Report VA5225.240425.NIA1.3

12-14 Jockey's Fields & 14 Bedford Row, London

Noise Impact Assessment

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True North Management

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Contents

Attachments

Report Version	Author	Approved	Changes	Date
NIA	Ben Alexander	Jamie Duncan	-	26/3/24
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The interpretations and conclusions summarised in this report represent Venta Acoustics' best technical interpretation of the data available to us at the time of assessment. Any information provided by third parties and referred to in this report has not been checked or verified by Venta Acoustics, unless otherwise expressly stated in the document. Venta Acoustics cannot accept any liability for the correctness or validity of the information provided. Due to a degree of uncertainty inherent in the prediction of all parameters, we cannot, and do not guarantee the accuracy or correctness of any interpretation and we shall not, except in the case of gross or wilful negligence on our part, be liable for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretations, predictions of conclusions made by the company or employees. The findings and conclusions are relevant to the period of the site survey works, and should not be relied upon to represent site conditions at later dates. Where additional information becomes available which may affect the findings of our assessment, the author reserves the right to review the information, reassess the findings and modify the conclusions accordingly.

1. Introduction & Executive Summary

It is proposed to install new condenser and air-to-water heat pump units at roof level of 12-14 Jockey's Fields & 14 Bedford Row, London.

Venta Acoustics has been commissioned by True North Management to undertake an assessment of the potential noise impact of these proposals in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the background noise levels at the most affected noise sensitive receptors. These levels have been used to undertake an assessment of the likely impact with reference to the planning requirements of Camden Council.

Where the necessary plant housings are provided, the cumulative noise emission level from the proposed plant has been demonstrated to be compliant with the established noise emission limits. The proposed scheme is therefore expected to result in a low noise impact at all nearby noise-sensitive receptors.

2. Design Criterion and Assessment Methodology

2.1 Camden Council Requirements

The Camden Council Local Plan (adopted June 2017), Appendix 3, provides the following guidance regarding noise from 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).*

Existing Noise sensitive receiver	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required.*

In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted $L_{eq,5mins}$ noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

3. Site Description

The property consists of a large 6-storey (basement to 4th floor) building fronting Bedford Row, connected to a small terrace of converted mews house buildings at the rear (12-13 and 14 Jockey's Fields). The Bedford Row and Jockey's Fields buildings are connected, creating a large flat roof area between the buildings.

New VRV condensing plant is proposed on the roof of 14 Jockey's Fields.

The noise sensitive receiver expected to be most affected by these plant proposals are the rear upper storey windows of the house at 13 Bedford Row.

Existing building services plant was noted on several of the neighbouring rooftops.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Thursday 14th and Monday 18th March 2024 at the external location at the rear of building shown in site plan VA5225/SP1. This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-15993-E0	1504971-2	28/3/23
Larson Davis calibrator	CAL200	13069	1506037-2	28/7/23

Table 4.1 – Equipment used for the tests

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA5225/TH1-4.

The background noise level at the measurement position is determined by traffic on the surrounding road network and plant on nearby rooftops.

The lowest background noise levels measured were:

Monitoring Period	Typical[1] $L_{A90,5min}$
07:00 – 23:00 hours	40 dB
23:00 – 07:00 hours	37 dB

Table 4.2 – Background noise levels **[dB ref. 20 µPa]**

[1] The typical background is defined as the 10th percentile of the corresponding LA90 dataset

4.3 Plant Noise Emission Limits

On the basis of the measured noise levels and the planning requirements of the Local Authority, and considering that it is not expected that tonal noise will be generated by the proposed plant units, the following plant specific sound levels should not be exceeded at the most affected noise sensitive receivers:

Monitoring Period	Limiting Design Criterion (L_{Aeq})
07:00 – 23:00 hours	30 dB
23:00 – 07:00 hours	27 dB

Table 4.3 – Specific sound pressure levels not to be exceeded at most affected noise sensitive receivers

5. Predicted Noise Impact

5.1 Proposed plant

The following plant is proposed for installation at roof level at the location indicated on site plan VA5225/SP1.

Plant Item	Quantity	Proposed Model	Notes
Condenser	1	Daikin REYQ20U	Serving Basement
Condenser	1	Daikin REYQ12U	Serving Ground Floor
Condensers	3	Daikin REYQ22U	Serving First to Third Floor
Condenser	1	Daikin REYQ10U	Serving Fourth Floor
Air-to-water heat pump units	3	Mitsubishi Q-ton ESA30EH-25	-

Table 5.1 – Indicative plant selections assumed for this assessment.

Consulting the manufacturer's datasheets, the following noise emissions levels are attributed to the proposed plant items.

The manufacturer of the air-to-water heat pump units has only published single figure noise data. A spectral shape for a heat pump unit of similar power and form-factor has been assumed and shifted to meet the overall published noise data.

Plant Item	Octave Band Centre Frequency (Hz) Sound Pressure Level, L_p @ 1m (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Daikin REYQ20U	71	65	66	63	59	54	53	46	65
Daikin REYQ12U	64	66	61	57	54	51	54	44	61
Daikin REYQ22U (REYQ10U + REYQ12U)	65	68	63	60	55	53	55	45	63
Daikin REYQ10U	59	62	58	56	49	48	47	36	57
Mitsubishi Q-ton ESA30EH-25	61	63	58	54	51	48	51	41	58

Table 5.2 – Advised plant noise data used for the assessment.

5.2 Recommended Mitigation Measures

To avoid exceedance of the Camden Council limiting plant noise criteria, all condensing and heat pump plant will need to be installed within fully enclosed plant housings, delivering the insertion loss performances shown in Table 5.3.

Plant Item Housing	Octave Band Centre Frequency (Hz) Minimum Insertion Loss (dB)							
	63	125	250	500	1k	2k	4k	8k
Daikin REYQ22U condensers	11	13	19	28	34	36	36	37
All other condensers and heat pumps	7	9	12	24	31	33	29	30

Table 5.3 – Minimum insertion loss performance required for plant housings

All plant and ductwork should be fitted with anti-vibration mounts in accordance with the manufacturer guidelines. This is expected to control structureborne noise to the building to acceptable levels.

Please note that the above recommendations relate to acoustic issues only. It is recommended that professional advice confirming the suitability of these measures be sought from others with regards to issues such as airflow, structural stability and visual impact.

5.3 Predicted noise levels

The cumulative noise level at the most affected noise sensitive receiver, some 20 meters away, has been calculated on the basis of the above information and assuming the recommended mitigation measures, with reference to the guidelines set out in ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation.*

A summary of the calculations are shown in Appendix B.

Description	dB(A)
Limiting plant noise criterion (24-hour operation)	27
Predicted L_p @ 1m from receiver	26

Table 5.4 – Predicted noise and level and design criteria at noise sensitive location

5.4 Comparison to NR35 Curve

As can been seen from the following comparison in Table 5.5, the predicted noise levels at 1m from the most affected receiver are comfortably below the NR35 curve.

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
NR35	63	52	45	39	35	35	30	28
Predicted levels	41	38	32	17	6	1	5	-5

Table 5.5 – Comparison of predicted noise levels against the NR35 criterion

6. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of 12-14 Jockey's Fields & 14 Bedford Row, London, in support of a planning application for the proposed introduction of new building services plant.

This has enabled noise emission limits to be set at the most affected noise sensitive receiver such that the proposed installation meets the requirements of Camden Council.

With necessary mitigation measures provided, the cumulative noise emission levels from the proposed plant have been assessed to be compliant with the plant noise emission limits and the proposed scheme is therefore expected to result in a low noise impact.

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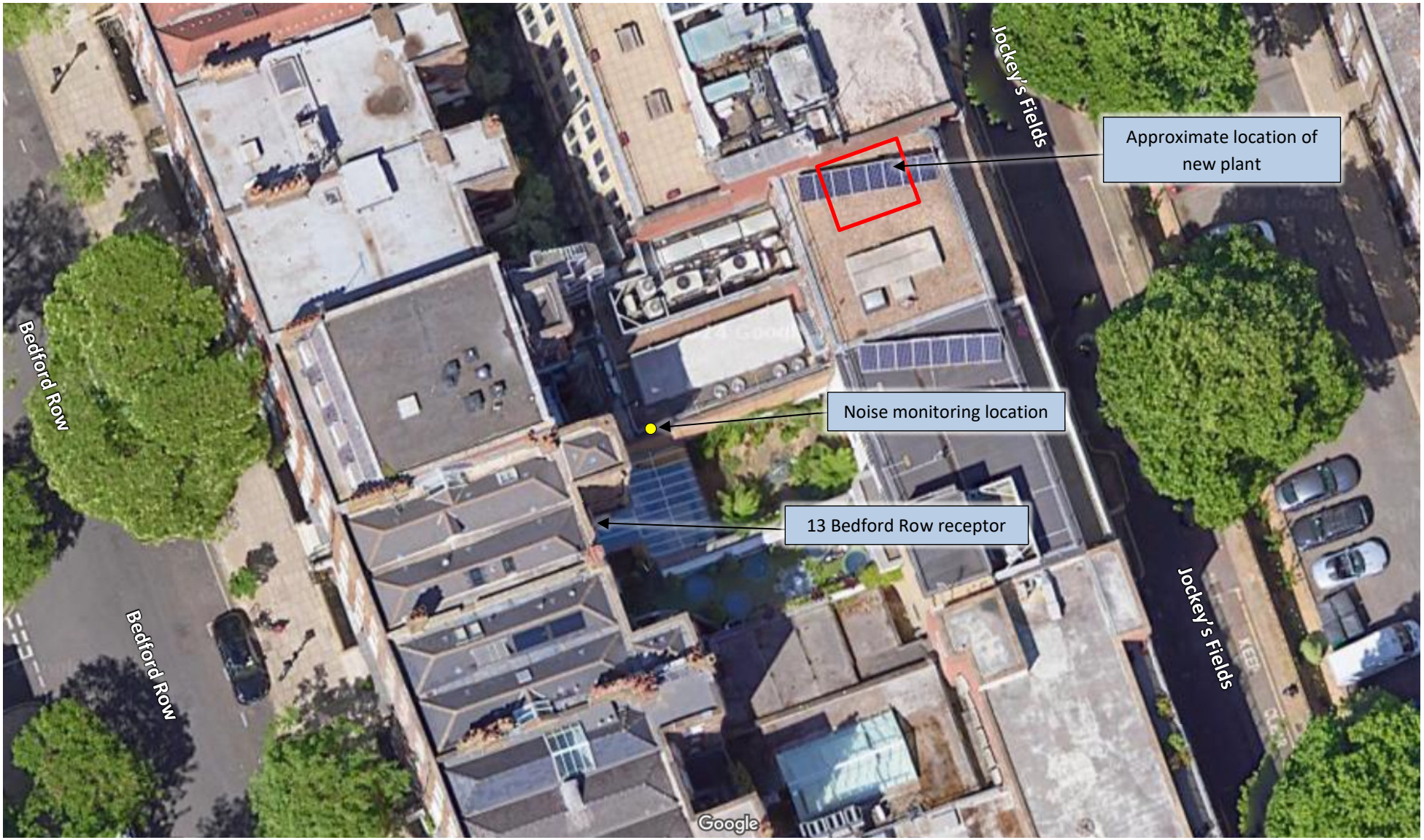
Approximate location of new plant
Noise monitoring location
13 Bedford Row receptor
Bedford Row
Bedford Row
Jockey's Fields
Jockey's Fields
Google

12-14 Jockey's Fields & 14 Bedford Row, London

Environmental Noise Time History: 1

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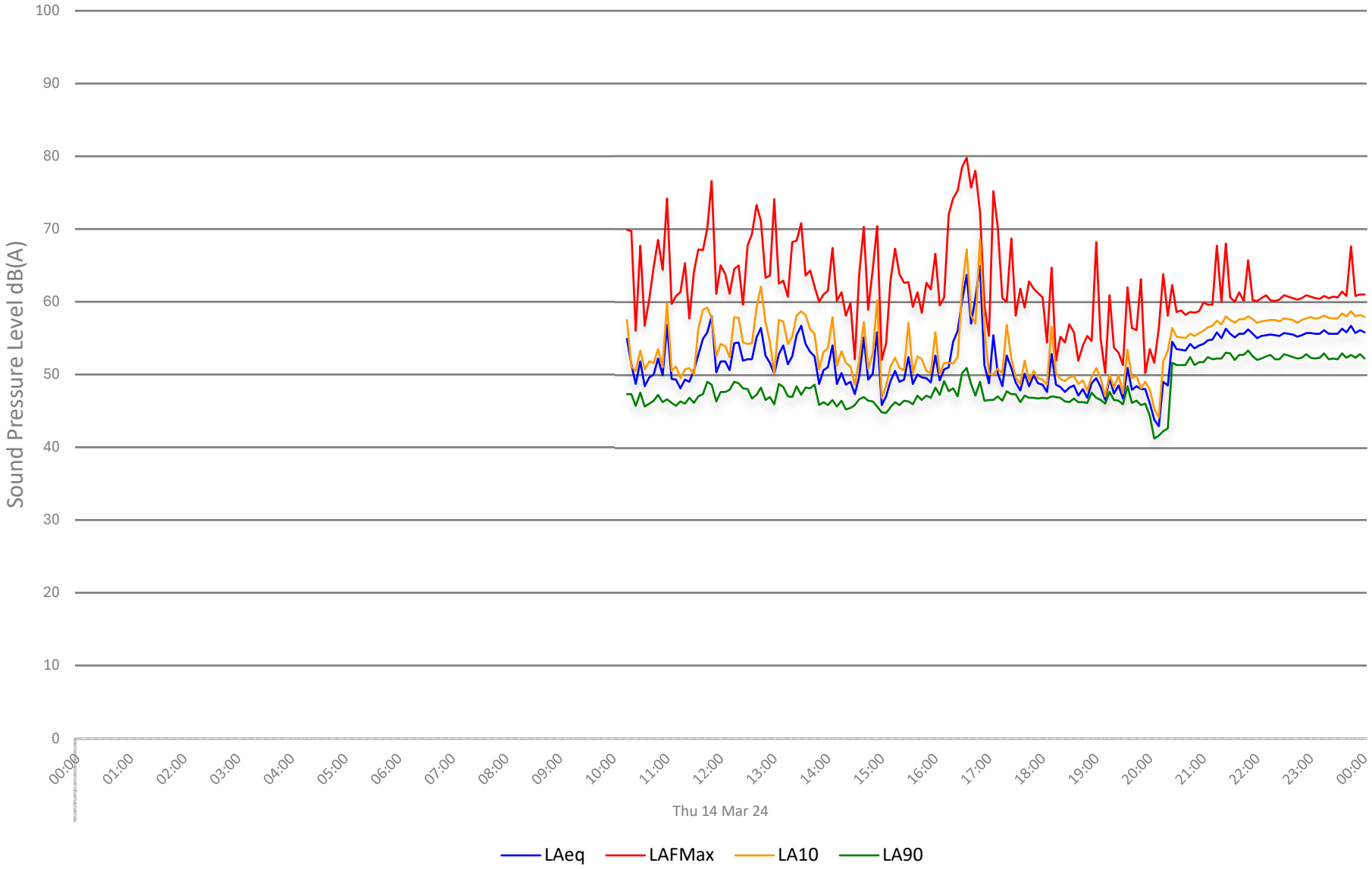
Figure VA5225/TH1



12-14 Jockey's Fields & 14 Bedford Row, London

Environmental Noise Time History: 2

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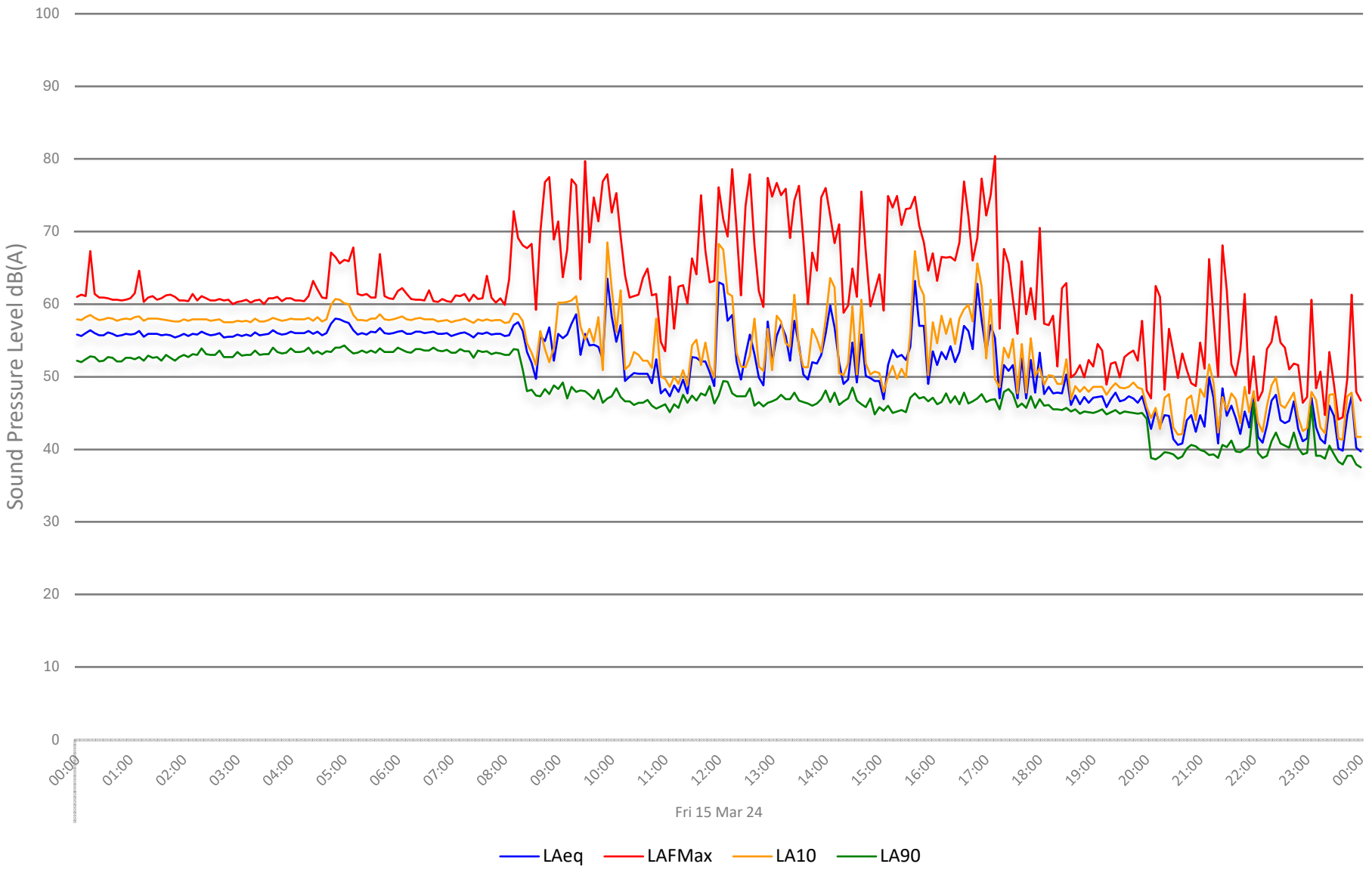
Figure VA5225/TH2



12-14 Jockey's Fields & 14 Bedford Row, London

Environmental Noise Time History: 3

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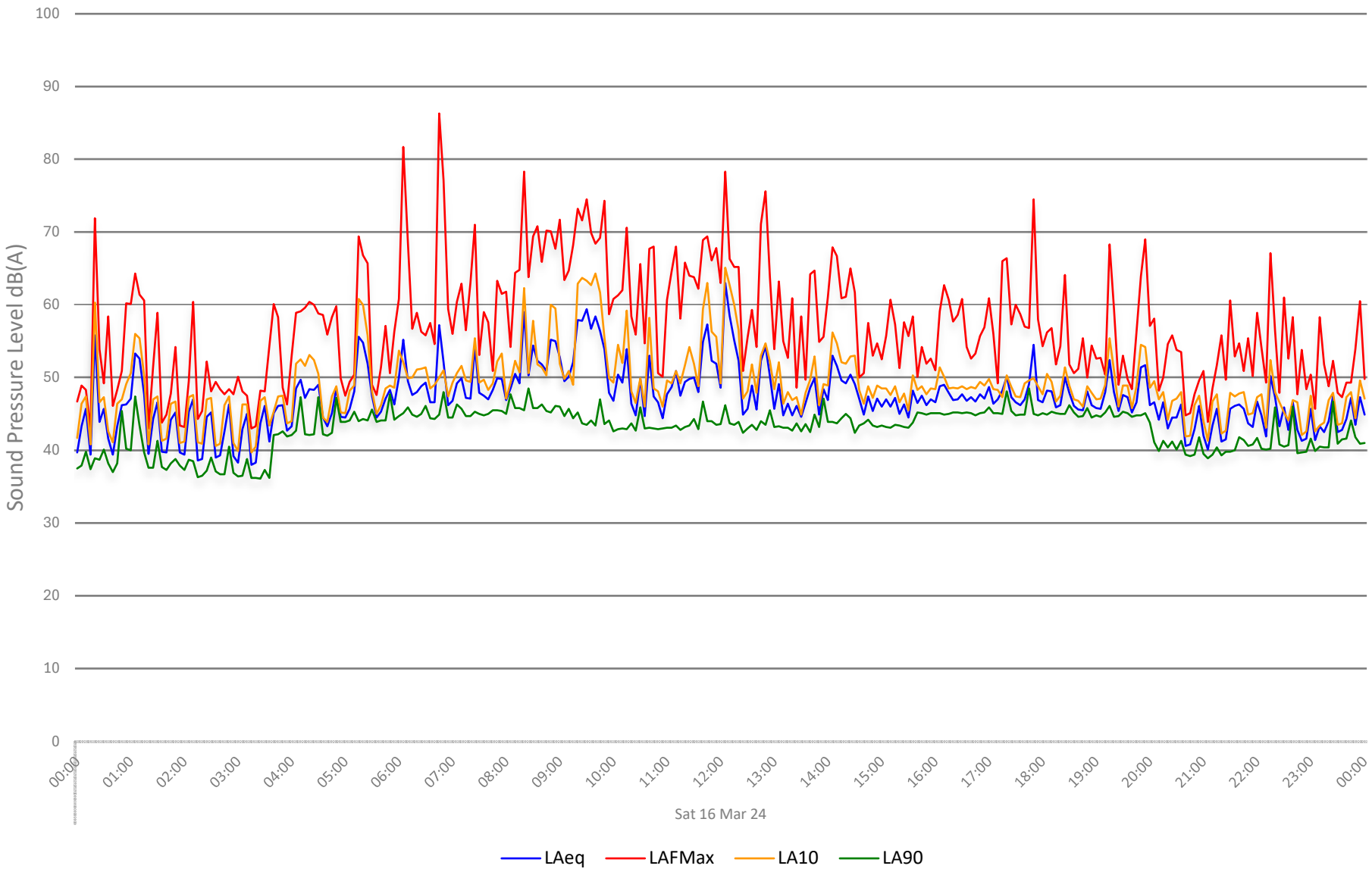
Figure VA5225/TH3



12-14 Jockey's Fields & 14 Bedford Row, London

Environmental Noise Time History: 4

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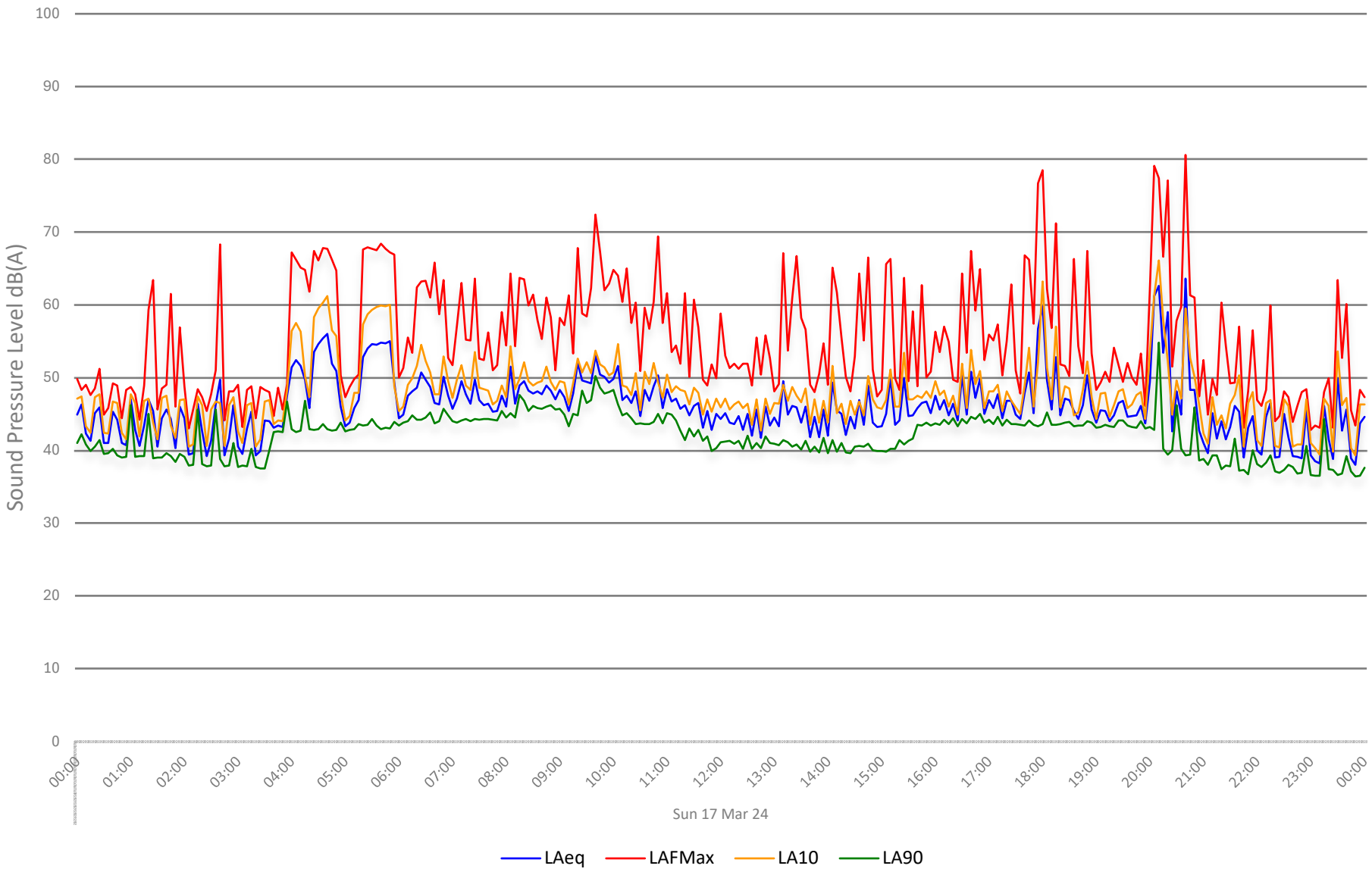
Figure VA5225/TH4



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	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 (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. 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 a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.1 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.2 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

APPENDIX B

VA5225 - 12-14 Jockey's Fields & 14 Bedford Row, London

Noise Impact Assessment

Assessment to closest rear windows of 13 Bedford Row

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Daikin REYQ20U source level	Lp @ 1m	71	65	66	63	59	54	53	46	**65**
Enclosure loss		-7	-9	-12	-24	-31	-33	-29	-30	
Distance Loss	To 20m	-26	-26	-26	-26	-26	-26	-26	-26	
Level at receiver	**Leq**	**38**	**30**	**28**	**13**	**2**	**-5**	**-2**	**-10**	**21**

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Daikin REYQ12U source level	Lp @ 1m	64	66	61	57	54	51	54	44	**61**
Enclosure loss		-7	-9	-12	-24	-31	-33	-29	-30	
Distance Loss	To 20m	-26	-26	-26	-26	-26	-26	-26	-26	
Level at receiver	**Leq**	**31**	**31**	**23**	**7**	**-3**	**-8**	**-1**	**-12**	**18**

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Daikin REYQ22U source level	Lp @ 1m	65	68	63	60	55	53	55	45	**63**
Number of Plant	3	5	5	5	5	5	5	5	5	
Enclosure loss		-11	-13	-19	-28	-34	-36	-36	-37	
Distance Loss	To 20m	-26	-26	-26	-26	-26	-26	-26	-26	
Level at receiver	**Leq**	**33**	**33**	**23**	**10**	**0**	**-4**	**-2**	**-14**	**19**

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Daikin REYQ10U source level	Lp @ 1m	59	62	58	56	49	48	47	36	**57**
Enclosure loss		-7	-9	-12	-24	-31	-33	-29	-30	
Distance Loss	To 20m	-26	-26	-26	-26	-26	-26	-26	-26	
Level at receiver	**Leq**	**26**	**27**	**20**	**6**	**-8**	**-11**	**-8**	**-20**	**15**

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Mitsubishi ESA30EH-25 source level	Lp @ 1m	61	63	58	54	51	48	51	41	**58**
Number of Plant	3	5	5	5	5	5	5	5	5	
Enclosure loss		-7	-9	-12	-24	-31	-33	-29	-30	
Distance Loss	To 20m	-26	-26	-26	-26	-26	-26	-26	-26	
Level at receiver	**Leq**	**33**	**33**	**25**	**9**	**-1**	**-6**	**1**	**-10**	**20**

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Cumulative level at receiver	**Leq**	41	38	32	17	6	1	5	-5	**26**