels incident on the surrounding noise sensitive receptors and should be taken into account by future analysis. An allowance for in-line attenuation should be included within the ducted systems to suitably control noise form these elements.

11.2 Plant Proposals & Future Analyses

It is understood that new plant installations generating external plant noise emissions will be at rooftop levels, however the specific location, number and model of the units are currently being developed.

Following the selection of final plant proposals, external plant noise emissions should be assessed and, where necessary, acoustic mitigation specified, such that the plant noise limits given in Section 5.2 are achievable at the nearest/worst-affected noise-sensitive receptor. The selection of the worst affected noise sensitive receptors will depend on the final plant locations in relation to the surrounding receptors.

12. CONCLUSION

RBA Acoustics have undertaken noise monitoring for the redevelopment of the site at 100 Avenue Road, London NW3.

Measured background noise levels were used in the setting of atmospheric plant noise emissions limits, in line with the requirements of London Borough of Camden. Structure-borne noise and internal mechanical services noise limits have also been set based on the relevant standards and guidance documents.

Measured noise levels have also been used to create an acoustic model of noise propagation across the site and provide an assessment of external noise levels affecting the development. This acoustic model has been used to provide indicative glazing specifications to ensure suitable internal noise levels are achieved at the proposed development with reference to BS 8233:2014, and WHO Guidelines.

Measured vibration levels have been used to assess the impact from underground train movement on the proposed development. Mitigation measures / construction option for a lightweight box-in-box solution has been provided to suitably control re-radiated noise within the affected areas.

Advice has been given regarding internal building fabric elements, both for residential units and the various commercial / amenity areas.

Based on the information provided in this report and the current design proposals, we do not believe there is any reason as to why planning permission for the s. 73 application should not be granted in relation to acoustic and / or vibration matters.

Appendix A – Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
$D_{n,e,w}$	A single number weighted quantity which characterises the airborne sound insulation through a specified small element. A higher numerical quantity represents a better performance.
$D_{n,f,w}$	A single number weighted quantity which characterises the airborne sound insulation between rooms via a specified flanking path. A higher numerical quantity represents a better performance.
$L_{eq,T}$	The level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
$L_{Aeq,T}$	The A-weighted level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
L_{An} (e.g. L_{A10}, L_{A90})	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
$L_{Amax,T}$	The instantaneous maximum A-weighted 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, e.g. sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the ambient level.
Octave band	A frequency band in which the upper limit of the band is twice the frequency of the lower limit.
1/3 Octave band	A frequency band which is one-third of an octave band.
R_w	A single number quantity which characterises the airborne sound insulation of a material or building element in a laboratory test.

Appendix B – Instrumentation

The following equipment was used for the survey measurements:

Table B1 – Equipment used for Noise Surveys

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406255	U44039	18 April 2025
Norsonic Pre Amplifier	1209	20491		
Norsonic ½" Microphone	1225	225529	44038	18 April 2025
Norsonic Sound Calibrator	1251	34391	U440373	18 April 2025
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U44036	18 April 2025
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	469005	44035	18 April 2025
Norsonic Sound Calibrator	1251	34429	U44034	18 April 2025
Norsonic Type 1 Sound Level Meter	Nor140	1406116	U42827	22 December 2024
Norsonic Pre Amplifier	1209	20295		
Norsonic ½" Microphone	1225	344468	42826	22 December 2024
Norsonic Sound Calibrator	1251	34307	U42827	22 December 2024
Norsonic Type 1 Sound Level Meter	Nor140	1406258	U43972	31 March 2025
Norsonic Pre Amplifier	1209	20490		
Norsonic ½" Microphone	1225	168249	43871	31 March 2025
Norsonic Sound Calibrator	1251	34397	U43870	30 March 2025

Table B2: Equipment Used for Attended Vibration Measurements

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Svantek Accelerometer	SV84	K2309	1502190-1	1 April 2024
Sinus Measurement System	Apollo	11023	-	-
SINUS Acoustic Multi-channel Universal Real-time Analysis Instrument (SAMURAI)	-	-	-	-

Appendix C – Room Absorption Coefficients

For the purposes of the analyses RBA have assumed the absorption coefficients detailed in Table C1 for bedrooms and Table C2 for living rooms.

Table C1 – 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

Table C2 – 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

Appendix D – Site Plans and Figures

100 Avenue Road, London NW3

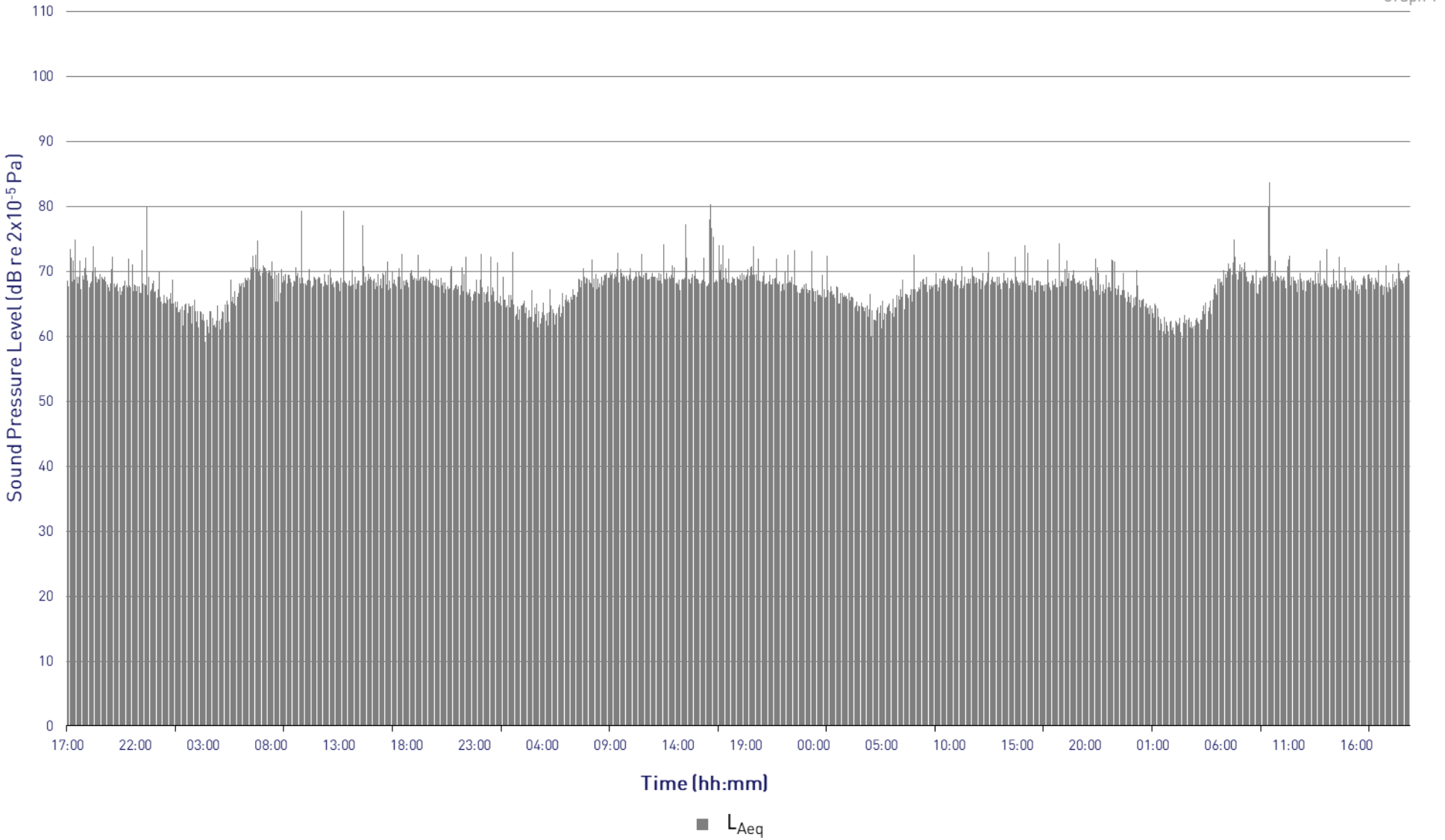
L_{Aeq} Time History

Measurement Position 1 - South West of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 1



100 Avenue Road, London NW3

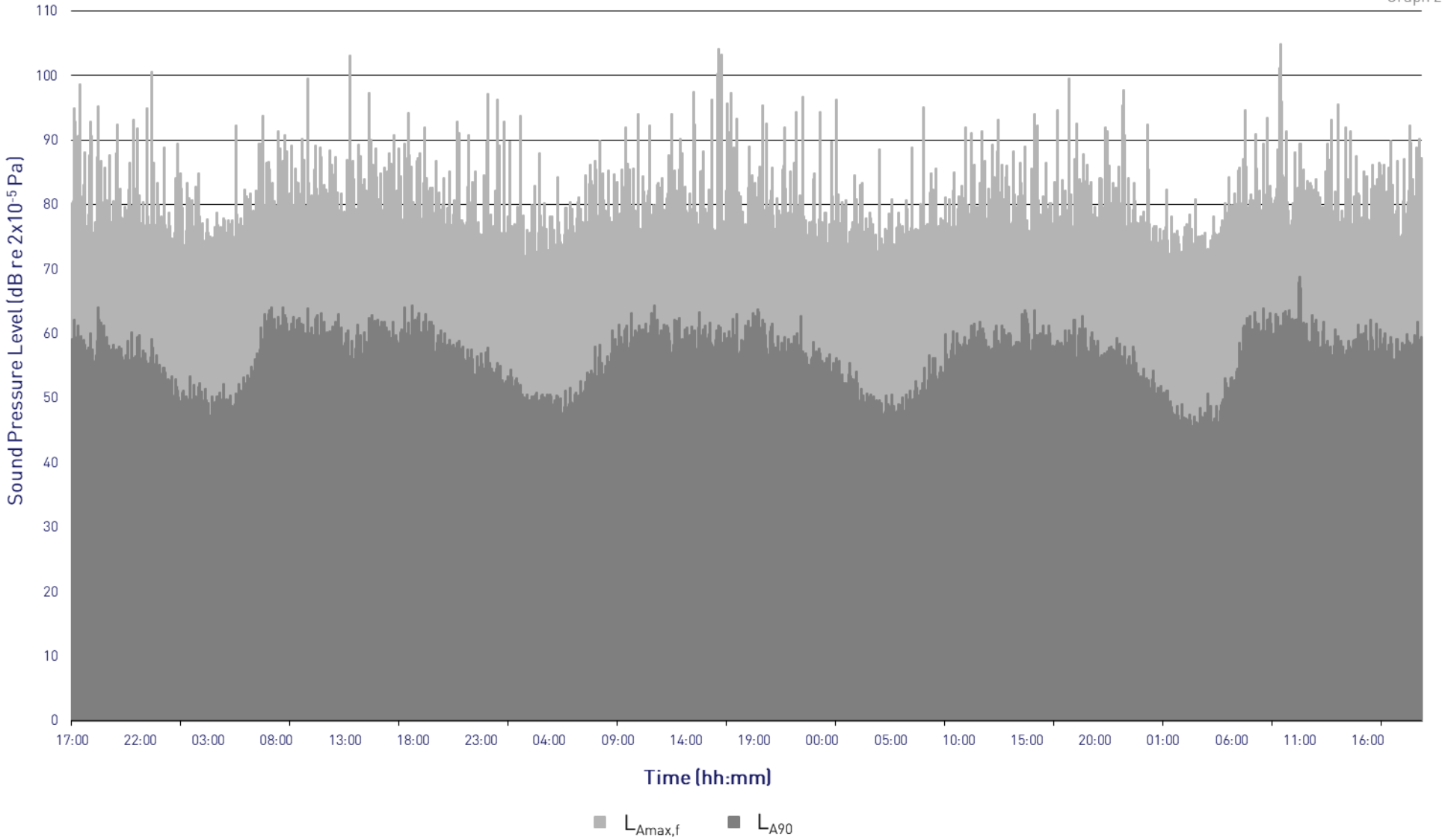
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1 - South West of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 2



100 Avenue Road, London NW3

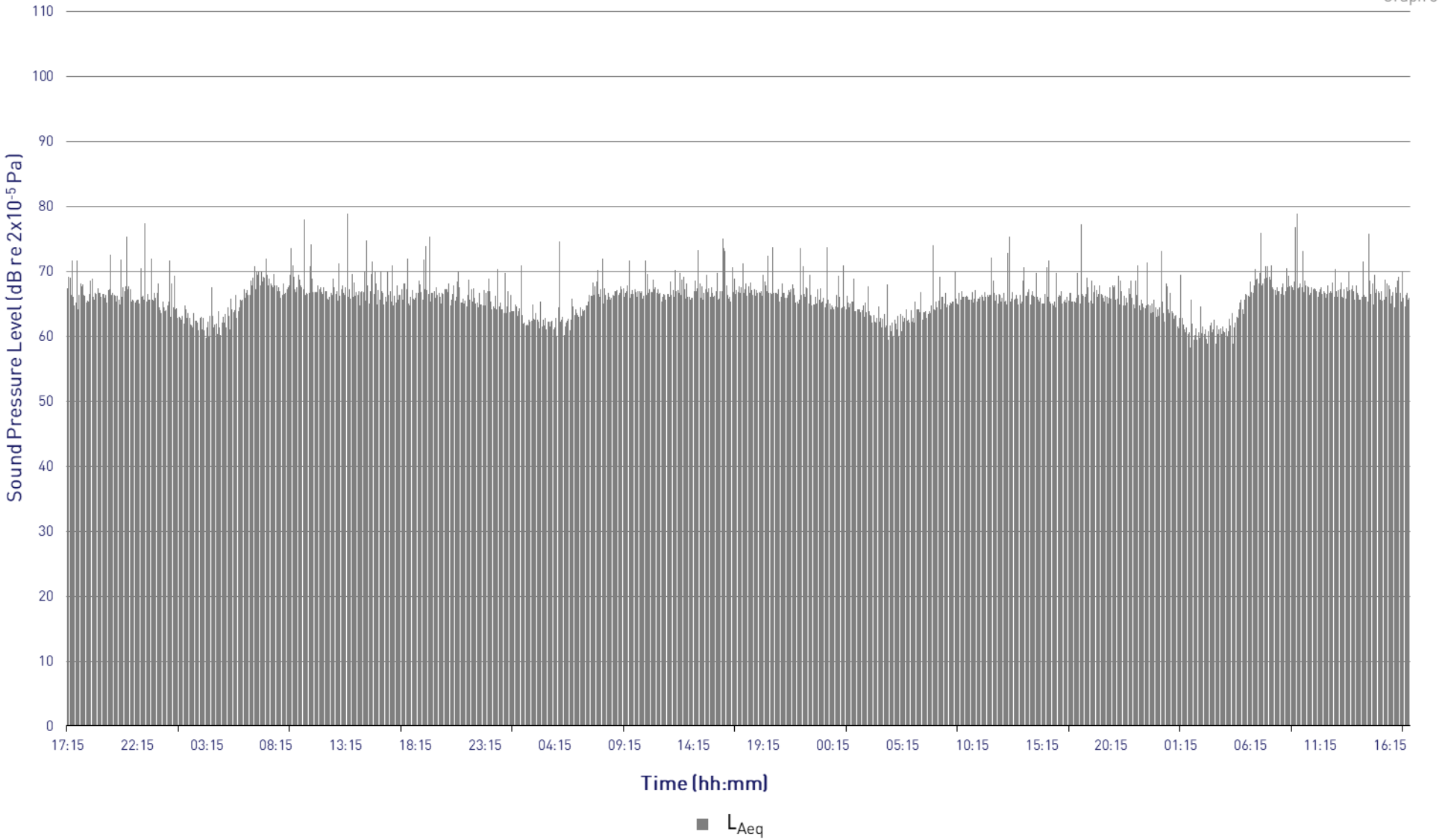
L_{Aeq} Time History

Measurement Position 2 - North West of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 3



100 Avenue Road, London NW3

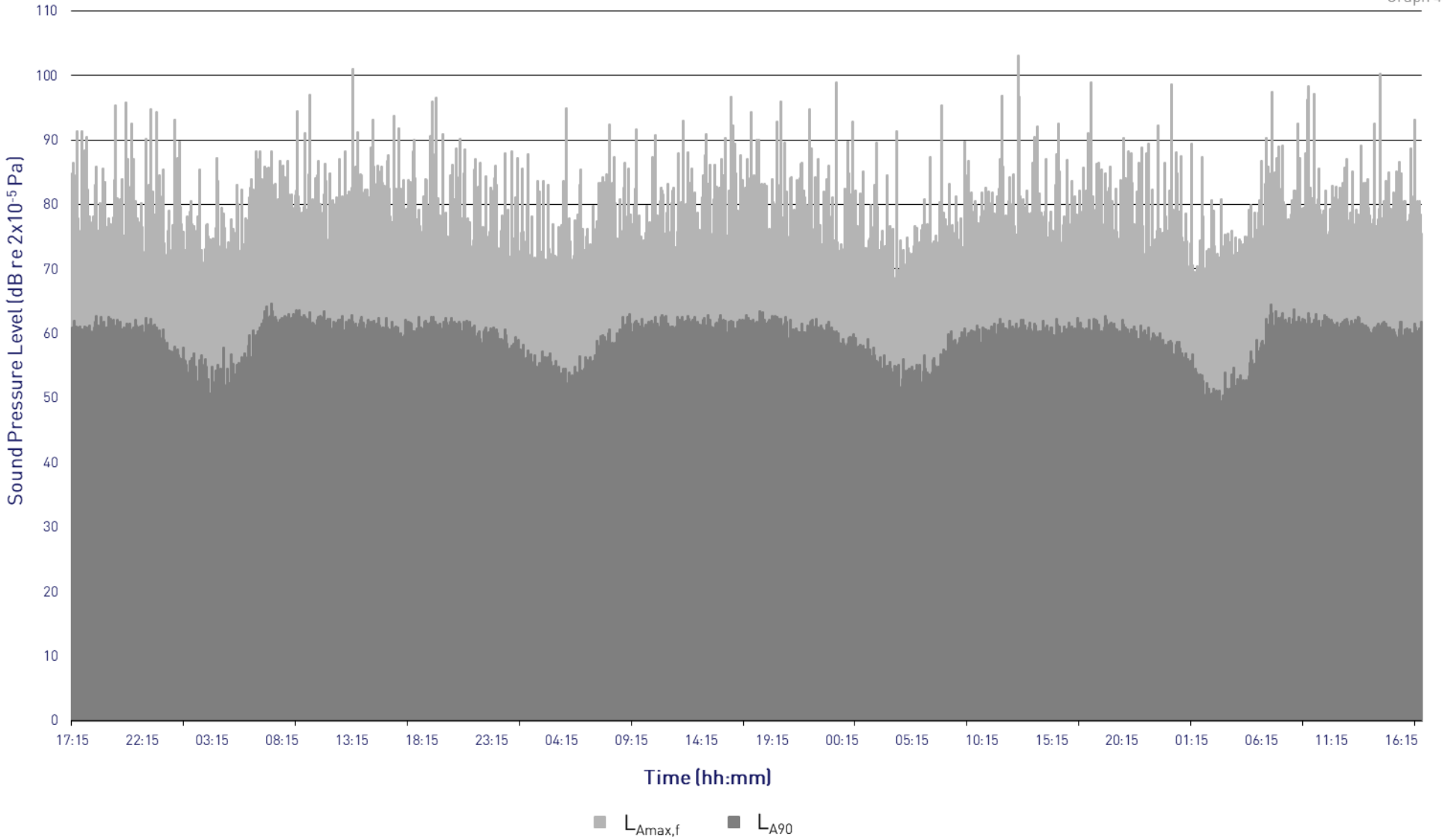
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 2 - North West of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 4



100 Avenue Road, London NW3

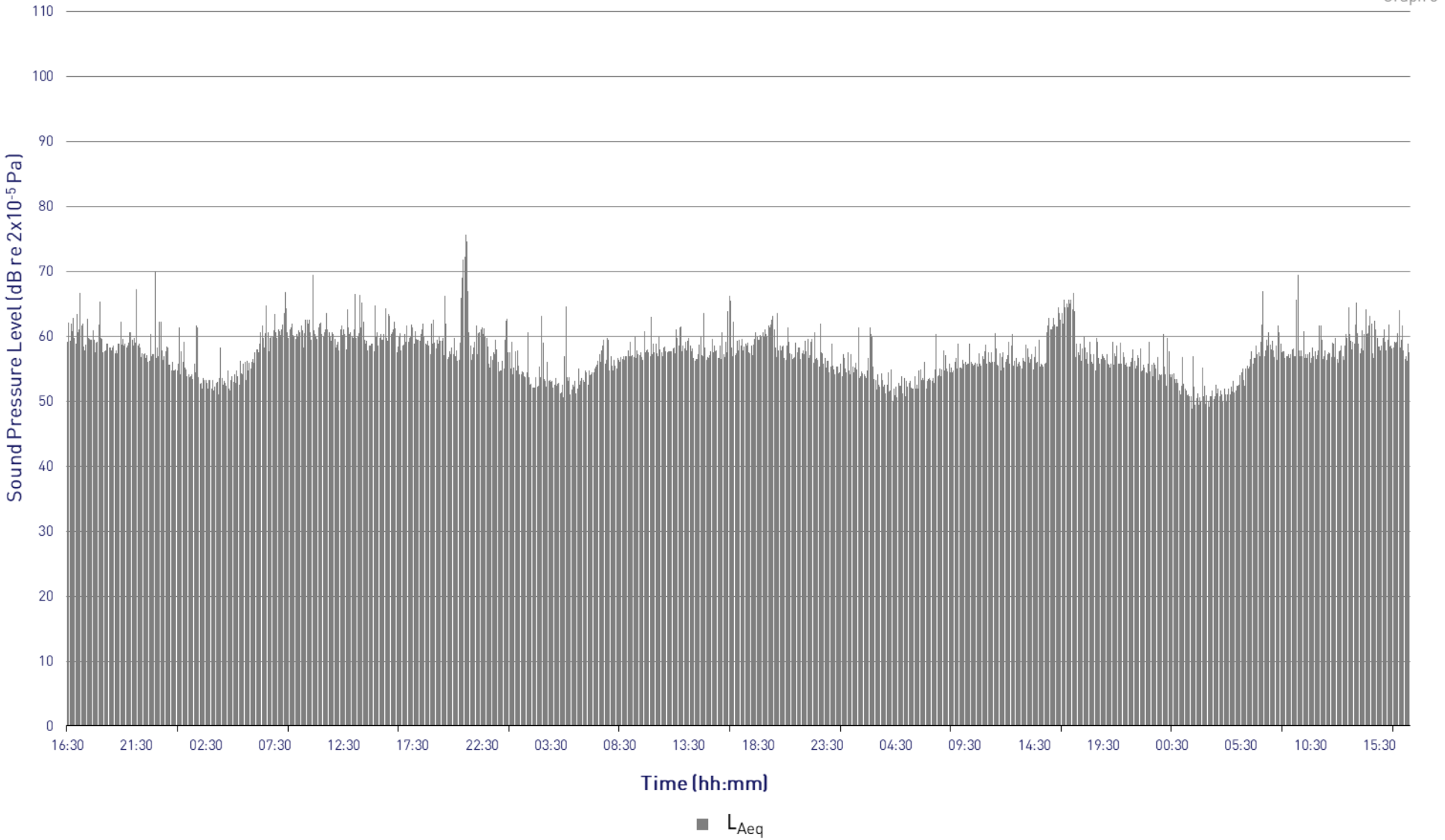
L_{Aeq} Time History

Measurement Position 3 - North East of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 5



100 Avenue Road, London NW3

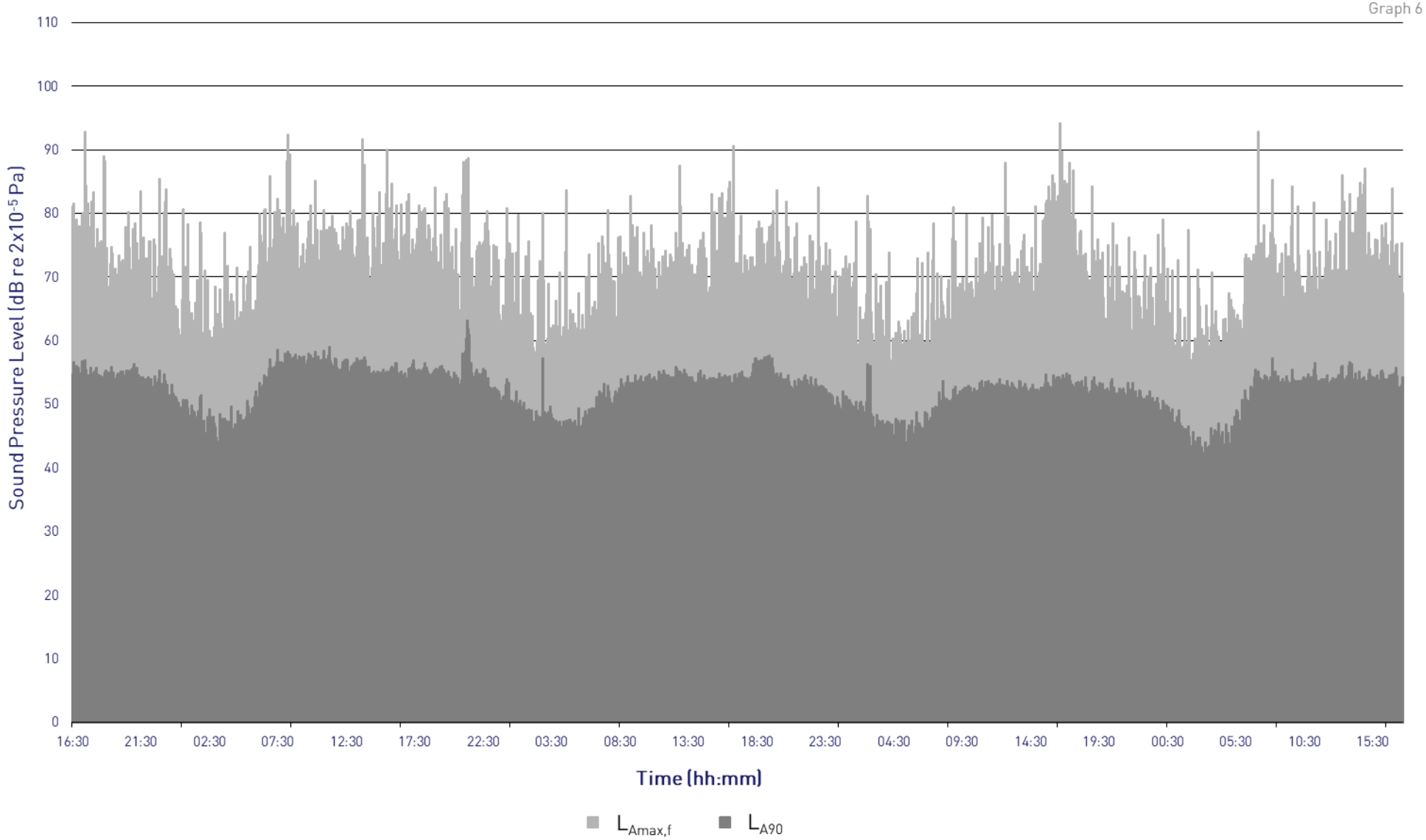
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 3 - North East of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 6



100 Avenue Road, London NW3

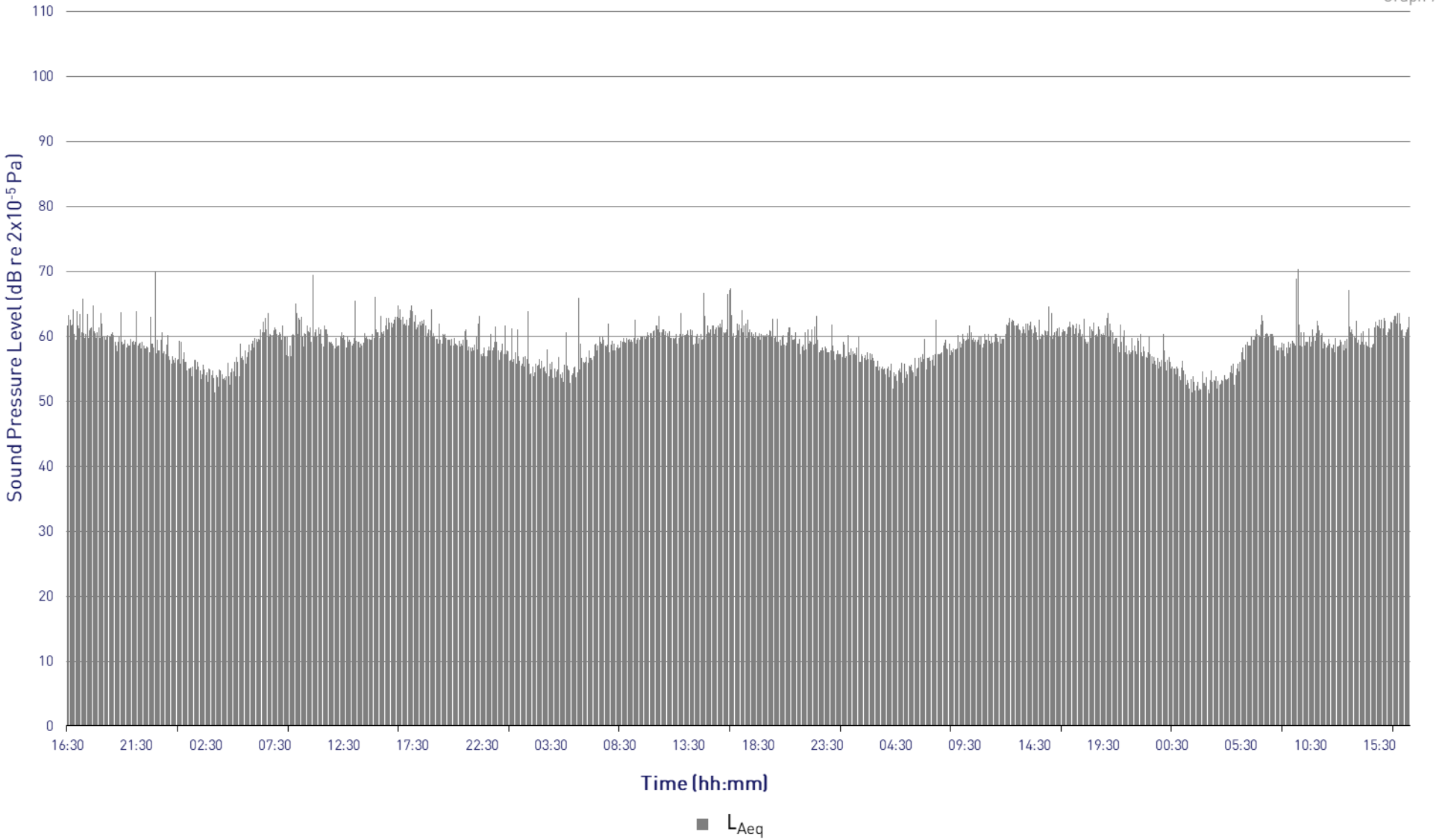
L_{Aeq} Time History

Measurement Position 4 - South East of Site, Thursday 16th to Monday 20th May 2024

RBA ACOUSTICS

Project: 13308

Graph 7



100 Avenue Road, London NW3

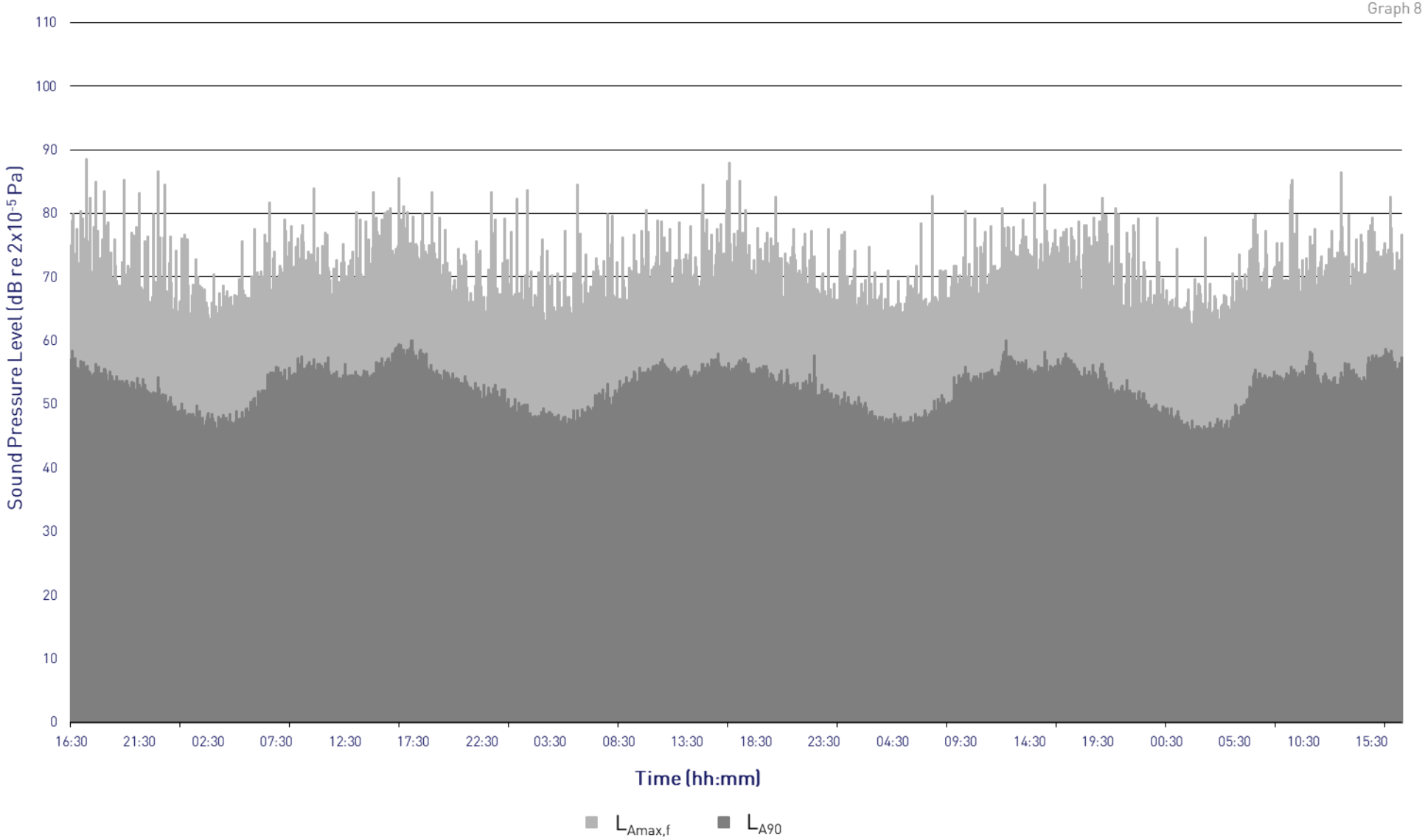
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 4 - South East of Site, Thursday 16th to Monday 20th May 2024

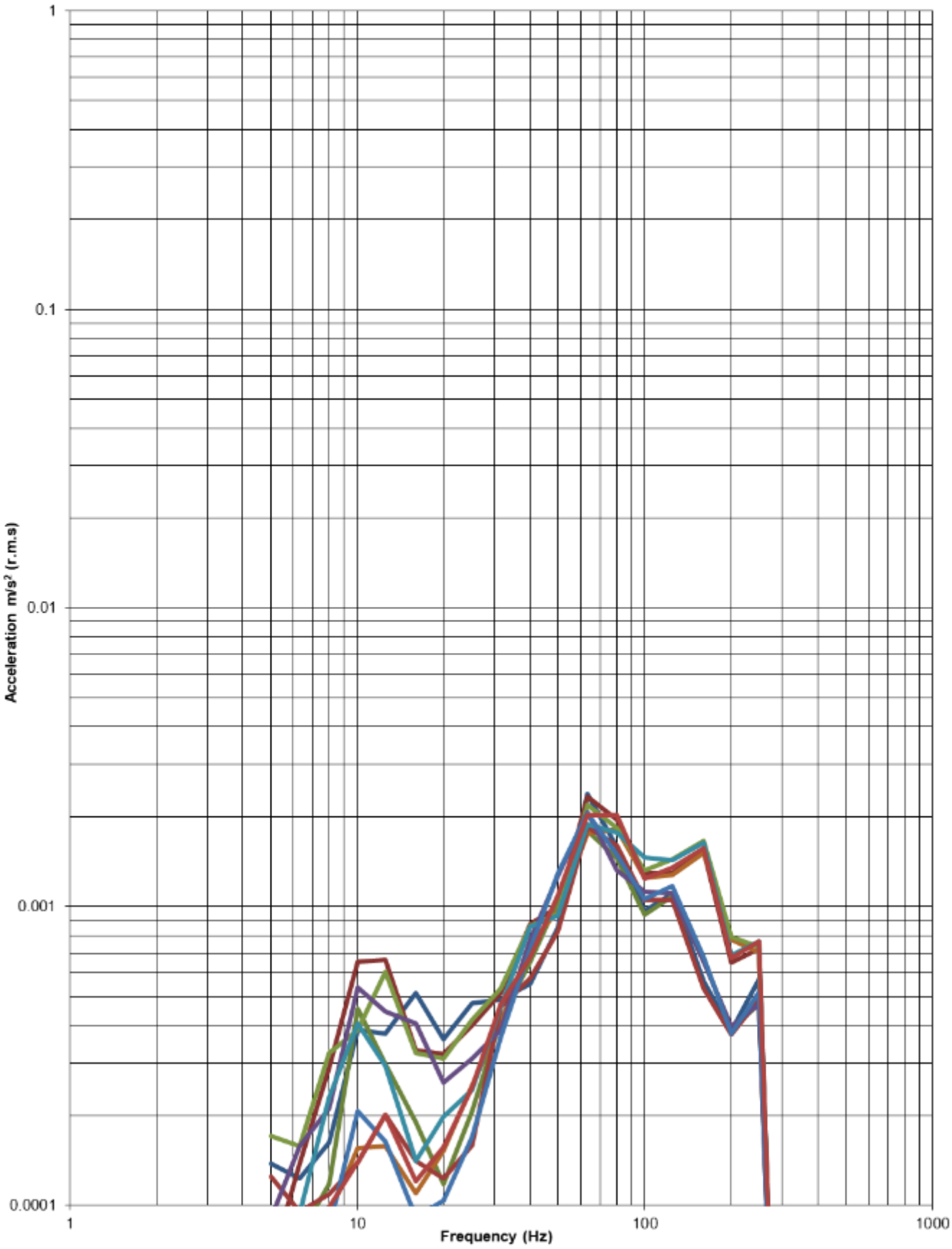
RBA ACOUSTICS

Project: 13308

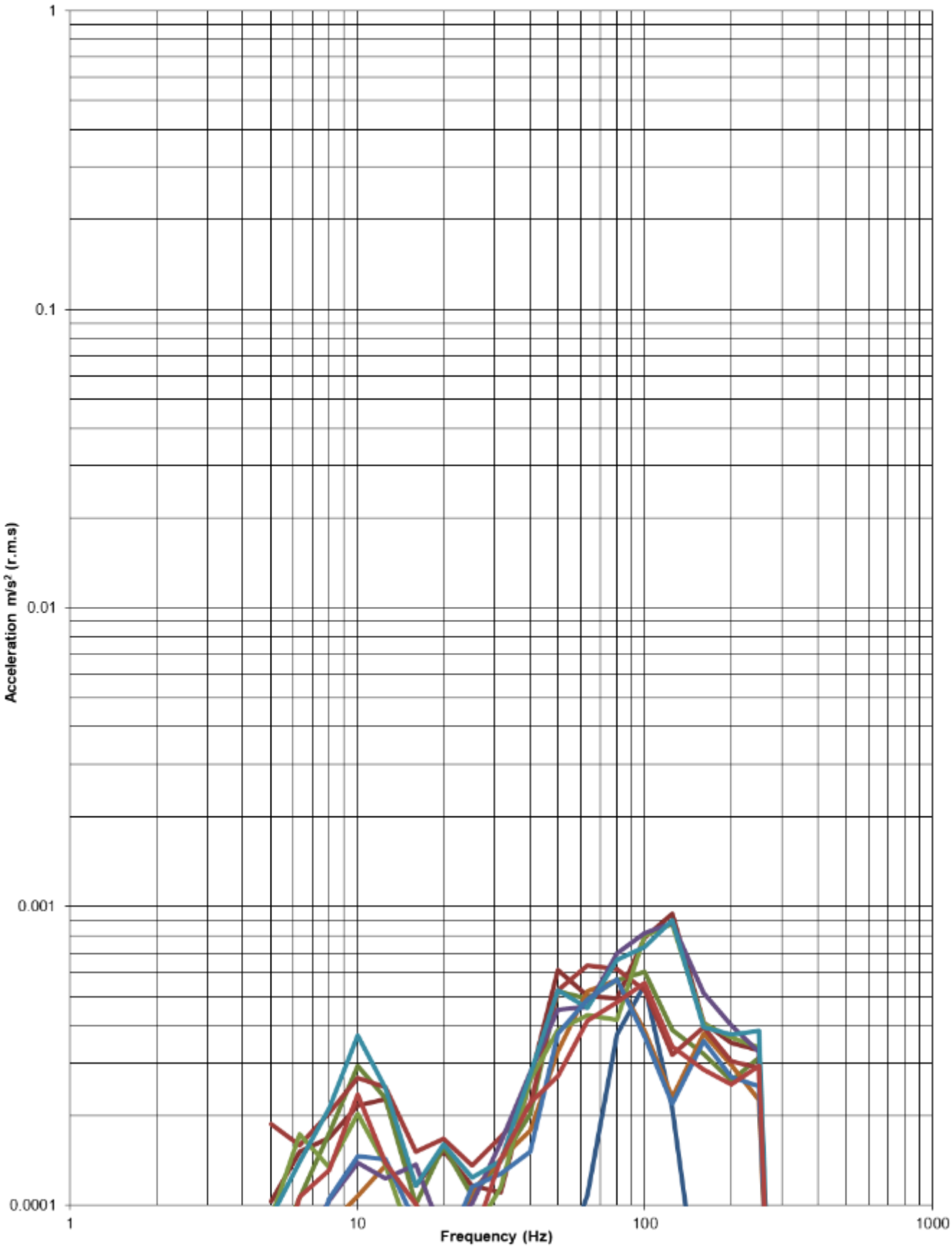
Graph 8



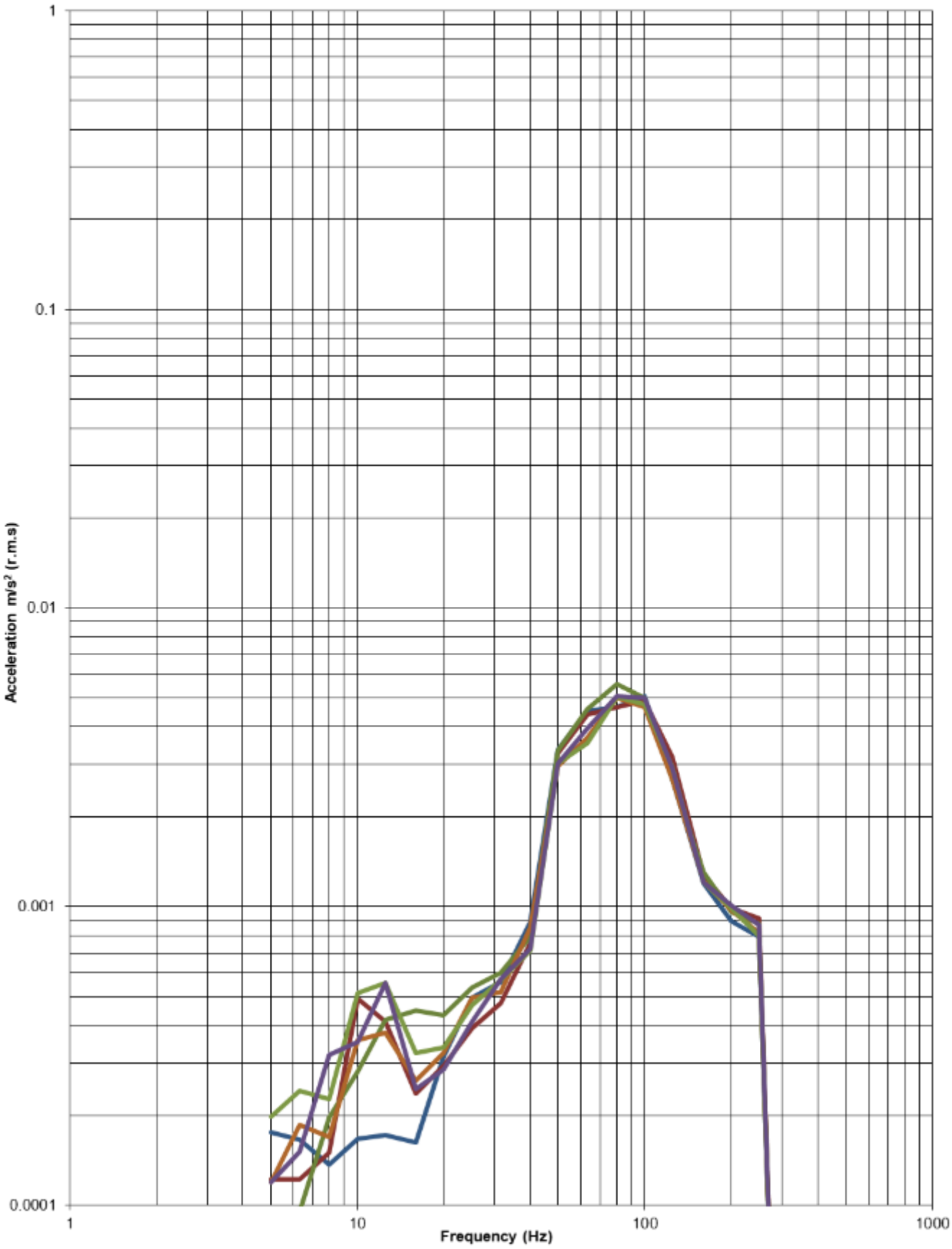
Address: 100 Avenue Road
Position: P1
Vertical Axis



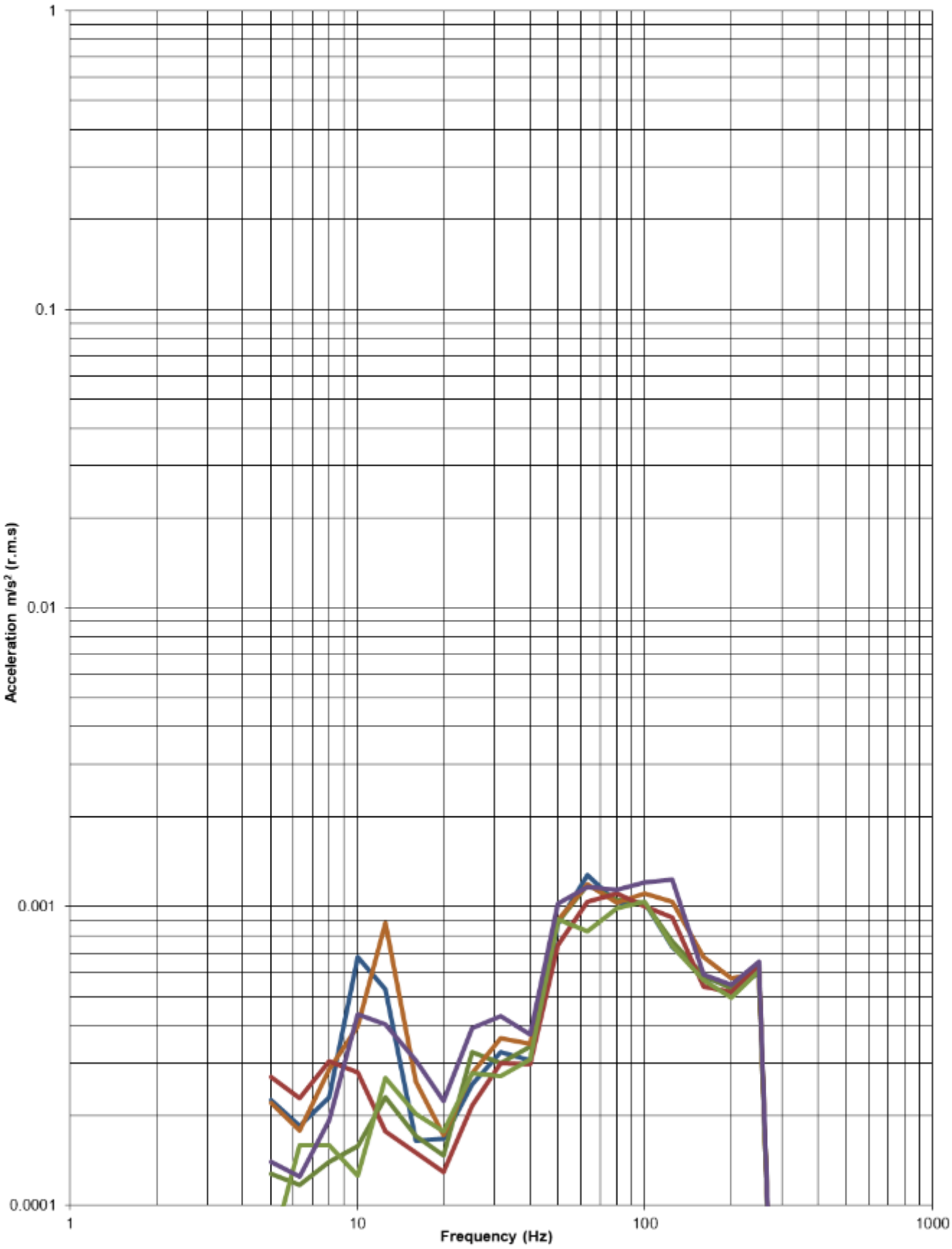
Address: 100 Avenue Road
Position: P2
Vertical Axis



Address: 100 Avenue Road
Position: P3
Vertical Axis

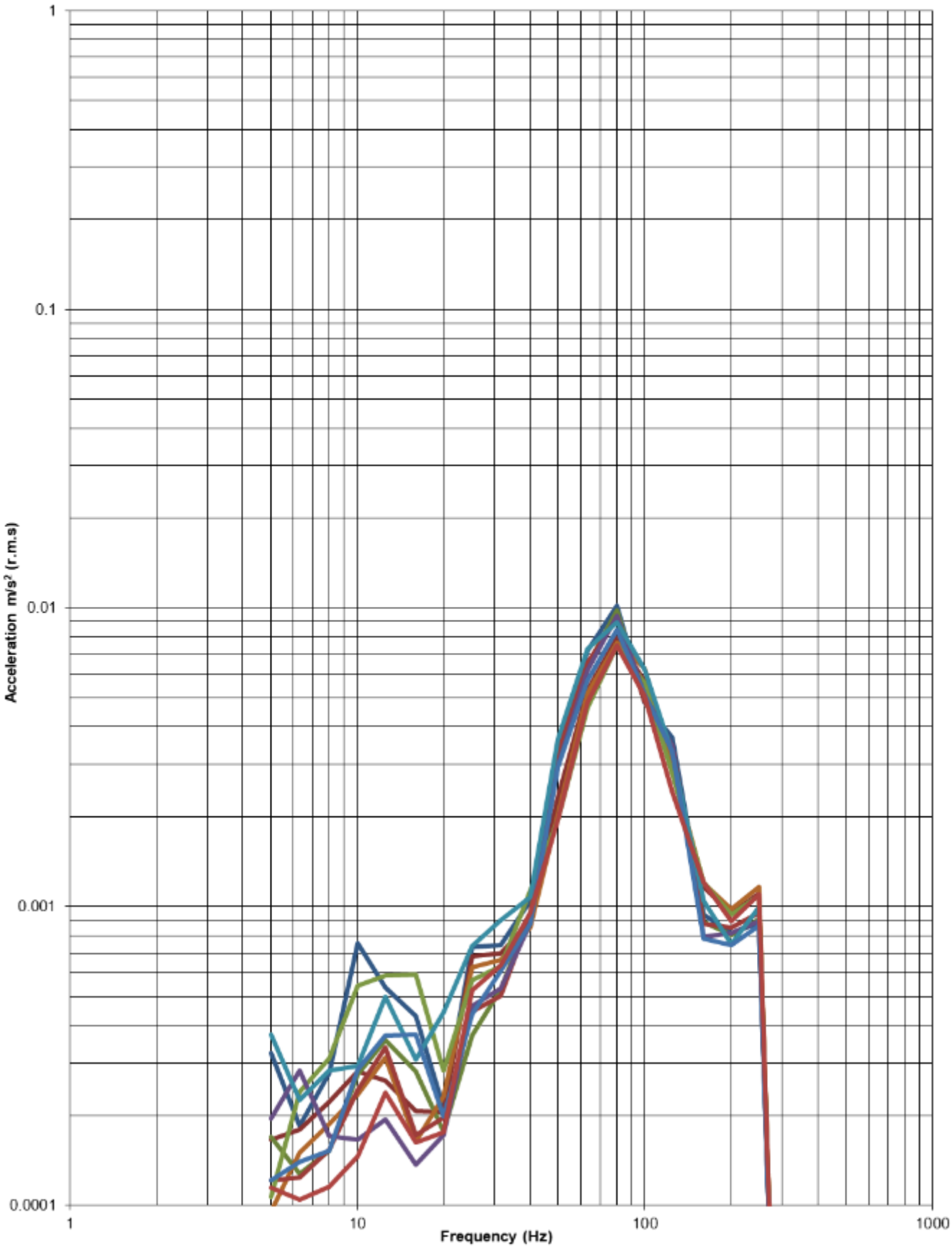


Address: 100 Avenue Road
Position: P4
Vertical Axis

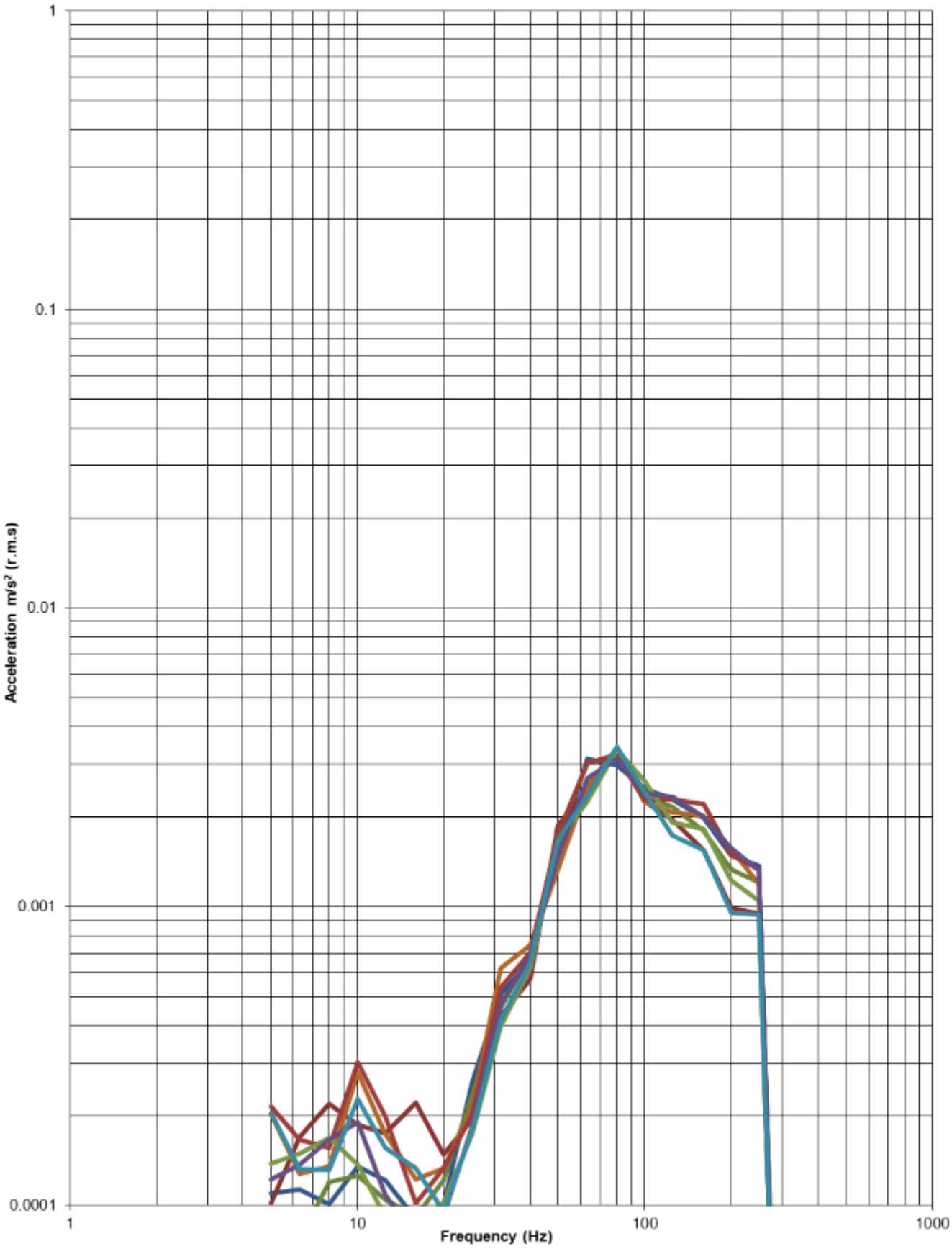


Address: 100 Avenue Road
Position: P5
Vertical Axis

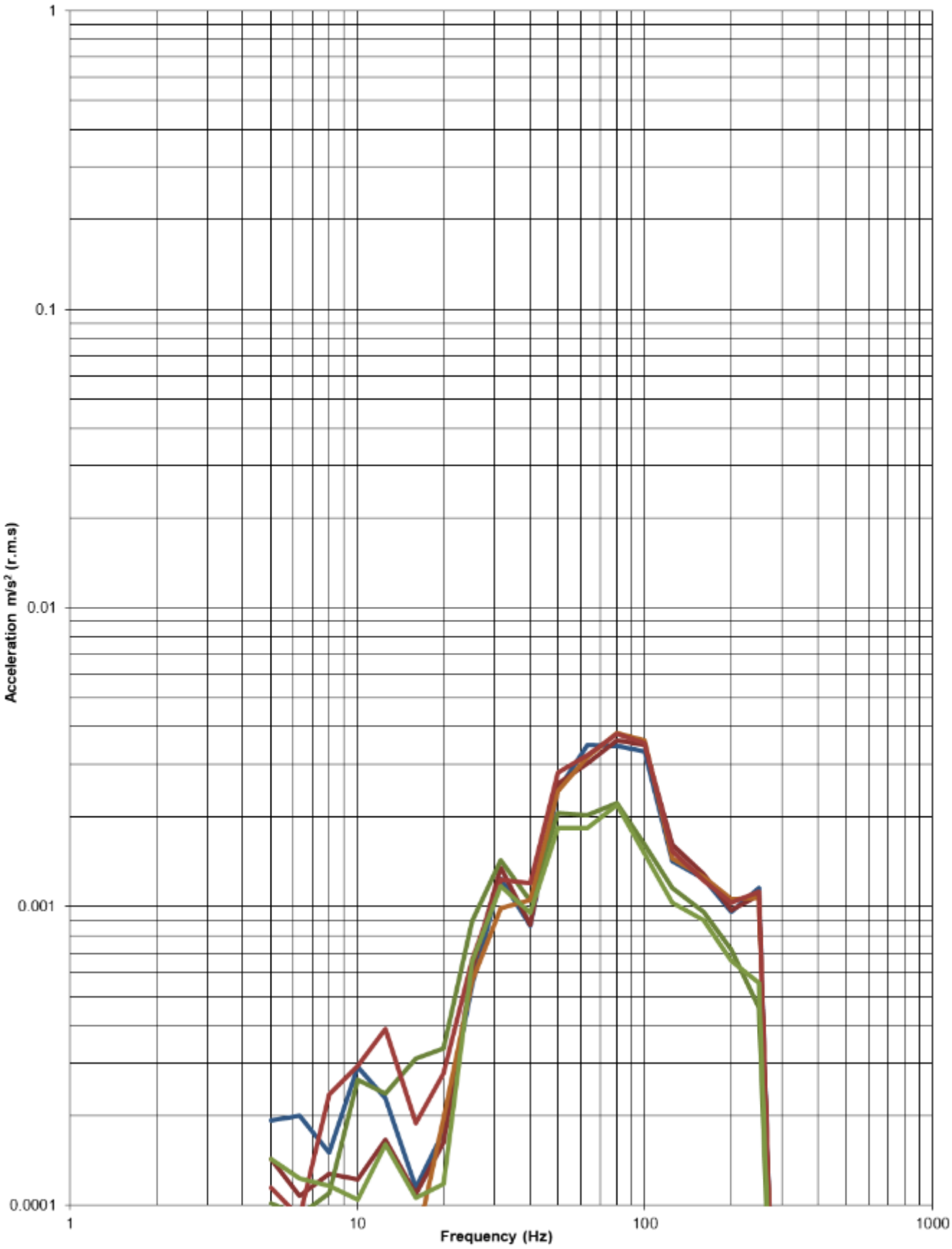
RBA ACOUSTICS



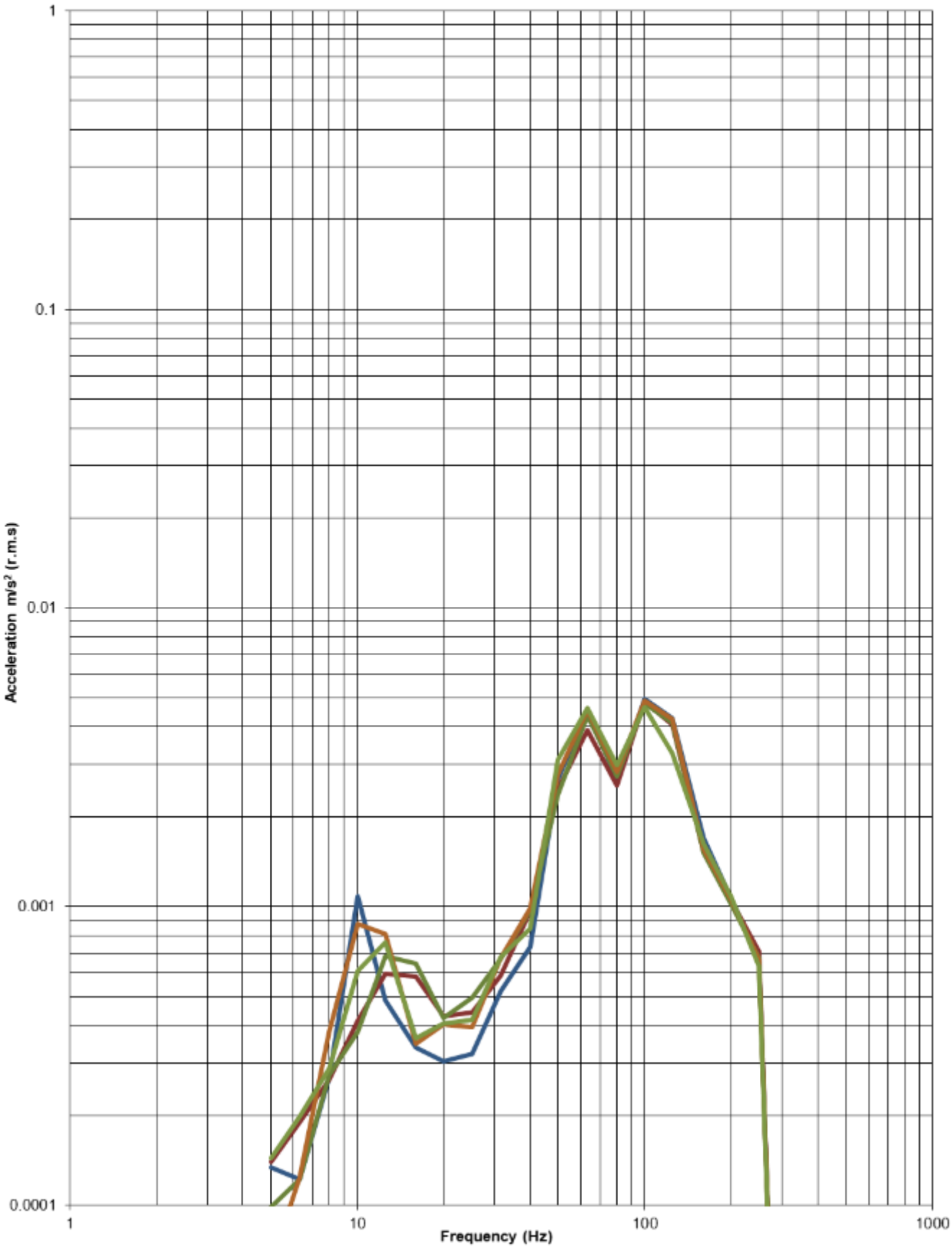
Address: 100 Avenue Road
Position: P6
Vertical Axis



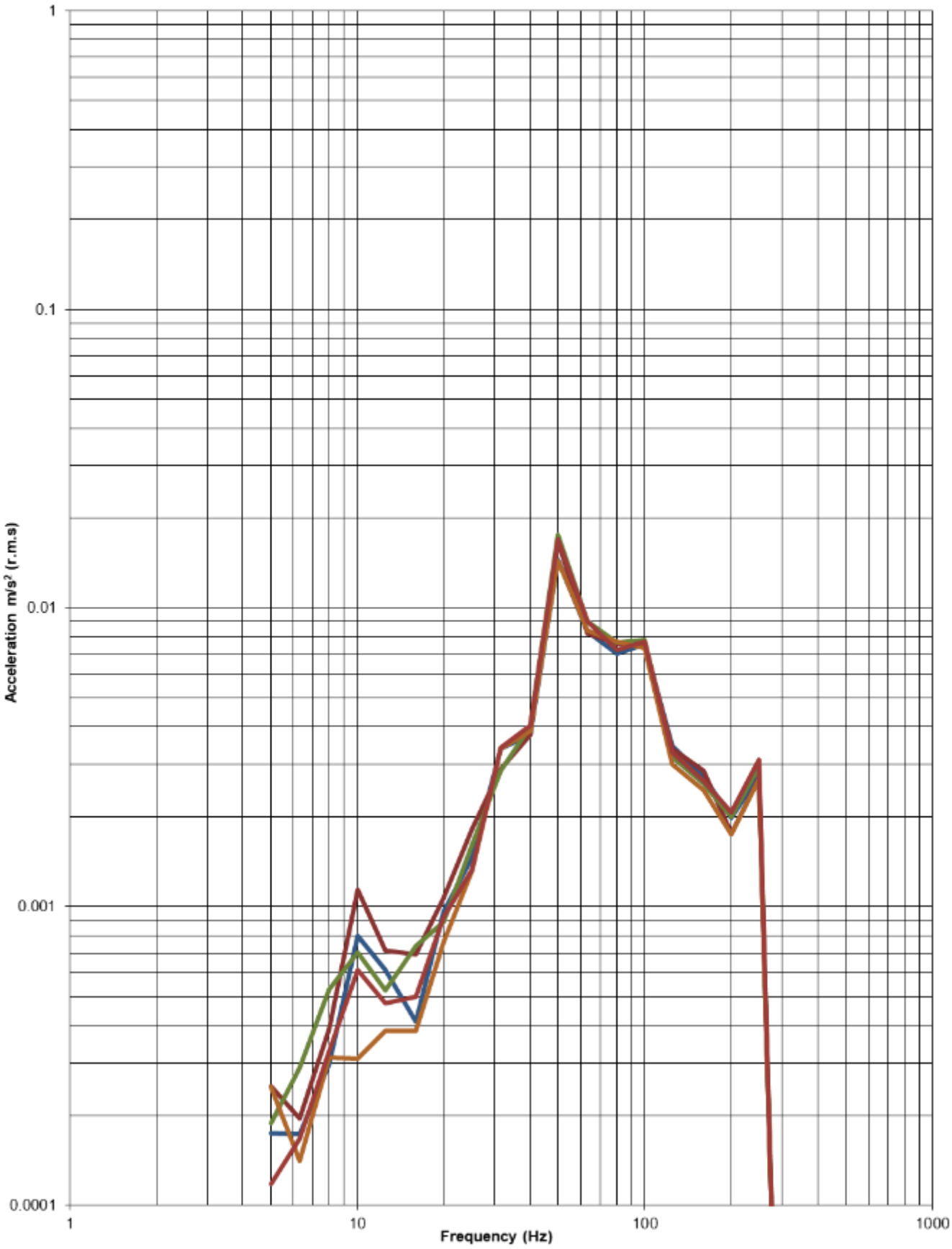
Address: 100 Avenue Road
Position: P7
Vertical Axis



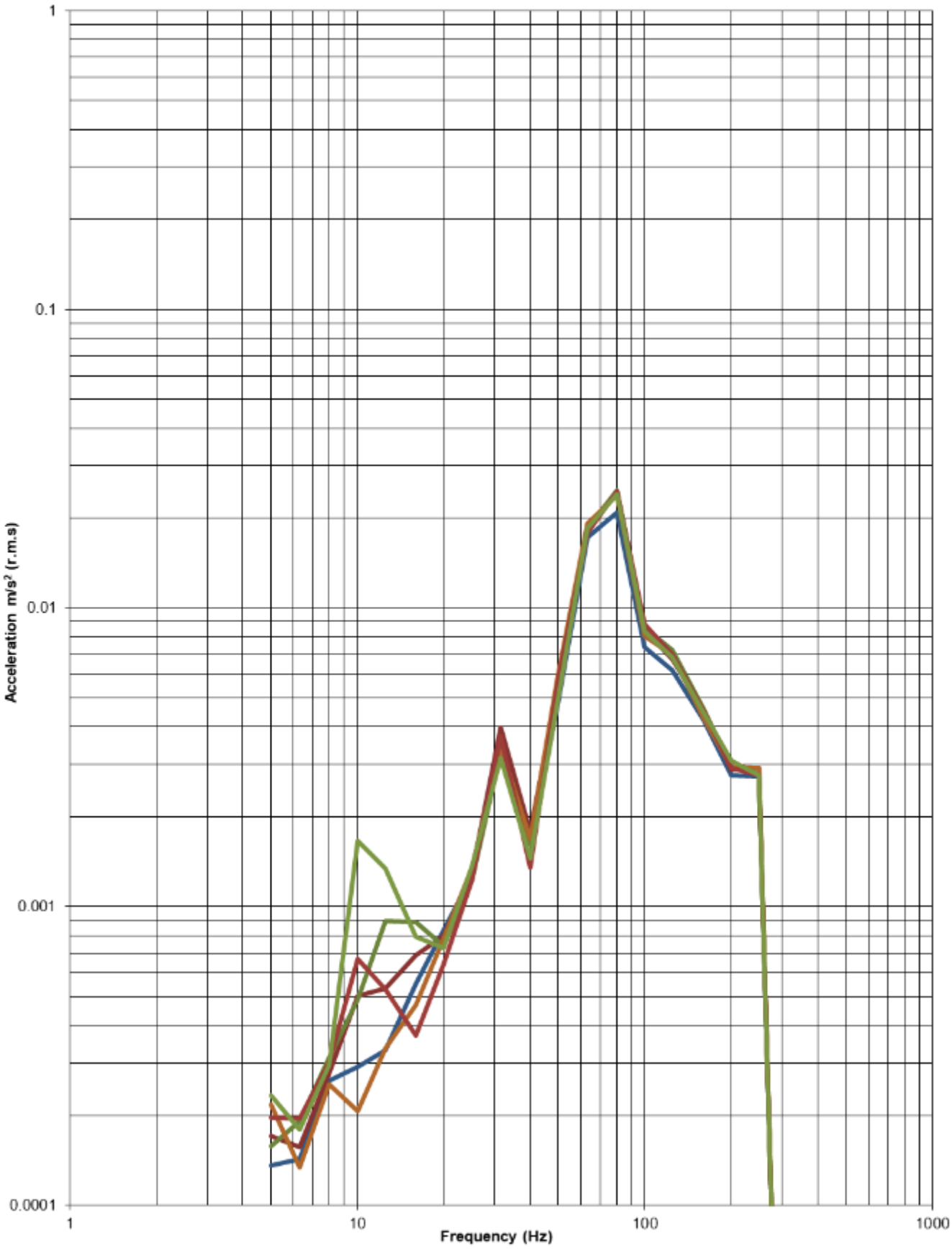
Address: 100 Avenue Road
Position: P8
Vertical Axis

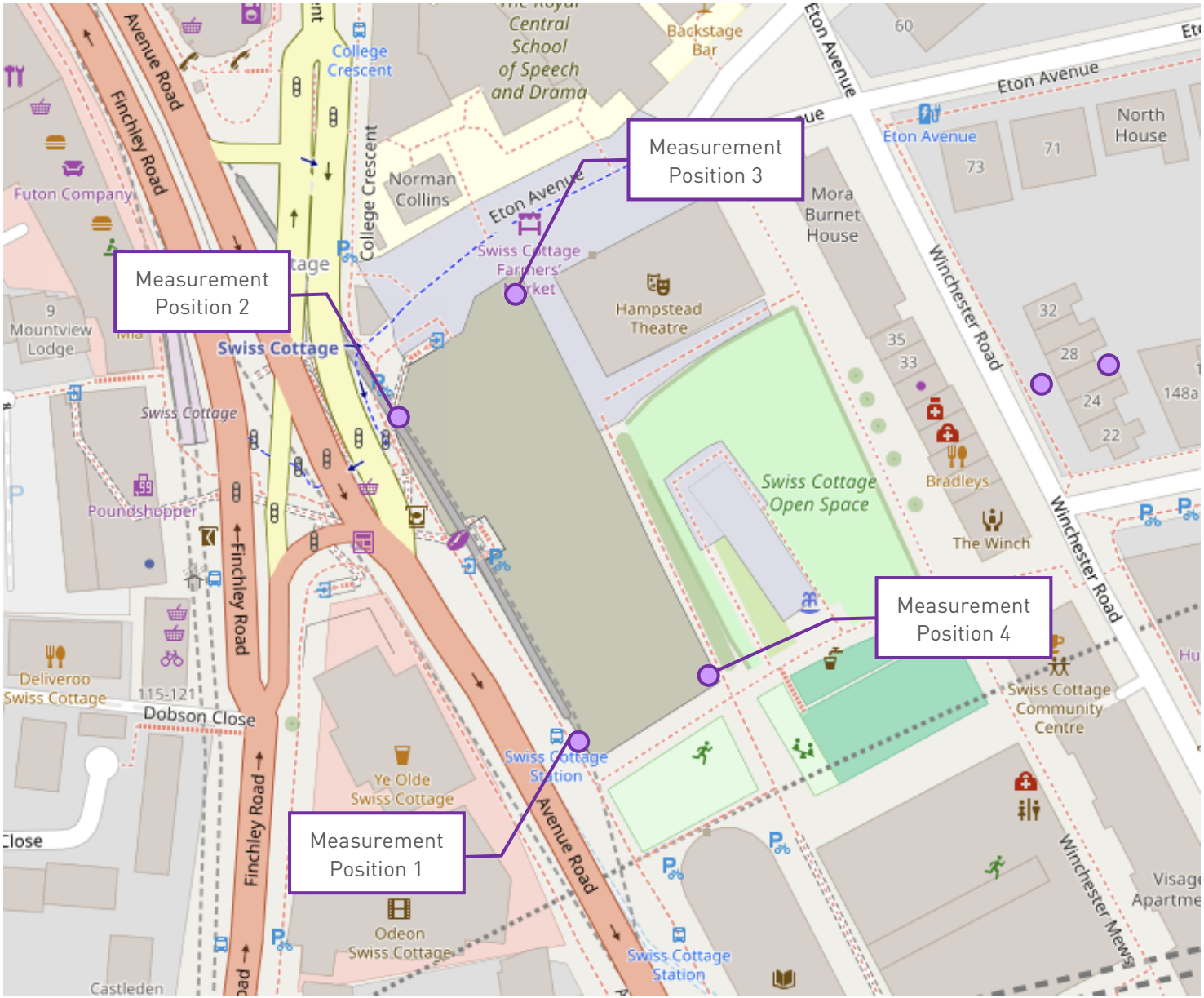


Address: 100 Avenue Road
Position: P9
Vertical Axis



Address: 100 Avenue Road
Position: P10
Vertical Axis





100 Avenue Road, London NW3

Site Layout & Nearest Noise-Sensitive Receptors

Project 13308

Figure 1

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Photograph Showing Measurement Position 1

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Figure 2

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Photograph Showing Measurement Position 2

Project 13308

Figure 3

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Photograph Showing Measurement Position 3

Project 13308

Figure 4

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Photograph Showing Measurement Position 4

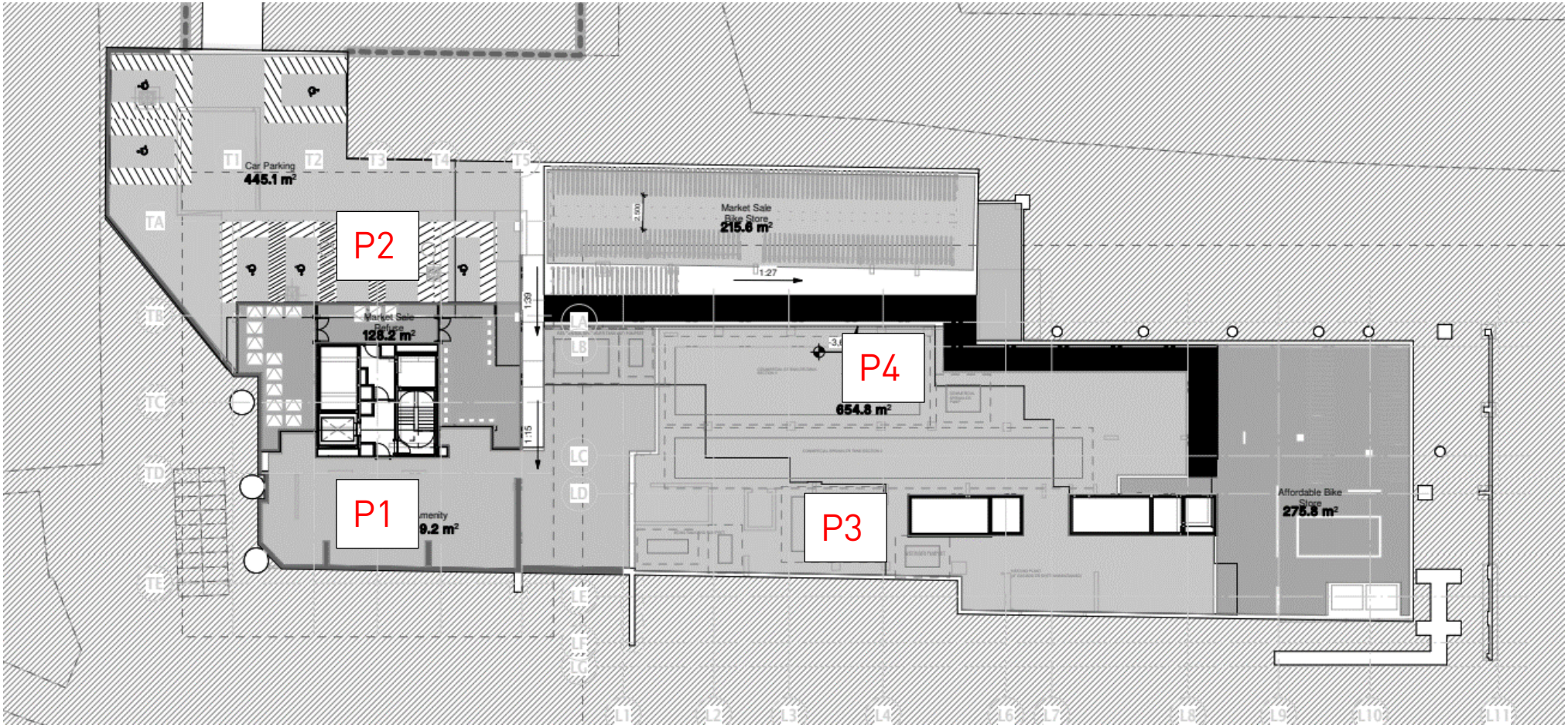
Project 13308

Figure 5

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Basement Plan Indicating Vibration Measurement Locations

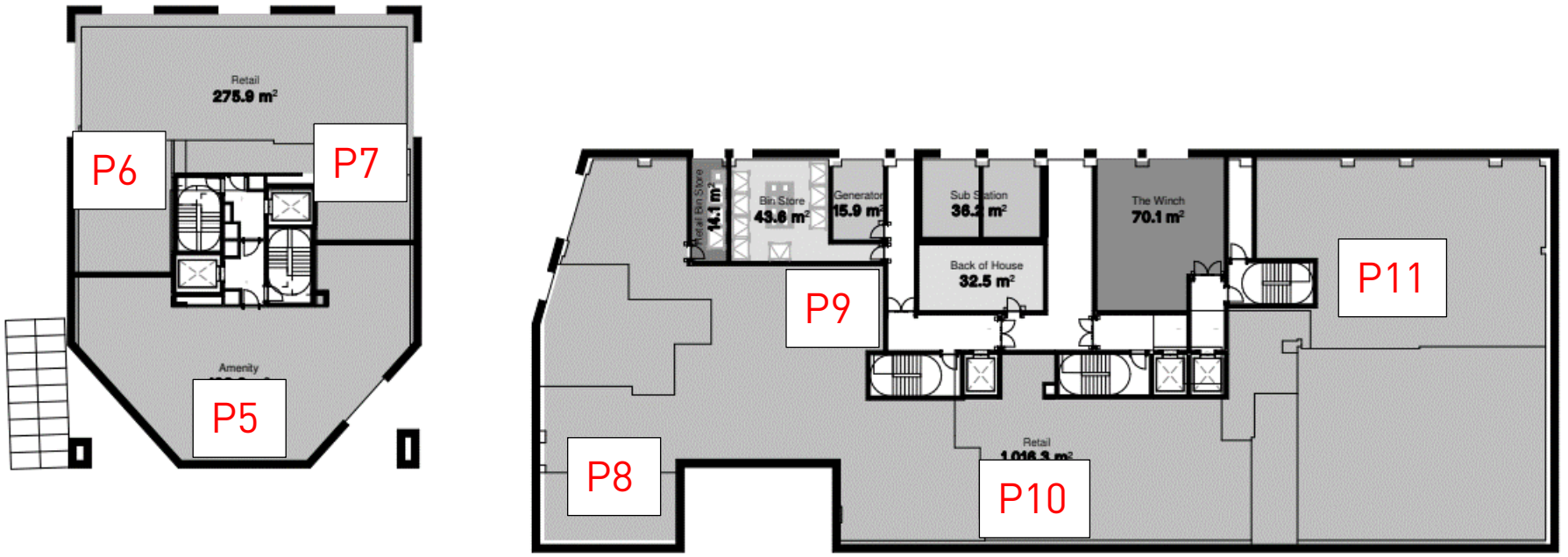
Project 13308

Figure 6

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Ground Floor Plan Indicating Vibration Measurement Locations

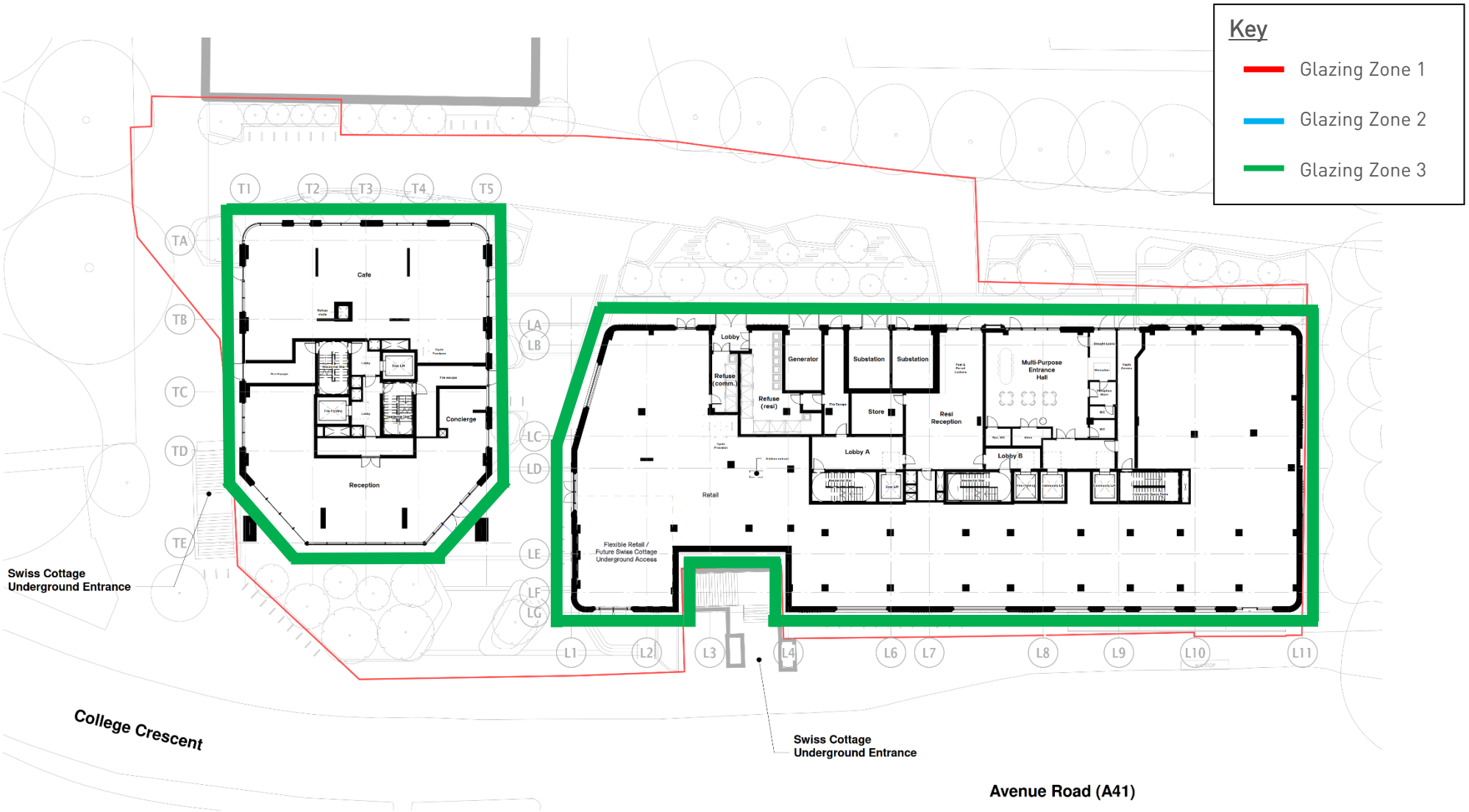
Project 13308

Figure 7

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Façade Zoning Plan – Ground Floor

Project 13308

Figure 8

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Façade Zoning Plan – First Floor

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Figure 9

6 February 2025

Not to Scale

RBA ACOUSTICS

100 Avenue Road, London NW3

Façade Zoning Plan – Second Floor

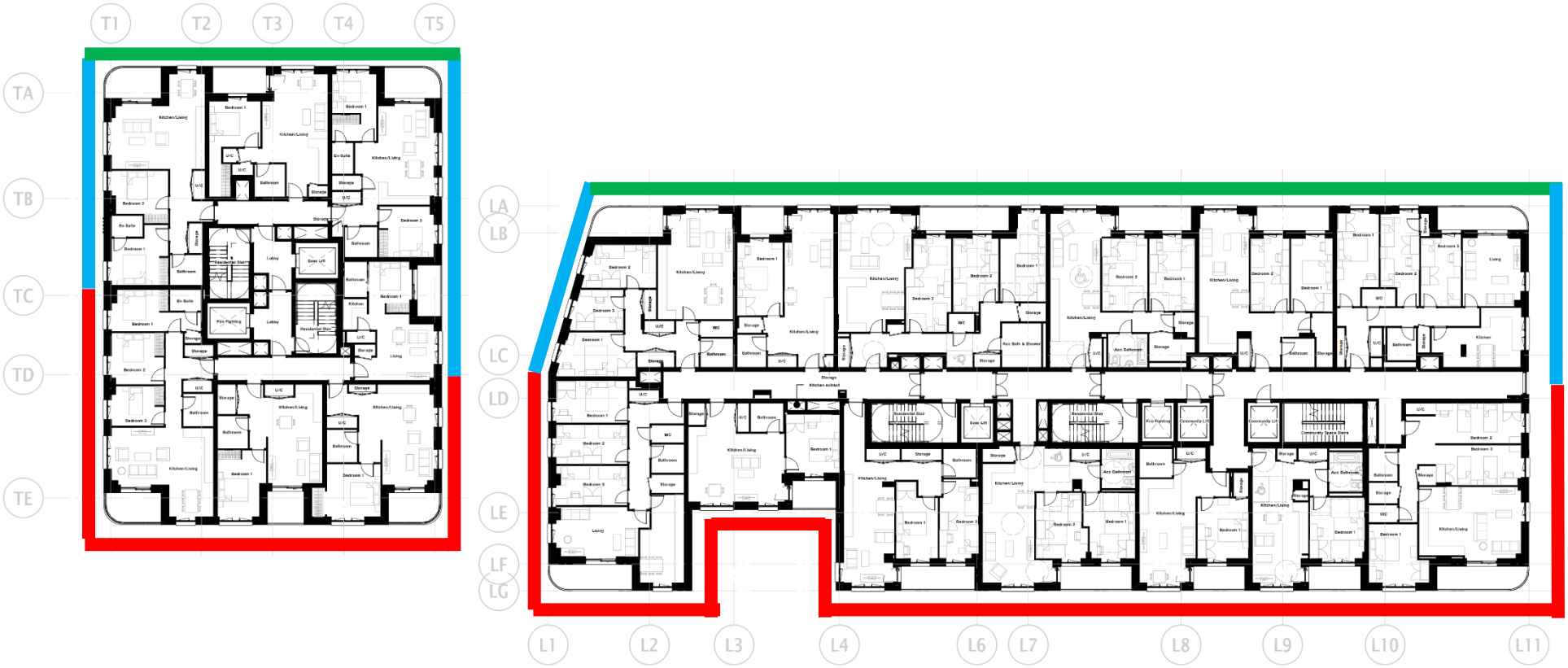
Project 13308

Figure 10

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Façade Zoning Plan – Third Floor

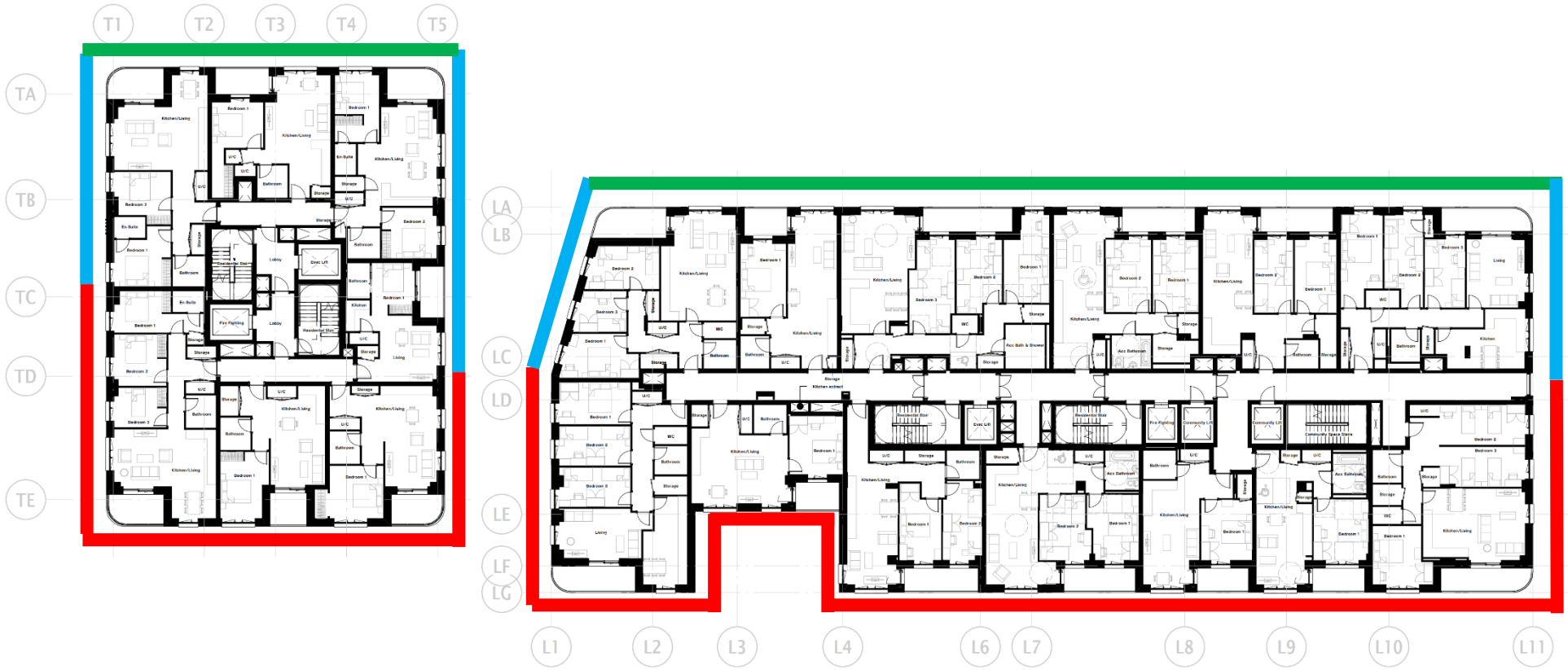
Project 13308

Figure 11

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Façade Zoning Plan – Fourth Floor

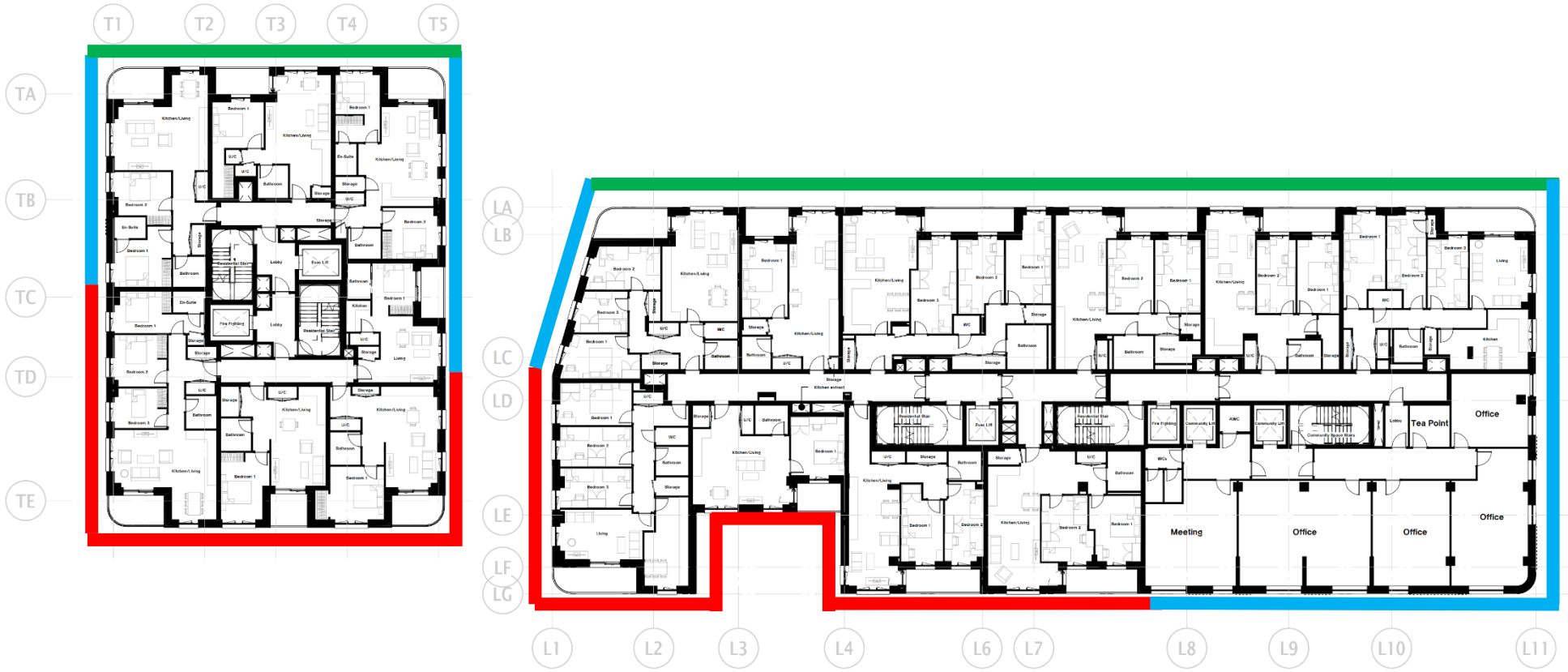
Project 13308

Figure 12

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Façade Zoning Plan – Fifth Floor

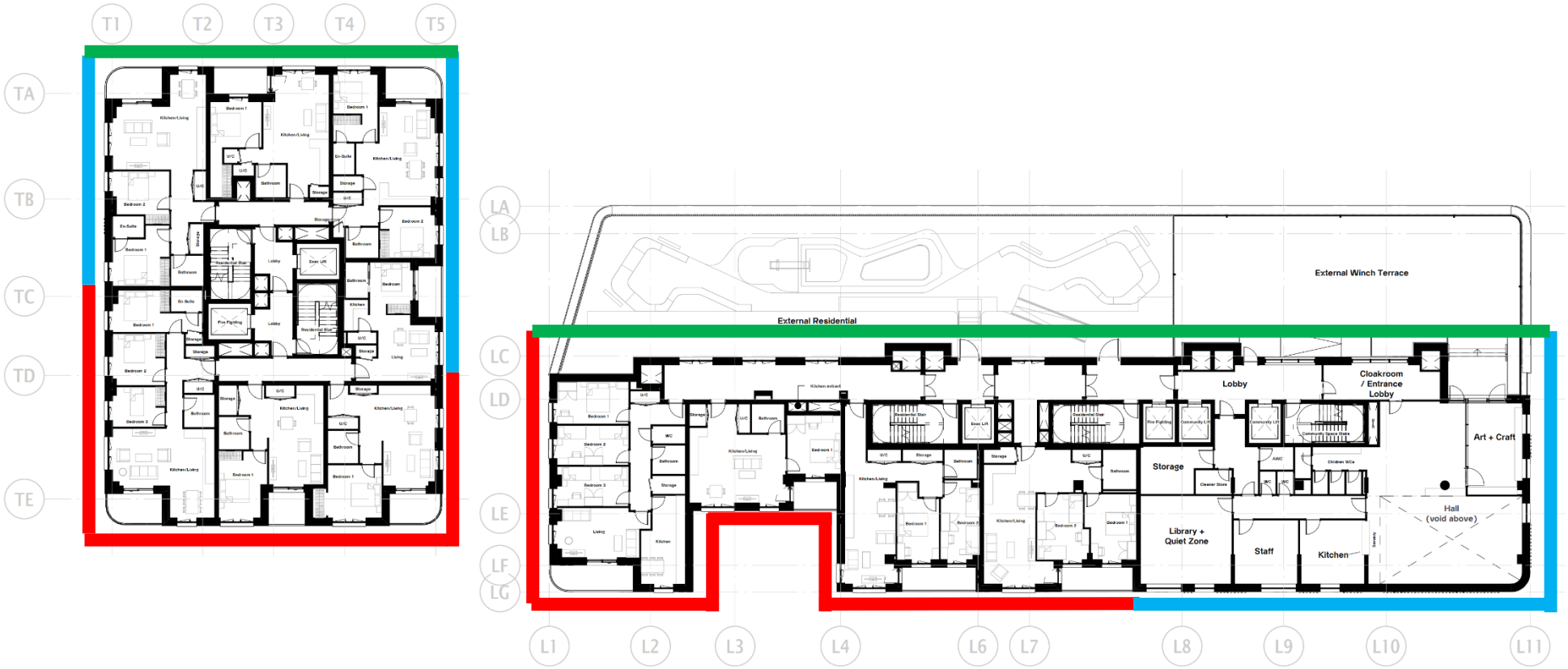
Project 13308

Figure 13

6 February 2025

Not to Scale

RBA ACOUSTICS



100 Avenue Road, London NW3

Façade Zoning Plan – Sixth Floor

Project 13308

Figure 14

6 February 2025

Not to Scale

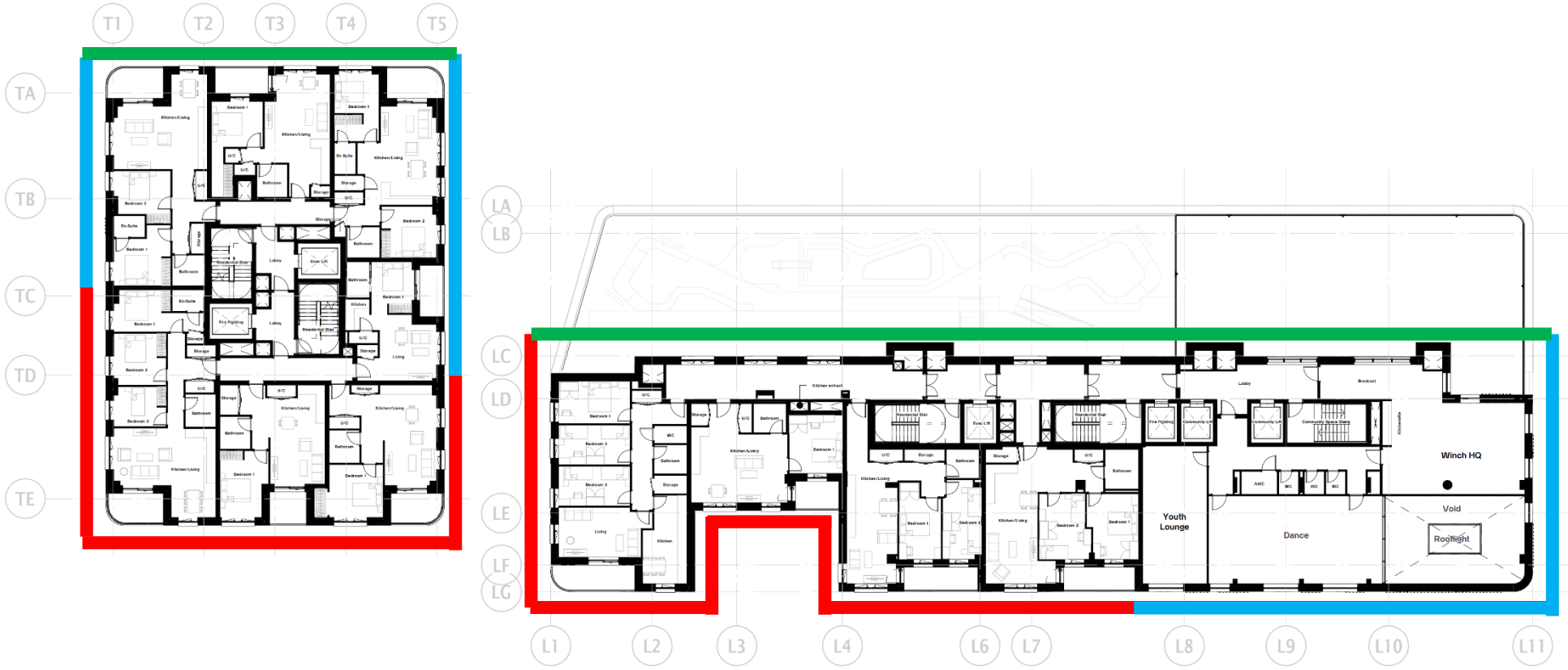
RBA ACOUSTICS

Key

Glazing Zone 1

Glazing Zone 2

Glazing Zone 3



100 Avenue Road, London NW3

Façade Zoning Plan – Seventh Floor

Project 13308

Figure 15

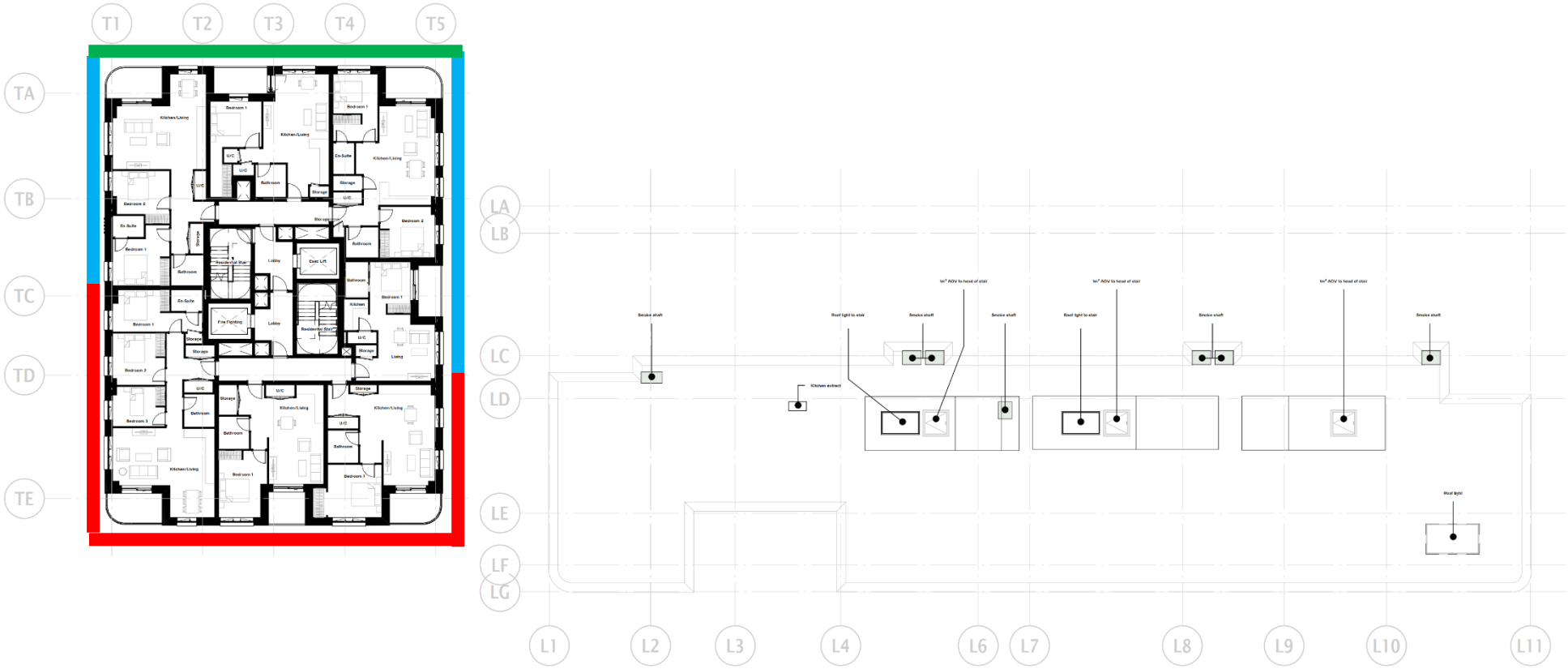
6 February 2025

Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3



100 Avenue Road, London NW3

Façade Zoning Plan – Eighth Floor

Project 13308

Figure 16

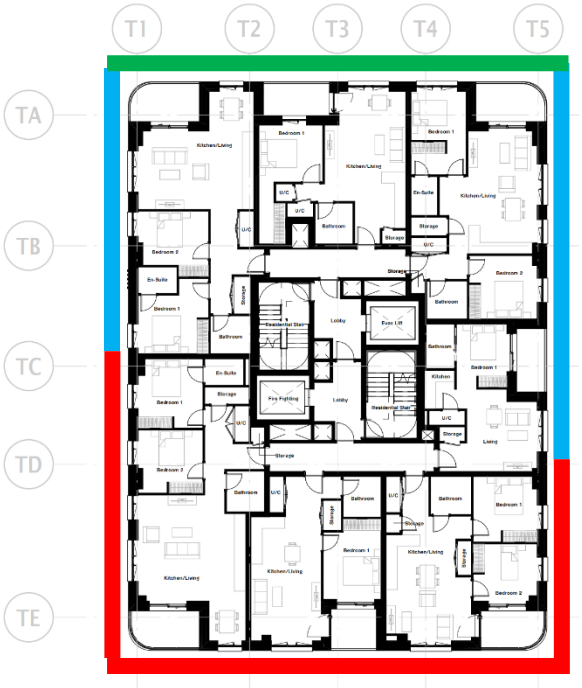
6 February 2025

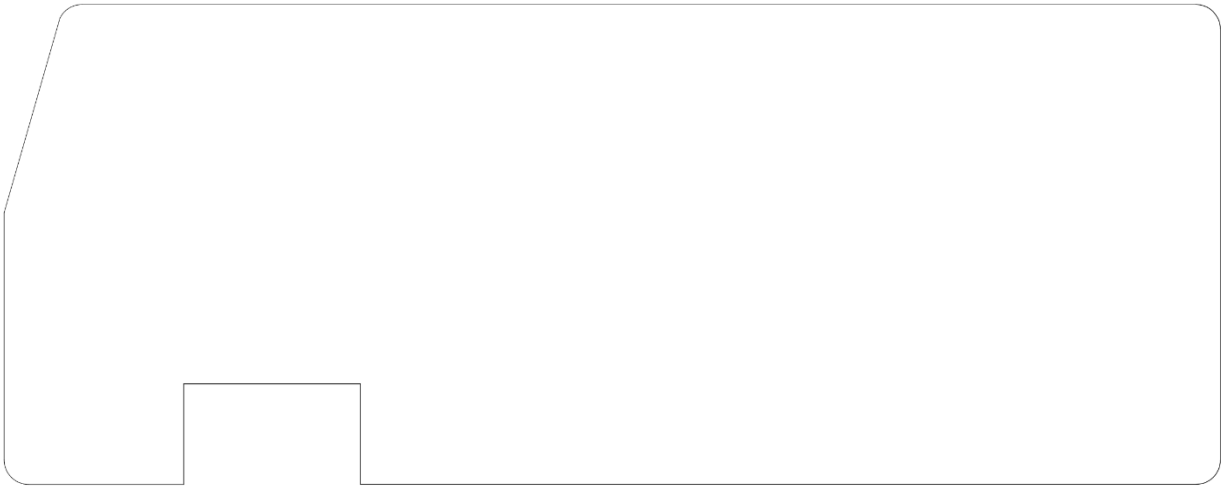
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Ninth Floor

Project 13308

Figure 17

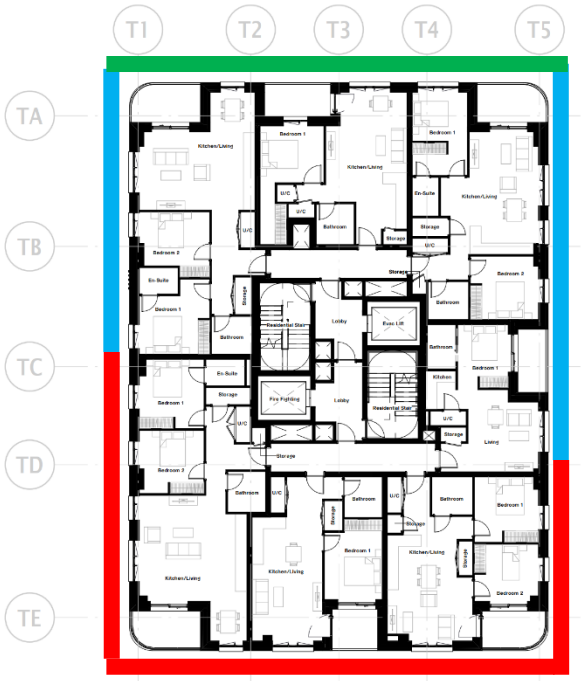
6 February 2025

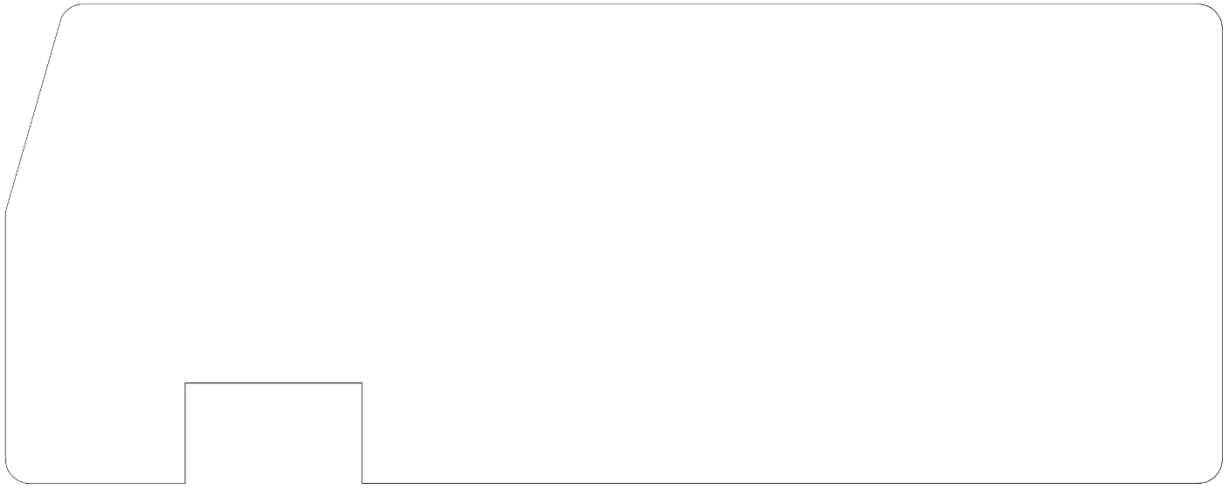
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Tenth Floor

Project 13308

Figure 18

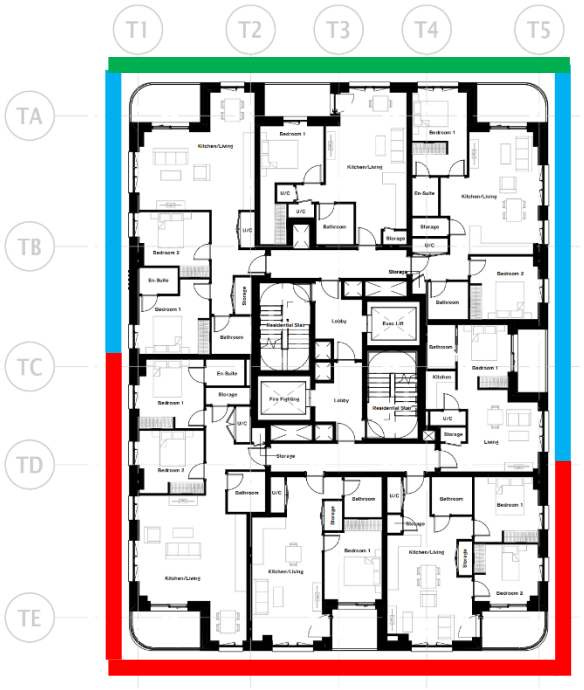
6 February 2025

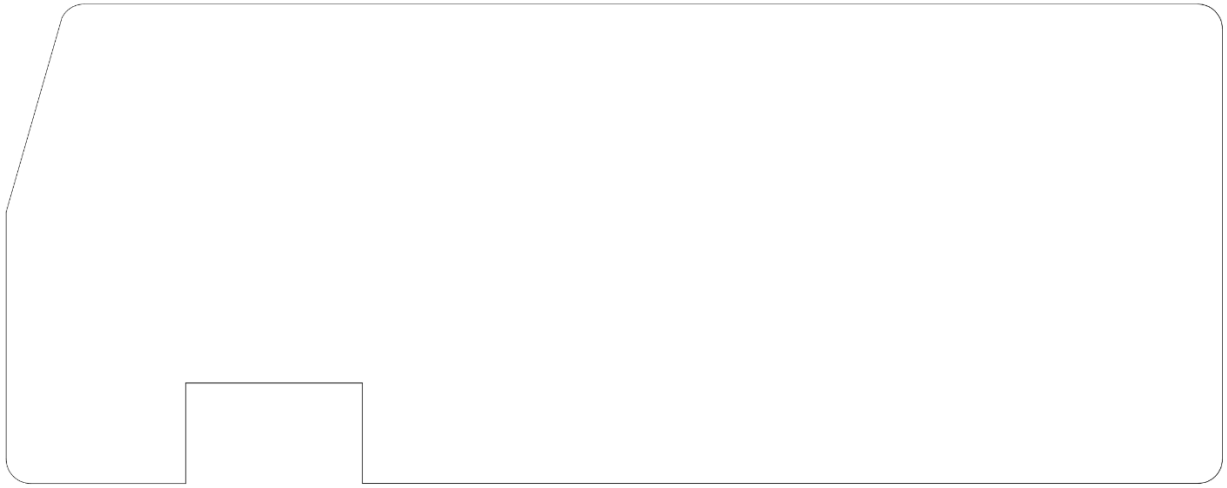
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Eleventh Floor

Project 13308

Figure 19

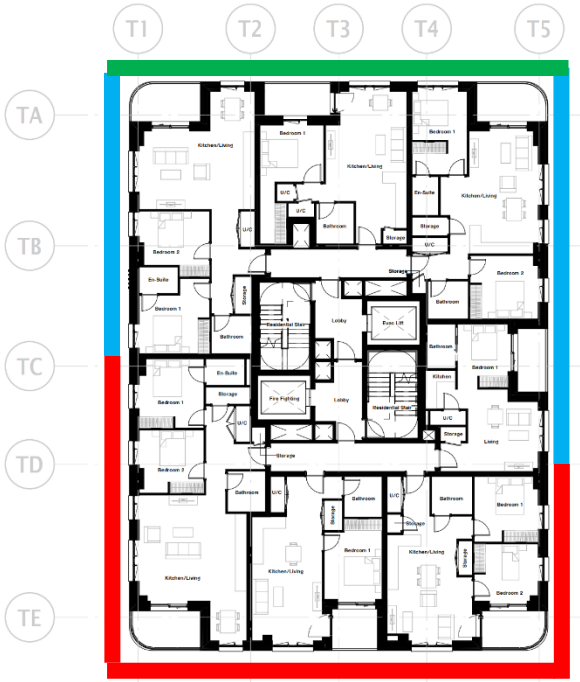
6 February 2025

Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3



100 Avenue Road, London NW3

Façade Zoning Plan – Twelfth Floor

Project 13308

Figure 20

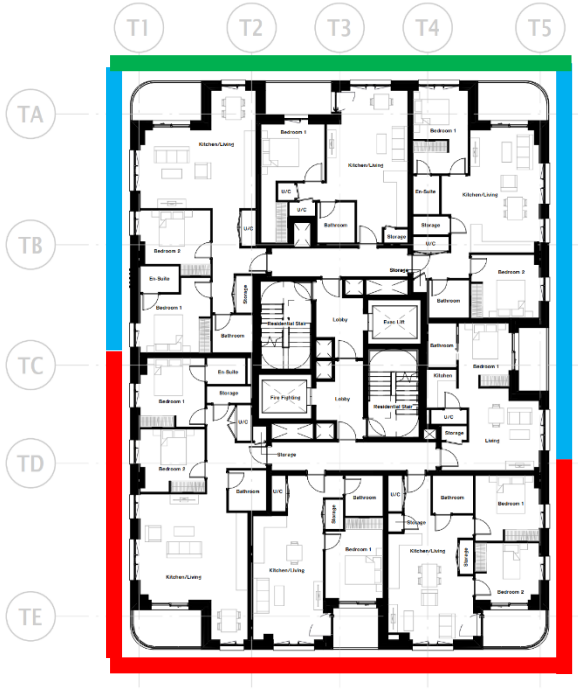
6 February 2025

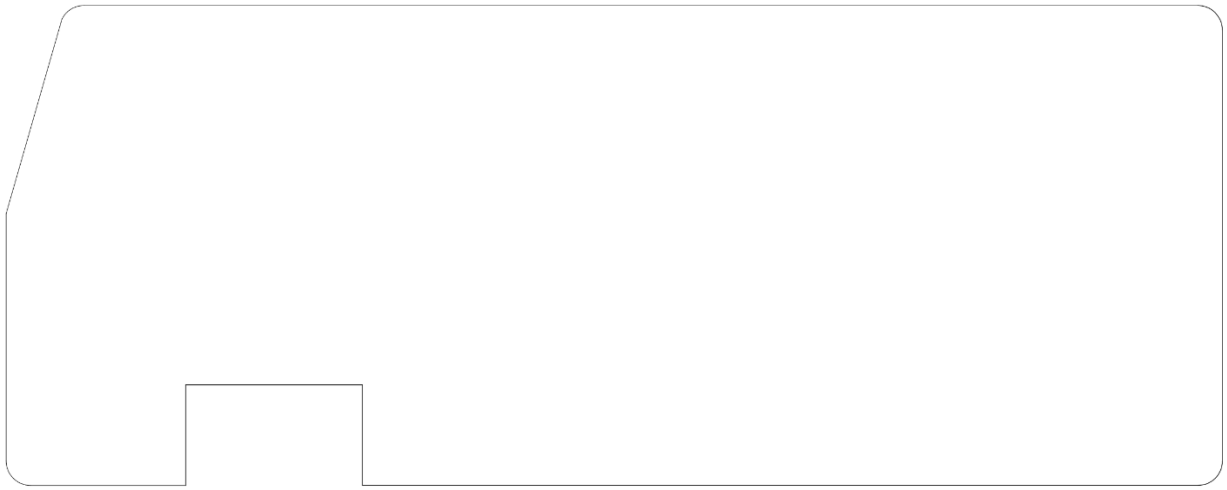
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Thirteenth Floor

Project 13308

Figure 21

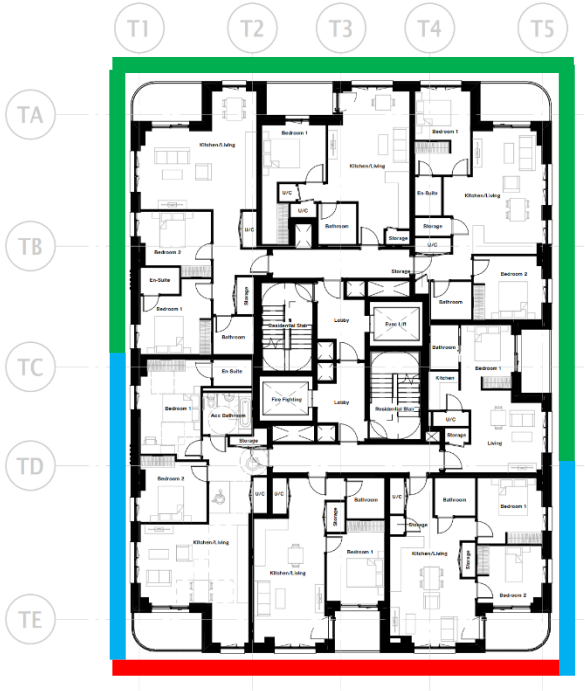
6 February 2025

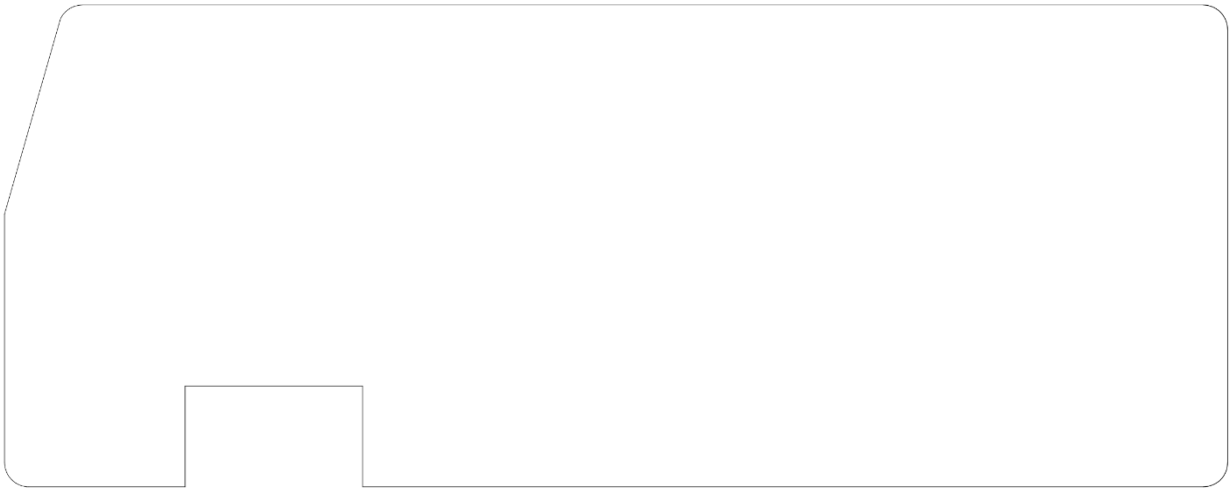
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Fourteenth Floor

Project 13308

Figure 22

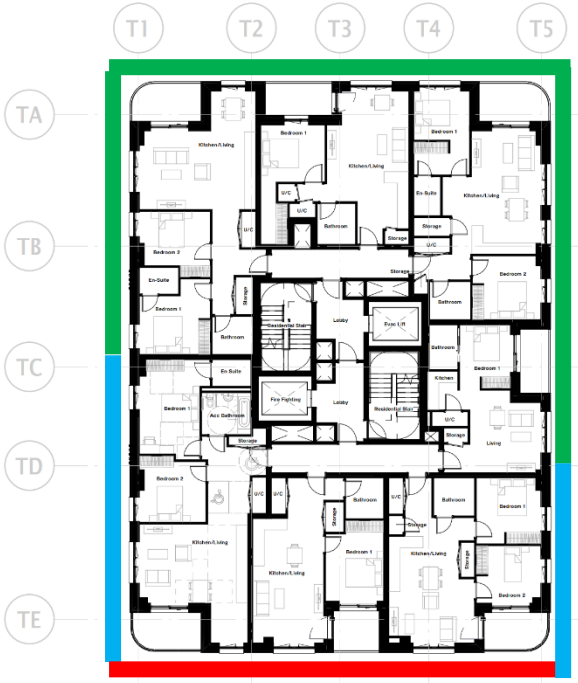
6 February 2025

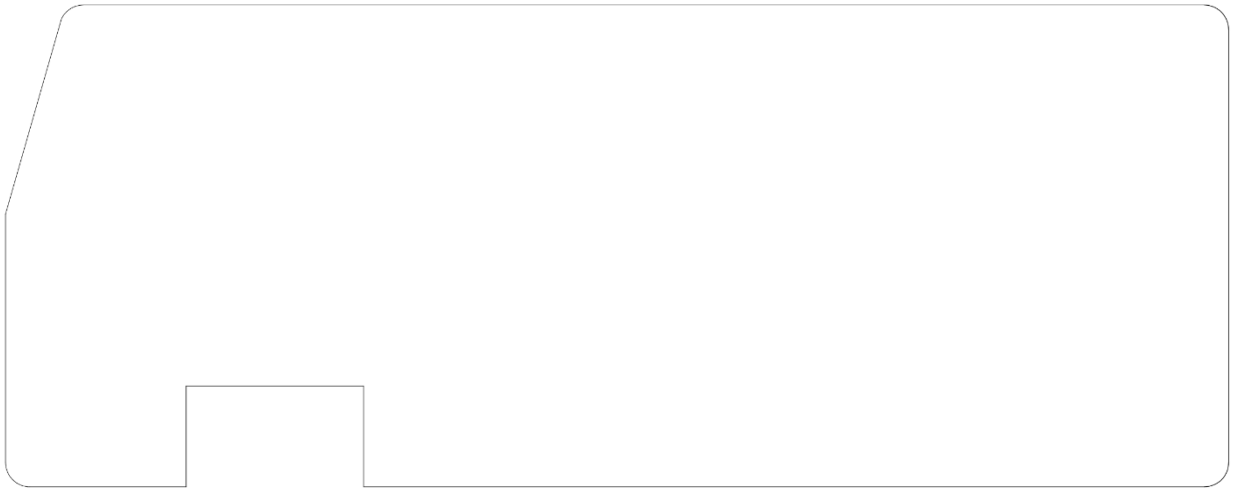
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Fifteenth Floor

Project 13308

Figure 23

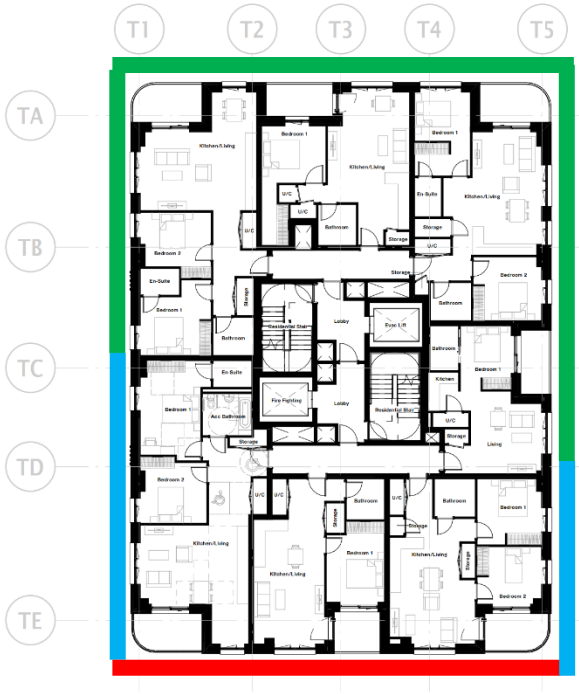
6 February 2025

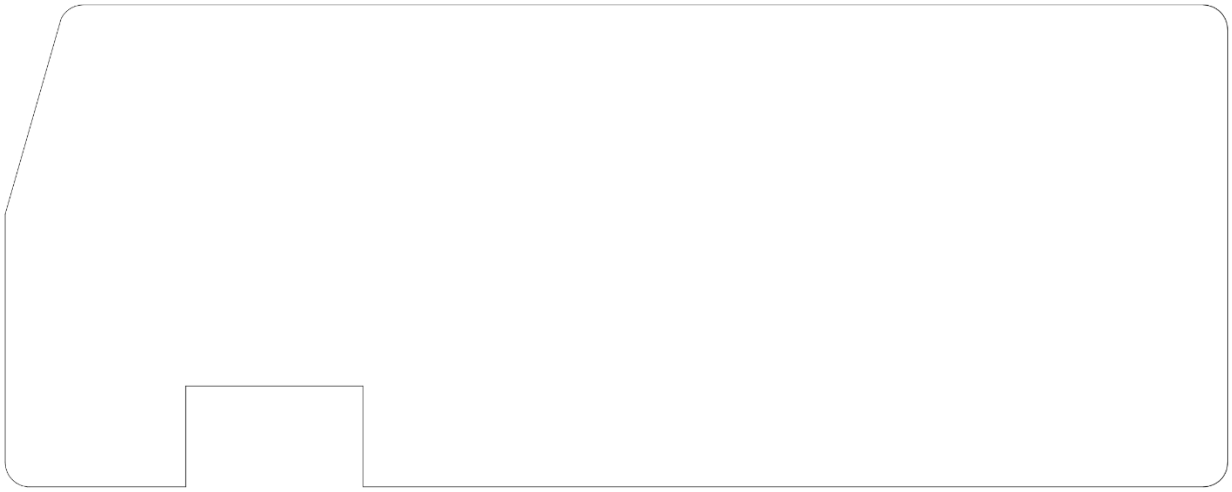
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Sixteenth Floor

Project 13308

Figure 24

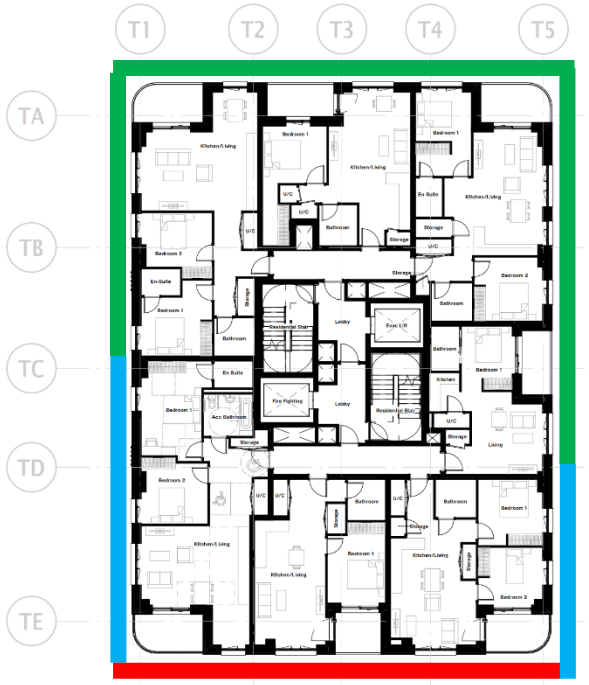
6 February 2025

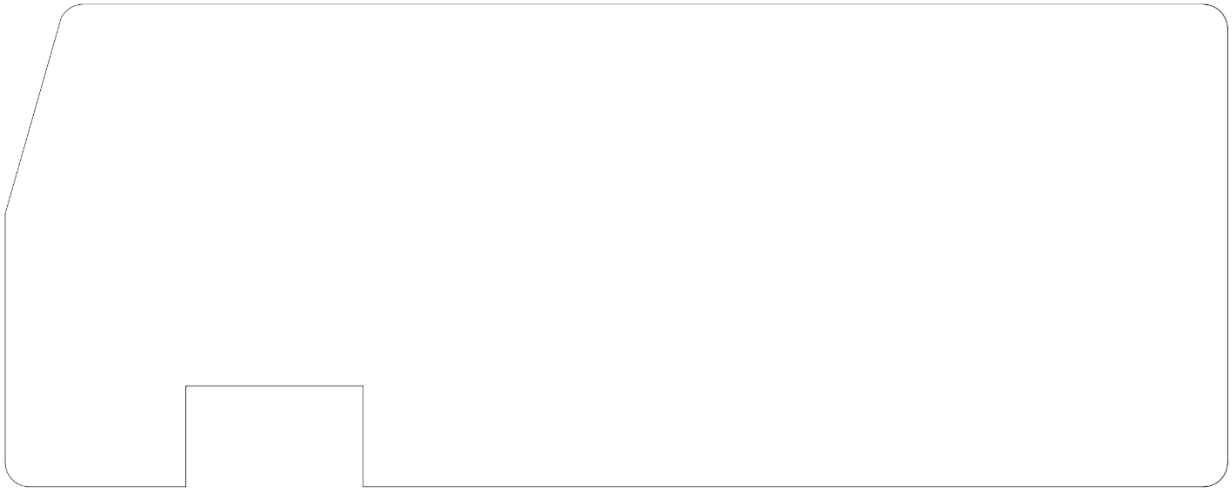
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Seventeenth Floor

Project 13308

Figure 25

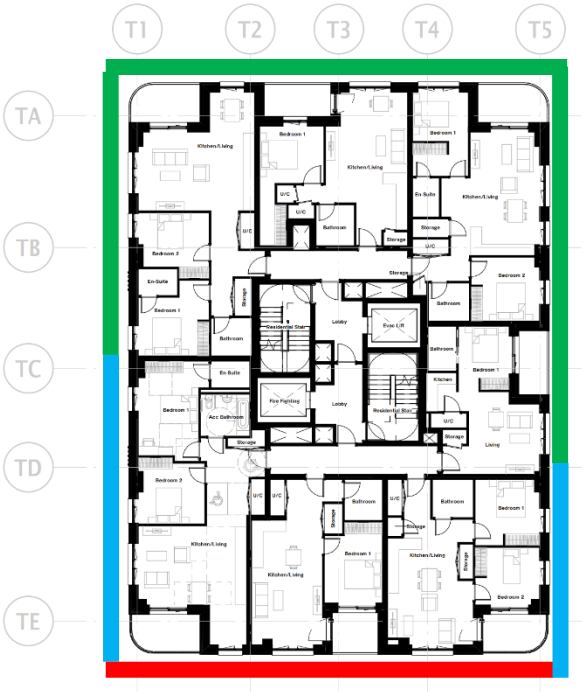
6 February 2025

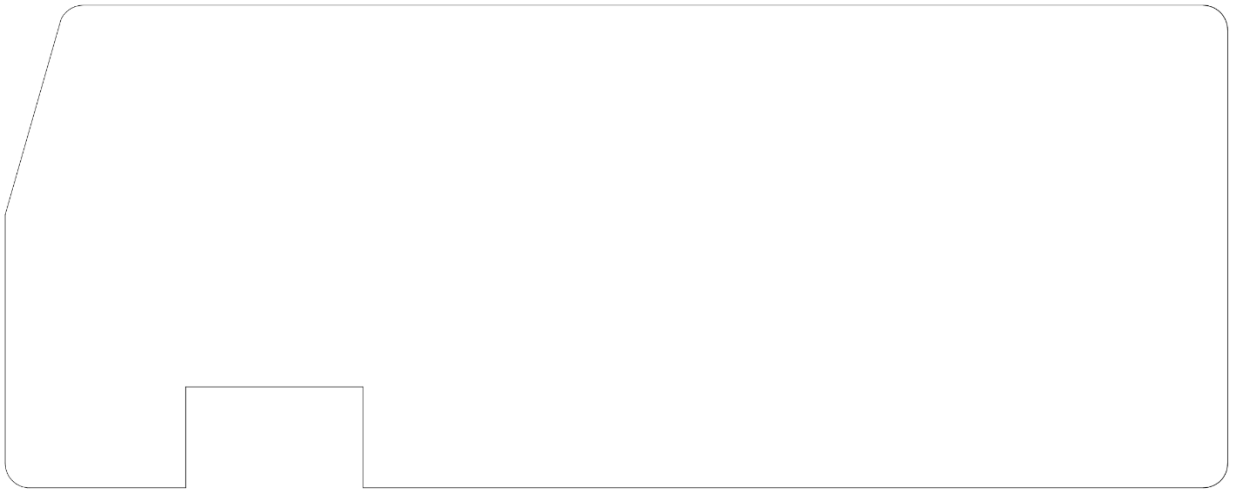
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Eighteenth Floor

Project 13308

Figure 26

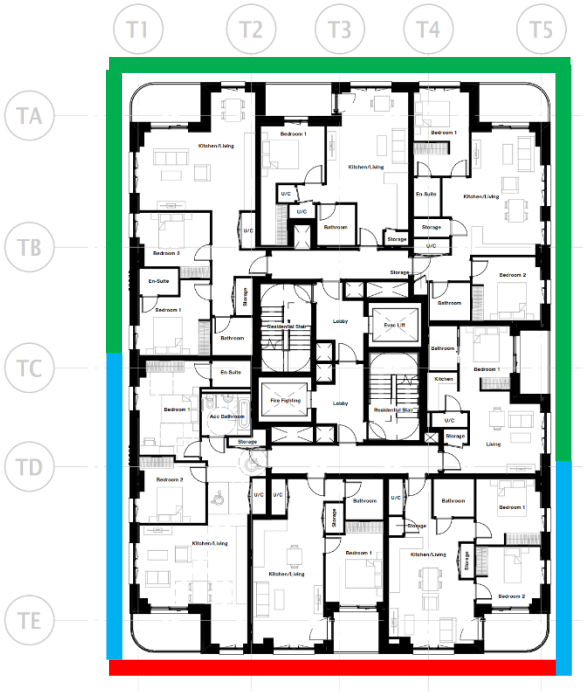
6 February 2025

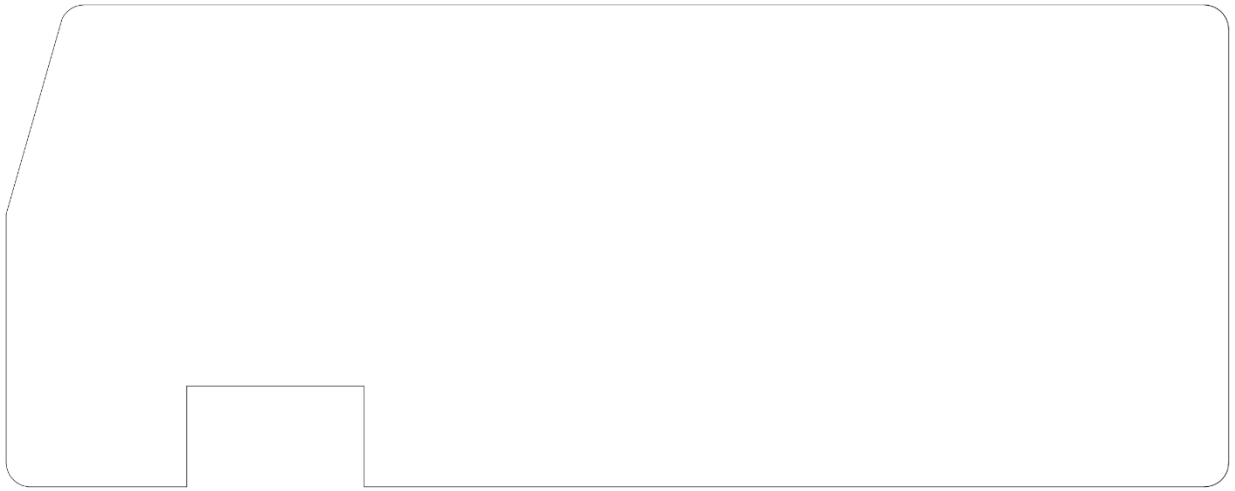
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Nineteenth Floor

Project 13308

Figure 27

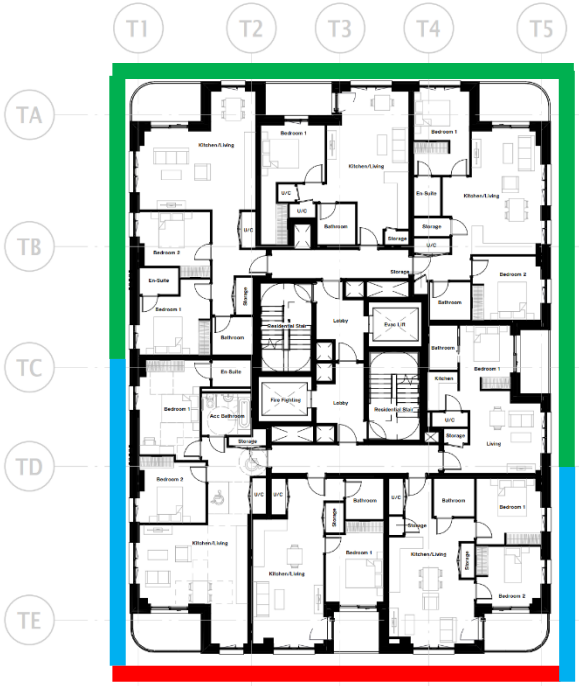
6 February 2025

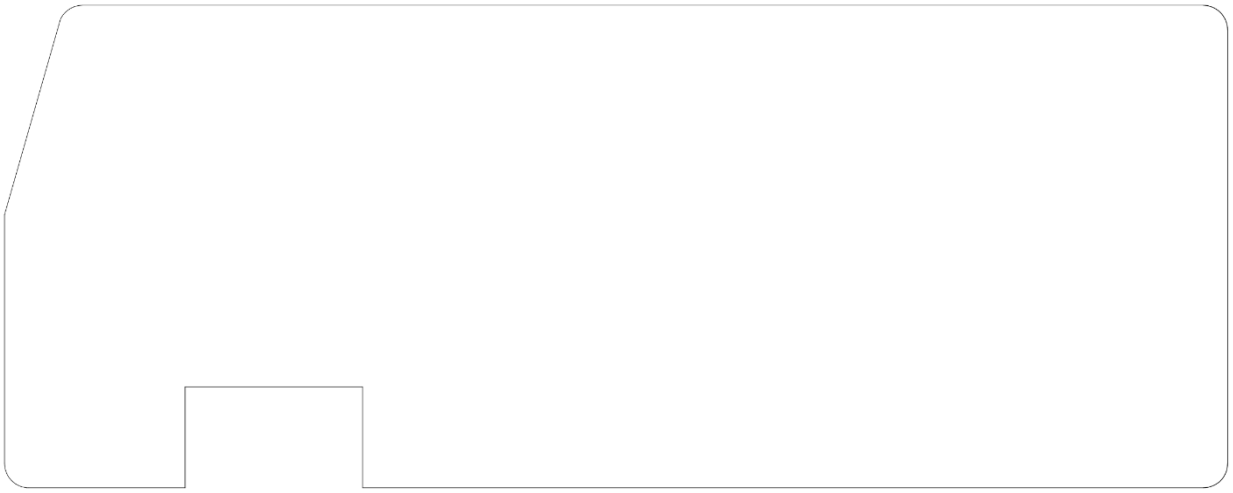
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Twentieth Floor

Project 13308

Figure 28

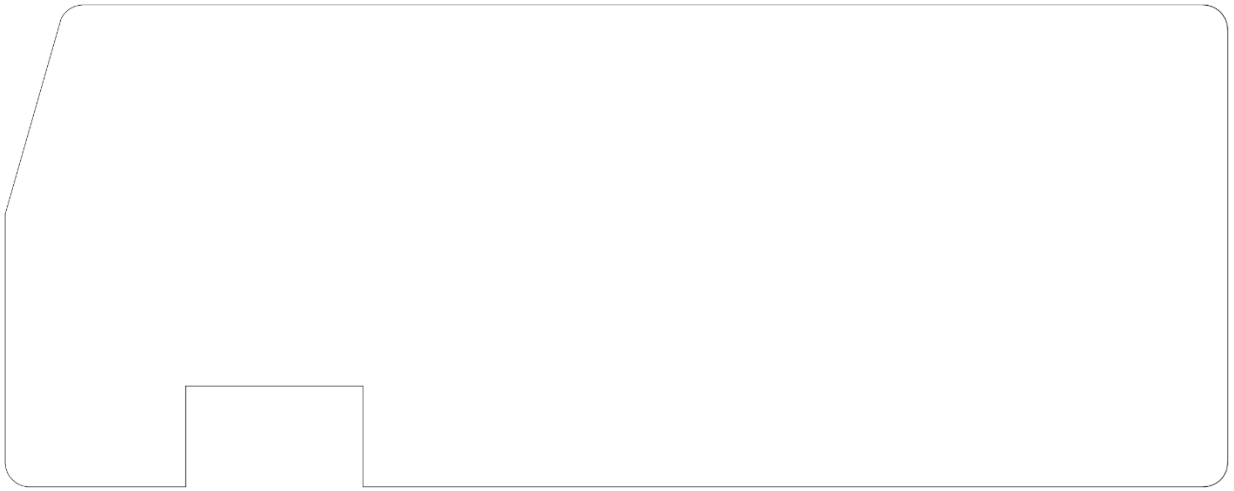
6 February 2025

Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3



100 Avenue Road, London NW3

Façade Zoning Plan – Twenty-First Floor

Project 13308

Figure 29

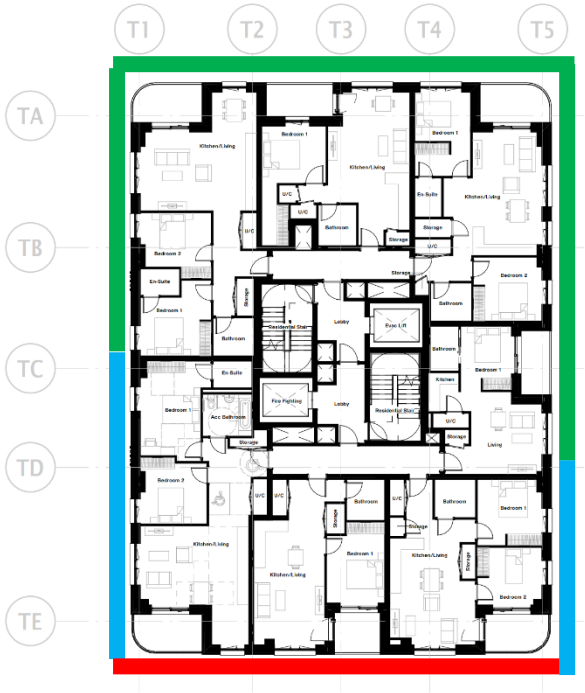
6 February 2025

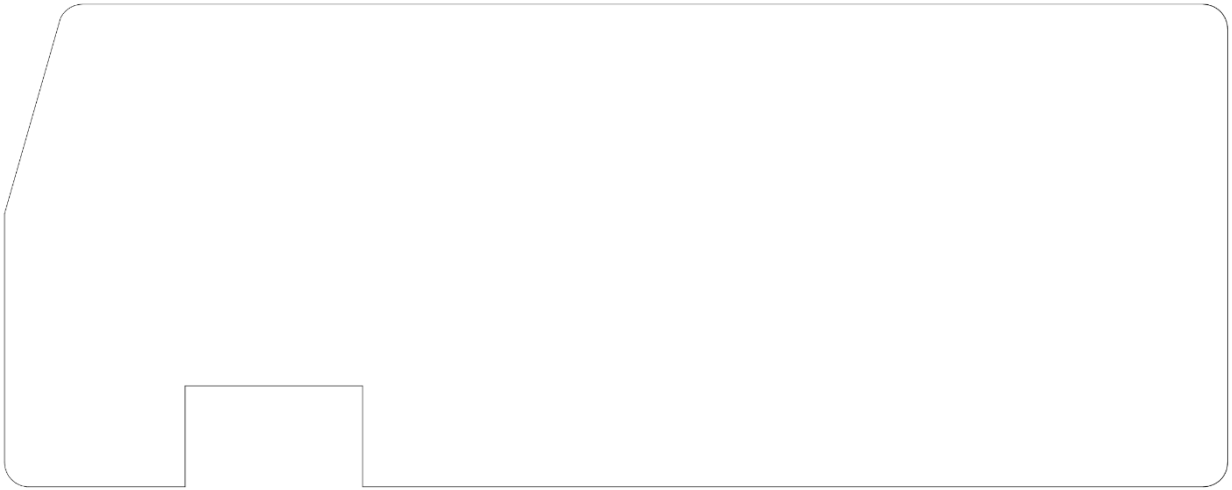
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Twenty-Second Floor

Project 13308

Figure 30

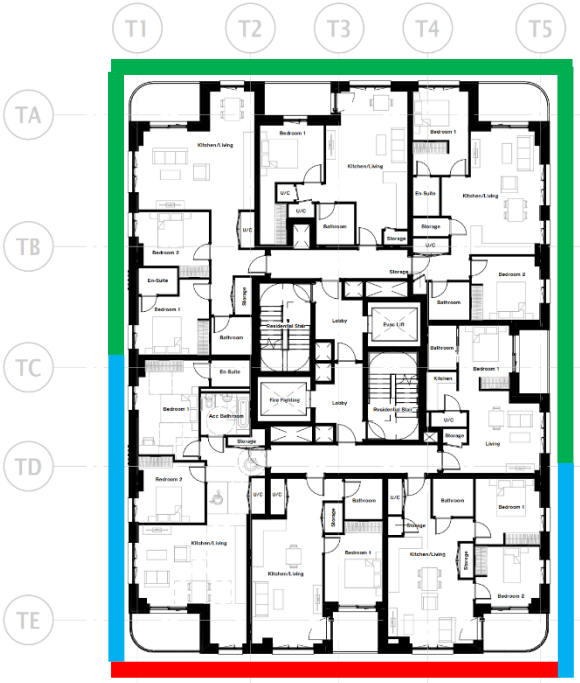
6 February 2025

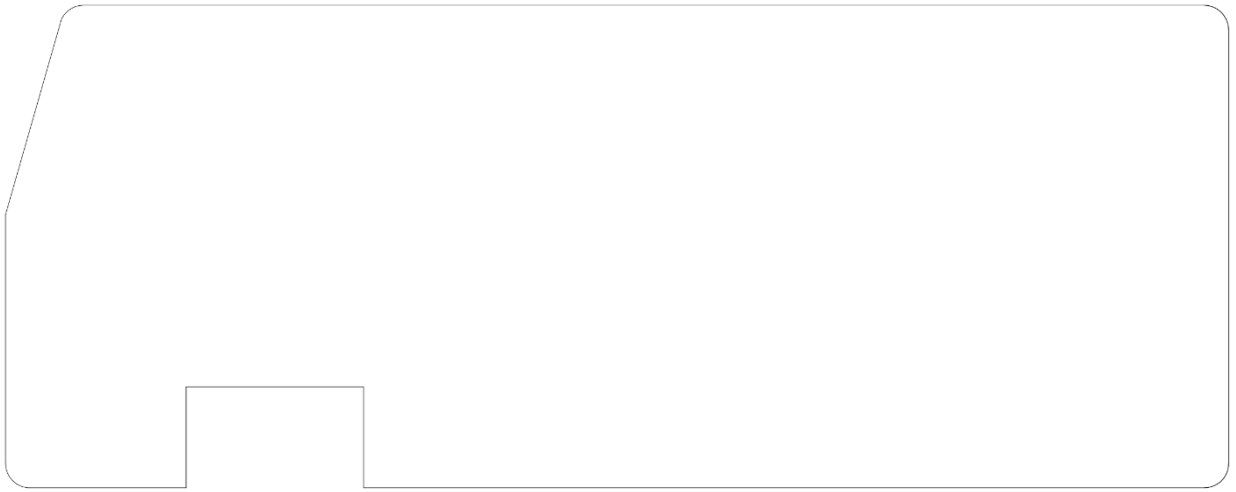
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Twenty-Third Floor

Project 13308

Figure 31

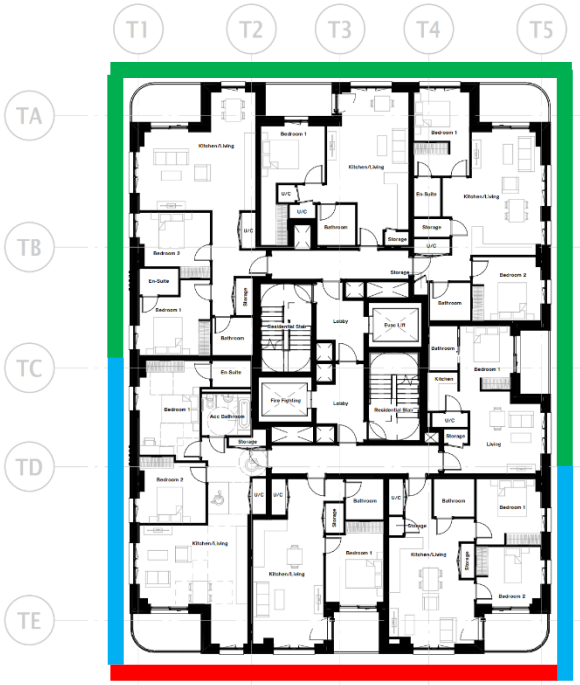
6 February 2025

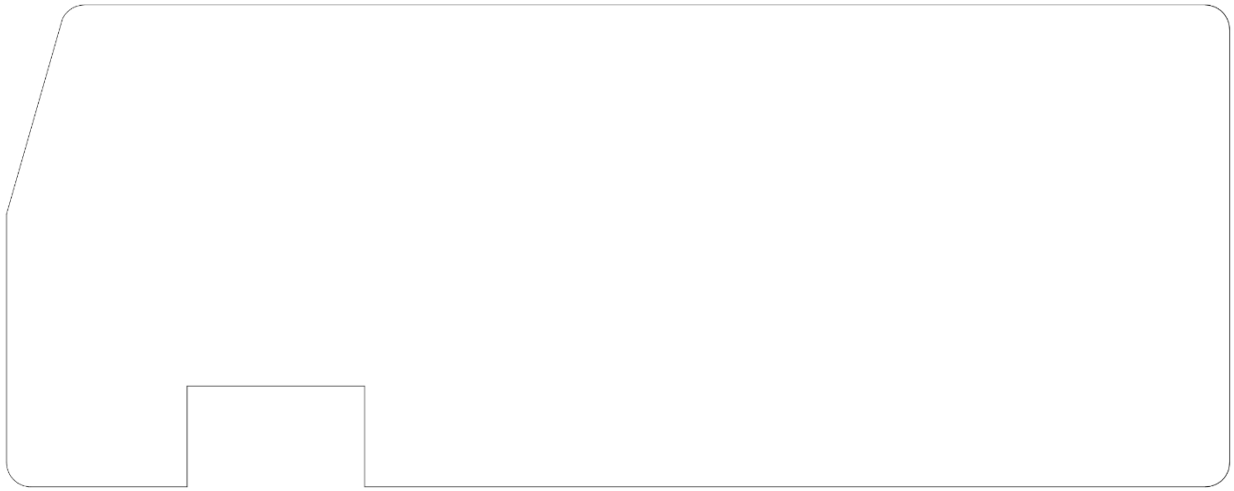
Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3





100 Avenue Road, London NW3

Façade Zoning Plan – Twenty-Fourth Floor

Project 13308

Figure 32

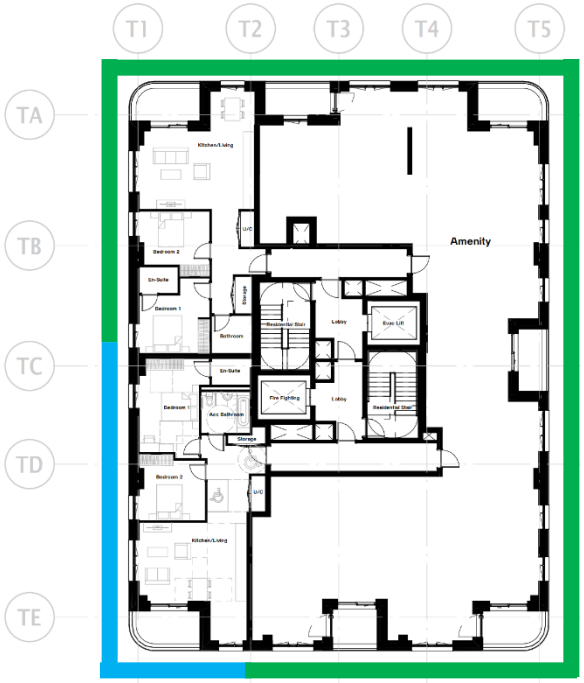
6 February 2025

Not to Scale

RBA ACOUSTICS

Key

- Glazing Zone 1
- Glazing Zone 2
- Glazing Zone 3



100 Avenue Road, London NW3

Façade Zoning Plan – Twenty-Fifth Floor

Project 13308

Figure 33

6 February 2025

Not to Scale

RBA ACOUSTICS

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