105 Judd Street, Camden, WC1H 9NE

Noise Assessment

March 2022

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1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of a noise & vibration assessment in relation to conversion to combined offices and laboratory-enabled rooms at basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

A noise & vibration survey has been undertaken and the results used to assess the noise exposure from proposed noise sources on existing nearby receptors. These noise exposure levels have been compared to representative background noise levels for the area to determine maximum noise ratings for proposed plant. An assessment has also been undertaken to determine the impact of existing noise & vibration sources upon the proposed office extension.

The noise levels from the proposed development have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A and Report Conditions are presented in Appendix B.

1.2 LEGISLATIVE CONTEXT

Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in July 2021. With regard to noise and planning, the NPPF contains the following statement at paragraph 174:

"*174 Planning policies and decisions should contribute to and enhance the natural and local environment by:*

> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…"*

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

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

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…"

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

188. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

Planning Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England, is to *'identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.'*

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated as follows:

Table 1.1 Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No Specific Measures Required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close	Observed Adverse Effect	Mitigate and reduce to a minimum

Perception	Examples of Outcomes	Increasing Effect Level	Action
	windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.		
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

1.3 ACOUSTIC CONSULTANTS' QUALIFICATIONS AND PROFESSIONAL MEMBERSHIPS

The lead project Acoustic Consultant is David Fink. The report has been checked and verified by Nigel Mann. Relevant qualifications, membership and experience are summarised below.

Table 1.2 Acoustic Consultants' Qualifications & Experience

Name	Education	Institute of Acoustics Post Graduate Diploma in Acoustic and Noise Control (Pass Date)	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
David Fink	BEng 2016	-	Mar 2017	Jun 2017	-
Samantha Griffith	BSc 2015	Dec (2019)	Sep (2015)	Jan (2020)	-
Ashley Shepherd	BSc 2013	-	Feb 2014	Feb 2014	Nov 2017

2.0 ASSESSMENT CRITERIA

2.1 NATIONAL GUIDANCE

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from the following standards and design guidance:

- BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings – Code of practice'*
- Building Bulletin 93 *'Acoustic Design of Schools – Performance Standards'*

Table 2.1 Noise Level Criteria and Actions

Effect Level	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level (NOAEL)	Noise levels are below: Offices: 35 dB $L_{Aeq,16hours}$ Science Laboratories (Refurbishment): 45 dB $L_{Aeq,30mins}$	Within BS8233 guideline criteria Within BB93 guideline criteria
Lowest Observed Adverse Effect Level (LOAEL)	Noise levels are at: Offices: 35 – 40 dB $L_{Aeq,16hours}$ Science Laboratories (Refurbishment): 45 dB $L_{Aeq,30mins}$	Within BS8233 guideline criteria Within BB93 guideline criteria
Significant Observed Adverse Effect Level (SOAEL)	Noise levels are exceeded, depending on context: Offices: 40 dB$L_{Aeq,16hours}$ Science Laboratories (Refurbishment): 45 dB $L_{Aeq,30mins}$	Mitigate and reduce to a achieve: Offices: 40 dB $L_{Aeq,16hours}$ Science Laboratories (Refurbishment): 45 dB $L_{Aeq,30mins}$

2.2 CAMDEN LOCAL PLAN 2017

The criterion of the London Borough of Camden for noise emissions of new plant is outlined within Appendix 3 of the Camden Local Plan as follows:

"Industrial and Commercial Noise Sources

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

2.3 VIBRATION ASSESSMENT CRITERIA

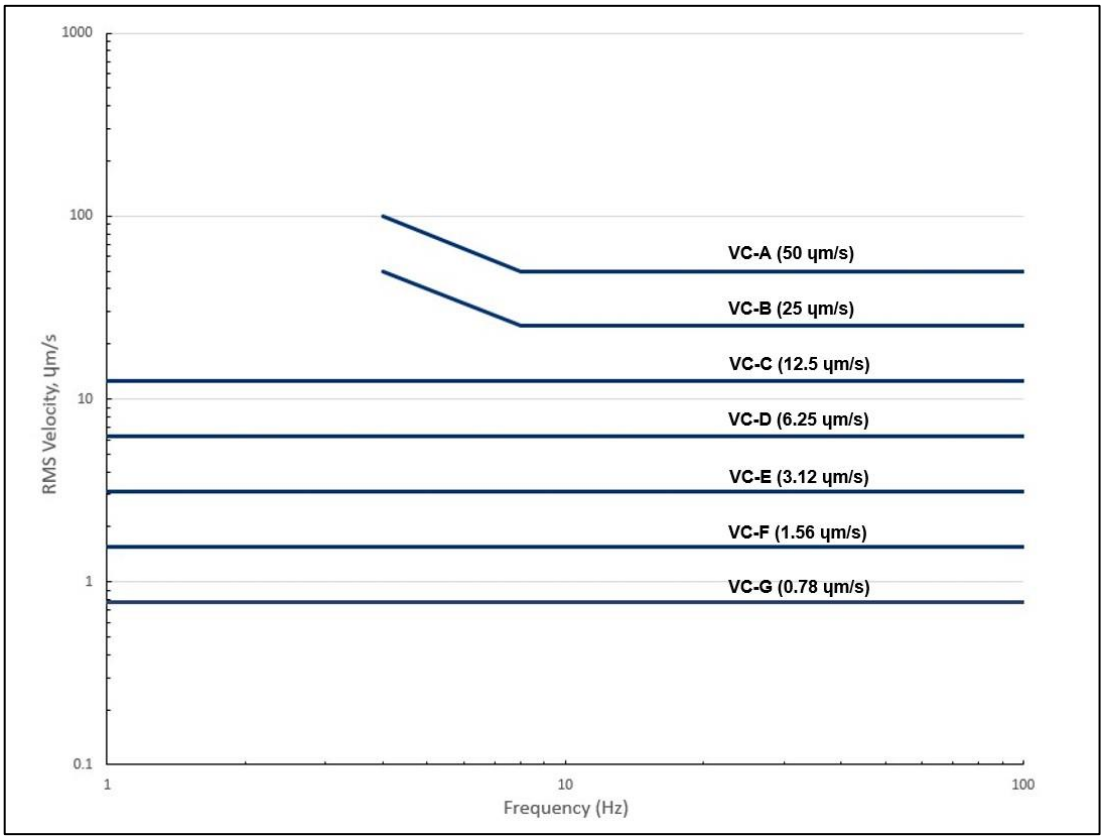
Standardised vibration criteria for vibration-sensitive manufacturing facilities and equipment is outlined by the IEST (Institute for Environmental Sciences and Technology – '*Generic Vibration Criteria for Vibration-Sensitive Equipment*', 1991), where classification of vibration sensitivity can be categorized by criteria curves (VC Curves) of increasing root-mean-squared (RMS) velocity. These curves assess vibration sensitivity across a velocity spectrum in 1/3 Octave Bands, where VC-A is of lowest sensitivity and VC-M is currently of highest. It should be noted that no category above VC-E is recommended for use as a design criterion, and only for evaluation.

The criterion and description of each VC Curve is outlined within Table 2.2, and graphically presented within Figure 2.1.

Table 2.2 Noise Level Criteria and Actions

Curve Criterion	Amplitude (μm/s)	Detail Size (μm)	Description of Use
VC-A	50	8	Adequate in most instances for optical microscopes to 400X microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	Appropriate for inspection and lithography (including steppers) to 3μm line widths.
VC-C	12.5	1-3	Appropriate standard for optical microscopes to 1000X, inspection and lithography inspection equipment (including moderately sensitive electron microscopes) to 1μm detail size, TFT-LCD stepper/scanner processes.
VC-D	6.25	0.1-0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems.
VC-E	3.12	<0.1	A challenging criterion to achieve. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems, E-Beam lithography systems working at nanometer scales, and other systems requiring extraordinary dynamic stability.
VC-F	1.56	N/A	Appropriate for extremely quiet research spaces; generally difficult to achieve in most instances, especially cleanrooms. Not recommended for use as a design criterion, only for evaluation.
VC-G	0.78	N/A	Appropriate for extremely quiet research spaces; generally difficult to achieve in most instances, especially cleanrooms. Not recommended for use as a design criterion, only for evaluation.

Figure 2.1 VC Curve Criteria Graph

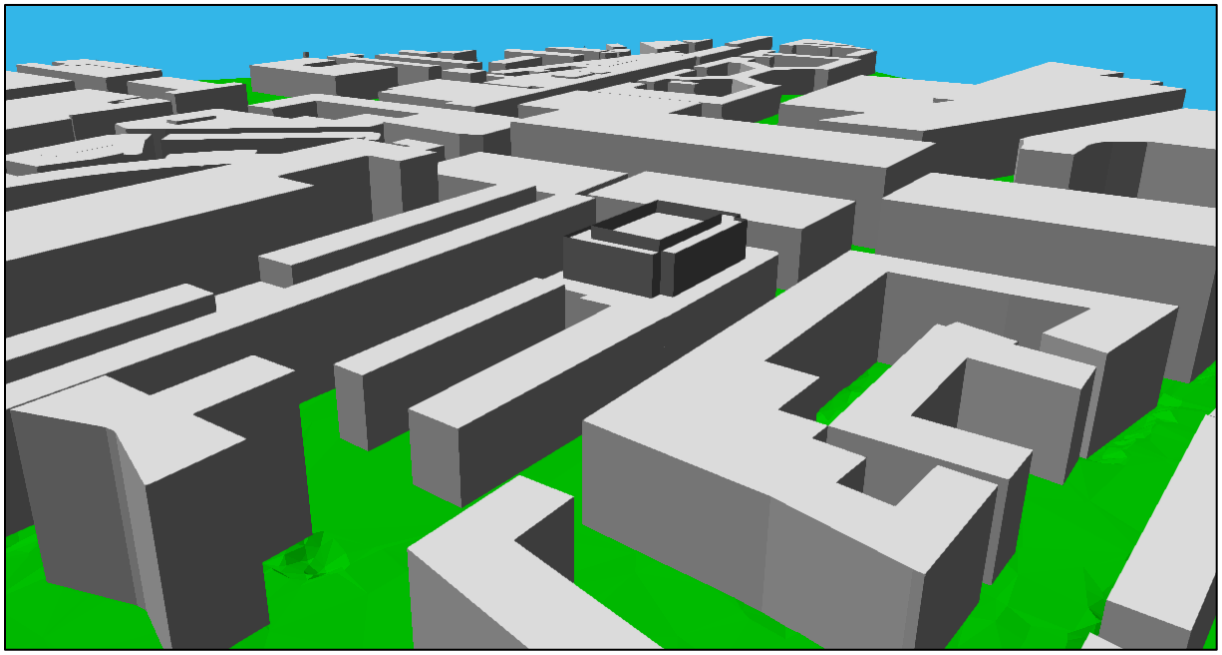


3.0 ASSESSMENT METHODOLOGY

3.1 NOISE MODELLING METHODOLOGY

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} noise levels both horizontally and vertically. CADNA noise modelling software has been used as shown in Figure 3.1. The figure shows the proposed development and the surrounding road network. This model is based on ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically.

Figure 3.1 CADNA Noise Model



The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels	Ordnance Survey	Next Map Britain – 10m Contours
Building heights – around site	Tt Observations	8 m height for two storey residential properties. Other height properties reviewed using Google Street View and amended as required
Plans	Stiff + Trevillion	Drawing Title: 4608 XX_OptG Dated: Feb 21

3.2 MODEL VERIFICATION (EXISTING AMBIENT NOISE CLIMATE)

The models were verified by modelling the monitoring locations for the 'existing' scenario, including contributions from the surrounding road and rail network. The worst-case daytime L_{Amax} scenario has been verified. The comparison between the monitoring and modelling results are shown in Table 3.2 below.

Table 3.2 Modelled vs. Monitored Results $L_{Aeq;\ daytime\ 07:00 – 23:00}$

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
ST01	62.3	62.4	0.1
ST02	53.9	53.5	-0.4
ST03	59.9	60.2	0.3
ST04	70.2	69.2	-1.0
ST05	61.5	61.4	-0.1
LT01	54.6	53.9	-0.7

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa

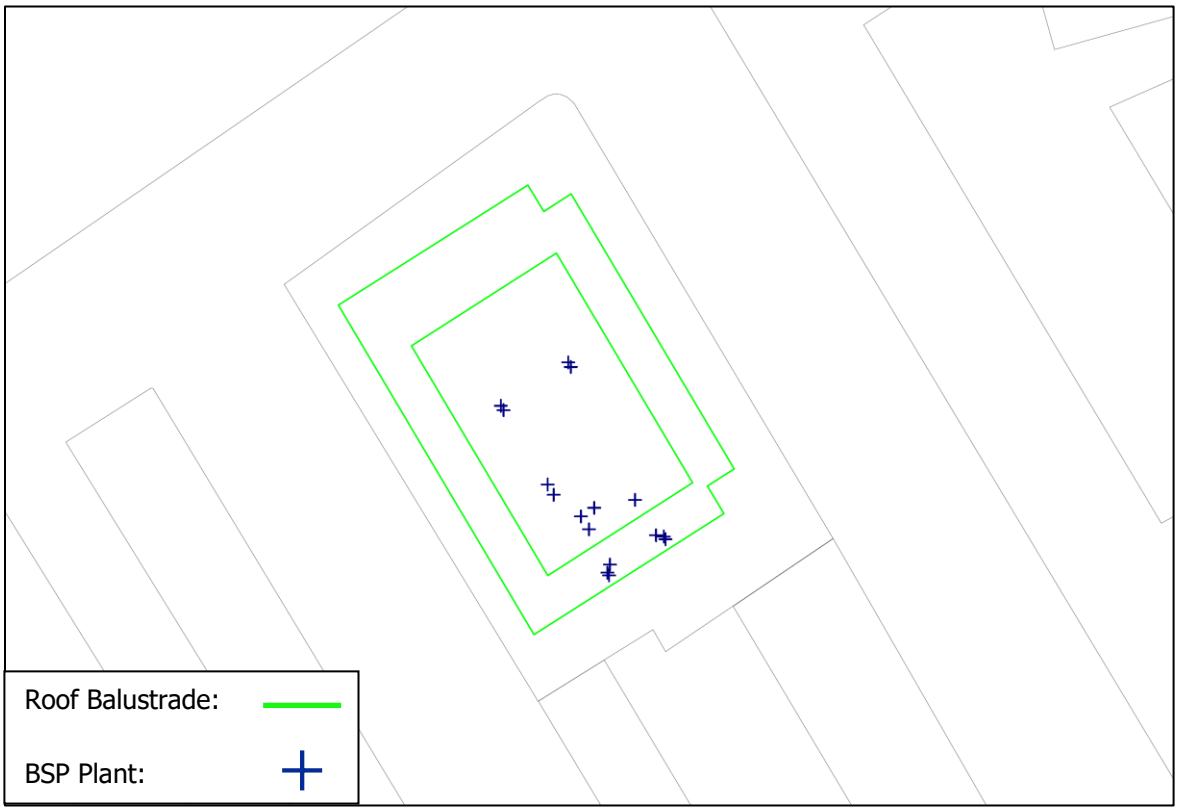
The noise levels modelled at the monitoring positions are within 3.0dB of measured levels, and so the noise model can be considered suitably verified.

3.3 BUILDING SERVICES PLANT NOISE DATA

Point sources have been used in the model to represent the potential plant associated with the scheme. The maximum sound pressure levels of the sources at 1 metre were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the BS4142 assessment criteria. Noise emission limits have been specified to ensure that plant noise rating levels are at least 10 dB below existing daytime and night-time background noise levels as outlined in Borough of Camden criteria.

The modelled locations of proposed plant units and intrinsic balustrades included within proposed roof plans are presented in Figure 3.1 below.

Figure 3.1 Building Plant Locations



Not to scale
OS Licence No. AL553611

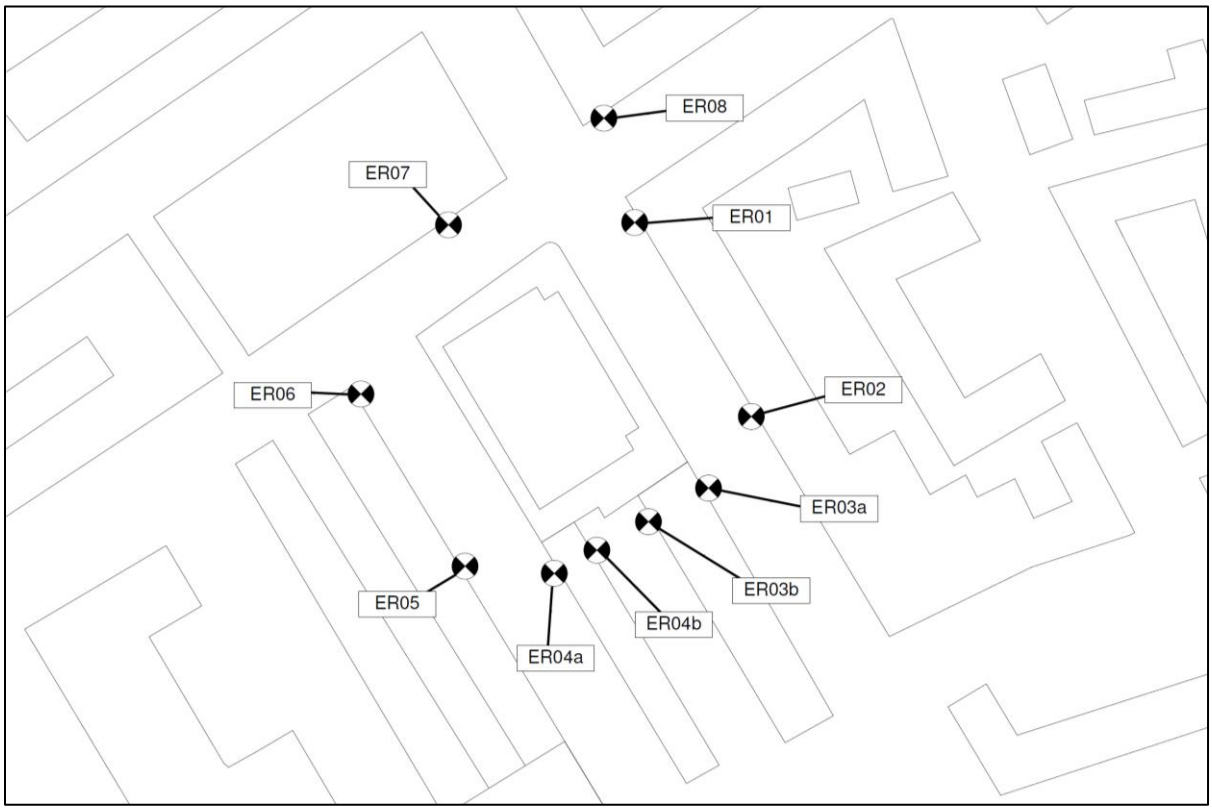
3.4 EXISTING SENSITIVE RECEPTOR LOCATIONS

Table 3.3 presents the existing receptor locations that are most likely to be exposed to operational noise from the rooftop plant. The locations of the existing receptor locations are illustrated in Figure 3.2.

Table 3.3 Sensitive Receptor Locations

Ref.	Description	Height (m)
ER01	114 Judd Street	18
ER02	106 Judd Street	18
ER03a	103 Judd Street (Front Façade)	14
ER03b	103 Judd Street (Rear Façade)	14
ER04a	17 Thanet Street (Front Façade)	14
ER04b	17 Thanet Street (Rear Façade)	14
ER05	Thanet House	18
ER06	Sinclair House	18
ER07	123 Judd Street	14
ER08	116 Judd Street	26

Figure 3.2 Sensitive Receptor Locations



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4.0 NOISE & VIBRATION SURVEY

4.1 NOISE SURVEY METHODOLOGY

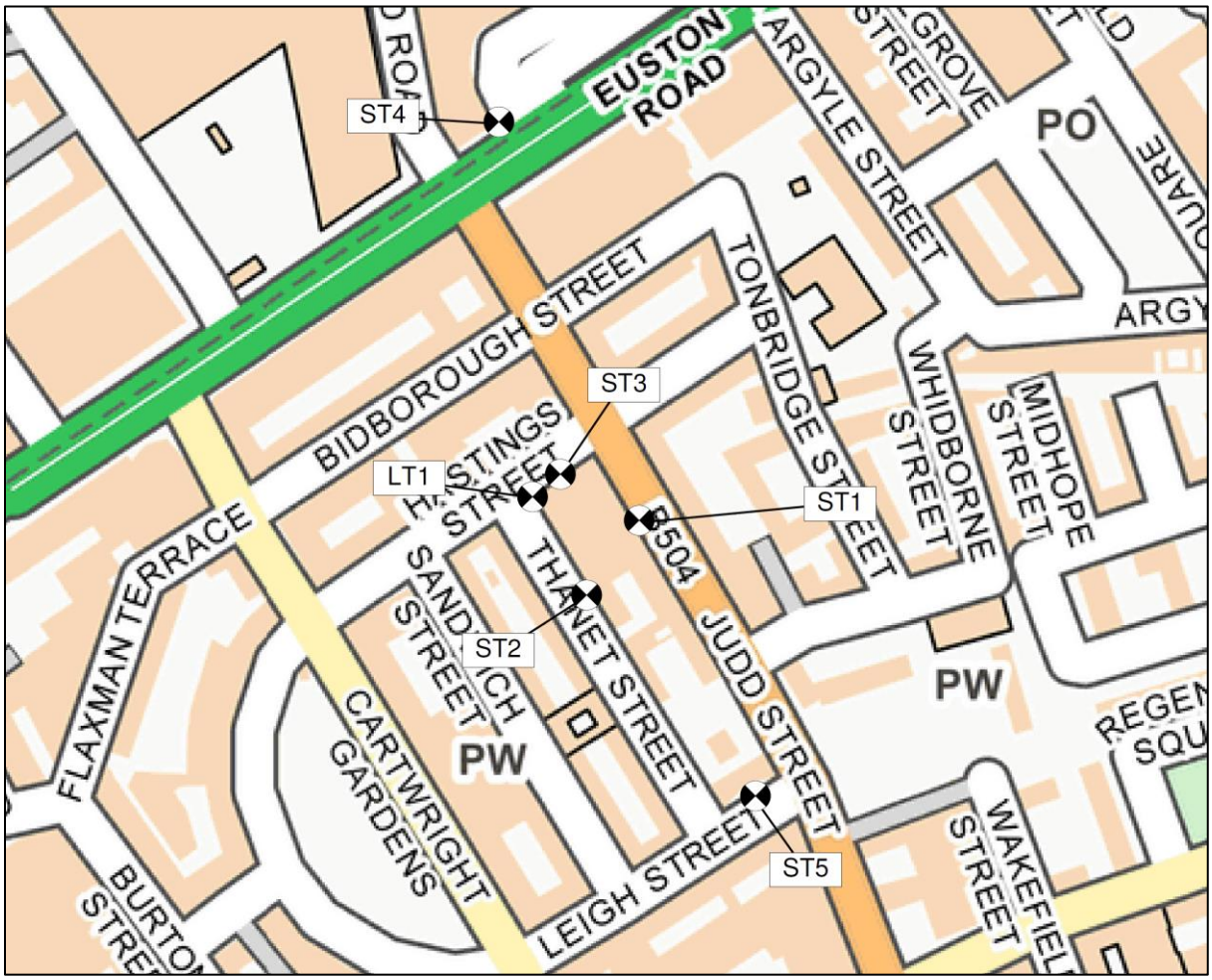
A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

Rion NL-52	*Environmental Noise Analyser*	*s/n*	*620858*
Rion NL-52	*Environmental Noise Analyser*	*s/n*	*732146*
Rion NC-75	*Sound Calibrator*	*s/n*	*35270131*

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, a drift of 0.0 dB was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at six locations (as specified in the following table and Figure 4.1) from Friday 11th June 2021 to Friday 18th June 2021. Attended short term measurements were undertaken at five locations during day, evening and night-time periods with one additional location being measured unattended over a 167-hour period. The raw data collected from the long-term monitoring is available upon request. Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being dry. Anemometer readings confirmed that wind speeds were less than 5 ms^{-1} at all times during the survey, with a predominant north-easterly wind direction during the survey.

Figure 4.1 Noise Monitoring Locations



Not to scale
OS Licence No. AL553611

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Roof level of the existing building
ST1	Judd Street façade of the existing building
ST2	Thanet Street façade of the existing building
ST3	Hastings Street façade of the existing building
ST4	North of the site, Euston Road
ST5	South of the site, Leigh Street

4.2 NOISE SURVEY RESULTS

The dominant noise sources found in the area include road traffic noise from Euston Road, Judd Street and Leigh Street.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey period.

Table 4.2 Meteorological Conditions during the Survey

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	14/06/2021 15:50	28	1	NW	4	Road traffic noise Judd Street
Day ST2	15/06/2021 11:50	21	3	NE	2	Construction noise from the south
Day ST3	14/06/2021 16:06	20	1	NW	4	Road traffic noise Hastings Street, Euston Road
Day ST4	14/06/2021 12:11	22	3	NE	3	Road traffic noise Euston Road
Day ST5	15/06/2021 11:33	21	3	NE	2	Road traffic noise Judd Street, Leigh Street
Evening ST1	15/06/2021 21:00	21	2	NE	0	Road traffic noise Judd Street
Evening ST2	15/06/2021 20:27	22	2	NE	0	Distant road traffic noise Euston Road
Evening ST3	15/06/2021 20:44	21	2	NE	0	Road traffic noise Euston Road, Judd Street
Evening ST4	15/06/2021 21:17	21	3	NE	0	Road traffic noise Euston Road
Evening ST5	15/06/2021 20:10	22	3	NE	0	Road traffic noise Judd Street, Leigh Street
Night ST1	15/06/2021 23:48	19	1	NE	1	Road traffic noise Euston Road
Night ST2	15/06/2021 23:16	19	1	NE	1	Distant road traffic noise
Night ST3	15/06/2021 23:32	19	1	NE	1	Road traffic noise Euston Road, Judd Street
Night ST4	16/06/2021 00:05	19	1	NE	1	Road traffic noise Euston Road
Night ST5	15/06/2021 22:59	19	2	NE	1	Distant road traffic noise

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2 x 10^{-5} Pa).

Table 4.3 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	80 Hours	11/06/2021 – 18/06/2021 12:08 – 11:38	LT1	54.6	85.4	44.1	55.8	50
Weekday Night-time 23:00 – 07:00	40 hours	11/06/2021 – 18/06/2021 23:00 - 07:00		49.4	84.0	42.3	49.4	44
Weekend Daytime 07:00 - 23:00	32 Hours	12/06/2021 - 13/06/2021 07:00 - 23:00		51.1	75.9	43.3	52.7	47
Weekend Night-time 23:00 – 07:00	16 hours	12/06/2021 - 13/06/2021 23:00 - 07:00		48.8	81.2	42.4	49.9	44
Daytime 07:00 - 19:00	15 Mins	14/06/2021 15:50	ST1	62.3	81.2	47.3	65.5	51.0
	15 Mins	15/06/2021 11:50	ST2	53.9	75.0	41.3	56.6	45.0
	15 Mins	14/06/2021 16:06	ST3	59.9	82.7	48.1	60.9	50.5
	15 Mins	14/06/2021 12:11	ST4	70.2	95.6	56.0	71.7	61.2
	15 Mins	15/06/2021 11:33	ST5	61.5	84.0	42.1	61.9	45.6
Evening 19:00 - 23:00	15 Mins	15/06/2021 21:00	ST1	56.5	74.0	45.3	58.8	49.0
	15 Mins	15/06/2021 20:27	ST2	45.5	61.5	40.0	47.4	41.9
	15 Mins	15/06/2021 20:44	ST3	60.6	90.9	45.4	57.0	47.7
	15 Mins	15/06/2021 21:17	ST4	67.4	81.0	53.7	70.2	58.3
	15 Mins	15/06/2021 20:10	ST5	56.7	80.3	43.5	58.4	46.2
Night-time 23:00 - 07:00	15 Mins	15/06/2021 23:48	ST1	56.5	79.5	39.6	56.8	42.1
	15 Mins	15/06/2021 23:16	ST2	43.6	65.3	39.5	44.9	40.7
	15 Mins	15/06/2021 23:32	ST3	54.2	71.5	42.0	57.1	44.3
	15 Mins	16/06/2021 00:05	ST4	69.0	89.0	50.0	69.6	55.7
	15 Mins	15/06/2021 22:59	ST5	56.9	81.9	41.2	57.6	43.4

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa

4.3 VIBRATION SURVEY METHODOLOGY

Measurements were obtained using Rion VM56 vibration meters (serial numbers V3 01763 & 00680056) fitted with ground vibration transducers. Attended simultaneous internal & external vibration measurements were taken on 18th June 2021, however due to weather conditions external vibration monitoring was not possible beyond 10:54AM. As such, solely internal vibrations were undertaken beyond this time. The instruments measured Peak Particle Velocity (PPV) at a scanning duration of 10 seconds.

The vibration measurements were carried out at the locations presented in Table 4.4.

Table 4.4 Vibration Monitoring Locations

Ref	Description
External 1	Building external facade
External 2	Building external facade
External 3	Adjacent 87 Judd Street
External 4	Adjacent Medway Court Thanet Street
Basement- Judd Street Store	Beam
Basement- Heritage Services	Beam
Basement- Meeting Room LG1	Beam
Basement- Computer Room	Column 1
Basement- Computer Room	Column 2
Basement- Conference Room 1	Floor (Free Field)
Basement- Conference Room 3	Floor (Free Field)
Basement- PABX Room	Floor (Free Field)
Basement- Multi-purpose Room	Floor (Free Field)
Basement- Conference Room 4	Floor (Free Field)
Basement- Restaurant/canteen	Floor (Free Field)

4.4 VIBRATION SURVEY RESULTS

Peak Particle Velocity (PPV) for events at simultaneous internal & external measurement locations are presented in Table 4.5, and Peak Particle Velocity (PPV) for internal measurement locations are presented in Table 4.6.

Table 4.5 Attended Internal/External Simultaneous Vibration Monitoring Results

Location Meter A	Location Meter B	Event	Date	Time	Distance from source (m)		PPV (max mms^{-1})	
					Meter A	Meter B	Meter A	Meter B
External 1 on building external façade	Storeroom in basement	Car	18.06.21	08:37:43	7	N/A	0.04	0.02
		Cars	18.06.21	08:39:00	7	N/A	0.14	0.03
		Van	18.06.21	08:40:00	7	N/A	0.06	0.02
		Motorbike	18.06.21	08:41:25	7	N/A	0.06	0.03
		Bin lorry	18.06.21	08:42:00	7	N/A	0.17	0.09
		Luton van	18.06.21	08:49:40	7	N/A	0.03	0.03
		Van	18.06.21	08:54:10	7	N/A	0.04	0.03
		Tube pass	18.06.21	08:55:30	Not known	Not known	0.06	0.03
		Tube pass	18.06.21	08:56:50	Not known	Not known	0.05	0.02
		Tube pass	18.06.21	08:59:39	Not known	Not known	0.01	0.02
		Truck	18.06.21	09:00:49	7	N/A	0.16	0.07
		Tube pass	18.06.21	09:02:31	Not known	Not known	0.04	0.03
		Van	18.06.21	09:03:20	7	N/A	0.04	0.03
		Tube pass	18.06.21	09:05:49	Not known	Not known	0.03	0.02
		Van	18.06.21	09:07:11	7	N/A	0.05	0.03

Location Meter A	Location Meter B	Event	Date	Time	Distance from source (m)		PPV (max mms^{-1})	
					Meter A	Meter B	Meter A	Meter B
		Tube pass	18.06.21	09:07:25	Not known	Not known	0.04	0.02
		Revving 4x4	18.06.21	09:07:50	7	N/A	0.04	0.02
External 2 on building external facade	Heritage Services room, basement	Tube pass	18.06.21	09:16:04	Not known	N/A	0.07	0.03
		Van manoeuvre	18.06.21	09:16:20	5	N/A	0.05	0.03
		Tube pass	18.06.21	09:17:40	Not known	Not known	0.03	0.02
		Tube pass	18.06.21	09:18:05	Not known	Not known	0.04	0.04
		Tube pass x2	18.06.21	09:18:36	Not known	Not known	0.03	0.02
		Tube pass	18.06.21	09:18:55	Not known	Not known	0.08	0.07
		Luton van	18.06.21	09:20:10	7	N/A	0.06	0.02
		Tube pass	18.06.21	09:20:40	Not known	Not known	0.08	0.06
		Tube pass	18.06.21	09:21;50	Not known	Not known	0.03	0.02
		Tube pass	18.06.21	09:22:00	Not known	Not known	0.03	0.02
		Tube pass	18.06.21	09:22:45	Not known	Not known	0.07	0.07
		Tube pass	18.06.21	09:25:53	Not known	Not known	0.04	0.05
		Tube pass	18.06.21	09:28:50	Not known	Not known	0.03	0.02
		Van	18.06.21	09:29:45	7	N/A	0.03	0.02
		Van	18.06.21	09:32:20	7	N/A	0.02	0.02
		Tube pass	18.06.21	09:36:05	Not known	Not known	-	0.08
External 3 adjacent 87 Judd Street	L.G. 1 Meeting room, basement	Luton van	18.06.21	09:39:35	3	N/A	0.08	0.03
		Tube pass	18.06.21	09:41:38	Not known	Not known	0.09	0.05
		Van	18.06.21	09:42:55	2	N/A	0.23	0.07
		Tube pass	18.06.21	09:50:42	Not known	Not known	0.03	0.08
		Tube pass	18.06.21	10:05:20	Not known	Not known	-	0.04
External 4- adjacent Medway Court Thanet Street	Computer Room, Column 1	Tube pass	18.06.21	09:57:00	Not known	Not known	0.02	0.03
		Tube pass	18.06.21	10:26:00	Not known	Not known	0.02	0.04
Plant Room Column 1	Computer Room Column 1	Tube pass	18.06.21	10:34:20	Not known	Not known	0.04	0.09
		Tube pass	18.06.21	10:36:12	Not known	Not known	0.04	0.05
		Tube pass	18.06.21	10:37:00	Not known	Not known	0.03	0.05
		Tube pass	18.06.21	10:39:00	Not known	Not known	0.02	0.02
		Tube pass	18.06.21	10:41:00	Not known	Not known	0.03	0.03
Plant Room Column 2	Computer Room Column 2	Tube pass	18.06.21	10:44:00	Not known	Not known	0.03	0.05
		Tube pass	18.06.21	10:46:00	Not known	Not known	0.03	0.04
		Tube pass	18.06.21	10:48:00	Not known	Not known	0.03	0.06
		Tube pass	18.06.21	10:51:00	Not known	Not known	0.04	0.05
		Tube pass	18.06.21	10:53:00	Not known	Not known	0.02	0.04
		Tube pass	18.06.21	10:54:00	Not known	Not known	0.04	0.04

Table 4.6 Attended Internal Vibration Monitoring Results

Location Meter B	Event	Date	Time	Distance from source (m)		PPV (max mms^{-1})
				Meter A	Meter B	Meter B
Conference Room 1	Background	18.06.21	10:58:01	Not known		0.01
	Tube pass 1	18.06.21	11:02:10	Not known		0.01
	Tube pass 2	18.06.21	11:07:03	Not known		0.01
Plant Room	Background	18.06.21	11:11:09	Not known		0.01
	Tube pass 1	18.06.21	11:11:58	Not known		0.02
	Tube pass 2	18.06.21	11:13:20	Not known		0.02
Conference Room 3	Background	18.06.21	11:15:31	Not known		0.01
	Tube pass 1	18.06.21	11:19:40	Not known		0.01
	Tube pass 2	18.06.21	11:23:05	Not known		0.01
	Tube pass 3	18.06.21	11:24:31	Not known		0.01
PABX Room	Background	18.06.21	11:26:10	Not known		0.01
	Tube pass 1	18.06.21	11:29:51	Not known		0.01
	Tube pass 2	18.06.21	11:34:03	Not known		0.01
Multi-purpose Room	Background	18.06.21	11:36.03	Not known		0.01
	Tube pass 1	18.06.21	11:42:45	Not known		0.01
	Tube pass 2	18.06.21	11:47.02	Not known		0.01
Conference Room 4	Background	18.06.21	11:50.22	Not known		0.01
	Tube pass 1	18.06.21	11:53.49	Not known		0.01
	Tube pass 2	18.06.21	11:57.22	Not known		0.02
Restaurant/Canteen	Background	18.06.21	11:59.08	Not known		0.01
	Tube pass 1	18.06.21	12:05.30	Not known		0.02
	Tube pass 2	18.06.21	12.09.11	Not known		0.02

5.0 ASSESSMENT OF KEY EFFECTS

5.1 BUILDING SERVICES PLANT

This assessment has been undertaken to establish the maximum external noise levels from the proposed building services plant associated with the development. The assessment compares the predicted worst-case breakout noise levels from potential plant with the representative background noise L_{A90} at the closest existing residential receptors.

A series of predictions were made by defining different sound power levels at various sources. When the sound pressure levels are set as shown in Tables 5.1 (which are considered to be achievable), the noise levels at all the existing receptors are predicted to be at least 10 dB below existing background levels during the worst-case night-time period as shown in Tables 5.2.

In accordance with section 9.2 of BS4142:2014 an overall +2 dB character correction has been applied to account for any intermittent characteristics of noise from the plant units which may be perceptible at the closest sensitive receptors. The assessment presented below has been undertaken with plant for each unit operating at full capacity, simultaneously.

Table 5.1 Proposed Maximum Plant Noise Emissions

Plant Reference	Noise Emission Limit – Sound Pressure Level (per unit)
Condenser Unit	57.5 dB(A) at 1m distance OR 47.9 dB(A) at 3m distance

All values are sound pressure levels in dB re: 2x 10^{-5} Pa

Table 5.2 Noise Rating Levels for Proposed Plant

Receptor Reference	Measured Average Background (L_{A90})	Rating Level From Plant	BS4142 Score
ER01	44	30	-14
ER02	44	32	-12
ER03a	44	32	-12
ER03b	44	31	-13
ER04a	44	34	-10
ER04b	44	33	-11
ER05	44	33	-12
ER06	44	32	-12
ER07	44	31	-13
ER08	44	30	-14

All values are sound pressure levels in dB re: 2x 10^{-5} Pa

As shown within Table 5.2 above (with the maximum permissible sound pressure levels shown within table 5.1) noise levels from the proposed plant at the surrounding noise sensitive receptors are at least 10 dB below the existing background L_{A90} noise levels during the worst-case night-time period and therefore in accordance with the local Camden noise guidance.

Figure 5.1 Plant Noise Contour Plot (L_{Aeq})

Not to scale
OS Licence No. AL55361
Contour Plot at 16.0m height

5.2 NOISE INTRUSION ASSESSMENT

This assessment has been undertaken to assess the impact of the existing noise climate upon the existing building façade and proposed office extension. The assessment derives internal noise levels within the proposed office space with windows open (where an assumption of partially open windows resulting in 15dB attenuation has been used), and with windows closed (where an assumption of standard double glazing resulting in 30dB attenuation has been used). Although criteria outlined within Section 2.0 states that an ambient internal noise level of 45dB $L_{Aeq,T}$ is acceptable, this assessment will design to an internal ambient noise specification of 40dB $L_{Aeq,T}$ to allow for uncertainty regarding mechanical ventilation and equipment within laboratory areas of the development, and to ensure a uniform glazing specification for all spaces within the development.

This assessment is presented in Table 5.3 below.

Table 5.3 Predicted Internal Noise Levels

Location	Height (m)	External L_{Aeq} at 1m from Facade	Internal L_{Aeq} with Windows Open	Internal L_{Aeq} with Windows Closed	Criteria Internal L_{Aeq}
North Façade	4.0	60.9	45.9	30.9	40
	8.0	60.6	45.6	30.6	40
	12.0	59.9	44.9	29.9	40
	16.0	46.8	31.8	16.8	40
	20.0	53.2	38.2	23.2	40
East Façade	4.0	63.1	48.1	33.1	40
	8.0	62.5	47.5	32.5	40
	12.0	61.8	46.8	31.8	40
	16.0	47.7	32.7	17.7	40
	20.0	54.1	39.1	24.1	40
South Façade	4.0	34.3	19.3	4.3	40
	8.0	35.9	20.9	5.9	40
	12.0	38.6	23.6	8.6	40
	16.0	40.3	25.3	10.3	40
	20.0	42.8	27.8	12.8	40
West Facade	4.0	55.1	40.1	25.1	40
	8.0	55.0	40.0	25.0	40
	12.0	54.6	39.6	24.6	40
	16.0	48.8	33.8	18.8	40
	20.0	52.9	37.9	22.9	40

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa

The results presented above demonstrate that internal noise level criteria outlined in BS8233:2014 & Building Bulletin 93 are achieved with windows closed. With windows open however, the internal noise criteria is exceeded on all facades, with the exception of the southern façade and western façade above a height of 12.0m. As the development does not have a fixed internal layout, a glazing and ventilation strategy to meet internal noise criteria is outlined within Table 5.4 below.

Table 5.4 Ventilation Requirements Per Façade

Storey	Room Type	Ventilation Requirement			
		Northern Façade	Eastern Façade	Southern Façade	Western Façade
Ground Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
First Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
Second Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Alternative Ventilation (Rw 30)
Third Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
Fourth Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
Fifth Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
Sixth Floor	Office	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation
	Laboratory-Enabled	Alternative Ventilation (Rw 30)	Alternative Ventilation (Rw 30)	Natural Ventilation	Natural Ventilation

5.3 VIBRATION ASSESSMENT

This assessment has been undertaken to quantify the magnitude of existing vibration sources within the vicinity of the site (predominantly traffic on the London Underground network directly beneath the building), and determine the level of effect this may have on proposed sensitive receptors within the development. As the exact nature of vibration-sensitive equipment to be situated within the building is unknown, this assessment will solely present the existing vibration effects in relation to the criteria outlined within Section 2, which will further inform requirements for specific vibration isolation when equipment specifications are determined during the detailed design stage.

To enable comparison with VC Curve criteria across the 1Hz-100Hz frequency range, frequency data from all internal vibration events exceeding 0.05mm/s PPV has been analysed to determine maximum

root-mean square (RMS) velocity across all frequencies for each event. The results of this assessment are outlined in Table 5.4 below. For ease of presentation, only the plane of vibration with the greatest PPV value and highest single frequency velocity within this plane is presented for each event.

Table 5.5 Worst-Case Maximum RMS Velocity per Event

Location	Event	Time	Internal PPV (mm/s)	Worst-Case Plane of Vibration	Worst-Case Frequency Band	Maximum Velocity (μm/s)	VC Curve Criteria Met
Storeroom in basement	Refuse Lorry	08:42:00	0.09	Y	16Hz	0.20	VC-G
	Truck Pass	09:00:49	0.07	Y	12.5Hz	0.13	VC-G
Heritage Services room, basement	Tube Pass	09:18:55	0.07	Z	40Hz	1.25	VC-F
	Tube Pass	09:20:40	0.06	Z	40Hz	0.98	VC-F
	Tube Pass	09:22:45	0.07	Y	63Hz	0.16	VC-G
	Tube Pass	09:25:53	0.05	Z	40Hz	0.84	VC-F
	Tube Pass	09:36:05	0.08	Y	50Hz	0.17	VC-G
L.G. 1 Meeting room, basement	Tube Pass	09:41:38	0.05	Z	31.5Hz	1.04	VC-F
	Van Pass	09:42:55	0.07	Z	20Hz	0.51	VC-G
	Tube Pass	09:50:42	0.08	Z	10Hz	0.64	VC-G
Computer Room Column 1	Tube Pass	10:34:20	0.09	Z	10Hz	0.65	VC-G
	Tube Pass	10:36:12	0.05	Z	16Hz/80Hz	0.24	VC-G
	Tube Pass	10:37:00	0.05	Z	12.5Hz	0.30	VC-G
Computer Room Column 2	Tube Pass	10:44:00	0.05	Z	12.5Hz	0.72	VC-G
	Tube Pass	10:48:00	0.06	Z	10Hz	0.98	VC-F
	Tube Pass	10:51:00	0.05	Z	10Hz	0.67	VC-G

As demonstrated within Table 5.5, no maximum RMS frequency velocity within the worst-case plane of vibration exceeds VC-F curve criteria for any event. As such, it is not expected that vibration effects will create any significant barrier to sensitive activity within the development, however this can be more suitably determined when the specification of proposed equipment is known. To further reduce the possibility for structure-borne vibration and noise transfer, vibration-sensitive equipment should ideally be isolated from the building structure and building services to minimise potential transmission pathways.

5.4 ROOFTOP TERRACE

There is a proposed rooftop terrace as part of the proposals. It is understood that no amplified music will be played in this area and the proposed uses will be between 8am and 8pm Monday to Friday as such noise from this area is not expected to be a significant issue.

6.0 Conclusions

This report presents the findings of a noise assessment undertaken in order to accompany a planning application for the conversion and extension of offices at 105 Judd Street, Camden.

Maximum noise level limits have been set for proposed building services plant which are predicted to result in a noise rating level which are at least 10 dB below the existing background noise level during the worst-case night-time period at the closest sensitive receptor locations in accordance with the local Borough of Camden guidance. Accordingly, building services plant is expected to have no adverse impact at the closest sensitive receptors.

An assessment has been undertaken to assess noise within the internal spaces of the proposed office and laboratory areas. The results demonstrate that internal noise level criteria outlined in BS8233:2014 and Building Bulletin 93 are achieved with windows closed. With windows open however, the internal noise criteria is exceeded and therefore alternative means of ventilation with a minimum sound reduction of $D_{n,e,w} + C_{tr}$ 30dB will be installed on the northern and eastern façades, and below 12.0m on the western façade. The alternative means of ventilation can vary from passive systems (such as trickle ventilation) to mechanical systems.

An additional assessment has been undertaken to quantity the magnitude of existing vibration upon the building, which may be used to inform requirements for localized vibration mitigation when detailed laboratory equipment specifications is determined. The results demonstrate that the worst-case vibration effects do not exceed generic vibration criterion VC-F, and therefore vibration should not present any significant barrier to vibration-sensitive equipment across the site.

APPENDICES

APPENDIX A – ACOUSTIC TERMINOLOGY AND ABBREVIATIONS

An explanation of the specific acoustic terminology referred to within this report is provided below.

dB — Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.

dB(A) — Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.

L_{Aeq} — Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq,\ 07:00 - 23:00}$ for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower that the $L_{Aeq,\ 07:00 - 23:00}$.

L_{Amin} — The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.

L_{Amax} — The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.

L_n — Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10,\ 1\ hr}$ = x dB.

The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.

R_w The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

An explanation of abbreviations used within this report is provided below.

CADNA – Computer Aided Noise Abatement
DMRB – Design Manual for Roads and Bridges
HGV – Heavy Goods Vehicle
UDP – Unitary Development Plan
UKAS – United Kingdom Accreditation Service

APPENDIX B – REPORT CONDITIONS

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