PROPOSED MIXED RESIDENTIAL AND COMMERCIAL DEVELOPMENT AT 18 – 22 HAVERSTOCK HILL

Noise Assessment

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Quality Management

	Version 1	Version 2	Version 3	Version 4
Date	09/03/2018	27/03/2018		
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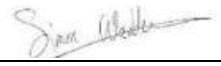
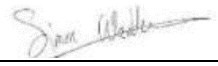
Signature				
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Table of Contents

1 Introduction 3

1.1 Background 3

1.2 Scope of assessment 3

1.3 Study area and noise sensitive receptors 4

1.4 Noise terms used in this assessment 4

2 Relevant guidance and advice 4

2.1 National Planning Policy Framework (NPPF) 4

2.2 Noise Policy Statement for England (NPSE) 5

2.3 British Standard BS 7445-1:2003 Description and Measurement of Environmental Noise. Guide to quantities and procedures 5

2.4 British Standard BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings 5

2.5 World Health Organization (WHO), Guidelines for Community Noise, 1999 6

2.6 Camden Local Plan 2017 6

3 Method 7

3.1 Consultation with Camden Council 7

3.2 Baseline noise survey 7

3.3 Derivation of post-development noise levels 8

3.4 Evaluation against criteria 8

4 Results 9

4.1 Measured baseline noise levels 9

4.2 Acoustic performance of existing glazing and facade 10

4.3 Evaluation against Camden Council criteria 11

4.4 Evaluation against BS8233 criteria 11

4.5 Evaluation against WHO criterion 12

4.6 Committed mitigation 12

4.7 Conclusion 13

Appendix A – Development Layout Drawings

Appendix B – Monitoring Results and Photographs of Monitoring Locations

Appendix C – Calibration Documents

1 Introduction

1.1 Background

1.1.1 ITPEnergised (ITPE) was appointed by PPR Haverstock Hill LLP (hereafter "PPR") to provide a noise assessment for the redevelopment of an existing block of flats into a mixed residential and commercial development (hereafter 'the proposed development').

1.1.2 The Proposed Development is located at 18-22 Haverstock Hill, London, within the administrative area of the London Borough of Camden (LBC). The proposed development site boundary and layout are shown on Figure 1.

1.1.3 The site is located opposite Chalk Farm Underground station and currently comprises two commercial units on the ground floor and several residential flats, including basement level, ground floor, first floor and second floor, with associated parking to the rear.

1.1.4 The redevelopment proposal comprises the demolition of the existing building and construction of a new six-storey building, comprising a basement and 5 above-ground storeys. The proposed building will include 29 residential units, with additional commercial units on the ground floor. Residential units in the basement and on the ground floor will not look out onto Haverstock Hill. Floor plans of the proposed building are provided in Appendix A.

1.2 Scope of assessment

1.2.1 The scope of this assessment included the following:

- Consultation with London Borough of Camden (Camden Council) Environmental Health Officer (EHO) to agree an appropriate method of assessment;
- Baseline noise survey to determine indoor and outdoor ambient noise levels during the daytime and night-time periods;
- Evaluation of external noise at the development site in the context of appropriate guidance;
- Evaluation of internal transmission of noise from existing commercial units within the building to proposed residential units;
- Identification of outline mitigation measures; and
- Report on findings.

1.2.2 The proposed development will not introduce any significant new noise sources to the area, therefore this assessment considers only potential noise impacts from existing noise sources at proposed noise sensitive receptors.

1.2.3 Noise from construction activities will be minimised in accordance with best practice guidance. If construction noise is identified as a particular concern by Camden Council, a construction noise management plan will be undertaken by the contractor prior to commencement of works. Construction noise impacts are therefore not considered further in this assessment.

1.2.4 The proposed development will not comprise any large external amenity areas, however, there will be a roof terrace, and balconies on facades not overlooking Haverstock Hill. As specified in BS8233 (refer to Section 2.3), noise limits do not apply to small external amenities such as balconies, and external amenity is therefore not considered further in this assessment.

1.3 Study area and noise sensitive receptors

1.3.1 The study area considered in the assessment includes the area contained within the redline boundary as shown in Figure 1. The assessment considers future residential units and commercial space within the proposed development to determine the suitability of the site for residential and commercial use.

1.3.2 Proposed residential units are considered as future noise-sensitive receptors. No new noise sources are anticipated to be associated with the proposed commercial space. Given the lower sensitivity of commercial receptors to noise than residential receptors, it is assumed that compliance with criteria at the proposed dwellings will entail compliance with appropriate criteria at commercial receptors.

1.4 Noise terms used in this assessment

1.4.1 Terms used within this assessment are defined below:

- **Noise** – unwanted sound.
- **Immissions** – incoming sound at a receptor location, (as opposed to "emissions").
- **dB** – decibel, the unit of measurement of sound.
- **A-weighting** – a frequency-dependent filter applied to measured sound levels which approximates the response of the human ear.
- $L_{Aeq,T}$ – the equivalent continuous A-weighted sound pressure level over the time interval, T. Commonly referred to as the "ambient" level.

2 Relevant guidance and advice

2.1 National Planning Policy Framework (NPPF)

2.1.1 The NPPF provides planning guidance for local planning authorities in England. The NPPF states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse noise impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and that existing businesses wishing to continue their operations should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.1.2 The NPPF characterises a significant adverse effect level as the level of noise exposure above which significant adverse effects on health and quality of life occur. The NPPF indicates that a "significant observed adverse effect level" (SOAEL) is defined in the Noise Policy Statement for England.

2.2 Noise Policy Statement for England (NPSE)

2.2.1 The NPSE provides three categories of effect:

- **NOEL – No Observed Effect Level;** the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level;** the level above which adverse effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level;** the level above which significant adverse effects on health and quality of life occur.

2.2.2 The NPSE provides the following guidance regarding the SOAEL:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times."

And:

"Increasing noise exposure will at some point cause the SOAEL boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused."

2.3 British Standard BS 7445-1:2003 Description and Measurement of Environmental Noise. Guide to quantities and procedures

2.3.1 BS7445 (BSI, 2003) provides guidance on appropriate environmental noise monitoring, including specification of equipment, suitable weather conditions and observations to note regarding the nature of the noise environment.

2.4 British Standard BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

2.4.1 BS8233 (BSI, 2014) provides guidance on the control of noise in and around buildings. The Standard sets out acceptable noise levels for new and refurbished buildings and amenity areas according to their use.

2.4.2 For external amenity areas BS8233 specifies a "desired" level of 50 $dBL_{Aeq,T}$ and an "upper guideline level" of 55 $dBL_{Aeq,T}$. It is acknowledged within the Standard that these guidelines may not be achievable in urban areas adjoining the transport network. It further notes that *"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 standard also notes that for locations such as balconies, roof gardens and terrace "specification of noise limits is not necessarily appropriate. 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. 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."*

2.4.3 The Standard provides noise limits for rooms within buildings by type of use; (bedroom, living room, office) and by time of day. Relevant noise criteria specified in the standard are summarised in Table 1.

Table 1 – BS8233 Internal noise level criteria

Location	Daytime Period (07:00 – 23:00)	Night-time Period (23:00 – 07:00)
Living room	35 dB $L_{Aeq\ 1hour}$	-
Bedroom	35 dB $L_{Aeq\ 1hour}$	30 dB $L_{Aeq\ 1\ hour}$

2.4.4 Methods are provided for simplified calculation of internal noise levels from external levels, and for detailed calculations. The simplified method relies on a reduction to façade levels provided either by open or closed windows, which are assumed to provide attenuation of approximately 15 dB and 33 dB respectively.

2.4.5 The Standard describes the Noise Rating (NR) graphical method, by which the maximum acceptable level in each octave band of a frequency spectrum may be specified. The NR of a sound spectrum corresponds to the value of the first NR contour that is entirely above the spectrum when plotted graphically. The Standard notes that NR values cannot be converted directly to broad-band dB(A) values, however, the following approximate relationship is provided: NR ≈ dB(A) – 6

2.4.6 Annex E of the Standard provides information on typical sound insulation values provided by different construction methods and materials.

2.5 World Health Organization (WHO), Guidelines for Community Noise, 1999

2.5.1 The WHO guidance notes the following with regard to sleep disturbance arising from noise.

"If negative effects on sleep are to be avoided the equivalent sound pressure level should not exceed 30 dBA indoors for continuous noise. If the noise is not continuous, sleep disturbance correlates best with L_{Amax} and effects have been observed at 45 dB or less. This is particularly true if the background level is low. Noise events exceeding 45 dBA should therefore be limited if possible. For sensitive people an even lower limit would be preferred. It should be noted that it should be possible to sleep with a bedroom window slightly open (a reduction from outside to inside of 15 dB). To prevent sleep disturbances, one should thus consider the equivalent sound pressure level and the number and level of sound events. Mitigation targeted to the first part of the night is believed to be effective for the ability to fall asleep."

2.6 Camden Local Plan 2017

2.6.1 Camden Local Development Framework guidance, published by Camden Council, provides specific noise guidance as Policy A4 Noise and Vibration. The guidance notes the following:

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 location which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

The Council provides noise thresholds for residential development reflecting observed effect levels outlined in National Planning Practice Guidance (refer to NPPF and NPSE guidance detailed above). The three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning

application. The design criteria outlined below are defined in Table 2. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- *Green – where noise is considered to be at an acceptable level (NOEL);*
- *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development (LOAEL); and*
- *Red – where noise is observed to have a significant adverse effect (SOAEL).*

Table 2 – Noise criteria provided in Appendix 3 of Camden Local Plan 2017

Dominant noise source	Assessment location	Design period	LOAEL (green)	LOAEL to SOAEL (amber)	SOAEL (red)
Anonymous noise such as general environmental noise, road traffic and rail traffic	Noise at 1 metre external to a sensitive façade	Daytime 0700 - 2300	<50$L_{Aeq,16hr}$	50dB$L_{Aeq,16hr}$ to 72dB$L_{Aeq,16hr}$	>72dB$L_{Aeq,16hr}$
		Night-time 2300 – 0700	<45$L_{Aeq,8hr3}$ <40$L_{Aeq,8hr}$	45$L_{Aeq,8hr}$ to 62$L_{Aeq,8hr}$ >40 dBL_{night}	>62dB$L_{Aeq,8hr}$
	Inside a bedroom	Daytime 0700 - 2300	<35dB$L_{Aeq,16hr}$	35$L_{Aeq,16hr}$ to 45$L_{Aeq,16hr}$	>45dB$L_{Aeq,16hr}$
		Night-time 2300 – 0700	<30dB$L_{Aeq,8hr}$ <42dB$L_{Amax,fast}$	30 dB$L_{Aeq,16hr}$ to 40dB$L_{Aeq,16hr}$ 40dB$L_{Amax,fast}$ to 73dB$L_{Amax,fast}$	>40dB$L_{Aeq, 8hr}$ >73dB$L_{Amax,fast}$
	Outdoor living space (free-field)	Day	<50dB$L_{Aeq,16hr}$	50dB$L_{Aeq,16h}$ to 55dB$L_{Aeq,16h}$	>55dB$L_{Aeq,16hr}$

2.6.2 The Local Plan also provides additional guidance on noise from entertainment or "non-anonymous" noise.

3 Method

3.1 Consultation with Camden Council

3.1.1 ITPE spoke with an Environmental Health Officer (EHO) to agree the scope and approach to this assessment[1]. The EHO confirmed that they were satisfied with our proposed approach, making reference to Camden Council's published planning guidance (Local Plan 2017) and national standards.

3.2 Baseline noise survey

3.2.1 A noise survey was undertaken within a first-floor flat within the existing building, in a room overlooking Haverstock Hill, on Wednesday 10th and Thursday 11th of January 2018. The room was unfurnished at the time of the survey, with a thin carpet and curtains providing the only sound absorption. Given that there no ground-floor dwellings within the proposed building overlooking Haverstock Hill, the chosen monitoring location is considered representative of the "worst-case" noise environment. Flats at basement level and ground floor level within the proposed development will be screened from road noise, and flats on the second floor and above will be further from road-level

[1] Telephone conversation with Mario Houska on 21st March 2018

noise sources, such as passing traffic, pedestrians and emergency vehicle sirens, and will therefore receive lower noise levels.

3.2.2 A Rion NL-52 Class I integrating sound level meter (SLM) was used for the monitoring. The SLM was within its laboratory calibration period, and a calibration check was performed before and after each measurement, with no significant drifts in calibration noted.

3.2.3 A measurement of approximately 24 hours duration was undertaken within the room with the window closed for security purposes. An additional, attended, measurement was undertaken in the same location, with the window overlooking Haverstock Hill open.

3.2.4 Weather conditions were dry, with dry road surfaces during the survey. Wind speeds varied throughout the measurement, but remained below 5 m/s. Conditions were therefore in accordance with the requirements of BS7445.

3.2.5 Details of observations made during the survey and photographs of the monitoring location are provided in Appendix B.

3.3 Derivation of post-development noise levels

3.3.1 Baseline noise levels measured within the existing building measured with the window open and with the window closed were compared to determine the approximate reduction to external noise levels achieved by the existing double glazing, using the assumed reduction of 15 dB attributable to an open window, as provided in BS8233. Measured noise levels have been conservatively assumed to be exclusively due to external noise sources. No contribution from adjacent residential units was noted during the attended survey, however, it is likely that some sound transmission from adjacent units may occur during the evening period when other flats within the building are occupied.

3.3.2 Noise levels due to external sources within the proposed building will be determined by the acoustic performance of the building façade, comprising windows and walls. Glazing is typically the weakest element of the façade, therefore the acoustic performance of the composite façade will be determined by the glazing. This assessment therefore focusses on the specification of appropriate glazing, and assumes that the remainder of the façade, comprising masonry and cladding, will at least meet the acoustic performance of the glazing.

3.4 Evaluation against criteria

3.4.1 Noise levels from external noise sources have been evaluated against Camden Council's specified evaluation criteria for daytime, evening and night-time periods (refer to Table 4).

3.4.2 In addition, derived internal noise levels within the proposed development have been evaluated against BS8233 internal noise limits for the daytime and night-time periods and against the WHO 45 dBL_{Amax} night-time criterion for the avoidance of sleep disturbance.

4 Results

4.1 Measured baseline noise levels

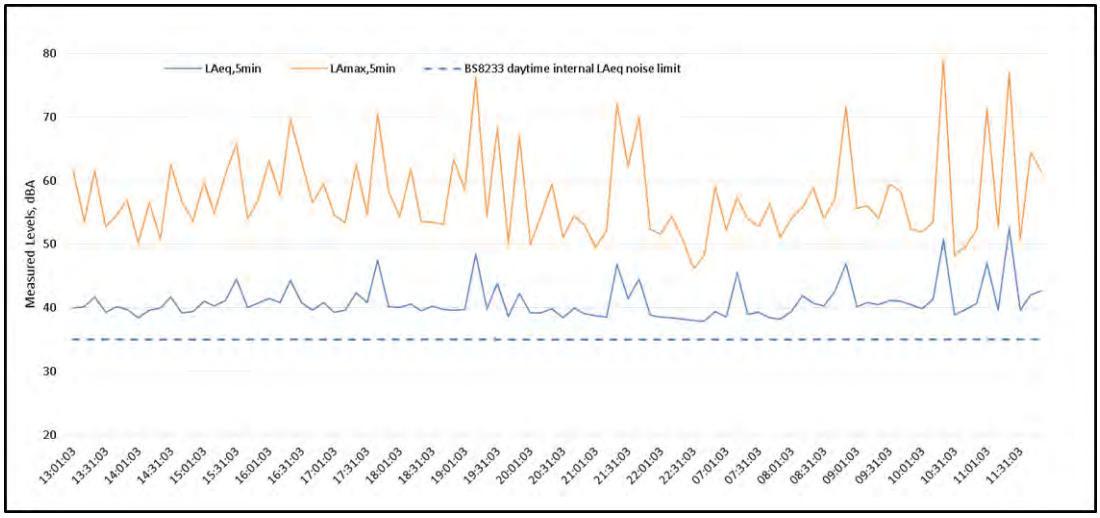
4.1.1 A summary of the measured baseline noise levels is provided in Table 3. Full monitoring results are provided in Appendix B.

Table 3 – Measured baseline noise levels within first-floor flat of existing building

Attenuation	Period & monitoring duration, T	Ambient noise level $dBL_{Aeq,T}$	Maximum noise level $dBL_{AMax,T}$
Closed windows	Daytime, 16 hours	42.3	79.0
	Night-time, 8 hours	37.1	67.8
Open windows	Daytime, 1 hour	56.0	84.3

4.1.2 The measured 10-minute averaged ambient and maximum daytime noise levels are provided in Chart 1.

Chart 1 – Measured internal ambient and maximum noise levels during the daytime period



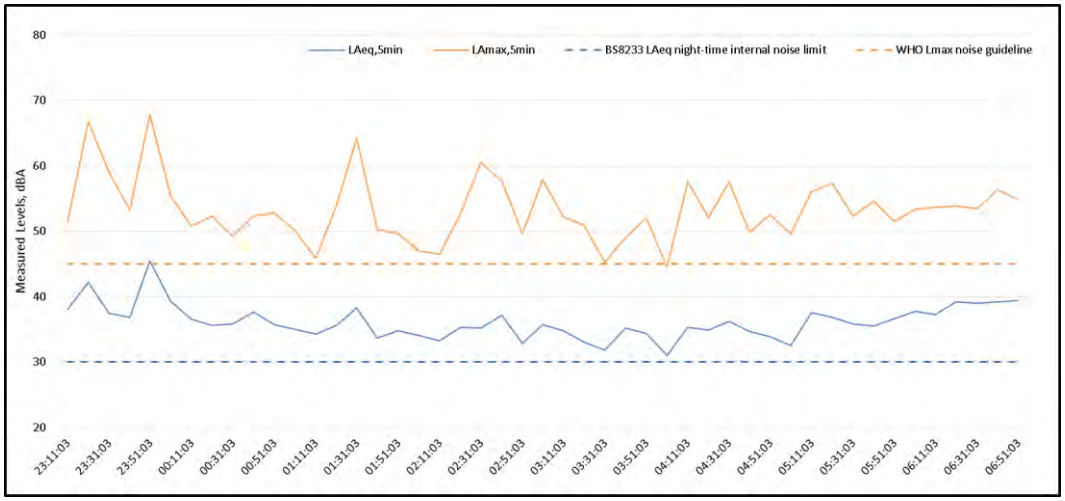
4.1.3 The measured 10 minute-averaged ambient level within the room exceeded the BS8233 35 $dBL_{Aeq,16hr}$ criterion throughout the measurement. During attended monitoring the dominant noise source was characterised as “anonymous noise”, and road traffic in particular, rather than “non-anonymous” entertainment noise, with regard to Camden Council guidance.

4.1.4 The ambient level remained broadly constant throughout the daytime period, with occasional spikes of up to 10 dB.

4.1.5 The measured L_{max} values ranged widely. During attended monitoring it was noted that the L_{max} index was particularly affected by passing emergency vehicle sirens.

4.1.6 The measured 10-minute averaged ambient and maximum night-time period noise levels are provided in Chart 2.

Chart 2 – Measured internal ambient and maximum noise levels during the night-time period



4.1.7 The measured ambient level within the room exceeded the BS8233 30 dB$L_{Aeq,8hr}$ criterion throughout the measurement. Similarly, the measured L_{Amax} level exceeded the WHO criterion for the avoidance of sleep disturbance throughout the measurement.

4.1.8 The ambient level shows a gradual decrease from around midnight through until approximately 04:00, before gradually increasing again.

4.2 Acoustic performance of existing glazing and facade

4.2.1 Measured noise levels within the existing building with open and closed window attenuation have been compared during the daytime period in Table 4**.** The same hour (11:00 – 12:00) on two subsequent days has been used for the comparison.

Table 4 – Comparison of open and closed window attenuation

Scenario	Measured level, dB		
	$L_{Aeq,1hr}$	$L_{A10,1hr}$	$L_{A90,1hr}$
Open window	56.0	57.9	45.9
Closed window	46.8	44.4	34.1
Difference	9.3	13.5	11.8

4.2.2 The difference between the measured open window and closed-window L_{Aeq} values was 9 dB. The measured L_{A10} and L_{A90} show a similar difference over the measurement period. The L_{Aeq} difference has been used in subsequent analysis.

4.2.3 BS8233 provides approximate reductions to external noise levels via transmission through an open window and via closed window transmission through double glazing. A partially open window is assumed to provide 15 dB reduction to external noise levels[2]. On the assumption that the open window provides a reduction of 15 dB, the external noise level in at the façade overlooking Haverstock Hill during the daytime period was:

56 dB + 15 dB = 71 dB

[2] As noted in BS8233 and WHO Guidelines for Community Noise

4.2.4 Furthermore, the noise level within the room with window closed was approximately 9 dB lower with windows closed compared to windows open, the attenuation to external noise levels provided by the existing glazing is:

15 dB + 9 dB = 24 dB

4.3 Evaluation against Camden Council criteria

4.3.1 The measured internal noise levels during the daytime and the night-time periods are compared with the Camden Council criteria (refer to Table 2) in Table 5.

Table 5 – Evaluation of effect level of measured internal noise levels

Period & duration, T	Measured internal ambient noise level	Effect level, $dBL_{Aeq,T}$	Reduction required to meet LOAEL
Daytime, 16 hours	42 $dBL_{Aeq,16hr}$	LOAEL – SOAEL (amber)	7 $dBL_{Aeq,16hr}$
Night-time, 8 hours	37 $dBL_{Aeq,8hr}$	LOAEL – SOAEL (amber)	7 $dBL_{Aeq,8hr}$
	68 dBL_{Amax}	LOAEL – SOAEL (amber)	26 dBL_{Amax}

4.3.2 During the daytime and the night-time periods the measured internal noise levels are above the criterion for ambient noise (L_{Aeq}) at which noise would be considered to be at an acceptable level (LOAEL, green), and within the band where noise is observed to have an adverse effect (LOAEL – SOAEL, amber), but which may be considered acceptable when assessed in the context of other merits of the development.

4.3.3 To be evaluated as LOAEL, ambient noise levels within bedrooms of the proposed development will need to be 7 $dBL_{Aeq,T}$ lower than those within the existing building, both during the daytime and the night-time period. Measured maximum noise levels would require a reduction of 26 dBL_{Amax} to meet the LOAEL criterion.

4.4 Evaluation against BS8233 criteria

4.4.1 The measured internal noise levels within the existing building, with windows closed, are evaluated against BS8233 noise limits for habitable rooms (bedrooms and living rooms) in Table 6. The measured levels have been rounded to the nearest integer dB.

Table 6 – Evaluation of measured internal noise levels against BS8233 criteria

Period & monitoring duration, T	Ambient noise level $dBL_{Aeq,T}$	BS8233 noise limit $dBL_{Aeq,T}$	Margin of compliance, dB (limit – derived level)
Daytime, 16 hours	42	35	-7
Night-time, 8 hours	37	30	-7

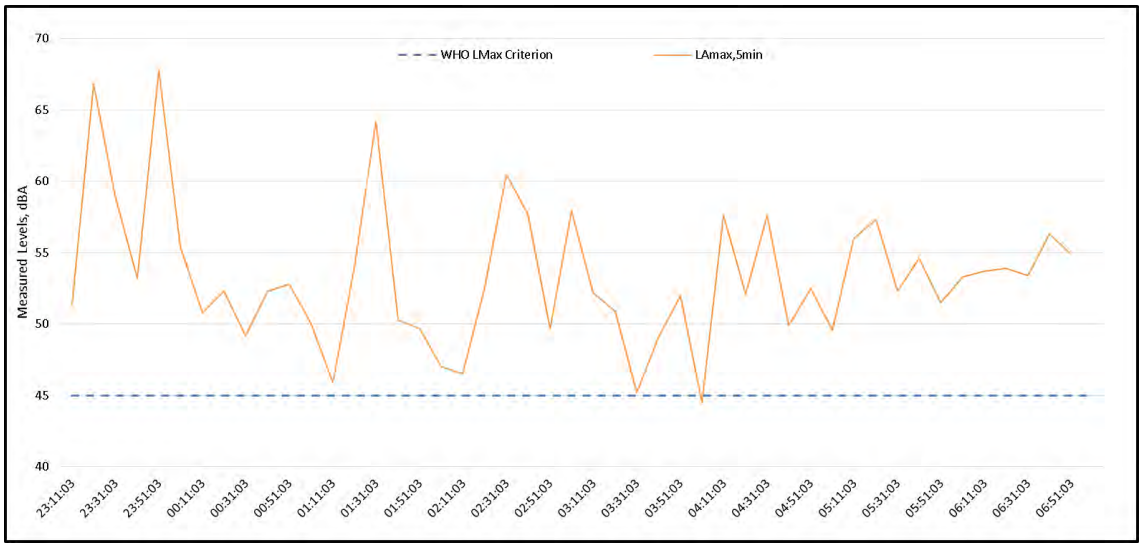
4.4.2 The measured internal ambient noise level exceeds the BS8233 noise limit, both during the daytime and the night-time, by a margin of approximately 7 dB (negative margin of compliance).

4.4.3 To enable the noise level within habitable rooms of the proposed development to meet the noise limits, glazing within the new building will need to provide at least 7 dB greater noise attenuation than the existing glazing. Given the derived attenuation provided by the existing glazing of 24 dB, this requires that the composite façade, comprising new glazing, the masonry or cladding, and any passive

or active ventilation systems should provide a minimum attenuation to external noise levels of 35 dB_{Rw} $C;C_{tr}$[3].

4.5 Evaluation against WHO criterion

4.5.1 The measured internal night-time L_{Max} noise levels within the existing building, with windows closed, are evaluated against the WHO criterion for the avoidance of sleep disturbance in Chart 4.



4.5.2 The internal L_{Max} within the existing building exceeded the WHO criterion in each sequential 5-minute averaging period throughout the night-time period. We note, however, that increasing the noise reduction of the composite façade by a minimum of 7 dB would reduce the number of exceedances of the criterion to a maximum of 2 – 3 events per hour.

4.6 Committed mitigation

4.6.1 On the southern side of the proposed development, overlooking Haverstock Hill, the composite façade, comprising walls, windows and any passive ventilation methods, will provide a minimum reduction of 35 dB R_w $C;C_{tr}$ in accordance with BS EN 12758[4]. We assume that the walls will provide a minimum reduction of 43 dB_{Rw}, equivalent to a well-constructed masonry wall with an overall mass per unit area not less than 150 kg/m^2. As an example specification, acoustic double glazing with composition 8-12-4 may give a reduction of 36 dB R_w $C;C_{tr}$. Assuming implementation of this specification, noise levels within the bedrooms of the proposed development will meet the Camden Council's LOAEL criterion for ambient noise via closed-window attenuation. The windows will remain openable for rapid or purge ventilation at the discretion of the occupant. To enable air circulation with windows closed, additional ventilation will be required. Any passive ventilation fitted will meet the same minimum acoustic specification as the proposed glazing (37 dB R_w).

4.6.2 On the other facades of the proposed building (north, east and west) away from the road, and where noise from road traffic will be screened, standard thermal double glazing may be used, assuming a minimum 33 $dB_{Rw,,}$ as indicated in BS8233.

4.6.3 The internal noise levels achieved within the proposed development by implementation of the mitigation described above will aid in reducing internal L_{Amax} levels within proposed dwellings,

[3] $C;C_{tr}$ is a correction to account for low-frequency component of road traffic noise

[4] BS EN 12758: 2011 Glass in building. Glazing and airborne sound insulation. Product descriptions and determination of properties.

however, it is not considered practicable to achieve the necessary 26 dBL_{Amax} reduction required to enable the Camden Council LOAEL criterion to be met.

4.7 Conclusion

4.7.1 ITPE has undertaken an assessment of the proposed development at 18-22 Haverstock Hill. The assessment comprised a baseline noise survey within a first-floor flat of the existing building, to determine existing noise levels in the vicinity of the proposed development, both with open and closed window attenuation.

4.7.2 The measured internal noise levels have been evaluated against Camden Council's noise criteria for residential development, with noise levels within the existing building found to be in the range of LOAEL – SOAEL. Mitigation has been specified to enable ambient noise levels within the bedrooms of the proposed development to meet the criterion for LOAEL and therefore be considered acceptable by Camden Council. The specified mitigation will also aid in reducing internal LAmax levels, however, these remain within the range LOAEL to SOAEL.

4.7.3 The measured internal noise levels have also been evaluated against BS8233 and WHO criteria, and found to exceed both sets of criteria within the existing building. Mitigation specified for the proposed building to enable the Camden Council LOAEL criterion will also enable the BS8233 and WHO criteria to be met in future dwellings within the proposed development.

KEY

- Study Area
- Site Boundary

0 180 360 Meters

Scale 1:6,500 @ A3

pprestates

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Proposed Mixed Residential and Commercial Development - 18-22 Haverstock Hill, London Noise Impact Assessment

Figure 1

Site location and layout

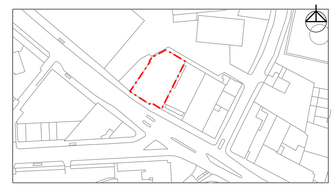
Date: 27/02/2018	Drawn by: GM	Checked by: JB	Version: V1

11296 27/02/2018 GM

Appendix A – Development Layout Drawings

Notes

Rev	Date	Description
A	21/02/2018	Design Update
/	27/11/2017	For Information



Project
18-22 Haverstock Hill

Client
PPR Estates

Date
21/02/2018

Scale
1:100@A1/1:200@A3

Drawing Title
Roof Plan

Drawn
VP

Checked
DC

Approved
SP

Drawing Status
For Information

Project	Disc	Level	Series	Drg No.	Rev
13528	**A**	**R**	**00**	**106**	**A**

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Rev	Date	Description
B	16/02/2018	Layout and massing update
A	11/12/2017	Layout and coordination update
/	01/12/2017	For Information

Project
18-22 Haverstock Hill

Client
PPR Estates

Date
16/02/2018

Scale
1:100@A1/1:200@A3

Drawing Title
Plan Level 01

Drawn
LP

Checked
DC

Approved
SP

Drawing Status
For Information

Project	Disc	Level	Series	Drg No.	Rev
13528	A	01	00	101	B

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Appendix B – Monitoring Results and Photographs of Monitoring Locations

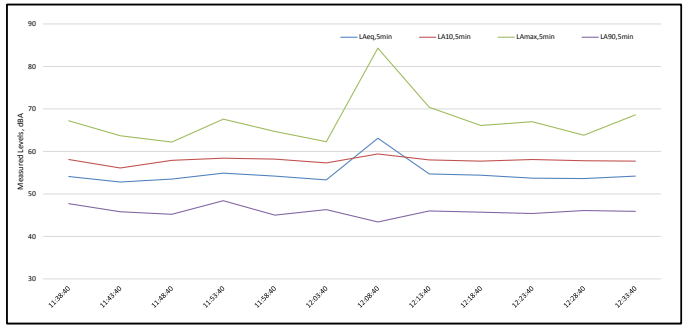
NMP1 - Day

	Raw Data									
Remove ?	Address	Date	Start Time	Measurement Time	$L_{Aeq,1}$	Antilog	$L_{Amax,1}$	$L_{A10,1}$	$L_{A90,1}$	Notes
	1	09/01/2018	11:38:40	00d 00:05:00.0	54.1	257039.6	67.2	58.1	47.7	
	2	09/01/2018	11:43:40	00d 00:05:00.0	52.8	190546.1	63.7	56.1	45.8	
	3	09/01/2018	11:48:40	00d 00:05:00.0	53.5	223872.1	62.2	57.9	45.2	
	4	09/01/2018	11:53:40	00d 00:05:00.0	54.9	309029.5	67.6	58.4	48.4	
	5	09/01/2018	11:58:40	00d 00:05:00.0	54.2	263026.8	64.7	58.2	45.0	
	6	09/01/2018	12:03:40	00d 00:05:00.0	53.3	213796.2	62.3	57.3	46.3	
	7	09/01/2018	12:08:40	00d 00:05:00.0	63.1	2041737.9	84.3	59.4	43.4	
	8	09/01/2018	12:13:40	00d 00:05:00.0	54.7	295120.9	70.4	58.0	46.0	
	9	09/01/2018	12:18:40	00d 00:05:00.0	54.4	275422.9	66.1	57.7	45.7	
	10	09/01/2018	12:23:40	00d 00:05:00.0	53.7	234422.9	67.0	58.1	45.4	
	11	09/01/2018	12:28:40	00d 00:05:00.0	53.6	229086.8	63.8	57.8	46.1	
	12	09/01/2018	12:33:40	00d 00:05:00.0	54.2	263026.8	68.6	57.7	45.9	

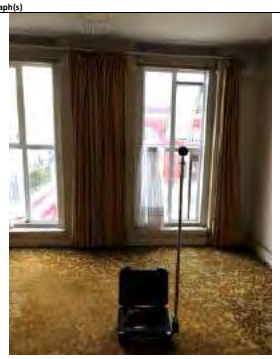
NMP1 - Day **GPS Coordinates** TQ 28166 84442 **File #** 401

Weather Conditions Dry - WS <0m/s - Apr 5 C - CC: Apr 100%

	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
T	*1 hr*	*1hr*	*1hr*	*1hr*
	56.0	84.3	57.9	45.9



Photograph(s)



Notes

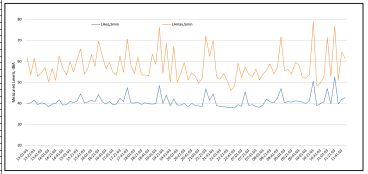
Main noise source - Traffic on haverstock hill, there is Traffic lights in front of the building so the traffic alternates between flowing to cars being stopped with the engine idle. Haverstock Hill is fairly busy with numerous cars, taxis, HGVs & buses. School playground was audible for a short period of time, in the room facing the school only, not in the rooms facing the road. Lmax noted to be impacted by emergency vehicles passing. Bird calls occasionally audible
Noise from pedestrains (sporadic & infrequent)

NMP2 - Day

Remove ?	Address	Date	Start Time	Measurement Time	L_{Aeq}	Antilog	L_{Amax}	L_{A10}	L_{A90}	Notes
						Raw Data				
	3	09/01/2018	13:01:03	00d 00:10:00.0	40.0	10000.0	61.5	43.3	31.1	
	4	09/01/2018	13:11:03	00d 00:10:00.0	40.2	10471.3	53.6	43.3	32.7	
	5	09/01/2018	13:21:03	00d 00:10:00.0	41.7	14791.1	61.5	44.5	33.1	
	6	09/01/2018	13:31:03	00d 00:10:00.0	39.3	8511.4	52.7	43.1	31.8	
	7	09/01/2018	13:41:03	00d 00:10:00.0	40.2	10471.3	54.7	43.7	33.5	
	8	09/01/2018	13:51:03	00d 00:10:00.0	39.8	9549.9	57.0	43.4	32.1	
	9	09/01/2018	14:01:03	00d 00:10:00.0	38.5	7079.5	50.2	42.3	31.6	
	10	09/01/2018	14:11:03	00d 00:10:00.0	39.6	9120.1	56.5	43.2	30.9	
	11	09/01/2018	14:21:03	00d 00:10:00.0	40.0	10000.0	50.9	43.6	32.6	
	12	09/01/2018	14:31:03	00d 00:10:00.0	41.7	14791.1	62.5	43.8	30.7	
	13	09/01/2018	14:41:03	00d 00:10:00.0	39.2	8317.6	56.7	42.9	32.0	
	14	09/01/2018	14:51:03	00d 00:10:00.0	39.4	8709.6	53.7	42.7	32.6	
	15	09/01/2018	15:01:03	00d 00:10:00.0	41.1	12882.5	59.8	44.2	33.2	
	16	09/01/2018	15:11:03	00d 00:10:00.0	40.3	10715.2	54.9	43.1	35.1	
	17	09/01/2018	15:21:03	00d 00:10:00.0	41.2	13182.6	61.0	43.9	33.6	
	18	09/01/2018	15:31:03	00d 00:10:00.0	44.5	28183.8	65.9	44.9	32.6	
	19	09/01/2018	15:41:03	00d 00:10:00.0	40.1	10232.9	53.9	43.3	33.7	
	20	09/01/2018	15:51:03	00d 00:10:00.0	40.7	11749.0	57.0	43.9	33.2	
	21	09/01/2018	16:01:03	00d 00:10:00.0	41.5	14125.4	63.2	43.9	34.3	
	22	09/01/2018	16:11:03	00d 00:10:00.0	40.8	12022.6	57.6	43.9	34.3	
	23	09/01/2018	16:21:03	00d 00:10:00.0	44.3	26915.3	69.7	43.7	33.8	
	24	09/01/2018	16:31:03	00d 00:10:00.0	40.9	12302.7	63.1	43.8	33.5	
	25	09/01/2018	16:41:03	00d 00:10:00.0	39.7	9332.5	56.5	43.0	34.1	
	26	09/01/2018	16:51:03	00d 00:10:00.0	40.8	12022.6	59.5	43.1	33.2	
	27	09/01/2018	17:01:03	00d 00:10:00.0	39.3	8511.4	54.7	42.4	32.5	
	28	09/01/2018	17:11:03	00d 00:10:00.0	39.7	9332.5	53.4	43.3	32.0	
	29	09/01/2018	17:21:03	00d 00:10:00.0	42.4	17378.0	62.5	43.9	32.2	
	30	09/01/2018	17:31:03	00d 00:10:00.0	40.8	12022.6	54.7	44.4	30.4	
	31	09/01/2018	17:41:03	00d 00:10:00.0	47.5	56234.1	70.6	45.3	32.9	
	32	09/01/2018	17:51:03	00d 00:10:00.0	40.2	10471.3	58.3	43.5	32.0	
	33	09/01/2018	18:01:03	00d 00:10:00.0	40.1	10232.9	54.3	43.9	32.1	
	34	09/01/2018	18:11:03	00d 00:10:00.0	40.6	11481.5	61.9	43.1	33.1	
	35	09/01/2018	18:21:03	00d 00:10:00.0	39.5	8912.5	53.6	42.8	33.1	
	36	09/01/2018	18:31:03	00d 00:10:00.0	40.3	10715.2	53.5	43.6	32.7	
	37	09/01/2018	18:41:03	00d 00:10:00.0	39.8	9549.9	53.2	43.6	32.0	
	38	09/01/2018	18:51:03	00d 00:10:00.0	39.7	9332.5	63.4	42.5	31.1	
	39	09/01/2018	19:01:03	00d 00:10:00.0	39.8	9549.9	58.6	43.0	31.4	
	40	09/01/2018	19:11:03	00d 00:10:00.0	48.5	70794.6	76.2	44.1	32.1	
	41	09/01/2018	19:21:03	00d 00:10:00.0	39.9	9772.4	54.3	43.5	32.6	
	42	09/01/2018	19:31:03	00d 00:10:00.0	43.9	24547.1	68.4	44.4	32.9	
	43	09/01/2018	19:41:03	00d 00:10:00.0	38.7	7413.1	50.2	42.3	32.2	
	44	09/01/2018	19:51:03	00d 00:10:00.0	42.3	16982.4	67.1	43.1	30.3	
	45	09/01/2018	20:01:03	00d 00:10:00.0	39.2	8317.6	50.0	43.7	29.7	
	46	09/01/2018	20:11:03	00d 00:10:00.0	39.2	8317.6	54.4	42.5	31.8	
	47	09/01/2018	20:21:03	00d 00:10:00.0	39.9	9772.4	59.5	43.0	30.4	
	48	09/01/2018	20:31:03	00d 00:10:00.0	38.4	6918.3	51.1	42.2	29.4	
	49	09/01/2018	20:41:03	00d 00:10:00.0	40.0	10000.0	54.4	43.2	29.3	
	50	09/01/2018	20:51:03	00d 00:10:00.0	39.1	8128.3	53.0	42.8	29.6	
	51	09/01/2018	21:01:03	00d 00:10:00.0	38.8	7585.8	49.6	42.9	29.5	
	52	09/01/2018	21:11:03	00d 00:10:00.0	38.6	7244.4	52.2	42.6	28.8	
	53	09/01/2018	21:21:03	00d 00:10:00.0	46.8	47863.0	72.1	42.8	28.1	
	54	09/01/2018	21:31:03	00d 00:10:00.0	41.5	14125.4	62.3	43.1	31.2	
	55	09/01/2018	21:41:03	00d 00:10:00.0	44.5	28183.8	69.9	43.5	30.5	
	56	09/01/2018	21:51:03	00d 00:10:00.0	38.9	7762.5	52.4	43.3	31.0	
	57	09/01/2018	22:01:03	00d 00:10:00.0	38.6	7244.4	51.6	42.7	30.8	
	58	09/01/2018	22:11:03	00d 00:10:00.0	38.5	7079.5	54.3	41.7	30.8	
	59	09/01/2018	22:21:03	00d 00:10:00.0	38.2	6606.9	50.8	41.5	30.1	
	60	09/01/2018	22:31:03	00d 00:10:00.0	38.0	6309.6	46.2	42.2	30.3	
	61	09/01/2018	22:41:03	00d 00:10:00.0	37.9	6166.0	48.3	41.6	30.1	
	62	09/01/2018	22:51:03	00d 00:10:00.0	39.4	8709.6	59.0	42.1	30.1	
	255	11/01/2018	07:01:03	00d 00:10:00.0	38.6	7244.4	52.3	42.2	29.1	
	256	11/01/2018	07:11:03	00d 00:10:00.0	45.5	35481.3	57.4	49.2	35.7	
	257	11/01/2018	07:21:03	00d 00:10:00.0	39.0	7943.3	53.9	42.5	29.6	
	258	11/01/2018	07:31:03	00d 00:10:00.0	39.3	8511.4	52.8	42.7	29.5	
	259	11/01/2018	07:41:03	00d 00:10:00.0	38.5	7079.5	56.3	42.3	28.4	
	260	11/01/2018	07:51:03	00d 00:10:00.0	38.2	6606.9	51.1	41.6	31.7	
	261	11/01/2018	08:01:03	00d 00:10:00.0	39.4	8709.6	54.0	42.7	31.0	
	262	11/01/2018	08:11:03	00d 00:10:00.0	41.9	15488.2	55.8	45.9	31.4	
	263	11/01/2018	08:21:03	00d 00:10:00.0	40.7	11749.0	58.8	43.4	34.7	
	264	11/01/2018	08:31:03	00d 00:10:00.0	40.3	10715.2	54.0	43.5	34.2	
	265	11/01/2018	08:41:03	00d 00:10:00.0	42.6	18197.0	57.1	44.8	36.2	
	266	11/01/2018	08:51:03	00d 00:10:00.0	46.9	48977.9	71.7	44.4	36.1	
	267	11/01/2018	09:01:03	00d 00:10:00.0	40.2	10471.3	55.6	43.7	32.0	
	268	11/01/2018	09:11:03	00d 00:10:00.0	40.9	12302.7	56.1	43.8	33.8	
	269	11/01/2018	09:21:03	00d 00:10:00.0	40.5	11220.2	54.0	43.8	33.9	
	270	11/01/2018	09:31:03	00d 00:10:00.0	41.2	13182.6	59.5	43.7	32.9	
	271	11/01/2018	09:41:03	00d 00:10:00.0	41.1	12882.5	58.4	44.8	33.1	
	272	11/01/2018	09:51:03	00d 00:10:00.0	40.5	11220.2	52.4	44.0	33.8	
	273	11/01/2018	10:01:03	00d 00:10:00.0	39.9	9772.4	52.0	43.8	31.6	
	274	11/01/2018	10:11:03	00d 00:10:00.0	41.4	13803.8	53.6	44.1	33.0	
	275	11/01/2018	10:21:03	00d 00:10:00.0	50.7	117489.8	79.0	44.7	34.1	
	276	11/01/2018	10:31:03	00d 00:10:00.0	38.9	7762.5	48.2	42.8	30.5	
	277	11/01/2018	10:41:03	00d 00:10:00.0	39.8	9549.9	49.7	43.8	31.9	
	278	11/01/2018	10:51:03	00d 00:10:00.0	40.7	11749.0	52.3	44.2	32.7	
	279	11/01/2018	11:01:03	00d 00:10:00.0	47.0	50118.7	71.3	44.6	32.9	
	280	11/01/2018	11:11:03	00d 00:10:00.0	39.6	9120.1	52.7	42.7	31.8	
	281	11/01/2018	11:21:03	00d 00:10:00.0	52.6	181970.1	77.0	48.4	35.2	
	282	11/01/2018	11:31:03	00d 00:10:00.0	39.6	9120.1	50.9	42.6	34.7	
	283	11/01/2018	11:41:03	00d 00:10:00.0	42.0	15848.9	64.5	43.6	35.7	
	284	11/01/2018	11:51:03	00d 00:10:00.0	42.7	18620.9	61.3	44.4	34.5	
						46.8	77.0	44.4	34.1	

NMP2 - Day **GPS Coordinates** TQ 28166 84442 **File #** 402

Weather Conditions Dry - WS <0m/s - Apr C - CC: Apr X%

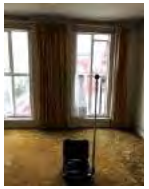


	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
T	15.3 hours	15.3 hours	15.3 hours	15.3 hours
Total	42.3	79.0	43.5	32.2
Daytime	42.5	79.0		
Evening	41.6	76.2		

Photograph(s)

Notes

Main noise source - traffic on haverstock hill

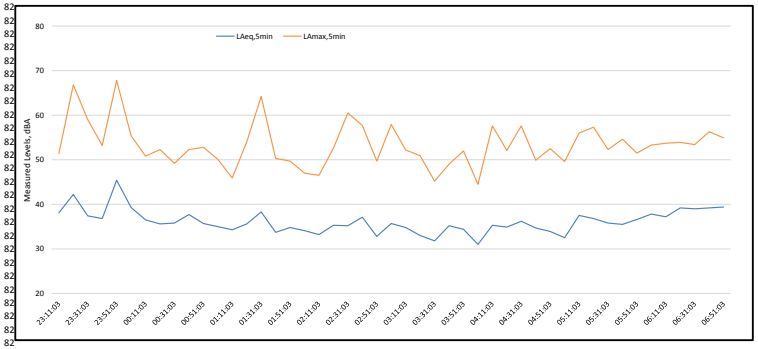


NMP2 - Night

	Raw Data									
Remove ?	Address	Date	Start Time	Measurement Time	$L_{Aeq,t}$	Antilog	$L_{Amax,t}$	$L_{A10,t}$	$L_{A90,t}$	Notes
	207	10/01/2018	23:01:03	00d 00:10:00.0	37.6	5754.4	48.8	40.9	29.6	
	208	10/01/2018	23:11:03	00d 00:10:00.0	38.1	6456.5	51.4	41.9	27.9	
	209	10/01/2018	23:21:03	00d 00:10:00.0	42.2	16595.9	66.8	42.8	26.9	
	210	10/01/2018	23:31:03	00d 00:10:00.0	37.4	5495.4	59.0	41.0	28.4	
	211	10/01/2018	23:41:03	00d 00:10:00.0	36.8	4786.3	53.2	39.9	28.8	
	212	10/01/2018	23:51:03	00d 00:10:00.0	45.4	34673.7	67.8	40.9	28.0	
	213	11/01/2018	00:01:03	00d 00:10:00.0	39.3	8511.4	55.4	42.5	27.0	
	214	11/01/2018	00:11:03	00d 00:10:00.0	36.5	4466.8	50.8	40.1	26.7	
	215	11/01/2018	00:21:03	00d 00:10:00.0	35.6	3630.8	52.3	39.9	26.1	
	216	11/01/2018	00:31:03	00d 00:10:00.0	35.8	3801.9	49.2	39.8	25.1	
	217	11/01/2018	00:41:03	00d 00:10:00.0	37.7	5888.4	52.3	41.1	27.1	
	218	11/01/2018	00:51:03	00d 00:10:00.0	35.7	3715.4	52.8	39.6	22.7	
	219	11/01/2018	01:01:03	00d 00:10:00.0	35.0	3162.3	50.1	38.9	23.4	
	220	11/01/2018	01:11:03	00d 00:10:00.0	34.3	2691.5	45.9	38.4	22.5	
	221	11/01/2018	01:21:03	00d 00:10:00.0	35.6	3630.8	54.0	39.5	19.7	
	222	11/01/2018	01:31:03	00d 00:10:00.0	38.3	6760.8	64.2	36.3	22.4	
	223	11/01/2018	01:41:03	00d 00:10:00.0	33.7	2344.2	50.3	37.0	20.3	
	224	11/01/2018	01:51:03	00d 00:10:00.0	34.8	3020.0	49.7	38.8	24.3	
	225	11/01/2018	02:01:03	00d 00:10:00.0	34.1	2570.4	47.0	38.6	21.4	
	226	11/01/2018	02:11:03	00d 00:10:00.0	33.2	2089.3	46.5	37.2	21.4	
	227	11/01/2018	02:21:03	00d 00:10:00.0	35.3	3388.4	52.6	38.6	20.1	
	228	11/01/2018	02:31:03	00d 00:10:00.0	35.2	3311.3	60.5	36.5	23.2	
	229	11/01/2018	02:41:03	00d 00:10:00.0	37.1	5128.6	57.7	40.0	24.8	
	230	11/01/2018	02:51:03	00d 00:10:00.0	32.8	1905.5	49.7	36.7	19.3	
	231	11/01/2018	03:01:03	00d 00:10:00.0	35.7	3715.4	57.9	37.1	20.0	
	232	11/01/2018	03:11:03	00d 00:10:00.0	34.8	3020.0	52.2	37.8	21.5	
	233	11/01/2018	03:21:03	00d 00:10:00.0	33.0	1995.3	50.9	35.7	20.1	
	234	11/01/2018	03:31:03	00d 00:10:00.0	31.8	1513.6	45.2	35.7	20.5	
	235	11/01/2018	03:41:03	00d 00:10:00.0	35.2	3311.3	49.0	39.7	21.3	
	236	11/01/2018	03:51:03	00d 00:10:00.0	34.4	2754.2	52.0	38.4	20.6	
	237	11/01/2018	04:01:03	00d 00:10:00.0	31.0	1258.9	44.5	35.3	18.6	
	238	11/01/2018	04:11:03	00d 00:10:00.0	35.3	3388.4	57.6	36.8	22.0	
	239	11/01/2018	04:21:03	00d 00:10:00.0	34.9	3090.3	52.1	38.8	22.3	
	240	11/01/2018	04:31:03	00d 00:10:00.0	36.2	4168.7	57.6	37.4	21.1	
	241	11/01/2018	04:41:03	00d 00:10:00.0	34.7	2951.2	49.9	37.7	20.7	
	242	11/01/2018	04:51:03	00d 00:10:00.0	33.9	2454.7	52.5	37.5	19.6	
	243	11/01/2018	05:01:03	00d 00:10:00.0	32.5	1778.3	49.6	36.8	20.9	
	244	11/01/2018	05:11:03	00d 00:10:00.0	37.5	5623.4	56.0	40.7	22.4	
	245	11/01/2018	05:21:03	00d 00:10:00.0	36.8	4786.3	57.3	41.5	20.8	
	246	11/01/2018	05:31:03	00d 00:10:00.0	35.8	3801.9	52.3	40.0	20.8	
	247	11/01/2018	05:41:03	00d 00:10:00.0	35.5	3548.1	54.6	39.1	22.5	
	248	11/01/2018	05:51:03	00d 00:10:00.0	36.6	4570.9	51.5	40.1	25.3	
	249	11/01/2018	06:01:03	00d 00:10:00.0	37.8	6025.6	53.3	41.4	25.2	
	250	11/01/2018	06:11:03	00d 00:10:00.0	37.2	5248.1	53.7	41.2	25.7	
	251	11/01/2018	06:21:03	00d 00:10:00.0	39.2	8317.6	53.9	42.7	28.1	
	252	11/01/2018	06:31:03	00d 00:10:00.0	39.0	7943.3	53.4	42.4	28.8	
	253	11/01/2018	06:41:03	00d 00:10:00.0	39.2	8317.6	56.3	42.6	28.4	
	254	11/01/2018	06:51:03	00d 00:10:00.0	39.4	8709.6	54.9	42.3	31.0	

NMP2 - Night **GPS Coordinates** TQ 28166 84442 **File #** 402

Weather Conditions Dry - WS NA m/s - Apr X C - CC: Apr X%



	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
T	*8 hours*	*8 hours*	*8 hours*	*8 hours*
	37.1	67.8	39.2	23.5

Photographs

Notes

Main noise source - traffic on haverstock hill

Appendix C – Calibration Documents

RION CO., LTD.

3-20-41 Higashimotomachi Kokubunji Tokyo 185-8533
Phone:042(359)7888, Facsimile:042(359)7442

Certificate of Calibration

Name : **Sound Level Meter, Class 1**

Model : **NL-52** **S/No.** : **00264486**

Date of Calibration : **February, 24, 2016**

We hereby certify that the above product was tested and calibrated according to the prescribed Rion procedures, and that it fulfills specification requirements.
The measuring equipment and reference devices used for testing and calibrating this unit are managed under the Rion traceability system and are traceable according to official Japanese standards and official standards of countries belonging to the International Committee of Weights and Measures.

RION CO., LTD.

K. Ikeda

Manager, Quality Control Department

RION

Supplied Accessories

Model	NL-42	Product Name	Sound Level Meter, Class 2

Ensure all the items below are in the package.
If there is a missing part, please contact your supplier.

Type	Description	Quantity	Note
NL-42	Main unit	1	
NL-42-025	Storage case	1	
WS-10	Windscreen	1	
NL-42-033	Windscreen fall prevention rubber	1	attached to the main unit
VM-63-017	Hand strap	1	
LR6	Size AA alkaline batteries	4	
	CD-ROM (Instruction manual, Serial interface manual, Technical notes, Program option manual)	1	
	Description for IEC 61672-1	1	
	SD memory card (512 MByte)	1	only when NX-42EX is pre-installed
	Inspection certificate	1	This sheet
	Document for China RoHS	1	only to China

Inspection Certificate

INSPECTOR

M. Kidaka

We hereby certify that this product has been tested and calibrated at our factory according to RION specifications and that the product satisfies all relevant requirements.

RION CO., LTD.
3-20-41 Higashimotomachi, Kokubunji,
Tokyo 185-8533,
Japan

Sound and Vibration Measuring Instrument Section Product information and software downloads can be found on our web-site:
http://svmeas.rion.co.jp/
Please check it out.

№C11030302

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 07 March 2017 **Certificate Number: UCRT17/1108**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

J. Harriman

Customer	Energised Environments Limited 7 Dundas Street Edinburgh EH3 6QG
Order No.	Jonas Beaugas
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-74	34167510

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	UKAS17/03072
Date Received	07 March 2017
Date Calibrated	07 March 2017

Previous Certificate	*Dated* *Certificate No.* *Laboratory*	Initial Calibration

ITPENERGISED

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