UCL Bicentennial Legacy Projects: Main Quad and Wilkins Cloisters

Noise Statement for Planning

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Contents

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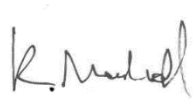

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1 Introduction

This document has been prepared by BDP Acoustics to support the planning and listed building consent application for developments as part of the University College London (UCL) Bicentennial works taking place at the Main Quad and Wilkins Building, Gower Street, London, WC1E 6BT (the 'Project').

The purpose of this document is to:

- Identify the external building service plant noise limits necessary to enable compliance with the referenced Camden London Borough Council external plant noise criteria, which all future Project plant will need to adhere to.
- Identify the outline plant attenuation measures necessary to achieve the identified external plant noise limits.
- Identify the entertainment noise limits necessary to enable compliance with the referenced Camden London Borough Council entertainment noise criteria, as well as other relevant guidance, which all future Project events will need to adhere to.

All advice provided in this correspondence is from an acoustic perspective only.

A glossary of acoustic terms is presented in Appendix I.

1.1 Proposed Development

The proposed Project will include:

- The remodelling, reorganising, and re-landscaping of the Main Quad, which is the main entrance for the Bloomsbury campus.
- The Refurbishment of the Wilkins Cloisters and adjacent rooms, including air source heat pumps in the existing roof plant enclosure space serving the Wilkins Building heating requirement.

The Main Quad will remain as a landscaped space, with a wide range of activities and social and temporary pop-up events organised by the student body taking place, including art installations, exhibitions, food markets and festivals.

There will also be large scale events such as Welcome Week and Cinema Screenings.

Some events will be held whilst the rest of the campus is in everyday use.

To support the use of the Quad during some large-scale events, there may be a requirement for lightweight temporary tent structures (coverings rather than solid tents), to provide solar shade and rain protection.

The proposed development will include the following indicative event layouts:

- **Pop-up tents (e.g. food festival/society fair):** multiple gazebos placed throughout the Quad for festival type scenario; pop-up tents placed along primary circulation routes.
- **Seated performances:** events with a stage in the centre of the Quad; temporary tiered seating installed over raised planting beds; loose temporary seating place in the centre of the Quad.
- **Bookable spaces:** small scale incidental events spaces year-round, which allow various events to happen in the Quad at the same time (bookable by students and societies).

A detailed description of the site and surrounding area can be found in the Design and Access Statement prepared by Burwell Architects.

Note that our design commentary provided in this statement assumes that the events will operate from 09:00 to 23:00 hours.

1.2 Noise Assessment Scope

The purpose of this report is to assess the environmental noise arising from the proposed development. The following noise sources have been assessed:

1. Entertainment noise from the development
2. Noise from new building services plant associated with the development.

Environmental noise arising from the proposed development will need to be controlled to prevent nearest noise sensitive premises being subjected to excessive noise levels.

For planning purposes, the nearest noise sensitive premises to the site are identified in Figure 1. These are identified to be as follows:

- The existing office buildings to the north of the proposed development site
- The hospital buildings to the west of the proposed development site
- UCL halls of residence to the south of the proposed development site
- Residential dwellings beyond the receptors identified above

Figure 1: Aerial image of site and surrounding area with identified noise sensitive receptors

Note that the nearest noise-sensitive receptors are understood to be the surrounding UCL operated buildings, including teaching and administration areas, as well as the educational buildings in the courtyard facing the Main Quad.

However, we expect that activities for events would be managed by UCL to ensure that the expected noise emissions from events do not adversely affect the operation of activities across the campus.

2 Relevant Guidance

The following documents have been considered in respect of the noise impact of the proposed development.

2.1 Noise Policy Statement for England

The National Policy Statement for England published in March 2010 provides guidance on the management of noise from sustainable development and sets out three key aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impact on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

2.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) specifies the Government's planning policies for England and how these are expected to be applied. It replaces a number of previous planning policy documents, including Planning Policy Guidance 24: Planning and Noise (PPG24). Unlike PPG24 which it replaced, NPPF does not contain any methodology for objective assessment. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

2.3 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature.

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.4 The Noise Council: *'Code of Practice on Environmental Noise Control at Concerts'*

This document provides guidance on noise limits for music events in various venue types, including open air sites and events within lightweight buildings. It gives guidance on how disturbance or annoyance from such events can be minimised. The Code is designed to assist those planning a music event, those responsible for licensing such events and those responsible for enforcing the nuisance provisions of the Environmental Protection Act 1990 (England and Wales) and the Control of Pollution Act 1974 (Scotland).

Figure 2 presents an extract from Section 3 of the Code of Practice, which provides guideline music noise limits for events of varying frequency or occurrence.

3.0 GUIDELINES

3.1 The Music Noise Levels (MNL) when assessed at the prediction stage or measured during sound checks or concerts should not exceed the guidelines shown in Table 1 at 1 metre from the façade of any noise sensitive premises for events held between the hours of 0900 and 2300.

TABLE 1

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL should not exceed 75dB(A) over a 15 minute period
1 to 3	Other Urban and Rural Venues	The MNL should not exceed 65dB(A) over a 15 minute period
4 to 12	All Venues	The MNL should not exceed the background noise level[4] by more than 15dB(A) over a 15 minute period

Notes to Table 1

1. The value used should be the arithmetic average of the hourly L_{A90} measured over the last four hours of the proposed music event or over the entire period of the proposed music event if scheduled to last for less than four hours.
2. There are many other issues which affect the acceptability of proposed concerts. This code is designed to address the environmental noise issue alone.
3. In locations where individuals may be affected by more than one venue, the impact of all the events should be considered.
4. For those venues where more than three events per calendar year are expected, the frequency and scheduling of the events will affect the level of disturbance. In particular, additional disturbance can arise if events occur on more than three consecutive days without a reduction in the permitted MNL.
5. For indoor venues used for up to about 30 events per calendar year an MNL not exceeding the background noise by more than 5dB(A) over a fifteen minute period is recommended for events finishing no later than 2300 hours.

Figure 2: Extract from Section 3 of The Noise Council: 'Code of Practice on Environmental Noise Control at Concerts'

2.5 Planning and Local Authority Requirements

The Camden Local Plan (2017) sets out the Local Authority's policy regarding noise.

2.5.1 Policy A1 Managing the impact of development

This policy aims to protect standards of amenity in the borough, considering various factors including noise and vibration. The policy states that:

"Noise and vibration can have a major effect on amenity. The World Health Organisation (WHO) for example states that excessive noise can seriously harm human health, disturb sleep and have cardiovascular and behavioural effects. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough.

Where uses sensitive to noise are proposed close to an existing source of noise or when development that is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. Further detail can be found in Policy A4 Noise and vibration and our supplementary planning document Camden Planning Guidance on amenity."

2.5.2 Policy A4 Noise and vibration

This policy provides guidance on controlling noise and vibration to protect amenity, and refers to Appendix 3 of the Local Plan (noise and vibration thresholds) as detailed below:

"The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for

a. *development likely to generate unacceptable noise and vibration impacts; or*
b. *development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity."

We understand that adhering to the operational noise egress criteria presented in the following subsections would be considered by Camden London Borough Council to suitably limit adverse noise impact on the identified noise sensitive receptors.

2.5.3 Entertainment Music Noise Egress Limits

Appendix 3 of the Camden Local Plan provides guidance on assessing noise from entertainment and leisure premises (including amplified music) and provides noise level limits from entertainment noise (15-minute L_{eq}), which are to be achieved in noise sensitive receptor properties, as shown in Table 1 below.

Room	Noise Rating Curve	Design Period
Bedrooms	NR 25	23:00 – 07:00
All Habitable Rooms	NR 35	07:00 – 23:00

Table 1: Noise level limits inside noise sensitive receptor properties

In addition to the above, the document also gives noise level limits for entertainment noise to be achieved at the nearest noise sensitive receptors (externally).

These limits are summarised in Table 2.

Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings	Garden used for amenity (free field)	Day	The higher of 55 dB $L_{Aeq,5min}$ Or 10 dB below existing $L_{Aeq,5min}$ Without entertainment noise	55 dB to 60 dB $L_{Aeq,5min}$ Or 9 dB to 3 dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 61 dB $L_{Aeq,5min}$ Or 2 dB below existing $L_{Aeq,5min}$ Without entertainment noise
Dwellings	Garden used for amenity (free field)	Evening	The higher of 50 dB $L_{Aeq,5min}$ Or 10 dB below existing $L_{Aeq,5min}$ Without entertainment noise	51 dB to 55 dB $L_{Aeq,5min}$ Or 9 dB to 3 dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 56 dB $L_{Aeq,5min}$ Or 2 dB below existing $L_{Aeq,5min}$ Without entertainment noise

Dwellings	Garden used for amenity (free field)	Night	The higher of 45 dB $L_{Aeq,5min}$ Or 10 dB below existing $L_{Aeq,5min}$ Without entertainment noise	46 dB to 50 dB $L_{Aeq,5min}$ Or 9 dB to 3 dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 51 dB $L_{Aeq,5min}$ Or 2 dB below existing $L_{Aeq,5min}$ Without entertainment noise

Table 2: Noise levels applicable to proposed entertainment premises

In addition to adhering to the above noise egress limits for less frequent events, Local Authorities would typically request that organisers of such less frequent events would include the following measures in an Operational Management Plan (OMP):

- A strategy to inform local residents of events which are expected to adhere to the less frequent entertainment events noise limits, rather than the day-to-day limits.
- A strategy to control and monitor music noise levels to enable compliance with the recommended limits.

2.5.4 Fixed Building Service Plant Noise Egress Limits

Appendix 3 of the Camden Local Plan makes reference to noise emission limits for industrial and commercial noise sources with the policy stating the following:

"A relevant standard or guidance document should be reference 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 (15 dB if tonal components are present) should be considered as the design criterion)".

We understand that the above is applicable to plant, however the document also states the following:

"There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS 4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR 35 or below, dependant on the room (based upon measured or predicted Leq, 5 mins noise levels in octave bands) 1 metre from the facade of affected premises, where the noise sensitive premises is located in a quiet background area."

Therefore, the above requirements will also be targeted.

3 Proposed External Plant Noise Criteria

Recommended external noise limits for fixed plant installations have been set in line with the planning policy requirements of Camden London Borough Council, to suitably limit noise adverse impacts on the identified nearest or most exposed noise sensitive receptors.

The typical planning requirements for external plant noise as set out in the Camden Local Plan (2017) and summarised in Section 2 are that plant noise emissions should be 10 dB below the existing background noise level at the nearest sensitive receptor.

As stated in the Local Plan, noise sensitive uses include dwellings, schools, and hospitals, as well as offices, workshops, and open spaces.

External amenity spaces such as gardens and balconies should also be considered.

We recommend the Project fixed external building service plant noise egress is limited to the criteria presented in Table 3 below, which are based on the measured background noise levels during the environmental noise survey undertaken by BDP Acoustics between 14th and 21st May 2024 within the vicinity of the Project site.

These criteria mirror the criteria which are presented in Section 2.5.2 of this report, albeit absolute limits have been presented in the table based on the referenced measured background noise levels.

Further details of our environmental noise survey are presented in Appendix II.

Time Period	Proposed Rating Level, $L_{Ar,Tr}$
Daytime (07:00 - 23:00)	41
Night-time (23:00 - 07:00)	40

Table 3: Proposed external plant noise emissions limits at noise sensitive receptors (NSRs)

We understand from discussions with the MEP engineer that plant could be operational during night-time periods. Therefore, the noise emissions limit of 40 dB will be targeted.

4 Noise Break-Out Assessment

4.1 Recommended Music Noise Break-Out Mitigating Measures

4.1.1 Day-To-Day Operational Music Noise Break-Out

In order to meet Camden London Borough Council planning policy in relation to suitably limiting adverse noise impact on the identified noise sensitive receptors, we recommend the Project day-to-day operational music noise break-out is limited to the criteria presented in Tables 4 and 5 below. The criteria mirror the criteria which are presented in Section 2.

Noise Sensitive Receptor	Assessment Location	Design Period	Music Limit
Dwellings	Garden used for amenity (free field)	Day (07:00 – 19:00)	55 dB $L_{Aeq,5min}$ [1]
		Evening (19:00 – 23:00)	50 dB $L_{Aeq,5min}$ [1]
		Night (23:00 – 07:00)	45 dB $L_{Aeq,5min}$ [1]

Table 4: Recommended day-to-day operational music noise break-out limits (external)

Note [1]: Value is higher than 10 dB below existing $L_{Aeq,5min}$ as detailed in Appendix II

Note that we assume that the receptor locations refer to private external amenity spaces, and do not apply to publicly accessible spaces such as public parks.

The closest spaces where the above requirements are applicable would be any external amenity spaces associated with the nearby university halls of residence, or the residential receptors to the east and west of the proposed development site.

Room	Noise Rating Curve	Design Period
Bedrooms [1]	NR 25	23:00 – 07:00
All Habitable Rooms	NR 35	07:00 – 23:00

Table 5: Recommended day-to-day operational noise break-out limits (internal)

Note [1]: For residential bedroom receptors, the limits apply assuming the receptor windows are open to meet the background ventilation requirements.
For hospital bedroom receptors, the limits apply assuming the receptor windows are closed, the window glazing specification is a minimum of 10 mm glass / 12 mm air gap / 6 mm glass, and ventilation requirements are met by a mechanical ventilation system.

4.1.2 Operational Music Noise Break-Out for Less Frequent Events

In order to suitably limit adverse noise impact on the identified noise sensitive receptors, we recommend the Project operational noise break-out for less frequent events is limited to the criteria presented in Table 6 below. These criteria mirror the criteria which is presented in Section 2.5.1 of this report, albeit absolute limits have been presented in the table based on the referenced measured background noise levels.

These noise levels are to be achieved at 1 m from any noise-sensitive properties.

Event Frequency	Maximum Noise Level Limit $L_{Aeq(15\text{-}min)}$
1 to 3 days per year	75 dB
4 to 12 days per year	66 dB [1]

Table 6: Recommended operational music noise break-out limits for less frequent entertainment events (between 09:00 to 23:00 hours)

Note [1]: The referenced limit is based on the arithmetic average of the L_{A90} values measured between 19:00 and 23:00 hours (assumed to be the last four hours of proposed events).

4.1.3 Operational Management Plan

An Operational Management Plan (OMP) should be prepared to address in more detail how UCL intend to work with the EHO officer, key stakeholders and local residents to ensure the events comply with the guidelines set out within this assessment. An OMP would typically include measures such as:

- Developing an event safety management plan and noise management plan for events which vary from the day-to-day operational conditions

- Consideration of any sound system speaker specification and layout to allow music noise levels at the extremities of the event areas of the Project boundary to be lower than the central event space area

- Communicating plans with the local community and key local stakeholders ahead of events

5 External Plant Noise Assessment

Building service items and associated attenuation measures will need to be selected to enable compliance with the external noise criteria stated in Section 3 of this report.

5.1 Fixed Building Service Plant Proposals

Current proposals are for new Air Source Heat Pumps (ASHPs) located at roof level of the Wilkins Building, to provide heating/cooling to the Cloisters and adjoining rooms.

We understand that the selected option is 4 no. MItsubishi Ecodan CAHV-R450YA-HPB 2-pipe ASHPs.

These units have a stated sound pressure level at 1 metre as shown in Table 7 below.

Sound Pressure Level (dB) at Octave Band Centre Frequency								dB(A)
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
66	73	69	67	61	59	61	52	69

Table 7: Manufacturer provided plant noise emissions levels

5.2 Fixed Building Service Plant Noise Egress Mitigating Measures

An acoustic enclosure to control noise break-out from the plant is proposed, which the Project building service engineers have confirmed will be incorporated into the design.

We have undertaken an assessment of external plant breakout using CadnaA noise modelling software, based on the current plant equipment selections and locations (including the proposed acoustic enclosure), as shown in Figure 3.

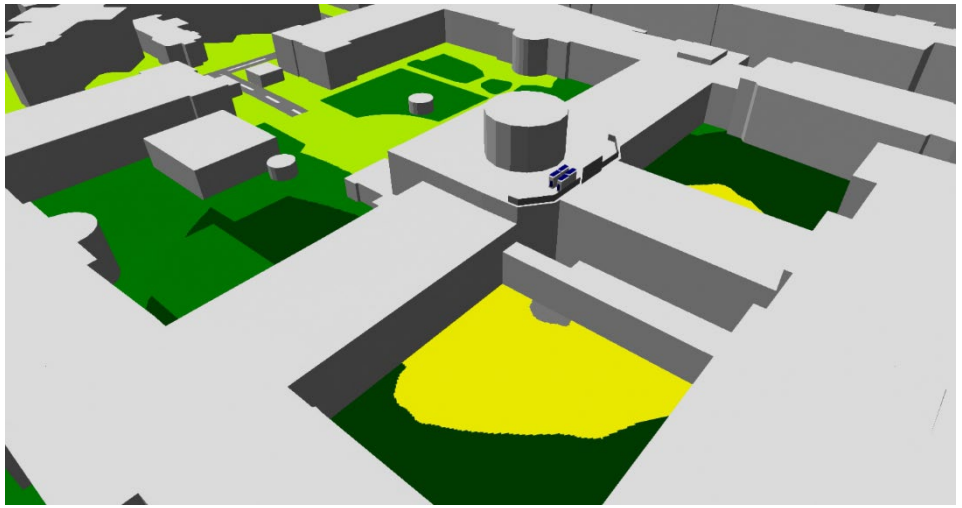

Figure 3: Screenshot from CadnaA external plant noise model

Our assessment of the currently proposed ASHP plant selections and location indicates that noise emissions from the rooftop plant installation with acoustic enclosure will enable compliance with the project acoustic criteria referenced in Section 3.

Building Service Equipment Vibration Isolation

All vibration generating plant and machinery should be mounted on a heavy framework or floor slab and be supported by suitable anti-vibration mounts or resilient pads to prevent vibration energy transfer to the structure. If package units have integral isolation, direct mounting on housekeeping bases may be acceptable. As initial guidance, AVMs are advised to be selected with reference to Table 47, Chapter 48 of ASHRAE guidance considering the plant item, structure and installation arrangements.

Flexible connections should be employed between isolated plant and non-isolated components and building elements. These connections should allow unrestricted movement of the plant item and should not make up for misalignment.

6 Summary

This document has been prepared by BDP Acoustics as part of the planning and listed building consent application related to the proposals as part of the development at the Main Quad and Wilkins Building, Gower Street, London, WC1E 6BT.

In summary, the purpose of this document is to provide the following information:

- A review of the relevant guidance documents in respect of assessing the noise impact of the proposed development.
- An assessment of the existing noise climate, including identification of representative background noise levels at the nearest noise sensitive receptors.
- Recommended event noise break-out mitigation measures, in the form of noise limits at the identified noise sensitive receptors, associated with frequent and less frequent events that may occur as part of the project operation.
- Recommendations to include event noise control measures in a Project Operational Management Plan (OMP).
- Recommended fixed external plant noise egress limits at the identified noise sensitive receptors necessary to enable compliance with the referenced Camden London Borough Council external plant noise criteria, which all Project plant will need to adhere to.
    - Proposed external plant noise limits are based on the background noise levels measured during the environmental noise survey undertaken by BDP Acoustics between 14th and 21st May 2024 in the vicinity of the Project site; further details of our environmental noise survey are presented in Appendix II.
- Plant attenuation measures necessary to achieve the identified external plant noise limits, in the form of an acoustic enclosure.

We have undertaken an assessment of external plant noise break-out using CadnaA noise modelling software, based on current plant equipment selections. As a result of this assessment, acoustic attenuation strategies are proposed which the project building service engineers have confirmed will be incorporated into the plant design.

All recommended mitigating measures have been based on enabling compliance with Camden London Borough Council planning policy in relation to suitably limiting adverse noise impact on the identified noise sensitive receptors.

Appendix I – Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from about 20 Hz to 20 kHz but sensitivity is greatest between about 500 Hz and 8 kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Decibel, dB

This is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10 dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level L_{eq} or L_{Aeq}

The continuous equivalent sound level, L_{Aeq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to measure any environmental noise which varies considerably with time and is denoted as the L_{Aeq}.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20 Hz to 20 kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500 Hz octave band are 1 kHz and 250 Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Statistical Level: L_{90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

CadnaA

CadnaA is an internationally recognised software package for calculation and assessment of environmental noise resulting from industrial and traffic sources. From input of calibrated noise sources, topographical data and building locations, a 3D model of an area can be produced. The propagation of noise from user defined sources can then be evaluated, taking into account height data and building locations. Noise levels at specific locations (such as a particular building façade) can then be calculated. The standard outdoor noise propagation model used in the CadnaA program is in accordance with ISO 9613 Parts 1 & 2: 1996 'Attenuation of sound during propagation outdoors'.

Appendix II – Environmental Noise Survey

Introduction and Survey Details

An unattended environmental noise survey has been undertaken onsite by BDP Acoustics to quantify the existing ambient (L_{eq}) and background (L_{90}) noise levels on and surrounding the Project site, to assist primarily with establishing noise limit criteria at nearby noise sensitive receptor (NSR) properties for external entertainment and plant noise emissions associated with the development.

This appendix summarises the noise survey undertaken and the results.

Noise measurements were undertaken by BDP Acoustics at a location considered to be representative of the noise climate at the nearest noise sensitive receptors (NSRs).

The noise survey was conducted between 16:15 hours on Tuesday 14th May 2024 and 13:20 hours on Tuesday 21st May 2024.

A-weighted and octave-band fast response noise levels were measured in 5-minute intervals and were collected to establish the existing noise climate at the site, and to determine the noise emission limits for entertainment noise and new building services plant associated with the development.

The weather conditions during the installation and collection of the noise monitor were generally dry with light winds.

The weather conditions during the noise survey period were established via publicly available meteorological data from a nearby weather station, and are understood to have been generally dry (with the exception of the mornings of 16th and 21st May), with typical wind speeds below 5 m/s.

Weather conditions were therefore suitable for noise measurement and assessment across most of the survey period and the short-term periods where conditions were not suitable (as detailed above) were discounted when assessing the background noise levels to inform the Project plant noise limit criteria.

Site Description

The proposed development areas are located within the existing Wilkins Building, located on Gower Street, London WC1E 6BT, at ground floor level, as well as the Main Quad.

New building services plant is proposed on the main roof of the building, directly to the northeast of the dome.

The Wilkins Building is bordered to the north, east, and south by existing UCL buildings, used predominantly for teaching or administration, as well as catering or entertainment.

There are several external amenity spaces surrounding the building: to the northeast lies the Wilkins Terrace, with the Japanese Garden to the southeast, and the Main Quad directly to the West of the Wilkins Building.

Gower Street is approximately 80 m to the west.

The nearest noise-sensitive receptors for the purposes of planning have been identified as the nearby hospital and office buildings, as well as residential dwellings beyond these.

Description of Ambient Noise Climate

A subjective description of the noise climate is provided below.

The ambient noise climate during the install and collection of the survey equipment consisted predominantly of road traffic noise from the surrounding roads (Euston Road and Gower Street), as well as low level mechanical plant noise.

Additional contributions were noted from people gathered in the Main Quad, as well as evacuation alarm testing, which could have caused increases in the measured ambient noise level for short periods, but would not impact the background noise level, which is used to set noise emissions limits.

Measurement Location

An unattended noise survey was carried out at a single position on the rooftop of the existing Wilkins Building site, overlooking the roof of the north wing of the building.

The survey measurement location is highlighted in Figure 4. The position was 1.5 metres above local ground level (i.e. roof level), and away from other reflective surfaces.

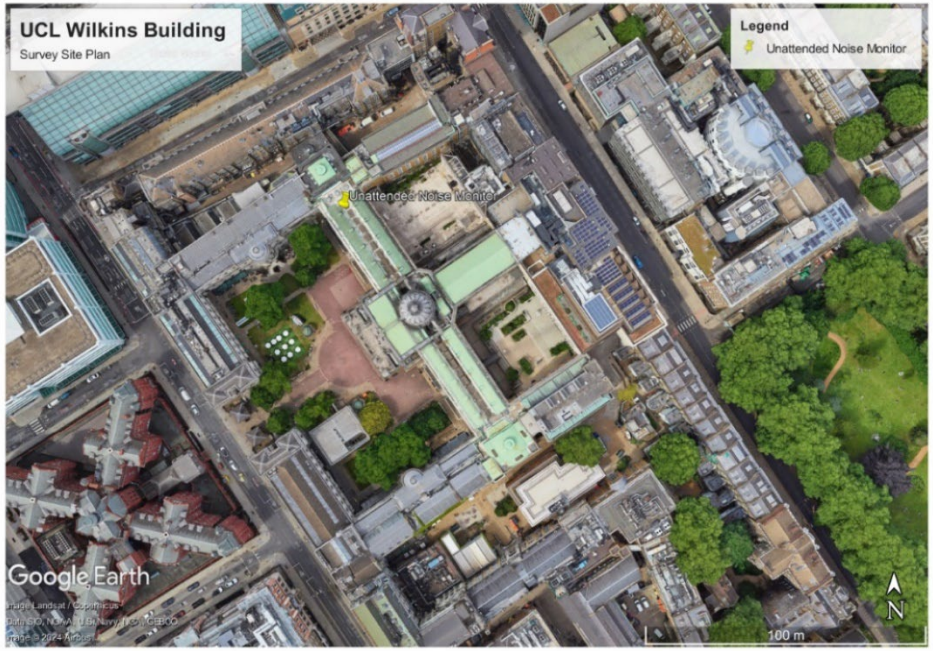

Figure 4: Site plan showing unattended measurement position

Measurement Equipment

The instrumentation used during the survey was a Rion NL-52 Class 1 sound level meter.

A field sensitivity check was undertaken on the sound level meter before and after the measurements and no significant variation in sensitivity was observed.

The sound level meter and calibrator used onsite were calibrated to traceable standards and calibration certificates are available on request.

Octave band and A-weighted fast response levels were recorded for a comprehensive suite of noise level metrics

Noise Survey Results Summary

A summary of results is presented as follows. Full measured data can be made available upon request.

A range of statistical noise data was captured; however, the following A-weighted noise parameters are the most relevant to this noise survey and have been presented below:

- L_{Aeq}: The time averaged sound pressure level. This is generally considered to be an acceptable representative descriptor of environmental noise.
- L_{A90}: The sound pressure level exceeded for 90% of the measurement period. This is generally accepted to be indicative of the continuous background noise level.

Table 8 presents a summary of the measured background noise level results from the unattended continuous noise survey during defined daytime (07:00 to 23:00) and night-time (23:00 to 07:00) periods, which have been used to inform the plant noise limits.

Date	Time Period	Typical $L_{A90, 5\ mins}$
14th May 2024	Daytime	53
	Night-time	52
15th May 2024	Daytime	52
	Night-time	50
16th May 2024	Daytime	51
	Night-time	50
17th May 2024	Daytime	51
	Night-time	50
18th May 2024	Daytime	51
	Night-time	50
19th May 2024	Daytime	51
	Night-time	50
20th May 2024	Daytime	51
	Night-time	50
21st May 2024	Daytime [1]	51
Overall	**Daytime**	**51**
	Night-time	**50**

Table 8: Summary of unattended noise measurement results (background noise levels)

Note [1]: Partial day from approximately 07:00 to 13:00

Table 9 presents a summary of the measured ambient and background noise level results from the unattended continuous noise survey during daytime (07:00 to 19:00), evening (19:00 – 23:00; assumed to be the last four hours of proposed events) and night-time (23:00 to 07:00) periods, which have been used to inform the entertainment noise limits.

Date	Time Period	Typical $L_{Aeq, 5\ mins}$	Average $L_{A90, 5\ mins}$
14th May 2024	Daytime	54	-
	Evening	53	53
	Night-time	52	-
15th May 2024	Daytime	53	-
	Evening	52	51
	Night-time	51	-
16th May 2024	Daytime	52	-
	Evening	53	52
	Night-time	51	-
17th May 2024	Daytime	52	-
	Evening	52	51
	Night-time	51	-
18th May 2024	Daytime	51	-
	Evening	51	51
	Night-time	50	-
19th May 2024	Daytime	51	-
	Evening	52	51
	Night-time	52	-
20th May 2024	Daytime	52	-
	Evening	52	51
	Night-time	50	-
21st May 2024	Daytime [1]	52	-
Overall	**Daytime**	**52**	**-**
	Evening	**52**	**51**
	Night-time	**51**	**-**

Table 9: Summary of unattended noise measurement results (ambient and background levels)

Note [1]: Partial day from approximately 07:00 to 13:00