105 Judd Street, Camden, WC1H 9NE

784-B030322

Noise Assessment

Norman Disney & Young Ltd.

April 2025

TETRA TECH

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Document:	Noise Assessment
Project:	105 Judd Street, Camden, WC1H 9NE
Client:	Norman Disney & Young Ltd.
Project number:	784-B030322
File origin:	Z:\Projects\784-B030322-C2 Judd Street\

Revision:	**9**	**Prepared by:**	Kishan Vegamwala Environmental Assistant	[redacted]
Date:	**09/04/2025**	**Checked by:**	Najwa Adnan-Smith Senior Environmental Consultant	[redacted]
tus:	**Ninth Issue**	**Approved by:**	Matthew Smith Associate Environmental Consultant	[redacted]
Des iption of revision:	**Minor updates**			

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Appendix A – Acoustic Terminology

Appendix B – References

Acronyms/Abbreviations

Acronyms/Abbreviations	Definition
CADNA	Computer Aided Noise Abatement
DMRB	Design Manual for Roads and Bridges
HGV	Heavy Goods Vehicle
PPG	Planning Practice Guidance
UDP	Unitary Development Plan
UKAS	United Kingdom Accreditation Service

Executive Summary

Planning permission was granted on 10 May 2023 to extend the building at third, fourth and fifth floor levels in connection with ongoing commercial use. As part of the permitted proposals, it was made clear that the building will be designed to accommodate lab enabled space for life science uses. Following occupier interest, scheme amendments are now sought as part of a Section 73 application. Amongst other changes, an extended rooftop plant enclosure is now sought. This noise and vibration assessment has been prepared to assess the revised proposals.

Noise levels have been assessed in accordance with BS 4142 criteria for proposed building services plant which, without mitigation, are predicted to result in a noise rating level which exceeds the requirement within the Camden Local Plan. Utilising the specified attenuation within Section 6.0, noise levels are at least 10 dB below the existing background noise level during the worst-case night-time period at the closest sensitive receptor locations and therefore is 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. Provided the noise limit of 10dB below measured background levels are adhered to, plant noise level will meet the BREEAM POL05 noise criteria. With the basement and first floor plant set in accordance with Section 5.1.2 and 5.1.3, noise breakout through proposed louvres will not exceed the Camden Local Plan at nearby existing 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 the internal noise criteria is exceeded, and therefore alternative means of ventilation with a minimum sound reduction of 30dB $D_{n,ew}$ + C_{tr} will be installed on the northern and eastern façades, and at up to 12.0m above ground level on the western façade. The alternative means of ventilation can vary from passive systems (such as trickle ventilation) to mechanical systems. Provided the mitigation is implemented, internal noise levels will meet the BREEAM HEA05 noise criteria.

An additional assessment has been undertaken to quantity the magnitude of existing vibration upon the building, which may be used to inform requirements for localised 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.

Considering the above, planning conditions 10 to 13 of the planning permission 2022/1817/P would continue to be adhered to.

1.0 Introduction

1.1 Purpose of this Report

Planning permission was granted on 10 May 2023 to extend the building at third, fourth and fifth floor levels in connection with ongoing commercial use. As part of the permitted proposals, it was made clear that the building will be designed to accommodate lab enabled space for life science uses. Following occupier interest, scheme amendments are now sought as part of a Section 73 application. Amongst other changes, an extended rooftop plant enclosure is now sought. This noise and vibration assessment has been prepared to assess the revised proposals.

A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise.

A list of acoustic terminology used in this report is provided in Appendix A. Report Conditions are available upon request.

1.2 Legislative Context

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in December 2024. With regard to noise and planning, the NPPF contains the following statement at Paragraph 198:

> "198. 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 […]

> "200. 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.
>
> "201. 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 (NPSE), 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 below in Table 1.1.

Table 1.1: PPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No Specific Measures Required
No Observed Adverse Effect Level (NOAEL)			
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 (LOAEL)			
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 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
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

The NPPF, NPSE and PPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents including ‘BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings’ (2014) and ‘BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound’ (2014) have been used. Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG also states that neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.

Furthermore, the PPG: Noise identifies at Paragraph: 011 Reference ID: 30-011-20190722 the requirement for developments proposals to incorporate measures to mitigating the impact of noise on residential developments. In particular:

"*Noise impacts may be partially offset if residents have access to one or more of:*

- *a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;*
- *a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;*
- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance).*

1.3 Camden Local Plan

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)."

1.4 Current Planning Permission

The existing planning permission 2022/1817/P which was granted on 10 May 2023 has the following planning conditions which are considered relevant to this Section 73 application.

*"**10 Roof terrace hours***

The proposed roof terraces hereby approved shall only be accessed between the hours of 08:00 and 20:00 Monday to Friday.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policy A1 of the London Borough of Camden Local Plan 2017."

*"**11 Roof terrace noise***

No music shall be played on the premises in such a way as to be audible within any adjoining premises or on the adjoining highway.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policies G1, CC1, D1, A1, and A4 of the London Borough of Camden Local Plan 2017."

*"**12 Plant and equipment - acoustic isolation***

Prior to occupation, the approved plant shall be provided with acoustic isolation, sound attenuation and anti-vibration measures in accordance with the scheme approved in writing by the local planning authority. All such measures shall thereafter be retained and maintained in accordance with the manufacturers' recommendations.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policy G1, A1, A4, D1 and CC1 of the London Borough of Camden Local Plan 2017."

*"**13 Plant and equipment - noise compliance***

Noise levels at a point 1 metre external to sensitive facades shall be at least 10dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note

(whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 15dB(A) below the LA90, expressed in dB(A).

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policies A1 and A4 of the London Borough of Camden Local Plan 2017."

1.5 Acoustic Consultants' Qualifications and Professional Memberships

The lead project Acoustic Consultant is Travis Smith. The report has been checked by Suzy Everett and verified by Dawit Abraham. Relevant qualifications, membership and experience are summarised in Table 1.2 below.

Table 1.2: Acoustic Consultants' Qualifications & Experience

Name	Education	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)
Travis Smith	BSc 2022	Jul 2022	-	-
Suzy Everett	BEng 2018	Jul 2016	Aug 2018	Sep 2022
Dawit Abraham	BSc 2008 MSc 2010	Oct 2010	Jan 2011	Jan 2015

2.0 Assessment Criteria

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 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'

While the assessment nature of The Camden Local Plan referenced in Section 1.3 of this report addresses the

A full bibliography of documents referenced within this report is provided within Appendix B.

Table 2.1: Noise Level Criteria and Actions

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
No Observed Adverse Effect Level (NOAEL)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level ($L_{Ar,T}$) dB and existing background level $L_{A90,T}$ dB is less than or equal to 0dB	**Justification for Effect Level:** Below low impact threshold in BS4142:2014 **Action Required:** None
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Noise levels are below: Offices: 35 dB $L_{Aeq,16hours}$	**Justification for Effect Level:** Within BS8233 guideline criteria **Action Required:** None
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Science Laboratories (Refurbishment): 45 dB $L_{Aeq,\ 30mins}$	**Justification for Effect Level:** Within BB93 Guideline Criteria **Action Required:** None
Lowest Observed Adverse Effect Level (LOAEL)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is between 1-4dB.	**Justification for Effect Level:** Lower rating levels relative to measured background indicate it is less likely for adverse impacts to occur (depending on context). **Action Required:** Reduce to a minimum the exceedance over 0dB above background threshold through good acoustic design where practicable, or demonstrate

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
		contextual reasoning as to why adverse effects are not predicted
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Noise levels are at: Offices: 35 – 40 dB $L_{Aeq,16hours}$	**Justification for Effect Level:** Within BS8233 guideline criteria **Action Required:** None
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Noise levels are at: Science Laboratories (Refurbishment): 45 dB $L_{Aeq, 30mins}$	**Justification for Effect Level:** Within BB93 guideline criteria **Action Required:** None
Significant Observed Adverse Effect Level (SOAEL)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is between 5-9dB.	**Justification for Effect Level:** Within adverse impact threshold in BS4142:2014. **Action Required** Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Noise levels exceed: Offices: 40 dB $L_{Aeq,16hours}$	**Justification for Effect Level:** Exceeds BS8233 guideline criteria. **Action Required:** Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria for the following noise sources with windows closed: • Associated proposed plant	Noise levels are exceeded, depending on context: Science Laboratories (Refurbishment): 45 dB $L_{Aeq, 30mins}$	**Justification for Effect Level:** Exceeds BB93 guideline criteria. **Action Required:** Additional mitigation required to achieve effect of LOAEL or less.

2.1 BREEAM 2014 POL05 and HEA05 Noise Criteria

2.1.1 BREEAM HEA05 Acoustic Performance Criteria

The British Research Establishment Environmental Assessment Method (BREEAM) sets out the way in which credits may be achieved for meeting standards to ensure the building's acoustic performance meets the appropriate standard(s) for its purpose.

Up to two credits are available for this development for acoustic performance in the following areas where a suitably qualified acoustician has been appointed:

- First Credit – Sound insulation and Internal ambient noise levels
- Second Credit - Reverberation

The building must meet the acoustic performance standards and testing requirements for the relevant building type and function areas as detailed below.

Table 2.2: BREEAM 2014 Refurbishment & Fit-Out Hea05 Requirements

Industrial, Retail, Prisons and Other Building Types (two credits)	
First Credit – Sound Insulation and Internal Ambient Noise Levels	
Criteria	Indoor ambient noise levels comply with the design ranges given in BS 8233: 2014 unless otherwise stated below. Where the room types below are present, the appropriate criteria for ambient noise levels, sound insulation and acoustic privacy must also be achieved. The sound insulation between acoustically sensitive rooms and other occupied areas complies with the example matrix relating to internal sound insulation within Section 7.5 of BS 8233:2014 which takes into consideration the likely level of activity noise, the degree of privacy required and the sensitivity of the adjacent space.
Testing Requirements	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on the facing page section of this BREEAM issue.
Rooms with specific functions	Educational space (teaching and learning spaces) - refer to Table 5.14 on page 109 Medical treatment rooms - refer to Table 5.15 on page 110.
Second Credit – Reverberation	
Criteria	Achieve reverberation times compliant with Section 1 of BB93. In addition, or alternatively, if relevant to the assessed building; classrooms, seminar rooms and lecture theatres achieve reverberation times compliant with section 1 of BB93.
Testing Requirements	Reverberation times within teaching and study spaces: A programme of acoustic measurements is carried out by a compliant test body to achieve the required performance standards set out in table 6 in section 1 of BB93. Measurements should be carried out in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Open Plan teaching spaces: STI Measurements of the STI should be taken in at least one in ten typical student listening positions in the open plan spaces in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Corridors and stairwells: installation of a specification compliant with the BB93 criteria demonstrates compliance. Reference is also made to the Notes below.
Rooms with specific functions	Educational space (teaching and learning spaces) - refer to Table 5.14 on page 109 Medical treatment rooms - refer to Table 5.15 on page 110.

2.1.2 BREEAM POL05 Acoustic Performance Criteria

This assessment is undertaken according to the performance criteria of BREEAM 2014 New Construction Pol 05 Reduction of Noise Pollution. The aim is to reduce the likelihood of noise arising from fixed installation on the new development affecting nearby noise

sensitive buildings. One credit may be awarded should the following requirement(s) be satisfied to demonstrate compliance:

1) Where there are, or will be, no noise-sensitive areas or buildings within 800m of the assessed site.

OR

2) Alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the site, one credit can be awarded as follows:

a) Where a noise impact assessment in compliance with BS 74451 has been carried out and the following noise levels measured/determined:

i) Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development or at a location where background conditions can be argued to be similar.

ii) The rating noise level resulting from the new noise source (see CN4).

3) The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body (see Relevant definitions in the Additional information section).

4) The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.

5) Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with criterion 4.

2.1.3 Internal Building Service Noise Criteria

It is recommended that the design standards specified within CIBSE Guide A noise limits are complied with to avoid adverse impact from the operation of building services plant.

Table 2.3: Recommended Internal Mechanical Services Noise Criteria

Internal Space	Mechanical Services Noise Criterion
	NR (*for guidance*)
Corridors	40
Laboratories	40
Private offices	35
Open plan offices	40

2.2 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.

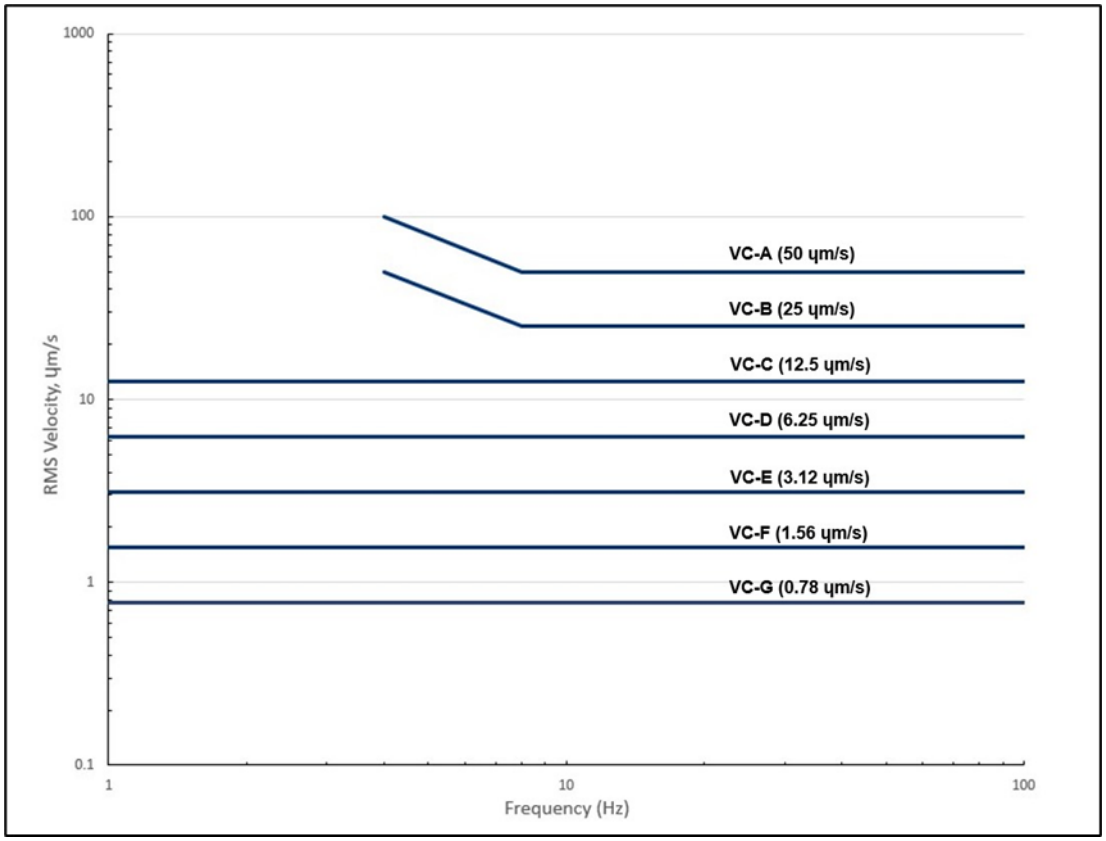
The criterion and description of each VC Curve is outlined within Table 2.4 and graphically presented within Figure 2.1.

Table 2.4: 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.

Curve Criterion	Amplitude (μm/s)	Detail Size (μm)	Description of Use
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 noise levels at a number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on ISO 9613-2 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. 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 Table 3.1 below have been used.

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Next Map Britain – 10m Contours
Building heights – around site	Tetra Tech Observations	• 4.0m height for one-storey properties • 8.0 m height for two storey properties • 3.0m per additional storey
Receptor positions*	Tetra Tech	• 1.5 m for ground floor properties • 4.0m height for first-floor properties • 3.0m per additional storey • 1.5m height for monitoring validation locations.
Modelling Parameters	Tetra Tech	• Ground Absorption: 0.5 • Order of Reflections: 2 • Noise Contour Plot Grid Receiver Spacing: 5.0
Proposed Plans	Norman Disney & Young	Drawing Title: Combined Services Sixth Floor Drawing No: SK-CS-06-002
*All receptors modelled 1.0m from building façade unless otherwise stated.		

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are worst-case.

3.2 Model Input Data

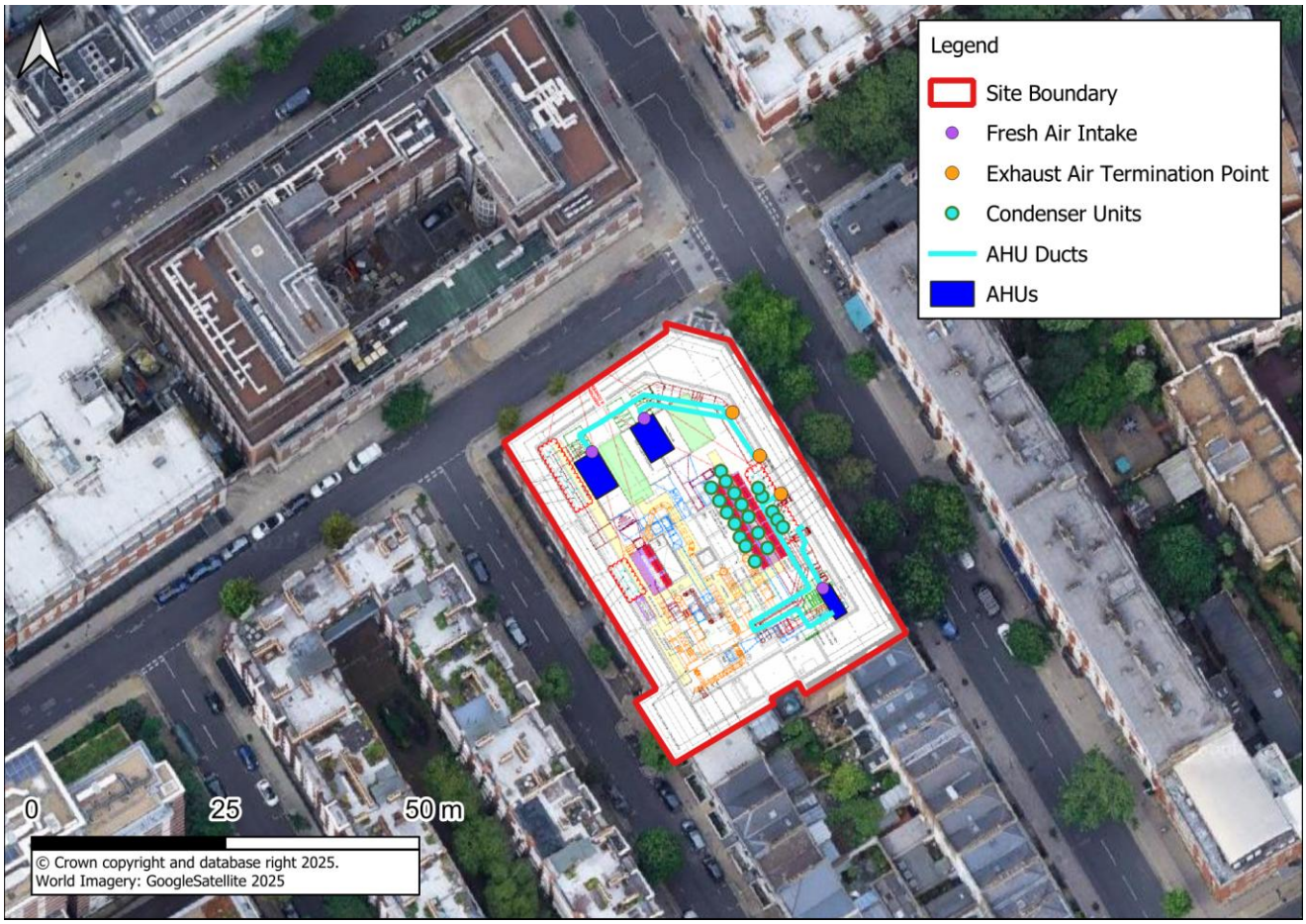
Details relating to the proposed BSP were provided by NDY on 26th March 2023. Table 3.2 outlines the AHU data used in the assessment and Table 3.3 presents the maximum permissible sound power levels for the proposed CU's. Figure 3.1 shows the illustrative plan and sensitive receptor locations. Existing receptors are indicated with ER.

Table 3.2: Summary of Building Services Plant (BSP)

System	Selections	Equipment	Sound Power Level								
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total (dB(A))
Office AHU	AHU - System Air Condenser - Mitsubishi	Break Out (AHU)	69	78	57	57	55	50	44	28	64
		Supply Air	76	88	79	80	78	71	65	58	82
		Exhaust Air	74	85	76	80	76	73	69	65	81
		Condenser	-	-	-	-	-	-	-	-	88
Biology AHU	AHU - System Air Condenser - Mitsubishi	Break Out (AHU)	71	81	59	58	56	51	44	28	66
		Supply Air	78	91	81	82	79	73	66	58	84
		Exhaust Air	76	89	77	80	77	73	69	64	82
		Condenser	-	-	-	-	-	-	-	-	88
Chemistry AHU	AHU - System Air Condenser - Mitsubishi	Break Out (AHU)	71	81	61	60	59	55	50	33	67
		Supply Air	78	92	83	84	82	77	71	62	86
		Condenser (x2)	-	-	-	-	-	-	-	-	83
Events AHU		Break Out (AHU)	69	77	64	59	59	58	52	35	66
		Supply Air	76	85	86	82	82	80	74	64	86

System	Selections	Equipment	Sound Power Level								
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total (dB(A))
	AHU - System Air Condenser - Mitsubishi	Exhaust Air	75	87	82	81	81	80	77	72	86
		Condenser	-	-	-	-	-	-	-	-	84
Fume Extract	Central Fans	Duty Fan (1)	92	85	86	81	73	67	61	57	67
		Duty Fan (2)	92	85	86	81	73	67	61	57	67
		Standby Fan (3)	92	85	86	81	73	67	61	57	67

Figure 3.1: Building Services Plant (BSP) Locations



3.3 Sensitive Receptors

3.3.1 Existing Sensitive Receptor Locations

Table 3.4 below summarises receptor locations that have been selected to represent worst-case sensitive receptors with respect to direct noise from the site. Façades of the nearest noise sensitive properties to the development site have been represented. The locations of the receptors are presented within Figure 3.4.

Table 3.3: Existing Sensitive Receptor Locations

Ref.	Description	Height (m) Daytime / Night-time
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

Ref.	Description	Height (m) Daytime / Night-time
ER05	Thanet House	18
ER06	Sinclair House	18
ER07	123 Judd Street	14
ER08	116 Judd Street	26

Figure 3.2: Existing Sensitive Receptor Locations

3.4 Model Verification (Existing Ambient Noise Climate)

Traffic noise from surrounding roads has been verified by modelling a measured daytime monitoring location for the 'existing' scenario. The comparison between the monitored and modelled results for the site is shown in Tables 3.5.

Table 3.4: 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			

As all of the verification points show a divergence between monitored and modelled results of no more than ±3 dB, the models are considered suitably verified.

4.0 Noise Survey

4.1 Noise Survey Details

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

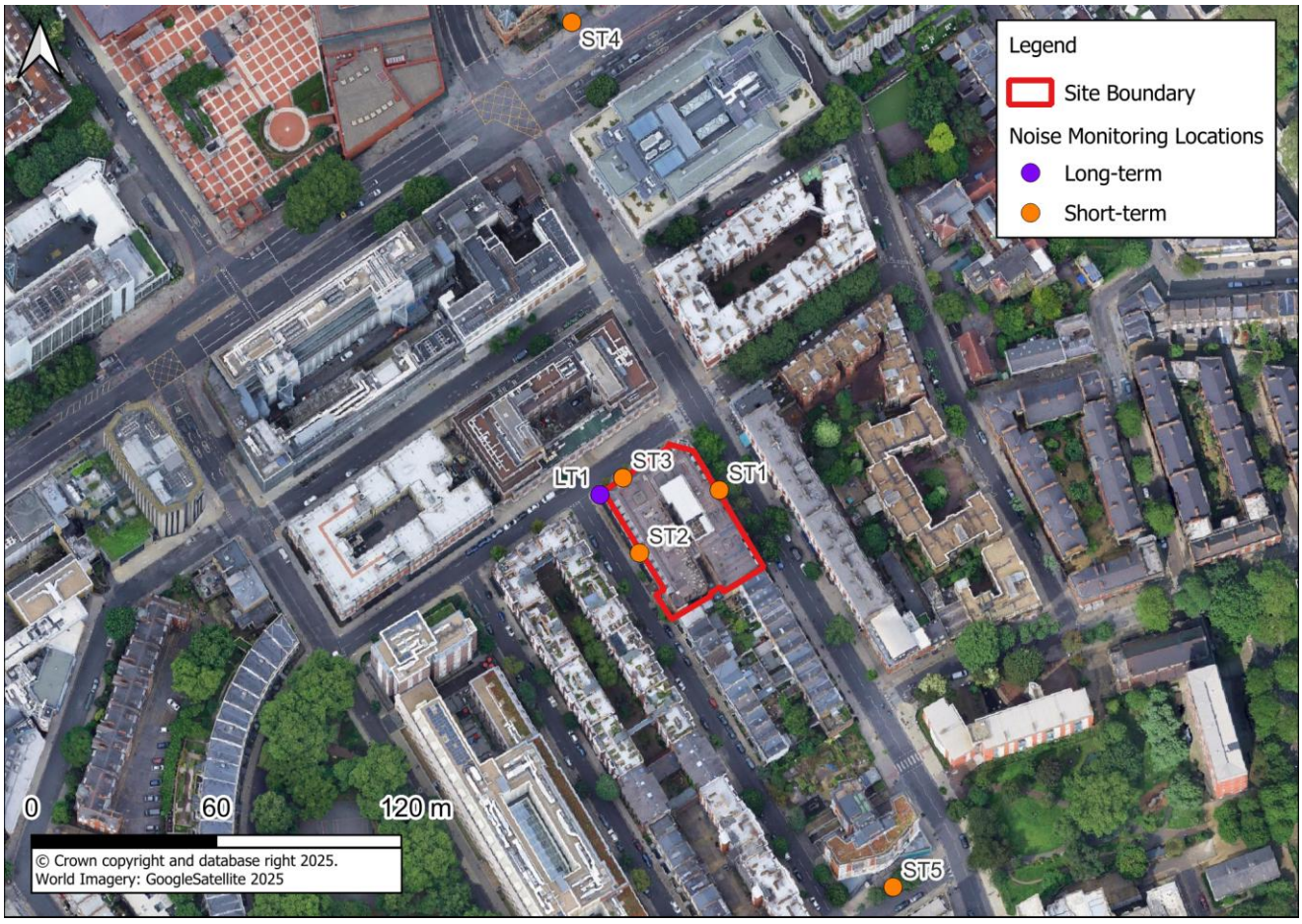
The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, a drift of 0.0 dB was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates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

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

Figure 4.1: Noise Monitoring Locations



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 (ºC)	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

Survey Location	Date & Time	Temperature (ºC)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
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

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)
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

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)
	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 Representative Background Noise Levels

Using the data collected during the baseline survey, representative background noise levels have been derived for all receptor locations presented in Figure 3.2. Table 4.4 presents the representative background noise levels considered appropriate for the existing sensitive receptors within the area. Only night-time representative levels have been utilised within the table below as maximum plant limits within Section 5.1 have been specified to meet the lower night-time background noise levels.

Table 4.4: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)*
ER01 – ER08	LT1	Night-time (23:00 – 07:00)	44

*Lowest $L_{A90,T}$ value selected from either Weekday or Weekend.

The representative noise levels presented in Table 4.4 have been used to inform the assessment presented in Section 5.0.

4.4 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 4.5.

Table 4.5: 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)

4.5 Vibration Survey Results

Peak Particle Velocity (PPV) for events at simultaneous internal & external measurement locations are presented in Table 4.6, and Peak Particle Velocity (PPV) for internal measurement locations are presented in Table 4.7.

Table 4.6: 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
		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

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 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

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
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 4.7: 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
	Background	18.06.21	11:15:31	Not known		0.01

Location Meter B	Event	Date	Time	Distance from source (m)		PPV (max mms^{-1})
				Meter A	Meter B	Meter B
Conference Room 3	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 Effects

5.1 Building Services Plant Noise Assessment

5.1.1 Roof Level Plant Assessment

This assessment has been undertaken to establish the predicted 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 (shown in Table 4.4).

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.

The results of the plant noise assessment are presented within Table 5.1, and the noise contour plot is presented within Figure 5.1.

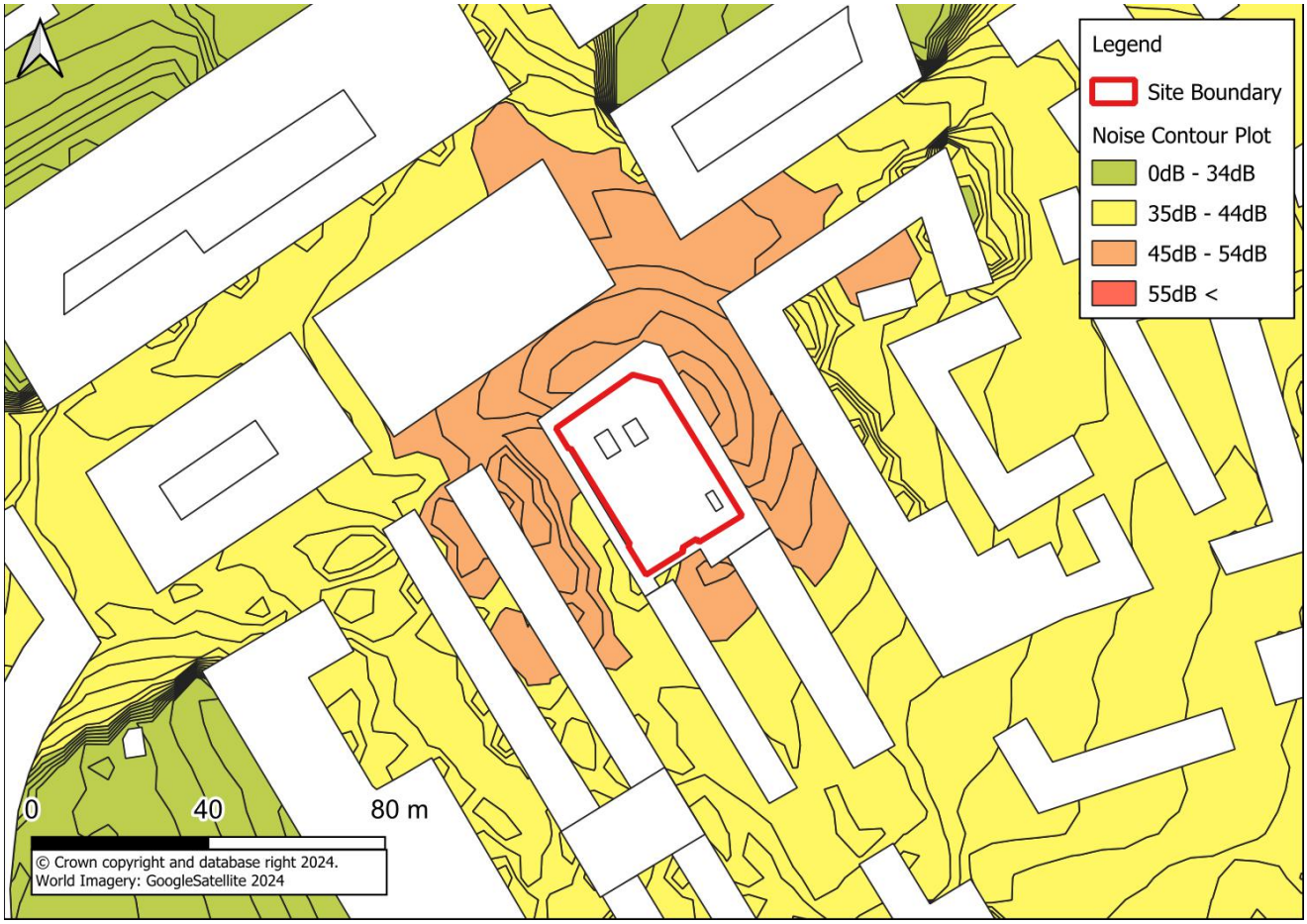
Table 5.1: BS4142 Assessment

Location	Existing Measured Background L_{A90}		Noise rating level from plant		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ER01	47	44	50	50	3	6
ER02	47	44	48	48	1	4
ER03a	47	44	43	43	-4	-1
ER03b	47	44	46	46	-1	2
ER04a	47	44	44	44	-3	0
ER04b	47	44	45	45	-2	1
ER05	47	44	47	47	0	3
ER06	47	44	48	48	1	4
ER07	47	44	48	48	1	4
ER08	47	44	49	49	2	5

All values are sound pressure levels in dBA re: 2x 10^{-5} Pa.
All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 para 8.6 the levels are expressed as integers (with 0.5 dB

being rounded up). This may mean that the arithmetic in the above table may appear to be up to 1 dB incorrect due to this rounding.

Figure 5.1: BS 4142 Noise Contour Plot



As shown within Table 5.1 above, noise levels from the proposed plant at the surrounding noise sensitive receptors are, at worst, +7dB above the existing background L_{A90} noise levels during the worst-case night-time period and therefore in accordance with the local Camden noise guidance, mitigation is required and will be outlined within Section 6.0.

5.1.2 Basement Level Plant Assessment

An assessment has also been undertaken of the basement generator and 2x AHUs set being located at Basement Level with the air intake and exhaust at basement level on Judd Street and Hastings Street.

These plant items will still require compliance with the criteria set out by Camdan Council. Basement level plant noise should also not exceed a sound pressure level of 65dB(A), as per the client requirements.

To achieve this, an acoustic louvre screen with a sound reduction performance set out below. The recommended sound reduction performance of the louvres is provided in Table 5.2.

Table 5.2: Recommended Acoustic Louvre Screen Sound Reduction Performance

Louvre(s)	Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
All boundaries	4	6	8	11	11	10

*Data taken from Caice Acoustic Air Movement.

Further to the above, a high specification (Class C) sound absorptive lining should be provided to all exposed internal plant room wall surfaces, typically comprising modular perforated acoustic panels made up of a 100mm thick 65kg/m^3 dense acoustic mineral wool core, faced with fibreglass facing tissue, retained in a galvanised sheet steel framework with light gauge impact resistant perforated galvanised steel panels each having a minimum free area of 28%. The perforated face should face into the generator room.

The minimum random incidence sound absorption co-efficient of the installed lining system shall be no less than that set out in Table 5.4.

Table 5.3: Minimum Random Incidence Performance of Absorptive Treatment

Sound Absorption Coefficients α Octave Band Centre Frequency							
63	125	250	500	1k	2k	4k	8k
0.10	0.20	0.40	0.60	0.60	0.60	0.50	0.40

The acoustic isolation hangers should comprise helical springs rated to provide not less than 20mm static defection. Please note, that all generators to be installed on anti-vibration mounts. Please refer to the schedule of the anti-vibration mounts for more detail.

The generator intake and discharge attenuators should provide a minimum insertion loss as set out in Table 5.4.

Table 5.4: Minimum Insertion Loss of Generator Intake & Discharge Attenuators

	Minimum DIL (dB) Required Centre Octave Band Frequency (Hz)								Notes
	63	125	250	500	1000	2000	4000	8000	
Intake Silencer	6	12	22	36	45	45	39	28	Typically achieved with a 33% FA attenuator at 1.2m long
Discharge Silencer	5	9	17	27	38	40	39	26	Typically achieved with a 33% FA attenuator at 1.2m long

5.1.3 First Floor Level

Duct Borne Noise Control (External Atmosphere)

In order to control noise radiated from first floor air handling unit (AHU) to the internal and external environment, induct silencers should be fitted to the following duct systems, achieving the minimum insertion losses as detailed in Table 5.5.

Table 5.5: Induct Silencer Specification to Atmosphere

System	ATT Ref.	Volume (m^3/s)	Dims (W*H) mm	Minimum Sound Insertion Loss, dB at each Octave Band Centre Frequency (Hz)						
				63	125	250	500	1k	2k	4k
Residential Discharge	ATT-01.01	1.04	700*400	-	-	-	5	6	9	11

For guidance only, example silencer configurations are provided in Table 5.6, which would typically be expected to be suitable in achieving the minimum sound insertion loss requirements.

Table 5.6: Example Silencer Configurations to Atmosphere

System	ATT Ref.	Volume (m^3/s)	Face Velocity (m/s)	Pressure Drop (Pa)	Example Silencer Specification (or equal and approved)
Residential Discharge	ATT-01.01	1.04	3.7	15	600*700*400 (L/W/H); 43% Free Area

Duct Borne Noise Control (Room Side)

In order to control noise radiated from first floor level air handling unit (AHU) room side, induct silencers should be fitted to the following duct systems, achieving the minimum insertion losses as detailed in Table 5.7.

Table 5.7: Induct Silencer Specification Room Side

System	ATT Ref.	Volume (m^3/s)	Dims (W*H) mm	Minimum Sound Insertion Loss, dB at each Octave Band Centre Frequency (Hz)						
				63	125	250	500	1k	2k	4k
Residential Supply	ATT-01.01	1.2	700*400	-	13	17	21	26	32	31

For guidance only, example silencer configurations are provided in Table 5.8, which would typically be expected to be suitable in achieving the minimum sound insertion loss requirements.

Table 5.8: Example Silencer Configurations to Room Side

System	ATT Ref.	Volume (m^3/s)	Face Velocity (m/s)	Pressure Drop (Pa)	Example Silencer Specification (or equal and approved)
Residential Extract	ATT-01.01	1.04	4.3	17	1800*700*400 (L/W/H); 43% Free Area

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 predicts 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.

Results of the noise intrusion assessment for average daytime noise levels are presented within Table 5.9.

Table 5.9: Noise Intrusion Levels $L_{Aeq,1hour}$

Location	Height (m)	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
North Facade	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 Facade	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 Facade	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 dBA re: 2×10^{-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 are 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 5.10.

Table 5.10: Ventilation Requirements Per Facade

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 rail movements 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 5.11. 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 5.11: 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

Location	Event	Time	Internal PPV (mm/s)	Worst-Case Plane of Vibration	Worst-Case Frequency Band	Maximum Velocity (μm/s)	VC Curve Criteria Met
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 5.11, 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 Tranquillity Assessment

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 Mitigation

6.1 Attenuation

In order to achieve a BS 4142 score of at least -10 dB for the night-time period, inline attenuators with a minimum octave band insertion loss (*IL*) presented in Table 6.1 would be required.

Table 6.1: Minimum Attenuation per Octave Band

Attenuation Type	Octave Band Centre Frequency (Hz) Minimum Insertion Loss (IL) dB							
	63	125	250	500	1000	2000	4000	8000
Radiated Noise (Steel Duct)	11	14	18	23	28	33	38	38
Attenuator	8	9	16	22	28	29	28	22

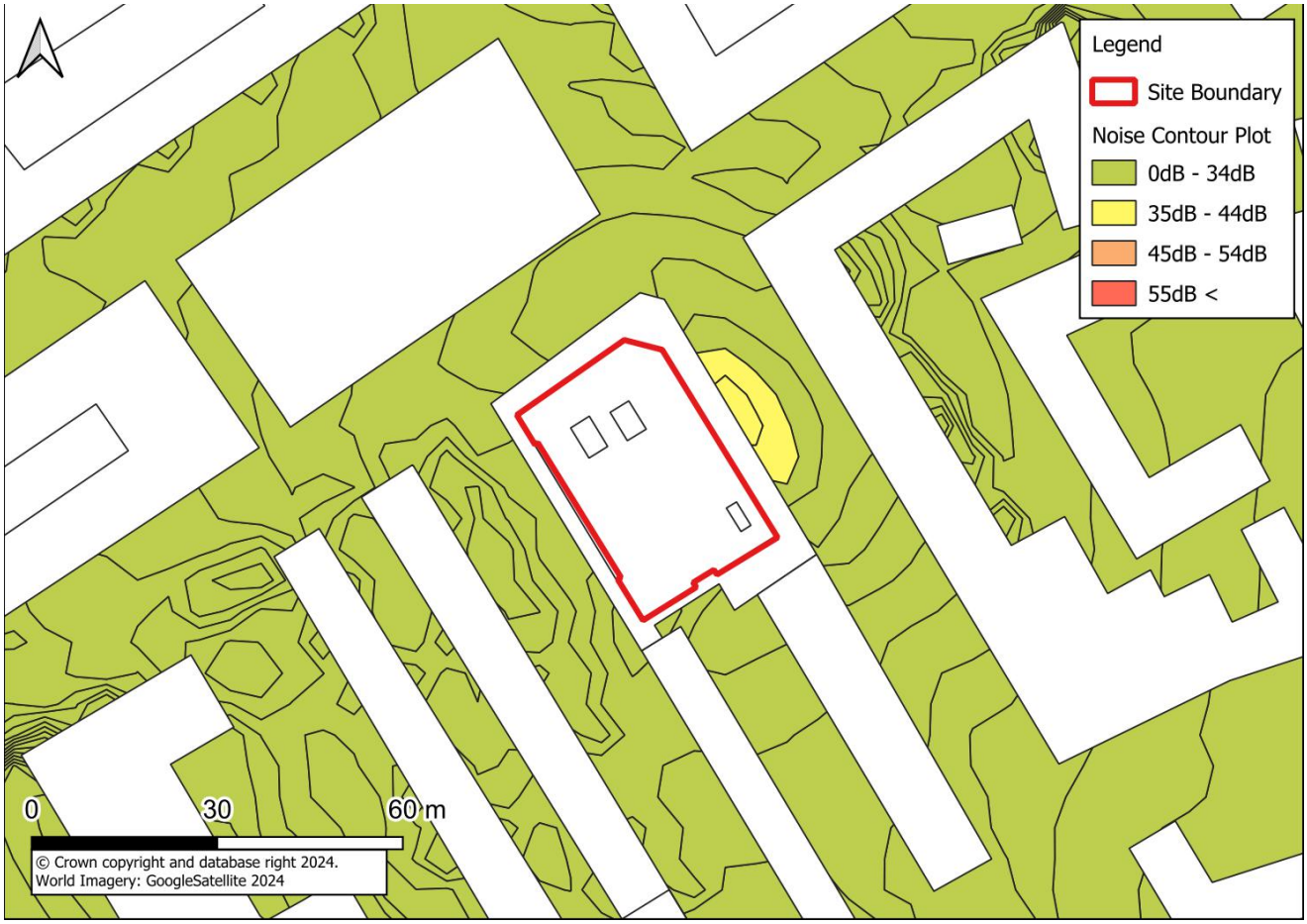
With the attenuation outlined above in place, the impact from the proposed development has been assessed below in accordance with BS 4142 criteria.

Table 6.2: BS 4142 Assessment with Attenuation

Location	Existing Measured Background L_{A90}		Noise rating level from plant		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ER01	47	44	34	34	-13	-10
ER02	47	44	34	34	-13	-10
ER03a	47	44	29	29	-18	-15
ER03b	47	44	32	32	-15	-12
ER04a	47	44	31	31	-16	-13
ER04b	47	44	31	31	-16	-13
ER05	47	44	33	33	-14	-11
ER06	47	44	33	33	-14	-11
ER07	47	44	32	32	-15	-12
ER08	47	44	34	34	-13	-10

All values are sound pressure levels in dBA re: 2x 10^{-5} Pa.
All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 para 8.6 the levels are expressed as integers (with 0.5 dB being rounded up). This may mean that the arithmetic in the above table may appear to be up to 1 dB incorrect due to this rounding.

Figure 6.1: BS 4142 Noise Contour Plot with Attenuation



As shown within Table 6.2 above and utilising the attenuation within Table 6.1, 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, the proposed development is in accordance with the local Camden noise guidance.

It is understood that there is provision for future tenant plant in the basement lightwell and rooftop areas of the scheme. It should be noted that any future tenant plant installation will be subject to the same criteria assessed within this assessment report.

7.0 Conclusion

Planning permission was granted on 10 May 2023 to extend the building at third, fourth and fifth floor levels in connection with ongoing commercial use. As part of the permitted proposals, it was made clear that the building will be designed to accommodate lab enabled space for life science uses. Following occupier interest, scheme amendments are now sought as part of a Section 73 application. Amongst other changes, an extended rooftop plant enclosure is now sought. This noise and vibration assessment has been prepared to assess the revised proposals.

Noise levels have been assessed in accordance with BS 4142 criteria for proposed building services plant which, without mitigation, are predicted to result in a noise rating level which exceeds the requirement within the Camden Local Plan. Utilising the specified attenuation within Section 6.0, noise levels are at least 10 dB below the existing background noise level during the worst-case night-time period at the closest sensitive receptor locations and therefore is 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. Provided the noise limit of 10dB below measured background levels are adhered to plant noise level will meet the BREEAM POL05 noise criteria. With the basement and first floor plant set in accordance with Section 5.1.2 and 5.1.3, noise breakout through proposed louvres will not exceed the Camden Local Plan at nearby existing 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 $D_{n,ew}$ + 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. Provided the mitigation is implemented, internal noise levels will meet the BREEAM HEA05 noise criteria.

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.

The NPPF provides test points against which the proposed development has been assessed. Considering these points, the following conclusions can be drawn:

NPPF paragraphs 191 and 194

Based upon the assessments presented, it is considered that the development does not adversely affect or put sensitive receptors at risk from noise pollution, and no significant adverse effects are predicted to occur.

NPPF paragraph 193

Considering the existing use of the site and wider development site, it is not considered that any existing businesses wanting to develop would be restricted by the proposals.

Planning Practice Guidance: Noise

It has been predicted that on-site operational noise effects associated with the Development will be below the Lowest Observed Adverse Effect Level, and therefore the development will have a low impact in relation to noise.

Considering the above, planning conditions 10 to 13 of the planning permission 2022/1817/P would continue to be adhered to.

Appendices

Appendix A – Acoustic Terminology

Acoustic Terminology

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 16-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.

Appendix B – References

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