PHASE 1, KIDDERPORE AVENUE, LONDON NW3 7SU

EXTERNAL BUILDING FABRIC ASSESSMENT

REPORT 6015/EBF
Prepared: 31 March 2014
Revision Number: 0

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External Building Fabric Assessment

PHASE 1,

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Revision	Comment	Date	Prepared By	Approved By
0	First Issue	31 March 2014	Mike Fuller	Alex J Wyatt

RBA ACOUSTICS

Contents

1.0 INTRODUCTION

The redevelopment of the site at Kidderpore Avenue, London is proposed. Phase 1 of the redevelopment includes the demolition of the existing buildings along Finchley Road to provide three blocks of flats (Blocks F, G and H), the refurbishment of the houses along Kidderpore Avenue to provide further blocks of flats (Blocks A1, A2, B and C) and the refurbishment of the central Library building to create a further block of flats in the centre of the site (Block D).

The site is located in North London with the main thoroughfare Finchley Road (A41) running the South-Western boundary of the site, Kidderpore Avenue to the North and Platt's lane to the West. Please also see attached Site Plan 6015/SP1.

RBA Acoustics have been commissioned to undertake the full acoustic design services for the proposed redevelopment.

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

This report is based upon application drawings and details and is suitable for the discharge of Planning Condition 28.

2.0 WSP ENVIRONMENTAL NOISE SURVEY

2.1 General

A noise survey was previously undertaken at the Kidderpore Avenue redevelopment site by WSP with one attended location on the 11 April and 20 June 2012 and two unattended locations over 30 March to 4 April 2012. Please refer to their "Acoustic Planning Report" (revision 1 dated 28 January 2013) for further details.

2.2 Measurement Positions

Noise measurements were taken at three locations around the redevelopment site. The short term measurement position 1 was along Kidderpore Avenue, while the long term measurement positions 2 and 3 were 1m from the façade of an existing building along Finchley Road and the roof of the existing library building in the centre of the site, respectively.

2.3 Results of Noise Survey by WSP

The measured noise levels from the WSP attended measurements at their Position 1 along Kidderpore Avenue are summarised in the following Table 6015/T1 below.

Table 6015/T1 – WSP Attended Measurement Noise Levels (free-field)

Measurement Period	$L_{Aeq, period}$ Noise Level (dB)	$L_{Amax(fast), period}$ Noise Level dB) (Lowest /Average / Highest)
Wednesday 11 April 2012 05:50 – 06:55 hours	58	67 / 68 / 88
Wednesday 11 April 2012 06:58 – 09:45 hours	55	54 / 72 /85
Wednesday 20 June 2012 23:00 – 00:00 hours	64	54 / 63 /73

The averaged daytime, evening and night-time L_{Aeq} noise levels from the relevant WSP unattended measurements are summarised in the following Table 6015/T2 below.

Table 6015/T2 – WSP L_{Aeq} Noise Levels (free-field)

Measurement Position	Average $L_{Aeq, period}$ Noise Level (dB)		
	Daytime (07:00 – 23:00)	Evening (19:00 – 23:00)	Night-time (23:00 – 07:00)
WSP Position 2 – Finchley Road	72	71	68
WSP Position 3 – Roof of Library building	58	57	55

3.0 RBA ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

General

Continuous noise monitoring was undertaken at the redevelopment site between Thursday 13th February and Friday 14th February in order to determine the corresponding noise levels over typical day and night-time periods. Weather conditions over the monitoring period were generally dry with only light wind speeds. Light rain showers are understood to have occurred on occasion after 09:00 hours on Friday the 14th February, but are not considered to have unduly affected the measured noise levels.

Instrumentation

The following instrumentation was used for the survey:

Table 6015/T3 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
01dB A&V Type 1 Sound Level Meter	Black Solo 01	60610	CE-DTE-T-13-PVE-69595	2 October 2015
01dB A&V Pre Amplifier	PRE 21 S	13676		
Gras ½" Microphone	MCE 212	84948		
01dB-Stell Calibrator	Cal 21	50441910	CE-DTE-T-13-PVE-69606	2 October 2015
01dB A&V Type 1 Sound Level Meter	Black Solo 01	65678	01651/2	27 January 2016
01dB A&V Pre Amplifier	PRE 21 S	16316		
01dB A&V ½" Microphone	MCE 212	153459		
01dB-Stell Calibrator	Cal 21	35242481	01651/1	27 January 2016

The sound level meters were calibrated both prior to and on completion of the survey with no calibration drifts observed.

Measurement Positions

Position 1 – Finchley Road

A microphone was positioned on an A-frame on the southern façade of the existing building along Finchley Road at second floor level. The microphone was considered to be subject to façade reflection effects.

Position 2 – Kidderpore Avenue

A microphone was positioned on an A-frame on the northern façade of the building along Kidderpore Avenue at second floor level. The microphone was considered to be subject to façade reflection effects.

The measurement positions are also shown on the attached Site Plan 6015/SP1 and Photographs 6015/P1-P2.

The measurement positions are considered to be representative of worst-case noise levels incident on the proposed residential aspects of the redevelopment.

3.2 Site Conditions

Since the measurements were unattended it is not possible to comment upon the noise climate at each measurement position over the entire monitoring period with absolute certainty. However, during our time on site it was noted that noise levels at Measurement Position 1 were dominated by road traffic movements along Finchley Road running the length of the South-Western boundary of the site. Finchley Road was noted to be very busy with constant traffic movements in both Northbound and Southbound directions of moderate speed with accelerating and braking noise due to the traffic lights at the crossroads with Platt's Lane. The traffic was noted to consist of passenger vehicles, HGVs and main bus routes in both directions. The road traffic movements are likely to provide the maximum noise levels to the general noise climate to the South-west of the site.

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

3.3 Results

The measured L_{Aeq}, L_{A90} and L_{Amax} 15 minute period levels are shown as time-histories on the attached Graphs 6015/G1-4. The averaged (façade reflection corrected) daytime and night-time L_{Aeq} noise levels are summarised in the following Table 6015/T4 below.

Table 6015/T4 – L_{Aeq} Noise Levels

Measurement Position	Average (façade reflection corrected) $L_{Aeq, period}$ Noise Level (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	72	70
Position 2 – Kidderpore Avenue	54	46

The minimum background noise levels ($L_{A90, 15mins}$) at each measurement position are summarised in the following Table 6015/T5 below. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development.

Table 6015/T5 – Minimum Measured $L_{A90, 15mins}$ Noise Levels

Measurement Position	Minimum $L_{A90, 15mins}$ Noise Level during period (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	60	46
Position 2 – Kidderpore Avenue	47	41

Averaged spectral noise levels are graphically represented on the attached Graphs 6015/G5-6.

3.4 Discussion

As can be seen from the measured average L_{eq} noise levels in Sections 2.3 and 3.3, the measured L_{Aeq} noise levels at WSP's Position 2 along Finchley Road are very similar (at most 2dB different, during the night-time) to those measured at RBA's Position 1 (Finchley Road). WSP's Position 1 measured noise levels along Kidderpore Avenue are somewhat higher than RBA's (Position 2), however, the discrepancy could be accounted for by the relatively short duration of WSP's measurements and also the position being closer to the road.

4.0 NOISE MODELLING

In order to predict the noise levels at the different façades with increasing height an acoustic model of the proposed site, including all proposed buildings and existing surrounding buildings, has been generated using the CadnaA platform.

The software allows the site topography, existing buildings and sound sources to be built into the model such that the sound sources (i.e. the main surrounding roads) can then be calibrated according to the on-site measurements (both WSP and RBA data). 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. The incident noise levels, where not measured directly on site, have then been used in the assessment of façade elements.

The attached Figure 6015/Cad1 illustrates the basic model, façade incident daytime L_{Aeq} noise levels and the daytime noise contours for the site at a height of 1.5 metres above (relative) ground level.

5.0 PLANT NOISE EMISSION CRITERIA

With reference to planning Condition 27 from Camden Borough Council's Decision document (ref: 2013/0685/P dated 13 September 2013) the requirements with regards to plant noise emissions are confirmed as follows:

> *"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A).*
>
> *For each of the octave bands of centre frequencies 63Hz-8kHz inclusive, noise levels from all plant/equipment (measured in LAeq) when in operation shall at all times add not more than 1 decibel to the existing background noise level LA90, expressed in dB(A), in the same octave band as measured 1 metre external to sensitive facades."*

In line with the above, we propose the following cumulative plant noise emission limits:

Table 6015/T6 – Plant Noise Emission Limits

Measurement Position	L_{Aeq} Noise Level limit of all operating plant (dB) at 1m from the nearest noise sensitive façade	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	55	41
Position 2 – Kidderpore Avenue	42	36

In line with planning Condition 27, should noise emissions from any item of proposed plant be identified as having characteristics outlined within the condition, a further 5dB should be subtracted from the applicable proposed noise emission limit for that individual item plant item.

In addition, the octave band centre frequency noise emission levels should be designed to 5dB below the background levels as indicated on the attached Graphs 6015/G5-G6.

6.0 NOISE INTRUSION CRITERIA

The sections below outline the assessment criteria required by Camden Borough Council and reference additional relevant standards.

6.1 Planning Condition

Planning Condition 28 of Camden Borough Council's 'Notification of Grant of Permission to Develop Land', states:

> *"Noise levels arising from external sources within all habitable rooms during the night period (23:00 - 07:00) shall not exceed 30dB L_{Aeq} (8 hours) nor 45dB $L_{Amax\ (fast)}$. Similarly, noise levels in habitable rooms shall not exceed 35 dB L_{Aeq} (16 hours) during the day time (07:00 - 23:00). Before the relevant part of each Phase commences details of sound insulation measures for all relevant residential windows shall be submitted to and approved in writing by the Local Planning Authority. The approved sound insulation measures shall be installed prior to occupation of any of the residential units, and retained and maintained thereafter."*

6.2 BS 8233

BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings" draws on the results of research and experience, such as that detailed in WHO 'Guidelines for Community Noise', to provide information on achieving internal acoustic environments appropriate to their functions. As part of this document recommendations are given to the internal noise levels which are commensurate with achieving good/reasonable resting and sleeping conditions within residential properties. The values given are generally in terms of an L_{Aeq} level although guidance is also given on the maximum noise level considered reasonable within bedrooms at night. The values given are detailed below:

Table 6015/T7 – BS 8233 Residential Criteria

Activity	Location	07:00 to 23:00 (Daytime)	23:00 to 07:00 (Night-time)
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedrooms *	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

* In addition individual noise events within bedrooms at night should not normally exceed 45dBA L_{max} (measured with F time-weighting) according to BS 8233:1999.

It should be noted that the glazing specifications for bedrooms are usually dictated by the L_{max} noise levels with the average L_{eq} noise levels achieving the BS 8233 criteria by default.

6.3 World Health Organisation: Guidelines for Community Noise

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

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

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

Table 6015/T8 – Guideline Values for Community Noise

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

6.4 Block E (Hampstead School of Art) Criteria

It is understood that Block E of the development is to house the Hampstead School of Art and, as such, suitable guidance criteria for internal noise levels within teaching spaces has been chosen from Building Bulletin 93: Acoustic Design in Schools (BB93) for the purposes of this assessment:

Table 6015/T9 – BB93 Criteria

Location	Upper Limit for the indoor ambient noise level $L_{Aeq,\ 30min}$ (dB)
Classrooms	35
Quiet Study Areas	35
Art Rooms	35
Multi-purpose Halls	35

6.5 Summary

The project criteria adopted are therefore as follows;

Habitable rooms	Daytime (07:00-23:00 hours) Night-time (23:00-07:00 hours)	35dB L_{Aeq} 30dB L_{Aeq} and 45dB $L_{Amax,f}$
Block E (Hampstead School of Art)	24 hour use	35dB L_{Aeq}

7.0 EXTERNAL BUILDING FABRIC ASSESSMENT

7.1 Background

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

7.2 Assumptions

Our external building fabric analyses have assumed the following:

a) Drawings

Our assessment has been based on the following Allies and Morrison architect's proposed drawings.

Drawing Number	Description	Revision	Date
809_01_07_100 to 809_01_07_108	Proposed Level -003 to 05 Plan	P2	January 2013
809_01_07_200 to 809_01_07_204	Proposed Elevations	P2	January 2013
809_01_07_400 to 809_01_07_410	Blocks A1 to H - Building Studies Plans and Elevations	P2	January 2013

(b) Noise Levels

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

(c) Room Absorption

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

Table 6015/T10– Bedroom Absorption Coefficients

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

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

Table 6015/T11 – 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

For the purposes of the Block E analyses we have assumed the BB93 mid-frequency reverberation time criteria will be met for classrooms (i.e. <0.8s T_{mf})

(d) External Wall

We understand that external non-glazed areas to blocks D, E, F, G and H are to comprise the following:

- Brickwork
- Thermal insulation and cavity
- Metsec type frame with mineral wool in void
- 2 x layers 15mm dense plasterboard

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

Table 6015/T12 – Non-Glazed SRIs

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

For the purposes of this assessment we have assumed the external non-glazed areas to the houses (Blocks A1, A2, B and C) along Kidderpore Avenue comprise the following:

- Brickwork/Blockwork cavity walls with thermal lining

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

Table 6015/T13 – Non-Glazed SRIs

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

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

(e) Ventilation

It is understood the preferred ventilation strategy is natural ventilation via trickle ventilators where external noise levels are such that it is possible to achieve the internal noise level criteria with these implemented. In areas of the site where this is not possible a fully ducted mechanical ventilation and heat recovery (MVHR) system is proposed.

The trickle ventilators have been assessed and the acoustic performance specification for such trickle ventilators is detailed below.

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

7.3 Specification & Guidance Constructions

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

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

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

Please note – *The guidance constructions described in Table 6015/T14 are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix B, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a window configuration will meet the performance specification.*

Table 6015/T14 – Glazing Guidance Constructions

Glazing Type	Glazing Configuration
G1	High spec double glazing comprising 10mm glass / 12mm cavity / 8.4mm acoustically laminated (PVB) glass
G2	Standard thermal double glazing with differing pane thicknesses, e.g. 4mm glass/12mm cavity/6mm glass

It should be noted that due to the necessity for security laminated glass on the ground (lower / accessible) floors, the specifications may exceed those stated above (G2 type) in some locations.

For guidance purposes we would typically expect the following trickle ventilator types to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix B.

Table 6015/T15 – Guidance Trickle Ventilator Types

Ventilator Type	Example Ventilator Type
V1	Any standard "through-the-frame" type trickle ventilator with indirect air path

7.4 Applicable Zoning

Due to the differences in the prevailing noise climate around the site, two primary glazing zones have been defined, as indicated on the attached Façade Zoning Plans 6015/FZP-03 to 6015/FZP05.

(i) Zone 1 – Glazing Type: G1
Ventilator Type: MVHR (trickle ventilators unsuitable)

(ii) Zone 2 – Glazing Type: G2
Ventilator Type: V1

7.5 Flanking Specification

We also advise on the flanking specification for any curtain walling or continuous glazing systems proposed as follows to aid the development of such systems.

Flanking Performance Specification

The previous Sections are in relation to external noise intrusion through any curtain walling systems to internal areas. Separating wall and floor sound insulation performance can often be compromised by curtain walling systems. It is thus important that an additional specification for the curtain walling package be introduced, which will limit the amount of sound transfer across separating wall and floor lines through the curtain walling system. A flanking performance specification is attached within Appendix B – Section 3.0.

Achievement of the specification can be demonstrated by laboratory acoustic testing in general accordance with BS EN ISO 10848-2:2006. This is admittedly a complex and costly testing procedure and therefore the supplier may – following tender reviews – be allowed to demonstrate by other means that the specification can be achieved. This is reflected in the specification wording.

The specification should also be incorporated within any other packages, which could affect the transmission of flanking sound at separating wall and floor lines.

It is likely insulated double/split mullions and transoms will be required in order to achieve the attached flanking 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.

8.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at Phase 1 Kidderpore Avenue, London. The measured noise levels are presented herein. The resultant noise levels have been used in our assessment of the glazing requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to the requirements of Camden Council stated in Planning Condition 28.

General guidance configurations have been suggested for the glazing constructions that should be capable of achieving the required specifications detailed within Appendix B. A worst case configuration of high performance acoustically laminated double glazing and an MVHR system is required in the worst affected flats of Blocks F, G and H along Finchley Road to protect the residences from any potential noise impact arising from Finchley Road. However, other areas only require more standard double glazing. Trickle ventilators, where suitable, have also been assessed and specified herein.

The data has also been used to set plant noise emission criteria for future assessment of any proposed plant at the development to ensure the adjacent neighbour's amenity spaces are protected from plant noise emissions in line with the Local Authority requirements of Planning Condition 27.

Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10}, L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B – External Building Fabric Acoustic Specification

1.0 Window Sound Insulation Performance

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

Type	Minimum Recommended Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
G1	31	28	30	39	44	49	56	56	42
G2	19	23	22	27	38	40	41	41	33

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

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

2.0 Trickle Ventilator Sound Insulation Performance

Trickle ventilators (in their open state) should achieve the following minimum element-normalised level differences as tested in accordance with BS EN 20140-10:1992:

Type	Minimum Recommended $D_{n,e,w}$ (dB) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$ (dB)
	63	125	250	500	1k	2k	4k	8k	
V1	29	33	33	33	31	32	32	32	33

Note: $D_{n,e,w}$ is the "overall weighted element normalised level difference" tested in a laboratory.

Please note the above specification(s) assumes one trickle ventilator will be installed per room, i.e. a continuous mechanical extract system (ADF System 3) will be utilised. The specification(s) should be increased by a factor of 10Log(N) should N ventilators be required per room, i.e. increase by +3dB or +5dB respectively should two or three ventilators be required per room.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for the trickle vents in their open state shall be submitted to RBA Acoustics for approval.

3.0 Acoustic Flanking Specification

Extent

There is potential for any curtain walling or continuous system to transmit sound across the separating floors and walls, and to thus result in future sound insulation problems.

The following specification should therefore be introduced within the tender documentation in order to ensure the system components are adequately designed.

The following specifications apply to all curtain walling or continuous elements between residential units and, if applicable, between residential units and commercial areas. Between non-residential areas (e.g. commercial to commercial, etc.) it is standard practice to relax the specification to a value of 50dB $D_{n,f,w}$.

With regard to potential flanking through the panels, the specification is commensurate with relatively high sound insulation levels. Achievement of this specification will require careful consideration of the panel design, in particular the insulation type and construction make-up of the panel skin. In addition it is likely to be necessary to design the cladding such that double/twin insulated mullions and transoms are included.

Horizontal Flanking at Separating Wall Lines

The curtain walling/continuous system shall achieve a horizontal weighted normalised flanking level difference of 62dB $D_{n,f,w}$ when tested in general accordance with BS EN ISO 10848-2:2006 [previously BS EN 20140-9:1994] (the methodology amended accordingly).

The supplier shall demonstrate by the provision of previous test reports (and comparative calculations if required) that the specification can be achieved. The Client, however, reserve the right to insist on laboratory acoustic testing if any doubts remain in relation to the flanking performance of the system.

The curtain walling system shall provide suitable surfaces against which a good acoustic seal can be made with future separating walls.

Vertical Flanking at Separating Floor Lines

The curtain walling system shall achieve a vertical weighted normalised flanking level difference of 62dB $D_{n,f,w}$ when tested in general accordance with BS EN ISO 10848-2:2006 [previously BS EN 20140-9:1994] (the methodology amended accordingly).

The supplier shall demonstrate by the provision of previous test reports (and comparative calculations if required) that the specification can be achieved. The Client, however, reserve the right to insist on laboratory acoustic testing if any doubts remain in relation to the flanking performance of the system.

The curtain walling system shall provide suitable surfaces against which a good acoustic seal can be made with future separating floors.

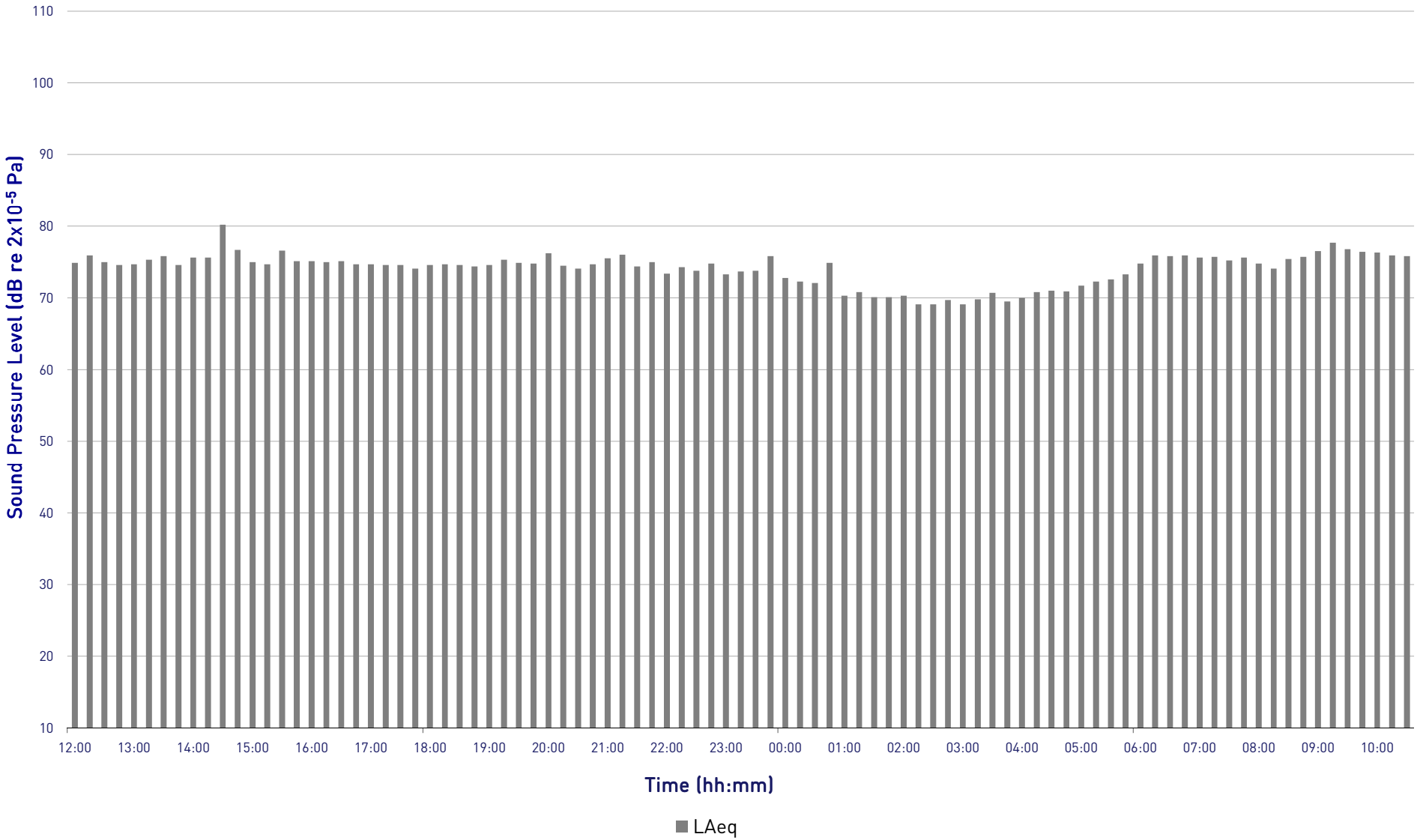
Phase 1 Kidderpore Avenue, London

L_{Aeq} Time History

Measurement Position 1 - Finchley Road, Thursday 13th February to Friday 14th February 2014

RBA ACOUSTICS

Graph 6015/G1



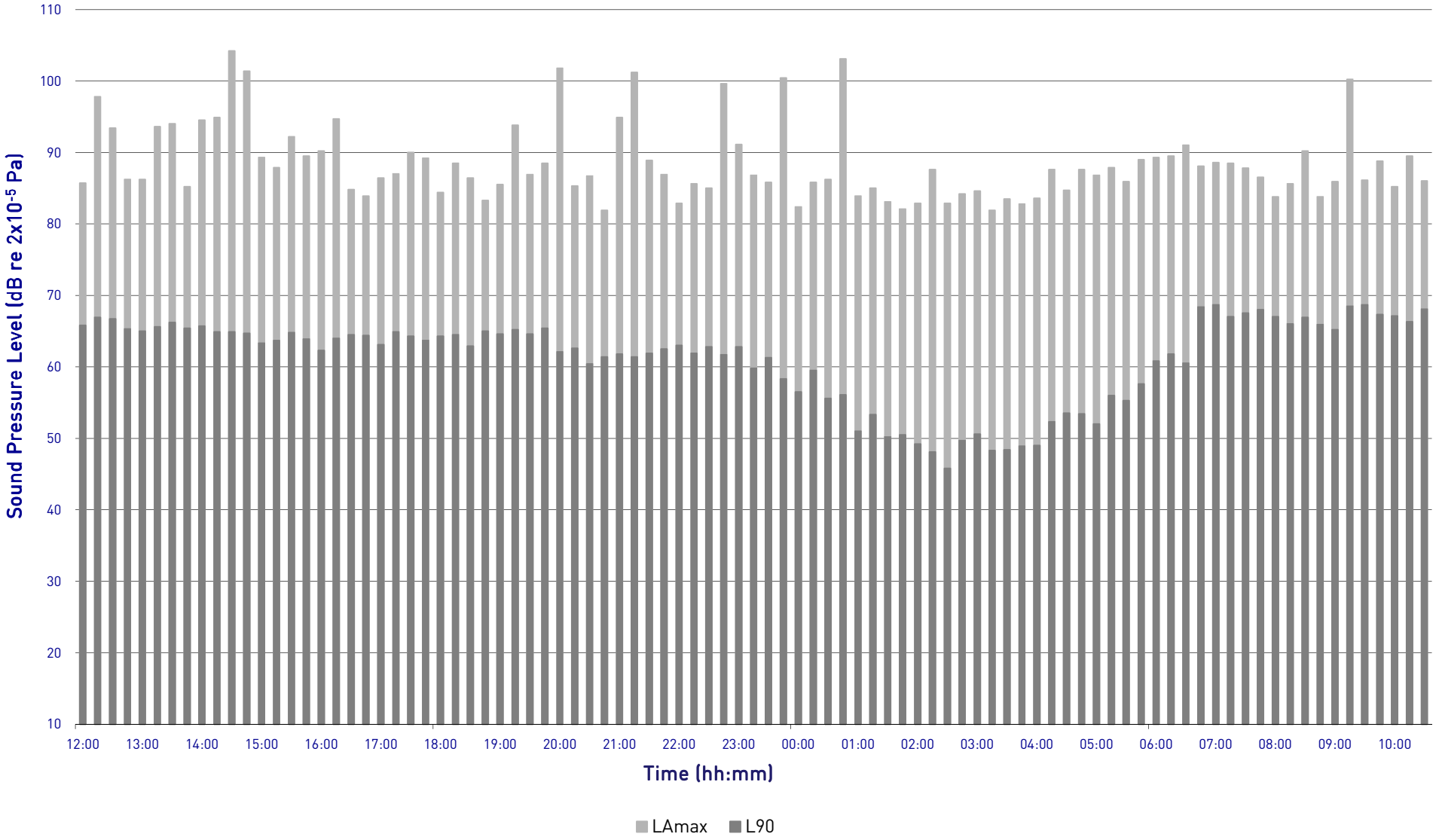
Phase 1 Kidderpore Avenue, London

L_{Amax} and L_{A90} Time History

Measurement Position 1 - Finchley Road, Thursday 13th February to Friday 14th February 2014

RBA ACOUSTICS

Graph 6015/G2



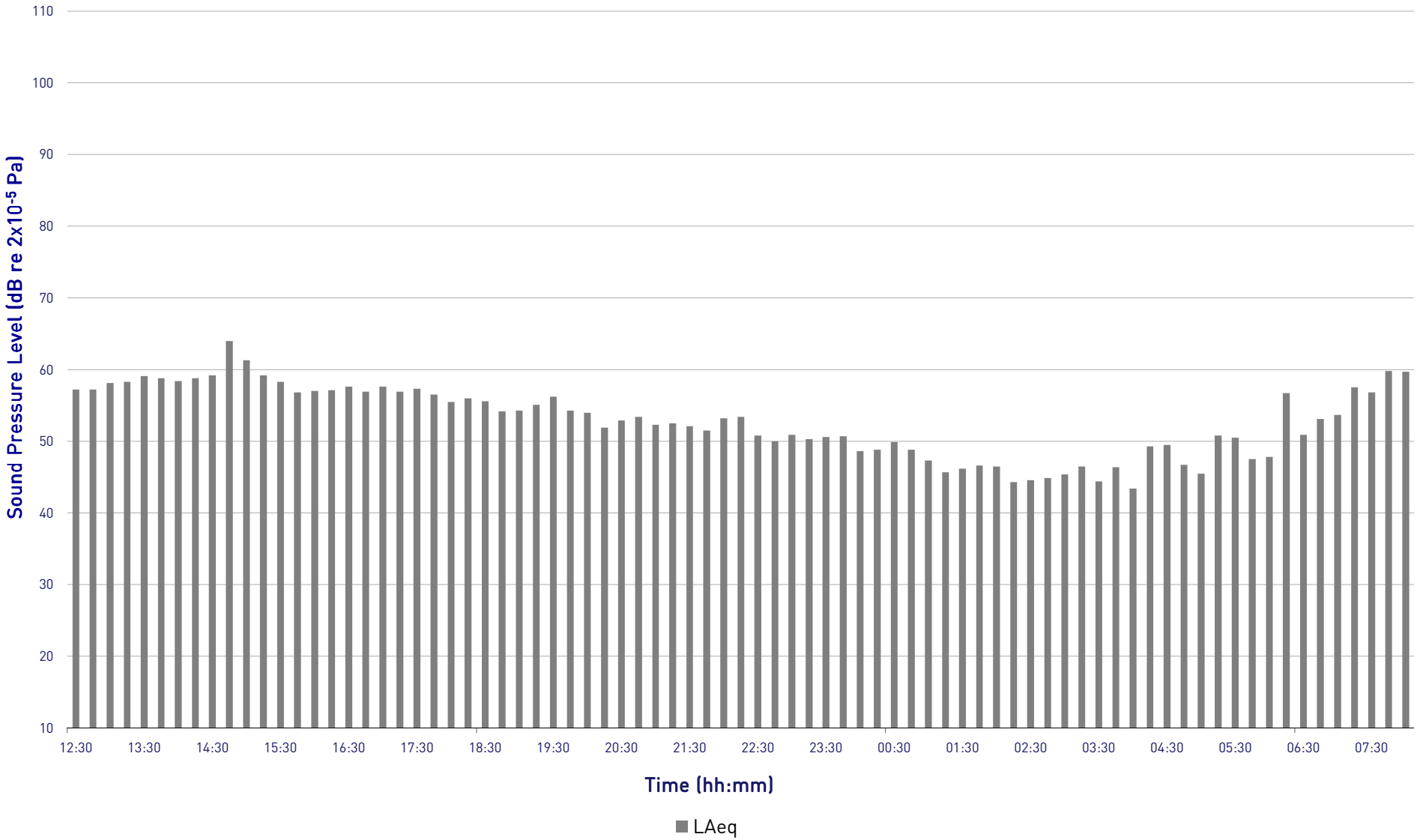
Phase 1 Kidderpore Avenue, London

L_{Aeq} Time History

Measurement Position 2 - Kidderpore Avenue, Thursday 13th February to Friday 14th February 2014

RBA ACOUSTICS

Graph 6015/G3



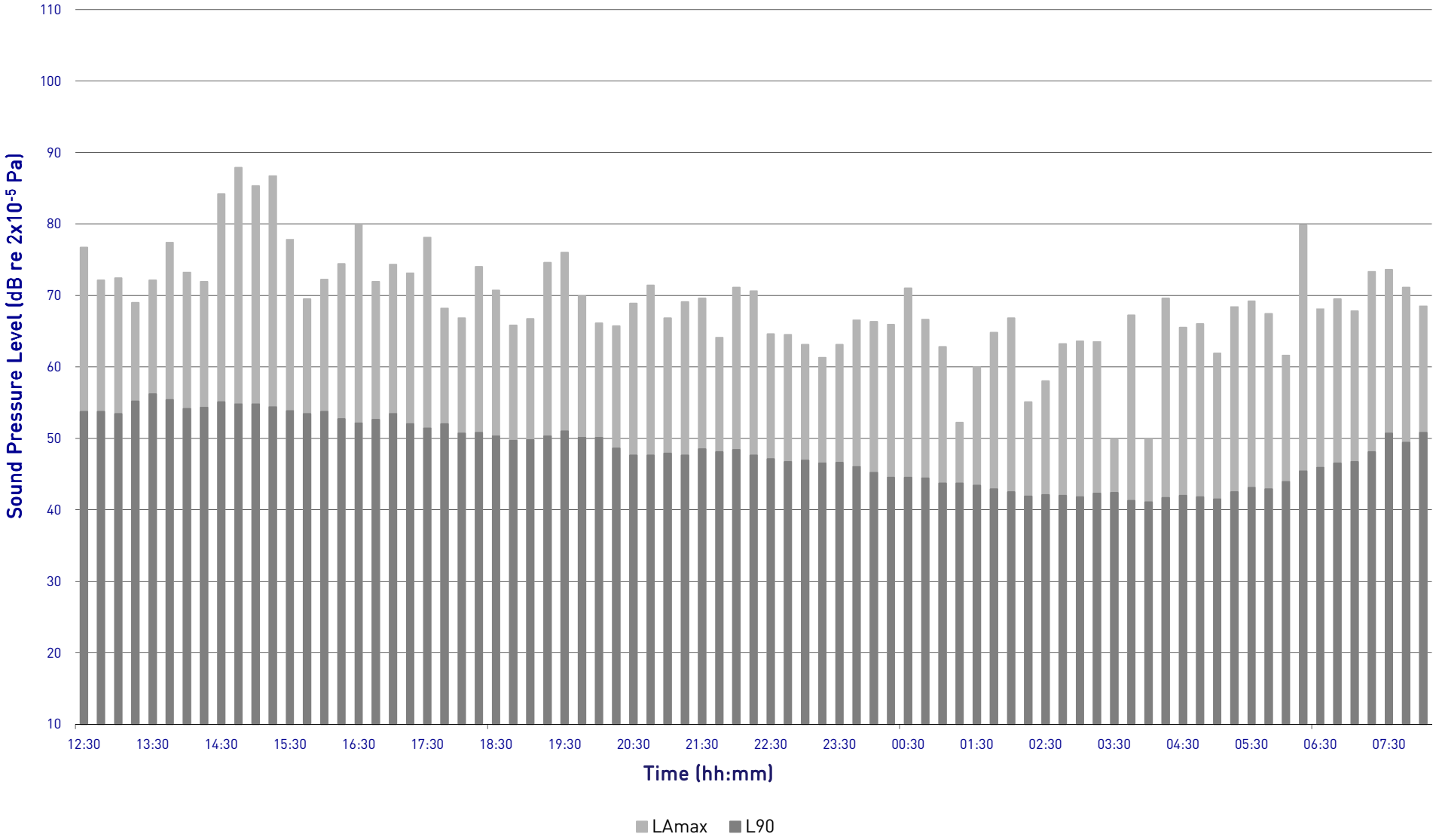
Phase 1 Kidderpore Avenue, London

L_{Amax} and L_{A90} Time History

Measurement Position 2 - Kidderpore Avenue, Thursday 13th February to Friday 14th February 2014

RBA ACOUSTICS

Graph 6015/G4

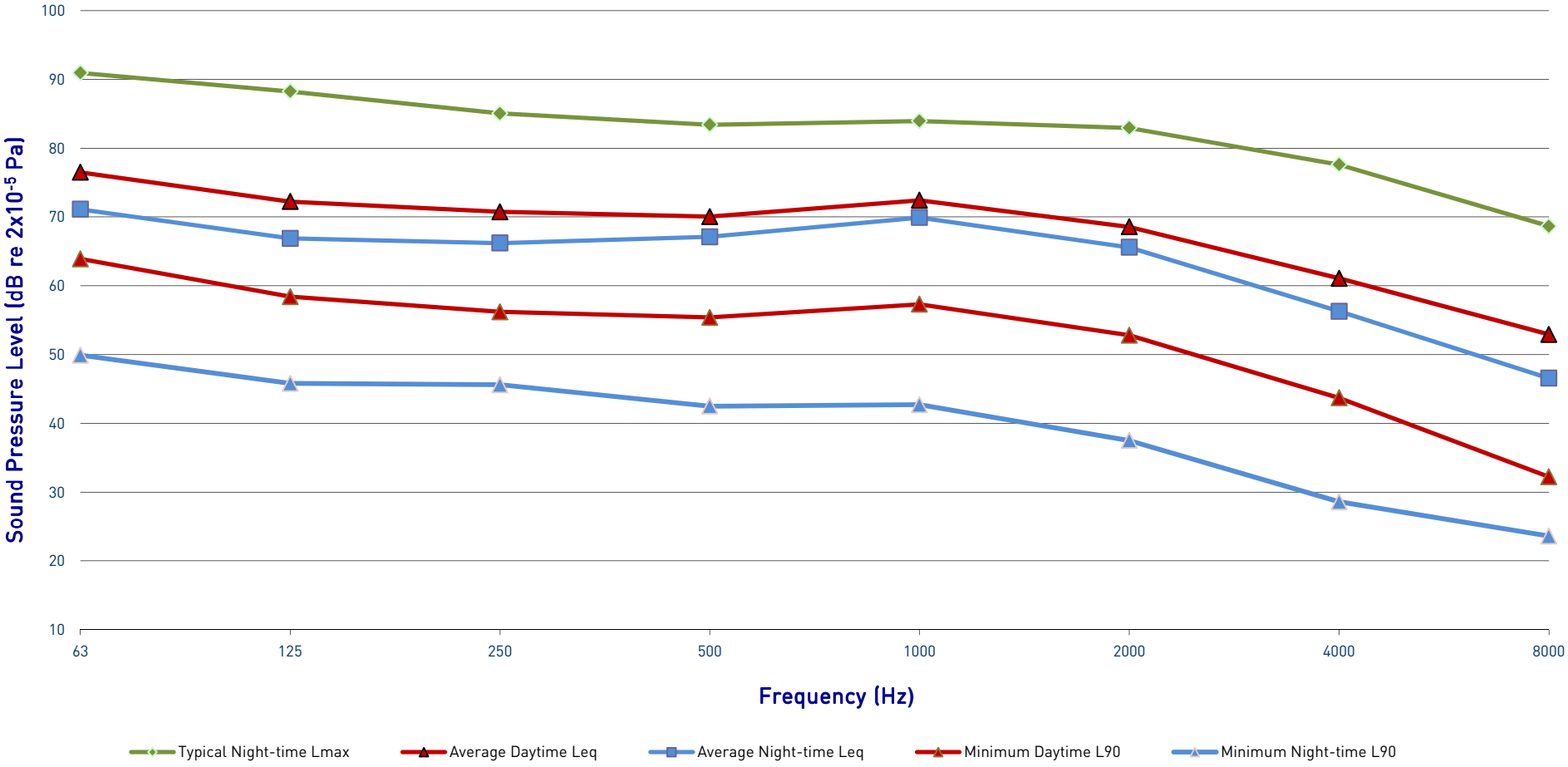


Phase 1 Kidderpore Avenue, London

Measured Noise Levels

Measurement Position 1 - Finchley Road, Thursday 13th February to Friday 14th February 2014

Graph 6015/G5

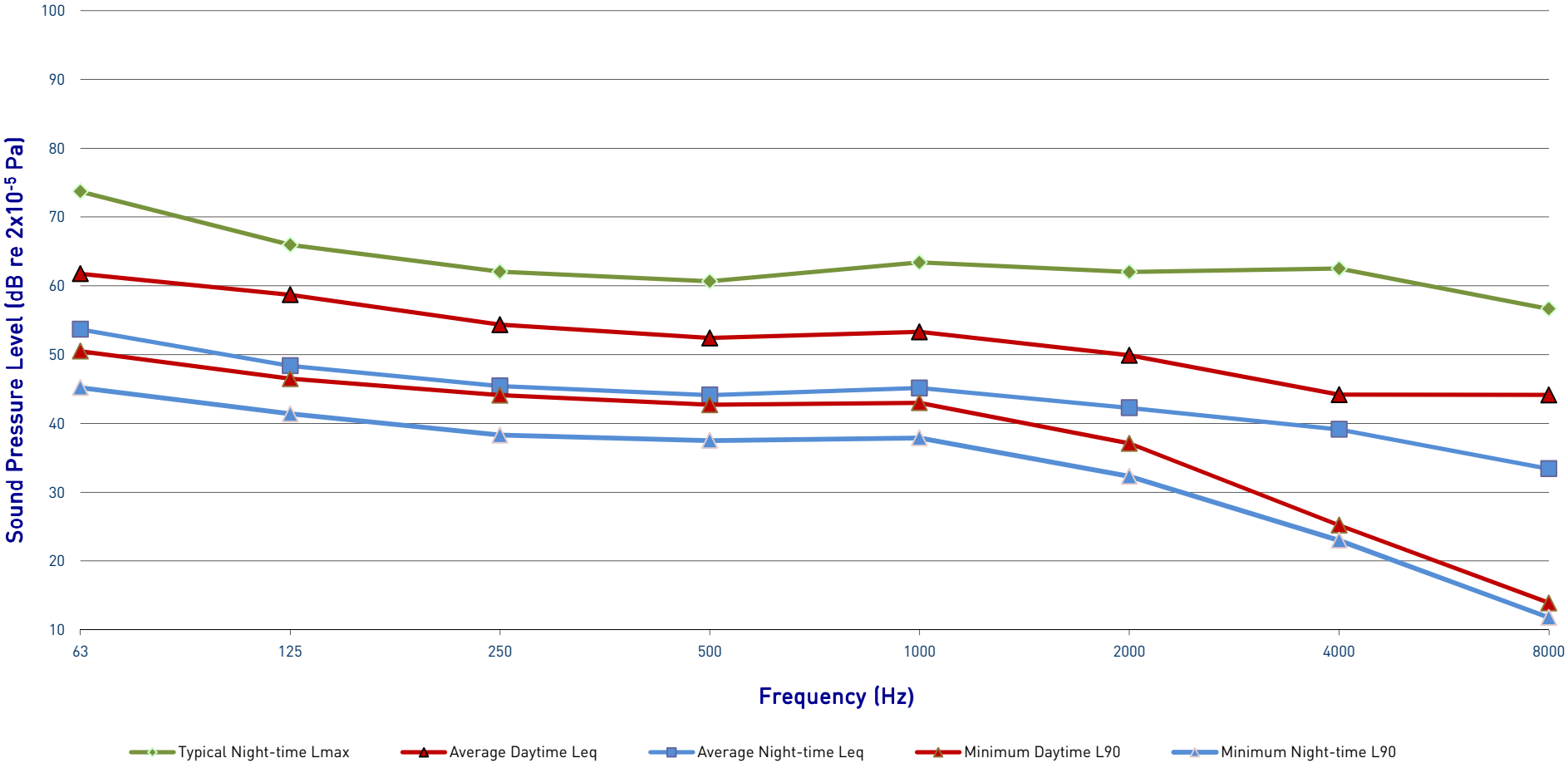


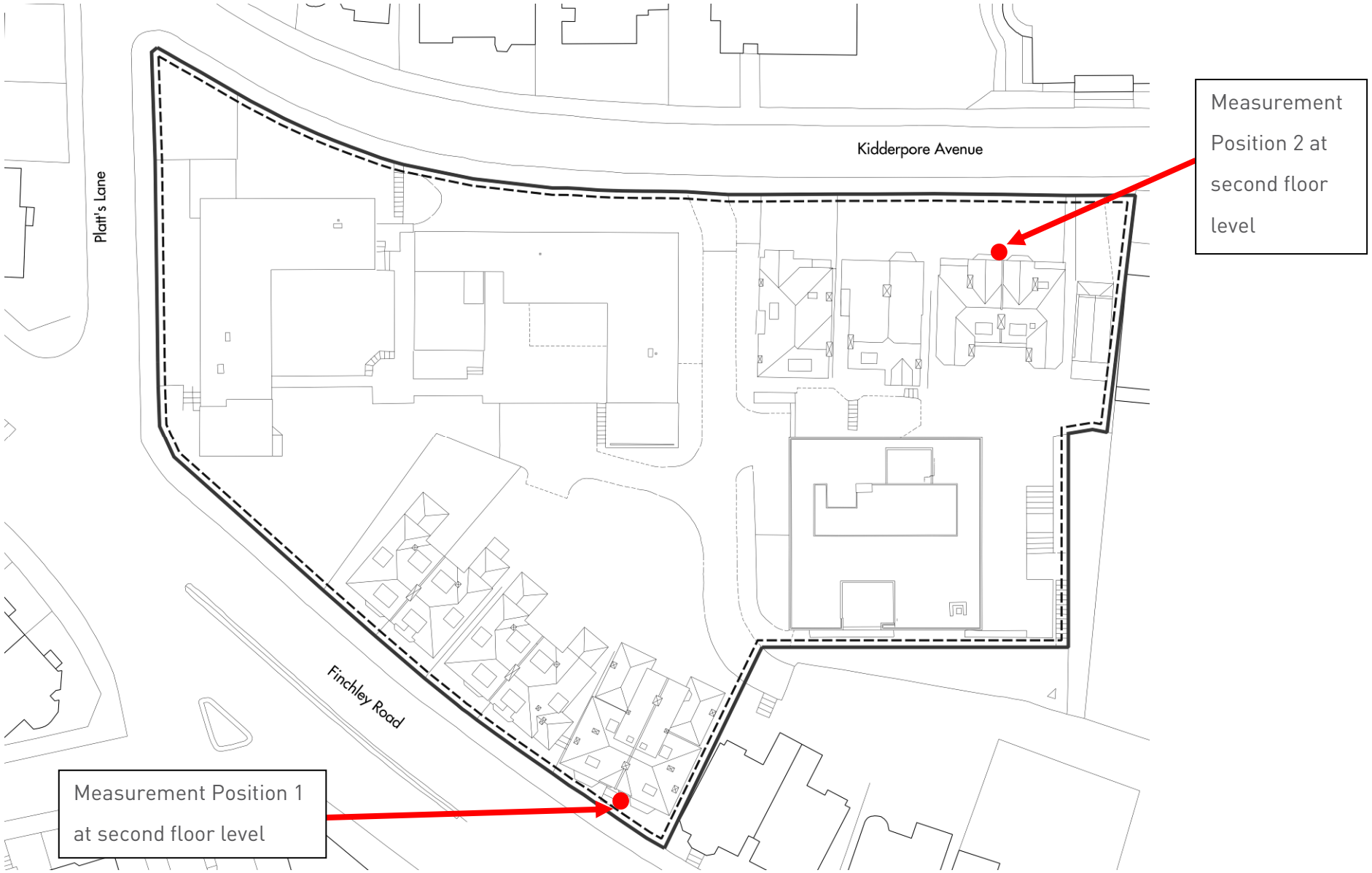
Phase 1 Kidderpore Avenue, London

Measured Noise Levels

Measurement Position 2 - Kidderpore Avenue, Thursday 13th February to Friday 14th February 2014

Graph 6015/G6





PHASE 1 KIDDERPORE AVENUE, LONDON

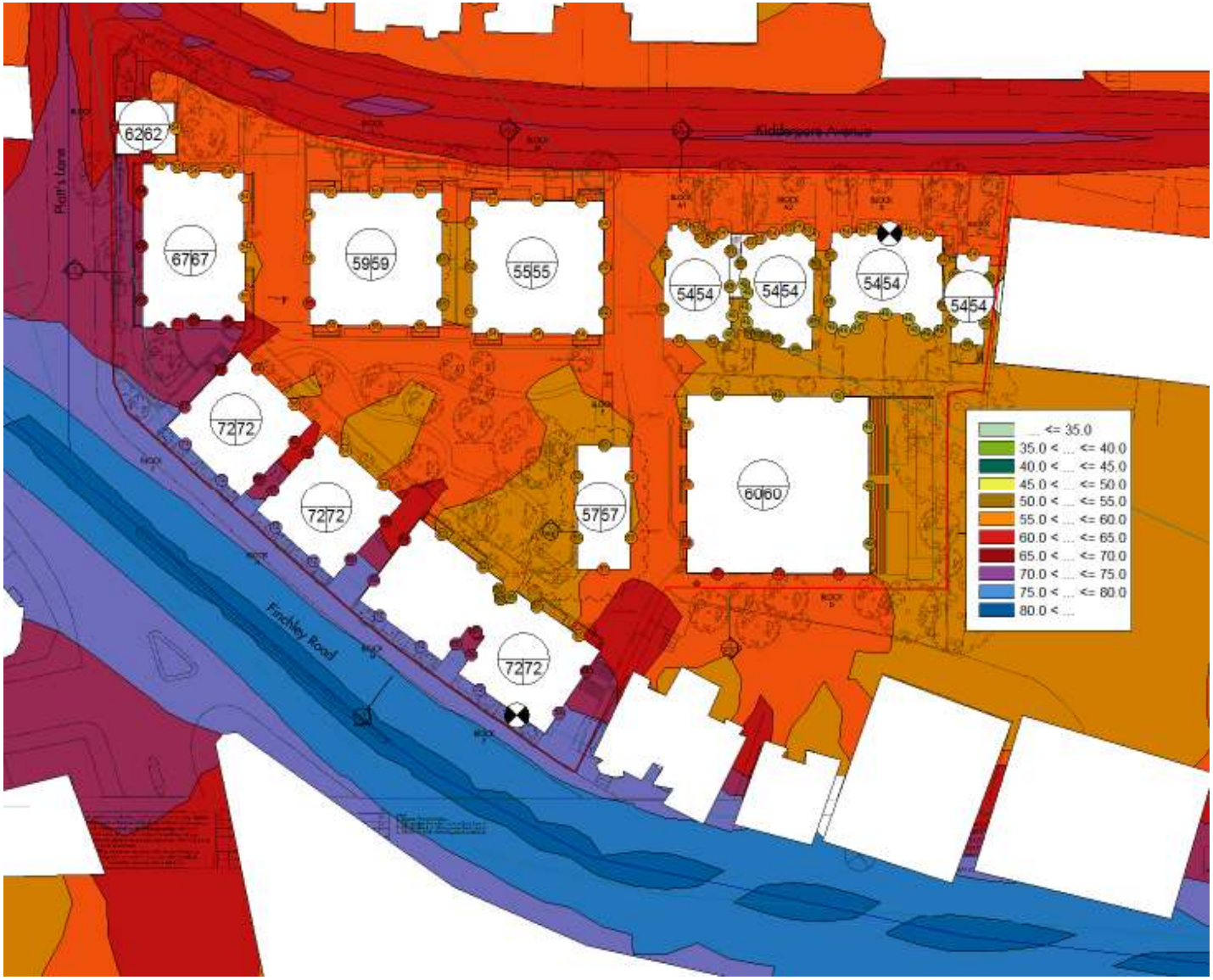
Site Plan Showing Measurement Positions at second floor level

Site Plan 6015/SP1

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

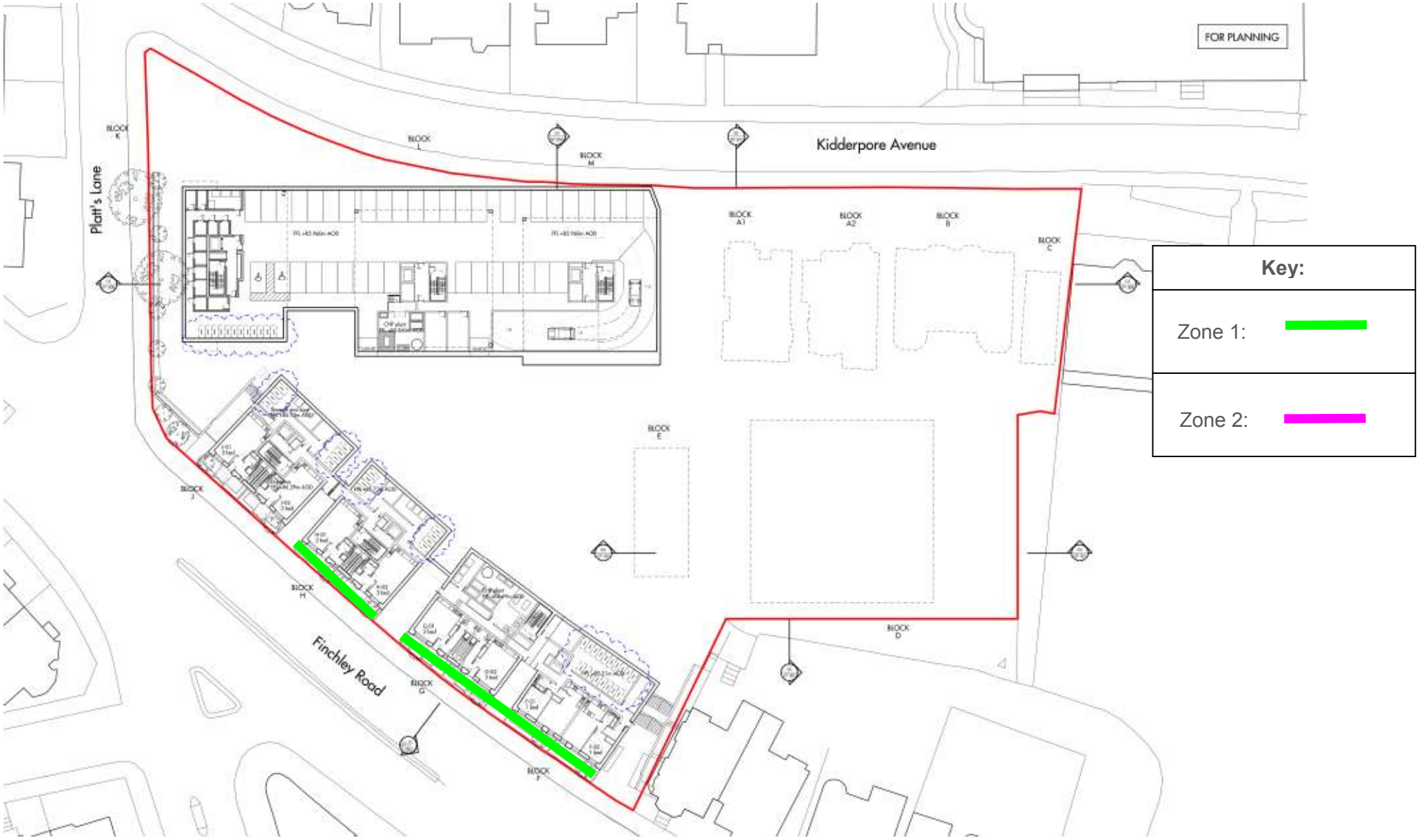
CadnaA Noise Map showing daytime $L_{eq,16hour}$ noise levels at 1.5m and maximum façade incident $L_{eq,16hour}$ noise levels.

6015/Cad1

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

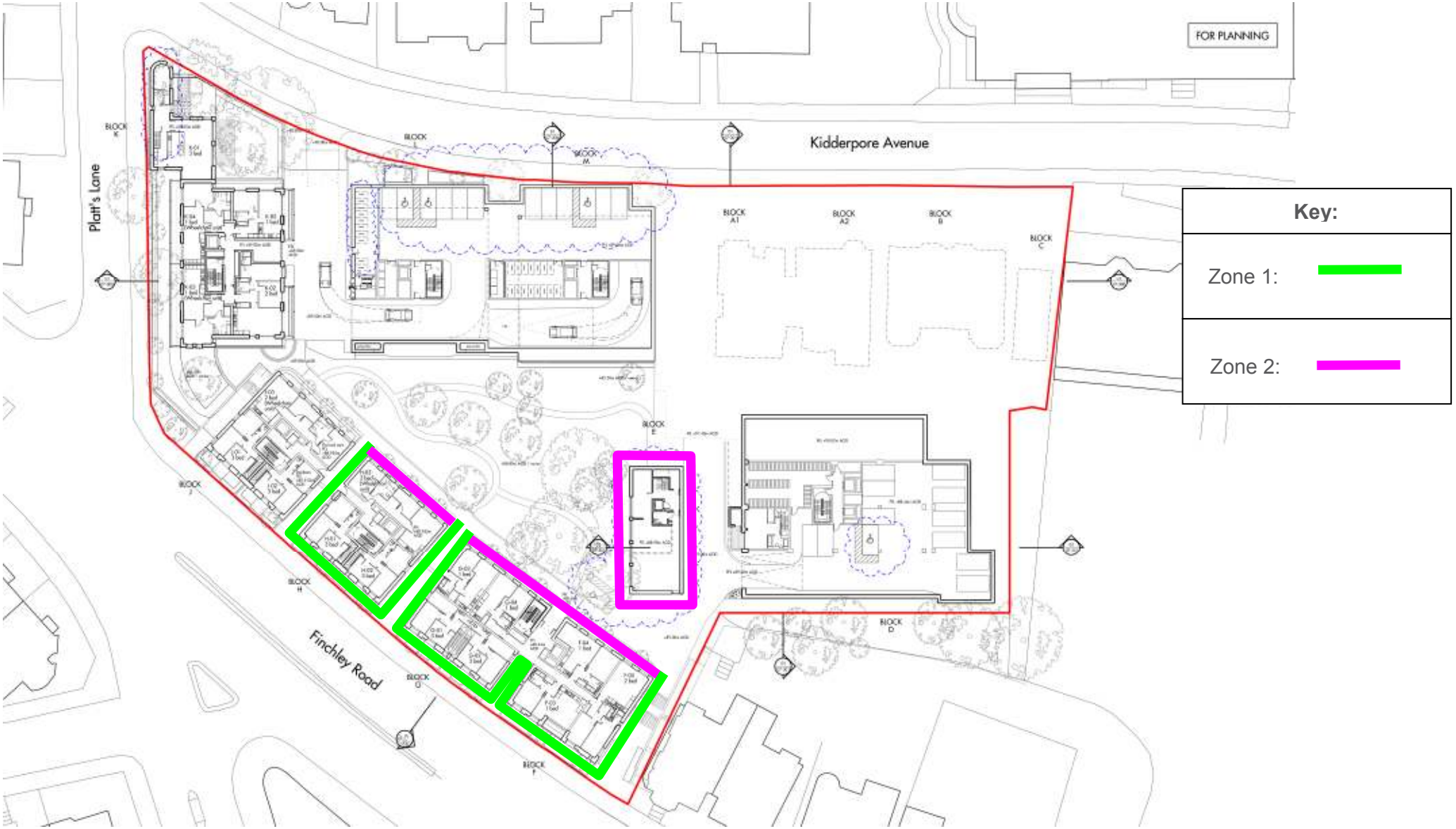
Façade Zoning Plan – Level -03

6015/FZP-03

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

Façade Zoning Plan – Level -02

6015/FZP-02

31 March 2014

Not to Scale

RBA ACOUSTICS

PHASE 1 KIDDERPORE AVENUE, LONDON

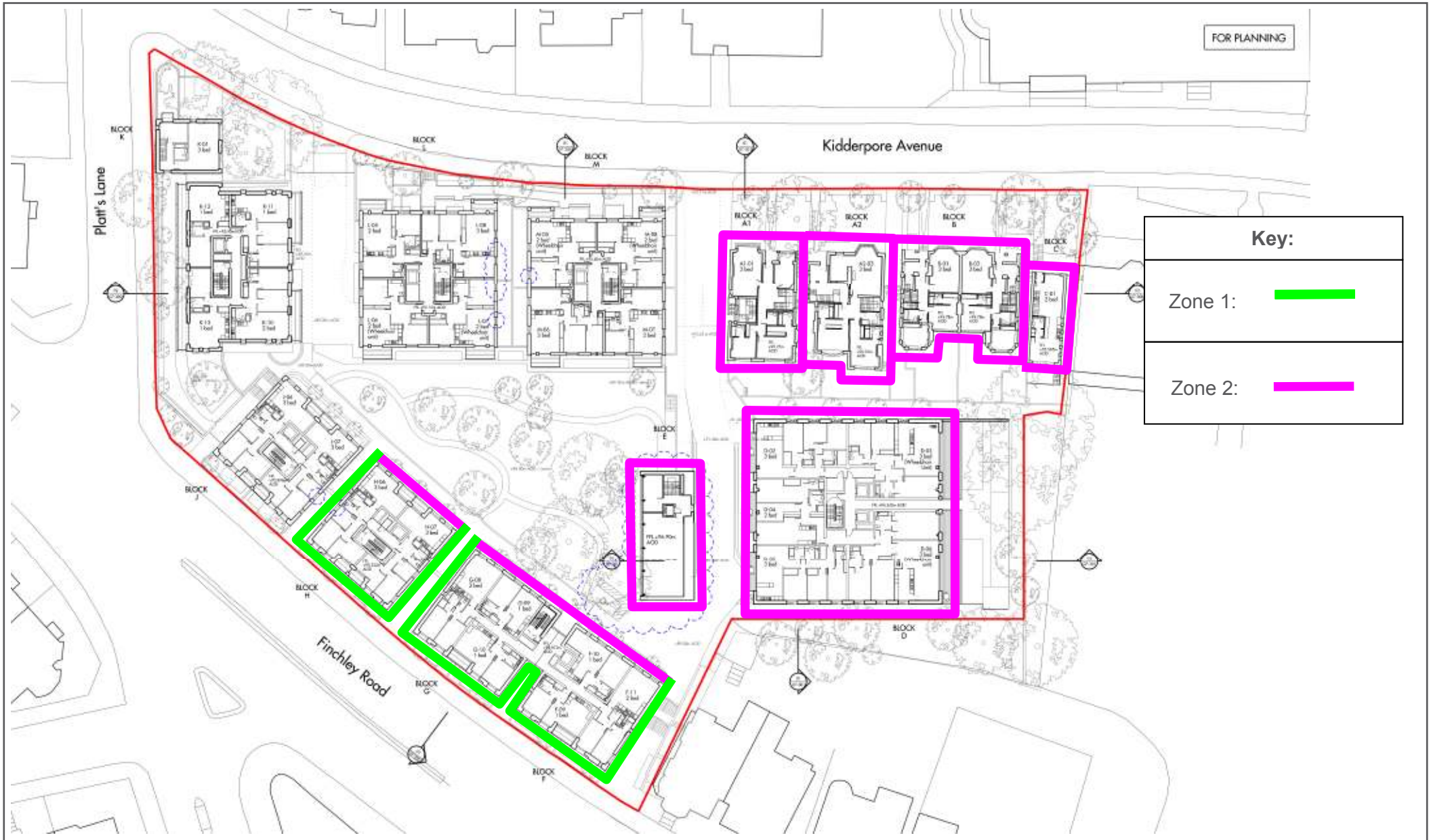
Façade Zoning Plan – Level -01

6015/FZP-01

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

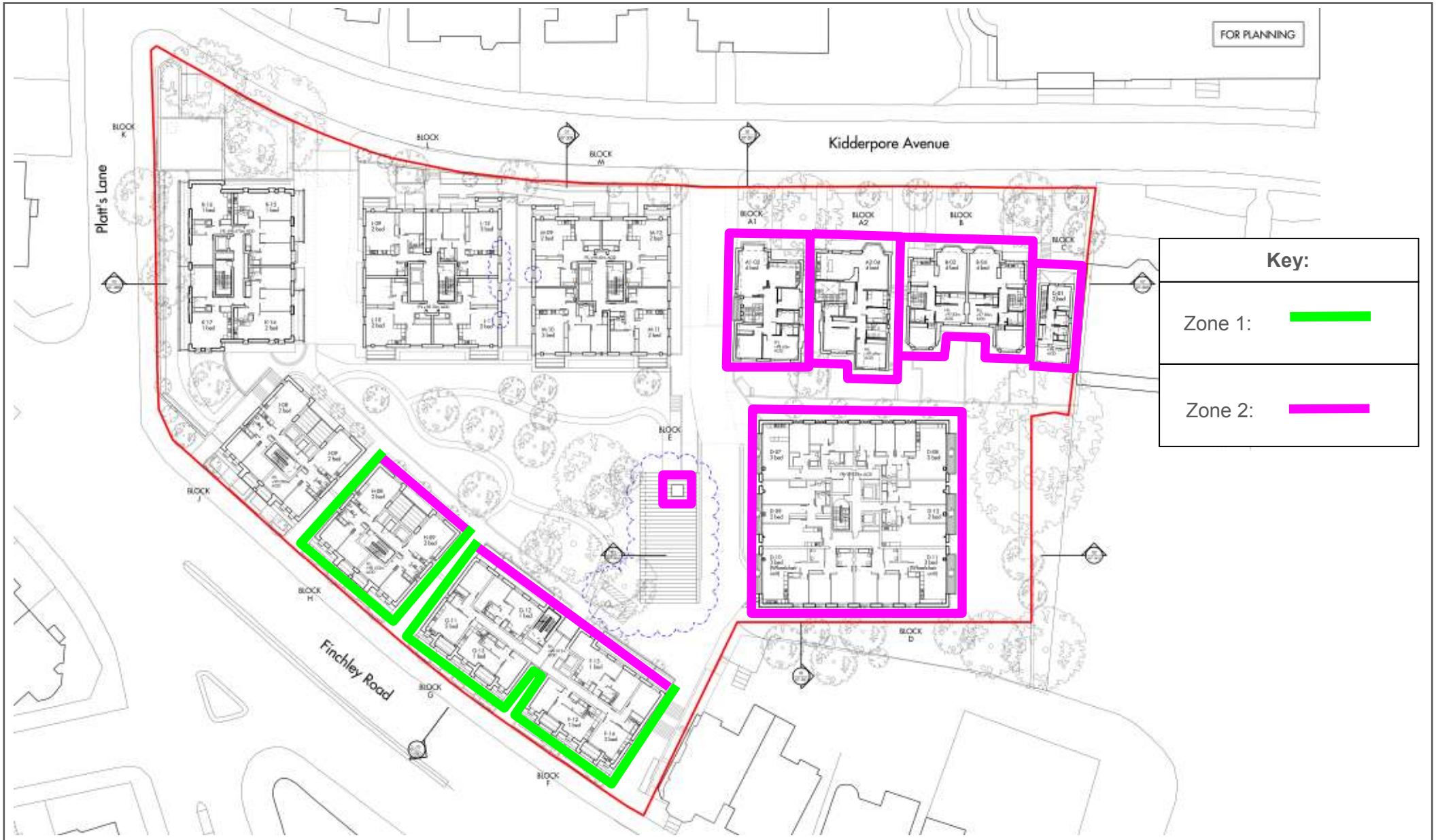
Façade Zoning Plan – Level 00

6015/FZP00

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

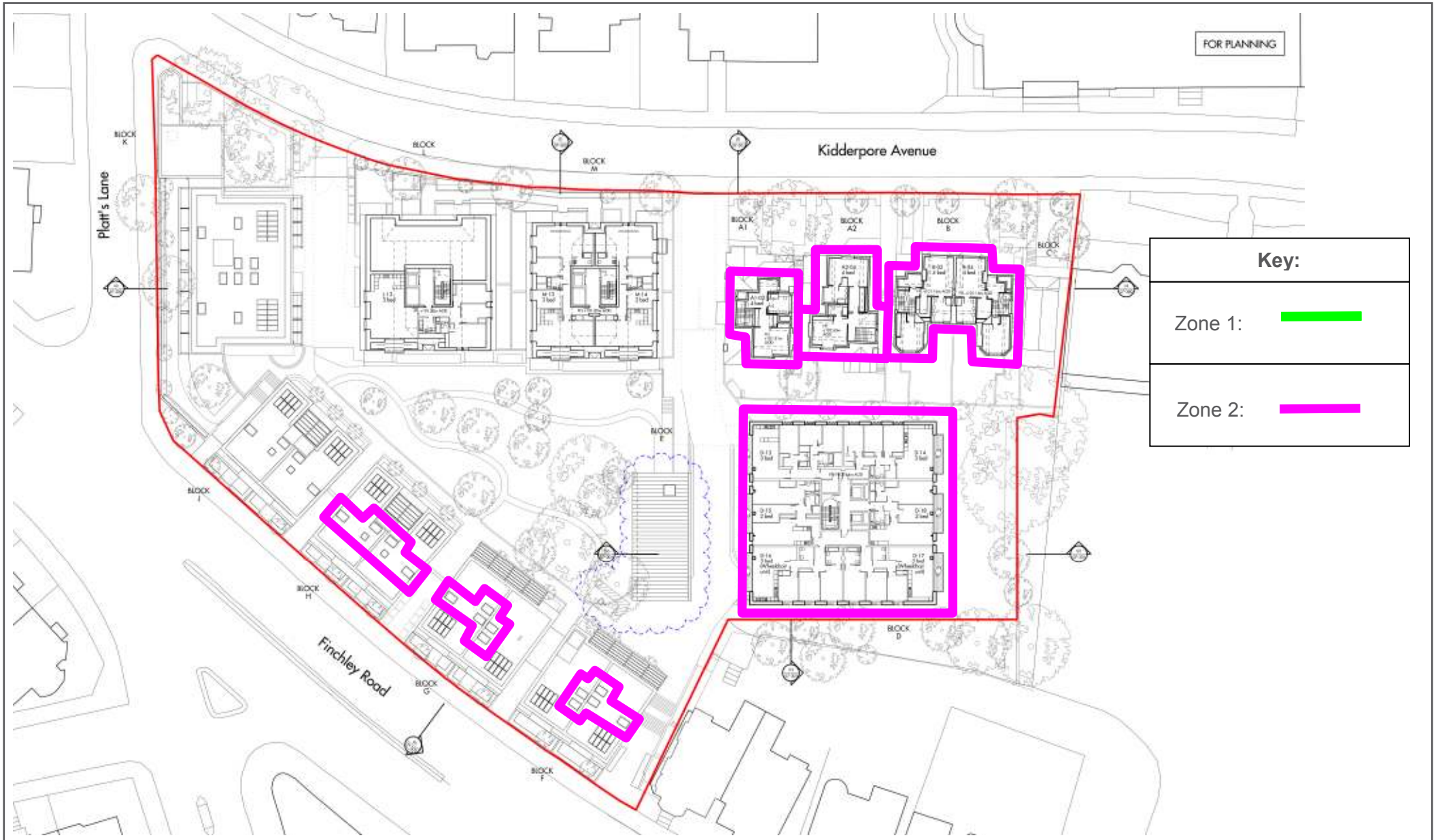
Façade Zoning Plan – Level 01

6015/FZP01

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

Façade Zoning Plan – Level 02

6015/FZP02

31 March 2014

Not to Scale

RBA ACOUSTICS

PHASE 1 KIDDERPORE AVENUE, LONDON

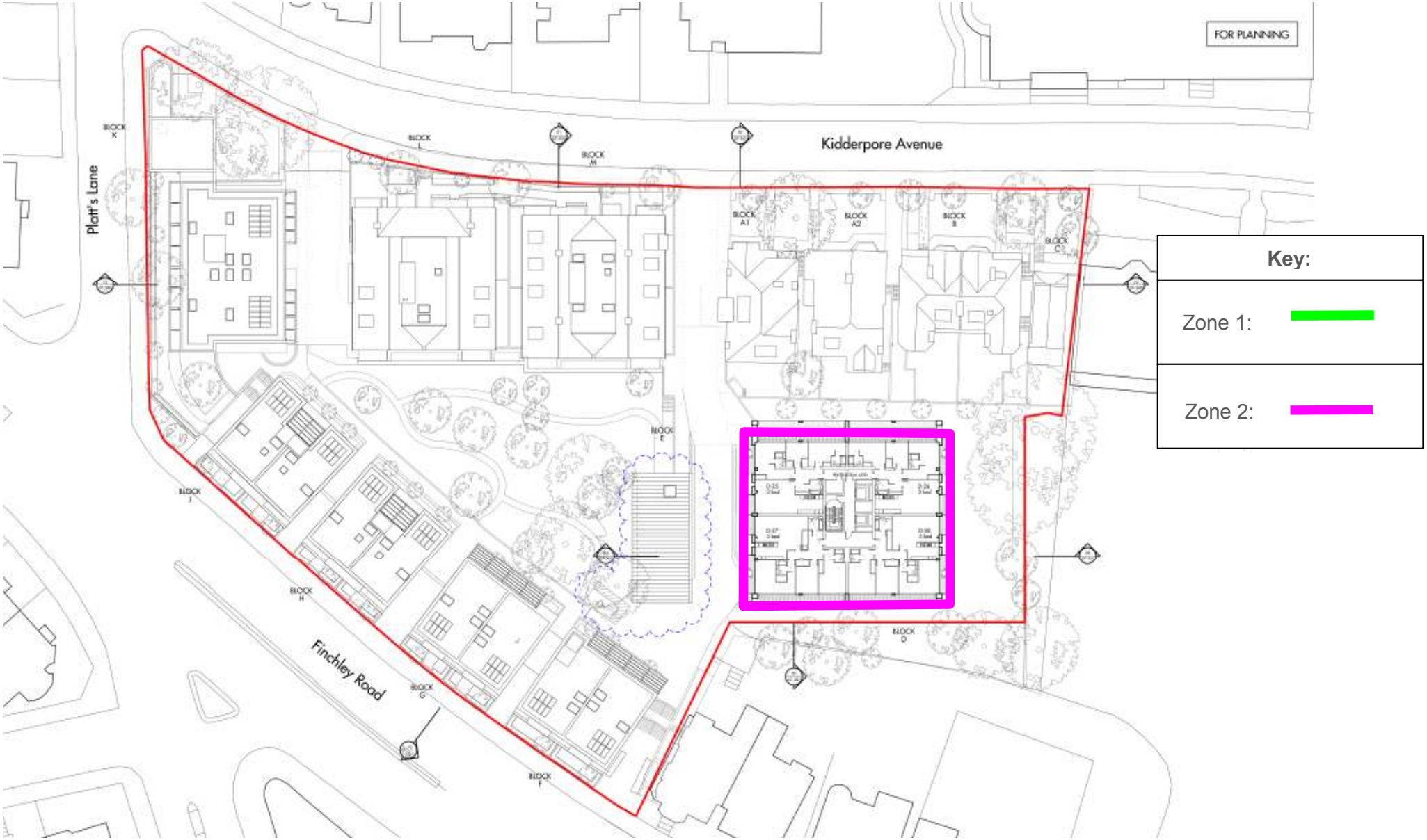
Façade Zoning Plan – Level 03

6015/FZP03

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

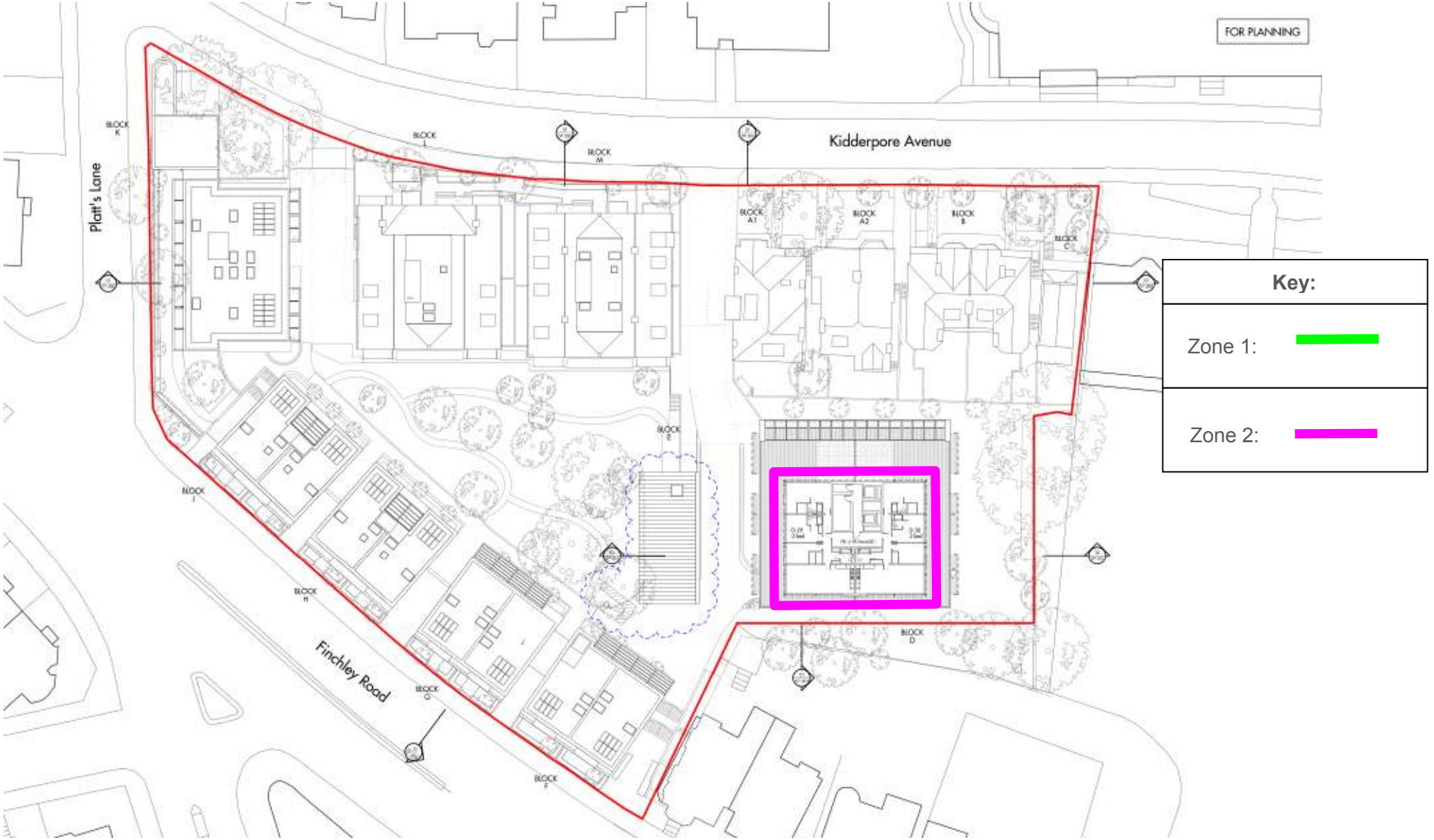
Façade Zoning Plan – Level 04

6015/FZP04

31 March 2014

Not to Scale

RBA ACOUSTICS



PHASE 1 KIDDERPORE AVENUE, LONDON

Façade Zoning Plan – Level 05

6015/FZP05

31 March 2014

Not to Scale

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PHASE 1 KIDDERPORE AVENUE, LONDON

Photograph detailing measurement position 1

Finchley Road

Measurement Position 1

6015/P1

31 March 2014

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PHASE 1 KIDDERPORE AVENUE, LONDON

Photograph detailing measurement position 2

Kidderpore Avenue

Measurement Position 2

6015/P2

31 March 2014

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